GroundSolve Ltd
Consulting Geotechnical Engineers

VERIFICATION REPORT – PLOT 4 HERITAGE COURT, ACREFAIR

GSL3059R12

VERSION 1

22 AUGUST 2025

FINAL

Prepared for:

GOWER HOMES

Prepared by: **A Bell**

GroundSolve Ltd

DOCUMENT CONTROL

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This report has been prepared by GroundSolve Ltd with all reasonable care and diligence, within the best practice and guidance current at the time of issue within the proposed redline boundary and proposed Site end use as presented by the Client.

This report is confidential to the Client and GroundSolve Ltd accepts no responsibility whatsoever to third parties to whom this report is presented.

Version No.	Description of Issue / Revision	Date of Issue	Author	Reviewed By	Approved By
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1 INTRODUCTION

GroundSolve Ltd was commissioned by Gower Homes to undertake a verification report for Plot 4, which is part of a wider development off Llangollen Road, Acrefair in North Wales referred to as Heritage Court (the "Site").

This report has been devised to generally comply with the relevant principles and requirements of a range of guidance including:

- Welsh Local Government Assoc- Development of Land Affected By Contamination Guide for Developers 2017
- Part IIA of the Environment Protection Act, 1990
- BS5930:2015: "Code of practice for site investigations"
- BS10175: 2011 +A2:2017 "Investigation of Potentially Contaminated Sites - Code of Practice"
- The Building Regulations 2010. Part C (HM Government 2013)
- Environment Agency: Land Contamination Risk Management (LCRM), Version 3, October 2020
- Environment Agency (2017) "The Environment Agency's Approach to Groundwater Protection" November 2018 Version 1.2.

1.1 Proposed Development

The proposed development comprises the construction of 22 No. three and four-bedroom residential properties with associated gardens, roads and services. This verification report relates to plot 4 only.

It is understood that the Principal Contractor for the development is Gower Homes Ltd.

Planning Application number P/2021/0793 – Condition 4 outlines:

Each part of the site subject to the remediation under the scheme approved as part of condition 3 shall not be occupied/used until a validation report has been completed in respect of that part of the site.



Figure 1: Extract from proposed development plan (see Appendix A)

The findings and conclusions of the risk assessments have been set out and recommendations given for the proposed residential end use.

1.2 Objectives

The report provides verification of site material, compares site conditions and soil chemical parameters to the specification for verification as agreed with Wrexham County Borough Council in the Remediation Strategy outlined in GroundSolve Ltd report GSL3059R01-1 Issued, 26th February 2024.

1.3 Previous Investigations

The following reports have already been undertaken and will be summarised in Section 3:

- Phase II Assessment, South Site (Former Engineering Works), Acrefair, Wrexham – carried out by WSP (Reference 9460(2), dated July 2011. which encompassed the current site of interest within a larger parcel of land.
- Coal Mining Risk Assessment Report undertaken by Earth Environmental & Geotechnical Ltd (Reference: A3341/17, August 2017)
- Phase 1 Preliminary Risk Assessment undertaken by Earth Environmental & Geotechnical Ltd (Ref. A3341/19, dated 17th December 2019)
- Phase 2 Ground Investigation undertaken by Earth Environmental & Geotechnical Ltd (Ref: A3341/20/SI/V2, dated 9th September 2020)
- A Soil Contamination Delineation Letter Report undertaken by Earth Environmental & Geotechnical Ltd (Ref: A3341/21, dated 24th June 2020)
- Remediation Strategy - GroundSolve Ltd report GSL3059R01-1 Issued, 26th February 2024
- Gas Membrane Verification - GSL3116LR01 - Gas Membrane Verification Plots 19, 20 and 21
- Gas Membrane Verification - GSL3116LR02 - Gas Membrane Verification Plots 1, 2, 3
- Gas Membrane Verification - GSL3116LR03 - Gas Membrane Verification Plots 4, 5 and 7
- Gas Membrane Verification - GSL3116LR04 - Gas Membrane Verification Plots 6, 9 and 17-18
- Gas Membrane Verification - GSL3116LR05 - Gas Membrane Verification Plots 16

The previous site investigation reports are discussed and summarised in **Section 3** of this report.

1.4 Limitations

This report has been prepared for the sole use of Gower Homes Ltd. No other third party may rely upon or reproduce the contents of this report without the written approval of GroundSolve Ltd. If any unauthorised third party comes into possession of this report, they rely on it entirely at their own risk.

2 SITE DETAILS AND DESCRIPTION

Table 2.1 Current Site Overview.

Site name	Heritage Court, Llangollen Rd, Acrefair
Site address	Llangollen Rd, Acrefair, closest postcode LL14 3HW
National Grid Reference (NGR)	328138, 343231
Approximate Site area	The area of the site is 1.12 ha.
Site shape	The site is irregular in shape with maximum dimensions of approximately 150m north-south and 155m east-west.
Current land use on the Site	The site is currently part of the new residential development with plots under various phases of construction.
Surrounding land uses	To the northwest of the site is Llangollen Road (A539) with residential properties and vacant land beyond, to the northeast is a bowling green, to the east is a steep slope with residential properties beyond and to the south is a vacant plot of land
General topography and ground levels	No up-to-date topographical survey has been provided to GSL since groundwork changes and development on the site, however the previous topographical survey suggests site slopes from generally from north to south varying between 53mOD on the northern boundary to 48.5m OD on the southern boundary. There is a steep overgrown slope along the eastern boundary ranging from 50m OD to 61m OD.

3 PREVIOUS INVESTIGATIONS

Previous reports have already been undertaken, and the findings are summarised:

- Phase II Assessment, South Site (Former Engineering Works), Acrefair, Wrexham – carried out by WSP (Reference 9460(2), dated July 2011. which encompassed the current site of interest within a larger parcel of land.
- Coal Mining Risk Assessment Report undertaken by Earth Environmental & Geotechnical Ltd (Reference: A3341/17, August 2017)
- Phase 1 Preliminary Risk Assessment undertaken by Earth Environmental & Geotechnical Ltd (Ref. A3341/19, dated 17th December 2019)
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- A Soil Contamination Delineation Letter Report undertaken by Earth Environmental & Geotechnical Ltd (Ref: A3341/21, dated 24th June 2020)
- Remediation Strategy - GroundSolve Ltd report GSL3059R01-1 Issued, 26th February 2024
- Gas Membrane Verification - GSL3116R01 - Gas Membrane Verification Plots 19, 20 and 21
- Gas Membrane Verification - GSL3116LR03 - Gas Membrane Verification Plots 4, 5 and 7
- Gas Membrane Verification - GSL3116LR04 - Gas Membrane Verification Plots 6, 9 and 17-18
- Gas Membrane Verification - GSL3116LR05 - Gas Membrane Verification Plots 16

In summary, from the site history, review of historical maps and site walkover survey, there was identified a low risk of potential sources of contaminants being present at the site. Any Made Ground was anticipated to be relatively thin.

Table 3.1 Summary of main findings from the Phase 1 Report.

