

Site Details:

391352 411646

Client Ref: POR010967_Plot_L_Rochdale
Report Ref: HMD-214-3887196
Grid Ref: 391332, 411658

Map Name: National Grid

Map date: 1976

Scale: 1:10,000

Printed at: 1:10,000



Surveyed 1976
Revised 1976
Edition N/A
Copyright N/A
Levelled N/A

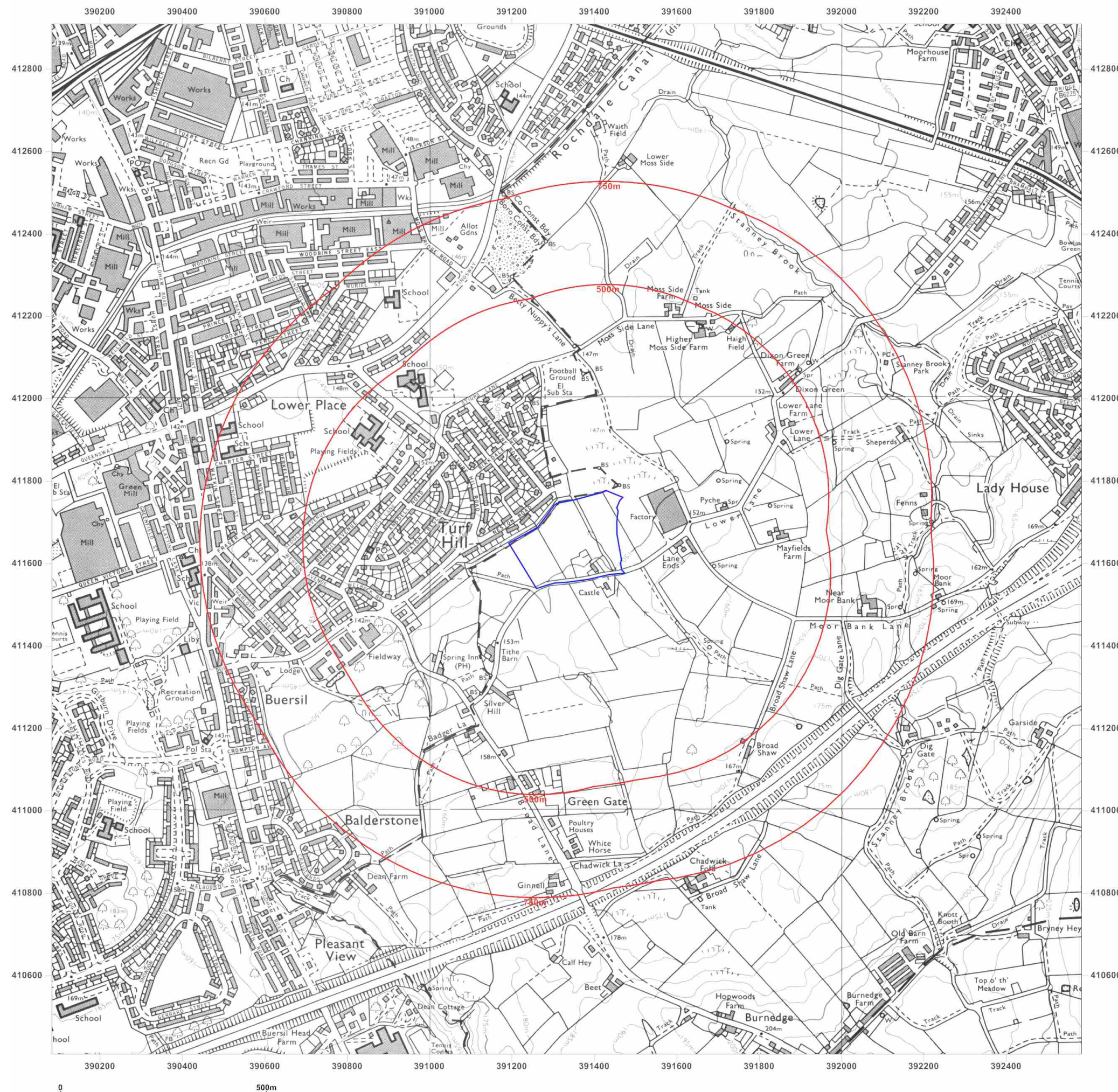


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Production date: 17 May 2017

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Site Details:

391352 411646

Client Ref: POR010967_Plot_L_Rochdale
Report Ref: HMD-214-3887196
Grid Ref: 391332, 411658

Map Name: 1:10,000 Raster

Map date: 2002

Scale: 1:10,000

Printed at: 1:10,000



2002



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Site Details:

391352 411646

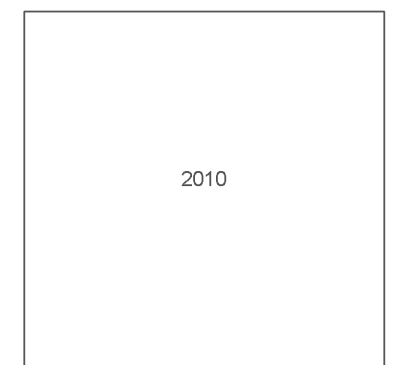
Client Ref: POR010967_Plot_L_Rochdale
Report Ref: HMD-214-3887196
Grid Ref: 391332, 411658

Map Name: National Grid

Map date: 2010

Scale: 1:10,000

Printed at: 1:10,000

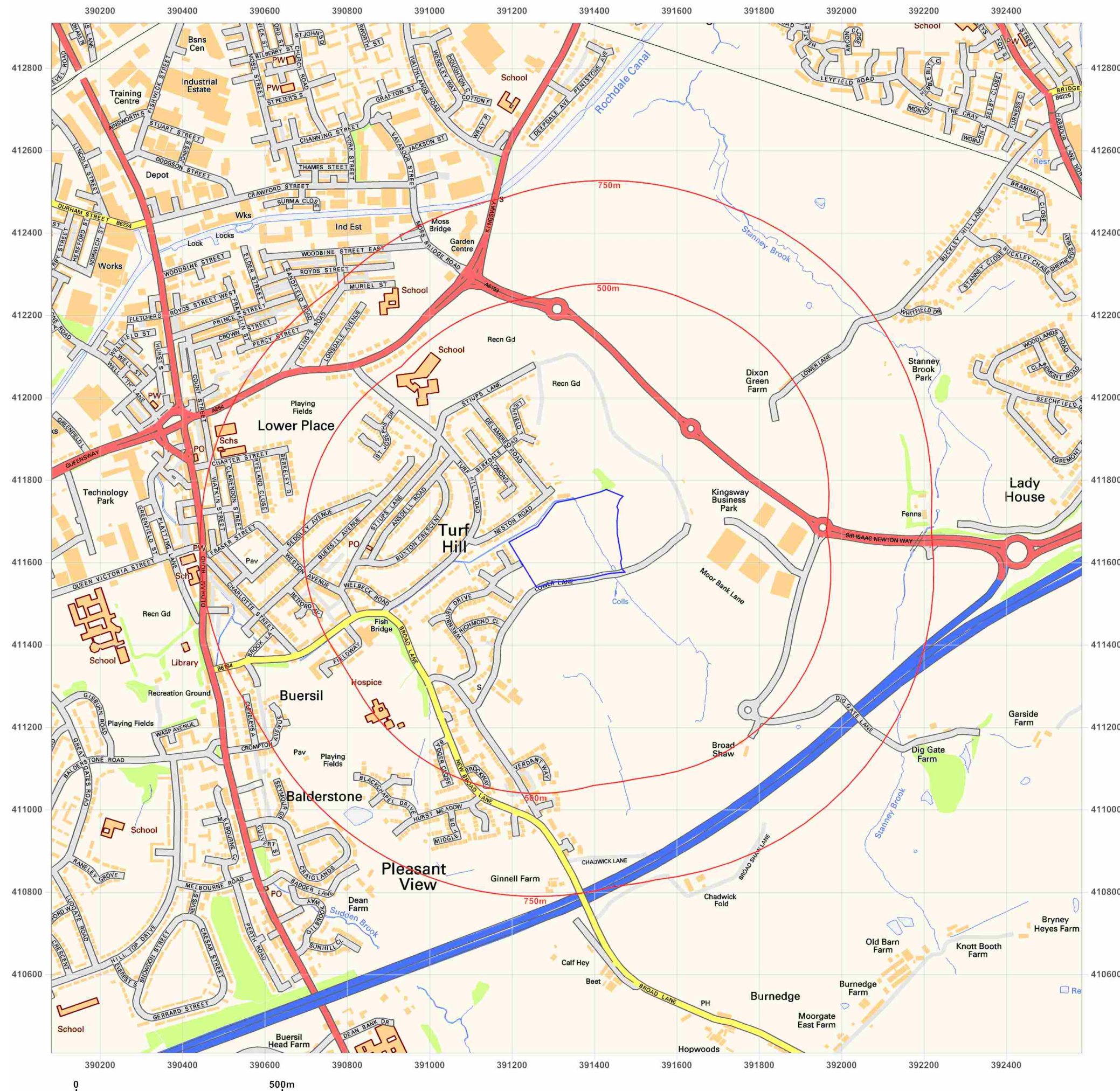


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Site Details:

391352 411646

Client Ref: POR010967_Plot_L_Rochdale
Report Ref: HMD-214-3887196
Grid Ref: 391332, 411658

Map Name: National Grid

Map date: 2014

Scale: 1:10,000

Printed at: 1:10,000



2014

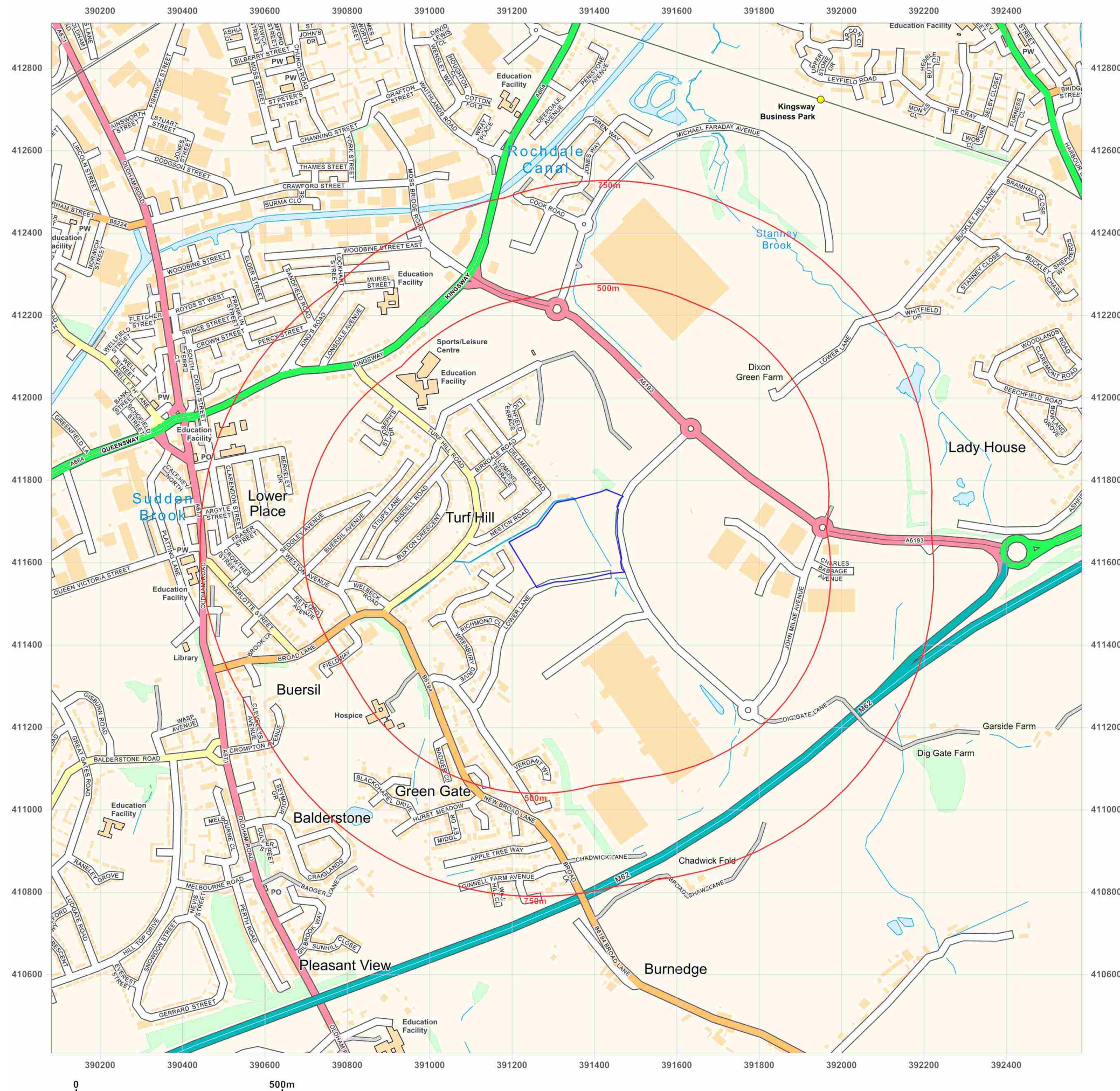


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Site Details:

391352 411646

Client Ref: POR010967_Plot_L_Rochdale
Report Ref: HMD-214-3887196
Grid Ref: 391332, 411658

Map Name: County Series

Map date: 1891

Scale: 1:2,500

Printed at: 1:2,500



Surveyed 1891
 Revised 1891
 Edition N/A
 Copyright N/A
 Levelled N/A

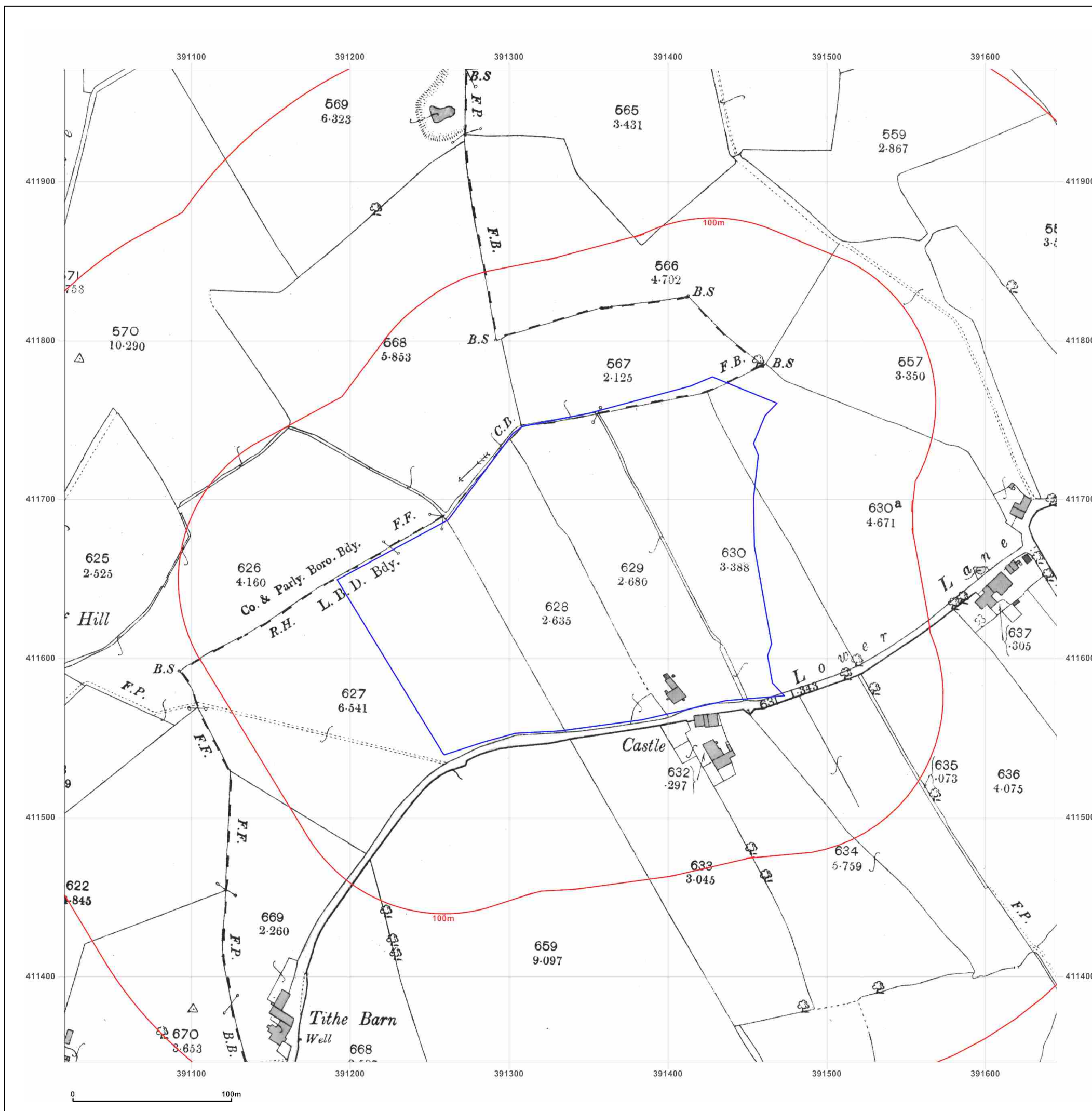


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Site Details:

391352 411646

Client Ref: POR010967_Plot_L_Rochdale
Report Ref: HMD-214-3887196
Grid Ref: 391332, 411658

Map Name: County Series

Map date: 1910

Scale: 1:2,500

Printed at: 1:2,500



Surveyed 1910
 Revised 1910
 Edition N/A
 Copyright N/A
 Levelled N/A

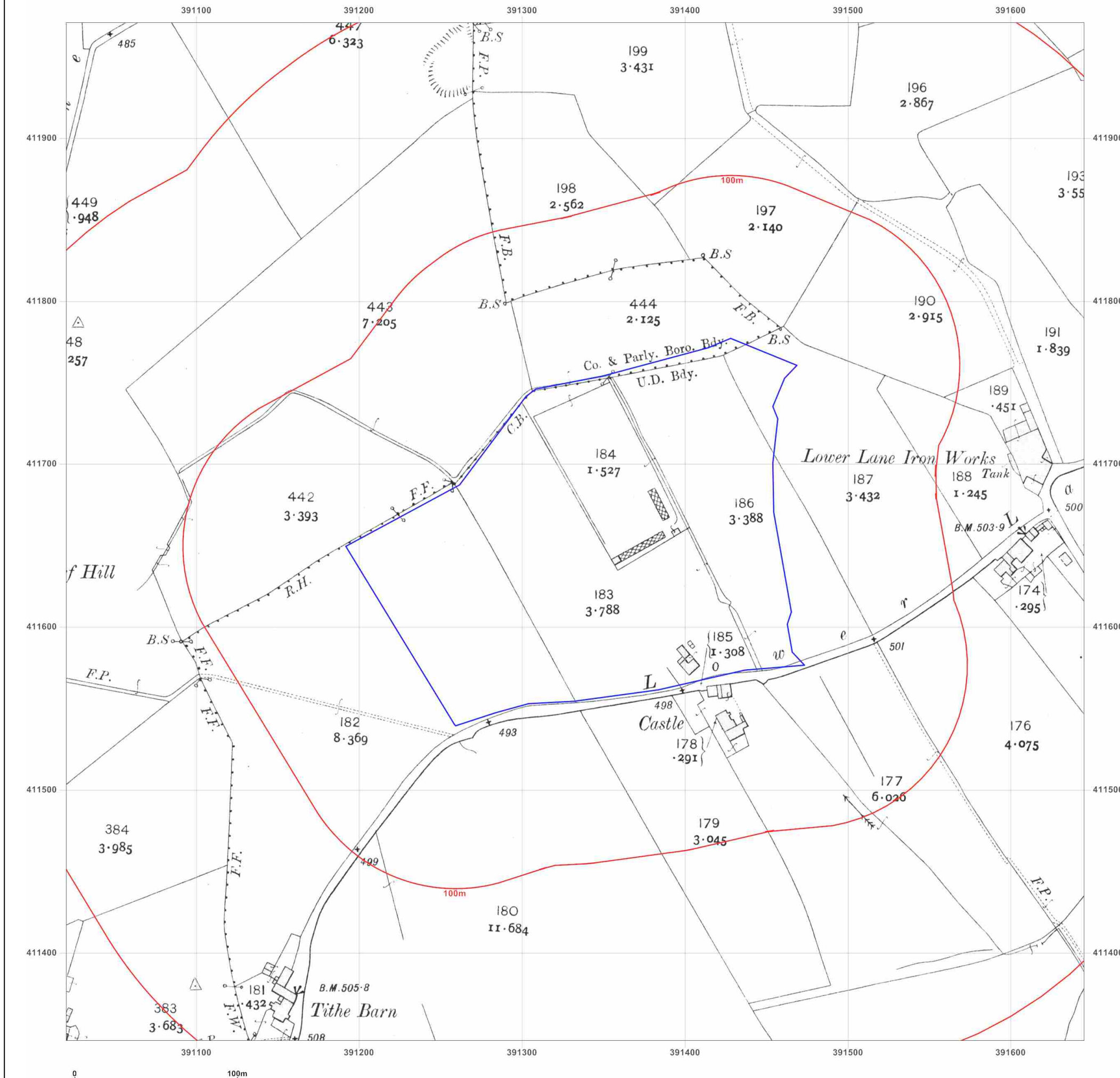


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Site Details:

391352 411646

Client Ref: POR010967_Plot_L_Rochdale
Report Ref: HMD-214-3887196
Grid Ref: 391332, 411658

Map Name: County Series

Map date: 1930

Scale: 1:2,500

Printed at: 1:2,500



Surveyed 1930
 Revised 1930
 Edition N/A
 Copyright N/A
 Levelled N/A

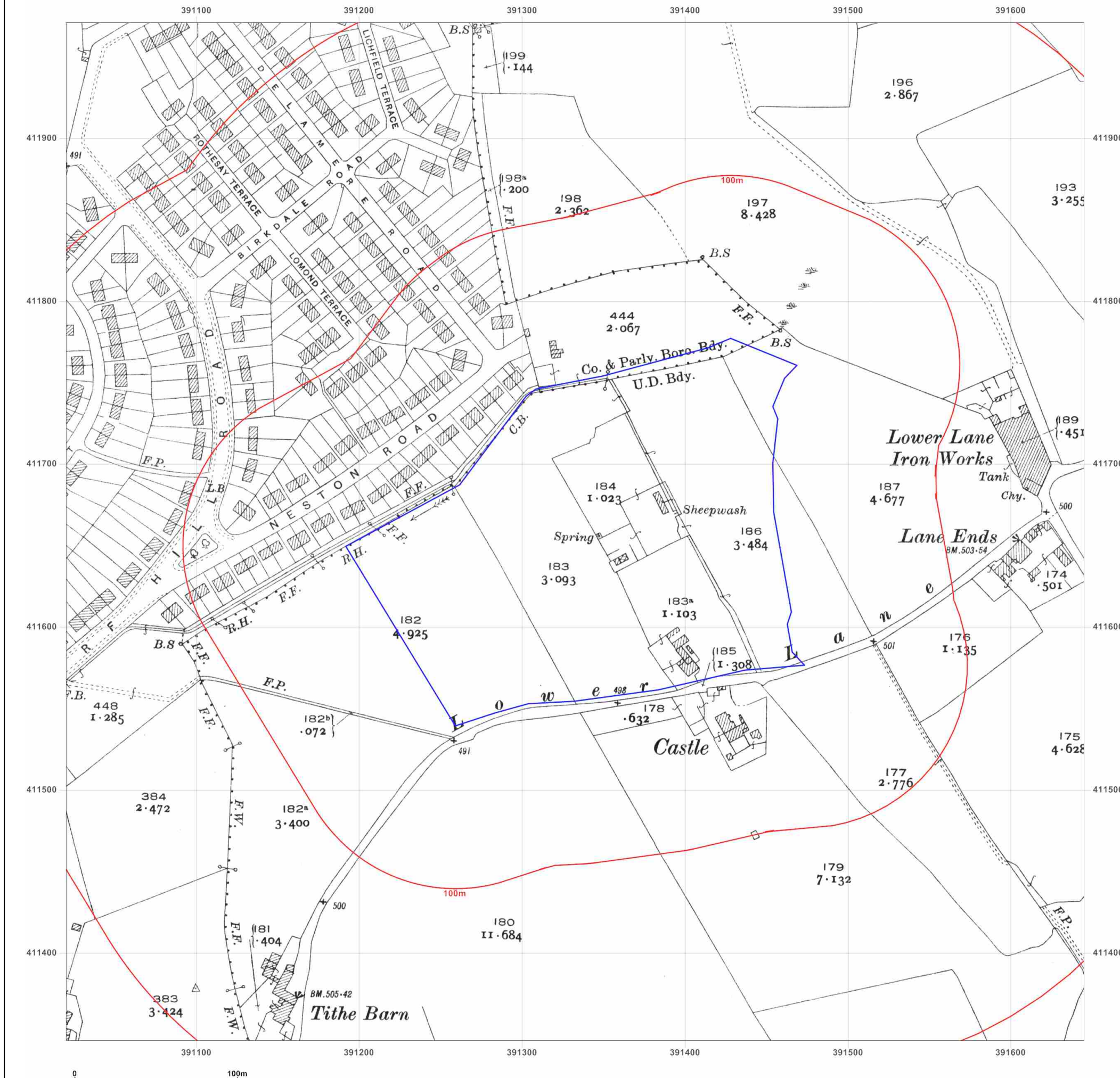


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Site Details:

391352 411646

Client Ref: POR010967_Plot_L_Rochdale
Report Ref: HMD-214-3887196
Grid Ref: 391332, 411658

Map Name: National Grid

Map date: 1955

Scale: 1:1,250

Printed at: 1:2,000



Surveyed 1955 Revised 1955 Edition N/A Copyright N/A Levelled 1929	Surveyed 1955 Revised 1955 Edition N/A Copyright N/A Levelled 1929
Surveyed 1955 Revised 1955 Edition N/A Copyright N/A Levelled 1929	Surveyed 1955 Revised 1955 Edition N/A Copyright N/A Levelled 1929



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Site Details:

391352 411646

Client Ref: POR010967_Plot_L_Rochdale
Report Ref: HMD-214-3887196
Grid Ref: 391332, 411658

Map Name: National Grid

Map date: 1955

Scale: 1:2,500

Printed at: 1:2,500



Surveyed 1955
 Revised 1955
 Edition 1956
 Copyright N/A
 Levelled 1929

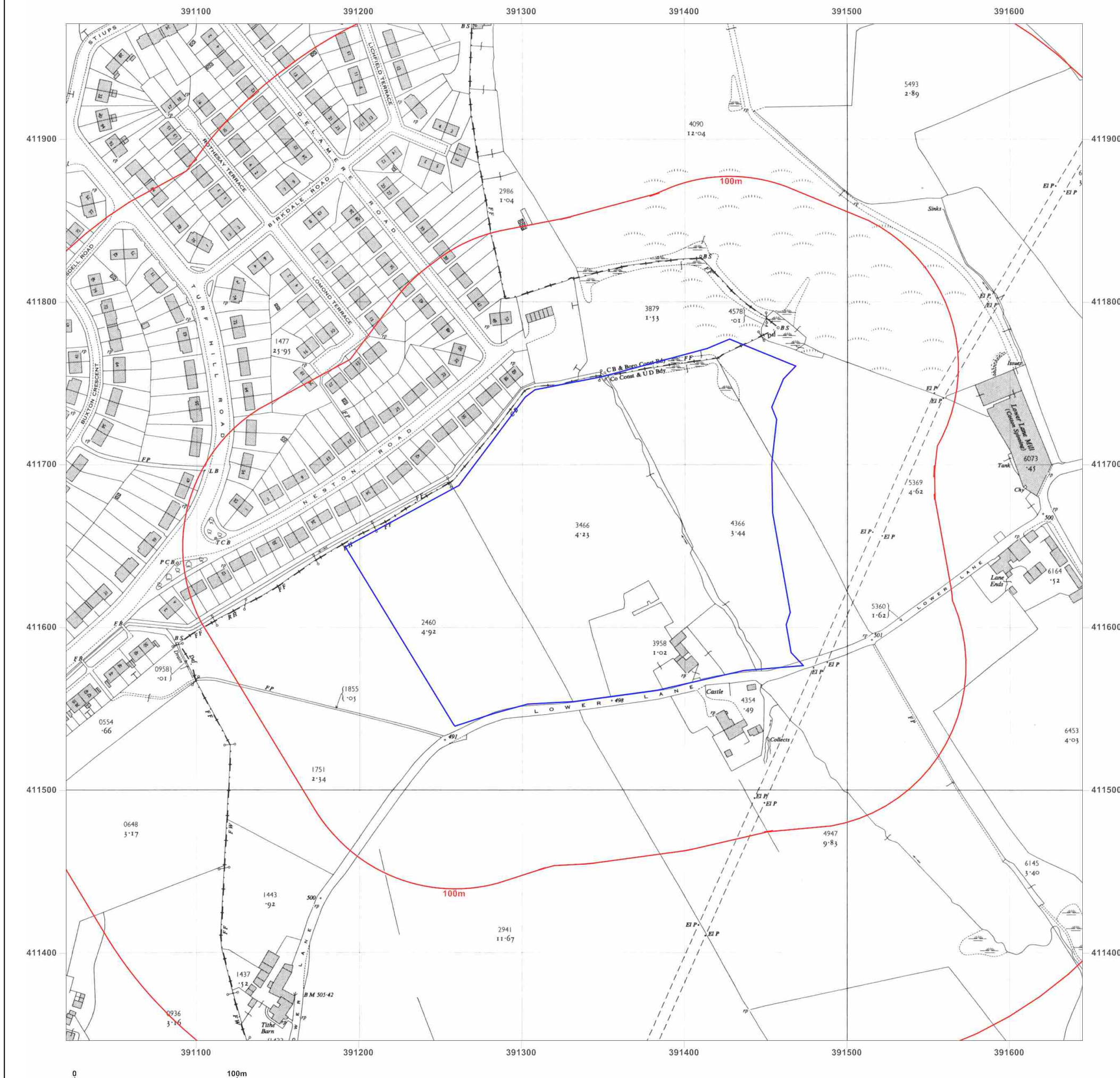


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Site Details:

391352 411646

Client Ref: POR010967_Plot_L_Rochdale
Report Ref: HMD-214-3887196
Grid Ref: 391332, 411658

Map Name: National Grid

Map date: 1987-1992

Scale: 1:1,250

Printed at: 1:2,000



Surveyed 1962
 Revised 1987
 Edition N/A
 Copyright 1987
 Levelled 1962

Surveyed 1962
 Revised 1987
 Edition N/A
 Copyright 1987
 Levelled 1962

Surveyed 1962
 Revised 1987
 Edition N/A
 Copyright 1987
 Levelled 1962

Surveyed 1992
 Revised N/A
 Edition N/A
 Copyright 1992
 Levelled N/A

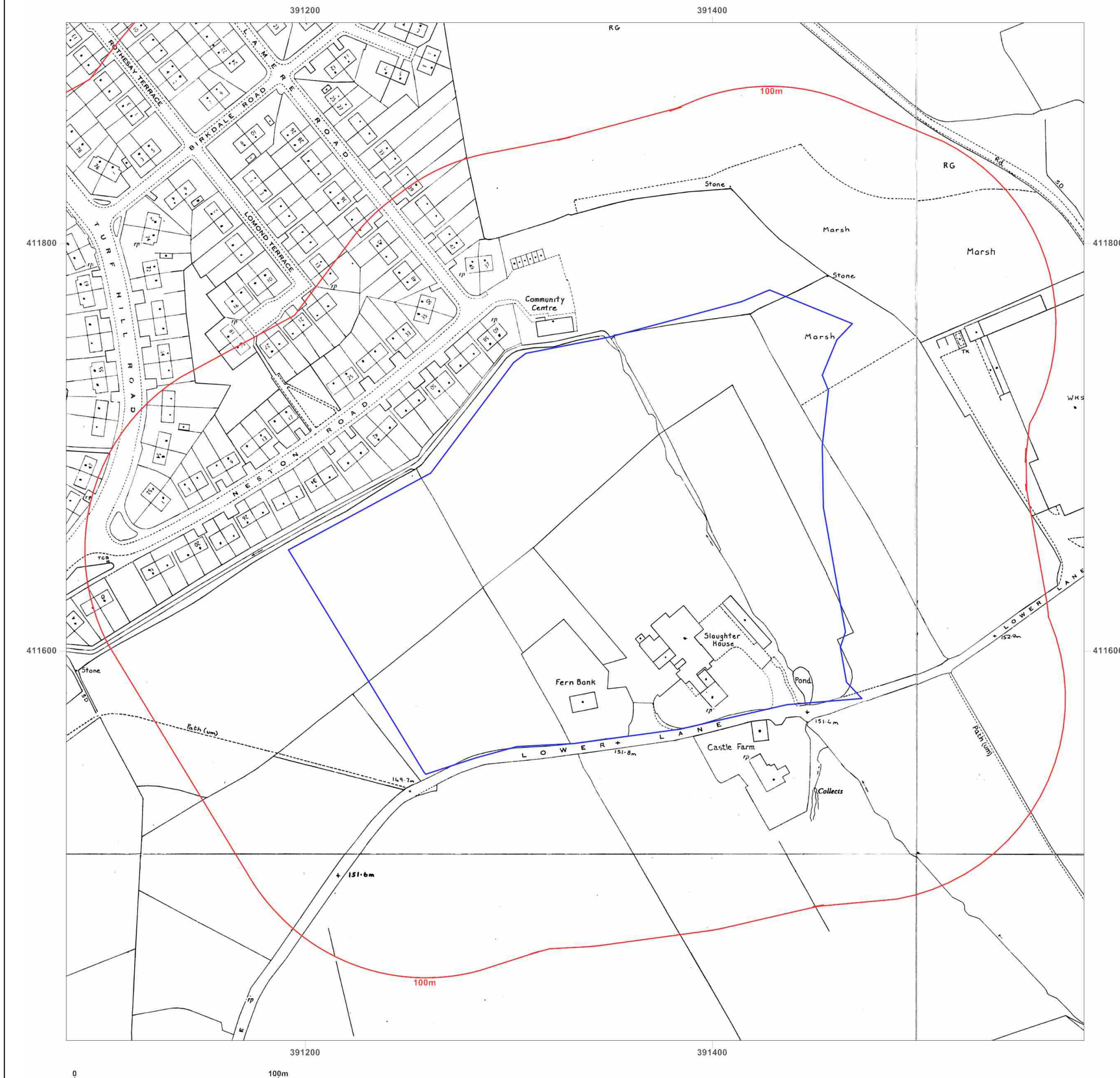


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Production date: 17 May 2017

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Site Details:

391352 411646

Client Ref: POR010967_Plot_L_Rochdale
Report Ref: HMD-214-3887196
Grid Ref: 391332, 411658

Map Name: National Grid

Map date: 1992

Scale: 1:1,250

Printed at: 1:2,000



Surveyed 1992
 Revised N/A
 Edition N/A
 Copyright 1992
 Levelled N/A

Surveyed 1992
 Revised N/A
 Edition N/A
 Copyright 1992
 Levelled N/A

Surveyed 1992
 Revised N/A
 Edition N/A
 Copyright 1992
 Levelled N/A

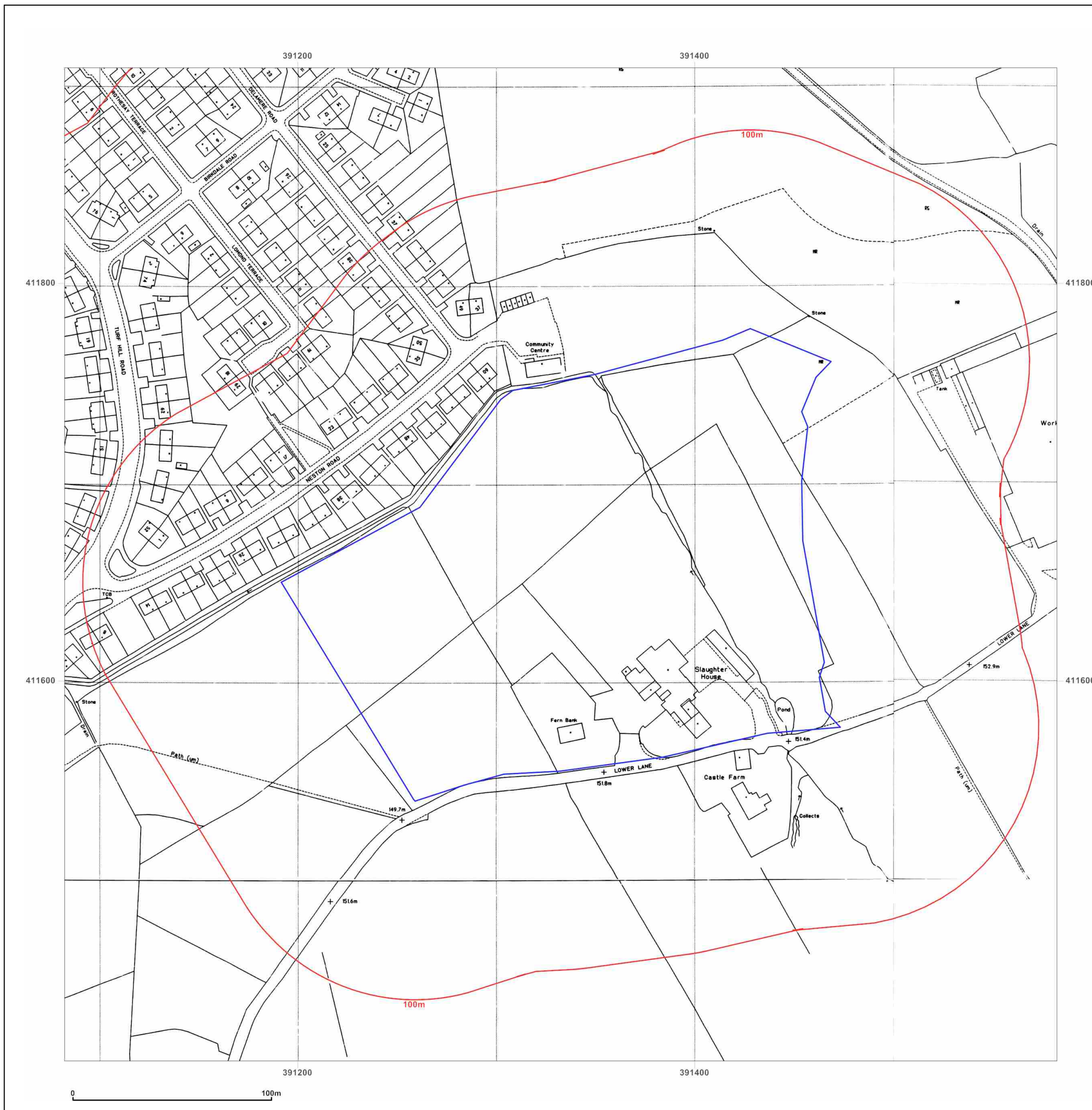


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Production date: 17 May 2017

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APPENDIX 4

ZETICA UXO RISK MAP

REGIONAL UNEXPLODED BOMB RISK

MANCHESTER

DENSITY OF BOMBS PER BOROUGH			
Borough	High explosive	Anti-personnel	Incendiary
Bolton	45	0	0
Eccles	114	1	0
Manchester	712	18	7
Middleton	37	0	0
Oldham	25	1	0
Salford	406	29	16
Stretford	456	64	0
Swinton & Pendlebury	92	2	0
Urmston	122	5	0
Worsley	32	2	0

On average, 10% of high explosive and 50% of incendiary bombs failed to explode.

