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Phase III Geotechnical Assessment



Project Name: Wrexham

Location: Tesco, Crescent Rd, Wrexham

Client: Glanville Group Ltd

Project ID: JN1246

Report Date: 21 August 2024

Report Issue: 2

SUMMARY

The site is located off Crescent Road, approximately 1km to the north-east of Wrexham Town Centre in North Wales, extends to about 0.22 ha and comprises an operational car park bounded by fencing, with hedgerows and semi-mature trees. It is proposed to redevelop the site with a new single storey McDonalds, and associated soft landscaping, car park and access roads.

A Phase I desk study and Phase II preliminary investigation have been undertaken previously, under the same job number. The reader is referred to this report for more detail. These Phase III works targeted the revised build-print for the proposed development, and aimed to improve confidence in soakage assessment, the sub-grade shrinkage potential and the CBR value. Very limited additions contamination analysis was also carried out.

Geological records indicate that the site geology consists of Glaciofluvial Sheet Deposits over Salop Formation.

Five windowless sampler holes were drilled as part of these Phase III works (3.45-4.45m deep), with one gravel-filled trial pit soakaway excavated by JCB.

As before, the soils encountered comprised a construction layer of Blacktop over sub-bases, over Made Ground, to a maximum depth of 2.2m, over Sand. On the raised western verge (WLS12&13) hardstand and sub-bases were replaced by subsoils of reworked local brown sand.

Most of the geotechnical recommendations for the site have not changed and the reader is referred to the Phase II document for fuller details. The same applies to the contamination recommendations.

The cohesive made ground subsoils are shown to be low to non-shrinkable and the initial low VCP classification reported during the Phase II investigation should still prudently be adopted.

The soakaway test worked well, with triple discharge achieved, at an inferred rate of 1.08×10^{-5} m/s.

CBR probe array inferred an existing sub-base CBR of around 50%+ and a CBR of 6%+ for the Made Ground. The Made Ground sub-grades appear to be in good condition, but are without full engineering provenance. Settlements are likely to be limited unless ground levels are to be raised significantly.

Contamination analysis was limited to confirmation that coal tars are absent from the site asphalt, and that the natural substrate soakaway discharge medium at depth in trial pit S1 was free from any significant contamination. The additional sulphate analysis confirmed DS-1, AC-1s condition as reported in our earlier investigation.

The investigation was conducted and this report has been prepared for the sole internal use and reliance of Glanville Group. This report shall not be relied upon or transferred to any other parties without the express written authorisation of Southern Testing Laboratories Ltd. If an unauthorised third party comes into possession of this report they rely on it at their peril and the authors owe them no duty of care and skill.

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For and on behalf of Southern Testing Laboratories Limited

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A INTRODUCTION

1 Location

The site is located off Crescent Road, approximately 1km to the north-east of Wrexham Town Centre in North Wales. The approximate National Grid Reference of the site is SJ 341 504.

2 Proposed Construction

It is proposed to construct a new single storey McDonald's restaurant with an associated car parking area, 'drive-thru' and areas of hard and soft landscaping. The intended build-print is approximately as indicated on Figure 2 in Appendix A.

3 Object

This is a Phase III supplemental geotechnical assessment. A desk study and Preliminary Phase II Investigation was undertaken for the site in May 2019 under the same job number. The reader is referred to this for more detail, although a summary is provided in section B.

The main objective of the investigation was to undertake some further geotechnical investigation in light of the revised build-print. This included a soakage test.

4 Scope

This report presents our Phase III Site Investigation findings, exploratory hole logs, laboratory test results and our interpretation of these data. A brief summary of the desk study and Phase II findings is also presented.

As with any site there may be differences in soil conditions between exploratory hole positions.

This report is not an engineering design and the figures and calculations contained in the report should be used by the Engineer, taking note that variations will apply, according to variations in design loading, in techniques used, and in site conditions. Our figures therefore should not supersede the Engineer's design.

The ground/site investigation has been completed with reference to BS 5930 Ref [4] and BS 10175 Ref [5].

The reader is referred to the Phase I and II report for further details.

The findings and opinions conveyed via this investigation report are based on information obtained from a variety of sources as detailed within this report, and which Southern Testing Laboratories Limited believes are reliable. Nevertheless, Southern Testing Laboratories Limited. cannot and does not guarantee the authenticity or reliability of the information it has obtained from others.

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The recommendations contained in this report are made in respect of the particular context of the investigation as described in the report and may not be appropriate to alternative development schemes. This report should be considered in its entirety and Southern Testing Laboratories Limited accepts no responsibility for and excludes liability in respect of any omission or alteration made by others, and any use of the report for any purpose other than that for which it was produced.

Detailed information on the proposed development, such as detailed final layout, loadings and serviceability limits was not provided. Accordingly, where geotechnical design advice is provided it is on the prescriptive basis allowed for by Eurocode 7: employing conventional and conservative design rules.

B DESK STUDY & PHASE II SUMMARY

A Phase I & II investigation has been carried out for the site, ref JN1246, dated 10th May 2019, to which the reader is referred for full details.

The desk study indicated that the site remained a field until the construction of the car park by 2003. The surrounding area has undergone significant development, including a large sand extraction pit along the north eastern boundary of the site. This represents a potential gas risk.

Geological records indicate that the site geology consists of Glaciofluvial Sheet Deposits over Salop Formation.

Glaciofluvial Sheet Deposits consist of material that has been transported, sorted and deposited by meltwater from a glacier or inland ice sheet. The meltwater collected in the ice and formed high velocity glacial rivers in tunnels and cracks leading out to the ice front. These rivers carried material ranging from clay particles to boulders. During transport in the glacial river, the particles were rounded and sorted.

The Salop Formation comprises red and red-brown mudstone, and red-brown (mostly sublitharenite) sandstone containing beds of pebbly sandstone and conglomerate itself containing Carboniferous limestone and chert clasts, and thin 'Spirobis' limestone beds and caliche in the lower part of the unit.

Intrusive investigation was undertaken comprising 8 No windowless sampler boreholes to a maximum depth of 5.00m bgl. The soils encountered comprised MADE GROUND (-0.5/1.9m) overlying medium-dense fine SAND (-5m+) with loose very clayey SAND bands [*only encountered within WLS1 & WLS2]*.

Pad & beam foundations were recommended for this site, transferring loads below any Made Ground, onto the natural sands beneath. DS-1, AC-1s concrete conditions would apply.

No significant contamination was identified relative to a commercial end-use, although ingress against natural radon and basic land gas protection was required.

C GROUND INVESTIGATION

5 Strategy and Method

This Phase III investigation targeted the reconfigured build-print and a full scale soakage test in the near vicinity of intended infrastructure. The works comprised the following:-

Activity / Method	Purpose	Max Depth Range (mbgl)	Installations / Notes
WLS 9-13	Windowless sampling to confirm bearing formation level for structure.	3.45-4.45 m	WLS12 & 13 were drilled on the slightly elevated landscaped area.
S1 soakaway	BRE 365 soakaway test.	1.2-3m	Gravel filled.
DCP CBR	Sub-grade CBR measurement at trial holes.	1.0 m	

The exploratory hole locations are shown on Figure 2 in Appendix A.

6 Weather Conditions

The fieldwork was carried out 29-30th May 2024, at which time weather was warm with light showers.

7 Soils as Found

The soils encountered are described in detail on the attached exploratory hole logs (Appendix A), but in general comprised a sequence of variable construction / Made Ground, over Clay, over sand. A summary is given below.

Depth (m)	Soil Type	Description
GL - 0.4/0.8	Construction or Verge	Typically 100mm asphalt over compact grey limestone aggregate. Island is deep topsoil over aggregate. Western landscape is topsoil and reworked local sand subsoils.
– 1.1/2.2	Fill	MADE GROUND composed of compacted dark grey mottled brown, silty, sandy CLAY, with occasional brick fragments.
– 4.45+	Sand	Loose to moderately compact buff brown silty fine SANDS.

The soil sequences observed were generally commensurate with the Phase II findings and infer a thorough placement of a thin fill blanket across the whole site. The aggregate below topsoil in the island might infer car park reconfiguration at some point.

8 Groundwater Observations

No groundwater was observed in any of the additional exploratory holes, to a maximum depth of 4.45m.

D DISCUSSION OF GEOTECHNICAL TEST RESULTS AND RECOMMENDATIONS

For full assessment reference must be made to the Phase II report. Only certain aspects have been supplemented and are reviewed as follows:-

8.1 Fill

The fill was encountered in all holes as compacted dark grey very sandy gravelly clays.

Two Atterberg limit results for this material from WLS9@1.5m and WLS11@1.0m, recorded a Plasticity Index of 9% and 10%, indicating a Low Volume Change Potential. Whilst granular fraction might downgrade the plasticity condition, prudent design should still consider low VCP commensurate with the majority of field descriptions for this material as cohesive.

8.2 Natural Sands

The fill was encountered in all holes as loose to moderately compact buff brown silty fine SANDS.

Three particle size distributions were established on these materials form holes 9, 11 & 12. Results indicate a medium grained sand with 6-30% fines fraction.

Findings are commensurate with the Phase 2 investigations, and the deeper natural substrate may be considered effectively non-shrinkable, below the overlying cohesive fill.

9 Soakaways

Soakage testing was carried out in S1. This tests indicated good infiltration as summarised in the table below.

9.1 Soakage Test Results

The BRE paper DG365, Ref [6] describes a method for site testing to determine soil infiltration rates at the proposed site of a soakaway. The in-situ test method is described in Appendix B.

The DG365 Ref [6], states that each pit should be allowed to drain three times to near empty, with filling on the same or consecutive days. This was rendered possible by gravel filling the pit to prevent side collapse on inundation. 40% air void was assumed in the calculation.

The infiltration rate from each trial hole is summarised in the table below. The soakage rate in this report in expressed as ℓ/m²/minute, which is a convenient rate to use. The BRE use a unit of m/sec, which is the value in l/m²/minute divided by 60,000.

Test ID	Test Depth (mbgl)	Design Infiltration Rate	
		ℓ/m²/minute	m/sec
S1	3.0m	0.952	$1.59x10^{-5}$
		0.808	$1.35x10^{-5}$
		0.649	$1.08x10^{-5}$

Note: The Design Infiltration Rate is the lowest of the three tests

9.2 General Guidance on Design of Soakaways

Any soakaway scheme may require the approval of Natural Resources Wales, Building Control and, where applicable, the adopting Highways Authority.

Soakaways are used to store the immediate surface water run-off from hard surfaced areas, such as roof or carparks, and allow for efficient infiltration into the adjacent soil. They should be designed to discharge their stored water sufficiently quickly to provide the necessary capacity to receive run-off from a subsequent storm. The time taken for discharge depends upon the soakaway shape and size, and the surrounding soil's infiltration characteristics.

Groundwater levels can vary considerably from season to season and year to year, often rising in wet or winter weather, and falling in periods of drought. As such, a high groundwater table may affect the storage capacity of soakaways. In addition, it should be noted that an unsaturated zone may be required between the base of soakaways and the groundwater table, by Natural Resources Wales. Longer term monitoring may be required to establish actual groundwater levels as part of the planning approval process.

The design of soakaways can be square, circular (conventional) or trench excavations, and they may be rubble filled, perforated precast concrete ring units, plastic cells or any similar structure that collects rainwater and run-off and allow discharge directly into the ground. Depending on the geological conditions, and depth at which suitable infiltration is achieved, soakaways can also be deep bored.

Long-term maintenance and inspection must be considered during the design and construction process. Maintenance of silt traps, gully pots and interceptors will improve the long-term performance of soakaways. The use of wet well chambers within the soakaway system can further assist in pollutant trapping and extending the operating life of soakaways.

Generally, roof and surface run-off should not significantly impact on groundwater quality and subject to appropriate approvals from Natural Resources Wales could be discharged directly to soakaways. However, although again subject to approvals from Natural Resources Wales, paved surface run-off for larger trafficked areas should generally be passed through a suitable form of oil interception device prior to discharge to the soakaway.

Care must be taken to ensure that the discharge of large volumes of surface run-off into the soil does not disrupt the existing sub-surface drainage patterns. Similarly, in areas of sloping topography, consideration should be given to the siting of soakaways to avoid potential discharge and or flooding of down slope areas.

10 Sulphates and Acidity

Chemical analysis of selected soils has been undertaken to establish the aggressive chemical environment for concrete in accordance with the BRE Special Digest 1, Ref [7].

5 No. additional samples were analysed for BRE SD1 suite B.

Oxidisable sulphides are calculated as being < 0.3% in all of samples.

Therefore pyrite is not considered to be potentially present and water extract of SO^4 is used to determine the site characteristic. Each water extract of SO4 is <500 mg/l.

In accordance with SD1, Table C, the Design Sulphate Class is **DS-1.**

Groundwater should be assumed to be mobile and the recorded pH values are in the range 5.2-7.9 (slightly acid to neutral). The corresponding ACEC class is therefore **AC-1s.**

Conditions are therefore similar to findings of the Phase II investigation.

11 Foundation Bearing Formation

The depth to bearing formation is schematically represented as Figure 3. Foundation design recommendations are discussed fully in the Phase II document, to which the reader is referred.

12 Pavement Construction

DCP CBR probes were undertaken at 5 trial hole locations. Driven from surface, a continual CBR with depth is attained down to 1m or refusal. The full results are appended and the lowest value attained for each of the horizons is tabulated below:-

Location	WLS13	WLS12	WLS11	WLS9	S1
Sub-base			67	155	373
Subgrade	9.3	6.1	20		22

The existing sub-base construction appears to be robust with 200-340mm of compacted quarrystone displaying good CBR values and inclusive of geo-grid and geotextile evidence in trial holes.

Based on the available data, it is anticipated that the sub-grade formation to proposed pavement areas will otherwise comprise of silty sandy clayey gravel and gravelly clay Made Ground.

The results of in-situ DCP CBR testing generally indicated sub-grade CBR values in the range of 6.1-22%. However, it should be noted that CBR readings can vary significantly depending on a number of factors, including the moisture content of the soil and this can in turn vary depending on the weather and other site conditions leading up to and during testing.

The results of Atterberg Limits tests on the cohesive fill materials indicate plasticity indices in the range of 9-10%. On the basis of guidance in the DMRB Ref [6], a CBR value of about 2.5% is estimated for a thin pavement construction for poor construction conditions with a low water table.

As discussed, full provenance is not available as to the engineered placement of the fill sub-grades at the site, and irrespective of the preliminary CBR data obtained, a design CBR of <2% would normally be prudently advised for hardstand design. Deep fill sub-grades underlie the site and hardstand construction should consider geo-grid reinforced design, with allowances for potential long term maintenance issues. Raising of levels should be avoided if settlements are to be mitigated.

