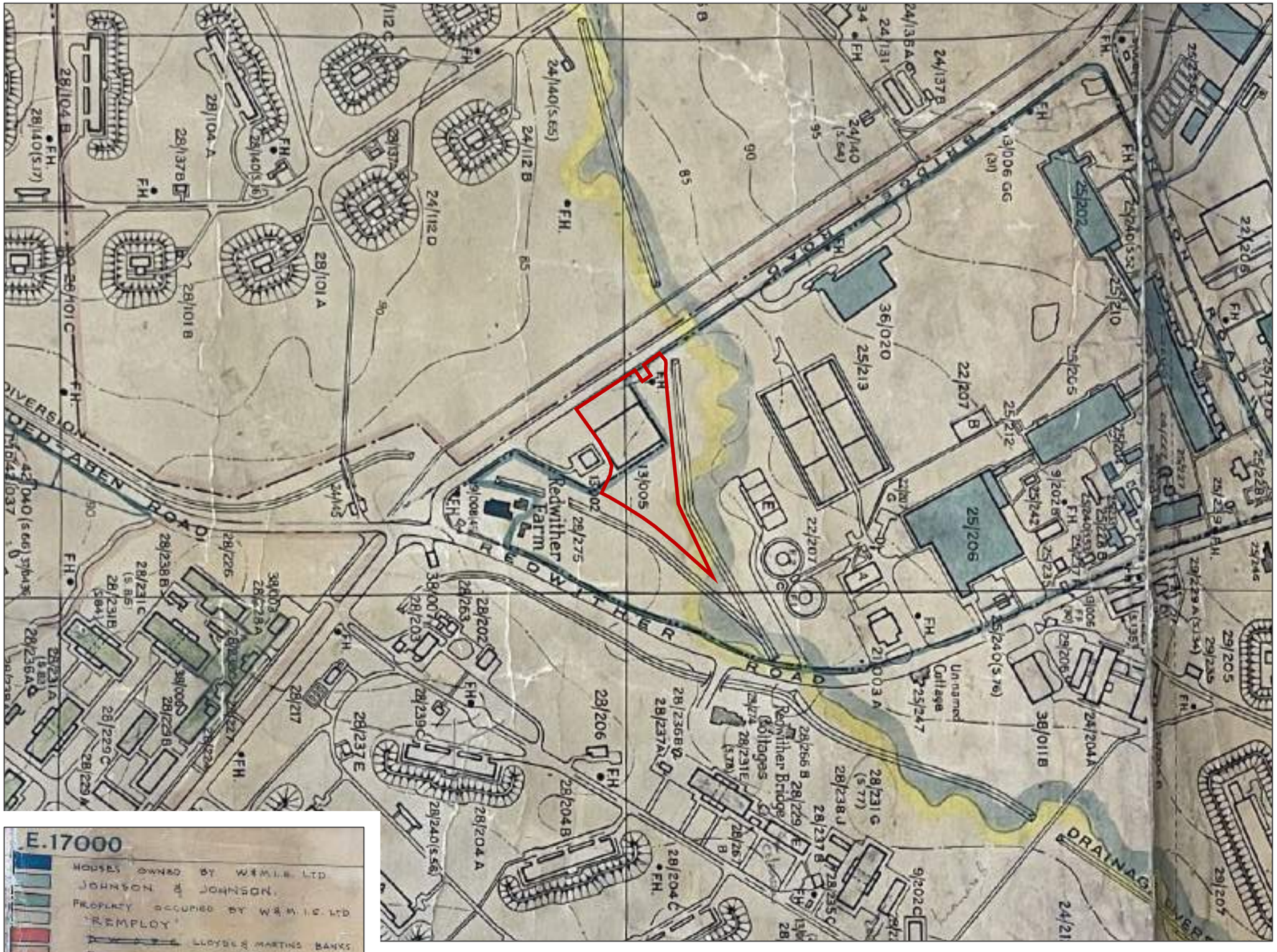


Figure: 04.2

Figure Title:
Royal Ordnance Plans - 1944

Legend:

Approx. Site boundary

Notes:

Source: North East Wales Archives

N

Project:	Land South of Bridge Road North, Wrexham
Client:	Geo2
Doc Ref:	DRA.10173.24
Version:	1

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Figure: 05.0

Figure Title:
Historic Aerial Photography:
2nd May 1946

Legend:

Approx. Site boundary

Notes:

Source: RCAHMW

N

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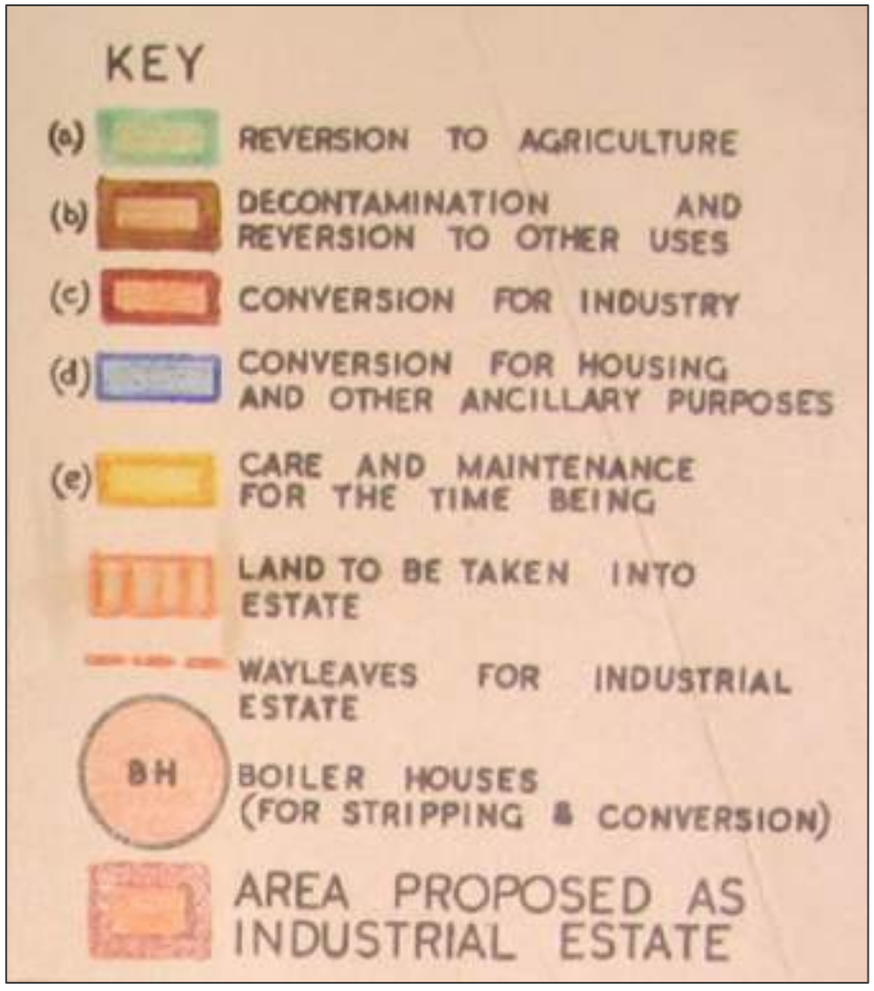


Figure: 06.0

Figure Title:
Royal Ordnance Plans - Post-War Decommissioning

Legend:

Approx. Site boundary

Notes:

Source: The National Archives

N

Project: Land South of Bridge Road North, Wrexham

Client: Geo2

Doc Ref: DRA.10173.24 **Version: 1**

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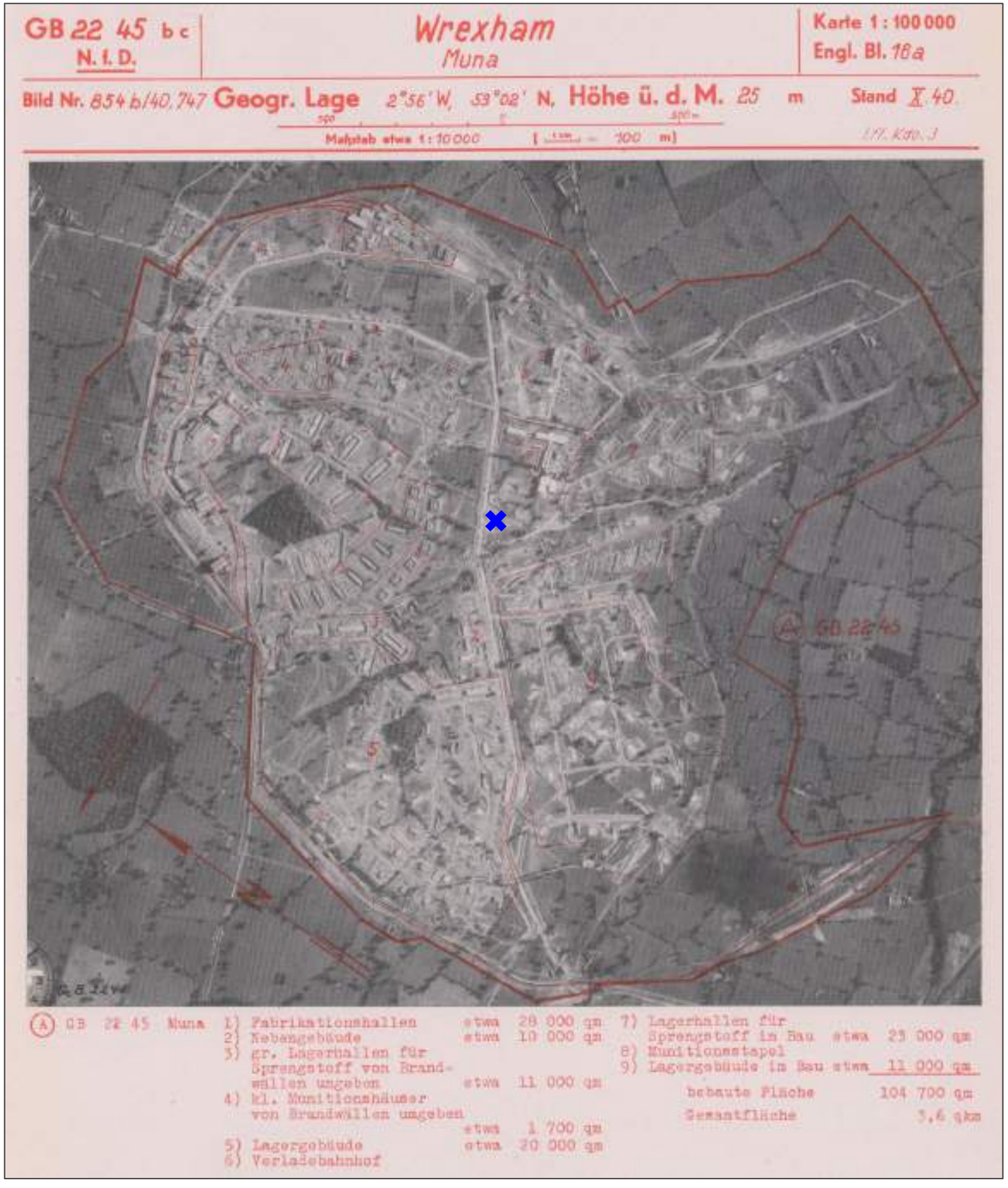


Figure: 07.0

Figure Title:
Luftwaffe Target Records - 18th September 1940

Legend:

✖ Approx. Site location

Notes:

Source: NARA

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Appendices: 1 - 4

British WW1 and WW2 Anti-Aircraft Projectiles

3.7-inch QF Heavy AA Gun (WW2)

Shell Weight:	12.7kg
Fill Weight:	1.1kg
Filling:	Amatol, TNT or RDX and TNT
Fuze Type:	Nose mechanical time delay fuze
Shell Dimensions:	94mm x 360 or 438mm
Shell Appearance:	Yellow or Grey body, copper driving bands, brass neck, grey nose fuze
Max Range:	12,000m
Rate of Fire:	10 to 20rpm



3-inch UP Rocket - Z Battery (WW2)

Rocket Weight:	24.5kg
Warhead Weight:	3.4kg
Fill Weight:	0.96kg
Filling:	TNT warhead. Black Powder solid fuel rocket motor
Fuze Type:	Nose mechanical time delay fuze
Rocket Dimensions:	1,930mm x 82mm
Shell Appearance:	Pointed bronze or black nose
Max Range:	6,770m



20mm Light AA Gun (WW2)

Shell Weight:	123g or 116g or 130g
Fill Weight:	6.0 to 11.0g
Filling:	Incendiary comp and/or TNT or Tetryl
Fuze Type:	Nose impact fuze
Shell Dimensions:	20mm x 110mm or 128mm
Shell Appearance:	Blue, orange, red or green bodies indicate TNT fill
Max Range:	4,389m
Rate of Fire:	250 to 450rpm





40mm Light AA Gun (WW2)

Shell Weight:	0.84kg
Fill Weight:	68g
Filling:	TNT
Fuze Type:	Nose impact fuze
Shell Dimensions:	40mm x 180mm
Shell Appearance:	Yellow or orange body, copper driving band, grey nose fuze
Max Range:	7,160m
Rate of Fire:	120rpm





3 inch QF Heavy AA Gun (WW1)

Shell Weight:	5.7kg or 7.3kg
Fill Weight:	<0.6kg (explosive)
Filling:	TNT or TNT plus ball bearings
Fuze Type:	Nose mechanical time delay fuze
Shell Dimensions:	76.2mm x 384mm or 420mm
Shell Appearance:	Black body, copper driving bands, brass nose fuze
Max Range:	6,700m
Rate of Fire:	16 to 18rpm

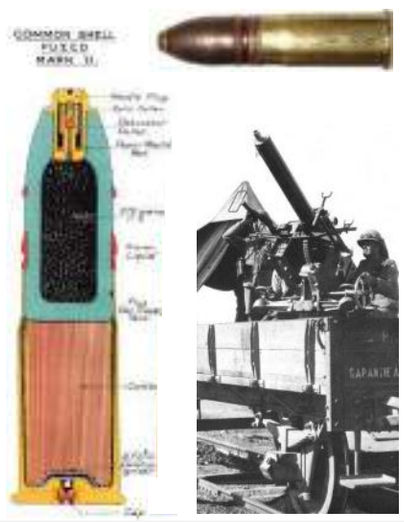






37mm Light AA Gun (WW1)

Shell Weight:	0.45kg
Fill Weight:	17.0g
Filling:	Gunpowder / black powder
Fuze Type:	Nose impact fuze
Shell Dimensions:	93mm x 37mm
Shell Appearance:	Brown body, copper driving bands and brass fuze.
Max Range:	4,110m
Rate of Fire:	300rpm



Appendix: 01.0

Appendix Title:
Data Sheets - Commonly Deployed British Anti-Aircraft Projectiles

Project:	Land South of Bridge Road North, Wrexham
Client:	Geo2
Doc Ref:	DRA.10173.24
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British Army WW2-era Land Service Ammunition

2-inch SBML Mortar (HE)

Shell Weight:	1.02kg
Fill Weight:	200g
Filling:	RDX or TNT (high explosive)
Dimensions:	51mm x 290mm
Material:	Steel
Appearance:	Cylindrical shape. Brown body, green and red bands, five finned.
Variants	Smoke, signal multi-star, parachute illumination, white phosphorus.