OTHER WWII TARGETS

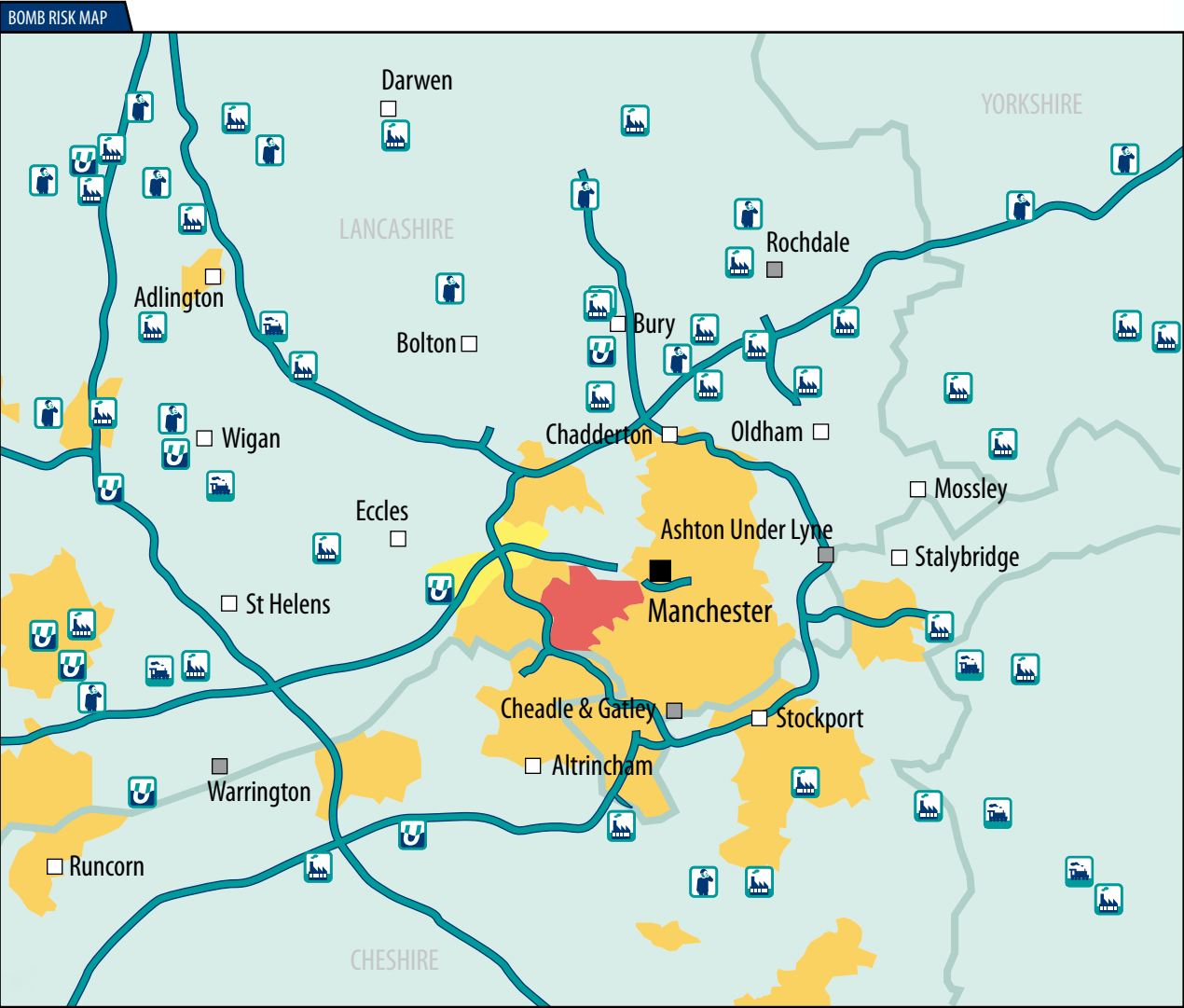
- military
- transport
- utilities
- industry
- docks
- other

BOMB TONNAGE

- >1000
- >500
- >100
- >0
- unverified

BOMB RISK

- high
- moderate
- low



The information in this regional UXB risk map is derived from a number of sources and should be read in conjunction with the "Users' Guide" (printed overleaf). Zetica cannot guarantee the accuracy or completeness of the information or data.

This map covers regions of coast with beaches, estuaries and alike. Further consideration of the bomb risk is required in these areas. The often inaccessible nature and changing ground conditions (e.g. movement of silt that may contain ordnance) means that historical bombing records for these areas are often poor or inaccurate and further assessment of the bomb risk may be required as part of a site specific study.

A FOUR-STEP PROCESS



Risk assessment and method statement from a qualified explosive ordnance clearance (EOC) operative.



Surface geophysical survey to allow shallow groundwork.



MAGCONE detects UXBs and obstructions on piling layout to the no-risk depth.



Detected UXBs can be dealt with by our EOC engineers and a Clearance Certificate issued for the site.



For more details on this and related services, telephone: +44 (0) 1993 886682 or visit our website: www.zetica.com

BOMB MAP USERS' GUIDE

Sources of information and explanation of bomb risk

Why?

Unexploded bombs (UXB) still present a risk to construction projects long after the end of the Second World War (WWII). UXBs often entered the ground unnoticed at high velocity and penetrated to a depth of several metres. Here they remain – vulnerable to disturbances from construction work. Beyond the depth of shallow excavation work, the greatest risk is to piling, drilling and probing crews. A piling rig could repeatedly hit a UXBs with considerable force before the crew realises an obstruction has been impacted. It could then be up to 72 hours before the detonator activates.

Who?

The responsibility for avoiding UXB risk usually lies with construction companies or house builders particularly those who are redeveloping urban sites. In addition, project engineering or environmental consultants are expected to advise their clients of a site's history. Other interested parties include those organisations whose employees are physically at most risk from intrusive works, normally piling companies, drillers or probing operators.

How?

UXB risk should be assessed for every site, but especially those in known heavily bombed areas or those situated near war-time strategic installations that were priority targets for enemy aircraft, for example, airfields. Zetica's regional bomb risk map is therefore a first point of reference from which the relative, potential abundance of UXBs can be judged. Consultants then advise their clients that an ordnance-risk desk study is required, which they may obtain from external sources. Construction companies or house builders who assess their own risk could choose to come direct to Zetica.

When?

Do not wait for the piling or drilling company to be on site before thinking about UXB risk – it will inevitably cause delays and higher costs. Request the regional bomb risk map from Zetica as soon as a site is being considered, and then use it to help you or your clients to decide if an ordnance-risk desk study is required.

Where?

Maps can be obtained for any county in England, Scotland, Wales or Northern Ireland – or for any London borough. They can help determine the areas that were most heavily bombed – but no part of the country should be considered 100% safe from UXB risk. Even remote rural areas can have a high risk if, for example, they were locations for decoy airfields or beacons that were lit to fool enemy pilots into thinking they had located a burning city that had been successfully hit by others in the raid.

How to use this regional map

This map is designed to give you an indication of the potential risk from UXBs in your area. If you are conducting work that involves excavation, piling or other disturbance of the ground, then you should use the map to identify the category of risk for your site.

The risk boundaries are a guide, compiled from data based on the political areas for which records are held; being just outside a high-risk area does not mean there is no UXB risk. You should use the map to assist in your decision of whether to investigate the UXB risk further.

Information on the regional risk remaining from UXBs in the UK

Zetica has built the largest UXB database of its kind in the UK. It includes a unique digital library of bomb census data, and maps showing key strategic points and bombing densities from the First and Second World Wars. The main sources of information include records from central government (Public Records Office), the Ministry of Defence, and the German Luftwaffe.

Using information from this database, Zetica has published maps of UXB risk on a regional, county and borough scale. The maps indicate relative degrees of UXB risk based on available records for bombing densities and known targeted areas for regions within the UK. The risk is broken down into individual boroughs, towns or cities. The data are based on the historical boroughs and are then overlaid onto the modern map. It is important to note that more-detailed research may be required for individual sites, particularly where proximity to a potential WWII target means the local risk may be higher.

High risk

Areas designated as high risk are those that show a high density of bombing hits (50+ bombs per 1000 acres) and abundant potential WWII targets. In high-risk regions, further action to mitigate UXB risk is considered essential.

Moderate risk

Moderate-risk regions are those that show a bomb density of between 11 and 50 bombs per 1000 acres and that may contain potential WWII targets. Action to mitigate the risk is considered essential, albeit more likely that a reduced scope of work is required compared with that needed for high-risk regions.

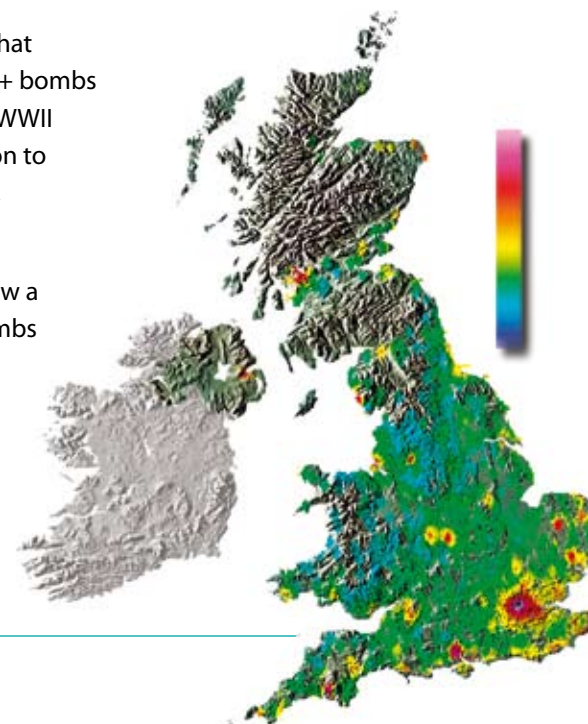
Low risk

Low-risk regions are those with a bombing density of up to 10 bombs per 1000 acres. These areas are considered to have a significant but low UXB risk. In general, further action to mitigate the risk is considered prudent, although not essential. Care is required when assessing the risk for specific sites where the risk may be higher because of local wartime activity.

Other WWII targets

Other regions with the risk of UXBs are key strategic points as defined by the government during WWII as representing potential enemy targets. Where these exist outside areas mapped as high, moderate or low risk, a site-specific assessment of the UXB risk may be required.

Relative UXB risk across UK



What to do if...

...you have a site that has a potential UXB risk

In the absence of current legislation requiring you to address the risk from UXBs, your responsibilities under health and safety legislation and regulations such as construction design and management require that you address all identified risks. The first stage is to request further advice from a professional adviser such as Zetica, or to gain more site-specific information by commissioning an ordnance-risk desk study. Then a strategy to deal with the risk can be established that is tailored to your proposed work.

...you find a suspect item or require advice

If during site works you find a suspect (ordnance-related) item, it is very important that you do not touch or move it (even if it has already been moved by an excavator). If it is clearly ordnance related, then dial 999 and ask for the police. Ensure that the area around the item is kept as clear as possible without placing yourself at risk. If you are unsure and do not wish to cause undue alarm, or you just require some advice, then you can call Zetica. We have experienced qualified UXB specialists on hand who can offer support and advice during any site works.

More-detailed procedures should be established in advance if you are in an area where the risk of finding a UXB is shown to be significant (moderate to high).

Site-specific desktop studies

Zetica is able to provide high-quality, site-specific UXB risk information for any residential, industrial or commercial property in the UK. These desktop studies provide details of the bombing density within an area and for the site itself, in order to indicate the risks of UXBs still being present. A risk assessment is provided to facilitate informed decision making on whether any further risk mitigation measures are required.

APPENDIX 5

EXPLORATORY HOLE LOGS

Scale 1:50

Sheet 1 of 2

LOCATION ID			Project Name: Plot L, Kingsway Business Park, Rochdale					Ground Level (m AOD): 150.31						
BH01			Project Number: NTT2589					Eastings: 391294.88						
			Client: Wilson Bowden Developments					Northings: 411573.42						
Hole Type: CP			Rig: Dando 2000		Start & End Date: 09/05/2017 - 10/05/2017			Engineer: LM		Checker: RTR				
Groundwater			Strata					Samples			In-Situ Tests			
Strike	Strike Details	Well	Level (m AOD) & Thickness (m)	Description	Legend	Depth (m bgl)	Type (Ublows)	From (m)	To (m)	Type	Depth (m)	Result	Casing Depth & (Water Level)	
			[0.25] 150.06 [1.10]	Grass over TOPSOIL. (Topsoil)		0.25	B	0.10	0.20					
				Orangish brown sandy GRAVEL. Sand is coarse. Gravel is fine to coarse, sub-rounded to rounded mudstone, sandstone and quartz. (Hummocky Glacial Deposits)			B	0.30	0.80					
			148.96 [1.35]	Loose brown very sandy CLAY. Sand is fine to medium. (Hummocky Glacial Deposits)		1.35	B D	1.20 1.20	1.65 1.65	S	1.20	N=10 (3,2/3,2,2,3)	1.20m (NR)	
							B D	2.00 2.00	2.45 2.45	S	2.00	N=6 (1,1/1,1,1,3)	2.00m (NR)	
			147.61 [0.30]	Orangish brown coarse SAND. (Hummocky Glacial Deposits)		2.70	D	2.70	2.70					
			147.31 [1.80]	Medium dense brown slightly clayey SAND AND GRAVEL with frequent clay lenses. Sand is medium to coarse. Gravel is fine to coarse, sub-rounded to rounded mudstone, sandstone and quartz. (Hummocky Glacial Deposits)		3.00	B D	3.00 3.00	3.45 3.45	S	3.00	N=19 (4,3/4,4,5,6)	3.00m (NR)	
							B D	4.00 4.00	4.45 4.45	C	4.00	N=9 (2,3/2,3,2,2)	4.00m (NR)	
			145.51 [0.20]	Firm brown silty CLAY. (Hummocky Glacial Deposits)		4.80	B	5.00	5.45	C	5.00	N=7 (1,2/1,2,2,2)	5.00m (NR)	
			145.31 [1.00]	Loose orangish brown slightly gravelly coarse SAND. Gravel is fine to coarse, sub-rounded to rounded mudstone, sandstone and quartz. (Hummocky Glacial Deposits)		5.00	D	5.00	5.45					
			144.31 [0.90]	Brown very sandy CLAY. Sand is fine to medium. (Hummocky Glacial Deposits)		6.00	B D	6.00 6.00	6.45 6.45	S	6.00	N=14 (2,2/2,3,4,5)	6.00m (NR)	
			143.41 [0.60]	Brown silty laminated CLAY. (Hummocky Glacial Deposits)		6.90	D	6.90	6.90					
			142.81 [0.20]	Loose orangish brown coarse SAND. (Hummocky Glacial Deposits)		7.50	B D	7.50 7.50	7.95 7.95	S	7.50	N=7 (1,1/1,1,2,3)	7.50m (NR)	
			142.61 [2.30]	Firm brown sandy CLAY with frequent sand lenses. Sand is fine to medium. (Hummocky Glacial Deposits)		7.70								
							D	8.50	8.50					
							D D	9.00 9.00	9.45 9.45	S	9.00	N=18 (1,2/3,4,5,6)	9.00m (NR)	
Chiseling			Remarks					Legend						
From (m bgl)	To (m bgl)	Time (hh:mm)	Reason for Termination: Target depth reached.					Sample Type:		Groundwater:		In-Situ Tests		
			Groundwater Remarks: Groundwater strike at 3.0m bgl.					B - Bulk C - Core D - Disturbed ES - Environmental Sample U - Undisturbed		Groundwater: Strike Resting Groundwater NR = Not Recorded		C - Cone Penetration Test HSV - Hand Shear Vane Test PID - Photo Ionisation Detection Screen S - Standard Penetration Test		
Water Added			Other Remarks: No visual or olfactory signs of contamination noted.					BWB Consulting Ltd Waterfront House Station Street Nottingham NG2 3DQ		Web: bwbconsulting.com P: 0115 9241100 E: nottingham@bwbconsulting.com		BWB CONSULTANCY ENVIRONMENT INFRASTRUCTURE BUILDINGS		
From (m bgl)	To (m bgl)	Volume (l)												

BOREHOLE LOG

Scale 1:50

Sheet 2 of 2

[illegible]

BOREHOLE LOG

Scale 1:50

Sheet 1 of 2

LOCATION ID		Project Name: Plot L, Kingsway Business Park, Rochdale					Ground Level (m AOD): 147.42						
BH02		Project Number: NTT2589					Eastings: 391333.19						
		Client: Wilson Bowden Developments					Northings: 411700.49						
Hole Type: CP		Rig: Dando 2000		Start & End Date: 08/05/2017 - 09/05/2017			Engineer: LM		Checker: RTR				
Groundwater			Strata				Samples			In-Situ Tests			
Strike	Strike Details	Well	Level (m AOD) & (Thickness (m))	Description	Legend	Depth (m bgl)	Type (U/blows)	From (m)	To (m)	Type	Depth (m)	Result	Casing Depth & (Water Level)
			[1.00]	Grass over sandy TOPSOIL. (Topsoil)			B	0.10	0.70				
			146.42 [1.00]	Soft greyish brown silty sandy CLAY. Sand is medium. (Hummocky Glacial Deposits)		1.00	B B D	1.00 1.20 1.20	1.20 1.65 1.65	S	1.20	N=2 (1,0/1,0,0,1)	1.20m (NR)
			145.42 [3.50]	Medium dense grey sandy GRAVEL. Sand is fine to medium. Gravel is fine to coarse, sub-rounded to rounded mudstone, sandstone and quartz. (Hummocky Glacial Deposits)		2.00	B D	2.00 2.00	2.45 2.45	S	2.00	N=10 (1,2/3,3,2,2)	2.00m (NR)
							D	2.60	2.60				
							B	3.00	3.45	C	3.00	N=15 (1,1/6,4,3,2)	3.00m (NR)
							B	4.00	4.45	C	4.00	N=14 (2,5/5,3,4,2)	4.00m (NR)
							B	5.00	5.45	C	5.00	N=11 (1,2/4,3,2,2)	5.00m (NR)
			141.92 [4.50]	Very loose reddish brown gravelly coarse SAND. Gravel is fine angular mudstone and sandstone. (Hummocky Glacial Deposits)		5.50	D	5.50	5.50				
							B D	6.00 6.00	6.45 6.45	S	6.00	N=3 (1,0/1,1,1,0)	6.00m (NR)
							B	7.50	7.95	S	7.50	N=1 (1,0/0,0,0,1)	7.50m (NR)
							D	8.50	8.50				
							B D	9.00 9.00	9.45 9.45	S	9.00	N=4 (1,1/1,1,1,1)	9.00m (NR)

Scale 1:50

Sheet 2 of 2

LOCATION ID			Project Name: Plot L, Kingsway Business Park, Rochdale						Ground Level (m AOD): 147.42								
BH02			Project Number: NTT2589						Eastings: 391333.19								
			Client: Wilson Bowden Developments						Northings: 411700.49								
Hole Type: CP			Rig: Dando 2000			Start & End Date: 08/05/2017 - 09/05/2017			Engineer: LM			Checker: RTR					
Groundwater			Strata						Samples			In-Situ Tests					
Strike	Strike Details	Well	Level (m AOD) & [Thickness (m)]	Description			Legend	Depth (m bgl)	Type (U/blows)	From (m)	To (m)	Type	Depth (m)	Result	Casing Depth & (Water Level)		
			137.42 [0.45]	Very loose reddish brown gravelly coarse SAND. Gravel is fine angular mudstone and sandstone. (Hummocky Glacial Deposits)				10.00	D	10.00	10.45	S	10.00	N=3 (1,0/1,1,0,1)	10.00m (NR)		
			136.97	Very loose brown medium to coarse SAND with soft clay lenses. (Hummocky Glacial Deposits)				10.45									
Hole Terminated at 10.45m bgl.																	

BOREHOLE LOG

LOCATION ID		Project Name: Plot L, Kingsway Business Park, Rochdale				Ground Level (m AOD): 149.41							
BH03		Project Number: NTT2589				Eastings: 391441.55							
		Client: Wilson Bowden Developments				Northings: 411668.69							
Hole Type: CP		Rig: Dando 2000		Start & End Date: 08/05/2017		Engineer: LM		Checker: RTR					
Groundwater			Strata				Samples		In-Situ Tests				
Strike	Strike Details	Well	Level (m AOD) & [Thickness (m)]	Description	Legend	Depth (m bgl)	Type (U/blows)	From (m)	To (m)	Type	Depth (m)	Result	Casing Depth & (Water Level)
			[0.50]	Grass over dark brown slightly sandy slightly clayey organic TOPSOIL with abundant rootlets. (Topsoil)		0.50	B	0.20	0.40				
			148.91 [0.70]	Soft brown mottled grey sandy CLAY with occassional rootlets. Sand is fine to medium. (Hummocky Glacial Deposits)			B	0.60	1.10				
			148.21 [1.50]	Very loose to loose greyish orangish brown gravelly medium SAND with occasional soft clay pockets. Gravel is fine to medium shale, quartz and weak mudstone. (Hummocky Glacial Deposits)		1.20	B D	1.20 1.20	1.65 1.65	S	1.20	N=2 (1,0/0,1,0,1)	1.20m (NR)
							B D	2.00 2.00	2.45 2.45	S	2.00	N=9 (2,2/3,3,2,1)	2.00m (NR)
			146.71 [1.30]	Firm orangish dark grey slightly gravelly CLAY. Gravel is fine quartz and flint. (Hummocky Glacial Deposits)		2.70	D	2.70	2.70				
			145.41 [1.50]	Brown slightly gravelly very sandy CLAY. Sand is fine to medium. Gravel is angular to sub-angular fine quartz and flint. (Hummocky Glacial Deposits)		4.00	B D	4.00 4.00	4.45 4.45	S	4.00	N=4 (1,0/1,0,1,2)	4.00m (NR)
							D	4.80	4.80				
							B D	5.00 5.00	5.45 5.45	S	5.00	N=5 (1,1/1,1,2,1)	5.00m (NR)
			143.91 [3.30]	Very loose to loose greyish brown slightly gravelly fine SAND. Gravel is fine angular to sub-angular mudstone. (Hummocky Glacial Deposits)		5.50	B D	6.00 6.00	6.45 6.45	S	6.00	N=5 (1,1/1,1,1,2)	6.00m (NR)
							D	7.00	7.00				
							B D	7.50 8.00	7.95 8.00	S	7.50	N=3 (1,1/0,1,1,1)	7.50m (NR)
			140.61 [1.30]	Stiff orangish brown slightly sandy slightly gravelly CLAY. Sand is fine to medium. Gravel is fine angular to sub-angular mudstone, sandstone and quartz. (Hummocky Glacial Deposits)		8.80	D B D	8.80 9.00 9.00	8.80 9.45 9.45	S	9.00	N=12 (2,2/2,3,4,3)	9.00m (NR)
Chiseling				Remarks				Legend					
From (m bgl)	To (m bgl)	Time (hh:mm)	Reason for Termination:				Sample Type:		Groundwater:		In-Situ Tests		
			Target depth reached.				B - Bulk C - Core D - Disturbed ES - Environmental Sample U - Undisturbed		Groundwater Strike Resting Groundwater NR = Not Recorded		C - Cone Penetration Test HSV - Hand Shear Vane Test PID - Photo Ionisation Detection Screen S - Standard Penetration Test		
Water Added			Groundwater Remarks:				BWB Consulting Ltd Waterfront House Station Street Nottingham NG2 3DQ		Web: bwbconsulting.com P: 0115 9241100 E: nottingham@bwbconsulting.com		BWB CONSULTANCY ENVIRONMENT INFRASTRUCTURE BUILDINGS		
From (m bgl)	To (m bgl)	Volume (l)	Other Remarks:										
			No visual or olfactory signs of contamination noted.										

BOREHOLE LOG

Scale 1:50

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[illegible]

TRIAL PIT LOG

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LOCATION ID: TP01	Project Name: Plot L, Kingsway Business Park, Rochdale		3.50 0.60Pit Dimensions (m)10 Degrees														
	Project Number: NTT2589																
	Client: Wilson Bowden Developments																
	Hole Type: TP	Plant: Tracked CAT 312E	Start & End Date: 09/05/2017		Stability: Unstable.												
Ground Level (m AOD): 147.57		Eastings & Northings: 391253E 411643N		Engineer: LM	Checker: RTR												
Groundwater		Strata				Samples			In-Situ Tests								
Strike	Strike Details	Backfill	Level (m AOD)	Thickn ess	Description	Legend	Depth (m bgl)	Type	From (m)	To (m)	Type	Depth (m)	Result				
▼3.1m bgl			146.97	0.60m	Grass over TOPSOIL. (Topsoil)		0.60	D	0.40	0.50	HSV	2.00	(4, 4, 5)kPa				
				1.10m	Yellowish brown very clayey very gravelly medium SAND. Gravel is fine to coarse sub-rounded to rounded quartz and mudstone. (Hummocky Glacial Deposits)			B	0.90	1.00							
				145.87	Very soft greyish brown sandy CLAY. Sand is fine. (Hummocky Glacial Deposits)			B	1.80	1.90							
144.47	0.30m	Orangish brown slightly clayey slightly gravelly medium SAND. Gravel is fine to coarse sub-rounded to rounded quartz and mudstone. (Hummocky Glacial Deposits)	D	3.40	3.50												
144.17	0.25m																
143.92																	
					Orangish brown and dark brown slightly sandy GRAVEL. Sand is fine to coarse. Gravel is fine to coarse sub-rounded to rounded quartz and mudstone. (Hummocky Glacial Deposits)												
						Hole Terminated at 3.65m bgl.											
Remarks														Legend			
Reason for Termination:						Samples:		Groundwater Strikes:		In-Situ Tests:							
Failure of pit walls.						B - Bulk D - Disturbed ES - Environmental Sample		Groundwater Strike Resting Groundwater Level		HSV - Hand Shear Vane Test PID - Photo Ionisation Detector Test							
Groundwater Notes:						BWB Consulting Ltd Waterfront House Station Street Nottingham NG2 3DQ		Web: bwbconsulting.com E: nottingham@bwbconsulting.com P: 0115 9241100		BWB CONSULTANCY ENVIRONMENT INFRASTRUCTURE BUILDINGS							
Groundwater strike at 3.1m bgl.																	
Other Remarks:																	
No visual or olfactory signs of contamination noted.																	

TRIAL PIT LOG

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LOCATION ID: TP01A	Project Name: Plot L, Kingsway Business Park, Rochdale		3.50 Pit Dimensions (m) 200 Degrees	
	Project Number: NTT2589			
	Client: Wilson Bowden Developments			
	Hole Type: TP	Plant: Tracked CAT 312E	Start & End Date: 11/05/2017	Stability: Unstable.
Ground Level (m AOD): 150.73		Eastings & Northings: 391400E 411594N	Engineer: LM	Checker: RTR

Groundwater		Strata						Samples			In-Situ Tests		
Strike	Strike Details	Backfill	Level (m AOD)	Thickn ess	Description	Legend	Depth (m bgl)	Type	From (m)	To (m)	Type	Depth (m)	Result
			150.48	0.25m	MADE GROUND comprising brown gravelly TOPSOIL. Gravel is fine to coarse angular to sub-angular brick and pot. (Made Ground)	                                   							

Remarks		Legend		
Reason for Termination: Failure of pit walls.	Groundwater Notes: No groundwater encountered	Samples: B - Bulk D - Disturbed ES - Environmental Sample	Groundwater Strikes:  Groundwater Strike  Resting  Groundwater Level	In-Situ Tests: HSV - Hand Shear Vane Test PID - Photo Ionisation Detector Test
Other Remarks: No visual or olfactory signs of contamination noted.		BWB Consulting Ltd Waterfront House Station Street Nottingham NG2 3DQ	Web: bwbconsulting.com E: nottingham@bwbconsulting.com P: 0115 9241100	 CONSULTANCY ENVIRONMENT INFRASTRUCTURE BUILDINGS

TRIAL PIT LOG

Scale: 1:50Sheet 1 of 1

LOCATION ID: TP02	Project Name: Plot L, Kingsway Business Park, Rochdale		3.50 0.60 Pit Dimensions (m) 300 Degrees																						
	Project Number: NTT2589																								
	Client: Wilson Bowden Developments																								
	Hole Type: TP	Plant: Tracked CAT 312E	Start & End Date: 09/05/2017		Stability: Stable.																				
Ground Level (m AOD): 148.99		Eastings & Northings: 391268E 411612N		Engineer: LM	Checker: RTR																				
Groundwater		Strata				Samples		In-Situ Tests																	
Strike	Strike Details	Backfill	Level (m AOD)	Thickn ess	Description	Legend	Depth (m bgl)	Type	From (m)	To (m)	Type	Depth (m)	Result												
					Grass over TOPSOIL. (Topsoil)			B ES	0.30 0.30	0.40 0.40															
			148.49	0.50m			0.50																		
				0.55m	Yellowish brown gravelly medium SAND. Gravel is fine to coarse sub-rounded to rounded quartz and mudstone. (Hummocky Glacial Deposits)		1.05	B	0.90	1.00															
			147.94																						
				2.55m	Soft reddish brown slightly sandy slightly gravelly CLAY. Sand is fine and medium. Gravel is fine quartz, sandstone, mudstone and shale. (Hummocky Glacial Deposits)			B ES	2.50 2.50	2.60 2.60	HSV	2.60	(9, 10, 14)kPa												
			145.39				3.60																		
			145.19	0.20m	Brown clayey gravelly SAND. Sand is fine to coarse. Gravel is fine to coarse sub-rounded to rounded flint, quartz, mudstone and sandstone. (Hummocky Glacial Deposits)		3.80	B	3.60	3.70															
					Hole Terminated at 3.80m bgl.																				
Remarks														Legend											
Reason for Termination: Target depth reached.														Samples: B - Bulk D - Disturbed ES - Environmental Sample				Groundwater Strikes: Groundwater Strike Resting Groundwater Level				In-Situ Tests: HSV - Hand Shear Vane Test PID - Photo Ionisation Detector Test			
Groundwater Notes: Groundwater strike at 3.6m bgl.																									
Other Remarks: No visual or olfactory signs of contamination noted.														BWB Consulting Ltd Waterfront House Station Street Nottingham NG2 3DQ				Web: bwbconsulting.com E: nottingham@bwbconsulting.com P: 0115 9241100				BWB CONSULTANCY ENVIRONMENT INFRASTRUCTURE BUILDINGS			

TRIAL PIT LOG

Scale: 1:50

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LOCATION ID: TP03

Hole Type: TP

Project Name: Plot L, Kingsway Business Park, Rochdale

Project Number: NTT2589

Client: Wilson Bowden Developments

Plant: Tracked CAT 312E

Start & End Date: 09/05/2017

Stability: Stable.

Ground Level (m AOD): 147.17

Eastings & Northings: 391275E 411665N

Engineer: LM

Checker: RTR

Groundwater

Strike

Strike Details

Backfill

Level (m AOD)

Thickn ess

Description

Legend

Depth (m bgl)

Type

From (m)

To (m)

In-Situ Tests

Type

Depth (m)

Result

▼ 1.9m bgl

▼ 3.1m bgl

146.62

146.37

146.07

144.07

143.57

0.55m

0.25m

0.30m

2.00m

0.50m

Grass over TOPSOIL.
(Hummocky Glacial Deposits)

Firm blackish grey mottled orange slightly sandy CLAY.
Sand is fine and medium.
(Hummocky Glacial Deposits)

Greyish orangish brown gravelly medium SAND with occasional soft clay pockets. Gravel is fine to medium shale, quartz and weak mudstone.
(Hummocky Glacial Deposits)

Soft reddish brown slightly sandy slightly gravelly CLAY.
Sand is fine and medium. Gravel is fine quartz, sandstone, mudstone and shale.
(Hummocky Glacial Deposits)

Orangish brown clayey gravelly medium SAND. Gravel is fine to coarse sub-angular to rounded quartz, sandstone, mudstone and shale.
(Hummocky Glacial Deposits)

Hole Terminated at 3.60m bgl.

ES

B

ES

B

0.20

0.70

1.80

2.90

0.30

0.80

1.90

3.00

HSV

HSV

0.25

0.75

(62, 54, 44)kPa

(74, 88, 78)kPa

Remarks

Reason for Termination:
Target depth reached.

Groundwater Notes:
Groundwater strikes at 1.9m and 3.1m bgl.

Other Remarks:
No visual or olfactory signs of contamination noted.

Samples:
B - Bulk
D - Disturbed
ES - Environmental Sample

Groundwater Strikes:
Groundwater Strike
Resting
Groundwater Level

In-Situ Tests:
HSV - Hand Shear Vane Test
PID - Photo Ionisation Detector Test

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LOCATION ID:

TP04

Hole Type: TP

Project Name:

Plot L, Kingsway Business Park, Rochdale

Project Number:

NTT2589

Client:

Wilson Bowden Developments

Plant:

Tracked CAT 312E

Start & End Date:

09/05/2017

Ground Level (m AOD):

147.50

Eastings & Northings:

391308E 411656N

Engineer:

LM

Checker:

RTR

3.50

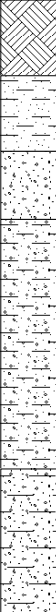
0.60

Pit Dimensions (m)

90

Degrees

Stability: Unstable.