Taking these factors into consideration, a preliminary design CBR value of 2% can be assumed for pavement foundation design purposes. However, given that the soils are likely to be disturbed by heavy plant during demolition and construction, it would be suggested that the CBR value is reassessed as construction progresses. Further sampling and laboratory testing may be necessary to satisfy Local Highway Authority design guidance, in terms of frequency and types of testing, if roads are to be submitted for adoption. Given the made ground status of the soils and the potential for marked variations in settlement characteristics from place to place, a geo-grid reinforced or lime/cement stabilised pavement construction should be considered.

The specialist contractor would be best placed to advise on the relative merits of the various systems available and on the suitability of the soils for the various treatments.

The most important element of any road construction is drainage and attention must be given not only to the drainage of the subsoil but to the various layers of construction. To this end, the formation should be shaped to a camber or crossfall to allow water movement out of the sub-base. Silty soils soften extremely quickly if allowed to become wet, or if they are excavated below the water table, and this softening can give rise to a very substantial increase in costs.

Sub-base and coarse capping materials tend to segregate during placing operations, particularly when end-tipped. On soft clay sub-grades this can lead to punching and softening of the formation. The use of an appropriate geo-textile or geo-fabric, laid in accordance with manufacturer's recommendations / guidance, should help to minimise this.

The formation should be proof-rolled in a manner appropriate to the sub-grade soils, and any soft spots found should be excavated and replaced with compacted granular material. The surface of the formation should then be appropriately compacted, prior to laying the capping layer and/or sub-base.

Construction traffic should be kept off formations and it is often advisable to leave a protective layer of soil above formation level until the last moment, before reducing to formation level and placing the capping and/or sub-base.

The formation should be considered potentially frost-susceptible.

13 Chemical Analysis

Along with the sulphate analysis reviewed in section 10 above, some additional contamination testing was undertaken.

The first test was a general suite undertaken on a sample of the natural sand subgrade in the location of the intended soakaway infrastructure. No elevated concentrations for a range of heavy metals, speciated PAHs and petroleum hydrocarbons were recorded above what might be considered natural background levels. This concurs with the visual and olfactory evidence. Provided the discharge media is the natural sands below the shallow fills, and there is no evidence of any impact, the contamination risk will be low.

The second analysis was precautionary screening of the site asphalt recovered from WLS9 & 10 for coal tars. None were recorded, and the data may be provided to receiving tips (along with all others from the Phase II investigation) for waste stream assessment.

REFERENCES

[1] BSI Standards, “BS 5930 Code of practice for ground investigations,” 2015.

[2] BSI Standards, “BS10175 Investigation of potentially contaminated sites – Code of practice,” 2013.

[3] Building Research Establishment (BRE), “DG365 Soakaway Design,” 2016.

[4] Building Research Establishment (BRE), “SD1 Concrete in aggressive ground,” 2005.

[5] Highways England, “Pavement Design CD 225 Design for new pavement foundations (Rev 1) (formerly IAN 73/06 revision 1 (2009), HD 25/94).”.

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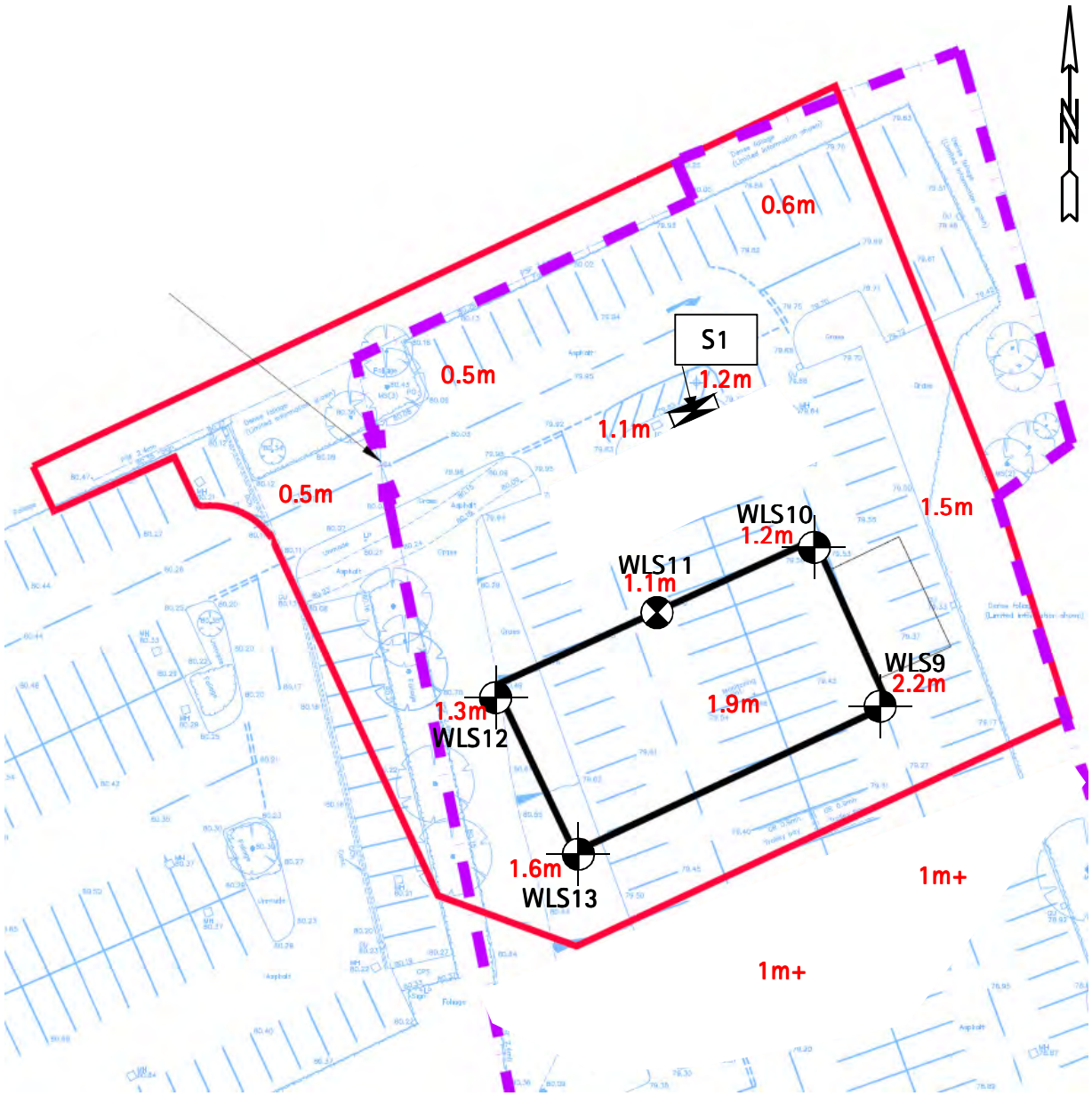


APPENDIX A

Site Plans and Exploratory Hole Logs



A



NB: Positions of Boreholes and/or Trial Pits are only indicative

Site:	Tesco Wrexham	STL: JN1246	Fig No: 1
Date:	29th May 2024	Made Ground Depths	

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Key to Exploratory Hole Logs, Plans and Sections

Backfill Symbols		Pipe Symbols		Principal Soil Types		Principal Rock Types		Drilling Records	
Arisings		Plain Pipe		Topsoil		Mudstone		Water Strike	
Concrete		Slotted Pipe		Made Ground		Claystone		Depth Water Rose	
Blacktop		Piezometer		Clay		Siltstone		Total Core Recovery (%) [TCR]	
Bentonite		Piezometer Tip		Silt		Sandstone		Solid Core Recovery (%) [SCR]	
Gravel Filter		Filter Tip		Sand		Limestone		Rock Quality Index (%) RQD]	
Sand Filter		Extensometer		Gravel		Chalk		Fracture Index (fractures / m) [FI]	
		Inclinometers		Peat					

All soil and rock descriptions are in general accordance with BS5930 2015, BS EN ISO 14688-1:2002+A1:2013 and BS EN ISO 14689-1:2003. Chalk descriptions are also based on CIRIA C574 and "Logging the Chalk – R.N. Mortimer 2015". The Geology Code is only provided where a positive identification of the sample strata has been made.

Location / Method Identifiers	
BH	Borehole (undefined)
CP	Cable Percussive
RC	Rotary Core
RO	Rotary Open Hole
ODC	Rotary Odex/Symmetrix drilling cased
CP+RC	Cable Percussive to Rotary Core
SNC	Sonic
CFA	Continuous Flight Auger
FA	Flight Auger
VC	Vibro Core
WLS+RC	Windowless (Dynamic) Sampler to Rotary Core
WLS	Windowless Sampler
WS	Window Sampler
HA	Hand Auger
C	Road / Pavement Core
IP	Inspection Pit (Hand Excavation)
TP	Trial Pit (Machine Excavated)
OP	Observation Pit (Supported Excavation Hand or Machine)

In-situ Test Location / Method	
DP	Dynamic Probe
CPT	Cone Penetration Test
CBR	In-situ CBR Test
DCP	CBR using Dynamic Cone Penetrometer
CBRT	CBR using TRL Probe
PB	Plate Bearing Test
SPT (S)	Standard Penetration Test (Split Barrel Sampler)
SPT (C)	Standard Penetration Test (Solid Cone)
N	SPT Result
-/-	Blows/Penetration (mm) after seating drive
-*/-	Total Blows / Penetration (mm)
( )	Extrapolated Value
PPT	Perth Penetration (In-House Method - Equivalent N Value)
HP / UCS	Strength from Hand Penetrometer (kN/m^2)
IVN	Strength from Hand Vane ((kN/m^2) P = peak, R = residual
PID	Photo Ionisation Detector (ppm)
MEXE	Mexi-Cone CBR (%)

Samples / Test Type	
B	Bulk Sample
BLK	Block Sample
C	Core Sample
CBRS	CBR Mould Sample
D	Small Disturbed Sample
ES	Environmental Sample (Soil)
EW	Environmental Sample (Water)
GS	Environmental Sample (Gas)

Samples / Test Type	
SPTLS	Standard Penetration Test Split Barrel Sample
TW	Thin Wall Push In Sample (e.g. Shelby Sampler)
U	Undisturbed Open Drive Sample (blows to take)
UT	Thin Wall Undisturbed Open Drive Sample (blows to take)
W	Water Sample (Geotechnical)
SP	Sample from Stockpile
P	Piston Sample
AMAL	Amalgamated Sample

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Start - End Date:	Project ID:	Hole Type:	S1
29/05/2024	JN1246	WS	Sheet 1 of 1

Client:	Glanvilles	Co-ordinates:	Level (m AOD)	Logger:

Project Name:	Tescos Wrexham	Location:	Crescent Rd, Wrexham

Well	Water Strikes	Samples and Insitu Testing			Progress	Depth (m)	Level (m AOD)	Legend	Stratum Description
		Depth (m)	Type/FI	Results	Window Run				
		0.30	ES				(0.55)		MADE GROUND:- Brown silty clayey sand topsoil. Some cobbles sandstone and concrete.
						0.55			
							(0.20)		MADE GROUND:- Moderately compact grey MOT limestone aggregate. Terram at base.
						0.75			
							(0.45)		MADE GROUND:- Moderately compact dark grey silty sandy gravelly clay including brick, tile, wire and glass fragments.
						1.20			
		1.80	ES SPT	N=9 (2,2/2,2,2,3)			(1.80)		Medium dense brown silty fine SAND.
						3.00			End of Borehole at 3.00m

1 2 3 4 5

Remarks:

1.6m long gravel filled soak

Status:		Log Print Date and Time:	10/06/2024 11:32	Log Approved By:	

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Start - End Date:	Project ID:	Hole Type:	WLS9
29/05/2024	JN1246	WS	Sheet 1 of 1

Client:	Glanvilles	Co-ordinates:	Level (m AOD)	Logger:

Project Name:	Tescos Wrexham	Location:	Crescent Rd, Wrexham

Well	Water Strikes	Samples and Insitu Testing			Progress	Depth (m)	Level (m AOD)	Legend	Stratum Description
		Depth (m)	Type/Fl	Results	Window Run				
		0.06	ES			0.11	(0.11)		ASPHALT
							(0.34)		MADE GROUND:- Moderately compact grey limestone MOT aggregate. Geogrid at base.
						0.45			MADE GROUD:- moderately compact dark grey silty sand and clay with abundant gravel including sandstone. brick and clinker.
		1.00	SPT	N=19 (3,5/4,5,6,4)			(1.75)		
		1.50	ES						
		2.00	SPT	N=14 (4,5/4,3,3,4)		2.20			Medium dense buff brown silty fine to medium SAND. From 3m becoming moister SILT & SAND.
		3.00	SPT	N=20 (3,2/3,5,6,6)			(2.25)		
		4.00	SPT	N=15 (2,4/4,4,3,4)					
		4.45	D			4.45			End of Borehole at 4.45m

Remarks:

Status:		Log Print Date and Time:	10/06/2024 11:32	Log Approved By:	

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Start - End Date:	Project ID:	Hole Type:	WLS10
29/05/2024	JN1246	WS	Sheet 1 of 1

Client:	Glanvilles	Co-ordinates:	Level (m AOD)	Logger:

Project Name:	Tescos Wrexham	Location:	Crescent Rd, Wrexham

Well	Water Strikes	Samples and Insitu Testing			Progress	Depth (m)	Level (m AOD)	Legend	Stratum Description
		Depth (m)	Type/FI	Results	Window Run				
		0.05	ES			0.10	(0.10)		ASPHALT.
							(0.30)		MADE GROUND:- Moderately compact to compact grey limestone MOT aggregate. Terram & geogrid at base.
						0.40			MADE GROUND:- Moderately compact dark grey silty sandy clay with gravel including brick and shale.
							(0.80)		
		1.00	ES SPT	N=22 (4,4/3,5,8,6)					
						1.20			Medium dense brown silty fine SAND. Initially dark brown.
		2.00	SPT	N=15 (2,4/4,4,5,2)			(2.25)		
		3.00	SPT	N=7 (2,2/1,1,2,3)					
		3.45	D			3.45			End of Borehole at 3.45m

1 2 3 4 5

Remarks:

Status:		Log Print Date and Time:	10/06/2024 11:32	Log Approved By:	

Southern Testing ST Consult	Start - End Date:	Project ID:	Hole Type:	WLS11
	29/05/2024	JN1246	WS	Sheet 1 of 1