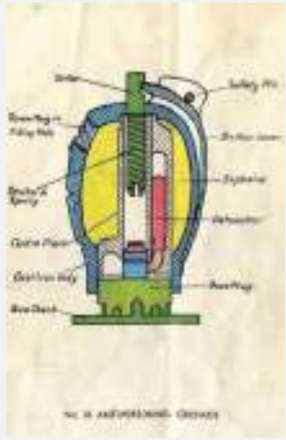




No.36 Hand Grenade - Frag

Weight:	760g
Fill Weight:	71g
Filling:	Baratol (high explosive)
Dimensions:	95mm x 61mm
Material:	Cast iron
Appearance:	Black grooved lemon shaped body. Fragmentation 'pineapple' design.
Fuze:	4 second time delay fuze.





3-inch ML Mortar (HE)

Shell Weight:	4.5kg
Fill Weight:	882g
Filling:	RDX or TNT (high explosive)
Dimensions:	81mm x 490mm
Material:	Steel
Appearance:	Pear-drop shape. Brown body, green and red bands, five finned tail.
Variants	Smoke, signal multi-star, parachute illumination, white phosphorus.

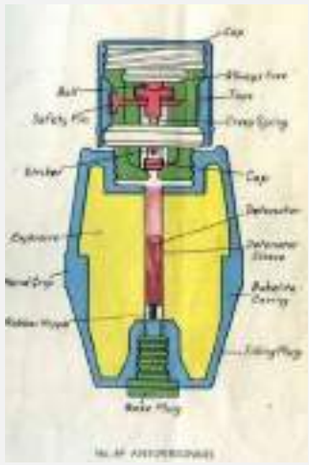




No.69 Hand Grenade - Blast

Weight:	383g
Fill Weight:	92g
Filling:	Baratol, Amatol or Lyddite (high explosive)
Dimensions:	114mm x 60mm
Material:	Bakelite (plastic)
Appearance:	Smooth black lemon shaped body. Green band.
Fuze:	4 second time delay fuze.





Ordnance QF 2-pounder Gun - HE

HE Round Weight:	1.86kg (full cartridge)
Fill Weight:	85g (plus propellant)
Filling:	RDX or TNT (high explosive)
Dimensions:	40mm x 304mm
Material:	Steel projectile. Brass case.
Appearance:	Brass body. Buff nose with red and green bands.
Remark	Note, the HE round was brough into service in 1942.



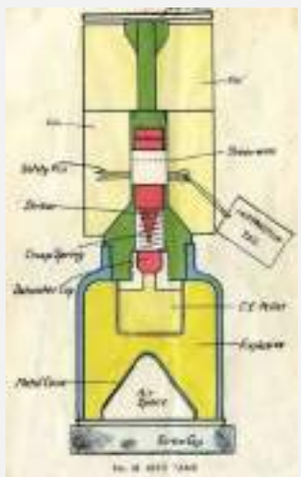


Anti-tank solid shot variant pictured

No.68 Anti-Tank Rifle Grenade

Weight:	893g
Fill Weight:	425g
Filling:	DX, Lyddite or Pentolite (high explosive)
Dimensions:	178mm x 64mm
Material:	Steel
Appearance:	Bell-shaped buff coloured body. Tail unit. Red and green bands.
Remark	These grenades were fired from a rifle using a special 'cup' attachment.





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Appendix: 02.0

Appendix Title:
Data Sheets - Commonly Deployed WW2-era British Army Land Service Ammunition

Project:	Land South of Bridge Road North, Wrexham
Client:	Geo2
Doc Ref:	DRA.10173.24
Version:	1

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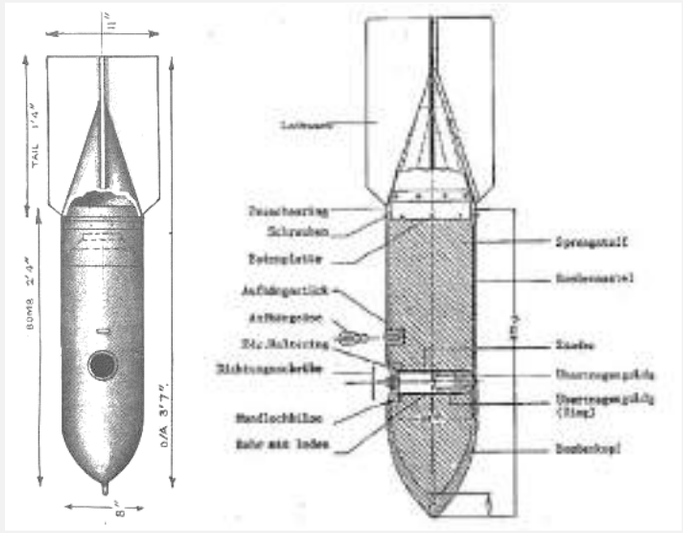
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German WW2 High Explosive ‘Iron Bombs’ - most likely to be encountered

SC 50

Bomb Weight:	54kg (119lb)
Explosive Weight:	25kg (55lb)
Filling:	TNT, Amatol or Trialen
Charge/Weight Ratio:	46%
Fuze Type:	Side fuzed. Electrical impact or mechanical delay
Body Dimensions:	670 to 762mm x 203mm
Material:	Steel
Appearance:	Grey/green with yellow stripe on the tail unit
Variants:	Grades I, II and III. Body length / construction

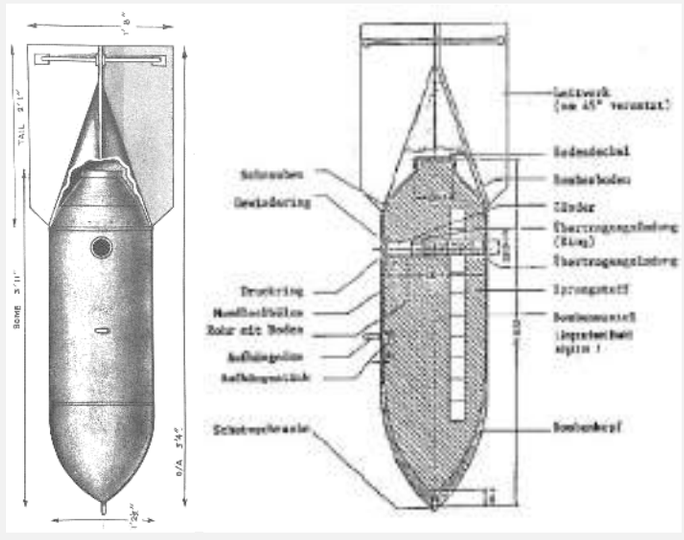






SC 250

Bomb Weight:	256kg (564lb)
Explosive Weight:	125 to 130kg (276 to 287lb)
Filling:	TNT, Amatol or Trialen
Charge/Weight Ratio:	44%
Fuze Type:	Side fuzed. Electrical impact or mechanical delay
Body Dimensions:	1,173 to 1,193mm x 368mm
Material:	Steel
Appearance:	Grey/green with yellow stripe on the tail unit
Variants:	Grades I and II. Body length and doubled fuzed type

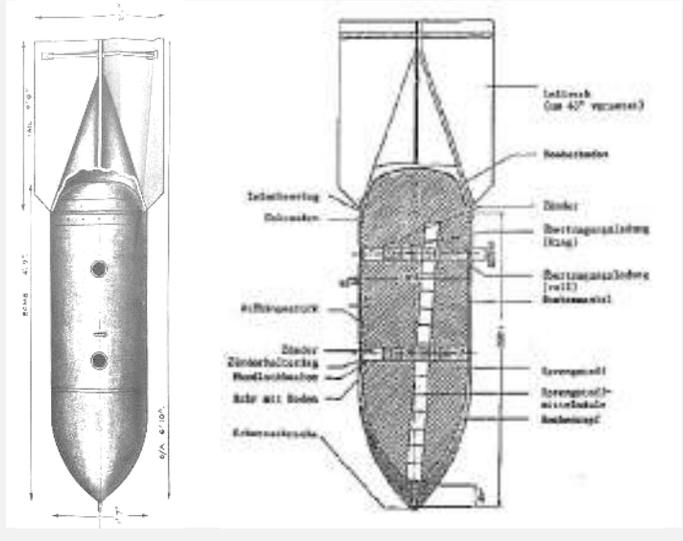






SC 500

Bomb Weight:	480 to 520kg (1,058 to 1,146lb)
Explosive Weight:	220kg (485lb)
Filling:	TNT, Amatol or Trialen
Charge/Weight Ratio:	44%
Fuze Type:	Side fuzed. Electrical impact or mechanical delay
Body Dimensions:	1,414 to 1,486mm x 470mm
Material:	Steel
Appearance:	Grey/green or buff with yellow stripe on the tail unit
Variants:	Grades I, II and III. Body length / construction







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Appendix: 03.1

Appendix Title:
Data Sheets - Commonly Deployed German WW2 Bombs

Project:	Land South of Bridge Road North, Wrexham
Client:	Geo2
Doc Ref:	DRA.10173.24
Version:	1

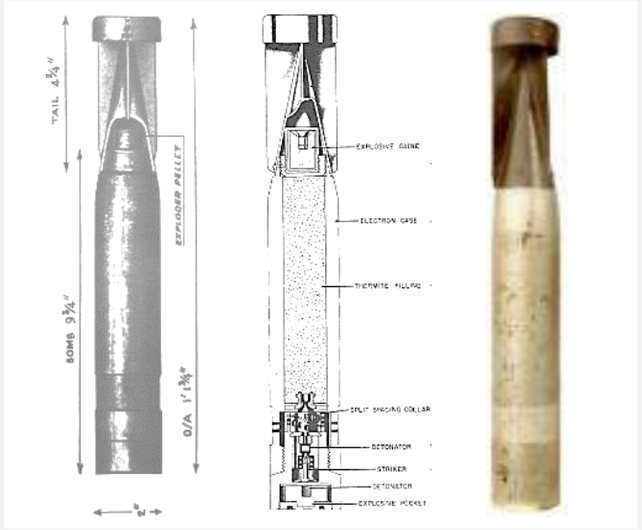
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German WW2 Incendiary Bombs - most likely to be encountered

B1 Series Sub-Munition

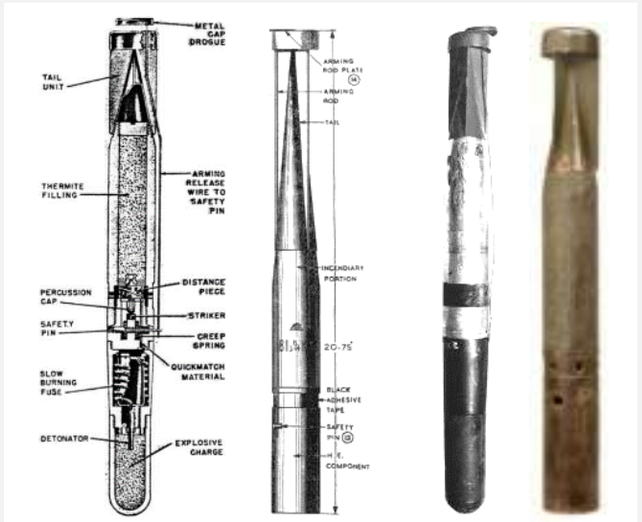
Bomb Weight:	1.0 to 1.3kg (2.20 to 2.87lb)
Incendiary Weight:	680g
Filling:	Thermite
Fuze Type:	Nose fuzed, impact
Body Dimensions:	247mm x 50mm
Material:	Magnesium alloy body, steel tail
Appearance:	Grey body, dark green tail unit
Variants:	Four types. Two delayed action and one steel nosed
Bomb Container:	Various sizes holding between 36No. and 620No. B1s

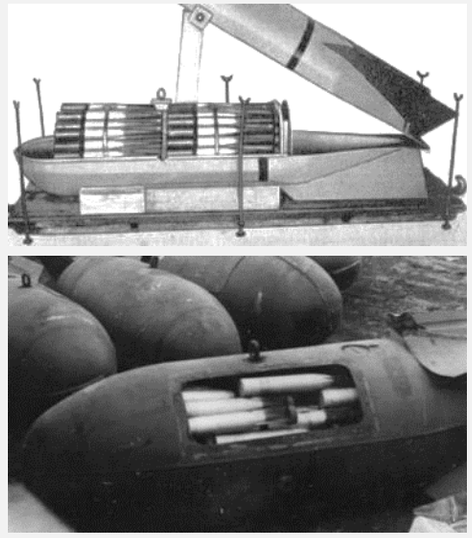




B2 Series Sub-Munition

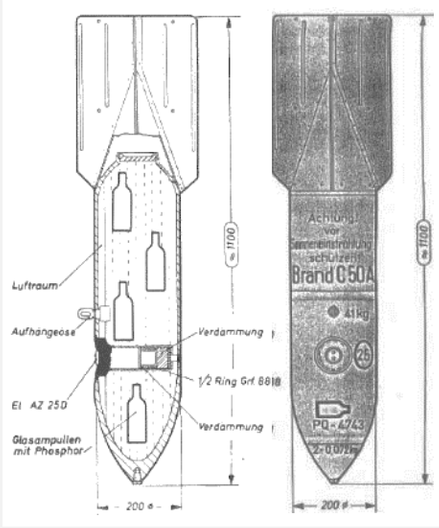
Bomb Weight:	2.0 to 2.2kg (4.40 to 4.85lb)
Fill Weight:	680g incendiary plus 100g HE
Filling:	Thermite and Penthrite or TNT
Fuze Type:	Nose fuzed, impact
Body Dimensions:	311mm x 50mm
Material:	Magnesium alloy and steel body, steel tail
Appearance:	Green body and tail, explosive black, red or unpainted
Variants:	Two types; round nose or flat nose plus longer tail unit
Bomb Container:	Various sizes holding up to 372No. B2s. Usually mixed with B1s.