Groundwater		Strata					Samples			In-Situ Tests			
Strike	Strike Details	Backfill	Level (m AOD)	Thickness	Description	Legend	Depth (m bgl)	Type	From (m)	To (m)	Type	Depth (m)	Result
	3.15m bgl		147.00	0.50m	Grass over TOPSOIL. (Topsoil)		0.50	D	0.50	0.60	HSV	0.60	(77, 92, 79)kPa
			146.50	0.50m	Firm blackish grey mottled orange slightly sandy CLAY. Sand is fine and medium. (Hummocky Glacial Deposits)		1.00						
			146.05	0.45m	Greyish orangish brown gravelly medium SAND with occasional soft clay pockets. Gravel is fine to medium shale, quartz and weak mudstone. (Hummocky Glacial Deposits)		1.45						
			144.40	1.65m	Soft reddish brown slightly sandy slightly gravelly CLAY. Sand is fine and medium. Gravel is fine quartz, sandstone, mudstone and shale. (Hummocky Glacial Deposits)		3.10	B	2.70	2.80	HSV	2.80	(4, 6, 5)kPa
			143.45	0.95m	Orangish brown clayey gravelly medium SAND. Gravel is fine to coarse sub-angular to rounded quartz, sandstone, mudstone and shale. (Hummocky Glacial Deposits)		4.05						
Hole Terminated at 4.05m bgl.													

Remarks

Reason for Termination:
Target depth reached.

Groundwater Notes:
Groundwater strike at 3.15m bgl.

Other Remarks:
No visual or olfactory signs of contamination noted.

Samples:
B - Bulk
D - Disturbed
ES - Environmental Sample

Groundwater Strikes:
 Groundwater Strike
 Resting
 Groundwater Level

In-Situ Tests:
HSV - Hand Shear
Vane Test
PID - Photo Ionisation
Detector Test

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TRIAL PIT LOG

Scale: 1:50

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LOCATION ID: TP05	Project Name: Plot L, Kingsway Business Park, Rochdale		3.50 0.60 Pit Dimensions (m) 270 Degrees	
	Project Number: NTT2589			
	Client: Wilson Bowden Developments			
	Hole Type: TP	Plant: Tracked CAT 312E	Start & End Date: 11/05/2017	Stability: Unstable.
Ground Level (m AOD): 148.74		Eastings & Northings: 391303E 411619N	Engineer: LM	Checker: RTR

[illegible]

Remarks		Legend		
Reason for Termination: Failure of pit walls.		Samples: B - Bulk D - Disturbed ES - Environmental Sample	Groundwater Strikes:  Groundwater Strike  Resting Groundwater Level	In-Situ Tests: HSV - Hand Shear Vane Test PID - Photo Ionisation Detector Test
Groundwater Notes: Groundwater strike at 3.3m bgl.				
Other Remarks: No visual or olfactory signs of contamination noted.		BWB Consulting Ltd Waterfront House Station Street Nottingham NG2 3DQ	Web: bwbconsulting.com E: nottingham@bwbconsulting.com P: 0115 9241100	 CONSULTANCY ENVIRONMENT INFRASTRUCTURE BUILDINGS

TRIAL PIT LOG

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LOCATION ID:

TP06

Hole Type: TP

Project Name:

Plot L, Kingsway Business Park, Rochdale

Project Number:

NTT2589

Client:

Wilson Bowden Developments

Plant:

Tracked CAT 312E

Start & End Date:

11/05/2017

Ground Level (m AOD):

151.46

Eastings & Northings:

391330E 411573N

Engineer:

LM

Checker:

RTR

3.50

0.60

Pit Dimensions (m)

90

Degrees

Stability:

Stable.

Groundwater

Strata

Samples

In-Situ Tests

Strike

Strike Details

Backfill

Level (m AOD)

Thickn ess

Description

Legend

Depth (m bgl)

Type

From (m)

To (m)

Type

Depth (m)

Result

151.06

0.40m

MADE GROUND comprising grass over gravelly TOPSOIL. Gravel is fine to coarse angular to sub-angular brick and pot. (Made Ground)

0.40

ES

0.30

0.40

149.66

1.40m

Orangish brown very clayey fine and medium SAND. (Hummocky Glacial Deposits)

1.80

B

1.20

1.30

149.66

0.30m

Orangish brown clayey gravelly medium SAND. Gravel is fine to coarse sub-angular to rounded quartz, sandstone, mudstone and shale. (Hummocky Glacial Deposits)

2.10

B

1.90

2.00

149.36

1.70m

Light brown medium SAND with frequent firm clay pockets. (Hummocky Glacial Deposits)

3.80

D

3.00

3.10

147.66

Hole Terminated at 3.80m bgl.

Remarks

Reason for Termination:

Target depth reached.

Groundwater Notes:

No groundwater encountered

Other Remarks:

No visual or olfactory signs of contamination noted.

Samples:

B - Bulk

D - Disturbed

ES - Environmental Sample

Groundwater Strikes:

Groundwater Strike

Resting

Groundwater Level

In-Situ Tests:

HSV - Hand Shear

Vane Test

PID - Photo Ionisation

Detector Test

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TRIAL PIT LOG

Scale: 1:50Sheet 1 of 1

LOCATION ID: TP07	Project Name: Plot L, Kingsway Business Park, Rochdale		3.50 0.60 Pit Dimensions (m) 250 Degrees		
	Project Number: NTT2589				
	Client: Wilson Bowden Developments				
	Hole Type: TP	Plant: Tracked CAT 312E	Start & End Date: 11/05/2017		Stability: Stable.
Ground Level (m AOD): 150.34		Eastings & Northings: 391352E 411591N		Engineer: LM	Checker: RTR

Groundwater		Strata				Samples			In-Situ Tests				
Strike	Strike Details	Backfill	Level (m AOD)	Thickn ess	Description	Legend	Depth (m bgl)	Type	From (m)	To (m)	Type	Depth (m)	Result
 3.3m bgl			149.14	1.20m	Grass over orangish brown clayey gravelly medium SAND with frequent pockets of firm brittle clay. Gravel is fine to coarse sub-angular to rounded mudstone, sandstone and quartz. (Hummocky Glacial Deposits)		1.20	ES	0.20	0.30			
					B			0.50	0.60				
			147.24 147.04	1.90m	Yellowish brown fine and medium SAND with frequent large clay pockets. (Hummocky Glacial Deposits)		3.10 3.30	B	2.30	2.40			
					D			2.40	3.20				
				0.20m	Black sandy GRAVEL. Sand is fine to coarse. Gravel is fine to coarse angular to sub-rounded dark mudstone and shale. (Hummocky Glacial Deposits)				4.00				
0.70m	Stiff dark brown slightly gravelly CLAY. Gravel is fine to coarse angular to sub-angular mudstone and sandstone. (Hummocky Glacial Deposits)												
146.34	Hole Terminated at 4.00m bgl.												

Remarks						Legend					
Reason for Termination:						Samples:		Groundwater Strikes:		In-Situ Tests:	
Target depth reached.						B - Bulk D - Disturbed ES - Environmental Sample		 Groundwater Strike  Resting  Groundwater Level		HSV - Hand Shear Vane Test PID - Photo Ionisation Detector Test	
Groundwater Notes:											
Groundwater strike at 3.3m bgl.											
Other Remarks:						BWB Consulting Ltd Waterfront House Station Street Nottingham NG2 3DQ		Web: bwbconsulting.com E: nottingham @bwbconsulting.com P: 0115 9241100			
No visual or olfactory signs of contamination noted.											

TRIAL PIT LOG

Scale: 1:50Sheet 1 of 1

LOCATION ID:		Project Name: Plot L, Kingsway Business Park, Rochdale				3.50 0.60 Pit Dimensions (m) 180 Degrees									
TP08		Project Number: NTT2589													
		Client: Wilson Bowden Developments													
		Plant: Tracked CAT 312E													
Hole Type: TP		Start & End Date: 11/05/2017				Stability: Stable.									
Ground Level (m AOD): 149.45		Eastings & Northings: 391380E 411641N				Engineer: LM		Checker: RTR							
Groundwater		Strata					Samples			In-Situ Tests					
Strike	Strike Details	Backfill	Level (m AOD)	Thickness	Description	Legend	Depth (m bgl)	Type	From (m)	To (m)	Type	Depth (m)	Result		
			149.05	0.40m	MADE GROUND comprising grass over gravelly TOPSOIL with occasional cobbles. Gravel is fine to coarse angular to sub-angular ash, brick, pot and concrete. Cobbles are angular brick and concrete. (Made Ground) Hole Terminated at 0.40m bgl.		0.40	ES	0.20	0.30					
Remarks						Legend									
Reason for Termination:						Samples:		Groundwater Strikes:		In-Situ Tests:					
Concrete obstruction at 0.40m.						B - Bulk D - Disturbed ES - Environmental Sample				Groundwater Strike Resting Groundwater Level		HSV - Hand Shear Vane Test PID - Photo Ionisation Detector Test			
Groundwater Notes:															
No groundwater encountered															
Other Remarks:						BWB Consulting Ltd Waterfront House Station Street Nottingham NG2 3DQ		Web: bwbconsulting.com E: nottingham @bwbconsulting.com P: 0115 9241100		BWB CONSULTANCY ENVIRONMENT INFRASTRUCTURE BUILDINGS					
No visual or olfactory signs of contamination noted.															

TRIAL PIT LOG

Scale: 1:50

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LOCATION ID: TP09	Project Name: Plot L, Kingsway Business Park, Rochdale		3.50 0.60 Pit Dimensions (m) 100 Degrees	
	Project Number: NTT2589			
	Client: Wilson Bowden Developments			
	Hole Type: TP	Plant: Tracked CAT 312E	Start & End Date: 11/05/2017	Stability: Unstable.
Ground Level (m AOD): 148.19		Eastings & Northings: 391337E 411644N	Engineer: LM	Checker: RTR

[illegible]

Remarks		Legend		
Reason for Termination: Failure of pit walls.		Samples: B - Bulk D - Disturbed ES - Environmental Sample	Groundwater Strikes:  Groundwater Strike  Resting Groundwater Level	In-Situ Tests: HSV - Hand Shear Vane Test PID - Photo Ionisation Detector Test
Groundwater Notes: No groundwater encountered				
Other Remarks: No visual or olfactory signs of contamination noted.		BWB Consulting Ltd Waterfront House Station Street Nottingham NG2 3DQ	Web: bwbconsulting.com E: nottingham@bwbconsulting.com P: 0115 9241100	 CONSULTANCY ENVIRONMENT INFRASTRUCTURE BUILDINGS

TRIAL PIT LOG

Scale: 1:50Sheet 1 of 1

LOCATION ID:		Project Name: Plot L, Kingsway Business Park, Rochdale				3.50 0.60 Pit Dimensions (m) 90 Degrees							
TP10		Project Number: NTT2589											
		Client: Wilson Bowden Developments											
		Plant: Tracked CAT 312E											
Hole Type: TP		Start & End Date: 09/05/2017				Stability: Unstable.							
Ground Level (m AOD): 147.89		Eastings & Northings: 391340E 411680N				Engineer: LM		Checker: RTR					
Groundwater		Strata					Samples			In-Situ Tests			
Strike	Strike Details	Backfill	Level (m AOD)	Thickn ess	Description	Legend	Depth (m bgl)	Type	From (m)	To (m)	Type	Depth (m)	Result
	2.3m bgl		147.39	0.50m	Grass over TOPSOIL. (Topsoil)		0.50	ES	0.10	0.20			
			146.19	1.20m	Brown mottled orange very clayey fine and medium SAND with pockets of very soft sandy clay. (Hummocky Glacial Deposits)			B	1.30	1.40			
			145.29	0.90m	Greyish brown clayey gravelly fine SAND with pockets of very soft sandy clay. Gravel is fine to coarse sub-angular to rounded mudstone and sandstone. (Hummocky Glacial Deposits)			B	1.80	1.90			
			143.99	1.30m	Orangish brown slightly clayey slightly gravelly medium SAND. Gravel is fine to coarse sub-rounded to rounded quartz and mudstone. (Hummocky Glacial Deposits)			B	3.70	3.80			
			Hole Terminated at 3.90m bgl.										
Remarks							Legend						
Reason for Termination:							Samples:			Groundwater Strikes:		In-Situ Tests:	
Target depth reached.							B - Bulk D - Disturbed ES - Environmental Sample			 Groundwater Strike  Resting  Groundwater Level		HSV - Hand Shear Vane Test PID - Photo Ionisation Detector Test	
Groundwater Notes:													
Groundwater strike at 2.3m bgl.													
Other Remarks:							BWB Consulting Ltd Waterfront House Station Street Nottingham NG2 3DQ			Web: bwbconsulting.com E: nottingham @bwbconsulting.com P: 0115 9241100			
No visual or olfactory signs of contamination noted.													

TRIAL PIT LOG

Scale: 1:50Sheet 1 of 1

LOCATION ID: TP11	Project Name: Plot L, Kingsway Business Park, Rochdale				3.50 0.60 Pit Dimensions (m) 60 Degrees								
	Project Number: NTT2589												
	Client: Wilson Bowden Developments												
	Hole Type: TP	Plant: Tracked CAT 312E	Start & End Date: 09/05/2017			Stability: Unstable.							
Ground Level (m AOD): 147.54		Eastings & Northings: 391354E 411731N				Engineer: LM		Checker: RTR					
Groundwater		Strata					Samples			In-Situ Tests			
Strike	Strike Details	Backfill	Level (m AOD)	Thickn ess	Description	Legend	Depth (m bgl)	Type	From (m)	To (m)	Type	Depth (m)	Result
			147.14	0.40m	Grass over TOPSOIL. (Topsoil)		0.40	D	0.30	0.40			
				0.90m	Brown mottled orange very clayey fine and medium SAND with pockets of soft very sandy clay. (Hummocky Glacial Deposits)						HSV	0.50	(30, 34, 40)kPa
			146.24				1.30	B	1.20	1.30	HSV	1.20	(48, 44, 60)kPa
				1.50m	Greyish brown clayey gravelly very organic fine SAND with pockets of very soft sandy clay. Gravel is fine to coarse sub-angular to rounded mudstone and sandstone. (Hummocky Glacial Deposits)			B ES	1.80 1.80	1.90 1.90			
			144.74		Hole Terminated at 2.80m bgl.		2.80						
Remarks													
Reason for Termination: Failure of pit walls.								Samples: Groundwater Strikes: In-Situ Tests:					
Groundwater Notes: No groundwater encountered								B - Bulk D - Disturbed ES - Environmental Sample					
Other Remarks: No visual or olfactory signs of contamination noted.								Groundwater Strike Resting Groundwater Level					
								BWB Consulting Ltd Waterfront House Station Street Nottingham NG2 3DQ		Web: bwbconsulting.com E: nottingham @bwbconsulting.com P: 0115 9241100		BWB CONSULTANCY ENVIRONMENT INFRASTRUCTURE BUILDINGS	

TRIAL PIT LOG

Scale: 1:50Sheet 1 of 1

LOCATION ID: TP12	Project Name: Plot L, Kingsway Business Park, Rochdale		3.50 0.60Pit Dimensions (m)90 Degrees														
	Project Number: NTT2589																
	Client: Wilson Bowden Developments																
	Hole Type: TP	Plant: Tracked CAT 312E	Start & End Date: 09/05/2017		Stability: Unstable.												
Ground Level (m AOD): 147.58		Eastings & Northings: 391385E 411738N			Engineer: LM		Checker: RTR										
Groundwater		Strata				Samples			In-Situ Tests								
Strike	Strike Details	Backfill	Level (m AOD)	Thickn ess	Description	Legend	Depth (m bgl)	Type	From (m)	To (m)	Type	Depth (m)	Result				
▼2.1m bgl			147.18	0.40m	Grass over TOPSOIL. (Topsoil)		0.40	D ES	0.20 0.20	0.30 0.30							
			146.48	0.70m	Brown mottled orange very clayey fine and medium SAND with pockets of soft very sandy clay. (Hummocky Glacial Deposits)		1.10	B ES	1.20 1.20	1.30 1.30							
			145.08	1.40m	Greyish brown gravelly organic fine SAND with pockets of very soft sandy clay. Gravel is fine to coarse sub-angular to rounded mudstone and sandstone. (Hummocky Glacial Deposits)		2.50	D	2.40 2.50								
			Hole Terminated at 2.50m bgl.														
Remarks														Legend			
Reason for Termination:						Samples:		Groundwater Strikes:		In-Situ Tests:							
Failure of pit walls.						B - Bulk D - Disturbed ES - Environmental Sample		Groundwater Strike Resting Groundwater Level		HSV - Hand Shear Vane Test PID - Photo Ionisation Detector Test							
Groundwater Notes:						BWB Consulting Ltd Waterfront House Station Street Nottingham NG2 3DQ		Web: bwbconsulting.com E: nottingham@bwbconsulting.com P: 0115 9241100		BWB CONSULTANCY ENVIRONMENT INFRASTRUCTURE BUILDINGS							
Groundwater strike at 2.1m bgl.																	
Other Remarks:																	
No visual or olfactory signs of contamination noted.																	

TRIAL PIT LOG

Scale: 1:50Sheet 1 of 1

LOCATION ID:TP13

Hole Type: TP

Project Name:Plot L, Kingsway Business Park, Rochdale

Project Number:NTT2589

Client:Wilson Bowden Developments

Plant:Tracked CAT 312E

Start & End Date:09/05/2017

Stability: Unstable.

Ground Level (m AOD):148.14

Eastings & Northings:391388E 411708N

Engineer: LM

Checker: RTR

Groundwater

Strike

Strike Details

Backfill

Level (m AOD)

Thickn ess

Description

Legend

Depth (m bgl)

2.5m bgl

147.84

0.30m

Grass over TOPSOIL. (Topsoil)

0.30

1.20m

Brown mottled orange very clayey fine and medium SAND with pockets of soft very sandy clay. (Hummocky Glacial Deposits)

1.50

146.64

0.40m

Very soft greyish brown mottled orange sandy CLAY. Sand is fine and medium. (Hummocky Glacial Deposits)

1.90

146.24

1.70m

Greyish brown mottled orange clayey gravelly medium SAND. Gravel is fine to coarse sub-angular to rounded mudstone and sandstone. (Hummocky Glacial Deposits)

3.60

144.54

Hole Terminated at 3.60m bgl.

Samples

Type

From (m)

To (m)

In-Situ Tests

Type

Depth (m)

Result

B

0.10

0.20

HSV

0.40

(58, 38, 38)kPa

B

1.50

1.60

HSV

1.50

(10, 8, 8)kPa

D

2.10

2.20

B

2.60

2.70

Remarks

Reason for Termination:

Groundwater Notes:

Other Remarks:

Groundwater Strikes:

Groundwater Level

Legend

Samples:

Groundwater Strikes:

In-Situ Tests:

BWB Consulting Ltd

Waterfront House

Station Street

Nottingham

NG2 3DQ

Web:

bwbconsulting.com

E: nottingham

@bwbconsulting.com

P: 0115 9241100

BWB

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TRIAL PIT LOG

Scale: 1:50Sheet 1 of 1

LOCATION ID: TP14	Project Name: Plot L, Kingsway Business Park, Rochdale		3.50 0.60 Pit Dimensions (m) 0 Degrees										
	Project Number: NTT2589												
	Client: Wilson Bowden Developments												
	Hole Type: TP	Plant: Tracked CAT 312E	Start & End Date: 10/05/2017		Stability: Unstable.								
Ground Level (m AOD): 149.08		Eastings & Northings: 391412E 411681N			Engineer: LM		Checker: RTR						
Groundwater		Strata				Samples			In-Situ Tests				
Strike	Strike Details	Backfill	Level (m AOD)	Thickn ess	Description	Legend	Depth (m bgl)	Type	From (m)	To (m)	Type	Depth (m)	Result
			148.68	0.40m	Grass over TOPSOIL. (Topsoil)		0.40						
				0.90m	Very soft light brown very sandy brittle CLAY. Sand is fine and medium. (Hummocky Glacial Deposits)			B	1.00	1.10			
			147.78				1.30				HSV	1.30	(10, 12, 23)kPa
			147.48	0.30m	Light brown very clayey SAND. (Hummocky Glacial Deposits)		1.60						
				1.40m	Light grey clayey sandy GRAVEL. Sand is fine to coarse. Gravel is fine to coarse sub-angular to sub-rounded quartz, mudstone and sandstone. (Hummocky Glacial Deposits)			D	2.50	2.60			
			146.08		Hole Terminated at 3.00m bgl.		3.00						
Remarks								Legend					
Reason for Termination: Failure of pit walls.								Samples: B - Bulk D - Disturbed ES - Environmental Sample		Groundwater Strikes:  Groundwater Strike  Resting  Groundwater Level		In-Situ Tests: HSV - Hand Shear Vane Test PID - Photo Ionisation Detector Test	
Groundwater Notes: No groundwater encountered													
Other Remarks: No visual or olfactory signs of contamination noted.								BWB Consulting Ltd Waterfront House Station Street Nottingham NG2 3DQ		Web: bwbconsulting.com E: nottingham@bwbconsulting.com P: 0115 9241100			

TRIAL PIT LOG

Scale: 1:50Sheet 1 of 1

LOCATION ID:		Project Name: Plot L, Kingsway Business Park, Rochdale				3.50 0.60 Pit Dimensions (m) 190 Degrees							
TP15		Project Number: NTT2589											
		Client: Wilson Bowden Developments											
		Plant: Tracked CAT 312E		Start & End Date: 10/05/2017									
Hole Type: TP						Stability: Unstable.							
Ground Level (m AOD): 150.21		Eastings & Northings: 391443E 411633N				Engineer: LM		Checker: RTR					
Groundwater		Strata				Samples			In-Situ Tests				
Strike	Strike Details	Backfill	Level (m AOD)	Thickness	Description	Legend	Depth (m bgl)	Type	From (m)	To (m)	Type	Depth (m)	Result
				0.80m	Grass over gravelly TOPSOIL containing rare cobbles of concrete and brick. (Made Ground)			B ES	0.50	0.60			
			149.41	1.25m	Light brown very sandy very organic CLAY. Sand is fine and medium. (Hummocky Glacial Deposits)		0.80						
			148.16	0.95m	Light brown very sandy organic GRAVEL with large soft clay pockets. Sand is fine and medium. (Hummocky Glacial Deposits)		2.05	B	1.90	2.00			
			147.21	0.80m	Soft to firm brown mottled orange sandy gravelly CLAY. Sand is medium to coarse. Gravel is fine to coarse sun-angular to rounded mudstone, sandstone and quartz. (Hummocky Glacial Deposits)		3.00	D	2.80	1.90	HSV	3.00	(54, 30, 52)kPa
			146.41	0.10m	Light brown mottled orange clayey gravelly fine and medium SAND. Gravel is fine to coarse sun-angular to rounded mudstone, sandstone and quartz. (Hummocky Glacial Deposits)		3.80	B	3.50	3.60	HSV	3.60	(58, 62, 61)kPa
			146.31		Hole Terminated at 3.90m bgl.		3.90						
Remarks								Legend					
Reason for Termination:								Samples:		Groundwater Strikes:		In-Situ Tests:	
Target depth reached.								B - Bulk D - Disturbed ES - Environmental Sample		Groundwater Strike Resting Groundwater Level		HSV - Hand Shear Vane Test PID - Photo Ionisation Detector Test	
Groundwater Notes:													
Other Remarks:								BWB Consulting Ltd Waterfront House Station Street Nottingham NG2 3DQ		Web: bwbconsulting.com E: nottingham @bwbconsulting.com P: 0115 9241100		BWB CONSULTANCY ENVIRONMENT INFRASTRUCTURE BUILDINGS	
No visual or olfactory signs of contamination noted.													

TRIAL PIT LOG

Scale: 1:50

Sheet 1 of 1

LOCATION ID: TP16	Project Name: Plot L, Kingsway Business Park, Rochdale			3.50 0.60 Pit Dimensions (m) 0 Degrees												
	Project Number: NTT2589															
	Client: Wilson Bowden Developments															
	Hole Type: TP	Plant: Tracked CAT 312E	Start & End Date: 08/05/2017			Stability: Unstable.										
Ground Level (m AOD): 149.46		Eastings & Northings: 391442E 411736N				Engineer: LM		Checker:								
Groundwater		Strata					Samples			In-Situ Tests						
Strike	Strike Details	Backfill	Level (m AOD)	Thickn ess	Description	Legend	Depth (m bgl)	Type	From (m)	To (m)	Type	Depth (m)	Result			
				1.30m	Brown very gravelly CLAY with frequent cobble content. Gravel is fine to coarse angular mudstone, sandstone, clinker, brick and steel. Cobbles are angular brick. (Made Ground)			B ES	0.70 0.70	0.80 0.80						
			148.16	0.70m	Blackish grey very gravelly CLAY with frequent cobble content. Gravel is fine to coarse angular mudstone, sandstone, clinker, brick and steel. Cobbles are angular brick. (Made Ground)		1.30	B ES	2.00 2.00	2.10 2.10						
			147.46	1.50m	Orangish brown gravelly fine SAND with frequent clay pockets. Gravel is sub-rounded to rounded mudstone, sandstone and quartz. (Made Ground)		2.00	B	3.40	3.50						
			145.96		Hole Terminated at 3.50m bgl.		3.50									
Remarks														Legend		
Reason for Termination:						Samples:			Groundwater Strikes:			In-Situ Tests:				
Failure of pit walls.						B - Bulk D - Disturbed ES - Environmental Sample			Groundwater Strike Resting Groundwater Level			HSV - Hand Shear Vane Test PID - Photo Ionisation Detector Test				
Groundwater Notes:																
No groundwater encountered																
Other Remarks:						BWB Consulting Ltd Waterfront House Station Street Nottingham NG2 3DQ			Web: bwbconsulting.com E: nottingham @bwbconsulting.com P: 0115 9241100			BWB CONSULTANCY ENVIRONMENT INFRASTRUCTURE BUILDINGS				
No visual or olfactory signs of contamination noted.																

APPENDIX 6

DRILLERS LOGS

P.B. DRILLING BH LOG		Client Co. Name: BWB		Rig No. 9	SPT No. 5	BH No. 3															
Site Name: Plot L Rochdale		Job No.: MTT 2589		Day: MON	Date: 8 / 5 / 17	Sheet 1 of 6	Digs Yes ☐ No ☒														
Depth (m)	Description	Sample/Test		Depth (m)		U Samples		Standard Penetration Tests								Casing Depth (m)	Water Level (m)	Chiselling			
		Type	No.	From	To	Blows	Length	1	2	3	4	5	6	Pen	Depth (m)			Time		Hours	
	Start of Shift	B	1	0.20	0.40																
0.10	gl grass	B	2	0.60	1.10																
0.10	dark brown very sandy topsoil	S	3	1.20	1.65			1	-	-	1	-	1		1.20						
0.50	grey brown medium Sand	B	4	1.1	1.1																
2.30	grey brown medium Sand + gravel	S	5	2.00	2.45			2	2	3	3	2	1		2.00						
2.70	Brown silty clay	B	6	1.1	1.1																
3.00	obstruction drove down to 4.00	D	7	2.70																	
		S	8	4.00	4.45			1	-	1	-	1	2	NR	4.00						
4.00	Sand + gravel	B	9	1.1	1.1																
4.80	Silty brown laminated clay	D	10	4.80																	
		S	11	5.00	5.45			1	1	1	1	2	1		5.00						
5.00	Coarse brown Sand with coal measures and clay lenses	B	12	1.1	1.1																
		S	13	6.00	6.45			1	1	1	1	1	2		6.00						
		B	14	1.1	1.1																
8.00	Coarse orange Sand with coal measures	D	15	7.00																	
		S	16	7.50	7.95			1	1	-	1	1	1	NR	7.50						
8.80	Soft to firm brown sandy boulder clay	B	17	1.1	1.1																
		D	18	8.00																	
10.10	dense fine slightly claybound brown Sand	D	19	8.80																	
		S	20	9.00	9.45			2	2	2	3	4	3		9.00						
		B	21	1.1	1.1																
		S	22	10.00	10.45			2	4	5	6	5	4		10.00						
End of Shift - Borehole Complete/Incomplete																					
Remarks: (standing time, dayworks, weather, etc.) Standing 8.00 - 9.15, waiting for Blt's to be scanned 15 min pulling casing		Backfill:																			
		Additional Equipment:																			
		Total Number of Samples																			
		C/SPT	U	D	B	W	CH	ES													
		7																			
Lead Driller: Ray Hurley		Asst. Driller: Wes mitchel		Eng. Name: Luke		Eng. Signature:															

PLEASE NOTE: No work at all can commence until the client has signed the Underground Services Form or the waiver form on the back of it. This form MUST be returned ASAP with your log sheet from the first day on the job. Then a trial pit must ALWAYS be dug to 1.2m unless the waiver form has been signed too. An 'End of Job' Sheet must be completed and signed by the site engineer at the end of every job and handed in at the office with the final log sheet. (All correct PPE must be worn at all times)

[illegible]

Remarks: (standing time, dayworks, weather, etc.) 	Backfill:						
	Additional Equipment:						
	Total Number of Samples						
	C/SPT	U	D	B	W	CH	ES

Lead Driller: <u>Rog Hurley</u>	Asst. Driller: <u>Wes mitchel</u>	Eng. Name: <u>LUKE</u>	Eng. Signature: _____
---------------------------------	-----------------------------------	------------------------	-----------------------

PLEASE NOTE: No work at all can commence until the client has signed the Underground Services Form or the waiver form on the back of it. This form **MUST** be returned ASAP with your log sheet from the first day on the job. Then a trial pit must **ALWAYS** be dug to 1.2m unless the waiver form has been signed too. An 'End of Job' Sheet must be completed and signed by the site engineer at the end of every job and handed in at the office with the final log sheet.
(All correct PPE must be worn at all times)

[illegible]

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[illegible]

Backfill:						
Additional Equipment:						
Total Number of Samples						
C/SPT	U	D	B	W	CH	ES
6		2	8			

PLEASE NOTE: No work at all can commence until the client has signed the Underground Services Form or the waiver form on the back of it. This form **MUST** be returned ASAP with your log sheet from the first day on the job. Then a trial pit must **ALWAYS** be dug to 1.2m unless the waiver form has been signed too. An 'End of Job' Sheet must be completed and signed by the site engineer at the end of every job and handed in at the office with the final log sheet. (All correct PPE must be worn at all times)

P.B. DRILLING BH LOG		Client Co. Name:		BWB						Rig No.	9	SPT No.	5	BH No.	1							
Site Name: Plot C Rochdale				Job No.: NTY 2589		Day: wed		Date: 10 / 5 / 17		Sheet 6 of 6		Digs Yes ☐ No ☒										
Depth (m)	Description	Sample/Test		Depth (m)		U Samples		Standard Penetration Tests								Casing Depth (m)	Water Level (m)	Chiselling				
		Type	No.	From	To	Blows	Length	1	2	3	4	5	6	Pen	Depth (m) From			To	Time From	To	Hours	
	Start of Shift	S	17	7.50	7.45			1	1	1	1	2	3		7.50	Σ						
6.90	Silty brown laminated clay	B	18	"	"																	
7.50	Coarse orange brown sand	D	19	8.50																		
		S	20	9.00	9.45			1	2	3	4	5	6		9.00	⊙						
		B	21	"	"																	
7.70	Firm brown sandy boulder clay with sand lenses	S	22	10.00	10.45			5	6	6	7	8	8		10.00	+						
10.00	Firm brown sandy boulder clay																					
																Water Entries 1 2 3						
																Depth Struck			7.50			
																Casing Depth			7.00			
																Depth 5 mins			light			
																Depth 10 mins			light			
																Depth 15 mins			light			
																Depth 20 mins			+			
																Cut off at			/			
																Water Added			From	To	Qty	
																Water Added						
																Borehole Kept Full						
																Casing Diameter (inches):			6			
																Consumables Supplied by:			☒ PBD	☐ Client		
																Pipe Supplied by:			☒ PBD	☐ Client		
																Completed			Trial Pit Dug:			
																BH			Job			Yes ☐
																Yes ☒ No			Yes ☒ No			No ☒
Remarks: (standing time, dayworks, weather, etc.) 15 min pulling casing																Backfill:						
																Additional Equipment:						
																Total Number of Samples						
																C/SPT	U	D	B	W	CH	ES
3		1	2																			
Lead Driller: Roy Hufley		Asst. Driller: Was Mitchell		Eng. Name: Luke		Eng. Signature:																
EASE NOTE: No work at all can commence until the client has signed the Underground Services Form or the waiver form on the back of it. This form MUST be signed by the client.																						