Client:	Glanvilles	Co-ordinates:	Level (m AOD)	Logger:
Project Name:	Tescos Wrexham	**Location:**	Crescent Rd, Wrexham	

Well	Water Strikes	Samples and Insitu Testing			Progress	Depth (m)	Level (m AOD)	Legend	Stratum Description
		Depth (m)	Type/FI	Results	Window Run				
						0.08	(0.08)		ASPHALT
									MADE GROUND:- Moderately compact grey limestone MOT aggregate. Geogrid at base.
						0.40	(0.32)		
									MADE GROUND:- Moderately compact dark grey silty sandy topsoil material including brick clinker and sandstone.
		1.00	ES SPT	N=14 (3,5/5,3,3,3)		1.10	(0.70)		
									Medium dense brown silty fine SAND with occasional rootlets.
		2.00	SPT	N=9 (3,2/2,1,3,3)		1.90	(0.80)		Medium dense buff fine to medium SAND.
		2.50	D						
		3.00	SPT	N=7 (2,2/2,1,2,2)			(1.55)		
						3.45			End of Borehole at 3.45m

Remarks:

Status:		Log Print Date and Time:	10/06/2024 11:32	Log Approved By:	

Southern Testing ST Consult	Start - End Date:	Project ID:	Hole Type:	WLS12
	29/05/2024	JN1246	WS	Sheet 1 of 1

Client:	Glanvilles	Co-ordinates:	Level (m AOD)	Logger:
Project Name:	Tescos Wrexham	**Location:**	Crescent Rd, Wrexham	

Well	Water Strikes	Samples and Insitu Testing			Progress	Depth (m)	Level (m AOD)	Legend	Stratum Description
		Depth (m)	Type/FI	Results	Window Run				
		0.10	ES			0.20	(0.20)		Topsoil & Turf
						0.80	(0.60)		MADE GROUND:- Loose to moderately compact reworked brown silty fine sand.
		1.00	SPT	N=22 (3,5/5,6,5,5,6)		1.30	(0.50)		MADE GROUND:- Moderately compact dark grey silty sandy clay including brick sandstone and clinker.
		1.50	D			1.90	(0.60)		Medium dense brown silty fine SAND.
		2.00	SPT	N=8 (2,1/2,1,2,3)			(1.55)		Medium dense buff fine to medium SAND.
		3.00	SPT	N=10 (2,1/2,2,2,4)					
		3.45	D			3.45			End of Borehole at 3.45m

Remarks:

Status:		Log Print Date and Time:	10/06/2024 11:32	Log Approved By:	

Southern Testing ST Consult

Start - End Date:	Project ID:	Hole Type:	WLS13
29/05/2024	JN1246	WS	Sheet 1 of 1

Client:	Glanvilles	Co-ordinates:	Level (m AOD)	Logger:

Project Name:	Tescos Wrexham	Location:	Crescent Rd, Wrexham

Well	Water Strikes	Samples and Insitu Testing			Progress	Depth (m)	Level (m AOD)	Legend	Stratum Description
		Depth (m)	Type/FI	Results	Window Run				
						0.20	(0.20)		Topsoil & Turf.
						0.65	(0.45)		MADE GROUND:- Reworked natural brown sand.
		1.00	ES SPT	N=26 (2,4/4,6,7,9)			(0.95)		MADE GROUND:- Moderately compact grey silty sandy gravelly clay topsoil material. Including sandstone, clinker and brick fragments.
						1.60	(0.30)		Medium dense brown silty fine SAND.
		2.00	SPT	N=9 (1,2/2,2,2,3)		1.90	(1.55)		Medium dense buff fine to medium SAND.
		3.00	ES SPT	N=8 (1,1/2,1,2,3)		3.45			End of Borehole at 3.45m

Remarks:

Status:		Log Print Date and Time:	10/06/2024 11:32	Log Approved By:	

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Environmental & Geotechnical



APPENDIX B

Field CBR & Soakage Test Results



B

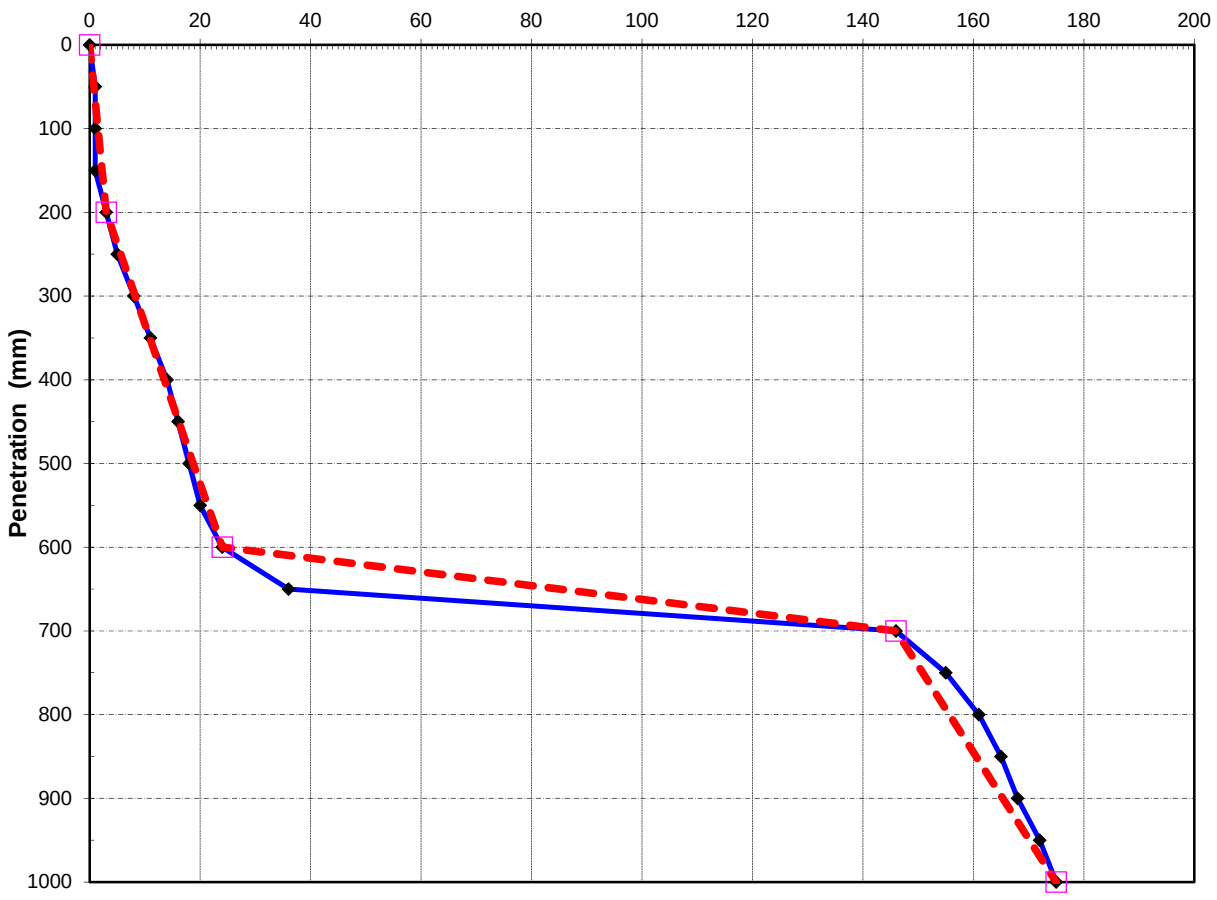
Dynamic Cone Penetrometer (DCP) Test Results

Test No: S1

Chainage:
Start Layer: Turf
Soil Condition:
Notes:

Tested By: ES
Checked By: CN
Test Date: 29-May-24

Perth Cone CBR Penetration *vs* Cumulative Blow Count



Evaluated CBR Values from DCP Test Results

Layer No	From *(mm)*	To *(mm)*	Depth *(mm)*	Blow Count	No. of Blows	DCP *mm/blow*	CBR *%*	Soil Type	Remarks
1	0	200	200	3	3	66.7	2.0		
2	200	600	400	24	21	19.0	9.9		
3	600	700	100	146	122	0.8	373		
4	700	1000	300	175	29	10.3	22		

Client:	**Glanville**	**Job No:**	JN1246		
Site:	**Wrexham**	**Date:**	29/05/2024	**Fig.**	

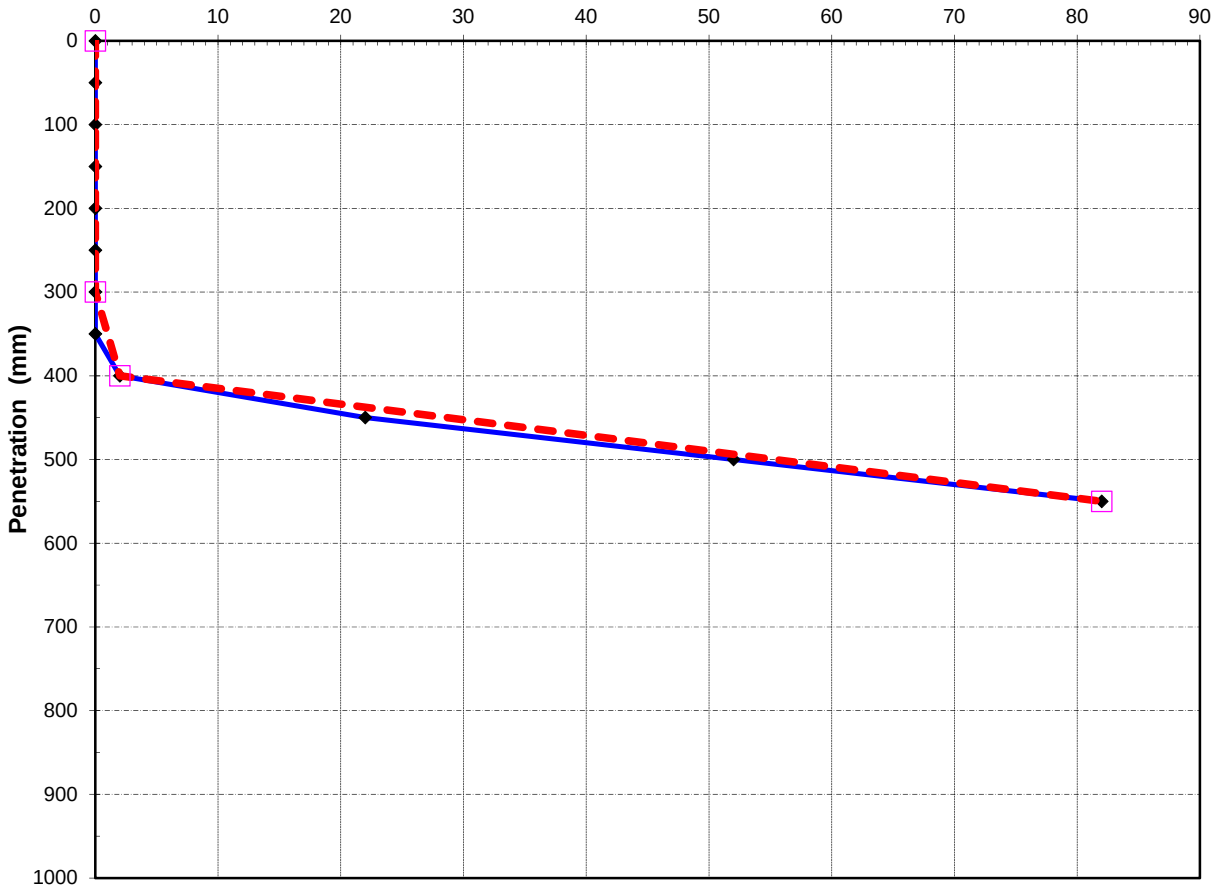
Dynamic Cone Penetrometer (DCP) Test Results

Test No: WLS9

Chainage:
Start Layer: Subbase
Soil Condition:
Notes:

Tested By: ES
Checked By: CN
Test Date: 29-May-24

Perth Cone CBR Penetration *vs* Cumulative Blow Count



Evaluated CBR Values from DCP Test Results

Layer No	From *(mm)*	To *(mm)*	Depth *(mm)*	Blow Count	No. of Blows	DCP *mm/blow*	CBR *%*	Soil Type	Remarks
1	0	300	300	0	0	0.0	0.0		
2	300	400	100	2	2	50.0	2.9		
3	400	550	150	82	80	1.9	155		

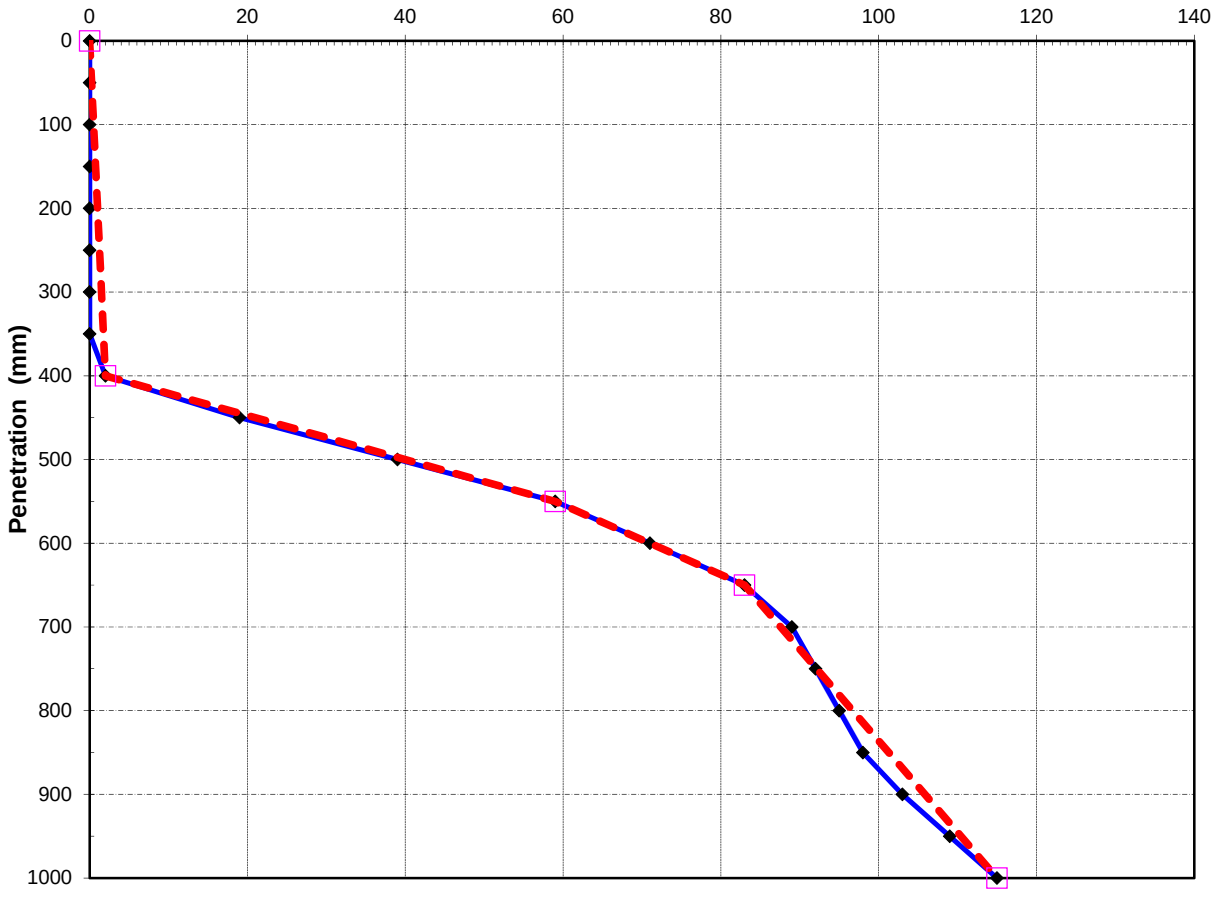
Client:	**Glanville**	**Job No:**	JN1246		
Site:	**Wrexham**	**Date:**	29/05/2024	**Fig.**	