Summary of main findings from the Phase 1 Report	
Site History	The earliest mapping (1873) shows the presence of railway tracks and sidings running though the centre of the site connecting works to the north and south. Along the southern section of the site there is a works, potentially connected to be New British Iron Works. There are also associated buildings in the north and west. There is an embankment along the eastern boundary. Offsite, there are three reservoirs / ponds relating to the works. There are other railway sidings along eastern boundary with a series of Coke Ovens further to the east. The New British Iron Works were removed by 1899 along with the majority of associated railway lines and sidings. The previous buildings were removed within the north and southern parts of the site. By 1960s, new rectangular buildings were now present in the southern part of the site. The remaining parts of the site were used for vehicle parking. The Acrefair engineering works and Air Products Engineering facility occupied to the south of the site. The former reservoirs / ponds were infilled by 1962. The site generally has remained unchanged until recently when the previous buildings were demolished.

Summary of main findings from the Phase 1 Report	
Geological Setting	Made ground – present on the site variable in thickness, deepest in southern part of site. Superficial deposits – Till (Diamicton), Devensian. Bedrock – Pennine Lower Coal Measures Formation comprising mudstone, coal seams, siltstone and sandstone), Carboniferous. Two coal seams outcrop through the site.
Mining	The site is located in a coal mining Development High Risk Area by the Coal Authority. There are 3no. associated coal seams and 1no. ironstone coal seam potentially underlying the site. There is a mine shaft present along the eastern boundary. The site is not in an area affected by historic brine or salt extraction. In an area where possible historical mining of bedded iron ore. Potential for difficult ground conditions are unlikely or localised and are at a level where they need not be considered
Radon	The site is located in a Radon Affected Area as between 3 and 5% of properties are above the Action Level. Basic Radon protection measures will therefore be necessary.
Hydrogeology	Superficial deposits (Glacial Till) – Secondary Undifferentiated Aquifer. Bedrock(Pennine Lower Coal Measure) – Secondary A Aquifer. There are no Groundwater Abstraction Licence, Potable Abstractions or Surface Water Abstraction Licence points within 1000m of the site. The site is not located within 500m of a Source Protection Zone or Source Protection Zone within a confined aquifer
Hydrology	There are no surface water features identified within 250m of the site.
Waste	There are no records for current Environment Agency landfill records within 1km of the site There are 9no. records of historic Environment Agency landfill sites within 1.5km of the site. The closest record refers to a site located 17m to the northwest of the site (former infilled works reservoir. The site received inert, industrial waste between 1950 and 1960.
Contamination Sources	Made Ground from various phases of on-site development and railway land Made Ground is present on site known to comprise ash/clinker/ coal. Thickness of Made Ground varies from 0.3m to 2.0m. Asbestos containing materials (ACM) from former structures Ground gas associated with deep made ground, and infilled features from railway land Contaminants may therefore include heavy metals, polycyclic aromatic hydrocarbons (PAH), total petroleum hydrocarbons (TPH), BTEX compounds, Volatile Organic Compounds (VOC), Polychlorinated Biphenyls (PCB), asbestos and ground gases (Carbon dioxide and methane).
Scope of Phase 2 Site Investigation	The scope of ground investigation works carried out at the site by GroundSolve comprised: • 6 No. Rotary boreholes (RH01-06) to a maximum depth of 30.0mbgl, • 4No Gas monitoring wells installed • 12 No. machine excavated Trial Pits to maximum depth of 3.15mbgl , • Sampling for chemical and geotechnical testing of soils, • Chemical testing.
Findings of the Phase 2 Ground Investigation	The sequence of strata encountered beneath the site was as follows: • Made Ground – Variable Made Ground was encountered in all the exploratory holes, comprising: o Asphalt hardstanding. o Gravels with varying sand and cobble content (containing brick, slag, glass, timber, clinker, concrete, metal, pottery fragments, carbonaceous fragments, sandstone and mudstone. • Clay was encountered in all the exploratory holes. The clay is thought to be a completely weathered mudstone that becomes less weathered with depth. This lithology was recovered as: o o Sandy gravelly clay (containing gravel of mudstone and carbonaceous fragments). o o Clayey mudstone was encountered in the rotary boreholes. • Mudstone was encountered in all of the rotary boreholes as: o Mudstone with occasional siltstone and sandstone bands. • Sandstone was also encountered in all of the rotary boreholes as: o Sandstone with mudstone bands and strong sandstone bands. • Coal was encountered in RH1 and RH3 and was found to be intact and separated by a thin layer of black shale.

Summary of main findings from the Phase 1 Report	
Phase 2 Conclusions – Geoenvironmental	**Human Health:** Elevated concentrations of contaminants of Lead, Mercury, TPH and PAH, with respect to the long-term protection of human health, have been identified across the site when compared to residential end use (with plant uptake) assessment criteria. **Controlled Waters:** No unacceptable risks. **Ground Gases (Human Health / Property):** Basic radon protective measures are indicated by the current guidance. Characteristic Situation 2 gas protection measures.
Remediation Strategy	In order to break potential pollutant linkages to future residential end users, it is recommended that garden areas across the site should have a clean soil cover of 600mm thickness (450mm thick in front gardens). Gas Protection measures to achieve CS2 and basic protection measures. • Floor Slab: ▪ Cast in situ ground-bearing floor slab (with only nominal mesh reinforcement) – Score 0.5; or • Passive sub floor dispersal layer ▪ Good performance– Score 1.5; Media used to provide the dispersal layer are: ▪ No-fines gravel layer • Gas resistant membrane – Score 2.0: ▪ Visqueen Gas Barrier – suitable for Co2 and Radon protection ▪ verified in accordance with CIRIA C735. Gas Membrane Verification - GSL3116R01 - Gas Membrane Verification Plots 19, 20 and 21 Gas Membrane Verification - GSL3116LR03 - Gas Membrane Verification Plots 4, 5 and 7 Gas Membrane Verification - GSL3116LR04 - Gas Membrane Verification Plots 6, 9 and 17-18 The Gas Membrane Verification reports above have already been carried out and have been submitted to the council for review.

4 VERIFICATION OF TOPSOIL AND SUBSOIL

4.1 Introduction

The risk assessments have concluded that remediation measures are required to address risks to human health only, resulting from minor contamination in the existing Made Ground.

It should be noted that the site strip has been carried out and the majority of the Made Ground had been removed from site.

The remedial actions required are:

- Made Ground can be left in-situ below building floor slabs and future permanent hard standing (e.g., parking areas, roads, footpaths), excluding service runs and areas where future excavation might be anticipated (assuming all geotechnical requirements are met).
- Remediation is only required for below areas of gardens/soft landscaping to enable provision of uncontaminated cover soils in areas of garden/soft landscaping (minimum of 600 mm);
- Provision of a clean cover system in areas of gardens and soft landscaping. A 600 mm thick cover of 'clean and inert' capping is proposed (comprising 450 mm subsoil and 150 mm topsoil).

Imported topsoil and subsoil will be required to be analysed for a suitable suite of contaminants in relation to human health (in addition to topsoil being compliant with BS3882:2015).

The proposed development will be carried out in phases, with this verification report relating to Plots 4 only.

4.2 Unexpected Contamination

No unexpected contamination has been encountered within the garden areas of Plot 4.