PLEASE NOTE: No work at all can commence until the client has signed the Underground Services Form or the waiver form on the back of it. This form MUST be returned ASAP with your log sheet from the first day on the job. Then a trial pit must ALWAYS be dug to 1.2m unless the waiver form has been signed too. An 'End of Job' Sheet must be completed and signed by the site engineer at the end of every job and handed in at the office with the final log sheet.
(All correct PPE must be worn at all times)

APPENDIX 7
TRIP HAMMER CALIBRATION CERTIFICATE

Testconsult Limited
Ruby House
40A Hardwick Grange
Woolston
Warrington
WA1 4RF

SPT Hammer Ref: PBD 12
 Test Date: 22/12/2016
 Report Date: 01/06/2017
 File Name: 27496.PBD 12.spt
 Test Operator: OT

Instrumented Rod Data

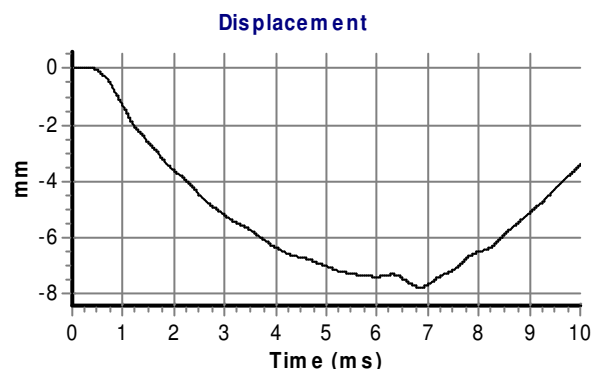
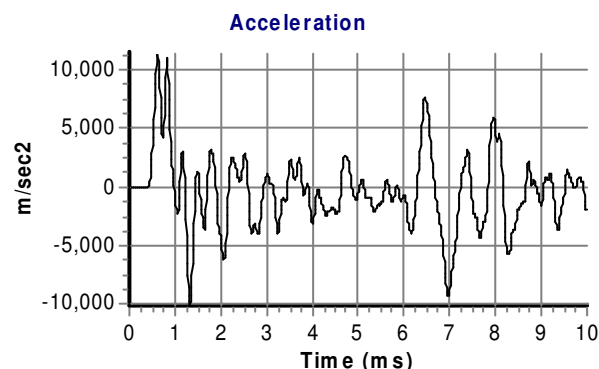
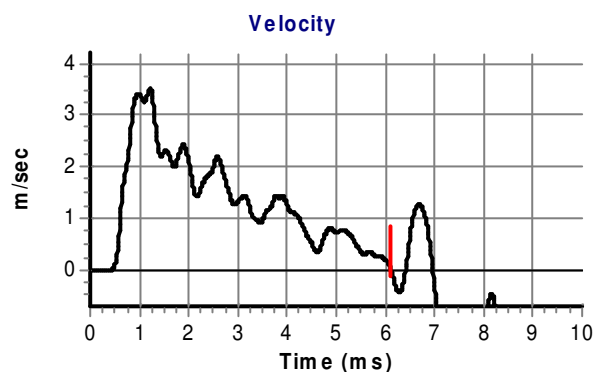
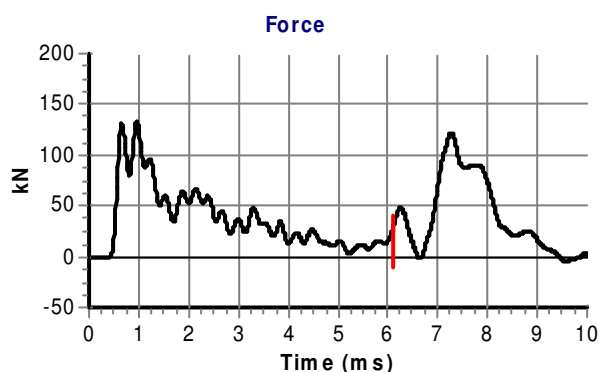
Diameter d_r (mm): 54
 Wall Thickness t_r (mm): 6.6
 Assumed Modulus E_a (GPa): 208
 Accelerometer No.1: 8965
 Accelerometer No.2: 8966

SPT Hammer Information

Hammer Mass m (kg): 63.5
 Falling Height h (mm): 760
 SPT String Length L (m): 14.5

Comments / Location

Client : Paul Blackledge Drilling
 Location : Testconsult Laboratory
 Type : Trip Hammer



Calculations

Area of Rod A (mm²): 983
 Theoretical Energy E_{theor} (J): 473
 Measured Energy E_{meas} (J): 372

Energy Ratio E_r (%): **79**



Signed: Oliver Turpin
 Title: Senior Technician

APPENDIX 8

GAS AND GROUNDWATER MONITORING RESULTS

BWB
CONSULTANCY | ENVIRONMENT
INFRASTRUCTURE | BUILDINGS

Weather Conditions	Start	End
(Dry / Raining)	Dry	Dry
Cloud Cover (Oktas)	7/8	7/8
Wind Strength (m/s)	3.5	3.5
Wind Direction (from)	W	W
Temperature (°C)	15.0	15.0
Barometric Pressure (mb)	992	992
(Rising/ Falling)		Steady
PID - Air		0
PID - Calibration Gas		

Site:		Plot L, Kingsway Business Park, Rochdale
Client:		Wilson Bowden Developments Ltd
Job No.:		NTT2589
Date:		19th May 2017
Start / End Time:		13:00-14:00
Engineer:		LM
Monitoring Equipment:	Gas Meter ID	
	PID ID	Shaw City Rental
	Dip Tape	
	Other	

[illegible]

BWB GAS AND GROUNDWATER MONITORING

Site:		Plot L, Kingsway Business Park, Rochdale	
Client:		Wilson Bowden Developments Ltd	
Job No.:		NTT2589	
Date:		25th May 2017	
Start / End Time:		13:00-14:00	
Engineer:		LM	
Monitoring Equipment:	Gas Meter ID		
	PID ID	Shaw City Rental	
	Dip Tape		
	Other		

NR = Not Recorded
Dry = No Groundwater



CONSULTANCY | ENVIRONMENT
INFRASTRUCTURE | BUILDINGS

Weather Conditions	Start	End
(Dry / Raining)	Dry	Dry
Cloud Cover (Oktas)	0/8	0/8
Wind Strength (m/s)	0.9	0.9
Wind Direction (from)	N	N
Temperature (°C)	26.0	26.0
Barometric Pressure (mb)	1004	1004
(Rising/ Falling)		Steady
PID - Air		0
PID - Calibration Gas		

[illegible]

BWB
CONSULTANCY | ENVIRONMENT
INFRASTRUCTURE | BUILDINGS

NR = Not Recorded
Dry = No Groundwater

Site:		Plot L, Kingsway Business Park, Rochdale
Client:		Wilson Bowden Developments Ltd
Job No.:		NTT2589
Date:		31st May 2017
Start / End Time:		13:00-14:00
Engineer:		LM
Monitoring Equipment:	Gas Meter ID	
	PID ID	Shaw City Rental
	Dip Tape	
	Other	

Weather Conditions	Start	End
(Dry / Raining)	Dry	Dry
Cloud Cover (Oktas)	1/8	1/8
Wind Strength (m/s)	2.2	2.2
Wind Direction (from)	N	N
Temperature (°C)	22.0	22.0
Barometric Pressure (mb)	1010	1010
(Rising/ Falling)		Steady
PID - Air		0
PID - Calibration Gas		

[illegible]

BWB GAS AND GROUNDWATER MONITORING

Site:		Plot L, Kingsway Business Park, Rochdale
Client:		Wilson Bowden Developments Ltd
Job No.:		NTT2589
Date:		5th June 2017
Start / End Time:		14:00-15:00
Engineer:		LM
Monitoring Equipment:	Gas Meter ID	
	PID ID	Shaw City Rental
	Dip Tape	
	Other	

NR = Not Recorded
Dry = No Groundwater



Weather Conditions	Start	End
(Dry / Raining)	Raining	Raining
Cloud Cover (Oktas)	8/8	8/8
Wind Strength (m/s)	4.0	4.0
Wind Direction (from)	S	S
Temperature (°C)	15.0	15.0
Barometric Pressure (mb)	987	987
(Rising/ Falling)		Steady
PID - Air		0
PID - Calibration Gas		

[illegible]

APPENDIX 9

SOIL BIOLOGICAL ANALYSIS RESULTS

Microbiology Team:
**Anthrax Analysis of Soil Samples for Luke McFadden (BWB
Consulting Ltd) at Plot L, Rochdale**

Author(s):

**Stephen Stagg BSc(Hons),
PGDipOccHyg**

Report Number:

17-2614



Microbiology Team:
Anthrax Analysis of Soil Samples for Luke McFadden (BWB Consulting Ltd) at Plot L, Rochdale

Reviewed and approved for issue by:	Jayne Farrant, PhD
Date of Issue:	10/05/17
Work carried out by:	Steve Stagg, BSc, PGDipOccHyg
Customer:	Luke McFadden, BWB Consulting Ltd, Whitehall Waterfront, 2 Riverside War, Leeds, LS1 4EH
Project number:	PE11501

Background

The Health and Safety Laboratory (HSL) received six soil samples on 09/05/17 for microbiological analysis of *Bacillus anthracis*, the causative agent of anthrax. Microbiological work was performed within our Containment Level 3 facility using HSL's standard operating procedure for anthrax detection. This method uses a combined approach of culture-based and DNA-based assessment.

Method

Approximately 10 g of each sample was dispersed in 90 ml sterile distilled water and heat treated at 70°C for 15 minutes to help eliminate non-spore forming background contaminants. An aliquot of each sample was then used to inoculate blood agar plates, which were incubated overnight to allow growth of any *B. anthracis*. Nutrient broth was added to the remainder of each sample and it was incubated overnight to enrich any bacteria present in the sample. Enriched broth and any emerging colonies indicative of *B. anthracis* were analysed separately the following day using molecular tests, to confirm the presence or absence of *B. anthracis*. DNA was extracted from the sample of broth or suspected bacterial colonies, and used in quantitative polymerase chain reaction (qPCR). The method employed is used commonly by HSL, Public Health England (PHE) and is endorsed by the World Health Organisation (WHO). The PCR reaction targets a region of the lethal factor gene located on the pXO1 plasmid and a capsular gene located on the pXO2 plasmid; both are carried by fully virulent strains of anthrax. Presence of any amplified DNA in the test sample was compared against positive and negative PCR controls.

Results

Full test data are as follows:

HSL code	Client sample number	Result
1702216	TP01A	Negative
1702217	TP05	Negative
1702218	TP06	Negative
1702219	TP07	Negative
1702220	TP08	Negative
1702221	TP09	Negative

Conclusion

No evidence of *Bacillus anthracis* (causative agent of anthrax) was found in the samples sent for analysis, either by real-time PCR assay or supportive culture-based analysis.

HSL: HSE's Health and Safety Laboratory is one of the world's leading providers of health and safety solutions to industry, government and professional bodies.

The main focus of our work is on understanding and reducing health and safety risks. We provide health and safety expert advice and consultancy, research, specialist training and products.

At HSL, we have been developing health and safety solutions for over 100 years. Our long history means that we're well placed to understand the changing health and safety landscape, and anticipate future issues.

We employ over 450 scientific, medical and technical specialists, including occupational health and risk management experts to help our clients manage a wide range of issues in workplace health and safety.

ISO 9001 ISO 14001 OHSAS 18001



Health and Safety Laboratory

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T : +44 (0) 1298 218000

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APPENDIX 10
SOIL CHEMICAL & LEACHATE ANALYSIS RESULTS



Luke McFadden
BWB Consulting Limited
Whitehall Waterfront
2 Riverside Way
Leeds
LS1 4EH

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

e: luke.mcfadden@bwbconsulting.com

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

Analytical Report Number : 17-48424

Replaces Analytical Report Number : 17-48424, issue no. 1

Project / Site name:	Plot L, Rochdale	Samples received on:	12/05/2017
Your job number:	NTT2589	Samples instructed on:	15/05/2017
Your order number:	POR010912	Analysis completed by:	22/05/2017
Report Issue Number:	2	Report issued on:	23/05/2017
Samples Analysed:	5 leachate samples - 13 soil samples		

Signed: 

Dr Claire Stone
Quality Manager
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

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

Analytical Report Number: 17-48424

Project / Site name: Plot L, Rochdale

Your Order No: POR010912

Lab Sample Number	749298	749299	749300	749301	749302
Sample Reference	TP06	TP07	TP08	TP16	TP16
Sample Number	None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Depth (m)	0.30-0.40	0.20-0.30	0.20-0.30	0.70-0.80	2.00-2.10
Date Sampled	11/05/2017	11/05/2017	11/05/2017	11/05/2017	08/05/2017
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
Moisture Content	%	N/A	NONE	13	10
Total mass of sample received	kg	0.001	NONE	0.98	0.84
				1.1	1.1
				1.1	1.2

Asbestos in Soil	Type	N/A	ISO 17025	Not-detected	Not-detected	Not-detected	Not-detected	-
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General Inorganics

pH - Automated	pH Units	N/A	MCERTS	6.0	6.2	7.8	10.1	8.2
Total Cyanide	mg/kg	1	MCERTS	< 1	< 1	< 1	< 1	< 1
Complex Cyanide	mg/kg	1	MCERTS	< 1	< 1	< 1	< 1	< 1
Free Cyanide	mg/kg	1	MCERTS	< 1	< 1	< 1	< 1	< 1
Water Soluble SO ₄ as SO ₄ (2:1) Gallery 16h extraction	g/l	0.00125	MCERTS	0.0172	< 0.0013	0.0297	0.219	0.0551
Total Sulphur	mg/kg	50	MCERTS	330	120	750	480	120
Fraction Organic Carbon (FOC)	N/A	0.001	NONE	0.025	0.0090	0.039	0.0085	0.0055

Total Phenols

Total Phenols (monohydric)	mg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
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Speciated PAHs

Naphthalene	mg/kg	0.05	MCERTS	1.6	< 0.05	3.8	< 0.05	< 0.05
Acenaphthylene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	0.64	< 0.05	< 0.05
Acenaphthene	mg/kg	0.05	MCERTS	0.46	< 0.05	6.0	< 0.05	< 0.05
Fluorene	mg/kg	0.05	MCERTS	0.26	< 0.05	4.5	< 0.05	< 0.05
Phenanthrene	mg/kg	0.05	MCERTS	2.1	0.20	32	0.48	< 0.05
Anthracene	mg/kg	0.05	MCERTS	0.34	< 0.05	8.0	< 0.05	< 0.05
Fluoranthene	mg/kg	0.05	MCERTS	2.1	0.28	43	0.68	< 0.05
Pyrene	mg/kg	0.05	MCERTS	1.8	0.25	39	0.59	< 0.05
Benzo(a)anthracene	mg/kg	0.05	MCERTS	0.95	0.10	24	0.33	< 0.05
Chrysene	mg/kg	0.05	MCERTS	1.1	0.14	20	0.30	< 0.05
Benzo(b)fluoranthene	mg/kg	0.05	MCERTS	1.0	< 0.05	26	0.38	< 0.05
Benzo(k)fluoranthene	mg/kg	0.05	MCERTS	0.50	< 0.05	10	0.15	< 0.05
Benzo(a)pyrene	mg/kg	0.05	MCERTS	0.89	< 0.05	20	0.32	< 0.05
Indeno(1,2,3-cd)pyrene	mg/kg	0.05	MCERTS	0.34	< 0.05	9.6	0.12	< 0.05
Dibenz(a,h)anthracene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	2.7	< 0.05	< 0.05
Benzo(ghi)perylene	mg/kg	0.05	MCERTS	0.43	< 0.05	12	0.18	< 0.05

Total PAH

Speciated Total EPA-16 PAHs	mg/kg	0.8	MCERTS	13.8	0.97	261	3.53	< 0.80
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Analytical Report Number: 17-48424

Project / Site name: Plot L, Rochdale

Your Order No: POR010912

Lab Sample Number	749298	749299	749300	749301	749302
Sample Reference	TP06	TP07	TP08	TP16	TP16
Sample Number	None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Depth (m)	0.30-0.40	0.20-0.30	0.20-0.30	0.70-0.80	2.00-2.10
Date Sampled	11/05/2017	11/05/2017	11/05/2017	11/05/2017	08/05/2017
Time Taken	None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Analytical Parameter (Soil Analysis)	Units	Limit of detection	Accreditation Status		

Heavy Metals / Metalloids

Arsenic (aqua regia extractable)	mg/kg	1	MCERTS	13	6.3	9.5	9.6	5.1
Barium (aqua regia extractable)	mg/kg	1	MCERTS	49	28	160	100	32
Beryllium (aqua regia extractable)	mg/kg	0.06	MCERTS	0.45	0.33	0.75	0.47	0.36
Boron (water soluble)	mg/kg	0.2	MCERTS	0.7	0.2	0.5	1.9	0.3
Cadmium (aqua regia extractable)	mg/kg	0.2	MCERTS	< 0.2	< 0.2	0.4	< 0.2	< 0.2
Chromium (hexavalent)	mg/kg	4	MCERTS	< 4.0	< 4.0	< 4.0	< 4.0	< 4.0
Chromium (aqua regia extractable)	mg/kg	1	MCERTS	13	18	20	19	10
Copper (aqua regia extractable)	mg/kg	1	MCERTS	21	11	58	21	17
Lead (aqua regia extractable)	mg/kg	1	MCERTS	52	9.4	73	46	19
Mercury (aqua regia extractable)	mg/kg	0.3	MCERTS	< 0.3	0.4	< 0.3	< 0.3	< 0.3
Nickel (aqua regia extractable)	mg/kg	1	MCERTS	12	18	19	19	13
Selenium (aqua regia extractable)	mg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Vanadium (aqua regia extractable)	mg/kg	1	MCERTS	20	19	27	17	12
Zinc (aqua regia extractable)	mg/kg	1	MCERTS	51	72	95	64	32

Monoaromatics

Benzene	ug/kg	1	MCERTS	< 1.0	< 1.0	< 1.0	< 1.0	-
Toluene	ug/kg	1	MCERTS	< 1.0	< 1.0	< 1.0	< 1.0	-
Ethylbenzene	ug/kg	1	MCERTS	< 1.0	< 1.0	< 1.0	< 1.0	-
p & m-xylene	ug/kg	1	MCERTS	< 1.0	< 1.0	< 1.0	< 1.0	-
o-xylene	ug/kg	1	MCERTS	< 1.0	< 1.0	< 1.0	< 1.0	-
MTBE (Methyl Tertiary Butyl Ether)	ug/kg	1	MCERTS	< 1.0	< 1.0	< 1.0	< 1.0	-

Petroleum Hydrocarbons

TPH C10 - C40	mg/kg	10	MCERTS	26	< 10	2900	160	< 10
TPH2 (C6 - C10)	mg/kg	0.1	NONE	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
TPH-CWG - Aliphatic >EC5 - EC6	mg/kg	0.001	MCERTS	< 0.001	< 0.001	< 0.001	< 0.001	-
TPH-CWG - Aliphatic >EC6 - EC8	mg/kg	0.001	MCERTS	< 0.001	< 0.001	< 0.001	< 0.001	-
TPH-CWG - Aliphatic >EC8 - EC10	mg/kg	0.001	MCERTS	< 0.001	< 0.001	< 0.001	< 0.001	-
TPH-CWG - Aliphatic >EC10 - EC12	mg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0	< 1.0	-
TPH-CWG - Aliphatic >EC12 - EC16	mg/kg	2	MCERTS	< 2.0	< 2.0	5.2	3.0	-
TPH-CWG - Aliphatic >EC16 - EC21	mg/kg	8	MCERTS	< 8.0	< 8.0	28	< 8.0	-
TPH-CWG - Aliphatic >EC21 - EC35	mg/kg	8	MCERTS	< 8.0	< 8.0	260	38	-
TPH-CWG - Aliphatic (EC5 - EC35)	mg/kg	10	MCERTS	< 10	< 10	300	48	-
TPH-CWG - Aromatic >EC5 - EC7	mg/kg	0.001	MCERTS	< 0.001	< 0.001	< 0.001	< 0.001	-
TPH-CWG - Aromatic >EC7 - EC8	mg/kg	0.001	MCERTS	< 0.001	< 0.001	< 0.001	< 0.001	-
TPH-CWG - Aromatic >EC8 - EC10	mg/kg	0.001	MCERTS	< 0.001	< 0.001	< 0.001	< 0.001	-
TPH-CWG - Aromatic >EC10 - EC12	mg/kg	1	MCERTS	2.0	< 1.0	6.0	< 1.0	-
TPH-CWG - Aromatic >EC12 - EC16	mg/kg	2	MCERTS	2.3	< 2.0	72	3.0	-
TPH-CWG - Aromatic >EC16 - EC21	mg/kg	10	MCERTS	< 10	< 10	350	< 10	-
TPH-CWG - Aromatic >EC21 - EC35	mg/kg	10	MCERTS	13	< 10	1400	49	-
TPH-CWG - Aromatic (EC5 - EC35)	mg/kg	10	MCERTS	24	< 10	1800	62	-

Analytical Report Number: 17-48424

Project / Site name: Plot L, Rochdale

Your Order No: POR010912

Lab Sample Number				749303	749304	749305	749306	749307
Sample Reference				TP05	TP01A	TP02	TP03	TP04
Sample Number				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Depth (m)				1.30-1.40	1.30-1.40	0.30-0.40	1.80-1.90	1.00-1.10
Date Sampled				11/05/2017	11/05/2017	09/05/2017	10/05/2017	11/05/2017
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	%	N/A	NONE	10	9.1	17	9.8	11
Total mass of sample received	kg	0.001	NONE	0.49	0.44	0.39	0.57	0.49

Asbestos in Soil	Type	N/A	ISO 17025	-	-	-	-	-
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General Inorganics

pH - Automated	pH Units	N/A	MCERTS	7.7	7.6	6.7	7.0	7.2
Total Cyanide	mg/kg	1	MCERTS	< 1	< 1	< 1	< 1	< 1
Complex Cyanide	mg/kg	1	MCERTS	< 1	< 1	< 1	< 1	< 1
Free Cyanide	mg/kg	1	MCERTS	< 1	< 1	< 1	< 1	< 1
Water Soluble SO ₄ as SO ₄ (2:1) Gallery 16h extraction	g/l	0.00125	MCERTS	< 0.0013	0.0071	0.0014	0.0077	0.0026
Total Sulphur	mg/kg	50	MCERTS	< 50	< 50	320	54	54
Fraction Organic Carbon (FOC)	N/A	0.001	NONE	0.0046	0.0027	0.035	0.0034	0.0034

Total Phenols

Total Phenols (monohydric)	mg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
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Speciated PAHs

Naphthalene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Acenaphthylene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Acenaphthene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Fluorene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Phenanthrene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	0.49	< 0.05	< 0.05
Anthracene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Fluoranthene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	0.69	< 0.05	< 0.05
Pyrene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	0.61	< 0.05	< 0.05
Benzo(a)anthracene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	0.34	< 0.05	< 0.05
Chrysene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	0.39	< 0.05	< 0.05
Benzo(b)fluoranthene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	0.42	< 0.05	< 0.05
Benzo(k)fluoranthene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	0.18	< 0.05	< 0.05
Benzo(a)pyrene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	0.35	< 0.05	< 0.05
Indeno(1,2,3-cd)pyrene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	0.15	< 0.05	< 0.05
Dibenz(a,h)anthracene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Benzo(ghi)perylene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	0.21	< 0.05	< 0.05

Total PAH

Speciated Total EPA-16 PAHs	mg/kg	0.8	MCERTS	< 0.80	< 0.80	3.83	< 0.80	< 0.80
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Analytical Report Number: 17-48424

Project / Site name: Plot L, Rochdale

Your Order No: POR010912

Lab Sample Number				749303	749304	749305	749306	749307
Sample Reference				TP05	TP01A	TP02	TP03	TP04
Sample Number				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Depth (m)				1.30-1.40	1.30-1.40	0.30-0.40	1.80-1.90	1.00-1.10
Date Sampled				11/05/2017	11/05/2017	09/05/2017	10/05/2017	11/05/2017
Time Taken				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Analytical Parameter (Soil Analysis)	Units	Limit of detection	Accreditation Status					
Heavy Metals / Metalloids								
Arsenic (aqua regia extractable)	mg/kg	1	MCERTS	5.5	3.5	16	2.5	2.3
Barium (aqua regia extractable)	mg/kg	1	MCERTS	23	23	63	36	30
Beryllium (aqua regia extractable)	mg/kg	0.06	MCERTS	0.48	0.42	0.62	0.55	0.18
Boron (water soluble)	mg/kg	0.2	MCERTS	< 0.2	0.2	0.4	0.2	< 0.2
Cadmium (aqua regia extractable)	mg/kg	0.2	MCERTS	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2
Chromium (hexavalent)	mg/kg	4	MCERTS	< 4.0	< 4.0	< 4.0	< 4.0	< 4.0
Chromium (aqua regia extractable)	mg/kg	1	MCERTS	15	16	15	14	10
Copper (aqua regia extractable)	mg/kg	1	MCERTS	15	14	29	18	12
Lead (aqua regia extractable)	mg/kg	1	MCERTS	6.9	6.8	56	6.9	5.3
Mercury (aqua regia extractable)	mg/kg	0.3	MCERTS	< 0.3	< 0.3	< 0.3	< 0.3	< 0.3
Nickel (aqua regia extractable)	mg/kg	1	MCERTS	15	17	16	15	8.4
Selenium (aqua regia extractable)	mg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Vanadium (aqua regia extractable)	mg/kg	1	MCERTS	15	15	28	15	11
Zinc (aqua regia extractable)	mg/kg	1	MCERTS	33	37	58	38	25

Monoaromatics

Benzene	ug/kg	1	MCERTS	-	-	-	-	-
Toluene	ug/kg	1	MCERTS	-	-	-	-	-
Ethylbenzene	ug/kg	1	MCERTS	-	-	-	-	-
p & m-xylene	ug/kg	1	MCERTS	-	-	-	-	-
o-xylene	ug/kg	1	MCERTS	-	-	-	-	-
MTBE (Methyl Tertiary Butyl Ether)	ug/kg	1	MCERTS	-	-	-	-	-

Petroleum Hydrocarbons

TPH C10 - C40	mg/kg	10	MCERTS	< 10	< 10	60	< 10	< 10
TPH2 (C6 - C10)	mg/kg	0.1	NONE	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
TPH-CWG - Aliphatic >EC5 - EC6	mg/kg	0.001	MCERTS	-	-	-	-	-
TPH-CWG - Aliphatic >EC6 - EC8	mg/kg	0.001	MCERTS	-	-	-	-	-
TPH-CWG - Aliphatic >EC8 - EC10	mg/kg	0.001	MCERTS	-	-	-	-	-
TPH-CWG - Aliphatic >EC10 - EC12	mg/kg	1	MCERTS	-	-	-	-	-
TPH-CWG - Aliphatic >EC12 - EC16	mg/kg	2	MCERTS	-	-	-	-	-
TPH-CWG - Aliphatic >EC16 - EC21	mg/kg	8	MCERTS	-	-	-	-	-
TPH-CWG - Aliphatic >EC21 - EC35	mg/kg	8	MCERTS	-	-	-	-	-
TPH-CWG - Aliphatic (EC5 - EC35)	mg/kg	10	MCERTS	-	-	-	-	-
TPH-CWG - Aromatic >EC5 - EC7	mg/kg	0.001	MCERTS	-	-	-	-	-
TPH-CWG - Aromatic >EC7 - EC8	mg/kg	0.001	MCERTS	-	-	-	-	-
TPH-CWG - Aromatic >EC8 - EC10	mg/kg	0.001	MCERTS	-	-	-	-	-
TPH-CWG - Aromatic >EC10 - EC12	mg/kg	1	MCERTS	-	-	-	-	-
TPH-CWG - Aromatic >EC12 - EC16	mg/kg	2	MCERTS	-	-	-	-	-
TPH-CWG - Aromatic >EC16 - EC21	mg/kg	10	MCERTS	-	-	-	-	-
TPH-CWG - Aromatic >EC21 - EC35	mg/kg	10	MCERTS	-	-	-	-	-
TPH-CWG - Aromatic (EC5 - EC35)	mg/kg	10	MCERTS	-	-	-	-	-

Analytical Report Number: 17-48424

Project / Site name: Plot L, Rochdale

Your Order No: POR010912

Lab Sample Number	749308	749309	749310		
Sample Reference	TP11	TP12	TP15		
Sample Number	None Supplied	None Supplied	None Supplied		
Depth (m)	1.80-1.90	1.20-1.30	0.50-0.60		
Date Sampled	12/05/2017	10/05/2017	10/05/2017		
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	< 0.1
Moisture Content	%	N/A	NONE	13	18
Total mass of sample received	kg	0.001	NONE	0.48	0.76

Asbestos in Soil	Type	N/A	ISO 17025	-	-	Not-detected		
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General Inorganics

pH - Automated	pH Units	N/A	MCERTS	7.2	7.1	7.2		
Total Cyanide	mg/kg	1	MCERTS	< 1	< 1	< 1		
Complex Cyanide	mg/kg	1	MCERTS	< 1	< 1	< 1		
Free Cyanide	mg/kg	1	MCERTS	< 1	< 1	< 1		
Water Soluble SO ₄ as SO ₄ (2:1) Gallery 16h extraction	g/l	0.00125	MCERTS	0.0097	0.0181	0.0406		
Total Sulphur	mg/kg	50	MCERTS	68	170	620		
Fraction Organic Carbon (FOC)	N/A	0.001	NONE	0.0024	0.0049	0.059		

Total Phenols

Total Phenols (monohydric)	mg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0		
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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	0.16		
Fluorene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	0.10		
Phenanthrene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	0.97		
Anthracene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	0.15		
Fluoranthene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	1.6		
Pyrene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	1.3		
Benzo(a)anthracene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	0.72		
Chrysene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	0.83		
Benzo(b)fluoranthene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	1.0		
Benzo(k)fluoranthene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	0.35		
Benzo(a)pyrene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	0.71		
Indeno(1,2,3-cd)pyrene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	0.29		
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	0.47		

Total PAH

Speciated Total EPA-16 PAHs	mg/kg	0.8	MCERTS	< 0.80	< 0.80	8.68		
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Analytical Report Number: 17-48424

Project / Site name: Plot L, Rochdale

Your Order No: POR010912

Lab Sample Number				749308	749309	749310		
Sample Reference				TP11	TP12	TP15		
Sample Number				None Supplied	None Supplied	None Supplied		
Depth (m)				1.80-1.90	1.20-1.30	0.50-0.60		
Date Sampled				12/05/2017	10/05/2017	10/05/2017		
Time Taken				None Supplied	None Supplied	None Supplied		
Analytical Parameter (Soil Analysis)	Units	Limit of detection	Accreditation Status					
Heavy Metals / Metalloids								
Arsenic (aqua regia extractable)	mg/kg	1	MCERTS	1.1	2.4	12		
Barium (aqua regia extractable)	mg/kg	1	MCERTS	19	38	130		
Beryllium (aqua regia extractable)	mg/kg	0.06	MCERTS	0.21	0.32	0.70		
Boron (water soluble)	mg/kg	0.2	MCERTS	0.2	< 0.2	0.5		
Cadmium (aqua regia extractable)	mg/kg	0.2	MCERTS	< 0.2	< 0.2	0.3		
Chromium (hexavalent)	mg/kg	4	MCERTS	< 4.0	< 4.0	< 4.0		
Chromium (aqua regia extractable)	mg/kg	1	MCERTS	8.3	13	12		
Copper (aqua regia extractable)	mg/kg	1	MCERTS	9.7	12	41		
Lead (aqua regia extractable)	mg/kg	1	MCERTS	4.4	11	120		
Mercury (aqua regia extractable)	mg/kg	0.3	MCERTS	< 0.3	< 0.3	0.4		
Nickel (aqua regia extractable)	mg/kg	1	MCERTS	11	15	12		
Selenium (aqua regia extractable)	mg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0		
Vanadium (aqua regia extractable)	mg/kg	1	MCERTS	9.3	13	20		
Zinc (aqua regia extractable)	mg/kg	1	MCERTS	16	23	73		

Monoaromatics

Benzene	ug/kg	1	MCERTS	-	-	< 1.0		
Toluene	ug/kg	1	MCERTS	-	-	< 1.0		
Ethylbenzene	ug/kg	1	MCERTS	-	-	< 1.0		
p & m-xylene	ug/kg	1	MCERTS	-	-	< 1.0		
o-xylene	ug/kg	1	MCERTS	-	-	< 1.0		
MTBE (Methyl Tertiary Butyl Ether)	ug/kg	1	MCERTS	-	-	< 1.0		

Petroleum Hydrocarbons

TPH C10 - C40	mg/kg	10	MCERTS	< 10	< 10	130		
TPH2 (C6 - C10)	mg/kg	0.1	NONE	< 0.1	< 0.1	< 0.1		
TPH-CWG - Aliphatic >EC5 - EC6	mg/kg	0.001	MCERTS	-	-	< 0.001		
TPH-CWG - Aliphatic >EC6 - EC8	mg/kg	0.001	MCERTS	-	-	< 0.001		
TPH-CWG - Aliphatic >EC8 - EC10	mg/kg	0.001	MCERTS	-	-	< 0.001		
TPH-CWG - Aliphatic >EC10 - EC12	mg/kg	1	MCERTS	-	-	< 1.0		
TPH-CWG - Aliphatic >EC12 - EC16	mg/kg	2	MCERTS	-	-	< 2.0		
TPH-CWG - Aliphatic >EC16 - EC21	mg/kg	8	MCERTS	-	-	< 8.0		
TPH-CWG - Aliphatic >EC21 - EC35	mg/kg	8	MCERTS	-	-	8.8		
TPH-CWG - Aliphatic (EC5 - EC35)	mg/kg	10	MCERTS	-	-	< 10		
TPH-CWG - Aromatic >EC5 - EC7	mg/kg	0.001	MCERTS	-	-	< 0.001		
TPH-CWG - Aromatic >EC7 - EC8	mg/kg	0.001	MCERTS	-	-	< 0.001		
TPH-CWG - Aromatic >EC8 - EC10	mg/kg	0.001	MCERTS	-	-	< 0.001		
TPH-CWG - Aromatic >EC10 - EC12	mg/kg	1	MCERTS	-	-	< 1.0		
TPH-CWG - Aromatic >EC12 - EC16	mg/kg	2	MCERTS	-	-	2.1		
TPH-CWG - Aromatic >EC16 - EC21	mg/kg	10	MCERTS	-	-	11		
TPH-CWG - Aromatic >EC21 - EC35	mg/kg	10	MCERTS	-	-	68		
TPH-CWG - Aromatic (EC5 - EC35)	mg/kg	10	MCERTS	-	-	81		



Analytical Report Number: 17-48424

Project / Site name: Plot L, Rochdale

Your Order No: POR010912

Lab Sample Number				749311	749312	749313	749314	749315
Sample Reference				TP06	TP07	TP08	TP16	TP02
Sample Number				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Depth (m)				0.30-0.40	0.20-0.30	0.20-0.30	0.70-0.80	0.30-0.40
Date Sampled				11/05/2017	11/05/2017	11/05/2017	11/05/2017	09/05/2017
Time Taken				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Analytical Parameter (Leachate Analysis)				Units	Limit of detection	Accreditation Status		

General Inorganics

pH	pH Units	N/A	ISO 17025	6.9	6.3	7.8	9.4	6.5
Total Cyanide	µg/l	10	ISO 17025	< 10	< 10	< 10	< 10	< 10
Sulphate as SO ₄	mg/l	0.1	ISO 17025	3.5	1.0	7.5	63	0.7

Heavy Metals / Metalloids

Arsenic (dissolved)	µg/l	1.1	ISO 17025	1.7	< 1.1	2.7	15	< 1.1
Barium (dissolved)	µg/l	0.05	ISO 17025	14	4.9	31	20	2.4
Beryllium (dissolved)	µg/l	0.2	ISO 17025	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2
Boron (dissolved)	µg/l	10	ISO 17025	59	56	52	120	59
Cadmium (dissolved)	µg/l	0.08	ISO 17025	< 0.08	< 0.08	< 0.08	< 0.08	< 0.08
Chromium (dissolved)	µg/l	0.4	ISO 17025	2.4	1.8	1.4	4.3	0.9
Copper (dissolved)	µg/l	0.7	ISO 17025	22	12	28	35	14
Lead (dissolved)	µg/l	1	ISO 17025	4.2	< 1.0	1.9	3.3	< 1.0
Mercury (dissolved)	µg/l	0.5	ISO 17025	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
Nickel (dissolved)	µg/l	0.3	ISO 17025	3.0	2.5	3.9	3.7	1.4
Selenium (dissolved)	µg/l	4	ISO 17025	< 4.0	< 4.0	< 4.0	4.4	< 4.0
Vanadium (dissolved)	µg/l	1.7	ISO 17025	3.0	< 1.7	7.0	20	3.8
Zinc (dissolved)	µg/l	0.4	ISO 17025	6.2	13	14	6.6	5.5



Analytical Report Number : 17-48424

Project / Site name: Plot L, Rochdale

* 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 *
749298	TP06	None Supplied	0.30-0.40	Brown loam and clay with gravel and vegetation.
749299	TP07	None Supplied	0.20-0.30	Light brown loam and clay with gravel and vegetation.
749300	TP08	None Supplied	0.20-0.30	Grey loam and sand with gravel and vegetation.
749301	TP16	None Supplied	0.70-0.80	Brown loam and gravel with brick and stones.
749302	TP16	None Supplied	2.00-2.10	Light brown sandy clay with gravel and vegetation.
749303	TP05	None Supplied	1.30-1.40	Brown clay and sand.
749304	TP01A	None Supplied	1.30-1.40	Brown sandy clay with gravel.
749305	TP02	None Supplied	0.30-0.40	Brown loam and clay with gravel and vegetation.
749306	TP03	None Supplied	1.80-1.90	Brown sandy clay with gravel.
749307	TP04	None Supplied	1.00-1.10	Light brown sandy clay.
749308	TP11	None Supplied	1.80-1.90	Light brown sand.
749309	TP12	None Supplied	1.20-1.30	Grey sandy clay.
749310	TP15	None Supplied	0.50-0.60	Brown loam and clay with gravel and vegetation.

Analytical Report Number : 17-48424

Project / Site name: Plot L, Rochdale

Water matrix abbreviations: Surface Water (SW) Potable Water (PW) Ground Water (GW) Process Water (PrW)

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 disperion staining techniques.	In house method based on HSG 248	A001-PL	D	ISO 17025
Boron in leachate	Determination of boron in leachate. Sample acidified and followed by ICP-OES.	In-house method based on MEWAM	L039-PL	W	ISO 17025
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	L038-PL	D	MCERTS
BS EN 12457-1 (2:1) Leachate Prep	2:1 (as recieved, moisture adjusted) end over end extraction with water for 24 hours. Eluate filtered prior to analysis.	In-house method based on BSEN12457-1.	L043-PL	W	NONE
BTEX and MTBE in soil (Monoaromatics)	Determination of BTEX in soil by headspace GC-MS.	In-house method based on USEPA8260	L073B-PL	W	MCERTS
Complex Cyanide in soil	Determination of complex cyanide by calculation.	In-house method based on Examination of Water and Wastewater 20th Edition: Clesceri, Greenberg & Eaton (Skalar)	L080-PL	W	MCERTS
Fraction of Organic Carbon in soil	Determination of fraction of organic carbon in soil by oxidising with potassium dichromate followed by titration with iron (II) sulphate.	In-house method based on BS1377 Part 3, 1990, Chemical and Electrochemical Tests	L023-PL	D	NONE
Free cyanide in soil	Determination of free cyanide by distillation followed by colorimetry.	In-house method based on Examination of Water and Wastewater 20th Edition: Clesceri, Greenberg & Eaton (Skalar)	L080-PL	W	MCERTS
Hexavalent chromium in soil	Determination of hexavalent chromium in soil by extraction in water then by acidification, addition of 1,5 diphenylcarbazine followed by colorimetry.	In-house method	L080-PL	W	MCERTS
Metals by ICP-OES in leachate	Determination of metals in leachate by acidification followed by ICP-OES.	In-house method based on MEWAM 2006 Methods for the Determination of Metals in Soil.	L039-PL	W	ISO 17025
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.	L038-PL	D	MCERTS
Moisture Content	Moisture content, determined gravimetrically.	In-house method based on BS1377 Part 2, 1990, Chemical and Electrochemical Tests	L019-UK/PL	W	NONE
Monohydric phenols in soil	Determination of phenols in soil by extraction with sodium hydroxide followed by distillation followed by colorimetry.	In-house method based on Examination of Water and Wastewater 20th Edition: Clesceri, Greenberg & Eaton (skalar)	L080-PL	W	MCERTS
pH at 20oC in leachate	Determination of pH in leachate by electrometric measurement.	In-house method based on BS1377 Part 3, 1990, Chemical and Electrochemical Tests	L005-PL	W	ISO 17025
pH in soil (automated)	Determination of pH in soil by addition of water followed by automated electrometric measurement.	In-house method based on BS1377 Part 3, 1990, Chemical and Electrochemical Tests	L099-PL	D	MCERTS
Speciated EPA-16 PAHs in soil	Determination of PAH compounds in soil by extraction in dichloromethane and hexane followed by GC-MS with the use of surrogate and internal standards.	In-house method based on USEPA 8270	L064-PL	D	MCERTS
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.	L019-UK/PL	D	NONE

Iss No 17-48424-2 Plot L, Rochdale NTT2589

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

Page 10 of 11

Analytical Report Number : 17-48424

Project / Site name: Plot L, Rochdale

Water matrix abbreviations: Surface Water (SW) Potable Water (PW) Ground Water (GW) Process Water (PrW)

Analytical Test Name	Analytical Method Description	Analytical Method Reference	Method number	Wet / Dry Analysis	Accreditation Status
Sulphate in leachates	Determination of sulphate in leachate by acidification followed by ICP-OES.	In-house method based on MEWAM 1986 Methods for the Determination of Metals in Soil""	L039-PL	W	ISO 17025
Sulphate, water soluble, in soil (16hr extraction)	Determination of water soluble sulphate by ICP-OES. Results reported directly (leachate equivalent) and corrected for extraction ratio (soil equivalent).	In-house method based on BS1377 Part 3, 1990, Chemical and Electrochemical Tests, 2:1 water:soil extraction, analysis by ICP-OES.	L038-PL	D	MCERTS
Sulphate, water soluble, in soil by Gallery 16hr	Determination of water soluble Sulphate by discrete analyser (precipitation method).	In house method based on BS1377-3: 1990.	L082B-PL	D	MCERTS
Total cyanide in leachate	Determination of total cyanide by distillation followed by colorimetry.	In-house method based on Examination of Water and Wastewater 20th Edition: Clesceri, Greenberg & Eaton (Skalar)	L080-PL	W	ISO 17025
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 based on BS1377 Part 3, 1990, and MEWAM 2006 Methods for the Determination of Metals in Soil	L038-PL	D	MCERTS
TPH Banding in Soil by FID	Determination of hexane extractable hydrocarbons in soil by GC-FID.	In-house method, TPH with carbon banding.	L076-PL	W	MCERTS
TPH2 (Soil)	Determination of hydrocarbons C6-C10 by headspace GC-MS.	In-house method based on USEPA8260	L088-PL	W	NONE
TPHCWG (Soil)	Determination of hexane extractable hydrocarbons in soil by GC-MS/GC-FID.	In-house method	L088/76-PL	W	MCERTS

For method numbers ending in 'UK' analysis have been carried out in our laboratory in the United Kingdom.