Dynamic Cone Penetrometer (DCP) Test Results

Test No: WLS11

Chainage:		Tested By:	ES
Start Layer:	Subbase	Checked By:	CN
Soil Condition:		Test Date:	29-May-24
Notes:			

Perth Cone CBR Penetration *vs* Cumulative Blow Count



Evaluated CBR Values from DCP Test Results

Layer No	From *(mm)*	To *(mm)*	Depth *(mm)*	Blow Count	No. of Blows	DCP *mm/blow*	CBR *%*	Soil Type	Remarks
1	0	400	400	2	2	200.0	0.5		
2	400	550	150	59	57	2.6	109		
3	550	650	100	83	24	4.2	67		
4	650	1000	350	115	32	10.9	20		

Client:	**Glanville**		**Job No:**	JN1246	
Site:	**Wrexham**		**Date:**	29/05/2024	**Fig.**

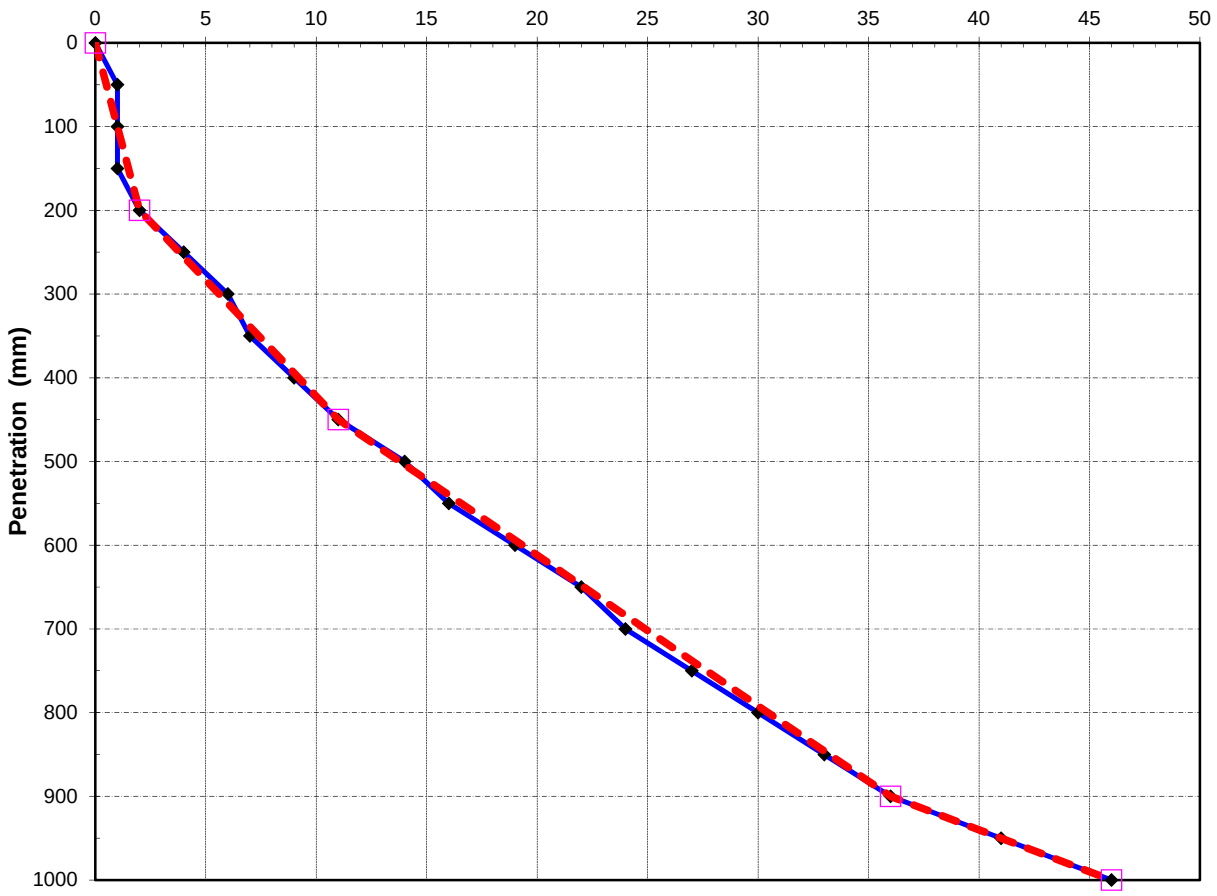
Dynamic Cone Penetrometer (DCP) Test Results

Test No: WLS12

Chainage:
Start Layer: Turf
Soil Condition:
Notes:

Tested By: ES
Checked By: CN
Test Date: 29-May-24

Perth Cone CBR Penetration *vs* Cumulative Blow Count



Evaluated CBR Values from DCP Test Results

Layer No	From *(mm)*	To *(mm)*	Depth *(mm)*	Blow Count	No. of Blows	DCP *mm/blow*	CBR *%*	Soil Type	Remarks
1	0	200	200	2	2	100.0	1.2		
2	200	450	250	11	9	27.8	6.1		
3	450	900	450	36	25	18.0	11		
4	900	1000	100	46	10	10.0	22		

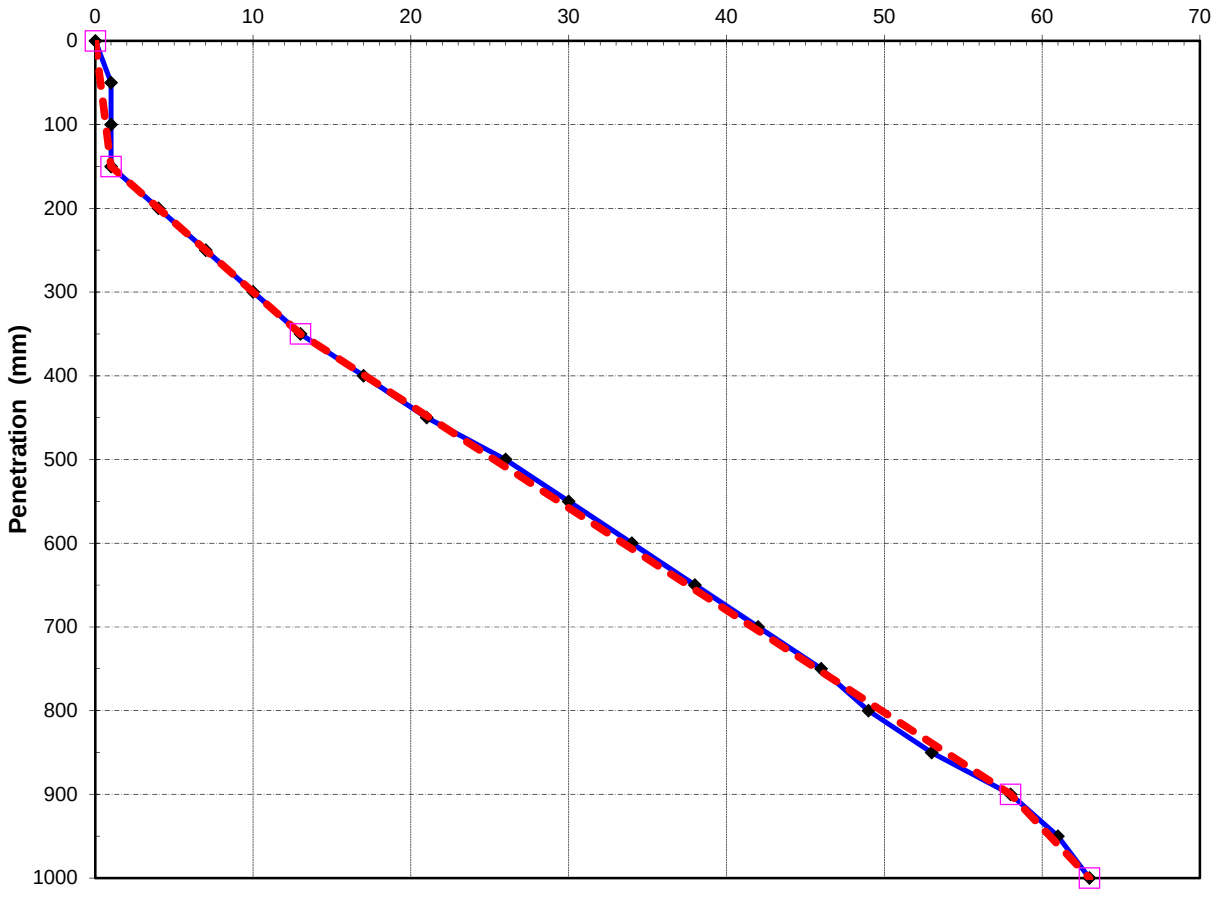
Client:	**Glanville**	**Job No:**	JN1246		
Site:	**Wrexham**	**Date:**	29/05/2024	**Fig.**	

Dynamic Cone Penetrometer (DCP) Test Results

Test No: WLS13

Chainage:		Tested By:	ES
Start Layer:	Turf	Checked By:	CN
Soil Condition:		Test Date:	29-May-24
Notes:			

Perth Cone CBR Penetration *vs* Cumulative Blow Count



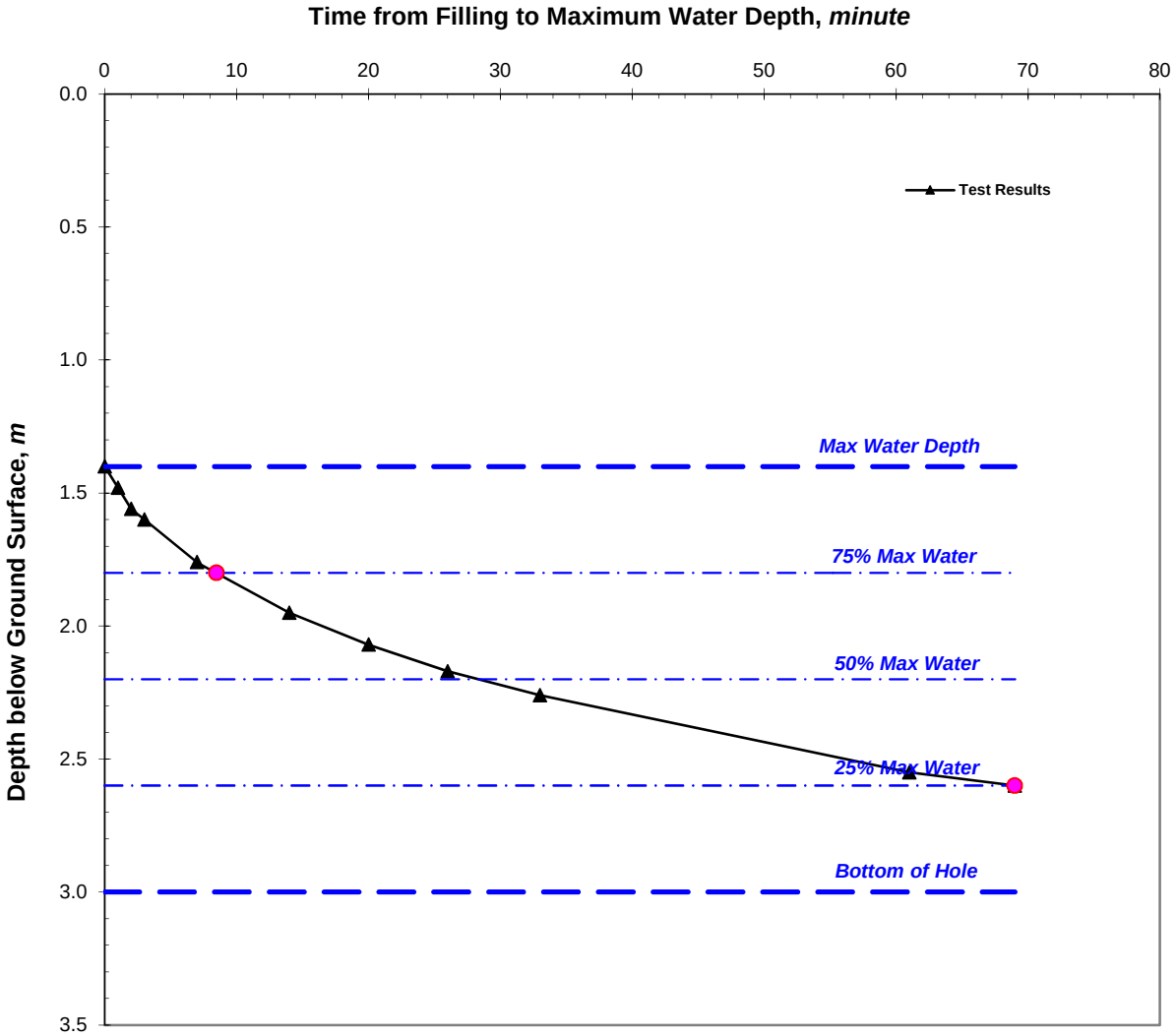
Evaluated CBR Values from DCP Test Results

Layer No	From *(mm)*	To *(mm)*	Depth *(mm)*	Blow Count	No. of Blows	DCP *mm/blow*	CBR *%*	Soil Type	Remarks
1	0	150	150	1	1	150.0	0.7		
2	150	350	200	13	12	16.7	12		
3	350	900	550	58	45	12.2	17		
4	900	1000	100	63	5	20.0	9.3		