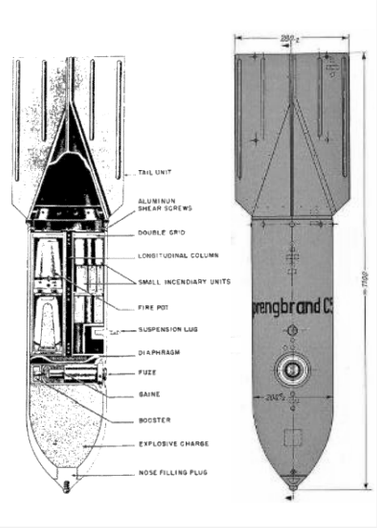
Brand C50 A

Bomb Weight:	41kg (75lb)
Incendiary Weight:	13kg (30lb)
Filling:	15 litres (86% Benzine, 10% Rubber, 4% Phosphorus)
Fuze Type:	Side fuzed. Electrical impact
Body Dimensions:	762mm x 203mm
Material:	Steel
Appearance:	Grey or green body, red base, red band around the centre of the body
Variants:	C50 B (77% Phosphorus fill)



Sprengbrand C50 'Fire Pot'

Bomb Weight:	50kg (110lb)
Fill Weight:	10kg (22lb)
Filling:	7kg TNT and 3kg Thermite in multiple small containers
Fuze Type:	Side fuzed. Electrical impact
Body Dimensions:	711mm x 203mm
Material:	Steel
Appearance:	Grey or green body, red or brown stencilling on body
Variants:	None



Appendix: 03.2

Appendix Title:
Data Sheets - Commonly Deployed German WW2 Bombs

Project:	Land South of Bridge Road North, Wrexham	
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Bates H - **Flying Bombs Over England** - Frogletts Publications Ltd - 1994

Castle I - **London 1914-17 The Zeppelin Menace** - Osprey - 2008

Castle I - **London 1917-18 The Bomber Blitz** - Osprey - 2010

CIRIA C681 - **Unexploded Ordnance (UXO), A Guide for the Construction Industry** - Construction Industry Research & Information Association (CIRIA) - 2009

CIRIA C785 - **Unexploded ordnance (UXO) Risk Management Guide for Land-Based Projects** - Construction Industry Research & Information Association (CIRIA) - 2019

Clarke N - **Adolf Hitler's Holiday Snaps: Luftwaffe Target Reconnaissance 1939-1942** - 1995

Clarke N - **Adolf Hitler's Home Counties Holiday Snaps: Luftwaffe Target Reconnaissance 1939-1942** - 1996

Clarke N - **Adolf's British Holiday Snaps: Luftwaffe Aerial Reconnaissance Photographs of England**, **Scotland and Wales** - 2011

Cocroft W - **Dangerous Energy** - Historic England - 2000

Dobinson C - **Fields of Deception, Britain's Bombing Decoys of World War II** - Methuen Publishing Ltd - 2000

Dobinson C - **Twentieth Century Fortifications in England Volume I Anti-Aircraft Artillery** - Council for British Archaeology - 1996

Dobinson C - **Twentieth Century Fortifications in England Volume II Anti-Invasion Defences of WWII** - Council for British Archaeology - 1996

Dobinson C - **Twentieth Century Fortifications in England Volume VIII Civil Defence in WWII** - Council for British Archaeology - 1996

Fleischer W - **German Air-Dropped Weapons to 1945 - Midland Publishing** - 2004

Groves C - **The Home Guard of Britain** - Hutchinson & Co – 1943

HMG Ministry Of Home Security - **Front Line 1940-41, The Official Story of the Civil Defence of Britain** - Ministry Of Home Security - 1942

Jappy M - Danger UXB: The Remarkable Story of the Disposal of Unexploded Bombs during the Second World War - Channel 4 Books - 2001

Longmate N - **The Real Dad's Army: The Story of the Home Guard** - Amberley Publishing - 2016

Morris J - **German Air Raids on Britain: 1914-1918** - Naval and Military Press - 2009

Osborne M - **Defending Britain, Twentieth-Century Military Structures in the Landscape** - The History Press - 2004

Pavelec M - **The Luftwaffe: Facts, Figures and Data for the German Air Force 1933-45** - Amber Books Ltd - 2010

Price A - **Blitz on Britain 1939-45** - Sutton Publishing Ltd - 2000

Ramsey W - **The Blitz Then and Now: Volume I - Battle of Britain Prints International Limited** - Battle of Britain Prints International Ltd - 1987

Ramsey W - **The Blitz Then and Now: Volume II - Battle of Britain Prints International Limited** - Battle of Britain Prints International Ltd - 1988

Ramsey W - **The Blitz Then and Now: Volume III - Battle of Britain Prints International Limited** - Battle of Britain Prints International Ltd - 1990

Ransted C - **Bomb Disposal in WWII** - Pen & Sword History - 2018

TNA Ref AIR 20 (various docs) **Air Ministry and Ministry of Defence: Papers accumulated by the Air Historical Branch**

TNA Ref DEFE 15 (various docs) **Technical reports and memoranda from the Royal Armament Research & Development Establishment**

TNA Ref HO 195 (various docs) **Ministry of Home Security: Research & Experiments Department, Civil Defence**

TNA Ref HO 198 (various docs) **Ministry of Home Security: Research & Experiments Department, Bomb Census Papers**

TNA Ref HO 199 (various docs) **Ministry of Home Security: Intelligence Branch: Registered Files**

TNA Ref WO 166 (various docs) **War Office: Home Forces: War Diaries, Second World War**

TNA Ref WO 195 (various docs) **MOD and predecessors: Advisory Council of Scientific Research and Technical Development**

TNA Ref WO 199 (various docs) **War Office: Home Forces: Military Headquarters Papers**

Whiting C - **Britain Under Fire: The Bombing of Britain's Cities 1940-1945** - Century London - 1986

Wood D *et al* - **The Narrow Margin: The Battle of Britain & the Rise of Air Power 1930-1940** - Pen & Sword Military - 2010

Project Specific:

Townscape Chartered Town & Heritage Consultant Ltd - **Royal Ordnance, Marchwiel (34), Wrexham: Historical Scoping Report** - March 2017

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Appendix E – Borehole Logs and SPT Certificates

Key to exploratory hole symbols and abbreviations

SAMPLE TYPES

ACM - Asbestos sample
AMAL - Amalgamated sample
B - Bulk disturbed sample
BLK - Block sample
C - Core sample
CBR - CBR test sample
D - Disturbed sample
ES - Environmental sample
EW - Environmental water sample
G - Gas sample
J - Jar sample
L - Liner sample
TW - Pushed thin wall sample
U - Undisturbed sample
UT - Undisturbed thin wall sample
W - Water sample

IN-SITU TESTS

HV - Hand shear vane
HV(r) - Hand shear vane residual
PID - Photo ionisation detector
PP - Hand penetrometer
SPT - Standard penetration test
SPT(C) - SPT using cone

GROUNDWATER

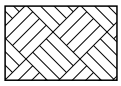

Groundwater strike

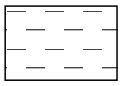

Groundwater rest level

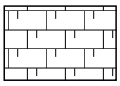
ROTARY CORE DETAILS

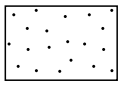
TCR - Total core recovery (%)
SCR - Solid core recovery (%)
RQD - Rock quality designation (%)
FI - Fracture index
NI - Non-intact core
AZCL - Assumed zone of core loss

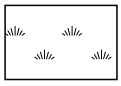
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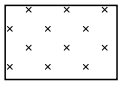

Topsoil

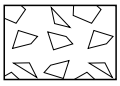

Clay

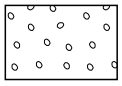

Chalk

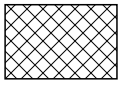

Sand backfill

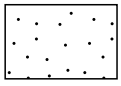

Peat

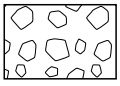

Silt

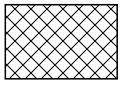

Breccia

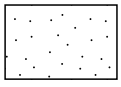

Gravel backfill

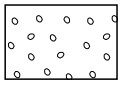

Made ground

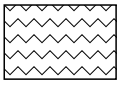

Sand

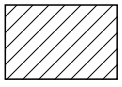

Conglomerate

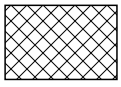

Arisings

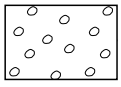

Concrete

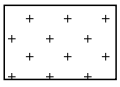

Gravel

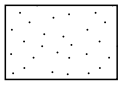

Metamorphic

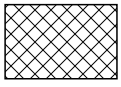

Bentonite

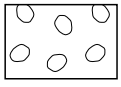

Wood


Cobbles


Igneous

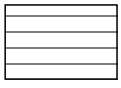

Concrete


Brick

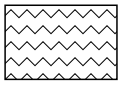

Boulders

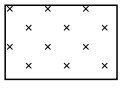

Grout


Bituminous material

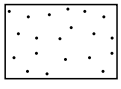

Mudstone


Plain pipe

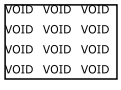

Gypsum


Siltstone

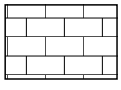

Coal


Sandstone


Slotted pipe



Void


Limestone

Borehole Log

DS101

Sheet 1 of 1

Hole Type	Easting	Northing	Ground Level (m)	Scale
DS	338108.09	349572.47	26.08	1:50

Project Name	Project No.	Start Date	End Date
Bridge Road, North Wrexham	4219	2024-08-20	2024-08-20

Client
Hero Future Energies

Contractor
Dynamic Sampling

Consultant
MOK

Inst/ Backfill	Water Levels	Samples and Tests: Depth (m)	Type/ Ref	Results	Level (m)	Depth (thickness) (m)	Strata: Legend	Description
		0.20 - 0.30	ES1			(0.40)		MADE GROUND: Sparse vegetation over greyish brown slightly sandy gravelly CLAY. Gravel is angular to sub-angular fine to coarse concrete, brick, clinker and mudstone. Sand is fine to coarse.
					25.68	0.40		MADE GROUND: Dark grey gravelly slightly silty fine to coarse SAND with frequent cobbles of angular brick. Gravel is angular to sub-angular fine to coarse concrete and brick.
						(0.60)		
		1.00	SPT	N=6 (2,1/1,1,2,2)	25.08	1.00		No recovery.
						(0.60)		
					24.48	1.60		MADE GROUND: Reddish brown sandy angular to sub-angular fine to coarse brick and concrete GRAVEL. Sand is fine to coarse.
						(0.40)		
		2.00	SPT	N=4 (1,1/1,1,1,1)	24.08	2.00		*End of Borehole at 2.00m*

Remarks
1. Logged in general accordance with BS 5930:2015+A1:2020. 2. Area spot cleared for services prior to excavation by a specialist third-party contractor. 3. Hand dug pit advanced to 0.70 m bgl. 4. SPT Hammer Ref. 110.45, Energy Ratio, 76%. 5. Borehole terminated at 2.00 m bgl due to fault on the rig. 6. Borehole installed with a 50 mm HDPE standpipe, gas bung and flush cover. 7. Groundwater encountered at 2.00 m bgl. 8. No olfactory or visual evidence of contamination noted.

Method, Plant, Stability, Dimensions
0.00 - 2.00m DS Premier 110

Logger
MOK

Checked By: AT **Approved By:** TH **Status:** FINAL

Borehole Log

DS102

Sheet 1 of 1

Hole Type	Easting	Northing	Ground Level (m)	Scale
DS	338125.91	349574.74	25.44	1:50

Project Name	Project No.	Start Date	End Date
Bridge Road, North Wrexham	4219	2024-08-20	2024-08-20

Client
Hero Future Energies

Contractor
Dynamic Sampling

Consultant
MOK

Inst/ Backfill	Water Levels	Samples and Tests: Depth (m)	Type/ Ref	Results	Level (m)	Depth (thickness) (m)	Strata: Legend	Description
		0.30 - 0.40	ES1					Sparse vegetation over light brown slightly sandy silty CLAY with rare roots. Sand is fine to medium. [ALLUVIUM]
		0.50 - 0.60	D1			(1.10)		
		0.90 - 1.00	D2					Rare gravel of angular to sub-angular fine to coarse sandstone. (0.80 - 1.20m)
		1.20	SPT	N=7 (1,1/1,2,2,2)	24.34	1.10 (0.30)		Soft light brown very sandy SILT. Sand is fine to coarse. [ALLUVIUM]
		1.40 - 1.50	ES2		24.04	1.40 (0.60)		Firm reddish brown slightly sandy silty CLAY. Sand is fine to medium. [ALLUVIUM]
		1.90 - 2.00	D3					
		2.00	SPT	N=9 (1,1/2,2,2,3)	23.44	2.00 (0.20)		Soft greyish brown SILT. [ALLUVIUM]
		2.30 - 2.40	D4		23.24	2.20 (0.80)		Firm light brown mottled light grey silty CLAY. [TILL, DEVENSIAN]
		2.50 - 3.00	B1					
		3.00	SPT	N=31 (4,4/4,5,10,12)	22.44	3.00		*End of Borehole at 3.00m*

Remarks
1. Logged in general accordance with BS 5930:2015+A1:2020. 2. Area spot cleared for services prior to excavation by a specialist third-party contractor. 3. Hand dug pit advanced to 1.20 m bgl. 4. SPT Hammer Ref. 110.71, Energy Ratio, 76%. 5. Borehole terminated at 3.00 m bgl due to sufficient depth reached. 6. Borehole installed with a 50 mm HDPE standpipe, gas bung and flush cover. 7. Borehole remained dry upon completion. 8. No olfactory or visual evidence of contamination noted.