For method numbers ending in 'PL' 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.

**Luke McFadden**

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Analytical Report Number : 17-48709

Project / Site name:	Plot L, Rochdale	Samples received on:	09/05/2017
Your job number:	NTT2589	Samples instructed on:	17/05/2017
Your order number:	POR010912	Analysis completed by:	23/05/2017
Report Issue Number:	1	Report issued on:	23/05/2017
Samples Analysed:	11 soil samples		

Signed:

Rexona Rahman
Reporting Manager
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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Analytical Report Number: 17-48709

Project / Site name: Plot L, Rochdale

Your Order No: POR010912

Lab Sample Number				750923	750924	750925	750926	750927
Sample Reference				TP11	TP12	TP15	TP11	TP07
Sample Number				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Depth (m)				1.80-1.90	1.20-1.30	1.90-2.00	1.20-1.30	0.50-0.60
Date Sampled				09/05/2017	09/05/2017	10/05/2017	09/05/2017	11/05/2017
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	%	N/A	NONE	23	17	26	23	12
Total mass of sample received	kg	0.001	NONE	0.34	0.35	0.44	0.33	0.34

General Inorganics

pH - Automated	pH Units	N/A	MCERTS	6.0	-	6.2	5.6	5.8
Total Sulphate as SO ₄	%	0.005	MCERTS	0.014	-	0.019	0.012	0.008
Water Soluble SO ₄ as SO ₄ (2:1) Gallery 16h extraction	g/l	0.00125	MCERTS	0.0057	-	0.0188	0.0079	< 0.0013
Total Sulphur	%	0.005	MCERTS	0.011	-	0.029	0.009	< 0.005
Organic Matter	%	0.1	MCERTS	1.3	0.6	2.8	-	-

Analytical Report Number: 17-48709

Project / Site name: Plot L, Rochdale

Your Order No: POR010912

Lab Sample Number				750928	750929	750930	750931	750932
Sample Reference				TP05	TP01	BH01	BH02	TP03
Sample Number				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Depth (m)				1.30-1.40	3.40-3.50	5.00-5.45	7.50-7.95	2.90-3.00
Date Sampled				11/05/2017	09/05/2017	10/05/2017	09/05/2017	09/05/2017
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	%	N/A	NONE	13	13	15	19	13
Total mass of sample received	kg	0.001	NONE	0.49	0.35	0.20	0.48	0.47

General Inorganics

pH - Automated	pH Units	N/A	MCERTS	6.1	6.2	6.8	7.0	5.6
Total Sulphate as SO ₄	%	0.005	MCERTS	0.007	0.018	0.012	0.008	0.006
Water Soluble SO ₄ as SO ₄ (2:1) Gallery 16h extraction	g/l	0.00125	MCERTS	0.0014	0.0272	0.0429	0.0187	0.0017
Total Sulphur	%	0.005	MCERTS	< 0.005	0.008	0.006	0.034	0.063
Organic Matter	%	0.1	MCERTS	-	-	-	-	-



Analytical Report Number: 17-48709
Project / Site name: Plot L, Rochdale
Your Order No: POR010912

Lab Sample Number				750933				
Sample Reference				TP01A				
Sample Number				None Supplied				
Depth (m)				3.00-3.10				
Date Sampled				11/05/2017				
Time Taken				None Supplied				
Analytical Parameter (Soil Analysis)	Units	Limit of detection	Accreditation Status					
Stone Content	%	0.1	NONE	< 0.1				
Moisture Content	%	N/A	NONE	11				
Total mass of sample received	kg	0.001	NONE	0.45				

General Inorganics

pH - Automated	pH Units	N/A	MCERTS	7.5				
Total Sulphate as SO ₄	%	0.005	MCERTS	0.013				
Water Soluble SO ₄ as SO ₄ (2:1) Gallery 16h extraction	g/l	0.00125	MCERTS	0.0218				
Total Sulphur	%	0.005	MCERTS	0.052				
Organic Matter	%	0.1	MCERTS	-				



Analytical Report Number : 17-48709

Project / Site name: Plot L, Rochdale

* 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 *
750923	TP11	None Supplied	1.80-1.90	Light brown clay and sand.
750924	TP12	None Supplied	1.20-1.30	Grey sandy clay.
750925	TP15	None Supplied	1.90-2.00	Brown clay and sand.
750926	TP11	None Supplied	1.20-1.30	Light brown clay.
750927	TP07	None Supplied	0.50-0.60	Brown clay and sand.
750928	TP05	None Supplied	1.30-1.40	Brown clay and sand.
750929	TP01	None Supplied	3.40-3.50	Brown clay and sand with gravel.
750930	BH01	None Supplied	5.00-5.45	Light brown sandy clay.
750931	BH02	None Supplied	7.50-7.95	Brown sand.
750932	TP03	None Supplied	2.90-3.00	Brown clay and sand.
750933	TP01A	None Supplied	3.00-3.10	Brown clay and sand with gravel.

Analytical Report Number : 17-48709

Project / Site name: Plot L, Rochdale

Water matrix abbreviations: Surface Water (SW) Potable Water (PW) Ground Water (GW) Process Water (PrW)

Analytical Test Name	Analytical Method Description	Analytical Method Reference	Method number	Wet / Dry Analysis	Accreditation Status
Moisture Content	Moisture content, determined gravimetrically.	In-house method based on BS1377 Part 2, 1990, Chemical and Electrochemical Tests	L019-UK/PL	W	NONE
Organic matter (Automated) in soil	Determination of organic matter in soil by oxidising with potassium dichromate followed by titration with iron (II) sulphate.	BS1377 Part 3, 1990, Chemical and Electrochemical Tests""	L009-PL	D	MCERTS
pH in soil (automated)	Determination of pH in soil by addition of water followed by automated electrometric measurement.	In-house method based on BS1377 Part 3, 1990, Chemical and Electrochemical Tests	L099-PL	D	MCERTS
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.	L019-UK/PL	D	NONE
Sulphate, water soluble, in soil by Gallery 16hr	Determination of water soluble Sulphate by discrete analyser (precipitation method).	In house method based on BS1377-3: 1990.	L082B-PL	D	MCERTS
Total Sulphate in soil as %	Determination of total sulphate in soil by extraction with 10% HCl followed by ICP-OES.	In-house method based on BS1377 Part 3, 1990, Chemical and Electrochemical Tests""	L038	D	MCERTS
Total Sulphur in soil as %	Determination of total sulphur in soil by extraction with aqua-regia, potassium bromide/bromate followed by ICP-OES.	In-house method based on BS1377 Part 3, 1990, and MEWAM 2006 Methods for the Determination of Metals in Soil	L038	W	MCERTS

For method numbers ending in 'UK' analysis have been carried out in our laboratory in the United Kingdom.

For method numbers ending in 'PL' 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.

APPENDIX 11

SOIL GEOTECHNICAL ANALYSIS RESULTS



TEST CERTIFICATE

Determination of Moisture Content

Tested in Accordance with BS 1377-2:1990: Clause 3.2

i2 Analytical Ltd
7 Woodshots Meadow
Croxley Green Business Park
Watford Herts WD18 8YS



Client: BWB Consulting Limited
Client Address: Whitehall Waterfront
2 Riverside Way
Leeds
LS1 4EH
Contact: Luke McFadden
Site Name: Plot L, Rochdale
Site Address: Not Given

Client Reference: NTT2589
Job Number: 17-48680
Date Sampled: 08/05 - 11/05/2017
Date Received: 12/05/2017
Date Tested: 25/04 - 24/05/2017
Sampled By: Not Given

Test results

Laboratory Reference	Sample Reference	Location	Depth Top [m]	Depth Base [m]	Sample Type	Description	Moisture Content [%]
750728	Not Given	BH01	2	2.45	D	Brown slightly clayey SAND	15
750720	Not Given	BH01	5	5.45	D	Brown slightly gravelly clayey SAND	27
750726	Not Given	BH01	6.9	Not Given	D	Brown slightly sandy CLAY	25
750727	Not Given	BH02	1.2	1.65	D	Dark brown very sandy CLAY	22
750721	Not Given	BH02	7.5	7.95	D	Brown slightly clayey SAND	19
750722	Not Given	BH03	9	9.45	D	Brown gravelly very sandy CLAY	14
750719	Not Given	TP01	3.4	3.5	D	Brown slightly gravelly clayey SAND	12
750725	Not Given	TP01A	3	3.1	B	Brown slightly gravelly sandy CLAY	14
750723	Not Given	TP02	0.9	1	B	Brown slightly clayey gravelly SAND	7.1
750724	Not Given	TP03	2.9	3	D	Brown slightly gravelly very clayey SAND	16

Remarks

Approved:

Dariusz Piotrowski
PL Laboratory Manager
Geotechnical Section

Signed:

Sushil Sharda
Technical Manager
(Geotechnical Division)

Date Reported: 31/05/2017

for and on behalf of i2 Analytical Ltd

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The analysis was carried out at i2 Analytical Limited, ul. Pionierow 39, 41-711 Ruda Slaska, Poland."



TEST CERTIFICATE

Determination of Moisture Content

Tested in Accordance with BS 1377-2:1990: Clause 3.2

i2 Analytical Ltd
7 Woodshots Meadow
Croxley Green Business Park
Watford Herts WD18 8YS



Client: BWB Consulting Limited
Client Address: Whitehall Waterfront
2 Riverside Way
Leeds
LS1 4EH
Contact: Luke McFadden
Site Name: Plot L, Rochdale
Site Address: Not Given

Client Reference: NTT2589
Job Number: 17-48680
Date Sampled: 09/05 - 11/05/2017
Date Received: 12/05/2017
Date Tested: 25/04 - 25/05/2017
Sampled By: Not Given

Test results

Laboratory Reference	Sample Reference	Location	Depth Top [m]	Depth Base [m]	Sample Type	Description	Moisture Content [%]
750718	Not Given	TP04	2.7	2.8	B	Brown slightly gravelly very clayey SAND	15
750717	Not Given	TP05	1.3	1.4	B	Brown slightly gravelly very clayey SAND	15
750714	Not Given	TP09	2.7	2.8	D	Brown SAND	19
750713	Not Given	TP10	3.7	3.8	D	Brown slightly gravelly very clayey SAND	19
750712	Not Given	TP11	1.2	1.3	B	Brown very clayey SAND	26
750708	Not Given	TP11	1.8	1.9	D	Brown sandy CLAY	35
750709	Not Given	TP12	1.2	1.3	D	Brownish grey sandy CLAY	23
750711	Not Given	TP13	2.6	2.7	B	Brown clayey very sandy GRAVEL with cobbles	12
750710	Not Given	TP15	1.9	2	D	Dark brown clayey SAND	25

Remarks

Approved:

Dariusz Piotrowski
PL Laboratory Manager
Geotechnical Section

Signed:

Sushil Sharda
Technical Manager
(Geotechnical Division)

Date Reported: 31/05/2017

for and on behalf of i2 Analytical Ltd

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TEST CERTIFICATE

Determination of Liquid and Plastic Limits

i2 Analytical Ltd
7 Woodshots Meadow
Croxley Green Business Park
Watford Herts WD18 8YS



Tested in Accordance with BS1377-2: 1990: Clause 4.4 & 5: One Point Method

Client: BWB Consulting Limited
Client Address: Whitehall Waterfront
2 Riverside Way
Leeds
LS1 4EH
Contact: Luke McFadden
Site Name: Plot L, Rochdale
Site Address: Not Given

Client Reference: NTT2589
Job Number: 17-48680
Date Sampled: 09/05/2017
Date Received: 12/05/2017
Date Tested: 25/04/2017
Sampled By: Not Given

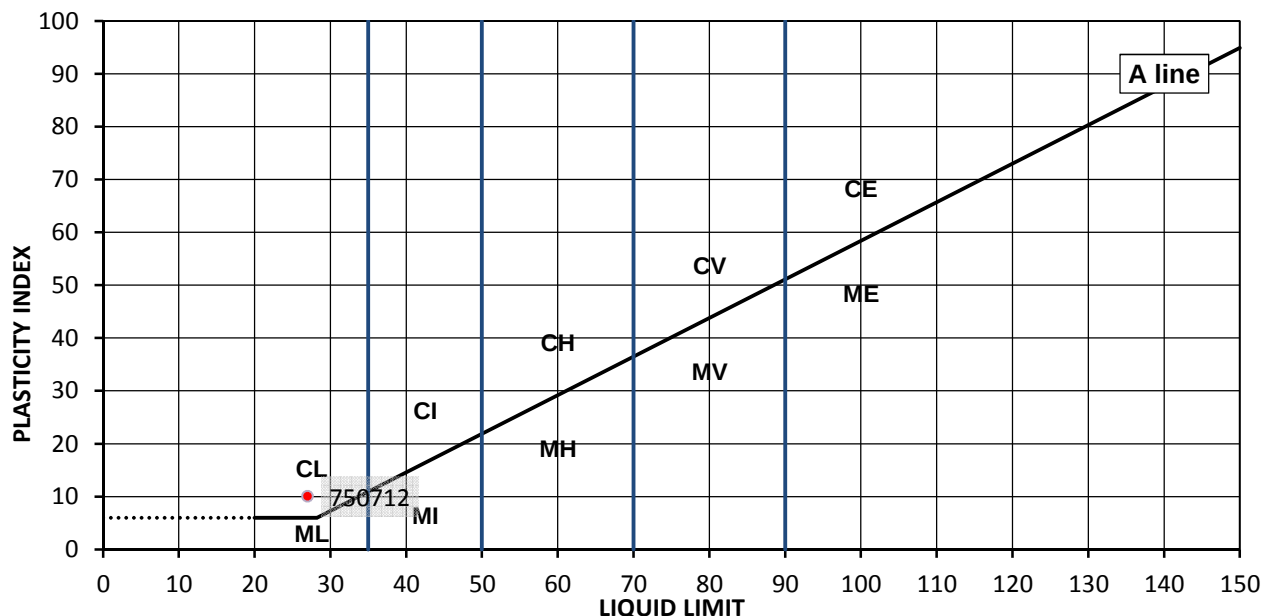
TEST RESULTS

Laboratory Reference: 750712
Sample Reference: Not Given

Description: Brown very clayey SAND
Location: TP11
Sample Preparation: Tested after washing to remove >425um

Sample Type: B
Depth Top [m]: 1.2
Depth Base [m]: 1.3

As Received Moisture Content [%]	Liquid Limit [%]	Plastic Limit [%]	Plasticity Index [%]	% Passing 425µm BS Test Sieve
26	27	17	10	98



Legend, based on BS 5930:2015 Code of practice for site investigations

	Plasticity	Liquid Limit
C	Clay	below 35
M	Silt	35 to 50
	L	Low
	I	Medium
	H	High
	V	Very high
	E	Extremely high
		exceeding 90
Organic	O	append to classification for organic material (eg CHO)

Remarks

Approved:

Signed:

Dariusz Piotrowski
PL Laboratory
Manager Geotechnical
Section
Date Reported: 30/05/2017

Piotrowski

Sushil Sharda
Technical Manager
(Geotechnical Division)

S Sharda

for and on behalf of i2 Analytical Ltd

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TEST CERTIFICATE

Determination of Liquid and Plastic Limits

i2 Analytical Ltd
7 Woodshots Meadow
Croxley Green Business Park
Watford Herts WD18 8YS



Tested in Accordance with BS1377-2: 1990: Clause 4.4 & 5: One Point Method

Client: BWB Consulting Limited
Client Address: Whitehall Waterfront
2 Riverside Way
Leeds
LS1 4EH
Contact: Luke McFadden
Site Name: Plot L, Rochdale
Site Address: Not Given

Client Reference: NTT2589
Job Number: 17-48680
Date Sampled: 11/05/2017
Date Received: 12/05/2017
Date Tested: 25/04/2017
Sampled By: Not Given

TEST RESULTS

Laboratory Reference: 750717
Sample Reference: Not Given

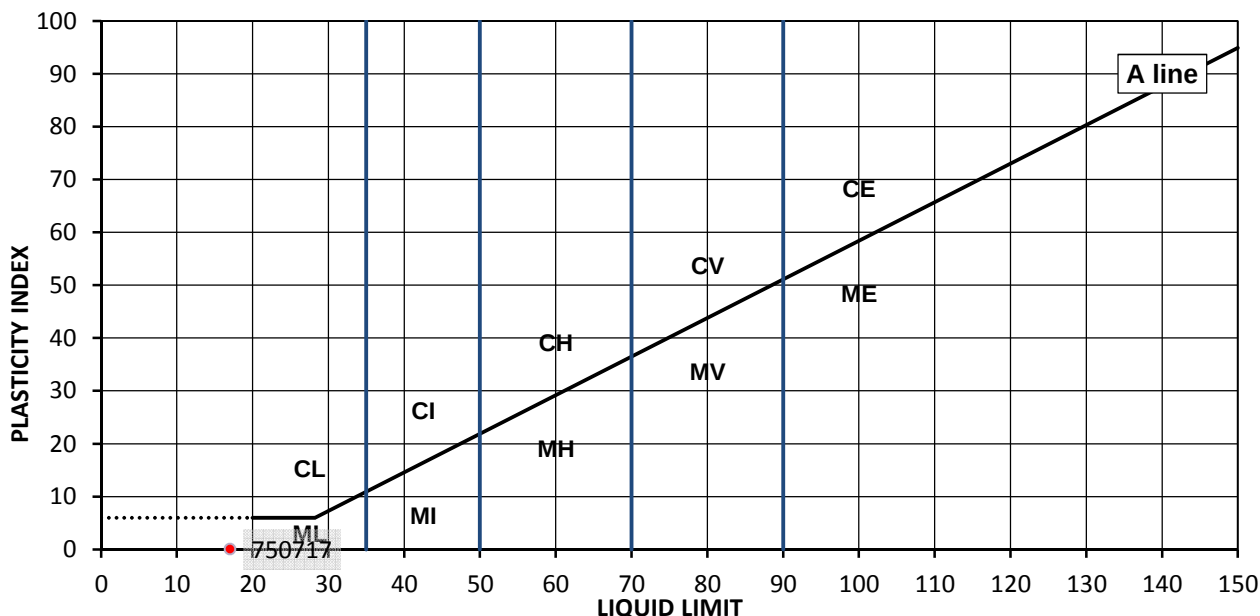
Description: Brown slightly gravelly very clayey SAND

Location: TP05

Sample Preparation: Tested after >425um removed by hand

Sample Type: B
Depth Top [m]: 1.3
Depth Base [m]: 1.4

As Received Moisture Content [%]	Liquid Limit [%]	Plastic Limit [%]	Plasticity Index [%]	% Passing 425µm BS Test Sieve
15	17	NP*	NA*	96



Legend, based on BS 5930:2015 Code of practice for site investigations

	Plasticity	Liquid Limit
C	Clay	below 35
M	Silt	35 to 50
	L Low	50 to 70
	I Medium	70 to 90
	H High	exceeding 90
	V Very high	
	E Extremely high	
Organic	O	append to classification for organic material (eg CHO)

Remarks * NP – non plastic; NA – non applicable for test.

Approved:

Signed:

Dariusz Piotrowski
PL Laboratory
Manager Geotechnical
Section
Date Reported: 30/05/2017

Piotrowski

Sushil Sharda
Technical Manager
(Geotechnical Division)

S Sharda

for and on behalf of i2 Analytical Ltd

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TEST CERTIFICATE

Determination of Liquid and Plastic Limits

i2 Analytical Ltd
7 Woodshots Meadow
Croxley Green Business Park
Watford Herts WD18 8YS



Tested in Accordance with BS1377-2: 1990: Clause 4.4 & 5: One Point Method

Client: BWB Consulting Limited
Client Address: Whitehall Waterfront
2 Riverside Way
Leeds
LS1 4EH
Contact: Luke McFadden
Site Name: Plot L, Rochdale
Site Address: Not Given

Client Reference: NTT2589
Job Number: 17-48680
Date Sampled: 09/05/2017
Date Received: 12/05/2017
Date Tested: 25/04/2017
Sampled By: Not Given

TEST RESULTS

Laboratory Reference: 750718
Sample Reference: Not Given

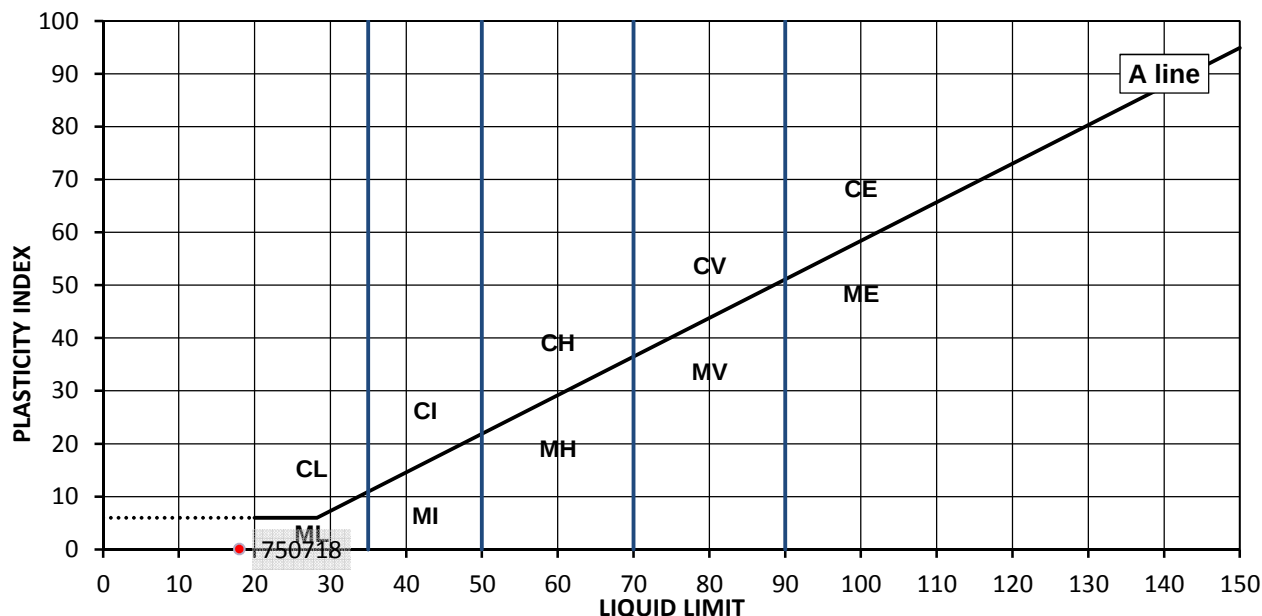
Description: Brown slightly gravelly very clayey SAND

Location: TP04

Sample Preparation: Tested after >425um removed by hand

Sample Type: B
Depth Top [m]: 2.7
Depth Base [m]: 2.8

As Received Moisture Content [%]	Liquid Limit [%]	Plastic Limit [%]	Plasticity Index [%]	% Passing 425µm BS Test Sieve
15	18	NP*	NA*	97



Legend, based on BS 5930:2015 Code of practice for site investigations

	Plasticity	Liquid Limit
C	Clay	below 35
M	Silt	35 to 50
	L Low	50 to 70
	I Medium	70 to 90
	H High	exceeding 90
	V Very high	
	E Extremely high	
Organic	O	append to classification for organic material (eg CHO)

Remarks * NP – non plastic; NA – non applicable for test.

Approved:

Signed:

Dariusz Piotrowski
PL Laboratory
Manager Geotechnical
Section

Piotrowski

Sushil Sharda
Technical Manager
(Geotechnical Division)

Sushil Sharda

Date Reported: 30/05/2017

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TEST CERTIFICATE

Determination of Liquid and Plastic Limits

i2 Analytical Ltd
7 Woodshots Meadow
Croxley Green Business Park
Watford Herts WD18 8YS



Tested in Accordance with BS1377-2: 1990: Clause 4.4 & 5: One Point Method

Client: BWB Consulting Limited
Client Address: Whitehall Waterfront
2 Riverside Way
Leeds
LS1 4EH
Contact: Luke McFadden
Site Name: Plot L, Rochdale
Site Address: Not Given

Client Reference: NTT2589
Job Number: 17-48680
Date Sampled: 11/05/2017
Date Received: 12/05/2017
Date Tested: 25/04/2017
Sampled By: Not Given

TEST RESULTS

Laboratory Reference: 750725
Sample Reference: Not Given

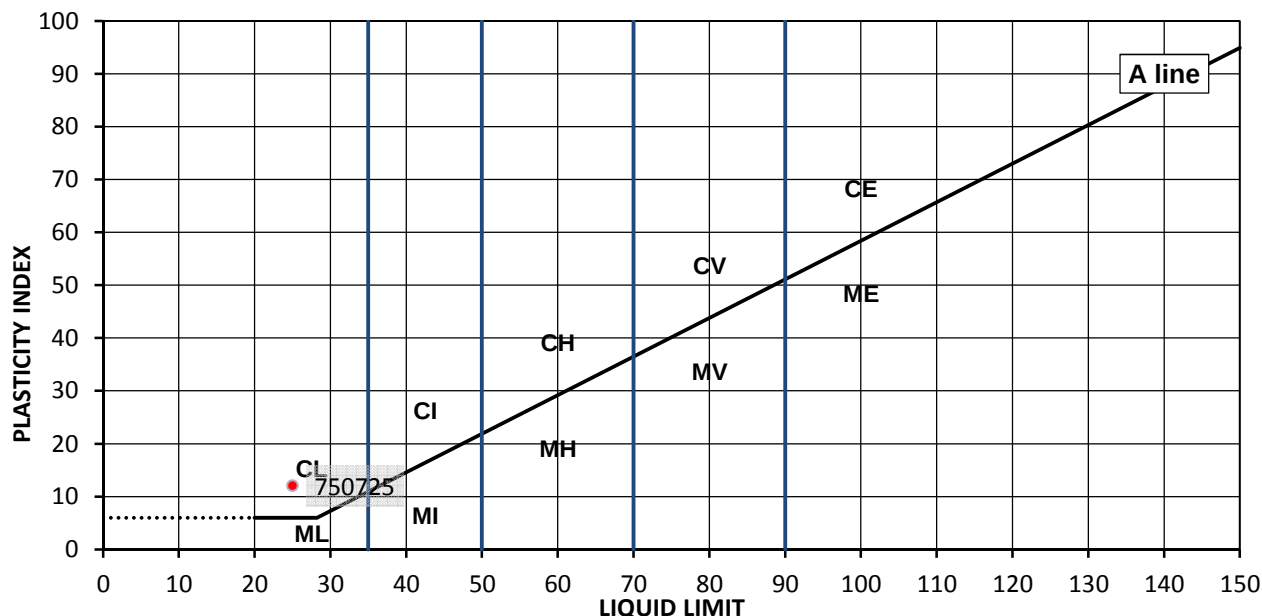
Description: Brown slightly gravelly sandy CLAY

Location: TP01A

Sample Preparation: Tested after >425um removed by hand

Sample Type: B
Depth Top [m]: 3
Depth Base [m]: 3.1

As Received Moisture Content [%]	Liquid Limit [%]	Plastic Limit [%]	Plasticity Index [%]	% Passing 425µm BS Test Sieve
14	25	13	12	96



Legend, based on BS 5930:2015 Code of practice for site investigations

	Plasticity	Liquid Limit
C	Clay	below 35
M	Silt	35 to 50
	L	Low
	I	Medium
	H	High
	V	Very high
	E	Extremely high
	O	append to classification for organic material (eg CHO)
	Organic	

Remarks

Approved:

Signed:

Dariusz Piotrowski
PL Laboratory
Manager Geotechnical
Section

Piotrowski

Sushil Sharda
Technical Manager
(Geotechnical Division)

S Sharda

Date Reported: 30/05/2017

for and on behalf of i2 Analytical Ltd

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TEST CERTIFICATE

Determination of Liquid and Plastic Limits

i2 Analytical Ltd
7 Woodshots Meadow
Croxley Green Business Park
Watford Herts WD18 8YS



Tested in Accordance with BS1377-2: 1990: Clause 4.4 & 5: One Point Method

Client: BWB Consulting Limited
Client Address: Whitehall Waterfront
2 Riverside Way
Leeds
LS1 4EH
Contact: Luke McFadden
Site Name: Plot L, Rochdale
Site Address: Not Given

Client Reference: NTT2589
Job Number: 17-48680
Date Sampled: 09/05/2017
Date Received: 12/05/2017
Date Tested: 24/05/2017
Sampled By: Not Given

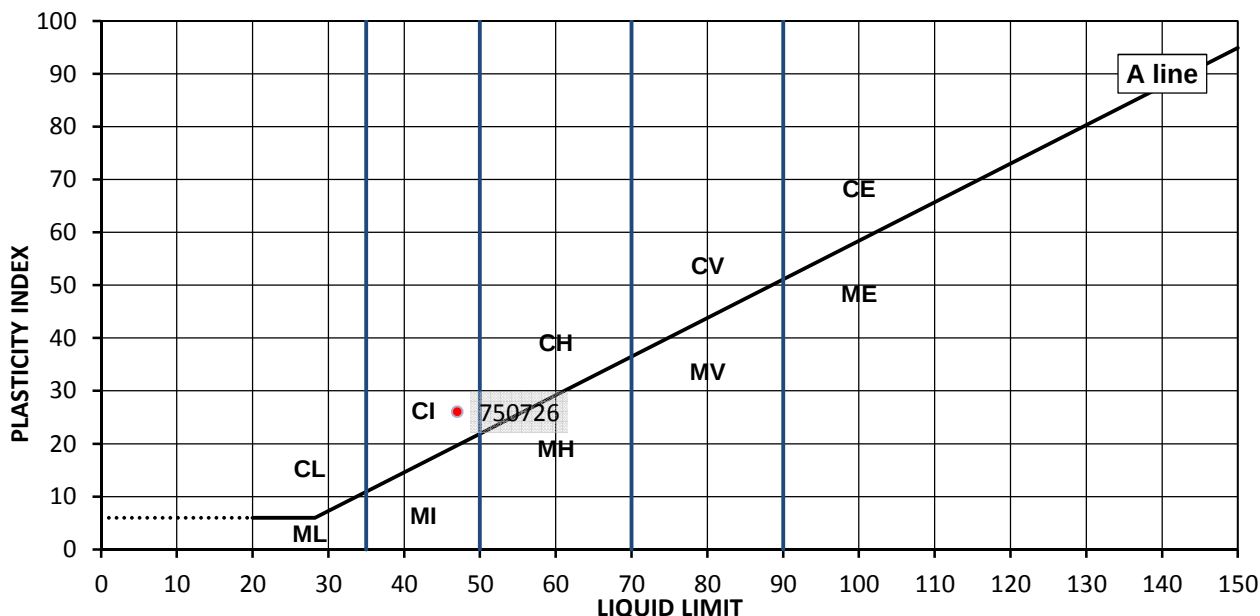
TEST RESULTS

Laboratory Reference: 750726
Sample Reference: Not Given

Description: Brown slightly sandy CLAY
Location: BH01
Sample Preparation: Tested in natural condition

Sample Type: D
Depth Top [m]: 6.9
Depth Base [m]: Not Given

As Received Moisture Content [%]	Liquid Limit [%]	Plastic Limit [%]	Plasticity Index [%]	% Passing 425µm BS Test Sieve
25	47	21	26	100



Legend, based on BS 5930:2015 Code of practice for site investigations

	Plasticity	Liquid Limit
C	Clay	below 35
M	Silt	35 to 50
	L Low	50 to 70
	I Medium	70 to 90
	H High	exceeding 90
	V Very high	
	E Extremely high	
Organic	O	append to classification for organic material (eg CHO)

Remarks

Approved:

Dariusz Piotrowski
PL Laboratory
Manager Geotechnical
Section
Date Reported: 30/05/2017

Signed:

Sushil Sharda
Technical Manager
(Geotechnical Division)

for and on behalf of i2 Analytical Ltd

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TEST CERTIFICATE

Determination of Liquid and Plastic Limits

i2 Analytical Ltd
7 Woodshots Meadow
Croxley Green Business Park
Watford Herts WD18 8YS



Tested in Accordance with BS1377-2: 1990: Clause 4.4 & 5: One Point Method

Client: BWB Consulting Limited
Client Address: Whitehall Waterfront
2 Riverside Way
Leeds
LS1 4EH
Contact: Luke McFadden
Site Name: Plot L, Rochdale
Site Address: Not Given

Client Reference: NTT2589
Job Number: 17-48680
Date Sampled: 09/05/2017
Date Received: 12/05/2017
Date Tested: 24/05/2017
Sampled By: Not Given

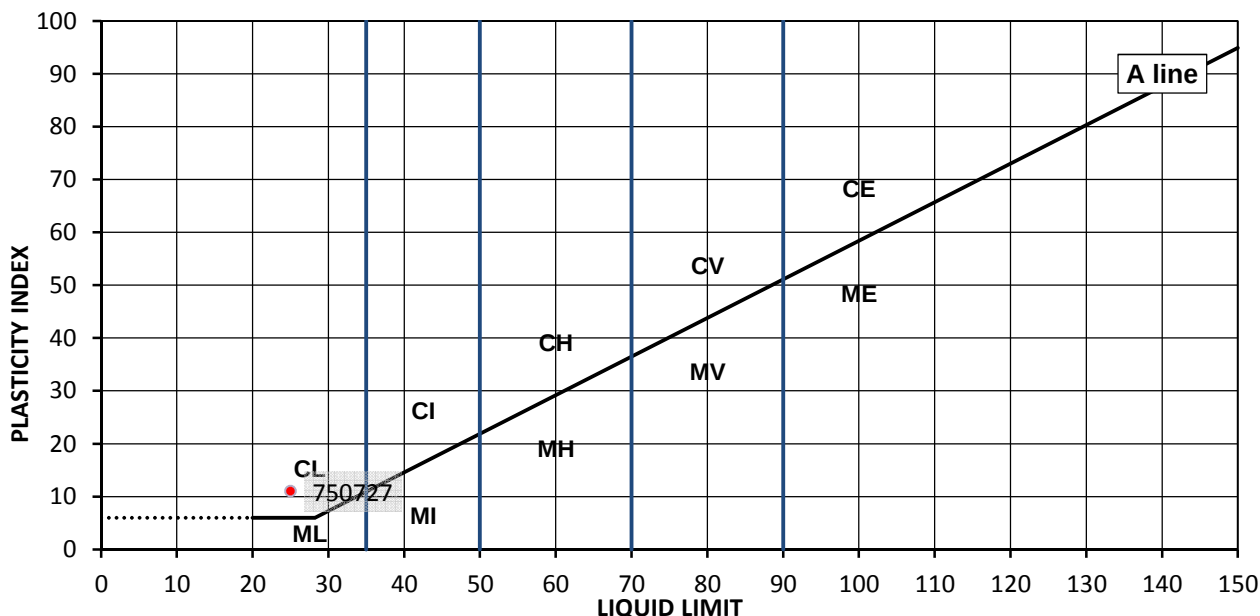
TEST RESULTS

Laboratory Reference: 750727
Sample Reference: Not Given

Description: Dark brown very sandy CLAY
Location: BH02
Sample Preparation: Tested in natural condition