4.3 Source of Topsoil / Subsoil

The source of the topsoil and subsoil is understood to have been delivered to site in 2021 and stored in stockpiles on site. The source of the topsoil and subsoil was from another residential development names Willow Cottage, Ruabon. The Phase 2 Geoenvironmental Report GSL2400 – issued October 2020 and has been provided previously.

4.4 Site works

GroundSolve were present at the site on the 4th July 2024 to describe and take samples of the topsoil and subsoil for chemical analysis and verify the thickness of the topsoil and subsoil. Photos are provided in Appendix B (topsoil and subsoil in garden areas).

4.5 Description of Topsoil and Thickness

One trial pit was excavated in the rear garden of plot 4.

Table 4.1 – Depth of Topsoil, Subsoil

Date	Exploratory Hole	Depth of Topsoil (m)	Depth of Subsoil (m)
07/07/2024	Plot 4 rear	0.30	0.60

Topsoil – Dark brown silty gravelly clayey fine to coarse SAND with frequent rootlets. Gravel is fine-coarse sub-rounded

Subsoil – Light brown slightly gravelly sandy clay. Gravel is fine to coarse angular, sub-rounded

Verification photographs of gardens areas are presented in **Appendix B**.

The front and rear garden of Plot 4 shows a thickness of topsoil which is a minimum of 300mm depth and a depth of subsoil which is a minimum of 600mm bgl. All areas comply with the requirements detailed in remediation strategy.

4.6 Verification of Topsoil and Subsoil – Sampling and Testing

A total of 8 No. samples of topsoil / subsoil were analysed from the existing stockpile. From visual observation, the materials constituted topsoil comprising of "Dark brown silty gravelly fine to coarse SAND".

The soil samples were sent to ChemTech. The laboratory is UKAS accredited in accordance with ISO17025 and is also MCERTS accredited for soil analysis in accordance with the Environment Agency's scheme. The laboratory analysis results are presented in Appendix C.

Table 4.2 – Acceptance Criteria for imported material (Topsoil and Subsoil)

Analyte	Soil Re-Use and Importation Criteria		Analyte	Soil Re-Use and Importation Criteria	
	mg/kg	Reference		mg/kg	Reference
Metals			**BTEX**		
Arsenic (total)	37	S4UL	Benzene	0.087	S4UL
Cadmium (total)	11	S4UL	Toluene	130	S4UL
Chromium (total)	520	HWT	Ethyl Benzene	47	S4UL
Chromium (hexavalent)	6	S4UL	Xylene – 0	60	S4UL
Copper (total)	200	BS3882	Xylene – M or P	56	S4UL
Lead (total)	200	C4SL			
Mercury (total inorganic)	40	S4UL	**Petroleum Hydrocarbons$**		
Nickel (total)	130	S4UL	Aliphatic > EC5 - EC6	42	S4UL
Selenium	250	S4UL	Aliphatic >EC6 - EC8	100	S4UL
Vanadium	410	S4UL	Aliphatic >EC8 - EC10	27	S4UL
Zinc (total)	2,009**	HWT	Aliphatic >EC10 - EC12	130	S4UL
			Aliphatic >EC12 - EC16	1000**	HWT
Inorganic			Aliphatic >EC16 - EC21	1000**	HWT
Sulphate	2400***	-	Aliphatic >EC21 - EC35	1000**	HWT
Phenol	120	S4UL			
			Aromatic >EC5 - EC7	70	S4UL
PAH&			Aromatic >EC7 - EC8	130	S4UL
Naphthalene	2.3	S4UL	Aromatic >EC8 - EC10	34	S4UL
Acenaphthylene	170	S4UL	Aromatic >EC10 - EC12	74	S4UL
Acenaphthene	210	S4UL	Aromatic >EC12 - EC16	140	S4UL
Fluorene	170	S4UL	Aromatic >EC16 - EC21	260	S4UL
Phenanthrene	95	S4UL	Aromatic >EC21 - EC35	1000**	HWT
Anthracene	2400	S4UL	Aromatic>EC35-44	1000**	HWT
Fluoranthene	280	S4UL	Aromatic>EC44-EC77	1000**	HWT
Pyrene	620	S4UL			
Benz(a)anthracene	7.2	S4UL	Asbestos	Not detected (<0.001%) for topsoil and subsoil	Lab LoD
Chrysene	15	S4UL			
Benzo(b)fluoranthene	2.6	S4UL			
Benzo(k)fluoranthene	77	S4UL			
Benzo(a)pyrene	2.2	S4UL			
Indeno(123cd)pyrene	27	S4UL			
Benzo(ghi)perylene	320	S4UL			
Dibenzo(ah)anthracene	0.28	S4UL			

The results of the samples collected were screened against Generic Assessment Criteria (GAC) for Human Health Risk Assessment (LQM/CIEH 2015) for a residential with gardens end-use, sandy soil with 6% SOM and pH 7.0 (presented in Table 4.1 and Appendix D).

Topsoil / Subsoil

8 No. samples were selected from the topsoil and subsoil material. All the topsoil and subsoil results pass the relevant screening criteria for residential land use with plant uptake, therefore are suitable for use within the garden areas. The results are summarised in Appendix D.

5 CONCLUSIONS

5.1 Clean Cover Depth

The remediation strategy details the requirement details the requirement for a minimum 0.60 m clean cover comprising a minimum of 200 mm topsoil across garden areas.

Visual inspection visits were performed by GroundSolve. Photographs showing the verification of depth across selected plots were found to comprise a sufficient clean cover system in accordance with the agreed remedial strategy and Welsh Local Government Association Guidance.

5.2 Topsoil and subsoil Material

Laboratory chemical analysis results from both the recovered sub-soil and topsoil material show the samples do not exceed the agreed GACs (1% SOM).

Laboratory analysis results of recovered samples show topsoil and subsoil are generally in compliance with BS3883:2015 and BS8601:2013.

5.3 Conclusions

The report indicates that the site inspections and chemical tests results from plot 4 has met all the requirements of the remediation as outlined in the remediation strategy agreed with the Welsh Local Government Assoc Guidance.

No unexpected contamination has been encountered within plot 4.

6 REFERENCES

BRE BR211 (2015). Radon: Guidance on Protective Measures for New Dwellings. IHS BRE Press, Bracknell.

BRE SD1 (2005). Concrete in Aggressive Ground. Special Digest 1 (revised edition). IHS BRE Press, Bracknell.

BRE 414 (2001) Protective measures for housing on gas-contaminated land. BRE.

BS 10175:2011+A2:2017 Investigation of Potentially Contaminated Sites - Code of Practice. British Standards Institution, London.

BS5930:2015+A12020 Code of practice for ground investigations BSI

BS8485 2015 Code of Practice for the design of protective measures for methane and carbon dioxide ground gases in new buildings. British Standards

BS8576-2013 Guidance on investigations for ground gas – permanent gases and volatile organic compounds (VOCs). BSI,

CIRIA Rep R 149 (1995a) Protecting Development from Methane. Report 149, CIRIA, London.

CIRIA Rep R 150 (1995b) Methane Investigation Strategies. Report 150, CIRIA, London.