Method, Plant, Stability, Dimensions
0.00 - 3.00m DS Premier 110

Logger
MOK

Checked By: AT **Approved By:** TH **Status:** FINAL

Borehole Log

DS103

Sheet 1 of 1

Hole Type	Easting	Northing	Ground Level (m)	Scale
DS	338116.45	349561.42	25.55	1:50

Project Name	Project No.	Start Date	End Date
Bridge Road, North Wrexham	4219	2024-08-20	2024-08-20

Client
Hero Future Energies

Contractor
Dynamic Sampling

Consultant
MOK

Inst/ Backfill	Water Levels	Samples and Tests: Depth (m)	Type/ Ref	Results	Level (m)	Depth (thickness) (m)	Strata: Legend	Description
					25.35	(0.20) 0.20		MADE GROUND: Light grey sandy angular to sub-angular fine to coarse concrete, brick, mudstone GRAVEL. Sand is fine to coarse.
		0.30 - 0.40	ES1					MADE GROUND: Greyish brown slightly sandy gravelly CLAY. Gravel is angular to sub-angular fine to coarse concrete, brick, clinker, siltstone and mudstone. Sand is fine to coarse.
						(1.00)		
	▽							
		1.20	SPT	N=4 (1,1/1,1,1,1)	24.35	1.20		No Recovery.
						(0.50)		Cobbles of angular brick. (1.20 - 1.30m)
					23.85	1.70		
					23.75	(0.10)		MADE GROUND: Reddish brown sandy angular to sub-angular fine to coarse brick GRAVEL. Sand is fine to coarse.
					23.65	(0.10)		
		2.00	SPT	N=4 (2,2/1,1,1,1)	23.55	2.00		MADE GROUND: Soft light brown slightly silty sandy CLAY. Sand is fine to coarse.
						(0.70)		MADE GROUND: Yellowish brown angular brick COBBLES.
								No Recovery.
					22.85	2.70		
					22.75	(0.10)		MADE GROUND: Cream angular concrete COBBLES.
					22.65	(0.10)		
		2.90 - 3.00	ES2					MADE GROUND: Dark grey slightly sandy clayey angular to sub-angular fine to coarse concrete and mudstone GRAVEL. Sand is fine to coarse.
		3.00	SPT	N=50 (25,0/50 for 0mm)	22.55	3.00		Slight hydrocarbon odour noted. (2.80 - 3.00m)
								MADE GROUND: Soft light brown silty CLAY.
								End of Borehole at 3.00m

Remarks
1. Logged in general accordance with BS 5930:2015+A1:2020. 2. Area spot cleared for services prior to excavation by a specialist third-party contractor. 3. Hand dug pit advanced to 0.60 m bgl. 4. SPT Hammer Ref. 110.71, Energy Ratio, 76%. 5. Borehole terminated at 3.00 m bgl due to refusal on suspected concrete obstruction. 6. Borehole backfilled with arisings. 7. Groundwater encountered at 1.00 m bgl. 8. Slight hydrocarbon odour noted between 2.80 and 3.00 m bgl.

Method, Plant, Stability, Dimensions
0.00 - 3.00m DS Premier 110

Logger
MOK

Checked By: AT **Approved By:** TH **Status:** FINAL

Borehole Log

DS104

Sheet 1 of 1

Hole Type	Easting	Northing	Ground Level (m)	Scale
DS	338111.08	349546.19	25.30	1:50

Project Name	Project No.	Start Date	End Date
Bridge Road, North Wrexham	4219	2024-08-20	2024-08-20

Client
Hero Future Energies

Contractor
Dynamic Sampling

Consultant
MOK

Inst/ Backfill	Water Levels	Samples and Tests: Depth (m)	Type/ Ref	Results	Level (m)	Depth (thickness) (m)	Strata: Legend	Description
		0.40 - 0.50 0.50 - 0.60	D1 ES1			(1.20)		Sparse vegetation over friable light brown slightly sandy silty CLAY with rare roots. Sand is fine to medium. [ALLUVIUM]
		1.10 - 1.20 1.20 1.20 - 1.30	D2 SPT ES2	N=6 (1,1/1,1,2,2)	24.10	1.20		
		1.50 - 1.60 1.50 - 2.00	D3 B1			(0.80)		Soft light brown sandy SILT with rare gravel of angular to sub-rounded quartzite. Sand is fine to medium. [ALLUVIUM]
		2.00 2.20 - 2.30	SPT D4	N=15 (1,1/2,3,5,5)	23.30	2.00		Firm reddish brown mottled light grey silty CLAY with calcite veins and rare gravel of sub-angular to sub-rounded fine to medium quartzite and siltstone. [TILL, DEVENSIAN]
		2.90 - 3.00 3.00	D5 SPT	N=34 (5,5/7,7,9,11)		(2.00)		
		3.90 - 4.00 4.00	D6 SPT	N=21 (4,4/4,5,6,6)	21.30	4.00		*End of Borehole at 4.00m*

Remarks

1. Logged in general accordance with BS 5930:2015+A1:2020. 2. Area spot cleared for services prior to excavation by a specialist third-party contractor. 3. Hand dug pit advanced to 1.20 m bgl. 4. SPT Hammer Ref. 110.71, Energy Ratio, 76%. 5. Borehole terminated at 4.00 m bgl due to sufficient depth reached. 6. Borehole installed with a 50 mm HDPE standpipe, gas bung and flush cover. 7. Borehole remained dry upon completion. No olfactory or visual evidence of contamination noted.

Method, Plant, Stability, Dimensions

0.00 - 4.00m DS Premier 110

Logger
MOK

Checked By: AT **Approved By:** TH **Status:** FINAL

Borehole Log

DS105

Sheet 1 of 1

Hole Type	Easting	Northing	Ground Level (m)	Scale
DS	338122.81	349546.53	25.11	1:50

Project Name	Project No.	Start Date	End Date
Bridge Road, North Wrexham	4219	2024-08-20	2024-08-20

Client
Hero Future Energies

Contractor
Dynamic Sampling

Consultant
MOK

Inst/ Backfill	Water Levels	Samples and Tests: Depth (m)	Type/ Ref	Results	Level (m)	Depth (thickness) (m)	Strata: Legend	Description
		0.10 - 0.60 0.20 - 0.30	B1 ES1					Sparse vegetation over friable light brown slightly sandy SILT. Sand is fine to medium. [ALLUVIUM]
		0.50 - 0.60	D1			(0.80)		
					24.31	0.80		Soft light brown sandy SILT. Sand is fine to medium. [ALLUVIUM]
		1.00 - 1.10	ES2			(0.50)		
		1.20	SPT	N=5 (1,1/1,1,1,2)				
					23.81	1.30		Soft brownish grey very sandy SILT. Sand is fine to medium. [ALLUVIUM]
		1.50 - 1.60	D2			(0.70)		
		1.90 - 2.00 2.00	D3 SPT	N=7 (1,1/1,2,2,2)	23.11	2.00		*End of Borehole at 2.00m*

0.5 1.0 1.5 2.0 2.5 3.0 3.5 4.0 4.5 5.0 5.5 6.0 6.5 7.0 7.5 8.0 8.5 9.0 9.5 10.0

Remarks
1. Logged in general accordance with BS 5930:2015+A1:2020. 2. Area spot cleared for services prior to excavation by a specialist third-party contractor. 3. Hand dug pit advanced to 1.20 m bgl. 4. SPT Hammer Ref. 110.71, Energy Ratio, 76%. 5. Borehole terminated at 2.00 m bgl due to sufficient depth reached. 6. Borehole backfilled with arisings. 7. Borehole remained dry upon completion. 8. No olfactory or visual evidence of contamination noted.

Method, Plant, Stability, Dimensions
0.00 - 2.00m DS Premier 110

Logger
MOK

Checked By: AT **Approved By:** TH **Status:** FINAL

SPT Hammer Energy Test Report

in accordance with BSEN ISO 22476-3:2005

Dynamic Sampling Uk Ltd
Unit 8 Victory Park
Victory Road
Derby
DE248ZF

SPT Hammer Ref:	110.45
Test Date:	16/07/2024
Report Date:	16/07/2024
File Name:	110.45.spt
Test Operator:	B.HUNTER

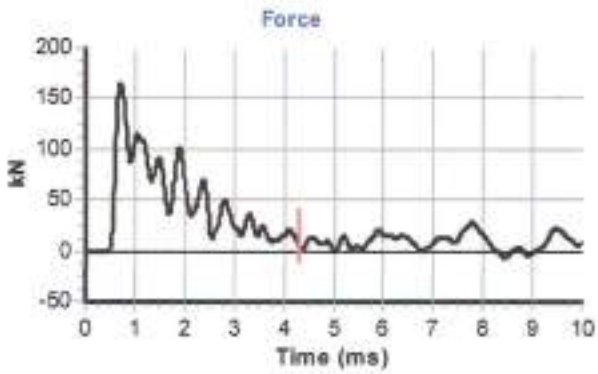
Instrumented Rod Data

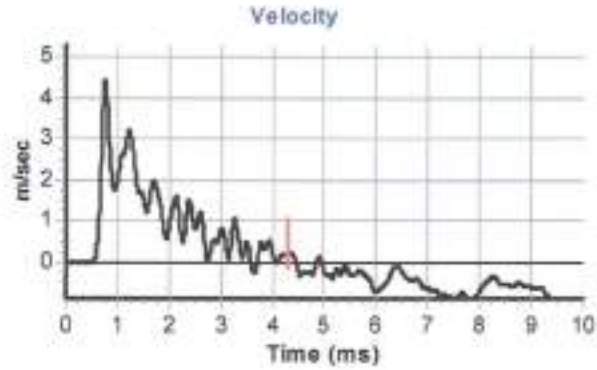
Diameter d_r (mm):	54
Wall Thickness t_r (mm):	6.6
Assumed Modulus E_a (GPa):	208
Accelerometer No.1:	62901
Accelerometer No.2:	69902

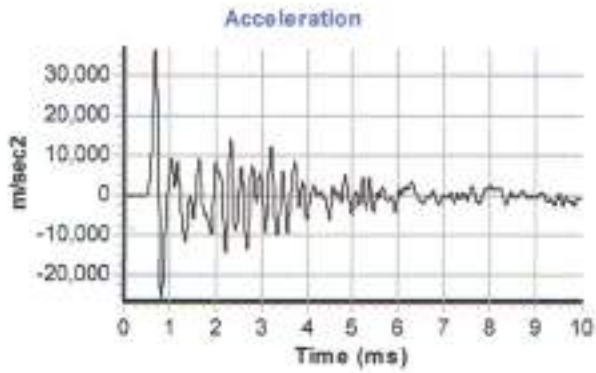
SPT Hammer Information

Hammer Mass m (kg):	63.5
Falling Height h (mm):	760
SPT String Length L (m):	10.0

Comments / Location









Calculations

Area of Rod A (mm2):	983
Theoretical Energy E_{theor} (J):	473
Measured Energy E_{meas} (J):	359

Energy Ratio E_r (%): 76

[redacted]

Signed: B.Hunter

Title: Operations Manager

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Appendix F – Monitoring Data

Site Name	Wrexham, Land North of Bridge Road	Job number	4219
Client	Hero Future Energies	Recorded by	MOK & EM
Date (DD/MM/YYYY)	30/08/2024		
Gas Analyser	GA 500	Visit Number	1
Readings at start	CH_4 (% v/v) <0.1	CO_2 (% v/v) 0.1	O_2 (% v/v) 21.1	H_2S (ppm) <1
General comments			

WEATHER	Start	End
Time	10:35	11:10
Weather (dry/rain/snow/ice)	Dry	Dry
Pressure (mb)	1020.0	1020.0
Rising/Falling Trend	Rising	
Wind Speed (m/s)	1.79	2.22
Wind Dir. (From)	N	N
Temperature °c	16.00	17.00
SWL Measured from	Top of Cover	

Ref	GROUND GAS													GROUNDWATER			Notes
	Flow		CH_4		CO_2		O_2		H_2S	CO	VOC	Differential (Relative) Pressure	Atmos. Pressure	Depth to free product	Depth to water	Depth to base	(e.g. water colour, sheen, odour, damage to well or gas tap, flooded ground etc.) $ For Depth to water state Depth to water or Dry or NR (= Not Recorded - provide reason if monitoring was intended) # For Depth to Product state ND (= Not detected - product looked for but absent) or NR (= Not Recorded - instrument used unable to detect product)
	l/hr		% v/v		% v/v		% v/v		ppm			mb	mb	m	m	m	
	Max	Steady	Max	Steady	Max	Steady	Min	Steady	Max	Max	Max						
	The formulae require that only numbers, "<0.1" for ground gas and flow or "DRY" for groundwater are entered in the sheet																
DS102	<0.1	<0.1	<0.1	<0.1	3.8	3.8	18.3	18.3	<1	3.0	<0.1	-1.63	1020	ND	2.63	3.00	
DS101	<0.1	<0.1	<0.1	<0.1	0.8	0.8	19.9	19.9	<1	<1	<0.1	-2.48	1020	ND	1.53	2.09	Slight blockage in gas tap.
DS104	<0.1	<0.1	<0.1	<0.1	4.5	4.5	16.9	16.9	3.0	<1	<0.1	-0.50	1020	ND	3.44	4.09	
=IF('Site Details'!B44=""																	

Version	1.2	Issue Date	18/06/2024

Site Name	Wrexham, Land North of Bridge Road	Job number	4219
Client	Hero Future Energies	Recorded by	EM
Date (DD/MM/YYYY)	05/09/2024		
Gas Analyser	GA 500	Visit Number	2

Readings at start	CH_4 (% v/v)	<0.1	CO_2 (% v/v)	0.1	O_2 (% v/v)	21.0	H_2S (ppm)	<1	
General comments									

WEATHER	Start	End
Time	10:35	11:10
Weather (dry/rain/snow/ice)	dry	dry
Pressure (mb)	1015.0	1015.0
Rising/Falling Trend	Rising	
Wind Speed (m/s)	4.92	5.80
Wind Dir. (From)	North	North
Temperature °C	16.00	12.00
SWL Measured from	Top of Cover	

Ref	GROUND GAS													GROUNDWATER			Notes
	Flow		CH_4		CO_2		O_2		H_2S	CO	VOC	Differential (Relative) Pressure	Atmos. Pressure	Depth to free product	Depth to water	Depth to base	(e.g. water colour, sheen, odour, damage to well or gas tap, flooded ground etc.) $ For **Depth to water** state **Depth to water or Dry or NR (= Not Recorded - provide reason if monitoring was intended)** # **For Depth to Product state** **ND (= Not detected - product looked for but absent) or NR (= Not Recorded - instrument used unable to detect product)**
	l/hr		% v/v		% v/v		% v/v		ppm								
	Max	Steady	Max	Steady	Max	Steady	Min	Steady	Max	Max	Max	mb	mb	m	m	m	
	The formulae require that only numbers, "<0.1" for ground gas and flow or "DRY" for groundwater are entered in the sheet																
DS102	<0.1	<0.1	<0.1	<0.1	3.6	3.6	18.4	18.4	<1	<1	<0.1	-3.10	1015	ND	2.72	3.00	
DS101	<0.1	<0.1	<0.1	<0.1	1.3	1.3	19.4	19.4	<1	<1	<0.1	-3.24	1015	ND	1.58	2.09	
DS104	<0.1	<0.1	<0.1	<0.1	4.7	4.7	17.0	17.0	<1	2.0	<0.1	-2.17	1015	ND	3.66	2.09	
=IF('Site Details'!B43																	