Sample Type: D
Depth Top [m]: 1.2
Depth Base [m]: 1.65

As Received Moisture Content [%]	Liquid Limit [%]	Plastic Limit [%]	Plasticity Index [%]	% Passing 425µm BS Test Sieve
22	25	14	11	100



Legend, based on BS 5930:2015 Code of practice for site investigations

	Plasticity	Liquid Limit
C	Clay	below 35
M	Silt	35 to 50
	L	Low
	I	Medium
	H	High
	V	Very high
	E	Extremely high
		exceeding 90
Organic	O	append to classification for organic material (eg CHO)

Remarks

Approved:

Signed:

Dariusz Piotrowski
PL Laboratory
Manager Geotechnical
Section
Date Reported: 30/05/2017

Piotrowski

Sushil Sharda
Technical Manager
(Geotechnical Division)

S Sharda

for and on behalf of i2 Analytical Ltd

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TEST CERTIFICATE

Determination of Liquid and Plastic Limits

i2 Analytical Ltd
7 Woodshots Meadow
Croxley Green Business Park
Watford Herts WD18 8YS



Tested in Accordance with BS1377-2: 1990: Clause 4.4 & 5: One Point Method

Client: BWB Consulting Limited
Client Address: Whitehall Waterfront
2 Riverside Way
Leeds
LS1 4EH
Contact: Luke McFadden
Site Name: Plot L, Rochdale
Site Address: Not Given

Client Reference: NTT2589
Job Number: 17-48680
Date Sampled: 09/05/2017
Date Received: 12/05/2017
Date Tested: 24/05/2017
Sampled By: Not Given

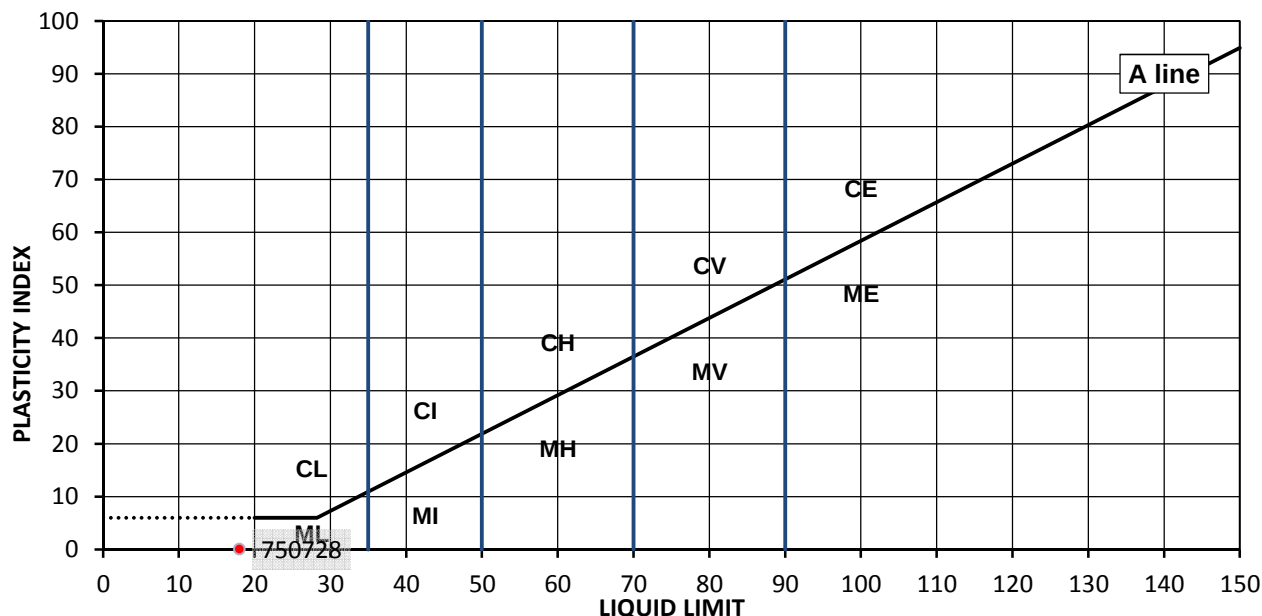
TEST RESULTS

Laboratory Reference: 750728
Sample Reference: Not Given

Description: Brown slightly clayey SAND
Location: BH01
Sample Preparation: Tested in natural condition

Sample Type: D
Depth Top [m]: 2
Depth Base [m]: 2.45

As Received Moisture Content [%]	Liquid Limit [%]	Plastic Limit [%]	Plasticity Index [%]	% Passing 425µm BS Test Sieve
15	18	NP*	NA*	100



Legend, based on BS 5930:2015 Code of practice for site investigations

	Plasticity	Liquid Limit
C	Clay	below 35
M	Silt	35 to 50
	L Low	50 to 70
	I Medium	70 to 90
	H High	exceeding 90
	V Very high	
	E Extremely high	
Organic	O	append to classification for organic material (eg CHO)

Remarks * NP – non plastic; NA – non applicable for test.

Approved:

Signed:

Dariusz Piotrowski
PL Laboratory
Manager Geotechnical
Section
Date Reported: 30/05/2017

Sushil Sharda
Technical Manager
(Geotechnical Division)

for and on behalf of i2 Analytical Ltd

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TEST CERTIFICATE

Summary of Classification Test Results

i2 Analytical Ltd
7 Woodshots Meadow
Croxley Green Business Park
Watford Herts WD18 8YS



Client: BWB Consulting Limited
Client Address: Whitehall Waterfront
2 Riverside Way
Leeds
LS1 4EH
Contact: Luke McFadden
Site Name: Plot L, Rochdale
Site Address: Not Given

Client Reference: NTT2589
Job Number: 17-48680
Date Sampled: 09/05 - 11/05/2017
Date Received: 12/05/2017
Date Tested: 25/04 - 24/05/2017
Sampled By: Not Given

Test results

Laboratory Reference	Hole No.	Sample				Soil Description	Density		M/C	Atterberg				PD
		Reference	Top depth [m]	Base depth [m]	Type		bulk	dry		% Passing 425um	LL	PL	PI	
							Mg/m3	Mg/m3		%	%	%	%	%
750728	BH01	Not Given	2.00	2.45	D	Brown slightly clayey SAND			15	100	18	NP*	NA*	
750726	BH01	Not Given	6.90	Not Given	D	Brown slightly sandy CLAY			25	100	47	21	26	
750727	BH02	Not Given	1.20	1.65	D	Dark brown very sandy CLAY			22	100	25	14	11	
750725	TP01A	Not Given	3.00	3.10	B	Brown slightly gravelly sandy CLAY			14	96	25	13	12	
750718	TP04	Not Given	2.70	2.80	B	Brown slightly gravelly very clayey SAND			15	97	18	NP*	NA*	
750717	TP05	Not Given	1.30	1.40	B	Brown slightly gravelly very clayey SAND			15	96	17	NP*	NA*	
750712	TP11	Not Given	1.20	1.30	B	Brown very clayey SAND			26	98	27	17	10	

Comments: * NP – non plastic; NA – non applicable for test.

Approved:

Dariusz Piotrowski
PL Laboratory Manager
Geotechnical Section

Date Reported: 31/05/2017

Signed:

Sushil Sharda
Technical Manager (Geotechnical
Division)

for and on behalf of i2 Analytical Ltd

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The analysis was carried out at i2 Analytical Limited, ul. Pionierow 39, 41-711 Ruda Slaska, Poland.*



4041

TEST CERTIFICATE**Determination of Particle Size Distribution**

Tested in Accordance with BS1377:Part 2:1990, clauses 9.2 and 9.5

i2 Analytical Ltd
7 Woodshots Meadow
Croxley Green Business Park
Watford Herts WD18 8YS



Client: BWB Consulting Limited
Client Address: Whitehall Waterfront
2 Riverside Way
Leeds
LS1 4EH
Contact: Luke McFadden
Site Name: Plot L, Rochdale
Site Address: Not Given

Client Reference: NTT2589
Job Number: 17-48680
Date Sampled: 09/05/2017
Date Received: 12/05/2017
Date Tested: 25/05/2017
Sampled By: Not Given

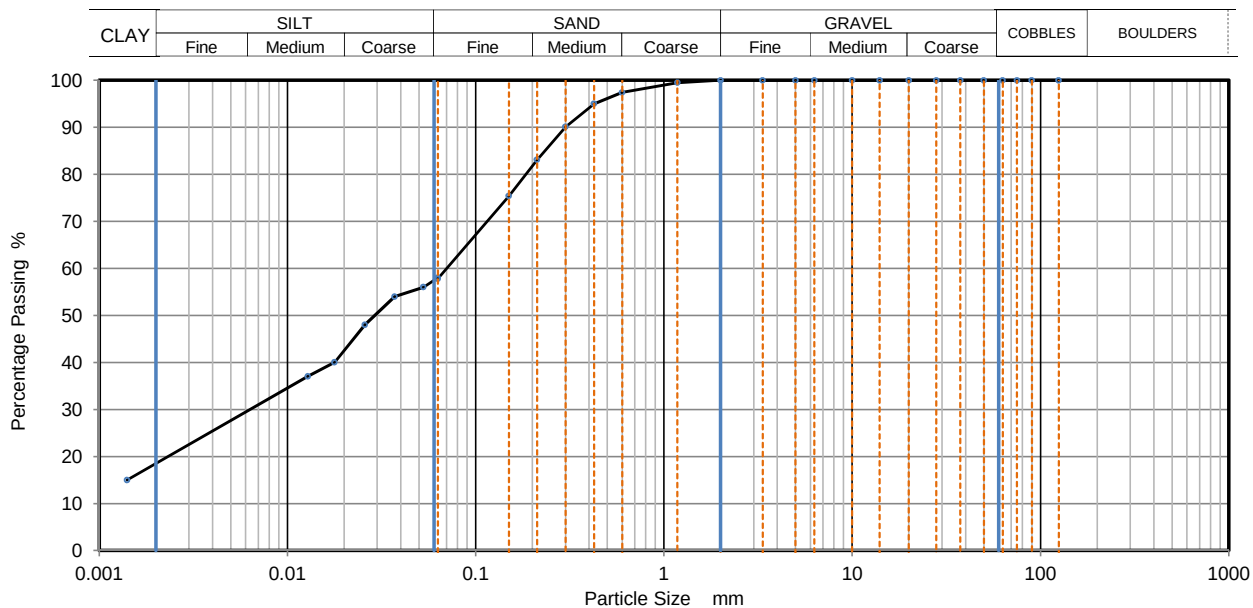
TEST RESULTS

Sample description: Brown sandy CLAY
Location: TP11
Supplier: Not Given

Laboratory Reference: 750708

Sample Reference: Not Given

Sample Type: D
Depth Top [m]: 1.8
Depth Base [m]: 1.9



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
125	100	0.0630	58
90	100	0.0529	56
75	100	0.0372	54
63	100	0.0258	48
50	100	0.0178	40
37.5	100	0.0128	37
28	100	0.0014	15
20	100		
14	100		
10	100		
6.3	100		
5	100		
3.35	100		
2	100		
1.18	100		
0.6	97	Particle density (assumed) 2.65 Mg/m3	
0.425	95		
0.3	90		
0.212	83		
0.15	75		
0.063	58		

Dry Mass of sample [g]: 147

Sample Proportions	% dry mass
Very coarse	0.00
Gravel	0.00
Sand	42.20
Silt	39.00
Clay	18.80

Grading Analysis	
D100	mm 2
D60	mm 0.0701
D30	mm 0.00644
D10	mm
Uniformity Coefficient	
Curvature Coefficient	

Remarks
Preparation and testing in accordance with BS1377 unless noted below

Approved:

Signed:

Dariusz Piotrowski
PL Laboratory Manager
Geotechnical Section

Sushil Sharda
Technical Manager
(Geotechnical Division)

Date Reported: 31/05/2017

for and on behalf of i2 Analytical Ltd

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TEST CERTIFICATE**Determination of Particle Size Distribution**

Tested in Accordance with BS1377:Part 2:1990, clauses 9.2 and 9.5

i2 Analytical Ltd
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Watford Herts WD18 8YS



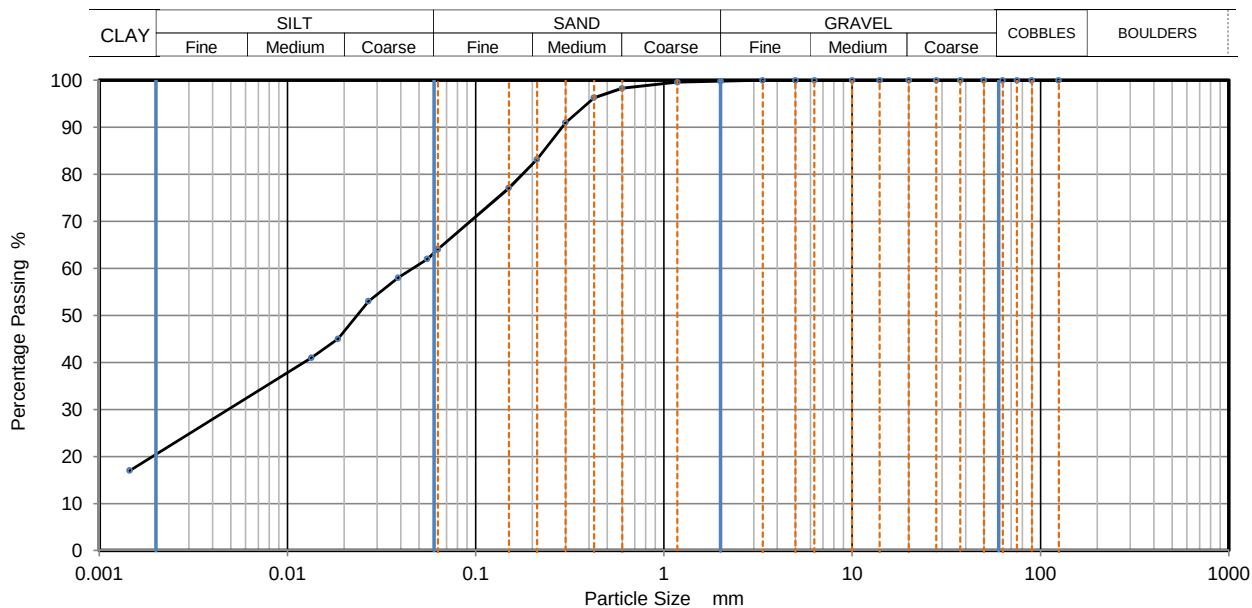
Client: BWB Consulting Limited
Client Address: Whitehall Waterfront
2 Riverside Way
Leeds
LS1 4EH
Contact: Luke McFadden
Site Name: Plot L, Rochdale
Site Address: Not Given

Client Reference: NTT2589
Job Number: 17-48680
Date Sampled: 09/05/2017
Date Received: 12/05/2017
Date Tested: 25/05/2017
Sampled By: Not Given

TEST RESULTS

Laboratory Reference: 750709
Sample description: Brownish grey sandy CLAY
Location: TP12
Supplier: Not Given

Sample Reference: Not Given
Sample Type: D
Depth Top [m]: 1.2
Depth Base [m]: 1.3



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
125	100	0.0630	64
90	100	0.0554	62
75	100	0.0388	58
63	100	0.0269	53
50	100	0.0186	45
37.5	100	0.0134	41
28	100	0.0015	17
20	100		
14	100		
10	100		
6.3	100		
5	100		
3.35	100		
2	100		
1.18	100		
0.6	98	Particle density (assumed) 2.65 Mg/m ³	
0.425	96		
0.3	91		
0.212	83		
0.15	77		
0.063	64		

Dry Mass of sample [g]: 204

Sample Proportions	% dry mass
Very coarse	0.00
Gravel	0.20
Sand	35.70
Silt	43.60
Clay	20.50

Grading Analysis	
D100	mm 5
D60	mm 0.0449
D30	mm 0.00474
D10	mm
Uniformity Coefficient	
Curvature Coefficient	

Remarks
Preparation and testing in accordance with BS1377 unless noted below

Approved:

Dariusz Piotrowski
PL Laboratory Manager
Geotechnical Section

Signed:

Sushil Sharda
Technical Manager
(Geotechnical Division)

Date Reported: 31/05/2017

for and on behalf of i2 Analytical Ltd

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TEST CERTIFICATE**Determination of Particle Size Distribution**

Tested in Accordance with BS1377:Part 2:1990, clauses 9.2 and 9.5

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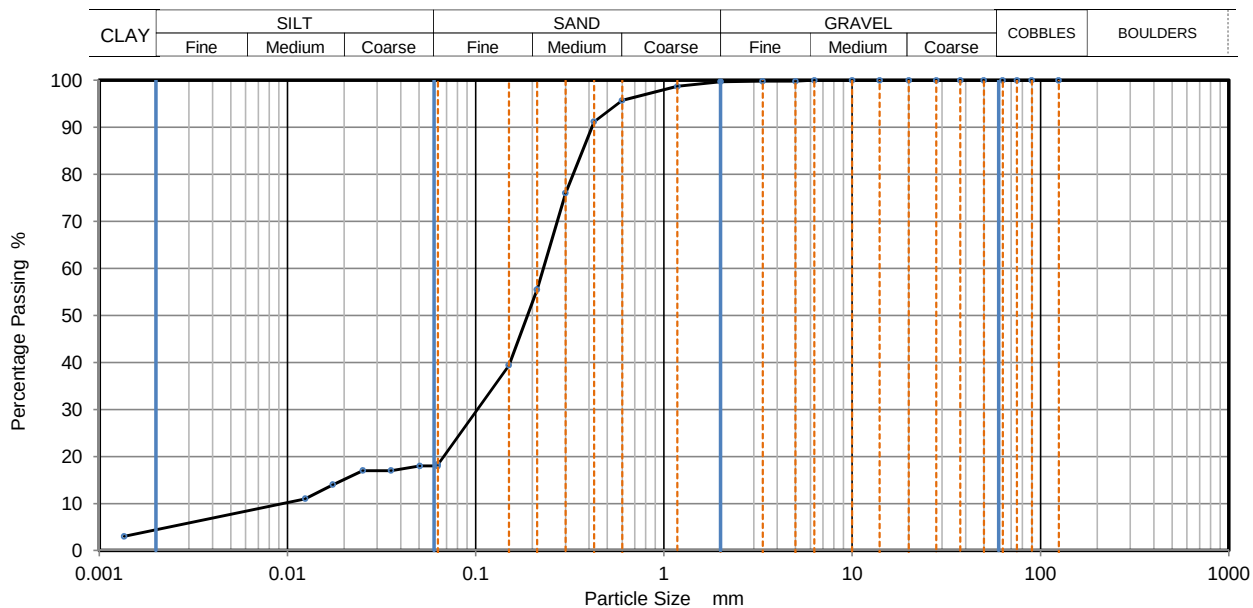
Client: BWB Consulting Limited
Client Address: Whitehall Waterfront
2 Riverside Way
Leeds
LS1 4EH
Contact: Luke McFadden
Site Name: Plot L, Rochdale
Site Address: Not Given

Client Reference: NTT2589
Job Number: 17-48680
Date Sampled: 10/05/2017
Date Received: 12/05/2017
Date Tested: 25/05/2017
Sampled By: Not Given

TEST RESULTS

Laboratory Reference: 750710
Sample description: Dark brown clayey SAND
Location: TP15
Supplier: Not Given

Sample Reference: Not Given
Sample Type: D
Depth Top [m]: 1.9
Depth Base [m]: 2



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
125	100	0.0630	18
90	100	0.0506	18
75	100	0.0356	17
63	100	0.0252	17
50	100	0.0174	14
37.5	100	0.0125	11
28	100	0.0014	3
20	100		
14	100		
10	100		
6.3	100		
5	100		
3.35	100		
2	100		
1.18	99		
0.6	96	Particle density (assumed) 2.65 Mg/m3	
0.425	91		
0.3	76		
0.212	56		
0.15	39		
0.063	18		

Dry Mass of sample [g]: 138

Sample Proportions	% dry mass
Very coarse	0.00
Gravel	0.30
Sand	81.40
Silt	13.80
Clay	4.50

Grading Analysis	
D100	mm 6.3
D60	mm 0.229
D30	mm 0.102
D10	mm 0.00903
Uniformity Coefficient	25
Curvature Coefficient	5

Remarks

Preparation and testing in accordance with BS1377 unless noted below

Approved:

Dariusz Piotrowski
PL Laboratory Manager
Geotechnical Section

Signed:

Sushil Sharda
Technical Manager
(Geotechnical Division)

Date Reported: 31/05/2017

for and on behalf of i2 Analytical Ltd

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TEST CERTIFICATE**Determination of Particle Size Distribution**

i2 Analytical Ltd
7 Woodshots Meadow
Croxley Green Business Park
Watford Herts WD18 8YS



Tested in Accordance with BS1377:Part 2:1990, clause 9.2

Client: BWB Consulting Limited
Client Address: Whitehall Waterfront
2 Riverside Way
Leeds
LS1 4EH

Client Reference: NTT2589
Job Number: 17-48680
Date Sampled: 09/05/2017
Date Received: 12/05/2017
Date Tested: 25/05/2017
Sampled By: Not Given

Contact: Luke McFadden
Site Name: Plot L, Rochdale
Site Address: Not Given

TEST RESULTS

Laboratory Reference: 750711

Sample Reference: Not Given

Sample description: Brown clayey very sandy GRAVEL with cobbles

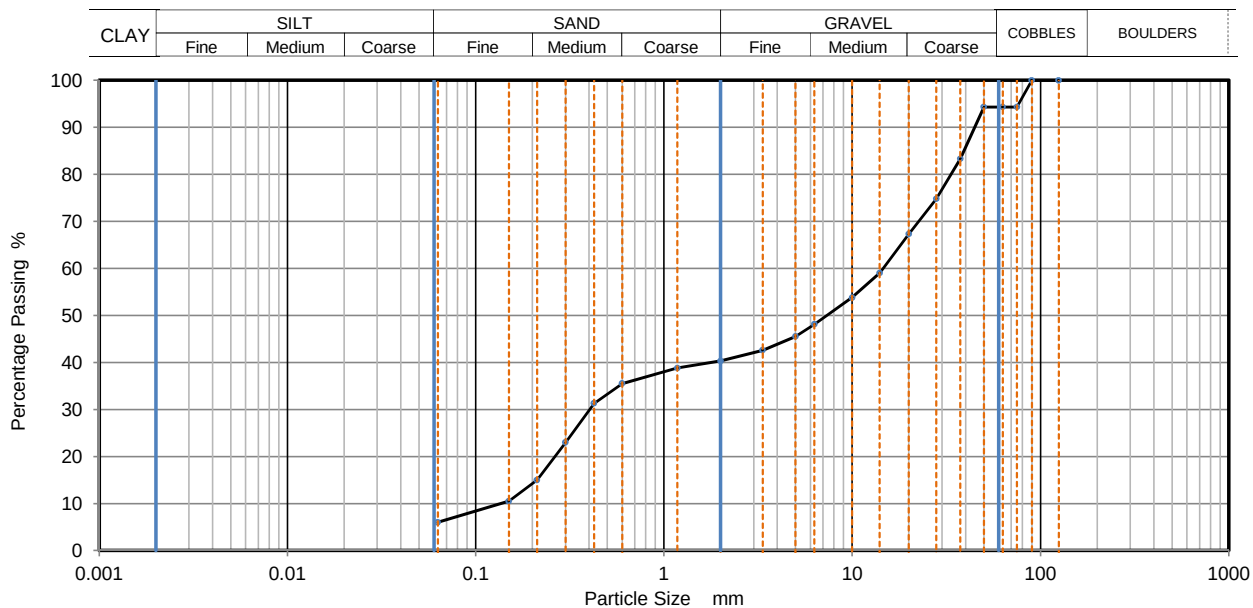
Sample Type: B

Location: TP13

Depth Top [m]: 2.6

Supplier: Not Given

Depth Base [m]: 2.7



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
125	100		
90	100		
75	94		
63	94		
50	94		
37.5	83		
28	75		
20	67		
14	59		
10	54		
6.3	48		
5	46		
3.35	43		
2	40		
1.18	39		
0.6	36		
0.425	31		
0.3	23		
0.212	15		
0.15	11		
0.063	6		

Dry Mass of sample [g]: 9475

Sample Proportions	% dry mass
Very coarse	5.70
Gravel	54.00
Sand	34.40
Fines <0.063mm	6.00

Grading Analysis	
D100	mm 90
D60	mm 14.6
D30	mm 0.402
D10	mm 0.137
Uniformity Coefficient	110
Curvature Coefficient	0.081

Remarks

Preparation and testing in accordance with BS1377 unless noted below
The material submitted, fails to meet the minimum mass requirements as stated in BS1377 Part 2 Table 3

Approved:

Signed:

Dariusz Piotrowski
PL Laboratory Manager
Geotechnical Section

Sushil Sharda
Technical Manager
(Geotechnical Division)

Date Reported: 31/05/2017

for and on behalf of i2 Analytical Ltd

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TEST CERTIFICATE**Determination of Particle Size Distribution**

Tested in Accordance with BS1377:Part 2:1990, clauses 9.2 and 9.5

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



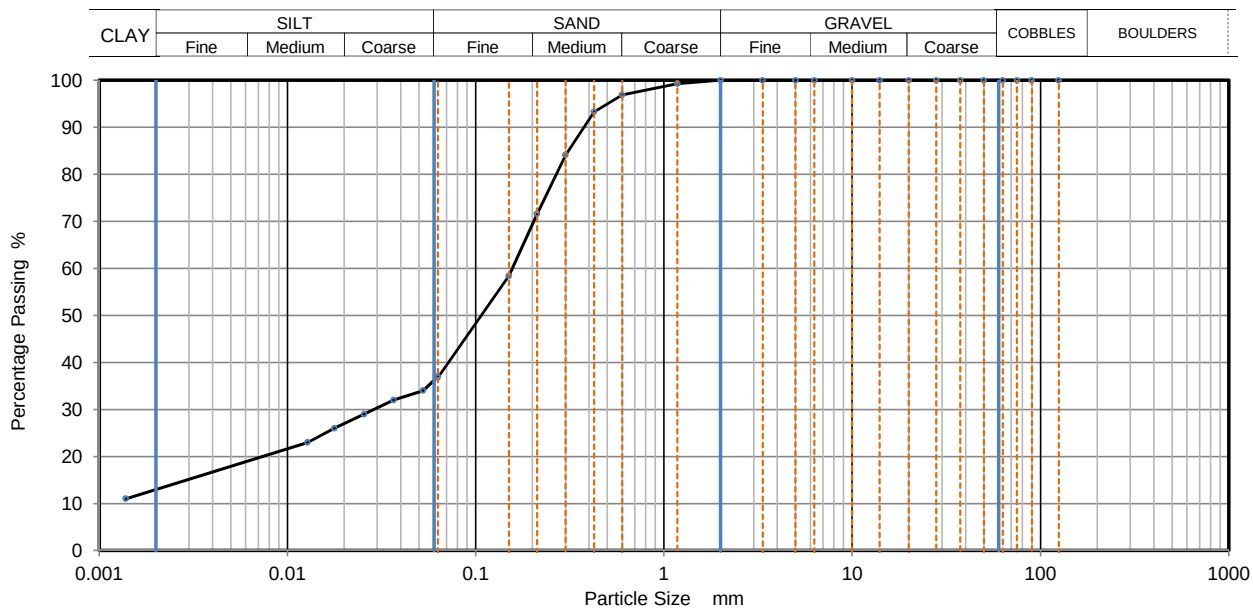
Client: BWB Consulting Limited
Client Address: Whitehall Waterfront
2 Riverside Way
Leeds
LS1 4EH
Contact: Luke McFadden
Site Name: Plot L, Rochdale
Site Address: Not Given

Client Reference: NTT2589
Job Number: 17-48680
Date Sampled: 09/05/2017
Date Received: 12/05/2017
Date Tested: 25/05/2017
Sampled By: Not Given

TEST RESULTS

Laboratory Reference: 750712
Sample description: Brown very clayey SAND
Location: TP11
Supplier: Not Given

Sample Reference: Not Given
Sample Type: B
Depth Top [m]: 1.2
Depth Base [m]: 1.3



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
125	100	0.0630	37
90	100	0.0525	34
75	100	0.0367	32
63	100	0.0256	29
50	100	0.0178	26
37.5	100	0.0128	23
28	100	0.0014	11
20	100		
14	100		
10	100		
6.3	100		
5	100		
3.35	100		
2	100		
1.18	99		
0.6	97	Particle density (assumed) 2.65 Mg/m3	
0.425	93		
0.3	84		
0.212	72		
0.15	58		
0.063	37		

Dry Mass of sample [g]: 318

Sample Proportions	% dry mass
Very coarse	0.00
Gravel	0.00
Sand	63.20
Silt	23.70
Clay	13.10

Grading Analysis	
D100	mm 2
D60	mm 0.156
D30	mm 0.0278
D10	mm
Uniformity Coefficient	
Curvature Coefficient	

Remarks
Preparation and testing in accordance with BS1377 unless noted below

Approved:

Dariusz Piotrowski
PL Laboratory Manager
Geotechnical Section

Signed:

Sushil Sharda
Technical Manager
(Geotechnical Division)

Date Reported: 31/05/2017

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TEST CERTIFICATE**Determination of Particle Size Distribution**

i2 Analytical Ltd
7 Woodshots Meadow
Croxley Green Business Park
Watford Herts WD18 8YS



Tested in Accordance with BS1377:Part 2:1990, clause 9.2

Client: BWB Consulting Limited
Client Address: Whitehall Waterfront
2 Riverside Way
Leeds
LS1 4EH

Client Reference: NTT2589
Job Number: 17-48680
Date Sampled: 09/05/2017
Date Received: 12/05/2017
Date Tested: 25/05/2017
Sampled By: Not Given

Contact: Luke McFadden
Site Name: Plot L, Rochdale
Site Address: Not Given

TEST RESULTS

Laboratory Reference: 750713

Sample Reference: Not Given

Sample description: Brown slightly gravelly very clayey SAND

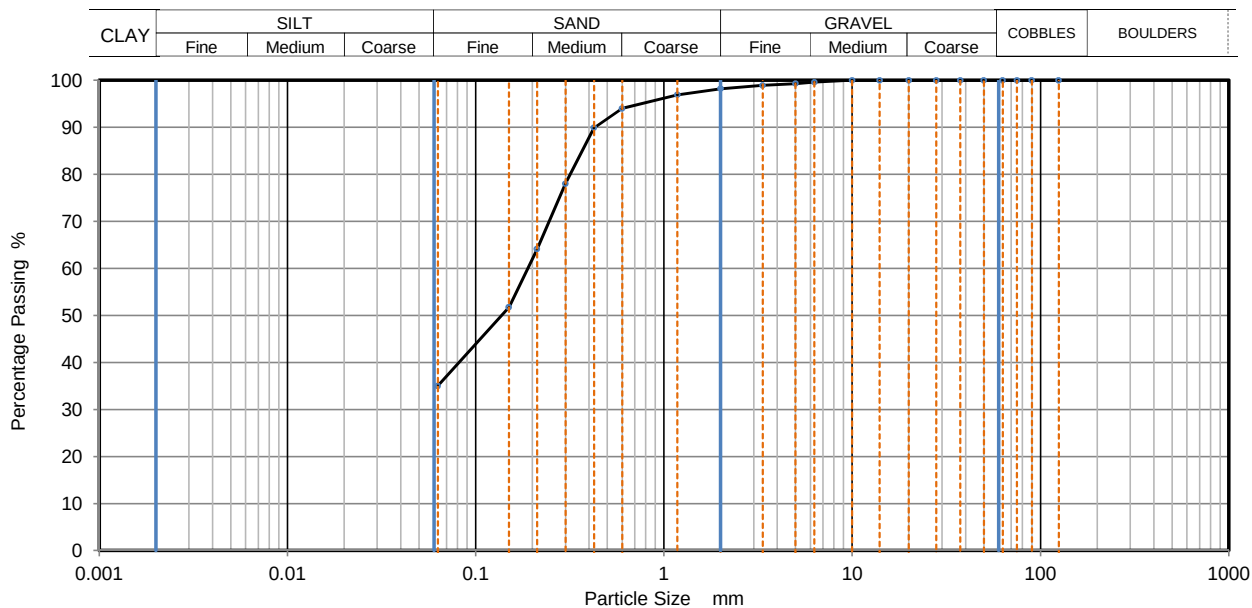
Sample Type: D

Location: TP10

Depth Top [m]: 3.7

Supplier: Not Given

Depth Base [m]: 3.8



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
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	99		
3.35	99		
2	98		
1.18	97		
0.6	94		
0.425	90		
0.3	78		
0.212	64		
0.15	52		
0.063	35		

Dry Mass of sample [g]: 240

Sample Proportions	% dry mass
Very coarse	0.00
Gravel	1.80
Sand	63.20
Fines <0.063mm	35.00

Grading Analysis	
D100	mm
D60	mm
D30	mm
D10	mm
Uniformity Coefficient	
Curvature Coefficient	

Remarks

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Approved:

Signed:

Dariusz Piotrowski
PL Laboratory Manager
Geotechnical Section

Sushil Sharda
Technical Manager
(Geotechnical Division)

Date Reported: 31/05/2017

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TEST CERTIFICATE**Determination of Particle Size Distribution**

i2 Analytical Ltd
7 Woodshots Meadow
Croxley Green Business Park
Watford Herts WD18 8YS



Tested in Accordance with BS1377:Part 2:1990, clause 9.2

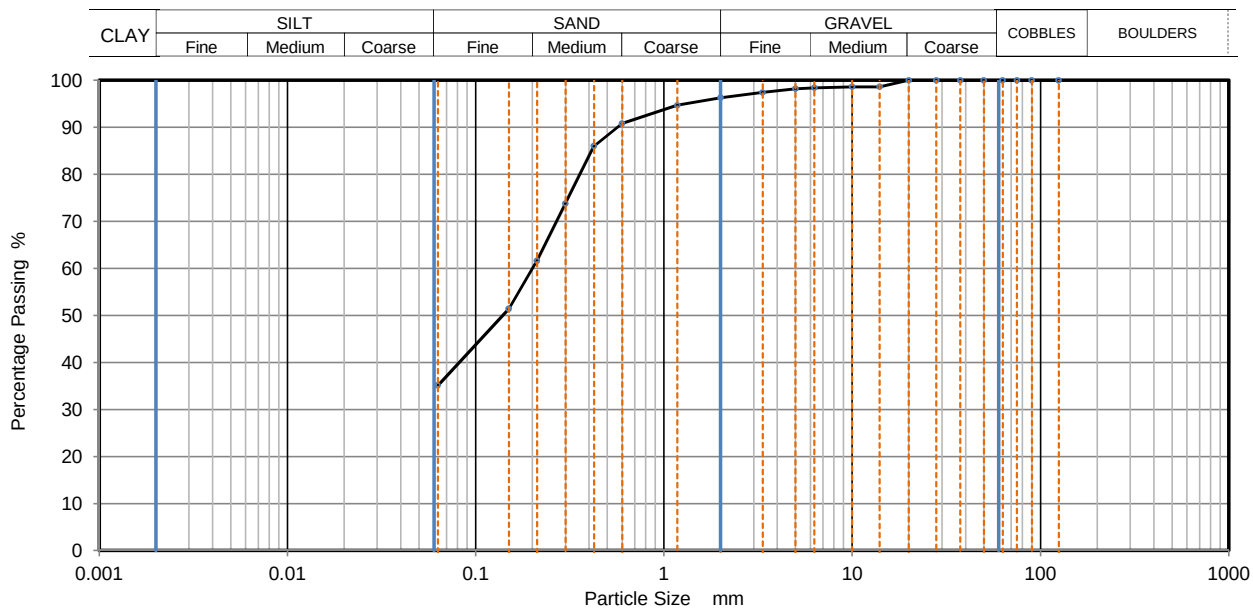
Client: BWB Consulting Limited
Client Address: Whitehall Waterfront
2 Riverside Way
Leeds
LS1 4EH
Contact: Luke McFadden
Site Name: Plot L, Rochdale
Site Address: Not Given