CIRIA Rep R 132 (1996) A Guide for Safe Working on Contaminated Sites. Report 132, CIRIA, London.

CIRIA C552 (2001) Contaminated land risk assessment. A guide to good practice (report no. C552).

CIRIA C665 (2007) Assessing the risks posed by hazardous gases to buildings CIRIA, London

CIRIA C681 (2009) Unexploded ordnance (UXO) A guide for the construction industry (C681)

CIRIA C785 (2019) Unexploded ordnance (UXO) risk management guide for land-based projects (C785)

CIRIA C758D (2019) Abandoned mine workings manual (C758D)

Contaminated Land: Applications in Real Environments (CL:AIRE) (2011) Definition of Waste Code of Practice (version 2).

Department of Environment Food and Rural Affairs (DEFRA) (2012) Environmental Protection Act 1990:Part 2A Contaminated Land Statutory Guidance (report no. PB13735).

Environment Agency (2000) Technical Aspects of Site Investigation. Report P5-065/TR, Environment Agency, Bristol.

Environment Agency (2002) Guidance on Monitoring Landfill Leachate, Groundwater and Surface Water. Report LFTGN02, Environment Agency, Bristol.

Environment Agency (2007) Evaluation of Models for Predicting Plant Uptake of Chemicals from Soil. Report SC050021/SR, Environment Agency, Bristol.

Environment Agency (2015) Guidance on the Classification and Assessment of Waste Technical Guidance WM3 (1st edition).European Union (1998) Drinking Water Directive (Council Directive 98/83/EC).

Land Contamination Risk Management (LCRM) Environment Agency October 2020 https://www.gov.uk/government/publications/land-contamination-risk-management-lcrm .

LQM/CIEH Ltd (2015) S4ULs for Human Health Risk Assessment. Land Quality Press, Nottingham.

SoBRA (2017) Development of Generic Assessment Criteria for Assessing Vapour Risks to Human Health from Volatile Contaminants in Groundwater – Version 1.0.

The Water Framework Directive, (Standards and Classification) Directions (England and Wales).

World Health Organisation (2017) Guidelines for Drinking Water Quality (4th edition).

Britain From Above - https://britainfromabove.org.uk/en/image/WPW060399

http://www.warstateandsociety.com/Bombing-Britain

https://www.epa.gov/pfas/basic-information-pfas

UK Maps of Radon, http://www.ukradon.org/information/ukmaps

Health and Safety Executive (2015) Construction (Design and Management) Regulations.

Coal Authority Interactive Map Viewer, http://mapapps2.bgs.ac.uk/coalauthority/home.html

BGS Geology of Britain Viewer http://mapapps.bgs.ac.uk/geologyofbritain/home.html

7 DEFINITIONS

AOD	Above Ordnance Datum
bgl	Below ground level
BGS	British Geological Survey
BRE	Building Research Establishment
CBR	California Bearing Ratio (test)
COMAH	Control of Major Accident Hazards (regulations)
DQRA	Detailed Quantitative Risk Assessment
DWS	Drinking Water Standard
EQS	Environmental Quality Standard
GAC	Generic Assessment Criterion
GQA	General Quality Assessment (Environment Agency)
GQRA	Generic Quantitative Risk Assessment
GSV	Gas Screening Value
HCV	Health Criteria Value
IPPC	Integrated Pollution Prevention and Control (regulations)
NGR	National Grid Reference
NIHHS	Notification of Installations Handling Hazardous Substances (regulations)
OS	Ordnance Survey
Ppm	Parts per million
Ppmv	Parts per million by volume
SAC	Special Area of Conservation
SPZ	Source Protection Zone
SSAC	Site-Specific Assessment Criterion
SSSI	Site of Special Scientific Interest

APPENDIX A - DRAWINGS

LLANGOLLEN ROAD

BOWLING GREEN

LANCASTER TERRACE / MAES DERWYDD

SITE PLAN

BIN COLLECTION AREA
plots 4 - 8
6M WIDE PRIVATE DRIVE

BIN COLLECTION AREA
plots 12 - 20

6M WIDE PRIVATE DRIVE

2m wide footpath link

6M WIDE PRIVATE DRIVE

OPEN SPACE AND SUDS ATTENUATION AREA

ESTABLISHED SOFT LANDSCAPE AREA TO BE RETAINED TO GIVE SOFT, NATURAL BORDER WITH MAES DERWYDD

PLOTS 17-21 INCLUSIVE TO FACE OUTWARDS ONTO LLANGOLLEN ROAD

1 2 3 4 5 6 7 8 9 10 11 12 12A 14 14A 15 16 17 18 19 20 21

42 43 44 45 50 51 52 53

0M 10 20 50M

SCALE BAR 1:500

EDGE ARCHITECTS

RIBA Chartered Practice

EDGE Architects NW Ltd.
Studio 55:20
North Wales Business Park, Abergele
Conwy, LL22 8LJ

CLIENT:
Gower Homes Ltd

ADDRESS:
Former Air Products site, Llangollen Road, Acrefair LL14 3HW

PROJECT:
Proposed residential development

DRAWING No: 21-DES-001-02 D

DATE: MARCH 2022

SCALE: 1:500 @ A3

APPENDIX B – SITE PHOTOGRAPHS (PLOT 4)



Plot 4 Garden Area



Plot 4 Rear Garden after installation of 600mm cover system

GroundSolve Ltd
Consulting Geotechnical Engineers

VERIFICATION PHOTOGRAPHS

Report No :	3059
Job Title :	Heritage Close, Acrefair
Date Taken:	04/07/2025



Topsoil Stockpile



Subsoil Stockpile

APPENDIX C – CHEMICAL TEST RESULTS

ANALYTICAL TEST REPORT

Report Number	24-05338, issue number 1
Contract name:	Heritage Court
Client reference:	3059
Clients name:	GroundSolve Ltd
Clients address:	GroundSolve Ltd Unit 1 Well House Barns Chester Road Bretton Flintshire CH4 0DH
Samples received:	17/12/2024
Analysis started:	18/12/2024
Analysis completed:	02/01/2025
Report issued:	02/01/2025

Key	
U	UKAS accredited test
M	MCERTS & UKAS accredited test
$	Test carried out by an approved subcontractor
I/S	Insufficient sample to carry out test
U/S	Sample not suitable for testing
NAD	No Asbestos Detected

[redacted]

Approved by: Abbie Neasham-Bourn
Senior Reporting Administrator

SAMPLE INFORMATION

MCERTS (Soils):

Soil descriptions are only intended to provide a log of sample matrices with respect to MCERTS validation. They are not intended as full geological descriptions. MCERTS accreditation applies for sand, clay and loam/topsoil, or combinations of these whether these are derived from naturally occurring soils or from made ground, as long as these materials constitute the major part of the sample. Other materials such as concrete, gravel and brick are not accredited if they comprise the major part of the sample.