Client:	**Glanville**	**Job No:**	JN1246	
Site:	**Wrexham**	**Date:**	29/05/2024	**Fig.**

BRE Digest DG365 Soakage Test

Test Hole No: S1
Test No: Test No 1 (Initial)



Pit Length, m	1.600	Depth to Water at Start of Test, ***m***	1.400
Pit Width, m	0.450	Max Water Dropdown during Test, ***m***	1.200
Depth to Pit Base, m	3.000	Total Soakage Test Time, ***min***	69.0
Depth to Top of Permeable Soils, ***m***	1.200	Mean Internal Discharge Area, m^2	4.000
Depth to Groundwater Surface, ***m***		Discharge Rate, ***litre/min***	3.807
Depth to Top of Granular Fill, ***m***	1.330	Soakage Rate, $litre/m^2/min$	**0.952**
Voids Assumed for Granular Fill, %	40%	BRE Soil Infiltration Rate, ***m/sec***	**1.59E-05**

Comments:

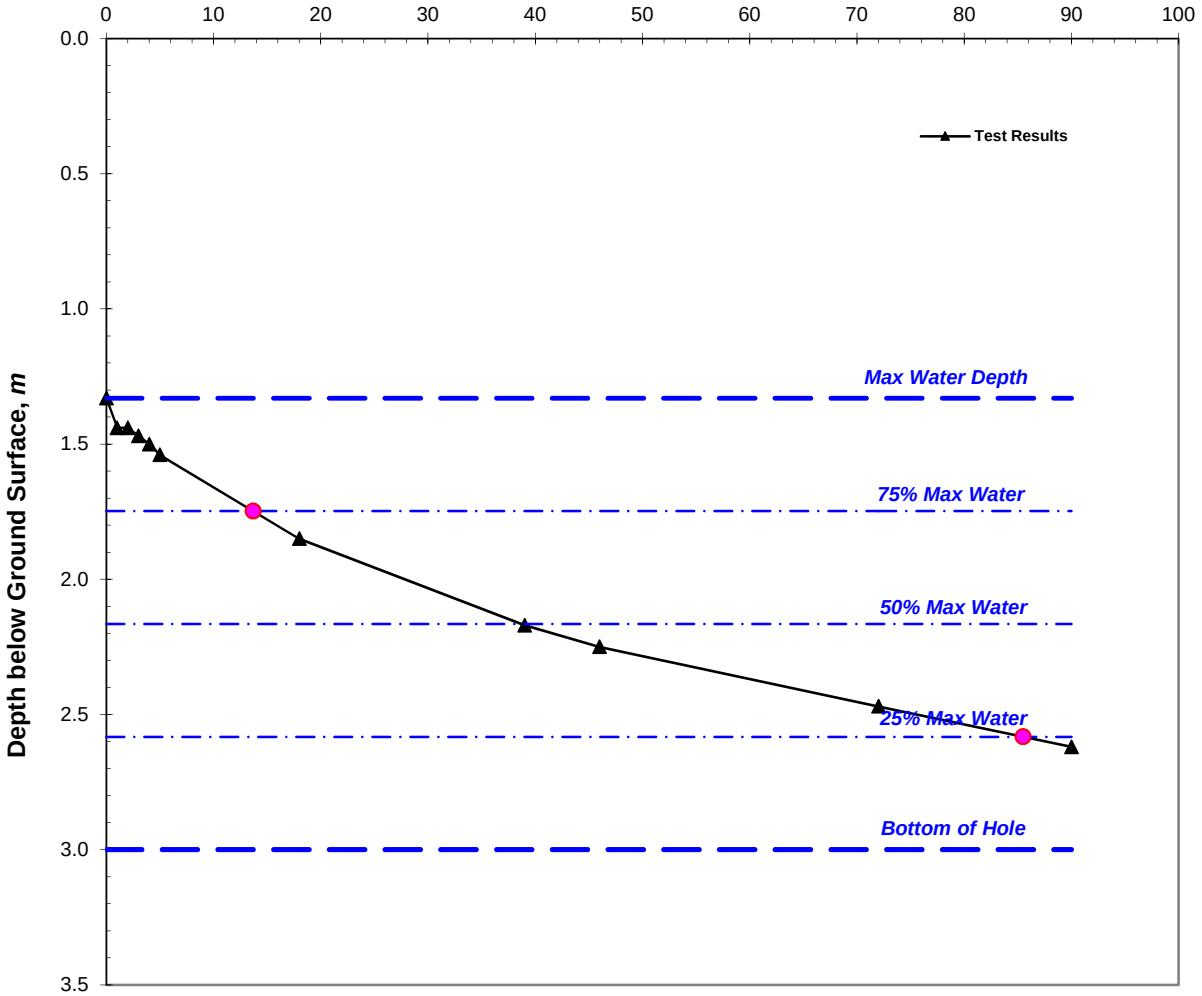
Pit was nearly emptied at finish of test.

Client:	Glanville	**Job No:**	JN1246	**Test Date:**	29/May/2024		
Site:	Wrexham	**Tested By:**	PB	**Engineer:**	CN	**Fig.**	**S1**

BRE Digest DG365 Soakage Test

Test Hole No: S1
Test No: Test No 2 (Repeated)

Time from Filling to Maximum Water Depth, *minute*



Pit Length, m	1.600	Depth to Water at Start of Test, ***m***	1.330
Pit Width, m	0.450	Max Water Dropdown during Test, ***m***	1.290
Depth to Pit Base, m	3.000	Total Soakage Test Time, ***min***	90.0
Depth to Top of Permeable Soils, ***m***	1.200	Mean Internal Discharge Area, ***m^2***	4.144
Depth to Groundwater Surface, ***m***		Discharge Rate, ***litre/min***	3.349
Depth to Top of Granular Fill, ***m***	1.330	Soakage Rate, ***litre/m^2/min***	**0.808**
Voids Assumed for Granular Fill, %	40%	BRE Soil Infiltration Rate, ***m/sec***	**1.35E-05**

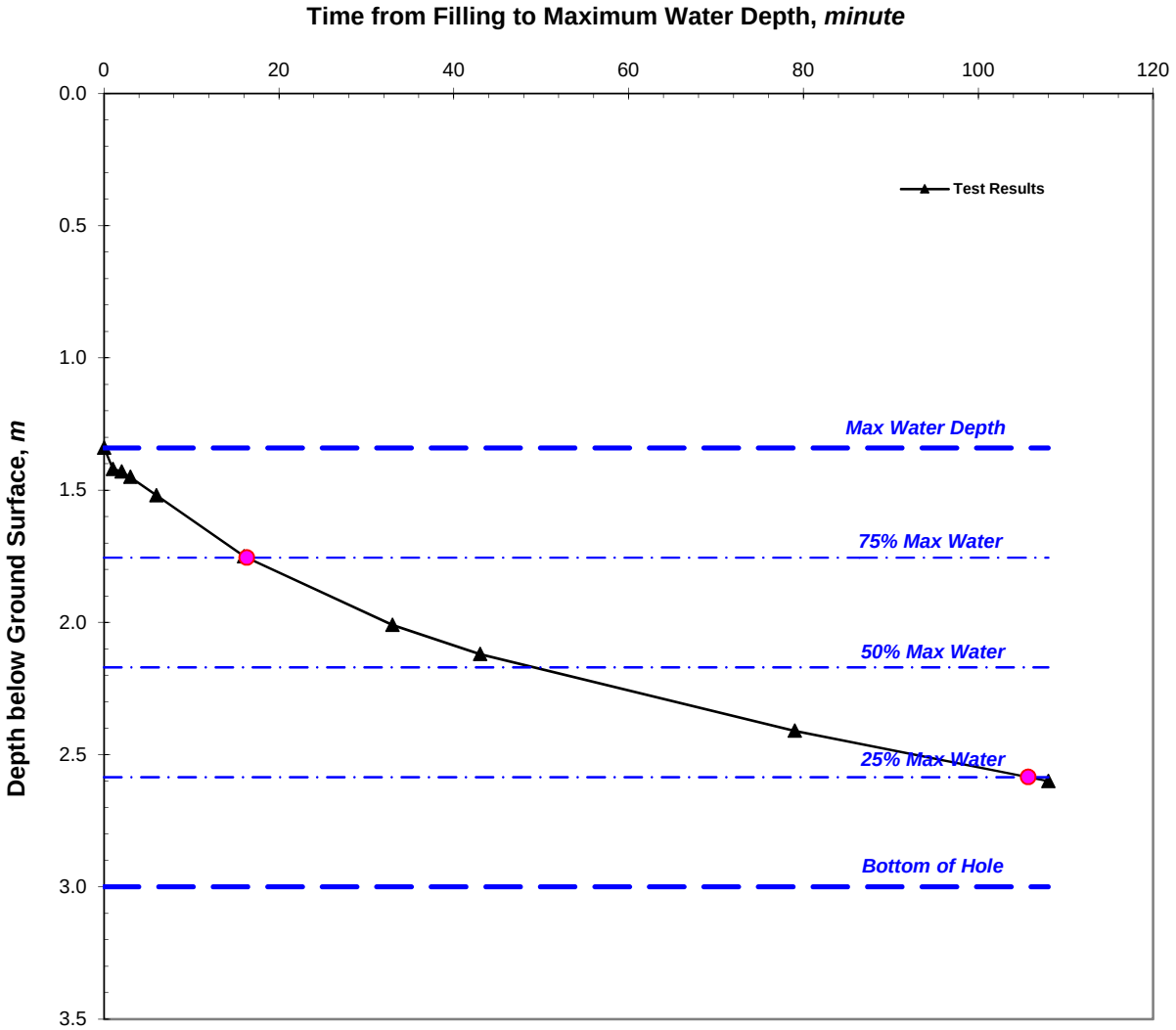
Comments:

Pit was nearly emptied at finish of test.

Client:	Glanville	**Job No:**	JN1246	**Test Date:**	29/May/2024		
Site:	Wrexham	**Tested By:**	PB	**Engineer:**	CN	**Fig.**	**S2**

BRE Digest DG365 Soakage Test

Test Hole No: S1
Test No: Test No 3 (Repeated)



Pit Length, m	1.600	Depth to Water at Start of Test, ***m***	1.340
Pit Width, m	0.450	Max Water Dropdown during Test, ***m***	1.260
Depth to Pit Base, m	3.000	Total Soakage Test Time, ***min***	108.0
Depth to Top of Permeable Soils, ***m***	1.200	Mean Internal Discharge Area, m^2	4.123
Depth to Groundwater Surface, ***m***		Discharge Rate, ***litre/min***	2.674
Depth to Top of Granular Fill, ***m***	1.330	Soakage Rate, $litre/m^2/min$	**0.649**
Voids Assumed for Granular Fill, %	40%	BRE Soil Infiltration Rate, ***m/sec***	**1.08E-05**

Comments:

Pit was nearly emptied at finish of test.

Client:	Glanville	**Job No:**	JN1246	**Test Date:**	29/May/2024		
Site:	Wrexham	**Tested By:**	PB	**Engineer:**	CN	**Fig.**	**S3**

Summary Sheet

Results of BRE Digest DG365 Soakage Tests

Site : Wrexham						**Job No :** JN1246	
Client : Glanville						**O S Reference :**	
Tested By : PB				**Engineer:** CN		**Test Date :** 29/May/2024	
Hole No	**Test No**	**Hole Depth** *m*	**Soakage Rate for Each Test** *litre/m² /min*	**Soakage Rate for Each Hole** *litre/m² /min*	*m/sec*	**Water Level at Finish of Test**	**Remarks**
S1	No 1	3.00	0.952	0.649	1.08E-5	Nearly empty pit.	Depth to top of permeable soils was 1.2m.
S1	No 2	3.00	0.808			Nearly empty pit.	
S1	No 3	3.00	0.649			Nearly empty pit.	
Mean Value of All Calculated Soakage Rates :				**0.649** *litre/m² /min*	**1.08E-5** *m/sec*		

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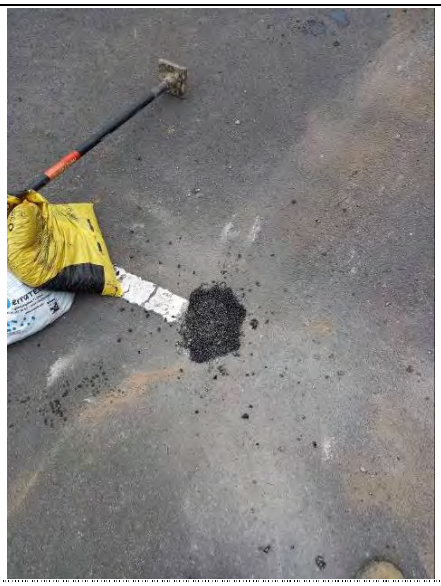
APPENDIX C

Photographs



C

JN1246 Wrexham 2024	
	
Soakaway S1	Skip muck away
	
Spoil area condition	NE corner of site
	
S1 reinstatement	Works entrance fencing & signage

JN1246 Wrexham 2024	
	
WLS10	WLS9
	
South to north across site	WLS11
	
Reinstate WLS11	WLS12

JN1246 Wrexham 2024	
	
Raised western landscape	East to west across site
	
Monitoring Well WLS3 decommissioning	Monitoring Well WLS3 decommissioning

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APPENDIX D

Laboratory Test Methods and Results



D

Southern Testing: Keeble House, Stuart Way, East Grinstead, West Sussex RH19 4QA
ST Consult: Twigden Barns, Brixworth Road, Creaton, Northampton NN6 8LU

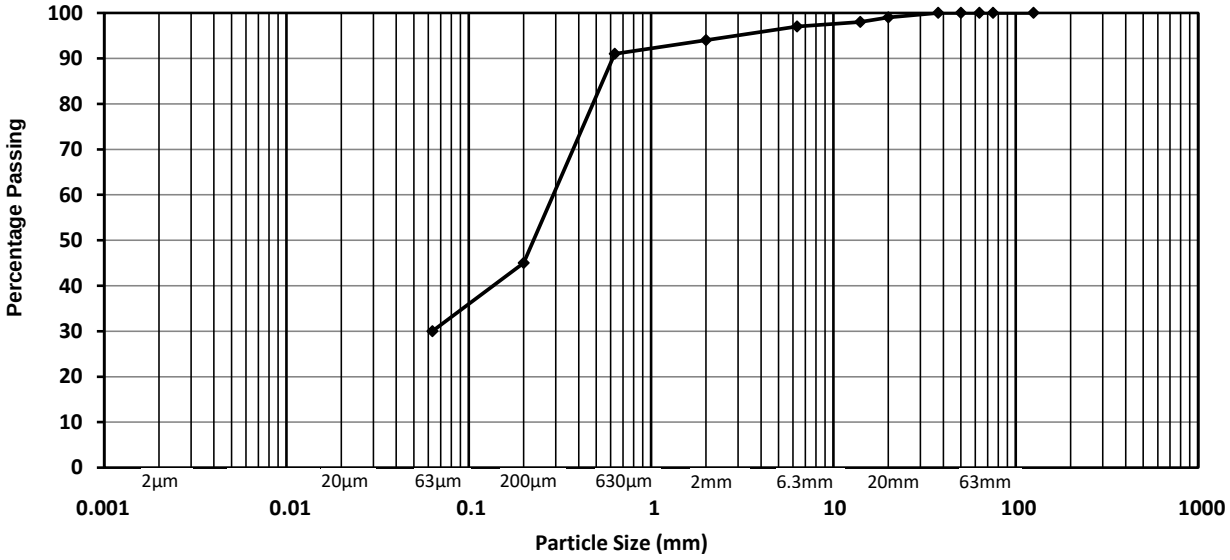
Particle Size Distribution - Grading

Project Name	**Tesco, Wrexham**			**Project No.**	**JN1246**
				Location ID	**WLS9**
Client	**Glanville Consultants Limited**	**Project Engineer**	**CW**	**Depth (m)**	**4.45**
				Sample Type	Small Bag
				Date Issued	**06-Jun-24**
				Tested By	RL
				Checked By	RL

Visual Description of Sample:

Dark brown clayey/silty gravelly fine and medium SAND. Gravel consists of fine to coarse subangular to well rounded sandstone.