Version	1.2	Issue Date	18/06/2024

Site Name	Wrexham, Land North of Bridge Road	Job number	4219
Client	Hero Future Energies	Recorded by	Enitial
Date (DD/MM/YYYY)	10/09/2024		
Gas Analyser	G507573	Visit Number	3

Readings at start	CH_4 (% v/v)	<0.1	CO_2 (% v/v)	<0.1	O_2 (% v/v)	21.0	H_2S (ppm)	<1	
General comments									

WEATHER	Start	End
Time	13:40	14:05
Weather (dry/rain/snow/ice)	Rain	Rain
Pressure (mb)	1001.0	1002.0
Rising/Falling Trend	Rising	
Wind Speed (m/s)	3.60	3.60
Wind Dir. (From)	WSW	WSW
Temperature °C	15.00	15.00
SWL Measured from	Top of Cover	

Ref	GROUND GAS													GROUNDWATER			Notes
	Flow		CH_4		CO_2		O_2		H_2S	CO	VOC	Differential (Relative) Pressure	Atmos. Pressure	Depth to free product	Depth to water	Depth to base	(e.g. water colour, sheen, odour, damage to well or gas tap, flooded ground etc.) $ For **Depth to water** state **Depth to water or Dry or NR (= Not Recorded - provide reason if monitoring was intended)** # For Depth to Product state **ND (= Not detected - product looked for but absent) or NR (= Not Recorded - instrument used unable to detect product)**
	l/hr		% v/v		% v/v		% v/v		ppm			mb	mb	m	m	m	
	Max	Steady	Max	Steady	Max	Steady	Min	Steady	Max	Max	Max						
	The formulae require that only numbers, "<0.1" for ground gas and flow or "DRY" for groundwater are entered in the sheet																
DS102	<0.1	<0.1	<0.1	<0.1	0.9	0.9	20.7	20.7	<1	<1	<0.1	-0.07	NR	ND	1.59	2.07	
DS101	<0.1	<0.1	<0.1	<0.1	3.5	3.5	18.5	18.5	<1	<1	<0.1	-0.07	NR	ND	2.53	2.98	
DS104	<0.1	<0.1	<0.1	<0.1	4.5	4.5	16.7	16.7	<1	2.0	<0.1	-0.03	NR	ND	3.38	4.06	

Version	1.2	Issue Date	18/06/2024

Site Name	Wrexham, Land North of Bridge Road	Job number	4219
Client	Hero Future Energies	Recorded by	Enitial
Date (DD/MM/YYYY)	16/09/2024		
Gas Analyser	G505315	Visit Number	4

Readings at start	CH_4 (% v/v)	<0.1	CO_2 (% v/v)	<0.1	O_2 (% v/v)	20.9	H_2S (ppm)	<1	
General comments									

WEATHER	Start	End
Time	11:05	11:40
Weather (dry/rain/snow/ice)	Dry	Dry
Pressure (mb)	1030.0	1030.0
Rising/Falling Trend	Falling	
Wind Speed (m/s)	1.40	1.40
Wind Dir. (From)	N	N
Temperature °C	15.00	15.00
SWL Measured from	Top of Cover	

Ref	GROUND GAS													GROUNDWATER			Notes
	Flow		CH_4		CO_2		O_2		H_2S	CO	VOC	Differential (Relative) Pressure	Atmos. Pressure	Depth to free product	Depth to water	Depth to base	(e.g. water colour, sheen, odour, damage to well or gas tap, flooded ground etc.) $ For **Depth to water** state **Depth to water or Dry or NR (= Not Recorded - provide reason if monitoring was intended)** # **For Depth to Product state** **ND (= Not detected - product looked for but absent) or NR (= Not Recorded - instrument used unable to detect product)**
	l/hr		% v/v		% v/v		% v/v		ppm			mb	mb	m	m	m	
	Max	Steady	Max	Steady	Max	Steady	Min	Steady	Max	Max	Max						
	The formulae require that only numbers, "<0.1" for ground gas and flow or "DRY" for groundwater are entered in the sheet																
DS102	0.1	0.1	<0.1	<0.1	0.8	0.1	18.2	20.2	<1	1.0	<0.1	-0.59	NR	ND	1.20	2.98	
DS101	<0.1	<0.1	<0.1	<0.1	0.9	0.9	19.5	19.5	<1	1.0	<0.1	0.05	NR	ND	1.58	2.05	
DS104	0.1	0.1	<0.1	<0.1	3.1	2.1	16.9	17.6	<1	1.0	<0.1	0.10	NR	ND	2.47	4.06	

Version	1.2	Issue Date	18/06/2024

Appendix G – Soil Chemical Analysis Results

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Analytical Report Number : 24-037838

Project / Site name:	Wrexham	**Samples received on:**	21/08/2024
Your job number:	4219	**Samples instructed on/ Analysis started on:**	21/08/2024
Your order number:	3028	**Analysis completed by:**	29/08/2024
Report Issue Number:	1	**Report issued on:**	30/08/2024
Samples Analysed:	4 soil samples		

[redacted]

Signed:

Anna Goc
PL Head of Reporting Team
For & on behalf of i2 Analytical Ltd.

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

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

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

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

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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: 24-037838
Project / Site name: Wrexham
Your Order No: 3028

Lab Sample Number				294365	294366	294367	294368
Sample Reference				DS102	DS104	DS104	DS105
Sample Number				None Supplied	None Supplied	None Supplied	None Supplied
Depth (m)				2.30-2.40	0.40-0.50	3.90-4.00	1.90-2.00
Date Sampled				20/08/2024	20/08/2024	20/08/2024	20/08/2024
Time Taken				None Supplied	None Supplied	None Supplied	None Supplied
Analytical Parameter (Soil Analysis)	**Units**	**Test Limit of detection**	**Test Accreditation Status**				
Stone Content	%	0.1	NONE	< 0.1	< 0.1	< 0.1	< 0.1
Moisture Content	%	0.01	NONE	14	13	16	15
Total mass of sample received	kg	0.1	NONE	0.2	0.5	0.5	0.8

General Inorganics

pH (L099)	pH Units	N/A	MCERTS	8	8.4	8.4	7.6
Water Soluble Sulphate as SO_4 16hr extraction (2:1)	mg/kg	2.5	MCERTS	330	9.7	52	89
Water Soluble SO_4 16hr extraction (2:1)	mg/l	1.25	MCERTS	164	4.84	26.2	44.6
Total Organic Carbon (TOC) - Automated	%	0.1	MCERTS	0.4	0.3	0.3	-

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

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

Analytical Report Number : 24-037838
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 *
294365	DS102	None Supplied	2.30-2.40	Brown clay with gravel
294366	DS104	None Supplied	0.40-0.50	Brown clay and loam with gravel and vegetation
294367	DS104	None Supplied	3.90-4.00	Brown clay
294368	DS105	None Supplied	1.90-2.00	Brown clay

Analytical Report Number : 24-037838
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
Total organic carbon (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
Sulphate, water soluble, in soil (16hr extraction)	Sulphate, water soluble, in soil (16hr extraction)	In-house method	L038B	D	MCERTS
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.

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

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Analytical Report Number : 24-037846

Replaces Analytical Report Number: 24-037846, issue no. 1
Additional analysis undertaken.
Asbestos Quantification added to sample 294396 as per client's request.

Project / Site name:	Wrexham	**Samples received on:**	21/08/2024
Your job number:	4219	**Samples instructed on/ Analysis started on:**	21/08/2024
Your order number:	3027	**Analysis completed by:**	12/09/2024
Report Issue Number:	2	**Report issued on:**	16/09/2024
Samples Analysed:	8 soil samples - 1 bulk sample		

Signed: [redacted]

Trevor Hill
Customer Service Advisor
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.

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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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Analytical Report Number: 24-037846
Project / Site name: Wrexham
Your Order No: 3027

Lab Sample Number				294393	294394	294395	294396	294397
Sample Reference				DS101	DS102	DS102	DS103	DS103
Sample Number				ES1	ES1	ES2	ES1	ES2
Depth (m)				0.20-0.30	0.30-0.40	1.40-1.50	0.30-0.40	2.90-3.00
Date Sampled				20/08/2024	20/08/2024	20/08/2024	20/08/2024	20/08/2024
Time Taken				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Analytical Parameter (Soil Analysis)	**Units**	**Test Limit of detection**	**Test Accreditation Status**					
Stone Content	%	0.1	NONE	20.8	< 0.1	< 0.1	< 0.1	< 0.1
Moisture Content	%	0.01	NONE	10	14	14	16	20
Total mass of sample received	kg	0.1	NONE	1.4	0.3	0.9	0.5	0.6
Asbestos								
Asbestos in Soil Detected/Not Detected	Type	N/A	ISO 17025	Not-detected	-	-	Detected	Not-detected
Asbestos Analyst ID	N/A	N/A	N/A	KJK	-	-	WEM	KJK
Actinolite detected	Type	N/A	ISO 17025	-	-	-	Not-detected	-
Amosite detected	Type	N/A	ISO 17025	-	-	-	Not-detected	-
Anthophyllite detected	Type	N/A	ISO 17025	-	-	-	Not-detected	-
Chrysotile detected	Type	N/A	ISO 17025	-	-	-	Detected	-
Crocidolite detected	Type	N/A	ISO 17025	-	-	-	Not-detected	-
Tremolite detected	Type	N/A	ISO 17025	-	-	-	Not-detected	-
Asbestos % by hand picking/weighing	%	0.001	ISO 17025	-	-	-	< 0.001	-
Asbestos Containing Material Types Detected (ACM)	Type	N/A	ISO 17025	-	-	-	Loose Fibres	-
Speciated PAHs								
Naphthalene	mg/kg	0.05	MCERTS	0.4	< 0.05	< 0.05	0.69	0.17
Acenaphthylene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Acenaphthene	mg/kg	0.05	MCERTS	4.3	< 0.05	< 0.05	0.84	0.89
Fluorene	mg/kg	0.05	MCERTS	2.5	< 0.05	< 0.05	0.55	0.81
Phenanthrene	mg/kg	0.05	MCERTS	33	0.15	< 0.05	13	2.3
Anthracene	mg/kg	0.05	MCERTS	12	< 0.05	< 0.05	6.4	1
Fluoranthene	mg/kg	0.05	MCERTS	74	0.27	< 0.05	64	8.5
Pyrene	mg/kg	0.05	MCERTS	65	0.23	< 0.05	64	7.2
Benzo(a)anthracene	mg/kg	0.05	MCERTS	33	0.11	< 0.05	37	3.9
Chrysene	mg/kg	0.05	MCERTS	33	0.12	< 0.05	35	3.6
Benzo(b)fluoranthene	mg/kg	0.05	ISO 17025	41	< 0.05	< 0.05	49	4.5
Benzo(k)fluoranthene	mg/kg	0.05	ISO 17025	15	< 0.05	< 0.05	16	1.6
Benzo(a)pyrene	mg/kg	0.05	MCERTS	33	< 0.05	< 0.05	38	3.8
Indeno(1,2,3-cd)pyrene	mg/kg	0.05	MCERTS	16	< 0.05	< 0.05	19	1.8
Dibenz(a,h)anthracene	mg/kg	0.05	MCERTS	3.1	< 0.05	< 0.05	2.9	0.39
Benzo(ghi)perylene	mg/kg	0.05	MCERTS	18	< 0.05	< 0.05	18	2
Total PAH								
Speciated Total EPA-16 PAHs	mg/kg	0.8	ISO 17025	382	0.89	< 0.80	365	42.3

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Analytical Report Number: 24-037846
Project / Site name: Wrexham
Your Order No: 3027

Lab Sample Number				294393	294394	294395	294396	294397
Sample Reference				DS101	DS102	DS102	DS103	DS103
Sample Number				ES1	ES1	ES2	ES1	ES2
Depth (m)				0.20-0.30	0.30-0.40	1.40-1.50	0.30-0.40	2.90-3.00
Date Sampled				20/08/2024	20/08/2024	20/08/2024	20/08/2024	20/08/2024
Time Taken				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Analytical Parameter (Soil Analysis)	**Units**	**Test Limit of detection**	**Test Accreditation Status**					
Heavy Metals / Metalloids								
Arsenic (aqua regia extractable)	mg/kg	1	MCERTS	13	11	9.1	15	16
Barium (aqua regia extractable)	mg/kg	1	MCERTS	180	150	98	240	130
Beryllium (aqua regia extractable)	mg/kg	0.06	MCERTS	1.1	1.2	1	1.1	1.4
Boron (water soluble)	mg/kg	0.2	MCERTS	0.7	0.5	0.6	1	1.1
Cadmium (aqua regia extractable)	mg/kg	0.2	MCERTS	1	< 0.2	< 0.2	< 0.2	< 0.2
Chromium (aqua regia extractable)	mg/kg	1	MCERTS	38	36	33	35	44
Copper (aqua regia extractable)	mg/kg	1	MCERTS	32	23	18	58	20
Lead (aqua regia extractable)	mg/kg	1	MCERTS	370	23	16	260	47
Mercury (aqua regia extractable)	mg/kg	0.3	MCERTS	0.7	< 0.3	< 0.3	< 0.3	< 0.3
Nickel (aqua regia extractable)	mg/kg	1	MCERTS	31	35	33	34	42
Selenium (aqua regia extractable)	mg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0	1.9	< 1.0
Vanadium (aqua regia extractable)	mg/kg	1	MCERTS	37	39	35	40	50
Zinc (aqua regia extractable)	mg/kg	1	MCERTS	260	76	60	290	78
Petroleum Hydrocarbons								
TPHCWG - Aliphatic >EC5 - EC6 $_{HS_1D_AL}$	mg/kg	0.01	MCERTS	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010
TPHCWG - Aliphatic >EC6 - EC8 $_{HS_1D_AL}$	mg/kg	0.01	MCERTS	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010
TPHCWG - Aliphatic >EC8 - EC10 $_{HS_1D_AL}$	mg/kg	0.01	MCERTS	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010
TPHCWG - Aliphatic >EC10 - EC12 $_{EH_CU_1D_AL}$	mg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
TPHCWG - Aliphatic >EC12 - EC16 $_{EH_CU_1D_AL}$	mg/kg	2	MCERTS	8.3	< 2.0	< 2.0	15	7.7
TPHCWG - Aliphatic >EC16 - EC21 $_{EH_CU_1D_AL}$	mg/kg	8	MCERTS	30	< 8.0	< 8.0	55	8.7
TPHCWG - Aliphatic >EC21 - EC35 $_{EH_CU_1D_AL}$	mg/kg	8	MCERTS	72	< 8.0	< 8.0	140	14
TPHCWG - Aliphatic >EC5 - EC35 $_{EH_CU+HS_1D_AL}$	mg/kg	10	NONE	110	< 10	< 10	210	30
TPHCWG - Aromatic >EC5 - EC7 $_{HS_1D_AR}$	mg/kg	0.01	MCERTS	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010
TPHCWG - Aromatic >EC7 - EC8 $_{HS_1D_AR}$	mg/kg	0.01	MCERTS	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010
TPHCWG - Aromatic >EC8 - EC10 $_{HS_1D_AR}$	mg/kg	0.02	MCERTS	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020
TPHCWG - Aromatic >EC10 - EC12 $_{EH_CU_1D_AR}$	mg/kg	1	MCERTS	1	< 1.0	< 1.0	< 1.0	< 1.0
TPHCWG - Aromatic >EC12 - EC16 $_{EH_CU_1D_AR}$	mg/kg	2	MCERTS	28	< 2.0	< 2.0	27	5.5
TPHCWG - Aromatic >EC16 - EC21 $_{EH_CU_1D_AR}$	mg/kg	10	MCERTS	220	< 10	< 10	390	24
TPHCWG - Aromatic >EC21 - EC35 $_{EH_CU_1D_AR}$	mg/kg	10	MCERTS	350	< 10	< 10	730	45
TPHCWG - Aromatic >EC5 - EC35 $_{EH_CU+HS_1D_AR}$	mg/kg	10	NONE	590	< 10	< 10	1100	74
VOCs								
MTBE (Methyl Tertiary Butyl Ether)	µg/kg	5	NONE	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0
Benzene	µg/kg	5	MCERTS	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0
Toluene	µg/kg	5	MCERTS	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0
Ethylbenzene	µg/kg	5	MCERTS	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0
p & m-Xylene	µg/kg	5	MCERTS	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0
o-Xylene	µg/kg	5	MCERTS	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0