Lab ref	Sample ID	Depth (m)	Sample description	Material removed	% Removed	% Moisture
28068	SS1-ES1	-	Brown Clay loamy sand with Gravel and Vegetation.	-	-	11.7
28069	SS1-ES2	-	Brown Clay loamy sand with Gravel and Vegetation.	-	-	10.6
28070	SS1-ES3	-	Brown Clay loamy sand with Gravel and Vegetation.	-	-	12.6
28071	SS1-SE4	-	Brown Clay loamy sand with Gravel and Vegetation.	-	-	13.1
28072	TS1-ES1	-	Brown Clay loamy sand with Gravel and Vegetation.	-	-	14.7
28073	TS1-ES2	-	Brown Clay loamy sand with Gravel and Vegetation.	-	-	16.0
28074	TS1-ES3	-	Brown Clay loamy sand with Gravel and Vegetation.	-	-	16.3
28075	TS1-ES4	-	Brown Clay loamy sand with Gravel and Vegetation.	-	-	16.3

DEVIATING SAMPLE INFORMATION

Comments

Sample deviation is determined in accordance with the UKAS note "Guidance on Deviating Samples" and based on reference standards and laboratory trials.

For samples identified as deviating, test result(s) may be compromised and may not be representative of the sample at the time of sampling.

Chemtech Environmental Ltd cannot be held responsible for the integrity of sample(s) received if Chemtech Environmental Ltd did not undertake the sampling. Such samples may be deviating.

Key

a	Sampling date not provided
b	Sampling time not provided (waters only)
c	Sample not received in appropriate containers
d	Storage Temperature
e	Headspace present in sample container
f	Sample exceeded sampling to reciept
g	Sample exceeded holding time(s)

Lab ref	Sample ID	Depth (m)	Deviating	Tests (Reason for deviation)
28068	SS1-ES1	-	N	
28069	SS1-ES2	-	N	
28070	SS1-ES3	-	N	
28071	SS1-SE4	-	N	
28072	TS1-ES1	-	N	
28073	TS1-ES2	-	N	
28074	TS1-ES3	-	N	
28075	TS1-ES4	-	N	

SOILS

Lab Number					28068	28069	28070	28071	28072
Client Reference					SOIL	SOIL	SOIL	SOIL	SOIL
Sample ID					SS1-ES1	SS1-ES2	SS1-ES3	SS1-SE4	TS1-ES1
Sampling Date					13/12/2024	13/12/2024	13/12/2024	13/12/2024	13/12/2024
Test	**Method**	**Accred**	**LoD**	**Units**					
Asbestos									
Asbestos Identification	SUBCON	SU	0	-	NAD	NAD	NAD	NAD	NAD
Soil sample preparation parameters									
Stones Content	CE001	N	0.1	%	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Metals									
Water Soluble Sulphate	CE061	M	0.01	g/l	0.568	0.126	0.039	0.028	0.040
Acid Soluble Sulphate (SO4)	CE062	M	0.01	%	0.18	0.04	0.02	0.02	0.04
Arsenic	CE264	U	1.8	mg/kg	6.3	6.3	4.8	7.6	3.8
Cadmium	CE264	M	1.6	mg/kg	< 1.6	2.2	< 1.6	< 1.6	< 1.6
Chromium	CE264	U	2	mg/kg	20.0	21.3	19.5	19.5	8.6
Copper	CE264	M	1.6	mg/kg	18.6	15.5	16.1	15.6	11.4
Lead	CE264	U	2.3	mg/kg	54.1	41.0	41.8	44.9	41.6
Mercury	CE264	U	0.7	mg/kg	< 0.7	< 0.7	< 0.7	< 0.7	0.8
Nickel	CE264	M	2.1	mg/kg	17.9	23.7	20.3	20.1	6.7
Selenium	CE264	U	3	mg/kg	< 3.0	< 3.0	< 3.0	< 3.0	< 3.0
Zinc	CE264	M	4	mg/kg	86.4	79.0	77.1	79.7	59.7
Volatile Petroleum Hydrocarbons									
>C5-C6 Aliphatic (HS_1D_AL)	CE267	N	0.1	mg/kg	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
>C6-C8 Aliphatic (HS_1D_AL)	CE267	N	0.1	mg/kg	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
>C8-C10 Aliphatic (HS_1D_AL)	CE267	N	0.1	mg/kg	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
>C8-C10 Aromatic (HS_1D_AR)	CE267	N	0.01	mg/kg	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010
>C6-C7 Aromatic (HS_1D_AR)	CE267	N	0.01	mg/kg	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010
>C7-C8 Aromatic (HS_1D_AR)	CE267	N	0.01	mg/kg	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010
Colourimetric									
Total Monohydric Phenols	CE078	N	0.5	mg/kg	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
Total Cyanide	CE077	N	1	mg/kg	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Combustion									
Moisture Content	CE001	N	0.1	%	11.7	10.6	12.6	13.1	14.7
Total Organic Carbon	CE197	N	0.1	%	1.25	0.85	10.8	0.95	1.86
Soil Organic Matter	CE072	N	0.1	%	2.16	1.47	18.6	1.64	3.21

SOILS

TPH Ali/Aro									
>C12-C16 Aliphatic (EH_2D_AL)	CE250	N	0.5	mg/kg	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
>C12-C16 Aromatic (EH_2D_AR)	CE250	N	1	mg/kg	< 1.0	< 1.0	< 1.0	< 1.0	2.3
>C16-C21 Aliphatic (EH_2D_AL)	CE250	N	0.7	mg/kg	< 0.7	< 0.7	< 0.7	< 0.7	< 0.7
>C16-C21 Aromatic (EH_2D_AR)	CE250	N	2	mg/kg	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0
>C21-C35 Aliphatic (EH_2D_AL)	CE250	N	4	mg/kg	< 4.0	< 4.0	< 4.0	< 4.0	< 4.0
>C21-C35 Aromatic (EH_2D_AR)	CE250	N	4.5	mg/kg	< 4.5	< 4.5	< 4.5	< 4.5	10.4
>C35-C40 Aliphatic (EH_2D_AL)	CE250	N	0.5	mg/kg	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
>C35-C40 Aromatic (EH_2D_AR)	CE250	N	1.5	mg/kg	< 1.5	< 1.5	< 1.5	< 1.5	2.3
>C10-C12 Aliphatic (EH_2D_AL)	CE250	N	1	mg/kg	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
>C10-C12 Aromatic (EH_2D_AR)	CE250	N	0.6	mg/kg	< 0.6	< 0.6	< 0.6	< 0.6	1.1
Polyaromatic hydrocarbons									
Naphthalene	CE087	M	0.016	mg/kg	< 0.016	0.055	0.024	< 0.016	< 0.016
Acenaphthylene	CE087	M	0.015	mg/kg	< 0.015	0.050	0.035	< 0.015	0.019
Acenaphthene	CE087	M	0.013	mg/kg	< 0.013	0.251	0.039	< 0.013	< 0.013
Fluorene	CE087	U	0.013	mg/kg	< 0.013	0.094	0.018	< 0.013	< 0.013
Phenanthrene	CE087	M	0.014	mg/kg	0.123	1.38	0.268	0.090	0.154
Anthracene	CE087	U	0.017	mg/kg	0.036	0.431	0.080	0.037	0.037
Fluoranthene	CE087	M	0.017	mg/kg	0.250	2.39	0.486	0.180	0.450
Pyrene	CE087	M	0.016	mg/kg	0.225	1.90	0.406	0.168	0.410
Benzo(a)anthracene	CE087	U	0.012	mg/kg	0.178	1.06	0.270	0.133	0.302
Chrysene	CE087	M	0.028	mg/kg	0.182	1.14	0.312	0.133	0.325
Benzo(b)fluoranthene	CE087	M	0.02	mg/kg	0.229	1.68	0.381	0.176	0.420
Benzo(k)fluoranthene	CE087	M	0.025	mg/kg	0.097	0.628	0.159	0.070	0.181
Benzo(a)pyrene	CE087	U	0.019	mg/kg	0.190	1.51	0.310	0.154	0.373
Indeno(1,2,3-cd)pyrene	CE087	M	0.019	mg/kg	0.171	1.89	0.310	0.151	0.306
Dibenzo(a,h)anthracene	CE087	M	0.017	mg/kg	0.031	0.30	0.066	0.029	0.056
Benzo(g,h,i)perylene	CE087	M	0.019	mg/kg	0.144	1.88	0.307	0.128	0.276
Coronene	CE087	N	0.02	mg/kg	< 0.020	0.253	0.038	< 0.020	< 0.020
Total PAH(17)	CE087	N	0.3	mg/kg	1.86	16.9	3.51	1.45	3.31
BTEX									
Benzene	CE267	U	0.0005	mg/kg	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005
Toluene	CE267	U	0.001	mg/kg	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001
Ethylbenzene	CE267	U	0.001	mg/kg	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001
MTBE	CE267	N	0.002	mg/kg	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002