Particle Size Distribution Chart



CLAY	Fine	Medium	Coarse	Fine	Medium	Coarse	Fine	Medium	Coarse	COBBLES
	SILT			SAND			GRAVEL			
30%				65%			6%			0%

Particle Size	% Passing
125mm	100
75mm	100
63mm	100
50mm	100
37.5mm	100
20mm	99
14mm	98
6.3mm	97
2mm	94
630µm	91
200µm	45
63µm	30

Coefficient of Uniformity D60/D10	>4.65

Comment:

Test Method:

Wet & Dry Grading: BS EN ISO 17892-4:2016 cl. 5.2

Southern Testing: Keeble House, Stuart Way, East Grinstead, West Sussex RH19 4QA
ST Consult: Twigden Barns, Brixworth Road, Creaton, Northampton NN6 8LU

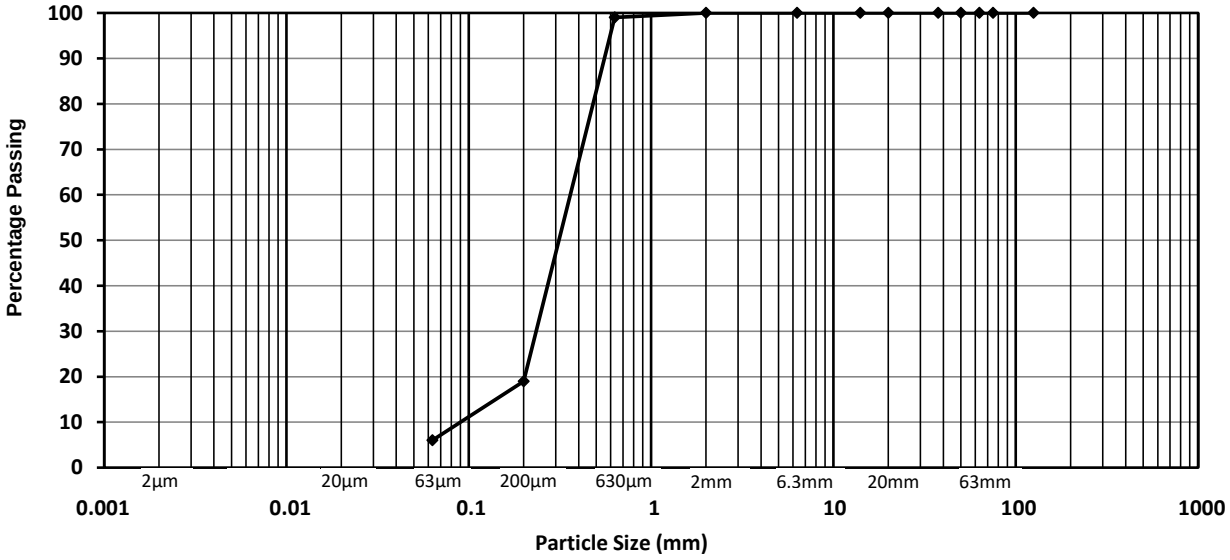
Particle Size Distribution - Grading

Project Name	**Tesco, Wrexham**			**Project No.**	**JN1246**
				Location ID	**WLS11**
Client	**Glanville Consultants Limited**	**Project Engineer**	**CW**	**Depth (m)**	**2.50**
				Sample Type	Small Bag
				Date Issued	**06-Jun-24**
				Tested By	RL
				Checked By	RL

Visual Description of Sample:

Brown clayey/silty fine and medium SAND.

Particle Size Distribution Chart



CLAY	Fine	Medium	Coarse	Fine	Medium	Coarse	Fine	Medium	Coarse	COBBLES
	SILT			SAND			GRAVEL			
6%				94%			0%			0%

Particle Size	% Passing
125mm	100
75mm	100
63mm	100
50mm	100
37.5mm	100
20mm	100
14mm	100
6.3mm	100
2mm	100
630µm	99
200µm	19
63µm	6

Coefficient of Uniformity D60/D10	3.87

Comment:

Test Method:

Wet & Dry Grading: BS EN ISO 17892-4:2016 cl. 5.2

Southern Testing: Keeble House, Stuart Way, East Grinstead, West Sussex RH19 4QA
ST Consult: Twigden Barns, Brixworth Road, Creaton, Northampton NN6 8LU

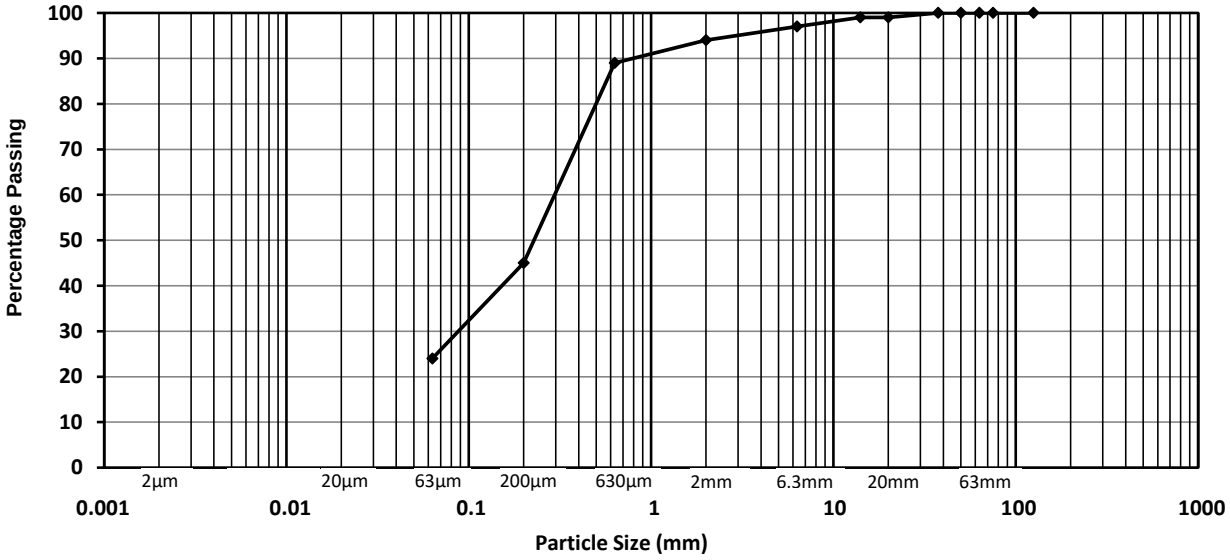
Particle Size Distribution - Grading

Project Name	**Tesco, Wrexham**			**Project No.**	**JN1246**
				Location ID	**WLS12**
Client	**Glanville Consultants Limited**	**Project Engineer**	**CW**	**Depth (m)**	**1.50**
				Sample Type	Small Bag
				Date Issued	**06-Jun-24**
				Tested By	RL
				Checked By	RL

Visual Description of Sample:

Dark brown clayey/silty gravelly fine and medium SAND. Gravel consists of fine to coarse subangular to well rounded sandstone.

Particle Size Distribution Chart



CLAY	Fine	Medium	Coarse	Fine	Medium	Coarse	Fine	Medium	Coarse	COBBLES
	SILT			SAND			GRAVEL			
24%				69%			6%			0%

Particle Size	% Passing
125mm	100
75mm	100
63mm	100
50mm	100
37.5mm	100
20mm	99
14mm	99
6.3mm	97
2mm	94
630µm	89
200µm	45
63µm	24

Coefficient of Uniformity D60/D10	>4.72

Comment:

Test Method:

Wet & Dry Grading: BS EN ISO 17892-4:2016 cl. 5.2

TEST CERTIFICATE

DETERMINATION OF LIQUID AND PLASTIC LIMITS

Tested in Accordance with: BS EN ISO 17892-12:2018+A2:2022, cl 5.3 and 5.5, Fall Cone Method, 4 Pt Test, BS 1377-2:2022, cl 5.2 and 6

i2 Analytical Ltd
Unit 8 Harrowden Road
Brackmills Industrial Estate
Northampton NN4 7EB

4041

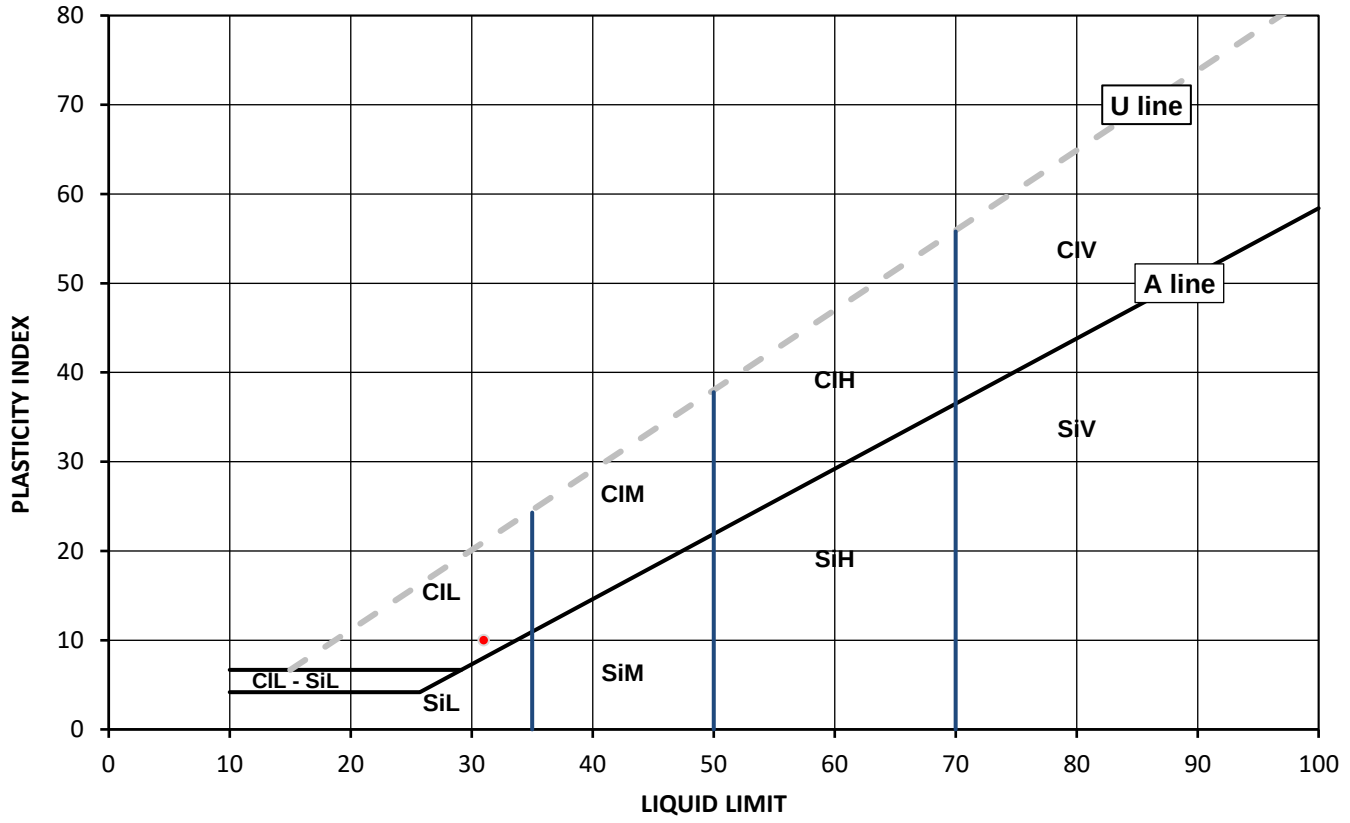
Client:	ST Consult Ltd	Client Reference:	JN1246
Client Address:	Twigden Barns, Brixworth Road, Creaton, Northamptonshire, NN6 8NN	Job Number:	24-022539-1
		Date Sampled:	Not Given
		Date Received:	31/05/2024
Contact:	Chris Nolan	Date Tested:	07/06/2024
Site Address:	Wrexham	Sampled By:	Not Given

Testing carried out at i2 Analytical Limited, ul. Pionierow, 41-711 Ruda Slaska, Poland

Test Results:

Laboratory Reference:	214537	Depth Top [m]:	1.50
Hole No.:	WLS9	Depth Base [m]:	Not Given
Sample Reference:	Not Given	Sample Type:	B
Sample Description:	Brown gravelly very sandy silty CLAY		
Sample Preparation:	Tested after washing to remove >0.425mm; The water content in the sample was increased		
Cone Type:	80g/30deg		

As Received Water Content [W] %	Liquid Limit [WL] %	Plastic Limit [Wp] %	Plasticity Index [Ip] %	Liquidity Index [IL] % #	Consistency Index [IC] % #	% Passing 425µm BS Test Sieve
13.4	31	21	10	-0.80	1.80	50



Legend, based on BS EN ISO 14688 2:2018 Geotechnical investigation and testing – Identification and classification of soil

		Plasticity		Liquid Limit
Cl	Clay	L	Low	below 35
Si	Silt	M	Medium	35 to 50
		H	High	50 to 70
		V	Very high	exceeding 70
		O	Organic	append to classification for organic material (eg ClHO)

Note: Water Content by BS EN 17892-1: 2014; # Non accredited

Remarks: Sample tested under Red Lab condition.