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

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Analytical Report Number: 24-037846
Project / Site name: Wrexham
Your Order No: 3027

Lab Sample Number				294398	294399	294400
Sample Reference				DS104	DS105	DS105
Sample Number				ES1	ES1	ES2
Depth (m)				0.50-0.60	0.20-0.30	1.00-1.10
Date Sampled				20/08/2024	20/08/2024	20/08/2024
Time Taken				None Supplied	None Supplied	None Supplied
Analytical Parameter (Soil Analysis)	**Units**	**Test Limit of detection**	**Test Accreditation Status**			
Stone Content	%	0.1	NONE	< 0.1	< 0.1	< 0.1
Moisture Content	%	0.01	NONE	14	13	12
Total mass of sample received	kg	0.1	NONE	0.5	0.9	0.5
Asbestos						
Asbestos in Soil Detected/Not Detected	Type	N/A	ISO 17025	-	-	-
Asbestos Analyst ID	N/A	N/A	N/A	-	-	-
Actinolite detected	Type	N/A	ISO 17025	-	-	-
Amosite detected	Type	N/A	ISO 17025	-	-	-
Anthophyllite detected	Type	N/A	ISO 17025	-	-	-
Chrysotile detected	Type	N/A	ISO 17025	-	-	-
Crocidolite detected	Type	N/A	ISO 17025	-	-	-
Tremolite detected	Type	N/A	ISO 17025	-	-	-
Asbestos % by hand picking/weighing	%	0.001	ISO 17025	-	-	-
Asbestos Containing Material Types Detected (ACM)	Type	N/A	ISO 17025	-	-	-
Speciated PAHs						
Naphthalene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 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	< 0.05	< 0.05
Phenanthrene	mg/kg	0.05	MCERTS	0.06	< 0.05	< 0.05
Anthracene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05
Fluoranthene	mg/kg	0.05	MCERTS	0.09	< 0.05	< 0.05
Pyrene	mg/kg	0.05	MCERTS	0.08	< 0.05	< 0.05
Benzo(a)anthracene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05
Chrysene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05
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	< 0.80	< 0.80

This certificate should not be reproduced, except in full, without the express permission of the laboratory.
The results included within the report relate only to the sample(s) submitted for testing.

Analytical Report Number: 24-037846
Project / Site name: Wrexham
Your Order No: 3027

Lab Sample Number				294398	294399	294400
Sample Reference				DS104	DS105	DS105
Sample Number				ES1	ES1	ES2
Depth (m)				0.50-0.60	0.20-0.30	1.00-1.10
Date Sampled				20/08/2024	20/08/2024	20/08/2024
Time Taken				None Supplied	None Supplied	None Supplied
Analytical Parameter (Soil Analysis)	**Units**	**Test Limit of detection**	**Test Accreditation Status**			
Heavy Metals / Metalloids						
Arsenic (aqua regia extractable)	mg/kg	1	MCERTS	9.2	10	6.9
Barium (aqua regia extractable)	mg/kg	1	MCERTS	120	160	89
Beryllium (aqua regia extractable)	mg/kg	0.06	MCERTS	1.1	1.1	0.79
Boron (water soluble)	mg/kg	0.2	MCERTS	0.6	0.5	0.4
Cadmium (aqua regia extractable)	mg/kg	0.2	MCERTS	< 0.2	< 0.2	< 0.2
Chromium (aqua regia extractable)	mg/kg	1	MCERTS	36	36	24
Copper (aqua regia extractable)	mg/kg	1	MCERTS	19	19	13
Lead (aqua regia extractable)	mg/kg	1	MCERTS	17	19	18
Mercury (aqua regia extractable)	mg/kg	0.3	MCERTS	< 0.3	< 0.3	< 0.3
Nickel (aqua regia extractable)	mg/kg	1	MCERTS	36	36	22
Selenium (aqua regia extractable)	mg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0
Vanadium (aqua regia extractable)	mg/kg	1	MCERTS	38	38	26
Zinc (aqua regia extractable)	mg/kg	1	MCERTS	70	70	47
Petroleum Hydrocarbons						
TPHCWG - Aliphatic >EC5 - EC6 $_{HS_1D_AL}$	mg/kg	0.01	MCERTS	< 0.010	< 0.010	< 0.010
TPHCWG - Aliphatic >EC6 - EC8 $_{HS_1D_AL}$	mg/kg	0.01	MCERTS	< 0.010	< 0.010	< 0.010
TPHCWG - Aliphatic >EC8 - EC10 $_{HS_1D_AL}$	mg/kg	0.01	MCERTS	< 0.010	< 0.010	< 0.010
TPHCWG - Aliphatic >EC10 - EC12 $_{EH_CU_1D_AL}$	mg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0
TPHCWG - Aliphatic >EC12 - EC16 $_{EH_CU_1D_AL}$	mg/kg	2	MCERTS	< 2.0	< 2.0	< 2.0
TPHCWG - Aliphatic >EC16 - EC21 $_{EH_CU_1D_AL}$	mg/kg	8	MCERTS	< 8.0	< 8.0	< 8.0
TPHCWG - Aliphatic >EC21 - EC35 $_{EH_CU_1D_AL}$	mg/kg	8	MCERTS	< 8.0	< 8.0	< 8.0
TPHCWG - Aliphatic >EC5 - EC35 $_{EH_CU+HS_1D_AL}$	mg/kg	10	NONE	< 10	< 10	< 10
TPHCWG - Aromatic >EC5 - EC7 $_{HS_1D_AR}$	mg/kg	0.01	MCERTS	< 0.010	< 0.010	< 0.010
TPHCWG - Aromatic >EC7 - EC8 $_{HS_1D_AR}$	mg/kg	0.01	MCERTS	< 0.010	< 0.010	< 0.010
TPHCWG - Aromatic >EC8 - EC10 $_{HS_1D_AR}$	mg/kg	0.02	MCERTS	< 0.020	< 0.020	< 0.020
TPHCWG - Aromatic >EC10 - EC12 $_{EH_CU_1D_AR}$	mg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0
TPHCWG - Aromatic >EC12 - EC16 $_{EH_CU_1D_AR}$	mg/kg	2	MCERTS	< 2.0	< 2.0	< 2.0
TPHCWG - Aromatic >EC16 - EC21 $_{EH_CU_1D_AR}$	mg/kg	10	MCERTS	< 10	< 10	< 10
TPHCWG - Aromatic >EC21 - EC35 $_{EH_CU_1D_AR}$	mg/kg	10	MCERTS	< 10	< 10	< 10
TPHCWG - Aromatic >EC5 - EC35 $_{EH_CU+HS_1D_AR}$	mg/kg	10	NONE	< 10	< 10	< 10
VOCs						
MTBE (Methyl Tertiary Butyl Ether)	µg/kg	5	NONE	< 5.0	< 5.0	< 5.0
Benzene	µg/kg	5	MCERTS	< 5.0	< 5.0	< 5.0
Toluene	µg/kg	5	MCERTS	< 5.0	< 5.0	< 5.0
Ethylbenzene	µg/kg	5	MCERTS	< 5.0	< 5.0	< 5.0
p & m-Xylene	µg/kg	5	MCERTS	< 5.0	< 5.0	< 5.0
o-Xylene	µg/kg	5	MCERTS	< 5.0	< 5.0	< 5.0

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

This certificate should not be reproduced, except in full, without the express permission of the laboratory.
The results included within the report relate only to the sample(s) submitted for testing.

Analytical Report Number: 24-037846
Project / Site name: Wrexham
Your Order No: 3027

Certificate of Analysis - Asbestos Quantification

Methods:

Qualitative Analysis

The samples were analysed qualitatively for asbestos by polarising light and dispersion staining as described by the Health and Safety Executive in HSG 248.

Quantitative Analysis

The analysis was carried out using our documented in-house method A006 based on HSE Contract Research Report No: 83/1996: Development and Validation of an analytical method to determine the amount of asbestos in soils and loose aggregates (Davies et al, 1996) and HSG 248. Our method includes initial examination of the entire representative sample, then fractionation and detailed analysis of each fraction, with quantification by hand picking and weighing.

The limit of detection (reporting limit) of this method is 0.001 %.

The method has been validated using samples of at least 100 g, results for samples smaller than this should be interpreted with caution.

Both Qualitative and Quantitative Analyses are UKAS accredited.

Sample Number	Sample ID	Sample Depth (m)	Sample Weight (g)	Asbestos Containing Material Types Detected (ACM)	PLM Results	Asbestos by hand picking/weighing (%)	Total % Asbestos in Sample
294396	DS103	0.30-0.40	112	Loose Fibres	**Chrysotile**	< 0.001	**< 0.001**

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

This certificate should not be reproduced, except in full, without the express permission of the laboratory.
The results included within the report are representative of the samples submitted for analysis.

Analytical Report Number: 24-037846
Project / Site name: Wrexham
Your Order No: 3027

Lab Sample Number				294401
Sample Reference				ACM1
Sample Number				None Supplied
Depth (m)				0.00
Date Sampled				20/08/2024
Time Taken				None Supplied
Analytical Parameter (Bulk Analysis)	**Units**	**Test Limit of detection**	**Test Accreditation Status**	

Asbestos

Asbestos in bulks	Type	N/A	ISO 17025	Detected
Asbestos Analyst ID	N/A	N/A	N/A	KJK
Actinolite detected	Type	N/A	ISO 17025	Not-detected
Amosite detected	Type	N/A	ISO 17025	Not-detected
Anthophyllite detected	Type	N/A	ISO 17025	Not-detected
Chrysotile detected	Type	N/A	ISO 17025	Detected
Crocidolite detected	Type	N/A	ISO 17025	Not-detected
Tremolite detected	Type	N/A	ISO 17025	Not-detected

Asbestos Containing Material Types Detected (ACM)	Type	N/A	ISO 17025	Asbestos Insulating Board

U/S = Unsuitable Sample I/S = Insufficient Sample

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

Analytical Report Number : 24-037846
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 *
294393	DS101	ES1	0.20-0.30	Brown loam and clay with stones and vegetation
294394	DS102	ES1	0.30-0.40	Brown loam and clay with gravel and vegetation
294395	DS102	ES2	1.40-1.50	Brown clay
294396	DS103	ES1	0.30-0.40	Brown clay and loam with gravel and vegetation
294397	DS103	ES2	2.90-3.00	Brown clay with gravel
294398	DS104	ES1	0.50-0.60	Brown clay with gravel
294399	DS105	ES1	0.20-0.30	Brown clay and loam with gravel and vegetation
294400	DS105	ES2	1.00-1.10	Brown clay with gravel

Analytical Report Number : 24-037846
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
Asbestos identification in Bulks	Asbestos Identification in bulk material with the use of polarised light microscopy in conjunction with dispersion staining techniques	In-house method based on HSG 248, 2021	A001B	W	ISO 17025
Asbestos Quantification - Gravimetric	Asbestos quantification by gravimetric method - in house method based on references	HSE Report No: 83/1996, HSG 248 (2021), HSG 264 (2012) & SCA Blue Book (draft)	A006B	D	ISO 17025
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
Boron, water soluble, in soil	Determination of water soluble boron in soil by hot water extract followed by ICP-OES	In-house method based on Second Site Properties version 3	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
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-PL	D/W	MCERTS