SOILS

Total BTEX	CE267	N	0.006	mg/kg	< 0.006	< 0.006	< 0.006	< 0.006	< 0.006
m,p-Xylene	CE267	U	0.002	mg/kg	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002
oXylenes	CE267	U	0.002	mg/kg	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002
Wet Chem									
pH	CE004	M	0.1	pH units	7.8	7.8	7.8	7.6	7.5
EPH									
Diesel Range Organics (>C10-C25) (EH_1D_	CE033	M	12	mg/kg	15	< 12	46	< 12	38
>C10-C40 Soil (EH_1D_Total)	CE033	M	19	mg/kg	34.4	23.5	176	21.4	168
Mineral Oil (>C10-C40 Total) (EH_CU_1D_T	CE162	N	19	mg/kg	23	27	131	19	116

SOILS

Lab Number					28073	28074	28075
Client Reference					SOIL	SOIL	SOIL
Sample ID					TS1-ES2	TS1-ES3	TS1-ES4
Sampling Date					13/12/2024	13/12/2024	13/12/2024
Test	**Method**	**Accred**	**LoD**	**Units**			
Asbestos							
Asbestos Identification	SUBCON	SU	0	-	NAD	NAD	NAD
Soil sample preparation parameters							
Stones Content	CE001	N	0.1	%	< 0.1	< 0.1	< 0.1
Metals							
Water Soluble Sulphate	CE061	M	0.01	g/l	0.075	0.030	0.026
Acid Soluble Sulphate (SO4)	CE062	M	0.01	%	0.03	0.03	0.05
Arsenic	CE264	U	1.8	mg/kg	4.8	4.1	2.4
Cadmium	CE264	M	1.6	mg/kg	< 1.6	< 1.6	< 1.6
Chromium	CE264	U	2	mg/kg	9.6	9.5	6.9
Copper	CE264	M	1.6	mg/kg	8.6	9.5	7.6
Lead	CE264	U	2.3	mg/kg	34.9	34.6	27.1
Mercury	CE264	U	0.7	mg/kg	< 0.7	< 0.7	< 0.7
Nickel	CE264	M	2.1	mg/kg	6.3	7.2	4.3
Selenium	CE264	U	3	mg/kg	< 3.0	< 3.0	< 3.0
Zinc	CE264	M	4	mg/kg	48.0	51.1	35.4
Volatile Petroleum Hydrocarbons							
>C5-C6 Aliphatic (HS_1D_AL)	CE267	N	0.1	mg/kg	< 0.10	< 0.10	< 0.10
>C6-C8 Aliphatic (HS_1D_AL)	CE267	N	0.1	mg/kg	< 0.10	< 0.10	< 0.10
>C8-C10 Aliphatic (HS_1D_AL)	CE267	N	0.1	mg/kg	< 0.10	< 0.10	< 0.10
>C8-C10 Aromatic (HS_1D_AR)	CE267	N	0.01	mg/kg	< 0.010	< 0.010	< 0.010
>C6-C7 Aromatic (HS_1D_AR)	CE267	N	0.01	mg/kg	< 0.010	< 0.010	< 0.010
>C7-C8 Aromatic (HS_1D_AR)	CE267	N	0.01	mg/kg	< 0.010	< 0.010	< 0.010
Colourimetric							
Total Monohydric Phenols	CE078	N	0.5	mg/kg	< 0.50	< 0.50	< 0.50
Total Cyanide	CE077	N	1	mg/kg	< 1.0	< 1.0	< 1.0
Combustion							
Moisture Content	CE001	N	0.1	%	16.0	16.3	16.3
Total Organic Carbon	CE197	N	0.1	%	2.50	2.25	2.32
Soil Organic Matter	CE072	N	0.1	%	4.31	3.88	4.00