Client Reference: NTT2589
Job Number: 17-48680
Date Sampled: 11/05/2017
Date Received: 12/05/2017
Date Tested: 25/05/2017
Sampled By: Not Given

TEST RESULTS

Laboratory Reference: 750715
Sample description: Brown slightly gravelly very clayey SAND
Location: TP07
Supplier: Not Given

Sample Reference: Not Given
Sample Type: D
Depth Top [m]: 0.5
Depth Base [m]: 0.6



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
125	100		
90	100		
75	100		
63	100		
50	100		
37.5	100		
28	100		
20	100		
14	99		
10	99		
6.3	98		
5	98		
3.35	97		
2	96		
1.18	95		
0.6	91		
0.425	86		
0.3	74		
0.212	62		
0.15	51		
0.063	35		

Dry Mass of sample [g]: 1378

Sample Proportions	% dry mass
Very coarse	0.00
Gravel	3.70
Sand	61.20
Fines <0.063mm	35.10

Grading Analysis	
D100	mm 20
D60	mm 0.201
D30	mm
D10	mm
Uniformity Coefficient	
Curvature Coefficient	

Remarks

Preparation and testing in accordance with BS1377 unless noted below

Approved:

Dariusz Piotrowski
PL Laboratory Manager
Geotechnical Section

Signed:

Sushil Sharda
Technical Manager
(Geotechnical Division)

Date Reported: 31/05/2017

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TEST CERTIFICATE**Determination of Particle Size Distribution**

i2 Analytical Ltd
7 Woodshots Meadow
Croxley Green Business Park
Watford Herts WD18 8YS



Tested in Accordance with BS1377:Part 2:1990, clause 9.2

Client: BWB Consulting Limited
Client Address: Whitehall Waterfront
2 Riverside Way
Leeds
LS1 4EH

Client Reference: NTT2589
Job Number: 17-48680
Date Sampled: 11/05/2017
Date Received: 12/05/2017
Date Tested: 25/05/2017
Sampled By: Not Given

Contact: Luke McFadden
Site Name: Plot L, Rochdale
Site Address: Not Given

TEST RESULTS

Laboratory Reference: 750716

Sample Reference: Not Given

Sample description: Brown gravelly very clayey SAND

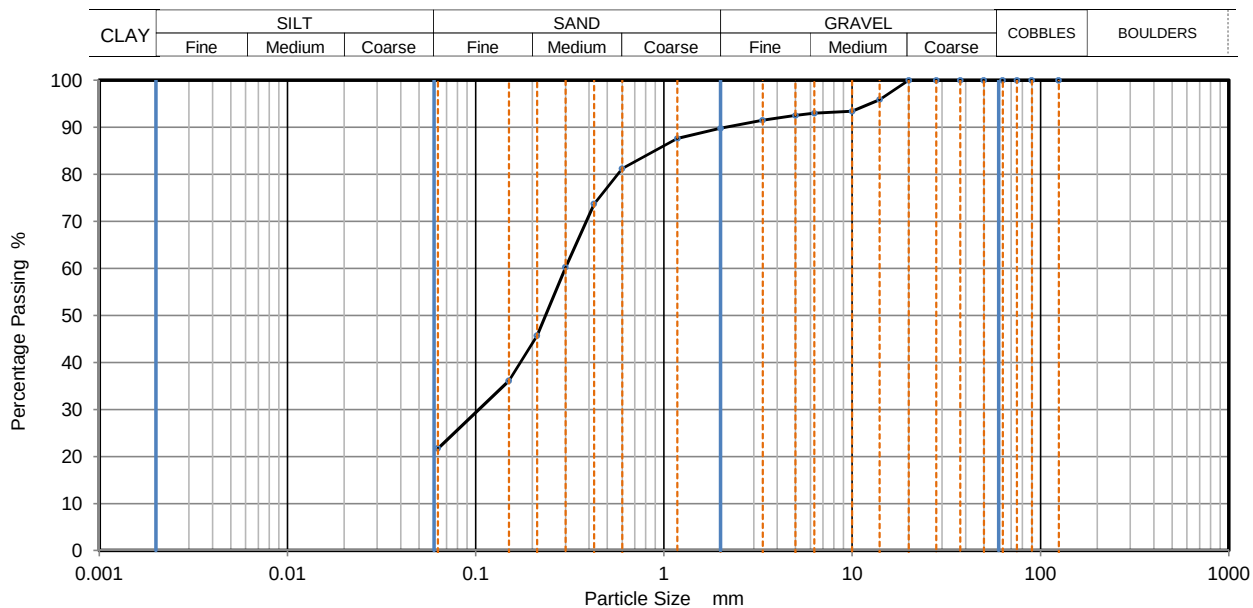
Sample Type: D

Location: TP06

Depth Top [m]: 1.2

Supplier: Not Given

Depth Base [m]: 1.3



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
125	100		
90	100		
75	100		
63	100		
50	100		
37.5	100		
28	100		
20	100		
14	96		
10	93		
6.3	93		
5	93		
3.35	92		
2	90		
1.18	88		
0.6	81		
0.425	74		
0.3	60		
0.212	46		
0.15	36		
0.063	22		

Dry Mass of sample [g]: 367

Sample Proportions	% dry mass
Very coarse	0.00
Gravel	10.20
Sand	68.10
Fines <0.063mm	21.70

Grading Analysis	
D100	mm 20
D60	mm 0.298
D30	mm 0.104
D10	mm
Uniformity Coefficient	
Curvature Coefficient	

Remarks

Preparation and testing in accordance with BS1377 unless noted below

Approved:

Signed:

Dariusz Piotrowski
PL Laboratory Manager
Geotechnical Section

Sushil Sharda
Technical Manager
(Geotechnical Division)

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TEST CERTIFICATE**Determination of Particle Size Distribution**

Tested in Accordance with BS1377:Part 2:1990, clauses 9.2 and 9.5

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



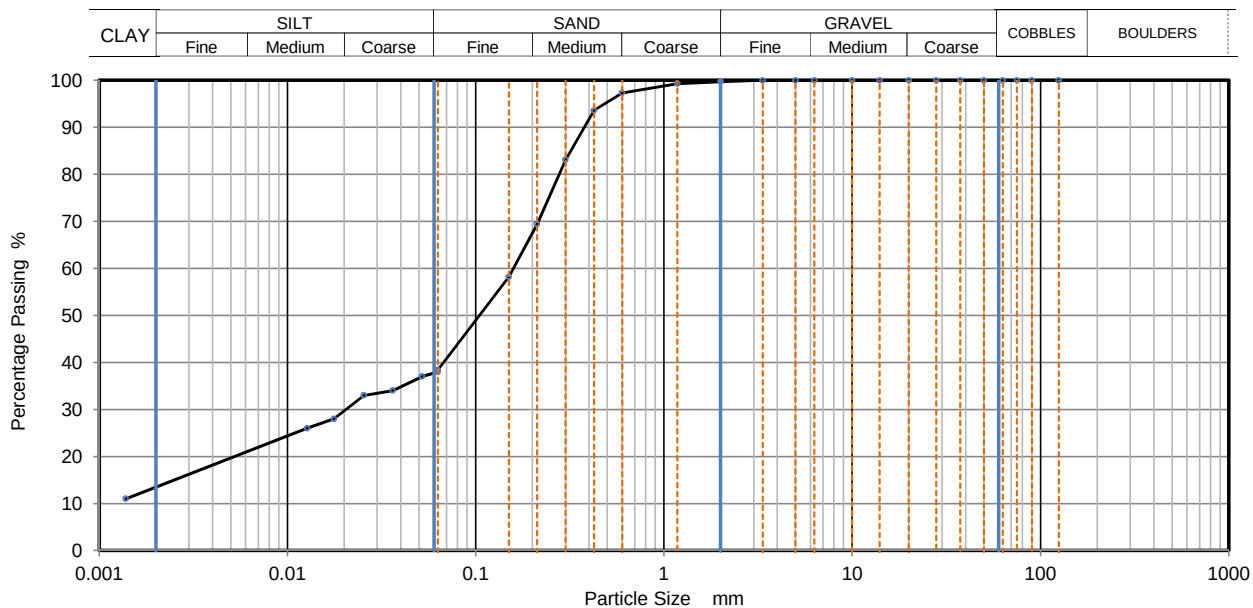
Client: BWB Consulting Limited
Client Address: Whitehall Waterfront
2 Riverside Way
Leeds
LS1 4EH
Contact: Luke McFadden
Site Name: Plot L, Rochdale
Site Address: Not Given

Client Reference: NTT2589
Job Number: 17-48680
Date Sampled: 11/05/2017
Date Received: 12/05/2017
Date Tested: 25/05/2017
Sampled By: Not Given

TEST RESULTS

Laboratory Reference: 750717
Sample description: Brown slightly gravelly very clayey SAND
Location: TP05
Supplier: Not Given

Sample Reference: Not Given
Sample Type: B
Depth Top [m]: 1.3
Depth Base [m]: 1.4



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
125	100	0.0630	38
90	100	0.0519	37
75	100	0.0363	34
63	100	0.0255	33
50	100	0.0177	28
37.5	100	0.0127	26
28	100	0.0014	11
20	100		
14	100		
10	100		
6.3	100		
5	100		
3.35	100		
2	100		
1.18	99		
0.6	97	Particle density (assumed) 2.65 Mg/m ³	
0.425	94		
0.3	83		
0.212	69		
0.15	58		
0.063	38		

Dry Mass of sample [g]: 384

Sample Proportions	% dry mass
Very coarse	0.00
Gravel	0.30
Sand	61.30
Silt	24.70
Clay	13.70

Grading Analysis	
D100	mm 5
D60	mm 0.159
D30	mm 0.0202
D10	mm
Uniformity Coefficient	
Curvature Coefficient	

Remarks
Preparation and testing in accordance with BS1377 unless noted below

Approved:

Dariusz Piotrowski
PL Laboratory Manager
Geotechnical Section

Signed:

Sushil Sharda
Technical Manager
(Geotechnical Division)

Date Reported: 31/05/2017

for and on behalf of i2 Analytical Ltd

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TEST CERTIFICATE**Determination of Particle Size Distribution**

Tested in Accordance with BS1377:Part 2:1990, clauses 9.2 and 9.5

i2 Analytical Ltd
7 Woodshots Meadow
Croxley Green Business Park
Watford Herts WD18 8YS



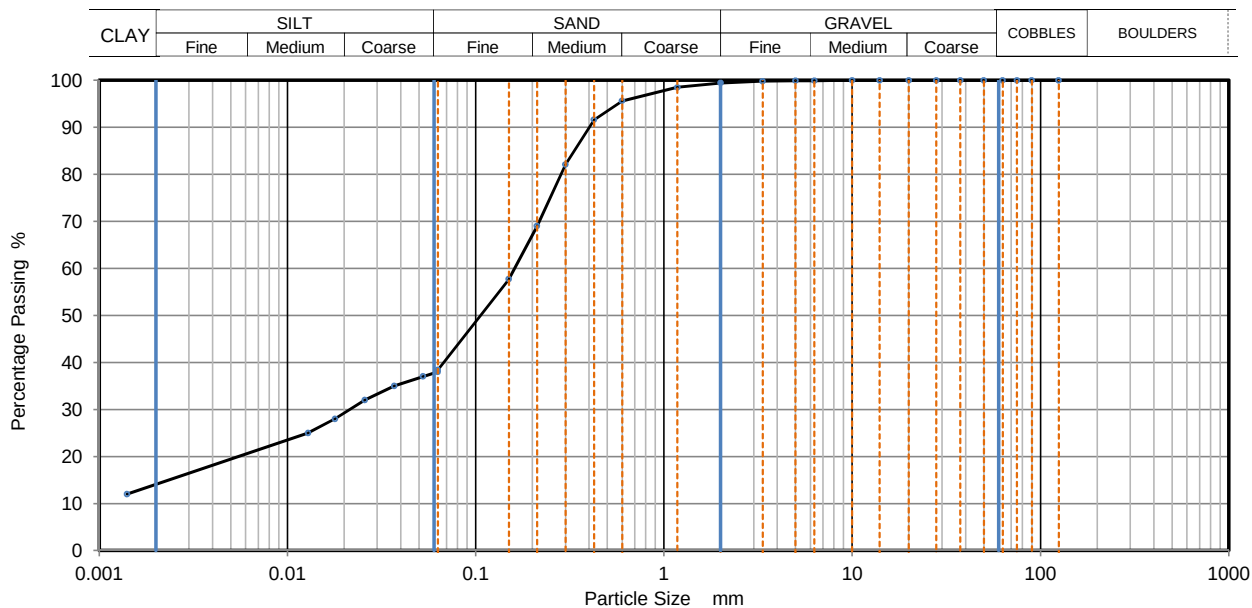
Client: BWB Consulting Limited
Client Address: Whitehall Waterfront
2 Riverside Way
Leeds
LS1 4EH
Contact: Luke McFadden
Site Name: Plot L, Rochdale
Site Address: Not Given

Client Reference: NTT2589
Job Number: 17-48680
Date Sampled: 09/05/2017
Date Received: 12/05/2017
Date Tested: 25/05/2017
Sampled By: Not Given

TEST RESULTS

Laboratory Reference: 750718
Sample description: Brown slightly gravelly very clayey SAND
Location: TP04
Supplier: Not Given

Sample Reference: Not Given
Sample Type: B
Depth Top [m]: 2.7
Depth Base [m]: 2.8



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
125	100	0.0630	38
90	100	0.0526	37
75	100	0.0369	35
63	100	0.0258	32
50	100	0.0179	28
37.5	100	0.0129	25
28	100	0.0014	12
20	100		
14	100		
10	100		
6.3	100		
5	100		
3.35	100		
2	99		
1.18	99		
0.6	96	Particle density (assumed) 2.65 Mg/m ³	
0.425	92		
0.3	82		
0.212	69		
0.15	58		
0.063	38		

Dry Mass of sample [g]: 440

Sample Proportions	% dry mass
Very coarse	0.00
Gravel	0.60
Sand	61.00
Silt	24.20
Clay	14.20

Grading Analysis	
D100	mm 10
D60	mm 0.161
D30	mm 0.0216
D10	mm
Uniformity Coefficient	
Curvature Coefficient	

Remarks

Preparation and testing in accordance with BS1377 unless noted below

Approved:

Dariusz Piotrowski
PL Laboratory Manager
Geotechnical Section

Signed:

Sushil Sharda
Technical Manager
(Geotechnical Division)

Date Reported: 31/05/2017

for and on behalf of i2 Analytical Ltd

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4041

TEST CERTIFICATE**Determination of Particle Size Distribution**

i2 Analytical Ltd
7 Woodshots Meadow
Croxley Green Business Park
Watford Herts WD18 8YS



Tested in Accordance with BS1377:Part 2:1990, clause 9.2

Client: BWB Consulting Limited
Client Address: Whitehall Waterfront
2 Riverside Way
Leeds
LS1 4EH

Client Reference: NTT2589
Job Number: 17-48680
Date Sampled: 10/05/2017
Date Received: 12/05/2017
Date Tested: 25/04/2017
Sampled By: Not Given

Contact: Luke McFadden
Site Name: Plot L, Rochdale
Site Address: Not Given

TEST RESULTS

Laboratory Reference: 750720

Sample Reference: Not Given

Sample description: Brown slightly gravelly clayey SAND

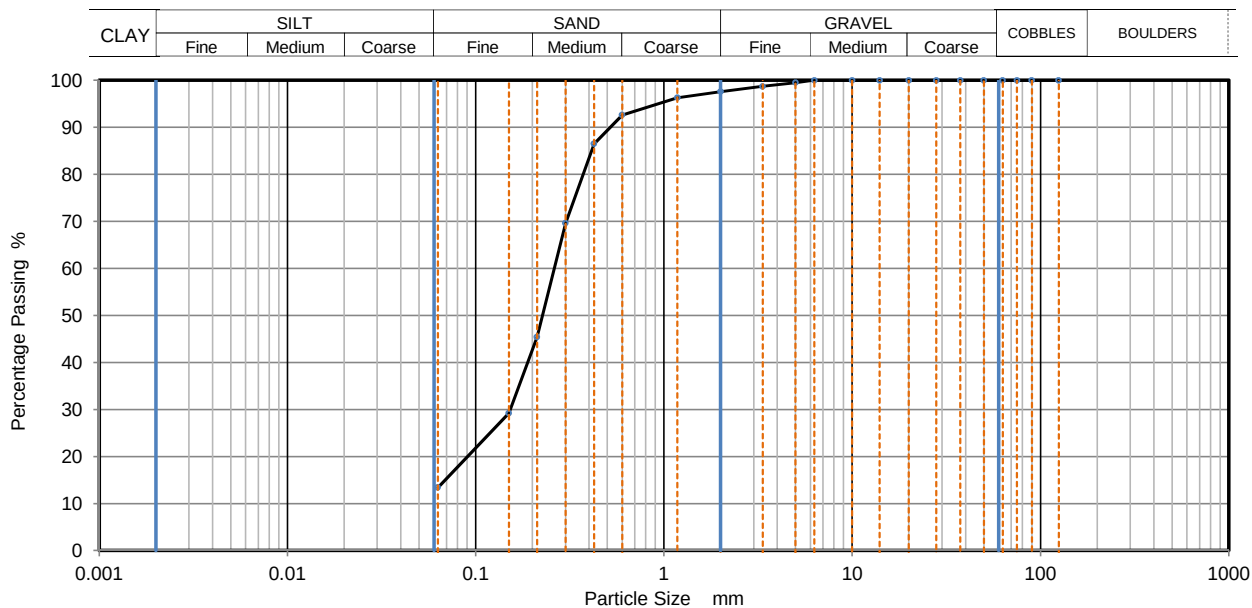
Sample Type: D

Location: BH01

Depth Top [m]: 5

Supplier: Not Given

Depth Base [m]: 5.45



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
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	99		
2	98		
1.18	96		
0.6	93		
0.425	87		
0.3	70		
0.212	45		
0.15	29		
0.063	13		

Dry Mass of sample [g]: 154

Sample Proportions	% dry mass
Very coarse	0.00
Gravel	2.40
Sand	84.10
Fines <0.063mm	13.40

Grading Analysis	
D100	mm 6.3
D60	mm 0.261
D30	mm 0.153
D10	mm
Uniformity Coefficient	
Curvature Coefficient	

Remarks

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Approved:

Signed:

Dariusz Piotrowski
PL Laboratory Manager
Geotechnical Section

Sushil Sharda
Technical Manager
(Geotechnical Division)

Date Reported: 31/05/2017

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TEST CERTIFICATE**Determination of Particle Size Distribution**

i2 Analytical Ltd
7 Woodshots Meadow
Croxley Green Business Park
Watford Herts WD18 8YS



Tested in Accordance with BS1377:Part 2:1990, clause 9.2

Client: BWB Consulting Limited
Client Address: Whitehall Waterfront
2 Riverside Way
Leeds
LS1 4EH

Client Reference: NTT2589
Job Number: 17-48680
Date Sampled: 09/05/2017
Date Received: 12/05/2017
Date Tested: 25/05/2017
Sampled By: Not Given

Contact: Luke McFadden
Site Name: Plot L, Rochdale
Site Address: Not Given

TEST RESULTS

Laboratory Reference: 750721

Sample Reference: Not Given

Sample description: Brown slightly clayey SAND

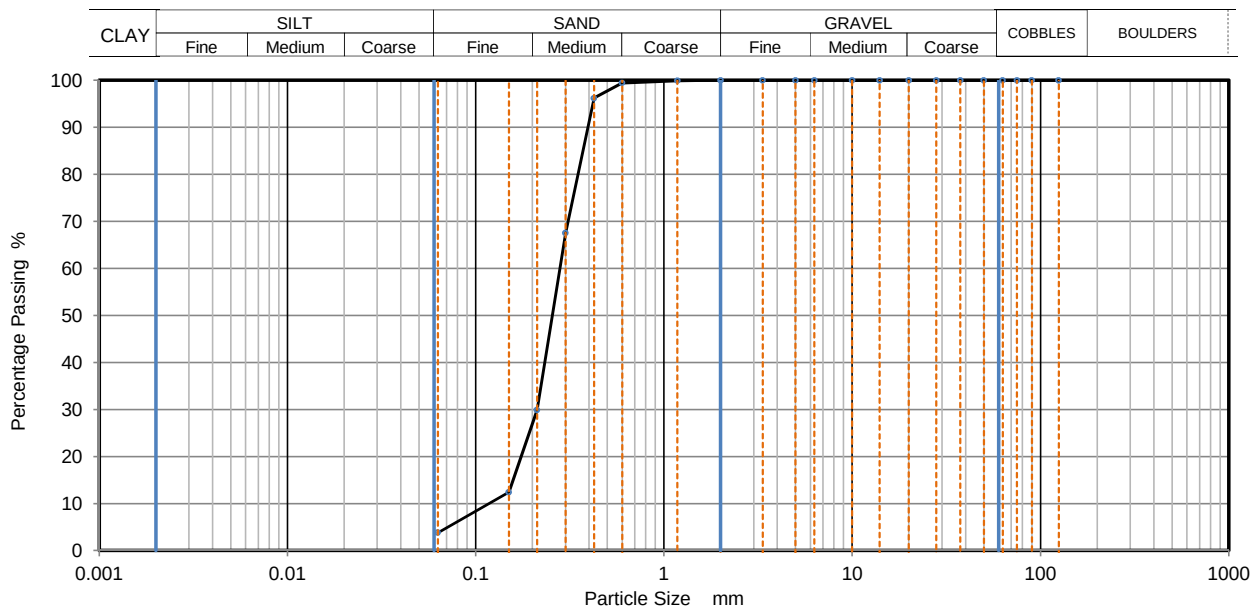
Sample Type: D

Location: BH02

Depth Top [m]: 7.5

Supplier: Not Given

Depth Base [m]: 7.95



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
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	100		
0.6	99		
0.425	96		
0.3	68		
0.212	30		
0.15	12		
0.063	4		

Dry Mass of sample [g]: 194

Sample Proportions	% dry mass
Very coarse	0.00
Gravel	0.00
Sand	96.20
Fines <0.063mm	3.80

Grading Analysis	
D100	mm
D60	mm
D30	mm
D10	mm
Uniformity Coefficient	
Curvature Coefficient	

Remarks

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Approved:

Signed:

Dariusz Piotrowski
PL Laboratory Manager
Geotechnical Section

Sushil Sharda
Technical Manager
(Geotechnical Division)

Date Reported: 31/05/2017

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TEST CERTIFICATE**Determination of Particle Size Distribution**

Tested in Accordance with BS1377:Part 2:1990, clause 9.2

i2 Analytical Ltd
7 Woodshots Meadow
Croxley Green Business Park
Watford Herts WD18 8YS



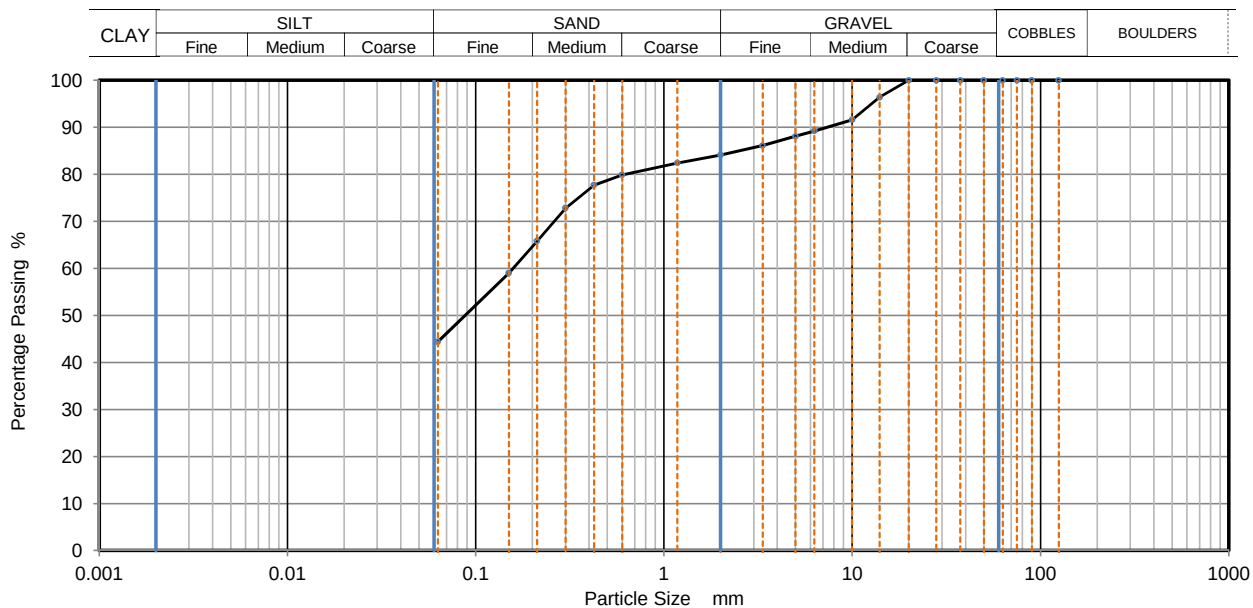
Client: BWB Consulting Limited
Client Address: Whitehall Waterfront
2 Riverside Way
Leeds
LS1 4EH
Contact: Luke McFadden
Site Name: Plot L, Rochdale
Site Address: Not Given

Client Reference: NTT2589
Job Number: 17-48680
Date Sampled: 08/05/2017
Date Received: 12/05/2017
Date Tested: 25/05/2017
Sampled By: Not Given

TEST RESULTS

Laboratory Reference: 750722
Sample description: Brown gravelly very sandy CLAY
Location: BH03
Supplier: Not Given

Sample Reference: Not Given
Sample Type: D
Depth Top [m]: 9
Depth Base [m]: 9.45



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
125	100		
90	100		
75	100		
63	100		
50	100		
37.5	100		
28	100		
20	100		
14	96		
10	92		
6.3	89		
5	88		
3.35	86		
2	84		
1.18	82		
0.6	80		
0.425	78		
0.3	73		
0.212	66		
0.15	59		
0.063	44		

Dry Mass of sample [g]: 202

Sample Proportions	% dry mass
Very coarse	0.00
Gravel	15.90
Sand	39.70
Fines <0.063mm	44.40

Grading Analysis	
D100	mm 20
D60	mm 0.158
D30	mm
D10	mm
Uniformity Coefficient	
Curvature Coefficient	

Remarks

Preparation and testing in accordance with BS1377 unless noted below

Approved:

Dariusz Piotrowski
PL Laboratory Manager
Geotechnical Section

Signed:

Sushil Sharda
Technical Manager
(Geotechnical Division)

Date Reported: 31/05/2017

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TEST CERTIFICATE**Determination of Particle Size Distribution**

i2 Analytical Ltd
7 Woodshots Meadow
Croxley Green Business Park
Watford Herts WD18 8YS



Tested in Accordance with BS1377:Part 2:1990, clause 9.2

Client: BWB Consulting Limited
Client Address: Whitehall Waterfront
2 Riverside Way
Leeds
LS1 4EH

Client Reference: NTT2589
Job Number: 17-48680
Date Sampled: 09/05/2017
Date Received: 12/05/2017
Date Tested: 25/05/2017
Sampled By: Not Given

Contact: Luke McFadden
Site Name: Plot L, Rochdale
Site Address: Not Given

TEST RESULTS

Laboratory Reference: 750723

Sample Reference: Not Given

Sample description: Brown slightly clayey gravelly SAND

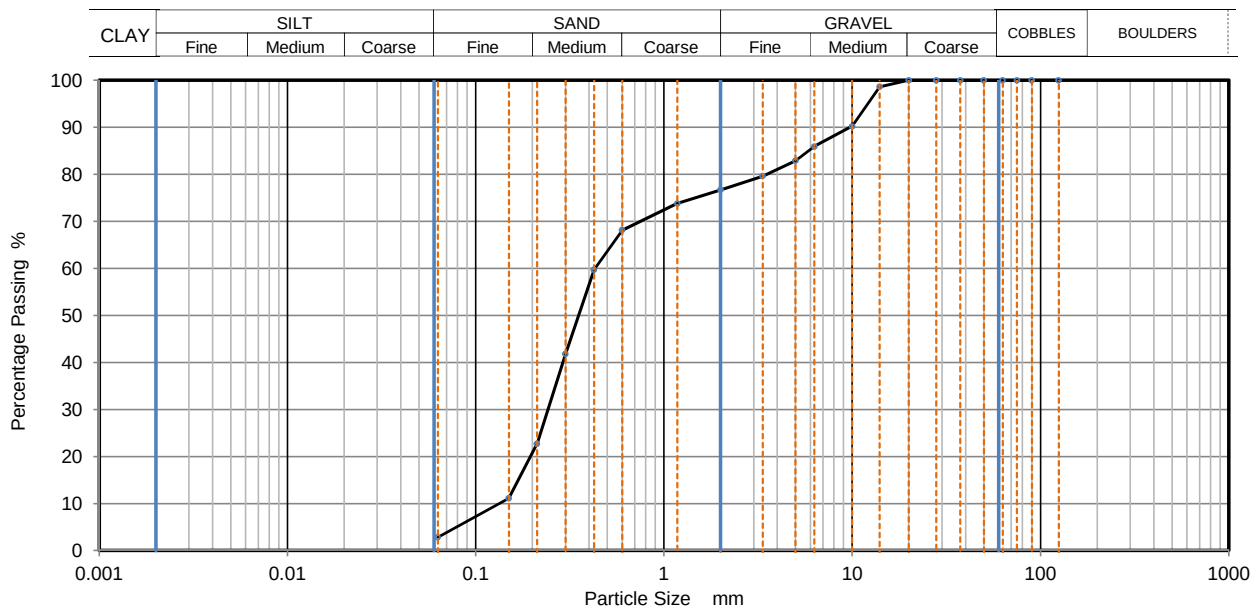
Sample Type: B

Location: TP02

Depth Top [m]: 0.9

Supplier: Not Given

Depth Base [m]: 1



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
125	100		
90	100		
75	100		
63	100		
50	100		
37.5	100		
28	100		
20	100		
14	99		
10	90		
6.3	86		
5	83		
3.35	80		
2	77		
1.18	74		
0.6	68		
0.425	60		
0.3	42		
0.212	23		
0.15	11		
0.063	3		

Dry Mass of sample [g]: 283

Sample Proportions	% dry mass
Very coarse	0.00
Gravel	23.30
Sand	73.90
Fines <0.063mm	2.80

Grading Analysis	
D100	mm 20
D60	mm 0.431
D30	mm 0.242
D10	mm 0.134
Uniformity Coefficient	3.2
Curvature Coefficient	1

Remarks

Preparation and testing in accordance with BS1377 unless noted below

Approved:

Signed:

Dariusz Piotrowski
PL Laboratory Manager
Geotechnical Section

Sushil Sharda
Technical Manager
(Geotechnical Division)

Date Reported: 31/05/2017

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TEST CERTIFICATE**Determination of Particle Size Distribution**

Tested in Accordance with BS1377:Part 2:1990, clauses 9.2 and 9.5

i2 Analytical Ltd
7 Woodshots Meadow
Croxley Green Business Park
Watford Herts WD18 8YS



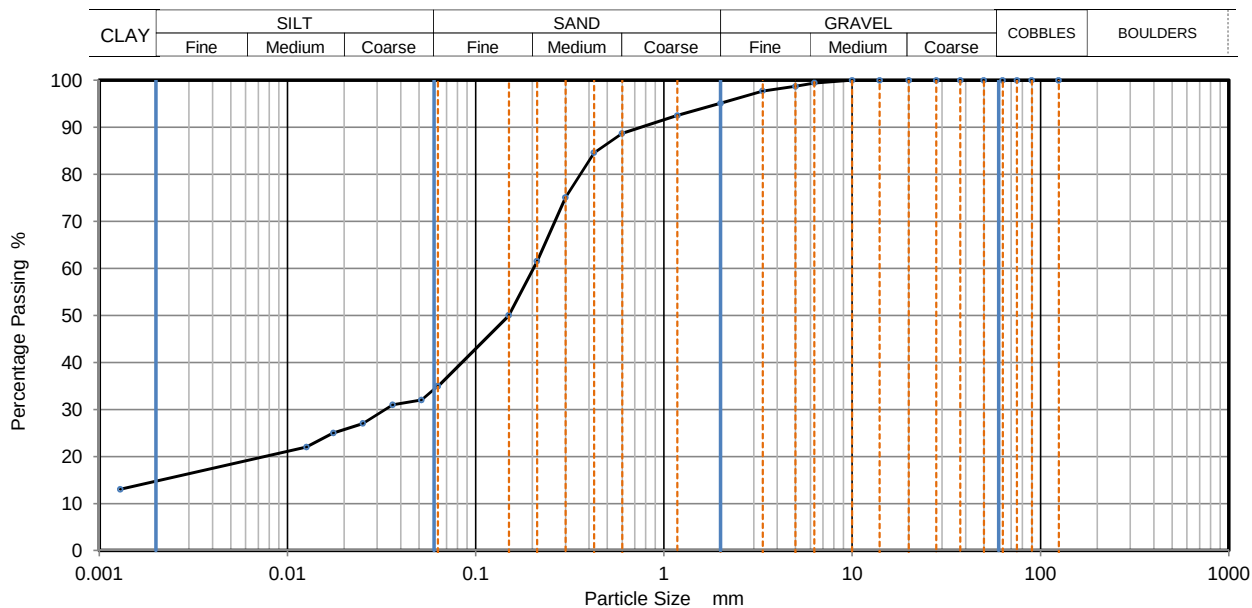
Client: BWB Consulting Limited
Client Address: Whitehall Waterfront
2 Riverside Way
Leeds
LS1 4EH
Contact: Luke McFadden
Site Name: Plot L, Rochdale
Site Address: Not Given

Client Reference: NTT2589
Job Number: 17-48680
Date Sampled: 09/05/2017
Date Received: 12/05/2017
Date Tested: 25/05/2017
Sampled By: Not Given

TEST RESULTS

Laboratory Reference: 750724
Sample description: Brown slightly gravelly very clayey SAND
Location: TP03
Supplier: Not Given

Sample Reference: Not Given
Sample Type: D
Depth Top [m]: 2.9
Depth Base [m]: 3



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
125	100	0.0630	35
90	100	0.0516	32
75	100	0.0362	31
63	100	0.0251	27
50	100	0.0176	25
37.5	100	0.0126	22
28	100	0.0013	13
20	100		
14	100		
10	100		
6.3	99		
5	99		
3.35	98		
2	95		
1.18	93		
0.6	89	Particle density (assumed) 2.65 Mg/m ³	
0.425	85		
0.3	75		
0.212	62		
0.15	50		
0.063	35		

Dry Mass of sample [g]: 232

Sample Proportions	% dry mass
Very coarse	0.00
Gravel	4.90
Sand	60.20
Silt	20.30
Clay	14.60

Grading Analysis	
D100	mm 10
D60	mm 0.203
D30	mm 0.0329
D10	mm
Uniformity Coefficient	
Curvature Coefficient	

Remarks
Preparation and testing in accordance with BS1377 unless noted below

Approved:

Signed:

Dariusz Piotrowski
PL Laboratory Manager
Geotechnical Section

Sushil Sharda
Technical Manager
(Geotechnical Division)

Date Reported: 31/05/2017

for and on behalf of i2 Analytical Ltd

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TEST CERTIFICATE**Determination of Particle Size Distribution**

Tested in Accordance with BS1377:Part 2:1990, clauses 9.2 and 9.5

i2 Analytical Ltd
7 Woodshots Meadow
Croxley Green Business Park
Watford Herts WD18 8YS