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

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

Appendix H – Geotechnical Analysis Results

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

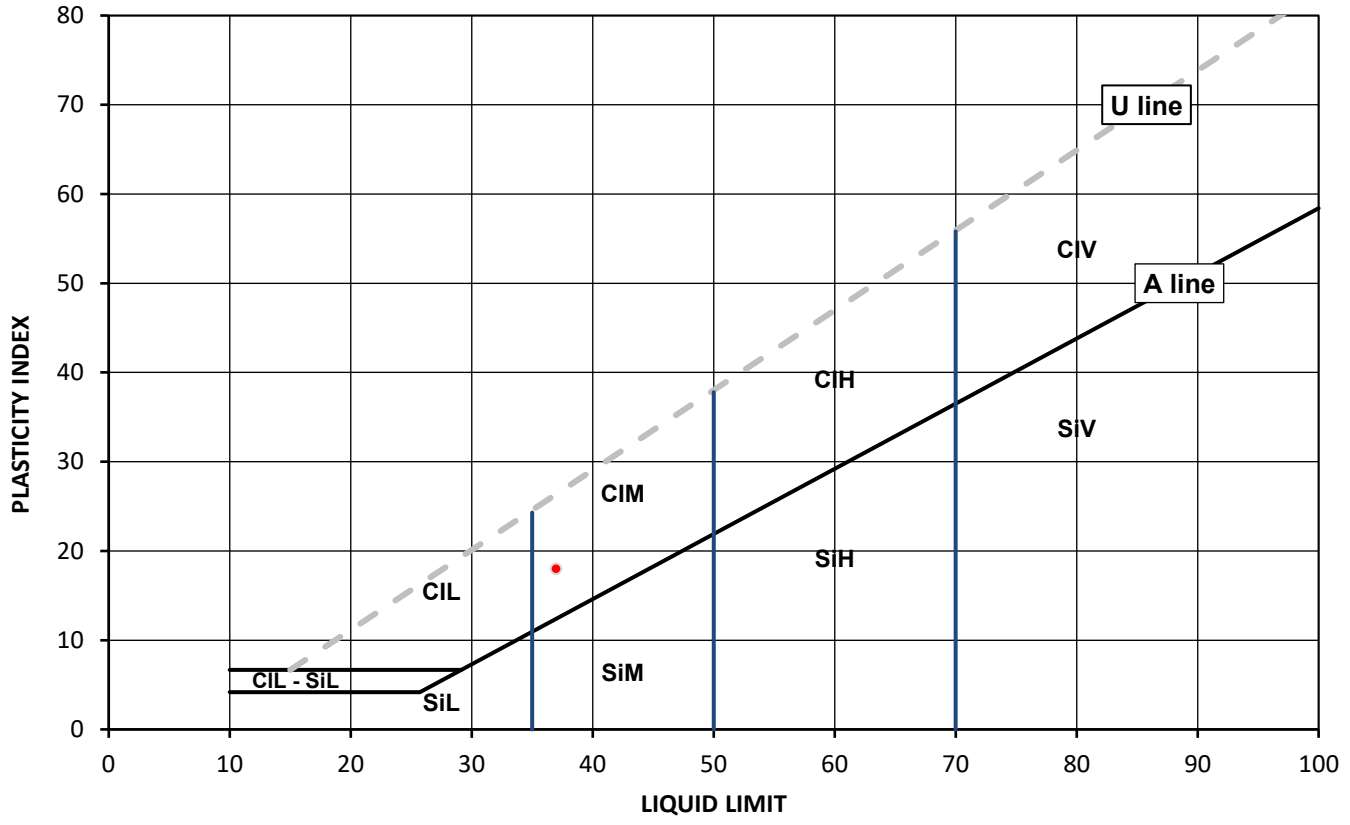
Client:	GEO2 Remediation Ltd	Client Reference:	4219
Client Address:	Coniston House, Louisa Street, Idle, BD10 8NE	Job Number:	24-037775-1
		Date Sampled:	20/08/2024
		Date Received:	21/08/2024
Contact:	Megan O Kelly	Date Tested:	29/08/2024
Site Address:	Wrexham	Sampled By:	Not Given

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

Test Results:

Laboratory Reference:	294200	Depth Top [m]:	0.90
Hole No.:	DS102	Depth Base [m]:	1.00
Sample Reference:	Not Given	Sample Type:	D
Sample Description:	Brown slightly gravelly sandy CLAY		
Sample Preparation:	Tested after >0.425mm removed by hand; 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
15.7	37	19	18	-0.17	1.17	86



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:

Signed: [redacted] Katarzyna Koziel
Senior Reporting Specialist
for and on behalf of i2 Analytical Ltd

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Date Reported: 11/09/2024

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

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

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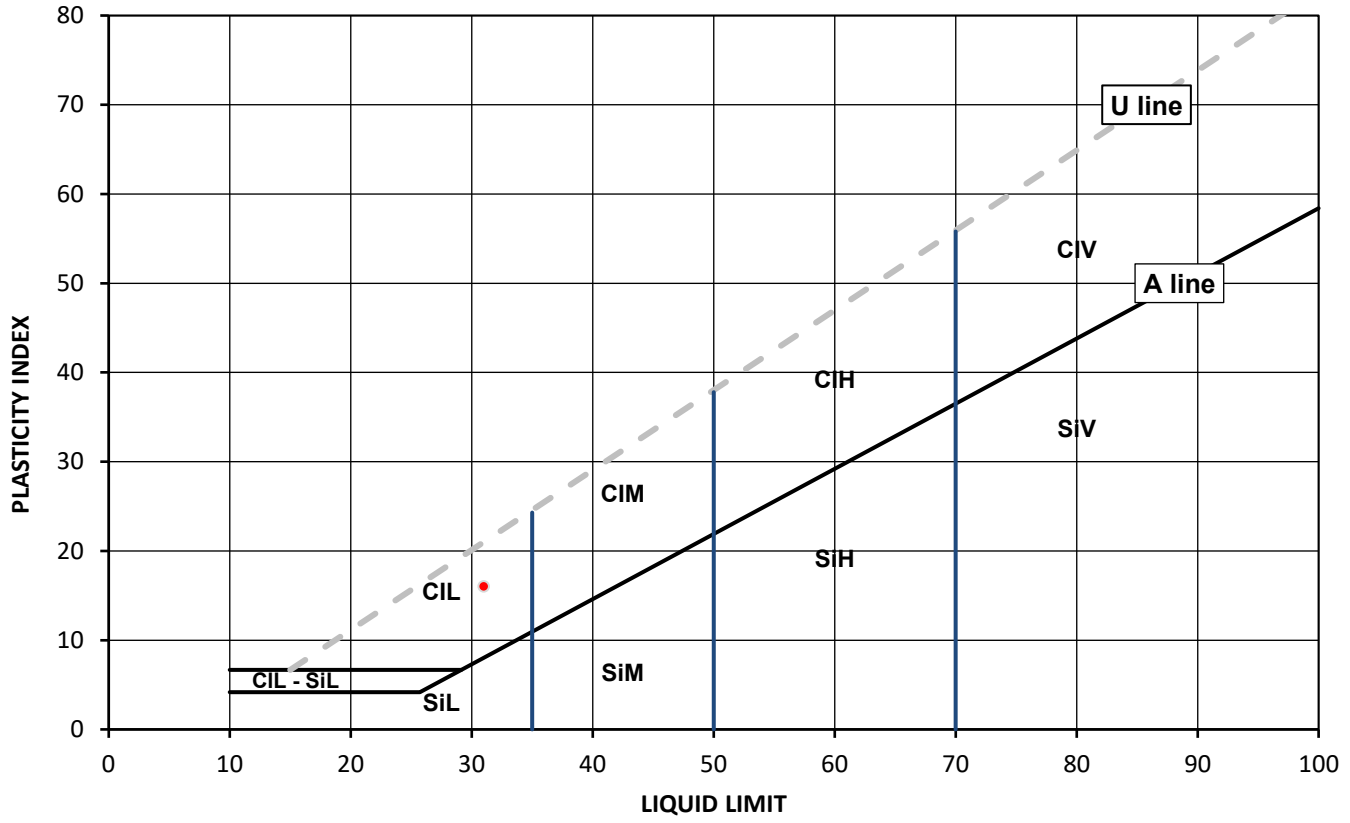
Client:	GEO2 Remediation Ltd	Client Reference:	4219
Client Address:	Coniston House, Louisa Street, Idle, BD10 8NE	Job Number:	24-037775-1
		Date Sampled:	20/08/2024
		Date Received:	21/08/2024
Contact:	Megan O Kelly	Date Tested:	29/08/2024
Site Address:	Wrexham	Sampled By:	Not Given

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

Test Results:

Laboratory Reference:	294201	Depth Top [m]:	1.90
Hole No.:	DS105	Depth Base [m]:	2.00
Sample Reference:	Not Given	Sample Type:	D
Sample Description:	Brown slightly gravelly very sandy 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
20.2	31	15	16	0.31	0.69	88



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:

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Signed: [redacted]
Katarzyna Koziel
Senior Reporting Specialist
for and on behalf of i2 Analytical Ltd

Date Reported: 11/09/2024

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

i2 Analytical Ltd
Unit 8 Harrowden Road
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Northampton NN4 7EB

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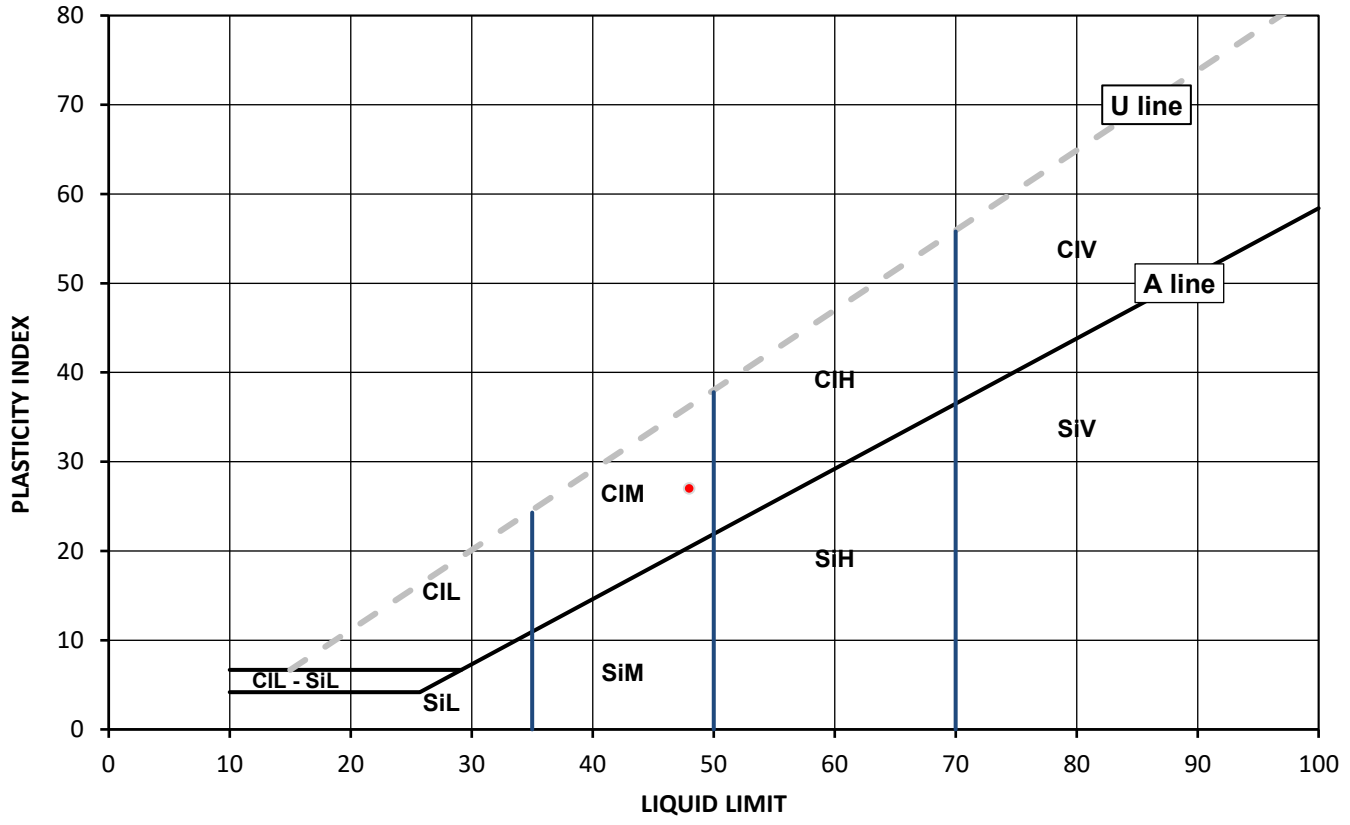
Client:	GEO2 Remediation Ltd	Client Reference:	4219
Client Address:	Coniston House, Louisa Street, Idle, BD10 8NE	Job Number:	24-037775-1
		Date Sampled:	20/08/2024
		Date Received:	21/08/2024
Contact:	Megan O Kelly	Date Tested:	29/08/2024
Site Address:	Wrexham	Sampled By:	Not Given

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

Test Results:

Laboratory Reference:	294202	Depth Top [m]:	2.90
Hole No.:	DS104	Depth Base [m]:	3.00
Sample Reference:	Not Given	Sample Type:	D
Sample Description:	Brown slightly gravelly slightly sandy CLAY		
Sample Preparation:	Tested after >0.425mm removed by hand; 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
16.8	48	21	27	-0.15	1.15	92



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:

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Signed: [redacted]

Katarzyna Koziel
Senior Reporting Specialist
for and on behalf of i2 Analytical Ltd

Date Reported: 11/09/2024

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: GEO2 Remediation Ltd

Client Address: Coniston House, Louisa Street, Idle, BD10 8NE

Contact: Megan O Kelly

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: 4219
Job Number: 24-037775-1
Date Sampled: 20/08/2024
Date Received: 21/08/2024
Date Tested: 29/08/2024
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
294200	DS102	Not Given	0.90	1.00	D	Brown slightly gravelly sandy CLAY	Atterberg 4 Point	15.7	86	37	-	19	18	80g/30 deg	R / I			
294201	DS105	Not Given	1.90	2.00	D	Brown slightly gravelly very sandy CLAY	Atterberg 4 Point	20.2	88	31	-	15	16	80g/30 deg	W / I			
294202	DS104	Not Given	2.90	3.00	D	Brown slightly gravelly slightly sandy CLAY	Atterberg 4 Point	16.8	92	48	-	21	27	80g/30 deg	R / I			
294203	DS102	Not Given	2.50	3.00	B	Brownish grey slightly sandy silty CLAY		17.8										
294204	DS104	Not Given	1.50	2.00	B	Reddish brown sandy CLAY		15.9										

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:

Signed: [redacted]

Katarzyna Koziel
Senior Reporting Specialist
for and on behalf of i2 Analytical Ltd

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Date Reported: 11/09/2024 **GF 362.15**

SUMMARY REPORT

DETERMINATION OF WATER CONTENT

Tested in Accordance with: BS EN ISO 17892-1:2014+A1:2022, BS 1377-2: 2022, clause 4.1