Opinions and interpretations expressed herein are outside of the scope of the UKAS Accreditation. This report may not be reproduced other than in full without the prior written approval of the issuing laboratory. The results included within the report relate only to the sample(s) submitted for testing.

Signed: Monika Siewior

Monika Siewior
Reporting Specialist
for and on behalf of i2 Analytical Ltd

Date Reported: 20/06/2024

GF 337.13

TEST CERTIFICATE

DETERMINATION OF LIQUID AND PLASTIC LIMITS

Tested in Accordance with: BS EN ISO 17892-12:2018+A2:2022, cl 5.3 and 5.5, Fall Cone Method, 4 Pt Test, BS 1377-2:2022, cl 5.2 and 6

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Unit 8 Harrowden Road
Brackmills Industrial Estate
Northampton NN4 7EB

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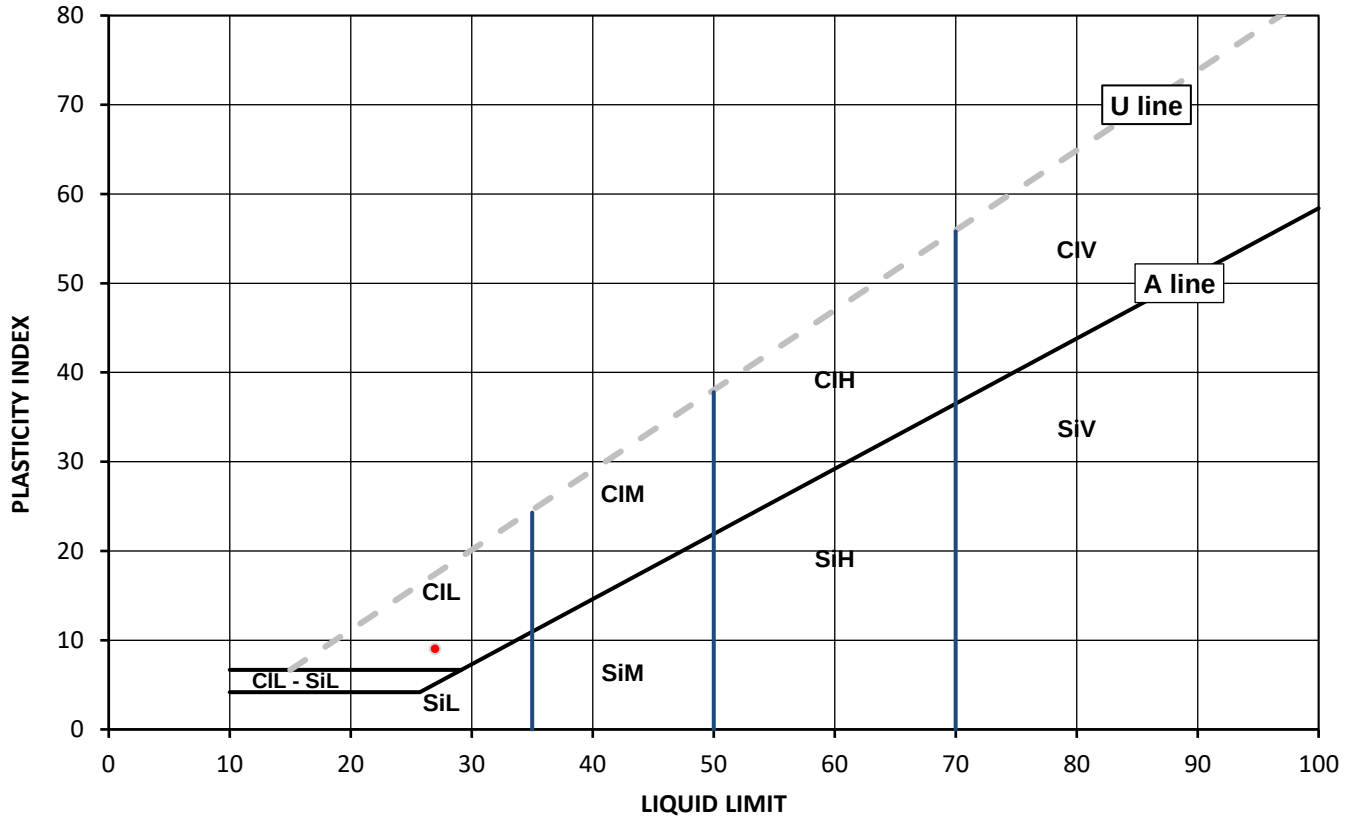
Client:	ST Consult Ltd	Client Reference:	JN1246
Client Address:	Twigden Barns, Brixworth Road, Creaton, Northamptonshire, NN6 8NN	Job Number:	24-022539-1
		Date Sampled:	Not Given
		Date Received:	31/05/2024
Contact:	Chris Nolan	Date Tested:	07/06/2024
Site Address:	Wrexham	Sampled By:	Not Given

Testing carried out at i2 Analytical Limited, ul. Pionierow, 41-711 Ruda Slaska, Poland

Test Results:

Laboratory Reference:	214538	Depth Top [m]:	1.00
Hole No.:	WLS11	Depth Base [m]:	Not Given
Sample Reference:	Not Given	Sample Type:	B
Sample Description:	Brown gravelly very sandy silty CLAY		
Sample Preparation:	Tested after washing to remove >0.425mm; The water content in the sample was increased		
Cone Type:	80g/30deg		

As Received Water Content [W] %	Liquid Limit [WL] %	Plastic Limit [Wp] %	Plasticity Index [Ip] %	Liquidity Index [IL] % #	Consistency Index [IC] % #	% Passing 425µm BS Test Sieve
7.4	27	18	9	-1.22	2.22	61



Legend, based on BS EN ISO 14688 2:2018 Geotechnical investigation and testing – Identification and classification of soil

		Plasticity		Liquid Limit
Cl	Clay	L	Low	below 35
Si	Silt	M	Medium	35 to 50
		H	High	50 to 70
		V	Very high	exceeding 70
		O	Organic	append to classification for organic material (eg ClHO)

Note: Water Content by BS EN 17892-1: 2014; # Non accredited

Remarks: Sample tested under Red Lab condition.

Opinions and interpretations expressed herein are outside of the scope of the UKAS Accreditation. This report may not be reproduced other than in full without the prior written approval of the issuing laboratory. The results included within the report relate only to the sample(s) submitted for testing.

Signed: Monika Siewior

Monika Siewior
Reporting Specialist
for and on behalf of i2 Analytical Ltd

Date Reported: 20/06/2024

GF 337.13

SUMMARY REPORT

SUMMARY OF CLASSIFICATION TEST RESULTS

Tested in Accordance with:

i2 Analytical Ltd
Unit 8 Harrowden Road
Brackmills Industrial Estate
Northampton NN4 7EB

4041

Client: ST Consult Ltd

Client Address: Twigden Barns, Brixworth Road, Creaton, Northamptonshire, NN6 8NN

Contact: Chris Nolan

Site Address: Wrexham

BS EN ISO 17892-12:2018+A2:2022 cl 5.3 and 5.5, Fall Cone Method, 4 Pt Test, BS 1377-2:2022, cl 5.2 and 6. W by BS EN ISO 17892-1:2014+A1:2022.

Client Reference: JN1246
Job Number: 24-022539-1
Date Sampled: Not Given
Date Received: 31/05/2024
Date Tested: 07/06/2024
Sampled By: Not Given

Testing carried out at i2 Analytical Limited, ul. Pionierow, 41-711 Ruda Slaska, Poland

Test results

Laboratory Reference	Hole No.	Sample				Description	Remarks	W	Liquid & Plastic Limit							Density		
		Reference	Depth Top m	Depth Base m	Type			%	% Passing 425um %	WL* %	Correlation Factor	Wp %	Ip %	Cone type	Sample Preparation	bulk Mg/m3	dry Mg/m3	PD Mg/m3
214537	WLS9	Not Given	1.50	Not Given	B	Brown gravelly very sandy silty CLAY	Atterberg 4 Point	13.4	50	31	-	21	10	80g/30 deg	W / I			
214538	WLS11	Not Given	1.00	Not Given	B	Brown gravelly very sandy silty CLAY	Atterberg 4 Point	7.4	61	27	-	18	9	80g/30 deg	W / I			

Note: # Non accredited; NP - Non plastic; N - Tested in natural condition, R - Tested after >0,425mm removed by hand, W - Tested after washing to remove >425mm; I - The water content in the sample was increased , D - The water content in the sample was decreased; * - One point liquid limit corrected as per the report Correlation Factor by Clayton C.R.I and Jukes A.W (1978)

Comments: Sample tested under Red Lab condition

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Signed:

Monika Siewior
Reporting Specialist
for and on behalf of i2 Analytical Ltd

Date Reported: 20/06/2024 **GF 362.15**

ST Consult Ltd
Twigden Barns
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Northamptonshire
NN6 8NN

t: 01604 500020

e: cnolan@stconsult.co.uk

i2 Analytical Ltd.
7 Woodshots Meadow,
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Watford,
Herts,
WD18 8YS

t: 01923 225404
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e: reception@i2analytical.com

Analytical Report Number : 24-022613

Project / Site name:	Wrexham	Samples received on:	31/05/2024
Your job number:	JN1246	Samples instructed on/ Analysis started on:	31/05/2024
Your order number:		Analysis completed by:	10/06/2024
Report Issue Number:	1	Report issued on:	11/06/2024
Samples Analysed:	8 soil samples		

Signed: Izabela Wójcik

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

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

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

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

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

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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.

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The results included within the report are representative of the samples submitted for analysis.

Analytical Report Number: 24-022613
Project / Site name: Wrexham

Lab Sample Number				214966	214967	214968	214969	214970
Sample Reference				S1	WLS10	WLS9	WLS13	WLS12
Sample Number				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Depth (m)				1.80	0.05	0.06	3.00	3.45
Date Sampled				Deviating	Deviating	Deviating	Deviating	Deviating
Time Taken				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Analytical Parameter (Soil Analysis)	Units	Limit of detection	Accreditation Status					
Stone Content	%	0.1	NONE	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Moisture Content	%	0.01	NONE	7.2	0.53	0.06	6.4	4.6
Total mass of sample received	kg	0.1	NONE	1	0.9	1	0.9	1.2
Asbestos								
Asbestos in Soil Detected/Not Detected	Type	N/A	ISO 17025	Not-detected	-	-	-	-
Asbestos Analyst ID	N/A	N/A	N/A	KWB	-	-	-	-
General Inorganics								
pH (L099)	pH Units	N/A	MCERTS	5.9	-	-	7	6.7
Total Sulphate as SO_4	%	0.005	MCERTS	-	-	-	0.007	0.008
Water Soluble Sulphate as SO_4 16hr extraction (2:1)	mg/kg	2.5	MCERTS	-	-	-	6.5	8.7
Water Soluble SO_4 16hr extraction (2:1 Leachate Equivalent)	mg/l	1.25	MCERTS	-	-	-	3.26	4.35
Total Sulphur	mg/kg	50	MCERTS	-	-	-	< 50	61
Total Sulphur	%	0.005	MCERTS	-	-	-	< 0.005	0.006
Organic Matter (automated)	%	0.1	MCERTS	0.8	-	-	-	-
Speciated PAHs								
Naphthalene	mg/kg	0.05	MCERTS	< 0.05	0.27	< 0.05	-	-
Acenaphthylene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05	-	-
Acenaphthene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05	-	-
Fluorene	mg/kg	0.05	MCERTS	< 0.05	0.14	0.08	-	-
Phenanthrene	mg/kg	0.05	MCERTS	< 0.05	0.56	0.37	-	-
Anthracene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05	-	-
Fluoranthene	mg/kg	0.05	MCERTS	< 0.05	0.29	0.08	-	-
Pyrene	mg/kg	0.05	MCERTS	< 0.05	0.34	0.15	-	-
Benzo(a)anthracene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	0.12	-	-
Chrysene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	0.54	-	-
Benzo(b)fluoranthene	mg/kg	0.05	ISO 17025	< 0.05	< 0.05	< 0.05	-	-
Benzo(k)fluoranthene	mg/kg	0.05	ISO 17025	< 0.05	< 0.05	< 0.05	-	-
Benzo(a)pyrene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05	-	-
Indeno(1,2,3-cd)pyrene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05	-	-
Dibenz(a,h)anthracene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05	-	-
Benzo(ghi)perylene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05	-	-
Total PAH								
Speciated Total EPA-16 PAHs	mg/kg	0.8	ISO 17025	< 0.80	1.61	1.35	-	-
Heavy Metals / Metalloids								
Arsenic (aqua regia extractable)	mg/kg	1	MCERTS	5.1	-	-	-	-
Cadmium (aqua regia extractable)	mg/kg	0.2	MCERTS	< 0.2	-	-	-	-
Chromium (hexavalent)	mg/kg	1.8	MCERTS	< 1.8	-	-	-	-
Chromium (III)	mg/kg	1	NONE	8.8	-	-	-	-
Chromium (aqua regia extractable)	mg/kg	1	MCERTS	8.8	-	-	-	-
Copper (aqua regia extractable)	mg/kg	1	MCERTS	14	-	-	-	-
Lead (aqua regia extractable)	mg/kg	1	MCERTS	27	-	-	-	-
Mercury (aqua regia extractable)	mg/kg	0.3	MCERTS	< 0.3	-	-	-	-
Nickel (aqua regia extractable)	mg/kg	1	MCERTS	8.5	-	-	-	-
Selenium (aqua regia extractable)	mg/kg	1	MCERTS	< 1.0	-	-	-	-
Zinc (aqua regia extractable)	mg/kg	1	MCERTS	41	-	-	-	-

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The results included within the report relate only to the sample(s) submitted for testing.