SOILS

TPH Ali/Aro							
>C12-C16 Aliphatic (EH_2D_AL)	CE250	N	0.5	mg/kg	< 0.5	< 0.5	< 0.5
>C12-C16 Aromatic (EH_2D_AR)	CE250	N	1	mg/kg	1.9	6.2	2.1
>C16-C21 Aliphatic (EH_2D_AL)	CE250	N	0.7	mg/kg	< 0.7	< 0.7	< 0.7
>C16-C21 Aromatic (EH_2D_AR)	CE250	N	2	mg/kg	< 2.0	7.8	< 2.0
>C21-C35 Aliphatic (EH_2D_AL)	CE250	N	4	mg/kg	< 4.0	6.0	< 4.0
>C21-C35 Aromatic (EH_2D_AR)	CE250	N	4.5	mg/kg	7.8	39.3	10.2
>C35-C40 Aliphatic (EH_2D_AL)	CE250	N	0.5	mg/kg	< 0.5	0.8	< 0.5
>C35-C40 Aromatic (EH_2D_AR)	CE250	N	1.5	mg/kg	2.1	9.2	2.2
>C10-C12 Aliphatic (EH_2D_AL)	CE250	N	1	mg/kg	< 1.0	< 1.0	< 1.0
>C10-C12 Aromatic (EH_2D_AR)	CE250	N	0.6	mg/kg	0.8	3.0	1.0
Polyaromatic hydrocarbons							
Naphthalene	CE087	M	0.016	mg/kg	< 0.016	< 0.016	< 0.016
Acenaphthylene	CE087	M	0.015	mg/kg	< 0.015	< 0.015	< 0.015
Acenaphthene	CE087	M	0.013	mg/kg	< 0.013	< 0.013	< 0.013
Fluorene	CE087	U	0.013	mg/kg	< 0.013	< 0.013	< 0.013
Phenanthrene	CE087	M	0.014	mg/kg	0.099	0.055	0.049
Anthracene	CE087	U	0.017	mg/kg	0.042	0.024	0.020
Fluoranthene	CE087	M	0.017	mg/kg	0.332	0.240	0.157
Pyrene	CE087	M	0.016	mg/kg	0.318	0.240	0.149
Benzo(a)anthracene	CE087	U	0.012	mg/kg	0.206	0.189	0.109
Chrysene	CE087	M	0.028	mg/kg	0.233	0.201	0.129
Benzo(b)fluoranthene	CE087	M	0.02	mg/kg	0.318	0.302	0.177
Benzo(k)fluoranthene	CE087	M	0.025	mg/kg	0.121	0.119	0.065
Benzo(a)pyrene	CE087	U	0.019	mg/kg	0.268	0.248	0.147
Indeno(1,2,3-cd)pyrene	CE087	M	0.019	mg/kg	0.238	0.252	0.148
Dibenzo(a,h)anthracene	CE087	M	0.017	mg/kg	0.047	0.041	0.027
Benzo(g,h,i)perylene	CE087	M	0.019	mg/kg	0.217	0.219	0.136
Coronene	CE087	N	0.02	mg/kg	< 0.020	< 0.020	< 0.020
Total PAH(17)	CE087	N	0.3	mg/kg	2.44	2.13	1.31
BTEX							
Benzene	CE267	U	0.0005	mg/kg	< 0.0005	< 0.0005	< 0.0005
Toluene	CE267	U	0.001	mg/kg	< 0.001	< 0.001	< 0.001
Ethylbenzene	CE267	U	0.001	mg/kg	< 0.001	< 0.001	< 0.001
MTBE	CE267	N	0.002	mg/kg	< 0.002	< 0.002	< 0.002

SOILS

Total BTEX	CE267	N	0.006	mg/kg	< 0.006	< 0.006	< 0.006
m,p-Xylene	CE267	U	0.002	mg/kg	< 0.002	< 0.002	< 0.002
oXylenes	CE267	U	0.002	mg/kg	< 0.002	< 0.002	< 0.002
Wet Chem							
pH	CE004	M	0.1	pH units	7.5	7.5	7.5
EPH							
Diesel Range Organics (>C10-C25) (EH_1D_	CE033	M	12	mg/kg	21	35	18
>C10-C40 Soil (EH_1D_Total)	CE033	M	19	mg/kg	104	150	101
Mineral Oil (>C10-C40 Total) (EH_CU_1D_T	CE162	N	19	mg/kg	56	102	68

METHOD DETAILS

METHOD	TESTNAME	METHOD SUMMARY	ANALYSIS BASIS
CE267	VPH in Soil	HS-GCFID	As submitted sample
SUBCON	Asbestos Solid	HSG248	Air Dried Sample
CE061	W. Sol Metals	ICPOES	Air dried sample
CE062	Acid Soluble Sulphate in Solids	Primacs	Air dried sample
CE264	Metals by ICP in Soil	ICPOES	Air dried sample
CE267	BTEX in solids	Analysis by HSGCFID	As submitted sample
CE033	EPH in Solids	Acetone:Hexane Extraction and GCFID	As submitted sample
CE250	GCXGC in Solids	DCM Extraction and GCxGC-FID	As submitted sample
CE087	PAH in Soil	DCM Extraction and GCMS	As submitted sample
CE078	Phenols in Solids	Continuous Flow Analyser	As submitted sample
CE077	Cyanides in Solids	Continuous Flow Analyser	As submitted sample
CE197	Primacs in Solids	Primacs	Air dried sample
CE162	Mineral Oil in Solids	Acetone:Hexane extract, Floriil clean up and GCFID	As submitted sample

REPORT INFORMATION

Report No.:24-05338, issue number 1

Key	
U	ISO17025 Accredited Result
M	ISO17025 and MCERTS Accredited Result
N	Do not currently hold accreditation
^	MCERTS accreditation not applicable for sample matrix
*	ISO17025 accreditation not applicable for sample matrix
S	Subcontracted
I/S	Insufficient Sample
U/S	Unsuitable sample
N/T	Not tested
<	Means "less than"
>	Means "greater than"

LOD refers to limit of detection, except in the case of pH soils and pH waters where it means limit of discrimination.

This report shall not be reproduced except in full, without prior written approval.

Opinions and interpretations expressed herein are outside the UKAS accreditation scope.

All testing carried out at Unit 6 Parkhead, Stanley, DH9 7YB, except for subcontracted testing.

The results relate only to the sample received.

Unless otherwise stated, sample information has been provided by the client. This may affect the validity of the results.

Moisture Content Calculated on a Wet Weight basis

Unless otherwise stated, Chemtech Environmental Ltd was not responsible for sampling.

Sampling was undertaken by Chemtech Environmental Limited and is outside the UKAS accreditation scope.

Methods, procedures and performance data are available on request.

Results reported herein relate only to the material supplied to the laboratory.

BTEX compounds are identified by retention time only and may include interference from co-eluting compounds.

For soils and solids, all results are reported on a dry basis. Samples dried at no more than 30°C in a drying

For soils and solids, analytical results are inclusive of stones, where applicable.

Sample Retention and Disposal

All soil samples will be retained for a period of 4 weeks from the point of receipt

All water samples will be retained for a period of 2 weeks from the point of Reporting

Charges may apply to extended sample storage

TPH Classification - HWOL Acronym System

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

APPENDIX D –SUMMARY OF CHEMICAL TEST

Job No: 3059
Site Name: Heritage Court, Llangollen Rd, Acrefair
Residential with gardens (6% SOM)

GroundSolve Ltd
Consulting Geotechnical Engineers

	SS1	SS1	SS1	SS1	TS1	TS2	TS3	TS4							
Metals & Non-Metals	ES1	ES2	ES3	ES4	ES1	ES2	ES3	ES4	Min (mg/kg)	Max (mg/kg)	Average (mg/kg)	Count	Adopted Guideline (mg/kg)	Source	Exceedances
Arsenic	6.3	6.3	4.8	7.6	3.8	4.8	4.1	2.4	2.4	7.6	5.01	8	37	C4SL	0
Cadmium	< 1.6	2.2	< 1.6	< 1.6	< 1.6	< 1.6	< 1.6	< 1.6	< 1.6	2.2	1.68	8	22	C4SL	0
Chromium	20	21.3	19.5	19.5	8.6	9.6	9.5	6.9	6.9	21.3	14.36	8	910	S4UL	0
Copper	18.6	15.5	16.1	15.6	11.4	8.6	9.5	7.6	7.6	18.6	12.86	8	2400	S4UL	0
Lead	54.1	41	41.8	44.9	41.6	34.9	34.6	27.1	27.1	54.1	40	8	200	C4SL	0
Mercury	< 0.7	< 0.7	< 0.7	< 0.7	0.8	< 0.7	< 0.7	< 0.7	< 0.7	0.8	0.71	8	1.2	S4UL	0
Nickel	17.9	23.7	20.3	20.1	6.7	6.3	7.2	4.3	4.3	23.7	13.31	8	130	S4UL	0
Phenol - Monohydric	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	<0.5	0.5	8	380	S4UL	0
Selenium	< 3.0	< 3.0	< 3.0	< 3.0	< 3.0	< 3.0	< 3.0	< 3.0	< 3.0	<3	3	8	250	S4UL	0
Zinc	86.4	79	77.1	79.7	59.7	48	51.1	35.4	35.4	86.4	64.55	8	3700	S4UL	0