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

4041

Client: GEO2 Remediation Ltd

Client Address: Coniston House, Louisa Street, Idle, BD10 8NE

Contact: Megan O Kelly

Site Address: Wrexham

Client Reference: 4219
Job Number: 24-037775-1
Date Sampled: 20/08/2024
Date Received: 21/08/2024
Date Tested: 27/08 - 29/08/2024
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	WC											
		Reference	Depth Top m	Depth Base m	Type			%											
294200	DS102	Not Given	0.90	1.00	D	Brown slightly gravelly sandy CLAY		15.7											
294201	DS105	Not Given	1.90	2.00	D	Brown slightly gravelly very sandy CLAY		20.2											
294202	DS104	Not Given	2.90	3.00	D	Brown slightly gravelly slightly sandy CLAY		16.8											
294203	DS102	Not Given	2.50	3.00	B	Brownish grey slightly sandy silty CLAY		17.8											
294204	DS104	Not Given	1.50	2.00	B	Reddish brown sandy CLAY		15.9											

Comments:

Signed: [redacted]

Katarzyna Koziel
Senior Reporting Specialist
for and on behalf of i2 Analytical Ltd

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Date Reported: 11/09/2024

GF 126.18

TEST CERTIFICATE

DETERMINATION OF PARTICLE SIZE DISTRIBUTION

Tested in Accordance with: BS EN ISO 17892-4:2016, BS 1377-2:2022 cl. 10

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

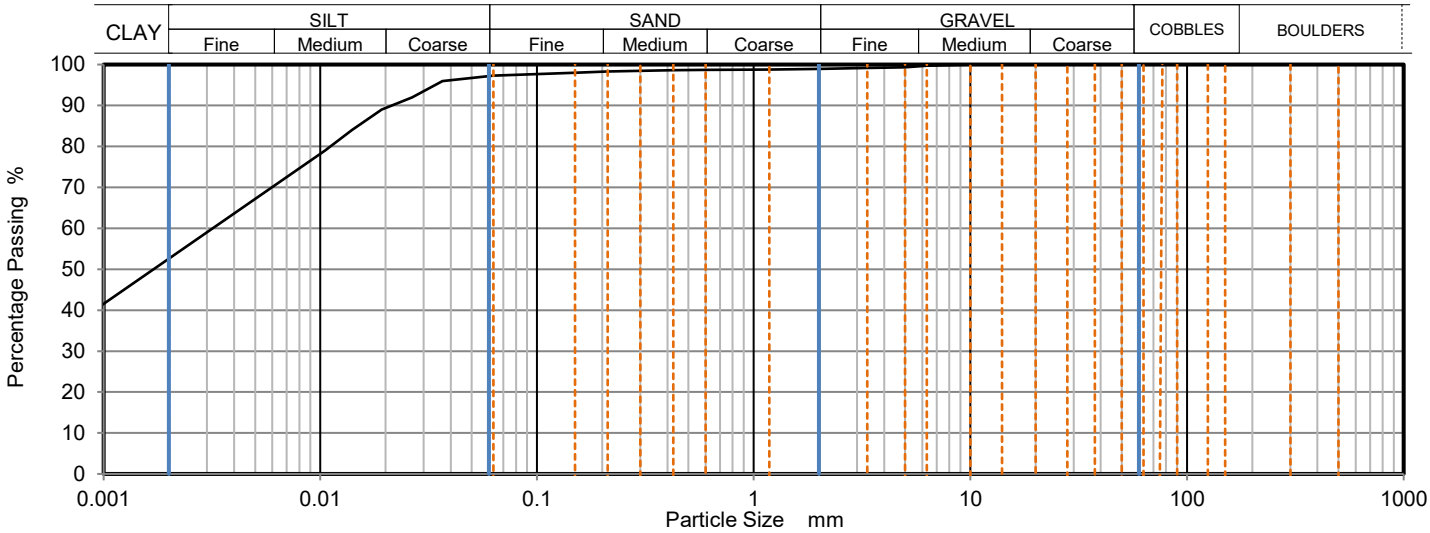
4041

Client:	GEO2 Remediation Ltd	Client Reference:	4219
Client Address:	Coniston House, Louisa Street, Idle, BD10 8NE	Job Number:	24-037775-1
		Date Sampled:	20/08/2024
		Date Received:	21/08/2024
Contact:	Megan O Kelly	Date Tested:	27/08/2024
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:	294203	Depth Top [m]:	2.50
Hole No.:	DS102	Depth Base [m]:	3.00
Sample Reference:	Not Given	Sample Type:	B
Sample Description:	Brownish grey slightly sandy silty CLAY		
Sample Preparation:	Sample was quartered, oven dried at 106.2 °C and broken down by hand.		



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
500	100	0.0366	96
300	100	0.0265	92
150	100	0.0192	89
125	100	0.0140	84
90	100	0.0105	79
75	100	0.0008	38
63	100		
50	100		
37.5	100		
28	100		
20	100		
14	100		
10	100		
6.3	100		
5	99		
3.35	99		
2	99		
1.18	99		
0.6	99	Particle density	(assumed)
0.425	99	2.65	Mg/m3
0.3	99		
0.212	98		
0.15	98		
0.063	97		

Sample Proportions	% dry mass
Very coarse	0.00
Gravel	1.00
Sand	2.00
Silt	45.00
Clay	52.00

Grading Analysis		
D100	mm	10
D60	mm	0.00317
D30	mm	
D10	mm	
Uniformity Coefficient		0.05
Curvature Coefficient		

Uniformity and Curvature Coefficient calculated in accordance with BS EN ISO 14688-2:2018

Note: Tested in Accordance with ISO 17892 -4, by sieving and hydrometer sedimentation

Remarks:

Signed: [redacted]

Katarzyna Koziel
Senior Reporting Specialist
for and on behalf of i2 Analytical Ltd

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Date Reported: 11/09/2024

GF 366.11

TEST CERTIFICATE

DETERMINATION OF PARTICLE SIZE DISTRIBUTION

Tested in Accordance with: BS EN ISO 17892-4:2016, BS 1377-2:2022 cl. 10

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

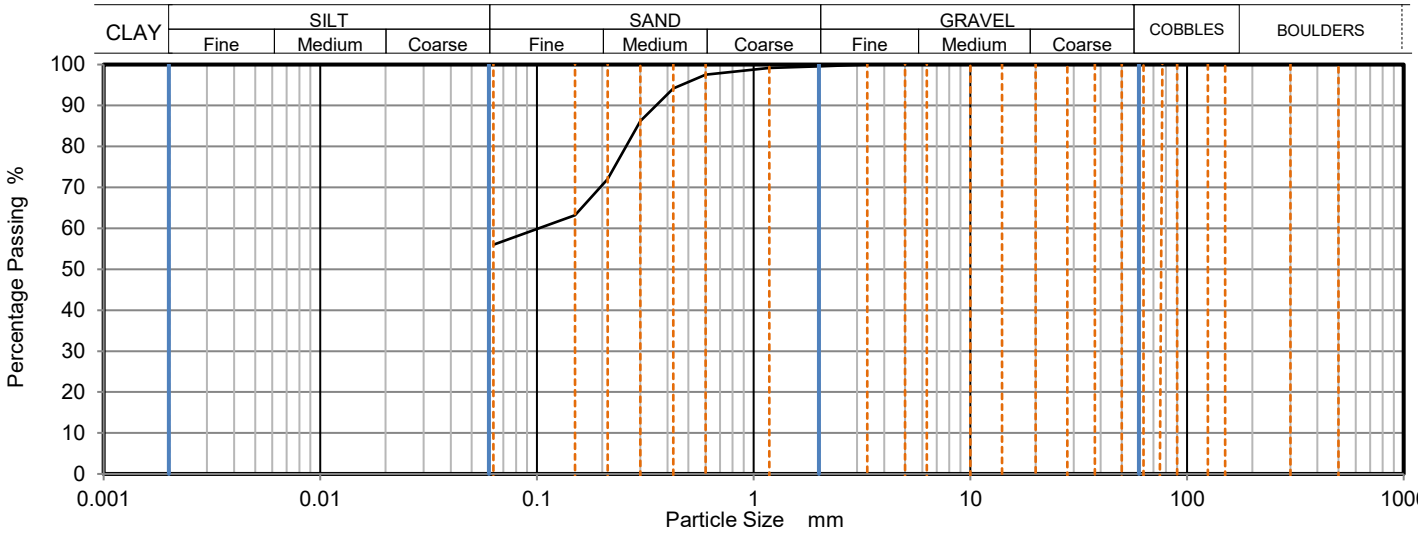
4041

Client:	GEO2 Remediation Ltd	Client Reference:	4219
Client Address:	Coniston House, Louisa Street, Idle, BD10 8NE	Job Number:	24-037775-1
		Date Sampled:	20/08/2024
		Date Received:	21/08/2024
Contact:	Megan O Kelly	Date Tested:	27/08/2024
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:	294204	Depth Top [m]:	1.50
Hole No.:	DS104	Depth Base [m]:	2.00
Sample Reference:	Not Given	Sample Type:	B
Sample Description:	Reddish brown sandy CLAY		
Sample Preparation:	Sample was quartered, oven dried at 106.2 °C and broken down by hand.		



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
500	100		
300	100		
150	100		
125	100		
90	100		
75	100		
63	100		
50	100		
37.5	100		
28	100		
20	100		
14	100		
10	100		
6.3	100		
5	100		
3.35	100		
2	100		
1.18	99		
0.6	98		
0.425	94		
0.3	86		
0.212	72		
0.15	63		
0.063	56		

Sample Proportions	% dry mass
Very coarse	0.00
Gravel	0.00
Sand	44.00
Fines <0.063 mm	56.00

Grading Analysis		
D100	mm	5
D60	mm	0.102
D30	mm	
D10	mm	
Uniformity Coefficient		1.6
Curvature Coefficient		

Uniformity and Curvature Coefficient calculated in accordance with BS EN ISO 14688-2:2018

Note: Tested in Accordance with ISO 17892 -4, by sieving on as received or wet sample

Remarks:

Signed: [redacted]

Katarzyna Koziel
Senior Reporting Specialist
for and on behalf of i2 Analytical Ltd

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Date Reported: 11/09/2024

GF 366.11

Appendix I – Risk Assessment Terminology

Definitions and Classifications of Risk Assessment Terminology.

Probability

Probability can be defined as the chance of a particular event occurring in a given period of time.

Descriptions of each of the four qualitative terms to be use in this report to describe the perceived probability of any identified pollutant linkage becoming realised are shown below in Table W.

Term	Description
High Likelihood	There is pollutant linkage and an event would appear very likely in the short-term and almost inevitable over the long-term, or there is evidence at the receptor of harm or pollution.
Likely	There is pollutant linkage and all the elements are present and in the right place which means that it is probable that an event will occur. Circumstances are such that an event is not inevitable, but possible in the short-term and likely over the long-term.
Low Likelihood	There is pollutant linkage and circumstances are possible under which an event could occur. However, it is by no means certain that even over a long period such an event would take place, and is less likely in the shorter term.
Unlikely	There is pollutant linkage but circumstances are such that it is improbable that an event would occur even in the very long-term.

Table W. Description of Probability Classifications

Severity

Severity (consequence) can be defined as the adverse effects (or harm) arising from a defined hazard, which impairs the quality of human health or the environment in the short or longer term.

Descriptions of each of the four qualitative terms to be use in this report to describe the perceived potential severity of any identified pollutant linkage becoming realised are shown below in Table X.

Term	Description
Severe	Highly elevated concentrations **likely** to result in "significant harm" to human health as defined by the EPA 1990, Part 2A, if exposure occurs. Equivalent to **EA Category 1** pollution incident including persistent and/or extensive effects on water quality; leading to closure of a potable abstraction point; major impact on amenity value or major damage to agriculture or commerce. Major damage to aquatic or other ecosystems, which is likely to result in a substantial adverse change in its functioning or harm to a species of special interest that endangers the long-term maintenance of the population. Catastrophic damage to crops, buildings or property.
Medium	Elevated concentrations which could result in "significant harm" to human health as defined by the EPA 1990, Part 2A if exposure occurs. Equivalent to **EA Category 2** pollution incident including significant effect on water quality; notification required to abstractors; reduction in amenity value or significant damage to agriculture or commerce. Significant damage to aquatic or other ecosystems, which may result in a substantial adverse change in its functioning or harm to a species of special interest that may endanger the long-term maintenance of the population. Significant damage to crops, buildings or property.
Mild	Exposure to human health **unlikely** to lead to "significant harm". Equivalent to **EA Category 3** pollution incident including minimal or short-lived effect on water quality; marginal effect on amenity value, agriculture or commerce. Minor or short-lived damage to aquatic or other ecosystems, which is unlikely to result in a substantial adverse change in its functioning or harm to a species of special interest that would endanger the long-term maintenance of the population. Minor damage to crops, buildings or property.
Minor	No measurable effect on humans. Equivalent to insubstantial pollution incident with no observed effect on water quality or ecosystems. Repairable effects of damage to buildings, structures and services.

Table X. Description of Severity Classifications

Once the severity and probability of a pollutant linkage has been determined the risk can be assessed using the risk matrix shown overleaf on Table Y.

Risk Matrix

By cross referencing the derived severity and probability in Table Y, below the perceived potential risk can be determined.

		Severity			
		Severe	Medium	Mild	Minor
Probability	High Likelihood	Very High Risk	High Risk	Moderate Risk	Moderate / Low Risk
	Likely	High Risk	Moderate Risk	Moderate / Low Risk	Low Risk
	Low Likelihood	Moderate Risk	Moderate / Low Risk	Low Risk	Very Low Risk
	Unlikely	Moderate / Low Risk	Low Risk	Very Low Risk	Very Low Risk

Table Y. Risk Assessment Matrix

The risk categories detailed above are defined below in the following Table Z.

Term	Description
Very High Risk	There is a high probability that significant harm could arise to a designated receptor from an identified hazard at the site without appropriate remedial action.
High Risk	Significant harm is likely to arise to a designated receptor from an identified hazard at the site without appropriate remedial action.
Moderate Risk	It is possible that without appropriate remedial action, harm could arise to a designated receptor but it is relatively unlikely that any such harm would be severe and if any harm were to occur, it is likely that such harm would be relatively mild.
Low Risk	It is possible that significant harm could arise to a designated receptor from an identified hazard but it is likely that at worst this harm if realised would normally be mild.
Very Low Risk	There is a low possibility that harm could arise to a receptor. In the event of such harm being realised, it is not likely to be severe.

Table Z. Definition of Risk