Analytical Report Number: 24-022613
Project / Site name: Wrexham

Lab Sample Number				214966	214967	214968	214969	214970
Sample Reference				S1	WLS10	WLS9	WLS13	WLS12
Sample Number				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Depth (m)				1.80	0.05	0.06	3.00	3.45
Date Sampled				Deviating	Deviating	Deviating	Deviating	Deviating
Time Taken				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Analytical Parameter (Soil Analysis)	Units	Limit of detection	Accreditation Status					
Petroleum Hydrocarbons								
TPHCWG - Aliphatic >C5 - C6 HS_1D_AL	mg/kg	0.02	NONE	< 0.020	-	-	-	-
TPHCWG - Aliphatic >C6 - C8 HS_1D_AL	mg/kg	0.02	NONE	< 0.020	-	-	-	-
TPHCWG - Aliphatic >C8 - C10 HS_1D_AL	mg/kg	0.05	NONE	< 0.050	-	-	-	-
TPHCWG - Aliphatic >C10 - C12 EH_CU_1D_AL	mg/kg	1	MCERTS	< 1.0	-	-	-	-
TPHCWG - Aliphatic >C12 - C16 EH_CU_1D_AL	mg/kg	2	MCERTS	< 2.0	-	-	-	-
TPHCWG - Aliphatic >C16 - C21 EH_CU_1D_AL	mg/kg	8	MCERTS	< 8.0	-	-	-	-
TPHCWG - Aliphatic >C21 - C35 EH_CU_1D_AL	mg/kg	8	MCERTS	< 8.0	-	-	-	-
TPHCWG - Aliphatic >C5 - C35 EH_CU+HS_1D_AL	mg/kg	10	NONE	< 10	-	-	-	-
TPHCWG - Aromatic >EC5 - EC7 HS_1D_AR	mg/kg	0.01	NONE	< 0.010	-	-	-	-
TPHCWG - Aromatic >EC7 - EC8 HS_1D_AR	mg/kg	0.01	NONE	< 0.010	-	-	-	-
TPHCWG - Aromatic >EC8 - EC10 HS_1D_AR	mg/kg	0.05	NONE	< 0.050	-	-	-	-
TPHCWG - Aromatic >EC10 - EC12 EH_CU_1D_AR	mg/kg	1	MCERTS	< 1.0	-	-	-	-
TPHCWG - Aromatic >EC12 - EC16 EH_CU_1D_AR	mg/kg	2	MCERTS	< 2.0	-	-	-	-
TPHCWG - Aromatic >EC16 - EC21 EH_CU_1D_AR	mg/kg	10	MCERTS	< 10	-	-	-	-
TPHCWG - Aromatic >EC21 - EC35 EH_CU_1D_AR	mg/kg	10	MCERTS	< 10	-	-	-	-
TPHCWG - Aromatic >EC5 - EC35 EH_CU+HS_1D_AR	mg/kg	10	NONE	< 10	-	-	-	-
VOCs								
MTBE (Methyl Tertiary Butyl Ether)	µg/kg	5	NONE	< 5.0	-	-	-	-
Benzene	µg/kg	5	MCERTS	< 5.0	-	-	-	-
Toluene	µg/kg	5	MCERTS	< 5.0	-	-	-	-
Ethylbenzene	µg/kg	5	MCERTS	< 5.0	-	-	-	-
p & m-Xylene	µg/kg	5	MCERTS	< 5.0	-	-	-	-
o-Xylene	µg/kg	5	MCERTS	< 5.0	-	-	-	-
Miscellaneous Organics								
Coal Tar		N/A	NONE	-	Not Identified	Not Identified	-	-
Total Residue	mg/kg	10	NONE	-	2700	4700	-	-

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

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Analytical Report Number: 24-022613
Project / Site name: Wrexham

Lab Sample Number				214971	214972	214973
Sample Reference				WLS10	S1	WLS12
Sample Number				None Supplied	None Supplied	None Supplied
Depth (m)				3.45	0.30	0.10
Date Sampled				Deviating	Deviating	Deviating
Time Taken				None Supplied	None Supplied	None Supplied
Analytical Parameter (Soil Analysis)	Units	Limit of detection	Accreditation Status			
Stone Content	%	0.1	NONE	< 0.1	39.4	16.5
Moisture Content	%	0.01	NONE	13	6.7	12
Total mass of sample received	kg	0.1	NONE	1.1	1	0.9
Asbestos						
Asbestos in Soil Detected/Not Detected	Type	N/A	ISO 17025	-	-	-
Asbestos Analyst ID	N/A	N/A	N/A	-	-	-
General Inorganics						
pH (L099)	pH Units	N/A	MCERTS	5.2	7.9	7.8
Total Sulphate as SO_4	%	0.005	MCERTS	0.024	0.017	0.025
Water Soluble Sulphate as SO_4 16hr extraction (2:1)	mg/kg	2.5	MCERTS	47	5.1	27
Water Soluble SO_4 16hr extraction (2:1 Leachate Equivalent)	mg/l	1.25	MCERTS	23.5	2.54	13.5
Total Sulphur	mg/kg	50	MCERTS	110	100	300
Total Sulphur	%	0.005	MCERTS	0.011	0.01	0.03
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	-	-	-
Heavy Metals / Metalloids						
Arsenic (aqua regia extractable)	mg/kg	1	MCERTS	-	-	-
Cadmium (aqua regia extractable)	mg/kg	0.2	MCERTS	-	-	-
Chromium (hexavalent)	mg/kg	1.8	MCERTS	-	-	-
Chromium (III)	mg/kg	1	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	-	-	-
Zinc (aqua regia extractable)	mg/kg	1	MCERTS	-	-	-

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Analytical Report Number: 24-022613
Project / Site name: Wrexham

Lab Sample Number				214971	214972	214973
Sample Reference				WLS10	S1	WLS12
Sample Number				None Supplied	None Supplied	None Supplied
Depth (m)				3.45	0.30	0.10
Date Sampled				Deviating	Deviating	Deviating
Time Taken				None Supplied	None Supplied	None Supplied
Analytical Parameter (Soil Analysis)	Units	Limit of detection	Accreditation Status			
Petroleum Hydrocarbons						
TPHCWG - Aliphatic >C5 - C6 HS_1D_AL	mg/kg	0.02	NONE	-	-	-
TPHCWG - Aliphatic >C6 - C8 HS_1D_AL	mg/kg	0.02	NONE	-	-	-
TPHCWG - Aliphatic >C8 - C10 HS_1D_AL	mg/kg	0.05	NONE	-	-	-
TPHCWG - Aliphatic >C10 - C12 EH_CU_1D_AL	mg/kg	1	MCERTS	-	-	-
TPHCWG - Aliphatic >C12 - C16 EH_CU_1D_AL	mg/kg	2	MCERTS	-	-	-
TPHCWG - Aliphatic >C16 - C21 EH_CU_1D_AL	mg/kg	8	MCERTS	-	-	-
TPHCWG - Aliphatic >C21 - C35 EH_CU_1D_AL	mg/kg	8	MCERTS	-	-	-
TPHCWG - Aliphatic >C5 - C35 EH_CU+HS_1D_AL	mg/kg	10	NONE	-	-	-
TPHCWG - Aromatic >EC5 - EC7 HS_1D_AR	mg/kg	0.01	NONE	-	-	-
TPHCWG - Aromatic >EC7 - EC8 HS_1D_AR	mg/kg	0.01	NONE	-	-	-
TPHCWG - Aromatic >EC8 - EC10 HS_1D_AR	mg/kg	0.05	NONE	-	-	-
TPHCWG - Aromatic >EC10 - EC12 EH_CU_1D_AR	mg/kg	1	MCERTS	-	-	-
TPHCWG - Aromatic >EC12 - EC16 EH_CU_1D_AR	mg/kg	2	MCERTS	-	-	-
TPHCWG - Aromatic >EC16 - EC21 EH_CU_1D_AR	mg/kg	10	MCERTS	-	-	-
TPHCWG - Aromatic >EC21 - EC35 EH_CU_1D_AR	mg/kg	10	MCERTS	-	-	-
TPHCWG - Aromatic >EC5 - EC35 EH_CU+HS_1D_AR	mg/kg	10	NONE	-	-	-
VOCs						
MTBE (Methyl Tertiary Butyl Ether)	µg/kg	5	NONE	-	-	-
Benzene	µg/kg	5	MCERTS	-	-	-
Toluene	µg/kg	5	MCERTS	-	-	-
Ethylbenzene	µg/kg	5	MCERTS	-	-	-
p & m-Xylene	µg/kg	5	MCERTS	-	-	-
o-Xylene	µg/kg	5	MCERTS	-	-	-
Miscellaneous Organics						
Coal Tar		N/A	NONE	-	-	-
Total Residue	mg/kg	10	NONE	-	-	-

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

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Analytical Report Number : 24-022613
Project / Site name: Wrexham

* 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 *
214966	S1	None Supplied	1.8	Brown sand
214967	WLS10	None Supplied	0.05	Non Soil. *b
214968	WLS9	None Supplied	0.06	Non Soil. *b
214969	WLS13	None Supplied	3	Brown sand
214970	WLS12	None Supplied	3.45	Brown sand
214971	WLS10	None Supplied	3.45	Brown clay and sand
214972	S1	None Supplied	0.3	Brown loam and sand with vegetation and stones
214973	WLS12	None Supplied	0.1	Brown loam and sand with vegetation and stones

Analytical Report Number : 24-022613
Project / Site name: Wrexham

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

Analytical Test Name	Analytical Method Description	Analytical Method Reference	Method number	Wet / Dry Analysis	Accreditation Status
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
Total Sulphur in soil	Determination of total sulphur in soil by extraction with aqua-regia, potassium bromide/bromate followed by ICP-OES	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
Coal Tar in soil	In-house method by GC-MS, by calculation of discrete polyaromatic content	In-house method by calculation	L064B	D	NONE
BTEX and/or Volatile organic compounds in soil	Determination of volatile organic compounds in soil by headspace GC-MS	In-house method based on USEPA 8260	L073B	W	MCERTS
Total petroleum hydrocarbons with carbon banding by GC-FID/GC-MS HS in soil	Determination of total petroleum hydrocarbons in soil by GC-FID/GC-MS HS with carbon banding aliphatic and aromatic	In-house method	L076B/L088	D/W	MCERTS
Chromium III in soil	In-house method by calculation from total Cr and Cr VI	In-house method by calculation	L080	W	NONE
Hexavalent chromium in soil	Determination of hexavalent chromium in soil by extraction in NaOH and addition of 1,5 diphenylcarbazide followed by colorimetry	In-house method	L080	W	MCERTS

Analytical Report Number : 24-022613
Project / Site name: Wrexham

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

Analytical Test Name	Analytical Method Description	Analytical Method Reference	Method number	Wet / Dry Analysis	Accreditation Status
pH in soil (automated)	Determination of pH in soil by addition of water followed by automated electrometric measurement	In-house method	L099	D	MCERTS

For method numbers ending in 'UK' or 'A' analysis have been carried out in our laboratory in the United Kingdom (Watford).
For method numbers ending in 'F' analysis have been carried out in our laboratory in the United Kingdom (East Kilbride).
For method numbers ending in 'PL' or 'B' analysis have been carried out in our laboratory in Poland.
Soil analytical results are expressed on a dry weight basis. Where analysis is carried out on as-received the results obtained are multiplied by a moisture correction factor that is determined gravimetrically using the moisture content which is carried out at a maximum of 30oC.
Unless otherwise indicated, site information, order number, project number, sampling date, time, sample reference and depth are provided by the client. The instructed on date indicates the date on which this information was provided to the laboratory.

Information in Support of Analytical Results

List of HWOL Acronyms and Operators

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

*b - Unaccredited sample matrix.

Sample Deviation Report

Analytical Report Number : 24-022613
Project / Site name: Wrexham

This deviation report indicates the sample and test deviations that apply to the samples submitted for analysis.Please note that the associated result(s) may be unreliable and should be interpreted with care.

Key: a - No sampling date b - Incorrect container c - Holding time d - Headspace e - Temperature

Sample ID	Other ID	Sample Type	Lab Sample Number	Sample Deviation	Test Name	Test Ref	Test Deviation
S1	N/A	S	214966	ab	Asbestos identification in Soil	A001B	a
S1	N/A	S	214966	ab	BTEX and/or Volatile organic compounds in soil	L073B	ab
S1	N/A	S	214966	ab	Chromium III in soil	L080	a
S1	N/A	S	214966	ab	Hexavalent chromium in soil	L080	a
S1	N/A	S	214966	ab	Metals in soil by ICP-OES	L038B	a
S1	N/A	S	214966	ab	Organic matter (Automated) in soil	L009B	a
S1	N/A	S	214966	ab	Speciated PAHs and/or Semi-volatile organic compounds in soil	L064B	ab
S1	N/A	S	214966	ab	Total petroleum hydrocarbons with carbon banding by GC-FID/GC-MS HS in soil	L076B/L088	ab
S1	N/A	S	214966	ab	pH in soil (automated)	L099	a
S1	N/A	S	214972	a	Sulphate, water soluble, in soil (16hr extraction)	L038B	a
S1	N/A	S	214972	a	Total Sulphur in soil	L038B	a
S1	N/A	S	214972	a	Total sulphate (as SO4 in soil)	L038B	a
S1	N/A	S	214972	a	pH in soil (automated)	L099	a
WLS10	N/A	S	214967	ab	Coal Tar in soil	L064B	ab
WLS10	N/A	S	214967	ab	Speciated PAHs and/or Semi-volatile organic compounds in soil	L064B	ab
WLS10	N/A	S	214971	a	Sulphate, water soluble, in soil (16hr extraction)	L038B	a
WLS10	N/A	S	214971	a	Total Sulphur in soil	L038B	a
WLS10	N/A	S	214971	a	Total sulphate (as SO4 in soil)	L038B	a
WLS10	N/A	S	214971	a	pH in soil (automated)	L099	a
WLS12	N/A	S	214970	a	Sulphate, water soluble, in soil (16hr extraction)	L038B	a
WLS12	N/A	S	214970	a	Total Sulphur in soil	L038B	a
WLS12	N/A	S	214970	a	Total sulphate (as SO4 in soil)	L038B	a
WLS12	N/A	S	214970	a	pH in soil (automated)	L099	a
WLS12	N/A	S	214973	a	Sulphate, water soluble, in soil (16hr extraction)	L038B	a
WLS12	N/A	S	214973	a	Total Sulphur in soil	L038B	a
WLS12	N/A	S	214973	a	Total sulphate (as SO4 in soil)	L038B	a
WLS12	N/A	S	214973	a	pH in soil (automated)	L099	a
WLS13	N/A	S	214969	a	Sulphate, water soluble, in soil (16hr extraction)	L038B	a
WLS13	N/A	S	214969	a	Total Sulphur in soil	L038B	a
WLS13	N/A	S	214969	a	Total sulphate (as SO4 in soil)	L038B	a
WLS13	N/A	S	214969	a	pH in soil (automated)	L099	a
WLS9	N/A	S	214968	ab	Coal Tar in soil	L064B	ab
WLS9	N/A	S	214968	ab	Speciated PAHs and/or Semi-volatile organic compounds in soil	L064B	ab

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