	SS1	SS1	SS1	SS1	TS1	TS2	TS3	TS4							
Petroleum Hydrocarbons	ES1	ES2	ES3	ES4	ES1	ES2	ES3	ES4	Min (mg/kg)	Max (mg/kg)	Average (mg/kg)	Count	Adopted Guideline (mg/kg)	Source	Exceedances
Benzene	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	<0.0005	0.0005	8	0.87	C4SL	0
Toluene	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	<0.001	0.001	8	660	S4UL	0
Ethylbenzene	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	<0.001	0.001	8	260	S4UL	0
m,p-Xylene	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	<0.002	0.002	8	310	S4UL	0
Aliphatic C5-C6	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	<0.1	0.1	8	160	S4UL	0
Aliphatic C6-C8	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	<0.1	0.1	8	530	S4UL	0
Aliphatic C8-C10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	<0.1	0.1	8	150	S4UL	0
Aliphatic >EC10-EC12	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	<1	1	8	760	S4UL	0
Aliphatic >EC12-EC16	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	<0.5	0.5	8	4300	S4UL	0
Aliphatic >EC16-EC35	< 4.0	< 4.0	< 4.0	< 4.0	< 4.0	< 4.0	6	< 4.0	< 4.0	6	4.25	8	110000	S4UL	0
Aliphatic >EC35-EC40	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	0.8	< 0.5	< 0.5	0.8	0.54	8	110000	S4UL	0
Aromatic C5-C7	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	<0.01	0.01	8	300	S4UL	0
Aromatic C7-C8	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	<0.01	0.01	8	660	S4UL	0
Aromatic C8-C10	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	<0.01	0.01	8	190	S4UL	0
Aromatic >EC10-EC12	< 0.6	< 0.6	< 0.6	< 0.6	1.1	0.8	3	1	< 0.6	3	1.04	8	380	S4UL	0
Aromatic >EC12-EC16	< 1.0	< 1.0	< 1.0	< 1.0	2.3	1.9	6.2	2.1	< 1.0	6.2	2.06	8	660	S4UL	0
Aromatic >EC16-EC21	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	7.8	< 2.0	< 2.0	7.8	2.73	8	930	S4UL	0
Aromatic >EC21-EC35	< 4.5	< 4.5	< 4.5	< 4.5	10.4	7.8	39.3	10.2	< 4.5	39.3	10.71	8	1700	S4UL	0
Aromatic >EC35-EC40	< 1.5	< 1.5	< 1.5	< 1.5	2.3	2.1	9.2	2.2	< 1.5	9.2	2.73	8	1700	S4UL	0

	SS1	SS1	SS1	SS1	TS1	TS2	TS3	TS4							
Polyaromatic Hydrocarbons (PAH)	ES1	ES2	ES3	ES4	ES1	ES2	ES3	ES4	Min (mg/kg)	Max (mg/kg)	Average (mg/kg)	Count	Adopted Guideline (mg/kg)	Source	Exceedances
Acenaphthene	< 0.013	0.251	0.039	< 0.013	< 0.013	< 0.013	< 0.013	< 0.013	< 0.013	0.251	0.05	8	1100	S4UL	0
Acenaphthylene	< 0.015	0.05	0.035	< 0.015	0.019	< 0.015	< 0.015	< 0.015	< 0.015	0.05	0.02	8	920	S4UL	0
Anthracene	0.036	0.431	0.08	0.037	0.037	0.042	0.024	0.02	0.02	0.431	0.09	8	11000	S4UL	0
Benzo(a)anthracene	0.178	1.06	0.27	0.133	0.302	0.206	0.189	0.109	0.109	1.06	0.31	8	13	S4UL	0
Benzo(a)pyrene	0.19	1.51	0.31	0.154	0.373	0.268	0.248	0.147	0.147	1.51	0.4	8	5	C4SL	0
Benzo(b)fluoranthene	0.229	1.68	0.381	0.176	0.42	0.318	0.302	0.177	0.176	1.68	0.46	8	3.7	S4UL	0
Benzo(g,h,i)perylene	0.144	1.88	0.307	0.128	0.276	0.217	0.219	0.136	0.128	1.88	0.41	8	350	S4UL	0
Benzo(k)fluoranthene	0.097	0.628	0.159	0.07	0.181	0.121	0.119	0.065	0.065	0.628	0.18	8	100	S4UL	0
Chrysene	0.182	1.14	0.312	0.133	0.325	0.233	0.201	0.129	0.129	1.14	0.33	8	27	S4UL	0
Dibenzo(a,h)anthracene	0.031	0.3	0.066	0.029	0.056	0.047	0.041	0.027	0.027	0.3	0.07	8	0.3	S4UL	0
Fluoranthene	0.25	2.39	0.486	0.18	0.45	0.332	0.24	0.157	0.157	2.39	0.56	8	890	S4UL	0
Fluorene	< 0.013	0.094	0.018	< 0.013	< 0.013	< 0.013	< 0.013	< 0.013	< 0.013	0.094	0.02	8	860	S4UL	0
Indeno(1,2,3-c,d)pyrene	0.171	1.89	0.31	0.151	0.306	0.238	0.252	0.148	0.148	1.89	0.43	8	41	S4UL	0
Naphthalene	< 0.016	0.055	0.024	< 0.016	< 0.016	< 0.016	< 0.016	< 0.016	< 0.016	0.055	0.02	8	13	S4UL	0
Phenanthrene	0.123	1.38	0.268	0.09	0.154	0.099	0.055	0.049	0.049	1.38	0.28	8	440	S4UL	0
Pyrene	0.225	1.9	0.406	0.168	0.41	0.318	0.24	0.149	0.149	1.9	0.48	8	2000	S4UL	0

	SS1	SS1	SS1	SS1	TS1	TS2	TS3	TS4							
Other Contaminants / Testing	ES1	ES2	ES3	ES4	ES1	ES2	ES3	ES4	Min (mg/kg)	Max (mg/kg)	Average (mg/kg)	Count	Adopted Guideline (mg/kg)	Source	Exceedances
Total Organic Carbon	1.25	0.85	10.8	0.95	1.86	2.5	2.25	2.32	0.85	10.8	2.85	8	-	-	-
pH	7.8	7.8	7.8	7.6	7.5	7.5	7.5	7.5	7.5	7.8	7.63	8	-	-	-
Total Cyanide	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	<1	1	8	-	-	-
Sulphate Aqueous Extract as SO4	0.568	0.126	0.039	0.028	0.04	0.075	0.03	0.026	0.026	0.568	0.12	8	-	-	-
Asbestos ID	NAD	NAD	NAD	NAD	NAD	NAD	NAD	NAD				8			