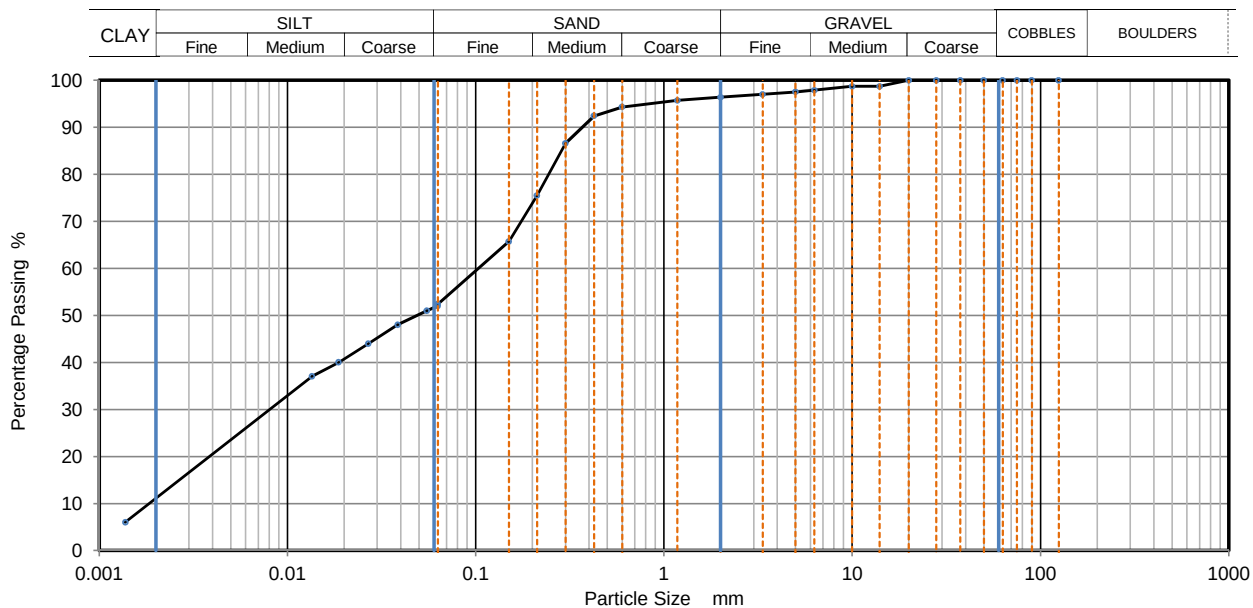
Client: BWB Consulting Limited
Client Address: Whitehall Waterfront
2 Riverside Way
Leeds
LS1 4EH
Contact: Luke McFadden
Site Name: Plot L, Rochdale
Site Address: Not Given

Client Reference: NTT2589
Job Number: 17-48680
Date Sampled: 11/05/2017
Date Received: 12/05/2017
Date Tested: 25/05/2017
Sampled By: Not Given

TEST RESULTS

Laboratory Reference: 750725
Sample description: Brown slightly gravelly sandy CLAY
Location: TP01A
Supplier: Not Given

Sample Reference: Not Given
Sample Type: B
Depth Top [m]: 3
Depth Base [m]: 3.1



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
125	100	0.0630	52
90	100	0.0551	51
75	100	0.0385	48
63	100	0.0269	44
50	100	0.0187	40
37.5	100	0.0135	37
28	100	0.0014	6
20	100		
14	99		
10	99		
6.3	98		
5	98		
3.35	97		
2	96		
1.18	96		
0.6	94	Particle density (assumed) 2.65 Mg/m3	
0.425	92		
0.3	87		
0.212	76		
0.15	66		
0.063	52		

Dry Mass of sample [g]: 227

Sample Proportions	% dry mass
Very coarse	0.00
Gravel	3.60
Sand	44.00
Silt	41.10
Clay	11.30

Grading Analysis	
D100	mm 20
D60	mm 0.104
D30	mm 0.00824
D10	mm 0.00182
Uniformity Coefficient	57
Curvature Coefficient	0.36

Remarks

Preparation and testing in accordance with BS1377 unless noted below

Approved:

Dariusz Piotrowski
PL Laboratory Manager
Geotechnical Section

Signed:

Sushil Sharda
Technical Manager
(Geotechnical Division)

Date Reported: 31/05/2017

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TEST CERTIFICATE

Dry Density / Moisture Content Relationship

Light Compaction

i2 Analytical Ltd
7 Woodshots Meadow
Croxley Green Business Park
Watford Herts WD18 8YS



Tested in accordance with BS 1377-4:1990: Clause 3.3 using 2.5kg[light] Rammer

Client: BWB Consulting Limited
Client Address: Whitehall Waterfront
2 Riverside Way
Leeds
LS1 4EH

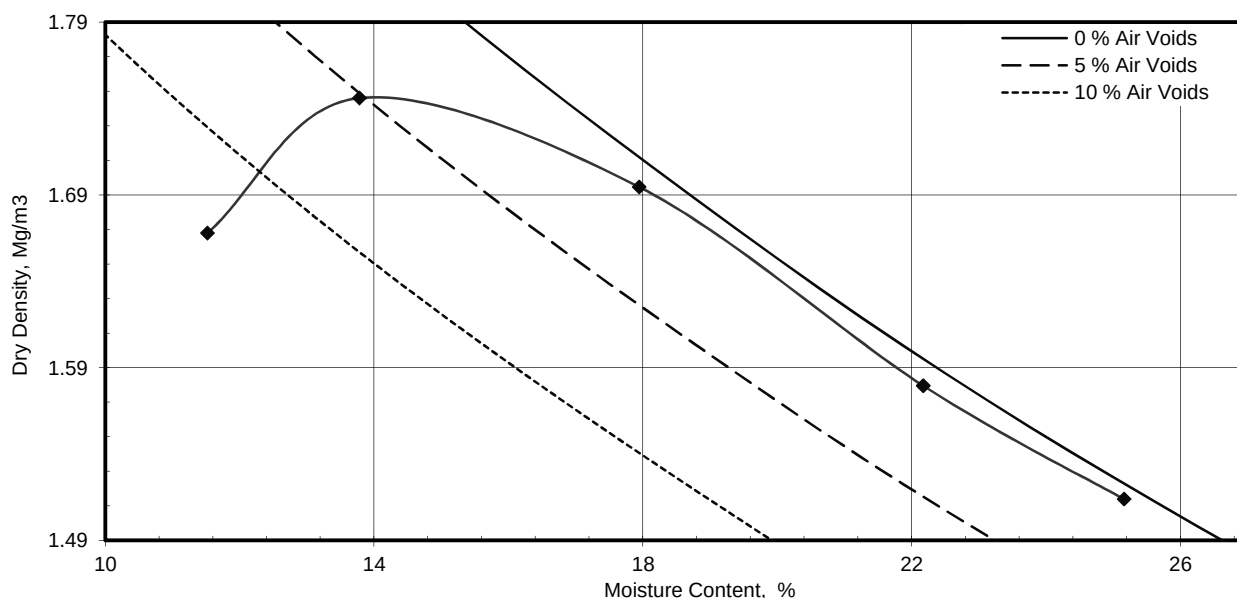
Client Reference: NTT2589
Job Number: 17-48680
Date Sampled: 09/05/2017
Date Received: 12/05/2017
Date Tested: 22/05/2017
Sampled By: Not Given

Contact: Luke McFadden
Site Name: Plot L, Rochdale
Site Address: Not Given

TEST RESULTS

Laboratory Reference: 750712
Hole No.: TP11
Sample Reference: Not Given
Sample Description: Brown very clayey SAND

Depth Top [m]: 1.2
Depth Base [m]: 1.3
Sample Type: B



Preparation	Material used was natural	
Mould Type	1 Litre	
Samples Used	Composite specimens tested	
Material Retained on 37.5 mm Sieve	%	0
Material Retained on 20.0 mm Sieve	%	0
Particle Density - Assumed	Mg/m³	2.47
As received Moisture Content	%	25
Maximum Dry Density	Mg/m³	1.75
Optimum Moisture Content	%	14

Remarks:

Approved:

Dariusz Piotrowski
PL Laboratory Manager
Geotechnical Section

Signed:

Sushil Sharda
Technical Manager
(Geotechnical Division)

Date Reported: 31/05/2017

for and on behalf of i2 Analytical Ltd

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TEST CERTIFICATE

Dry Density / Moisture Content Relationship

Light Compaction

i2 Analytical Ltd
7 Woodshots Meadow
Croxley Green Business Park
Watford Herts WD18 8YS



Tested in accordance with BS 1377-4:1990: Clause 3.3 using 2.5kg[light] Rammer

Client: BWB Consulting Limited
Client Address: Whitehall Waterfront
2 Riverside Way
Leeds
LS1 4EH

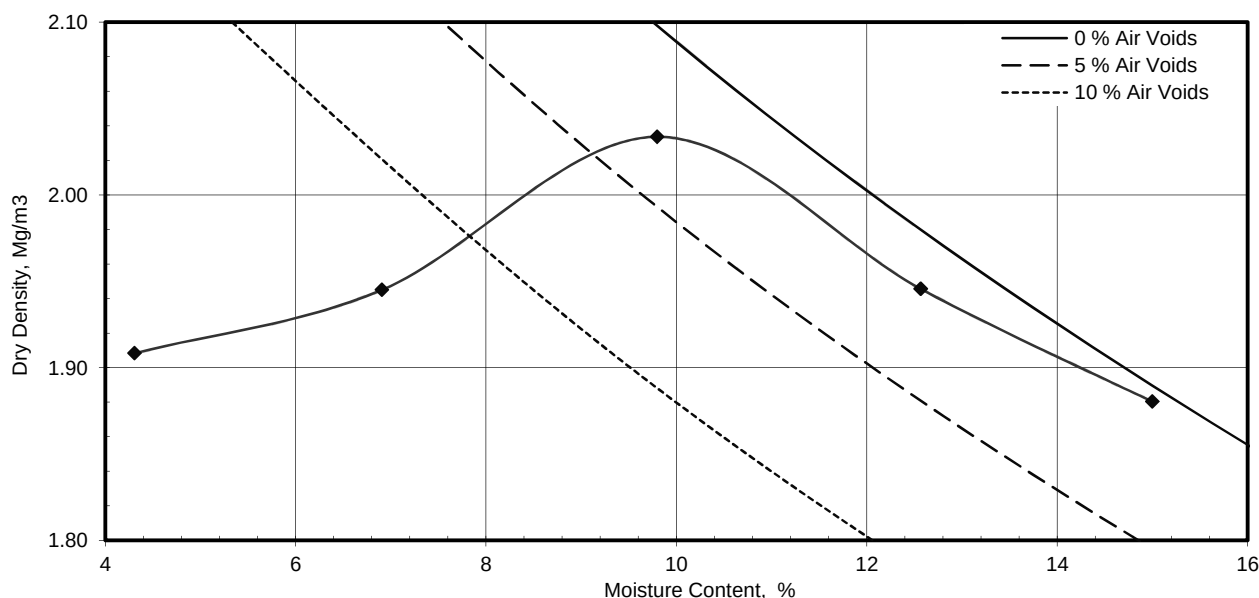
Client Reference: NTT2589
Job Number: 17-48680
Date Sampled: 11/05/2017
Date Received: 12/05/2017
Date Tested: 22/05/2017
Sampled By: Not Given

Contact: Luke McFadden
Site Name: Plot L, Rochdale
Site Address: Not Given

TEST RESULTS

Laboratory Reference: 750717
Hole No.: TP05
Sample Reference: Not Given
Sample Description: Brown slightly gravelly very clayey SAND

Depth Top [m]: 1.3
Depth Base [m]: 1.4
Sample Type: B



Preparation		Material used was natural
Mould Type		1 Litre
Samples Used		Composite specimens tested
Material Retained on 37.5 mm Sieve	%	0
Material Retained on 20.0 mm Sieve	%	0
Particle Density - Assumed	Mg/m³	2.64
As received Moisture Content	%	15
Maximum Dry Density	Mg/m³	2.03
Optimum Moisture Content	%	9.8

Remarks:

Approved:

Dariusz Piotrowski
PL Laboratory Manager
Geotechnical Section

Signed:

Sushil Sharda
Technical Manager
(Geotechnical Division)

Date Reported: 31/05/2017

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TEST CERTIFICATE

Dry Density / Moisture Content Relationship

Light Compaction

i2 Analytical Ltd
7 Woodshots Meadow
Croxley Green Business Park
Watford Herts WD18 8YS



Tested in accordance with BS 1377-4:1990: Clause 3.3 using 2.5kg[light] Rammer

Client: BWB Consulting Limited
Client Address: Whitehall Waterfront
2 Riverside Way
Leeds
LS1 4EH

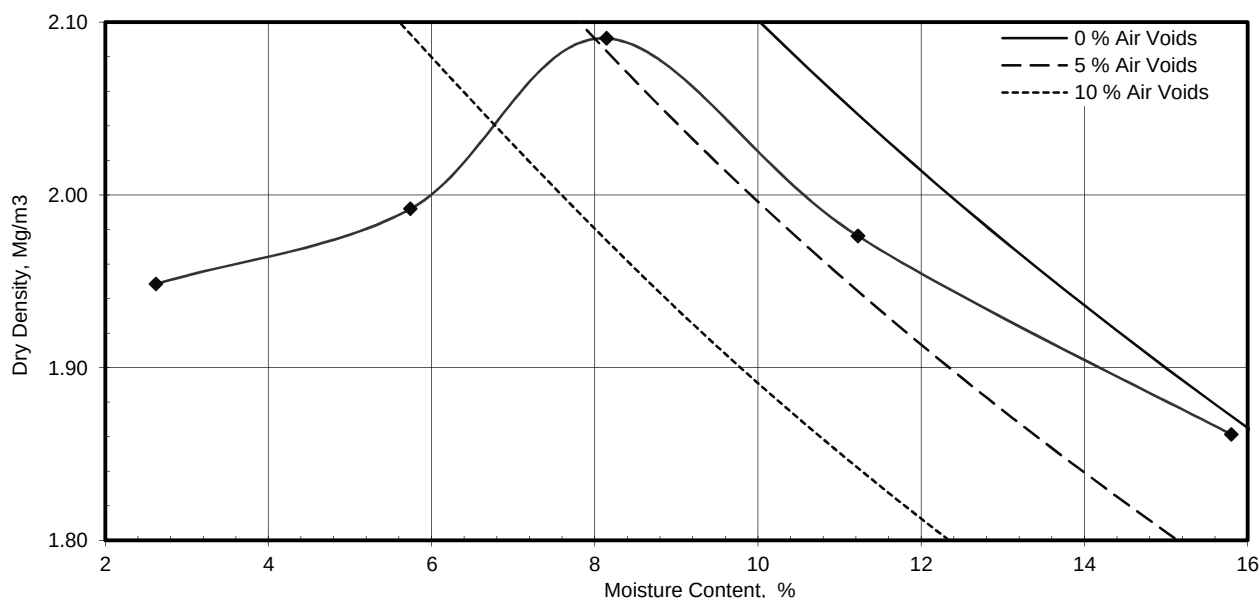
Client Reference: NTT2589
Job Number: 17-48680
Date Sampled: 09/05/2017
Date Received: 12/05/2017
Date Tested: 22/05/2017
Sampled By: Not Given

Contact: Luke McFadden
Site Name: Plot L, Rochdale
Site Address: Not Given

TEST RESULTS

Laboratory Reference: 750718
Hole No.: TP04
Sample Reference: Not Given
Sample Description: Brown slightly gravelly very clayey SAND

Depth Top [m]: 2.7
Depth Base [m]: 2.8
Sample Type: B



Preparation	Material used was natural	
Mould Type	1 Litre	
Samples Used	Composite specimens tested	
Material Retained on 37.5 mm Sieve	%	0
Material Retained on 20.0 mm Sieve	%	0
Particle Density - Assumed	Mg/m³	2.66
As received Moisture Content	%	16
Maximum Dry Density	Mg/m³	2.09
Optimum Moisture Content	%	8.1

Remarks:

Approved:

Dariusz Piotrowski
PL Laboratory Manager
Geotechnical Section

Signed:

Sushil Sharda
Technical Manager
(Geotechnical Division)

Date Reported: 31/05/2017

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TEST CERTIFICATE

Dry Density / Moisture Content Relationship

Light Compaction

i2 Analytical Ltd
7 Woodshots Meadow
Croxley Green Business Park
Watford Herts WD18 8YS



Tested in accordance with BS 1377-4:1990: Clause 3.3 using 2.5kg[light] Rammer

Client: BWB Consulting Limited
Client Address: Whitehall Waterfront
2 Riverside Way
Leeds
LS1 4EH

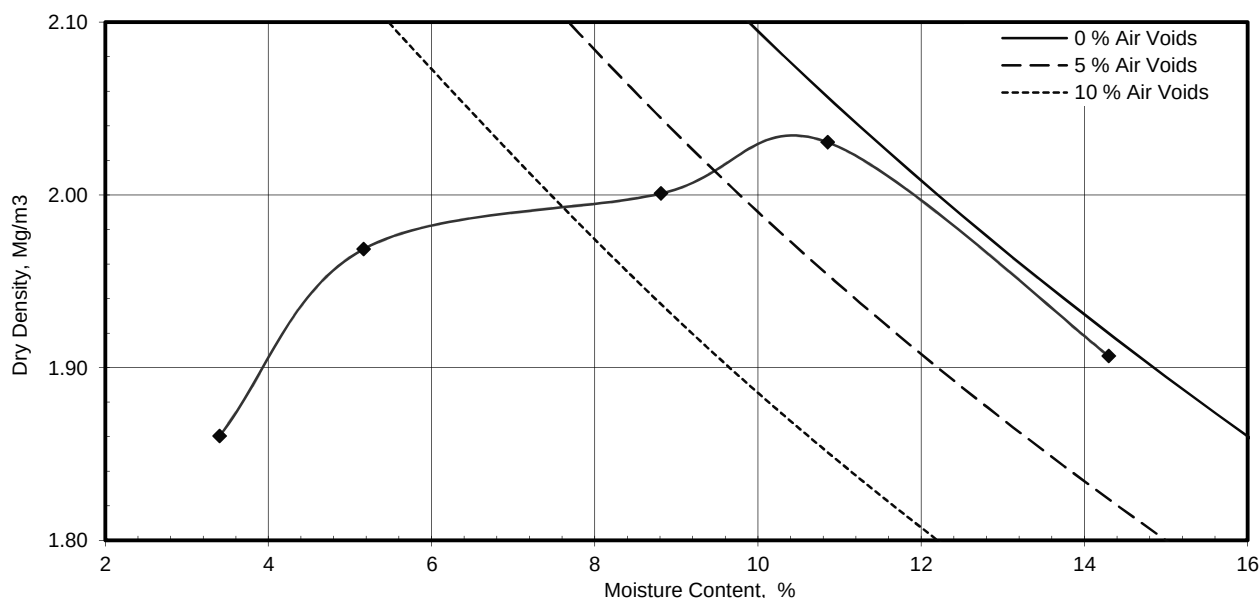
Client Reference: NTT2589
Job Number: 17-48680
Date Sampled: 11/05/2017
Date Received: 12/05/2017
Date Tested: 22/05/2017
Sampled By: Not Given

Contact: Luke McFadden
Site Name: Plot L, Rochdale
Site Address: Not Given

TEST RESULTS

Laboratory Reference: 750725
Hole No.: TP01A
Sample Reference: Not Given
Sample Description: Brown slightly gravelly sandy CLAY

Depth Top [m]: 3
Depth Base [m]: 3.1
Sample Type: B



Preparation	Material used was natural	
Mould Type	1 Litre	
Samples Used	Composite specimens tested	
Material Retained on 37.5 mm Sieve	%	0
Material Retained on 20.0 mm Sieve	%	2
Particle Density - Assumed	Mg/m³	2.65
As received Moisture Content	%	14
Maximum Dry Density	Mg/m³	2.04
Optimum Moisture Content	%	10

Remarks:

Approved:

Dariusz Piotrowski
PL Laboratory Manager
Geotechnical Section

Signed:

Sushil Sharda
Technical Manager
(Geotechnical Division)

Date Reported: 31/05/2017

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The results included within the report are representative of the samples submitted for analysis.
The analysis was carried out at i2 Analytical Limited, ul. Pionierow 39, 41-711 Ruda Slaska, Poland."

APPENDIX 12

TRL DCP RESULTS

BWB**BWB****BWB****BWB**

BWB**BWB****BWB****BWB**

BWB**BWB****BWB****BWB**

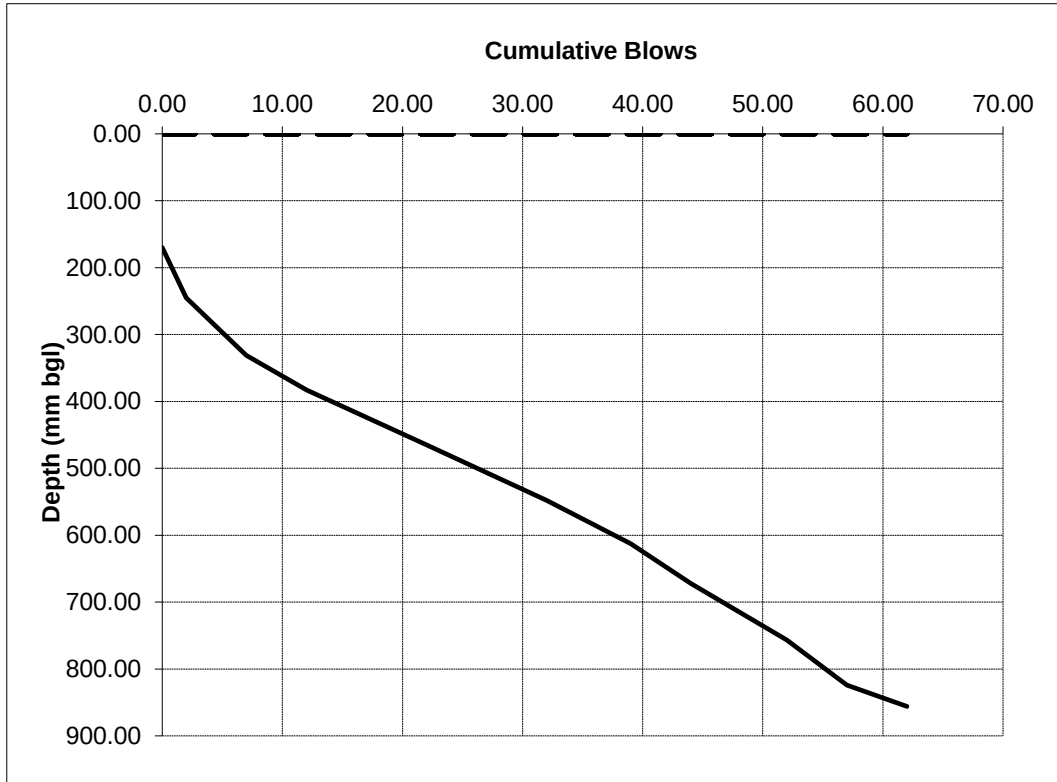
BWB**BWB****BWB****BWB**

Dynamic Cone Penetrometer

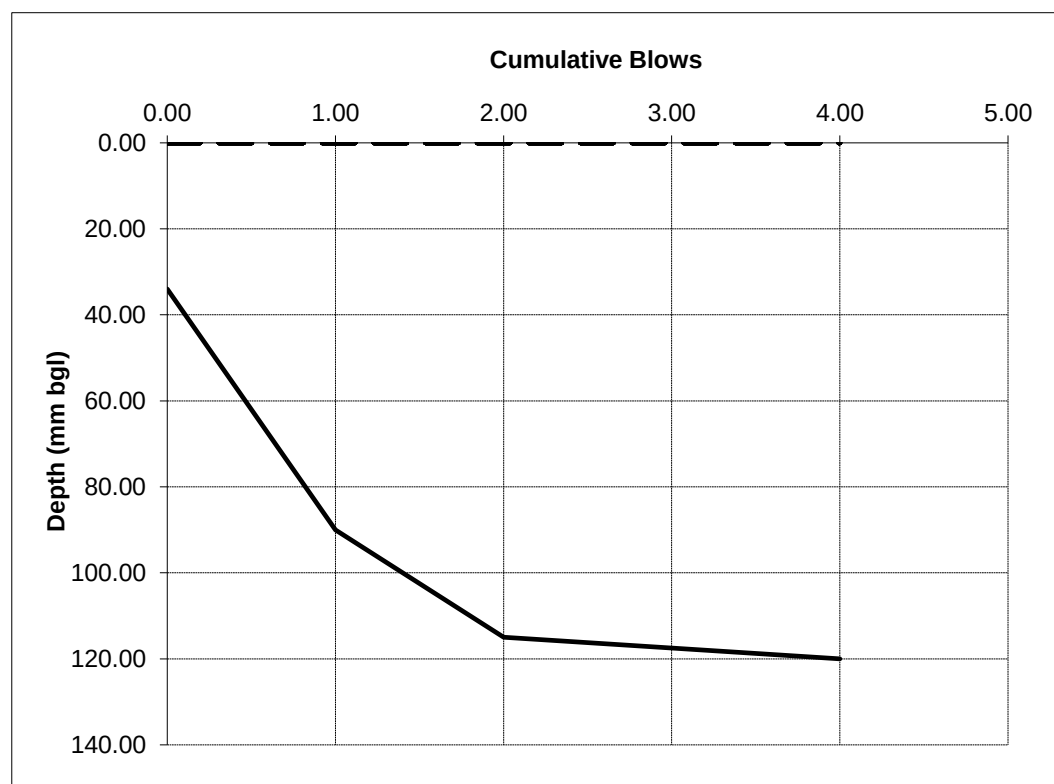
PROJECT NUMBER	NTT2589
PROJECT TITLE	Plot L, Kingsway, Rochdale
TEST REFERENCE	TRL-TP07
DATE	09-Jun-17
MATERIAL/ STRATA TYPE	Topsoil + Clay/Sand/Gravel
START DEPTH (mm bgl)	170
WEATHER/ GROUND CONDITION	Wet

BWB

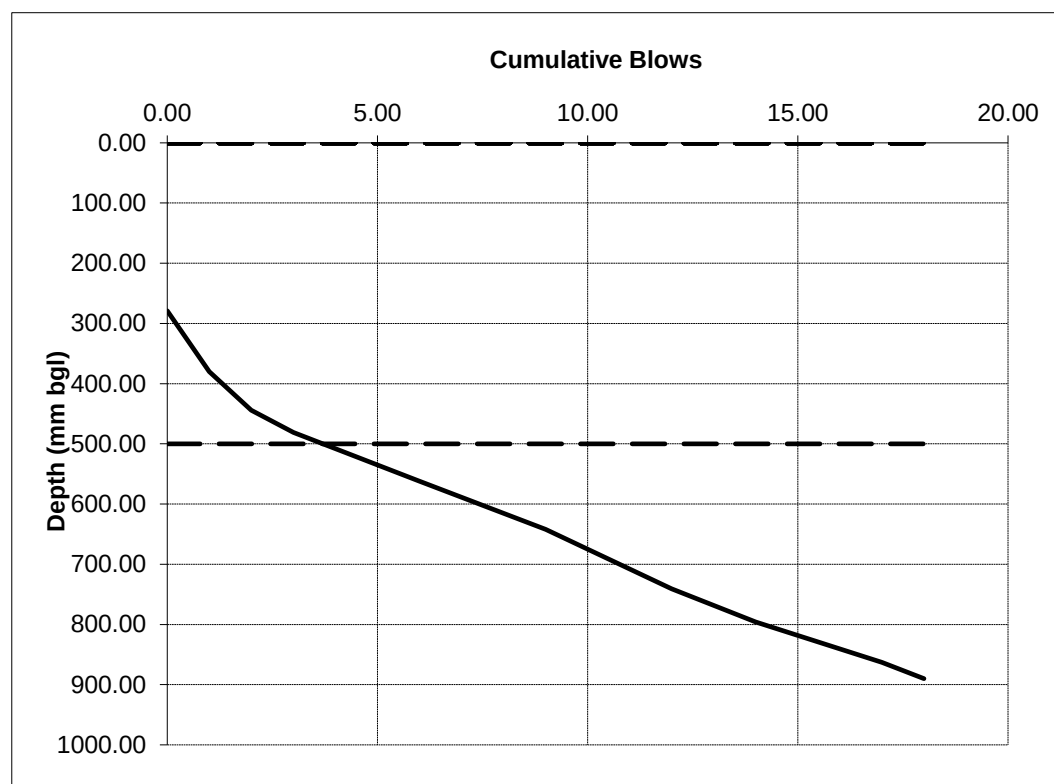
Layer	Blows	Cumulative Blows	Layer Thickness (mm)	Total Depth (mm bgl)	CBR (%)
1	62	62	1030	1200	15.5



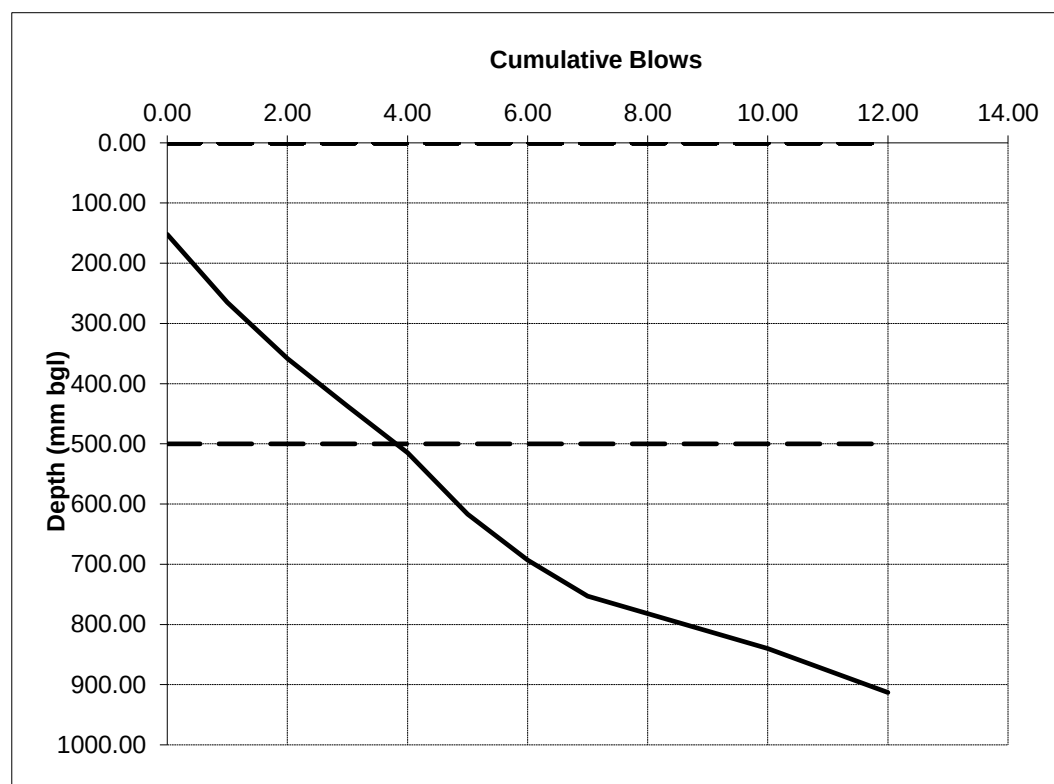
CBR Interpretation based on the TRL Equation: $\text{Log}_{10}(\text{CBR}) = 2.480 - [1.057 \times \text{Log}_{10}(\text{DCP Strength})]$

BWB**BWB**[illegible]

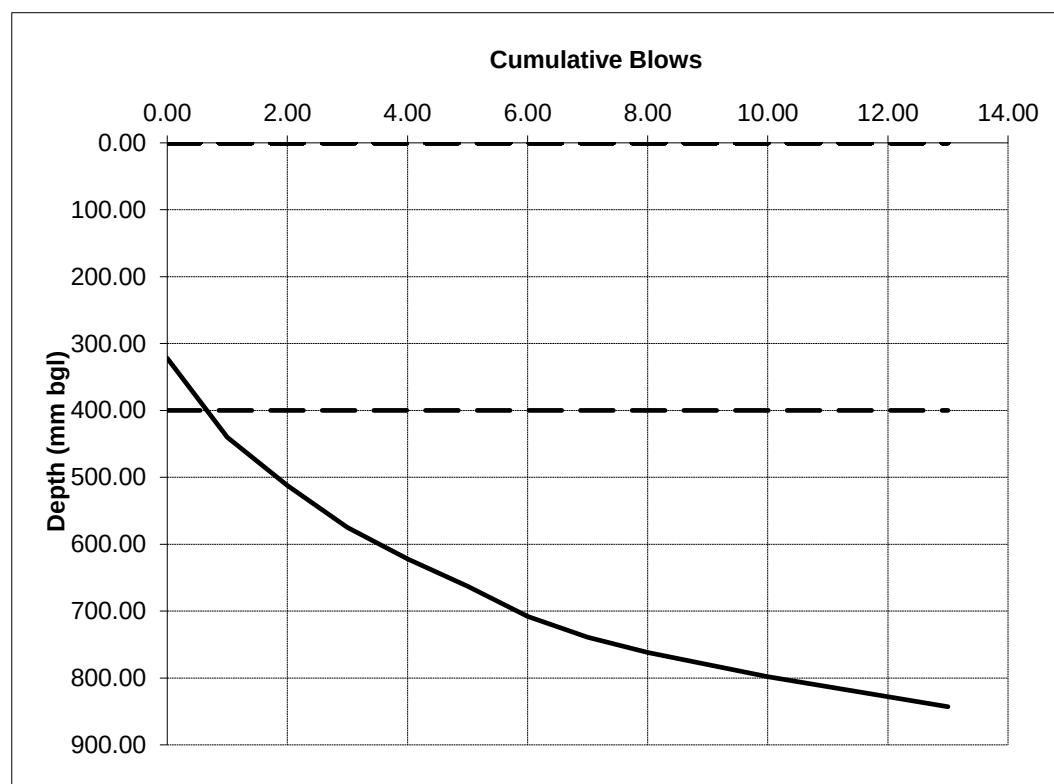
CBR Interpretation based on the TRL Equation: $\text{Log}_{10}(\text{CBR}) = 2.480 - [1.057 \times \text{Log}_{10}(\text{DCP Strength})]$

BWB**BWB**[illegible]

CBR Interpretation based on the TRL Equation: $\text{Log}_{10}(\text{CBR}) = 2.480 - [1.057 \times \text{Log}_{10}(\text{DCP Strength})]$

BWB**BWB**[illegible]

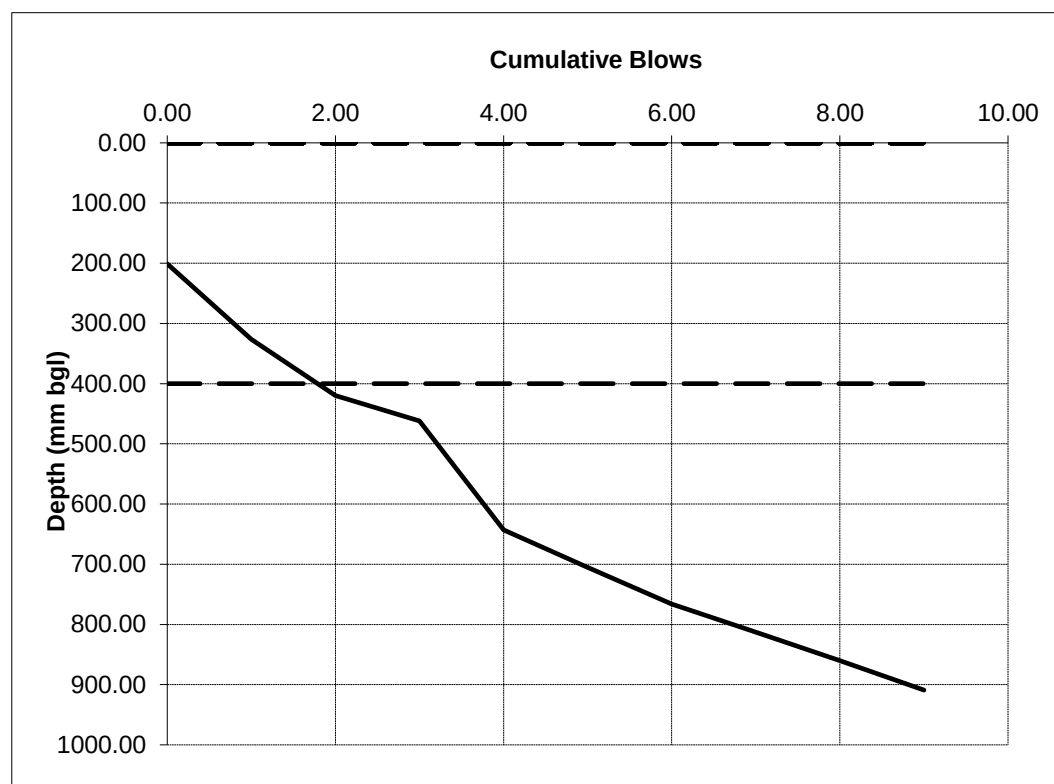
CBR Interpretation based on the TRL Equation: $\text{Log}_{10}(\text{CBR}) = 2.480 - [1.057 \times \text{Log}_{10}(\text{DCP Strength})]$

BWB**BWB**[illegible]

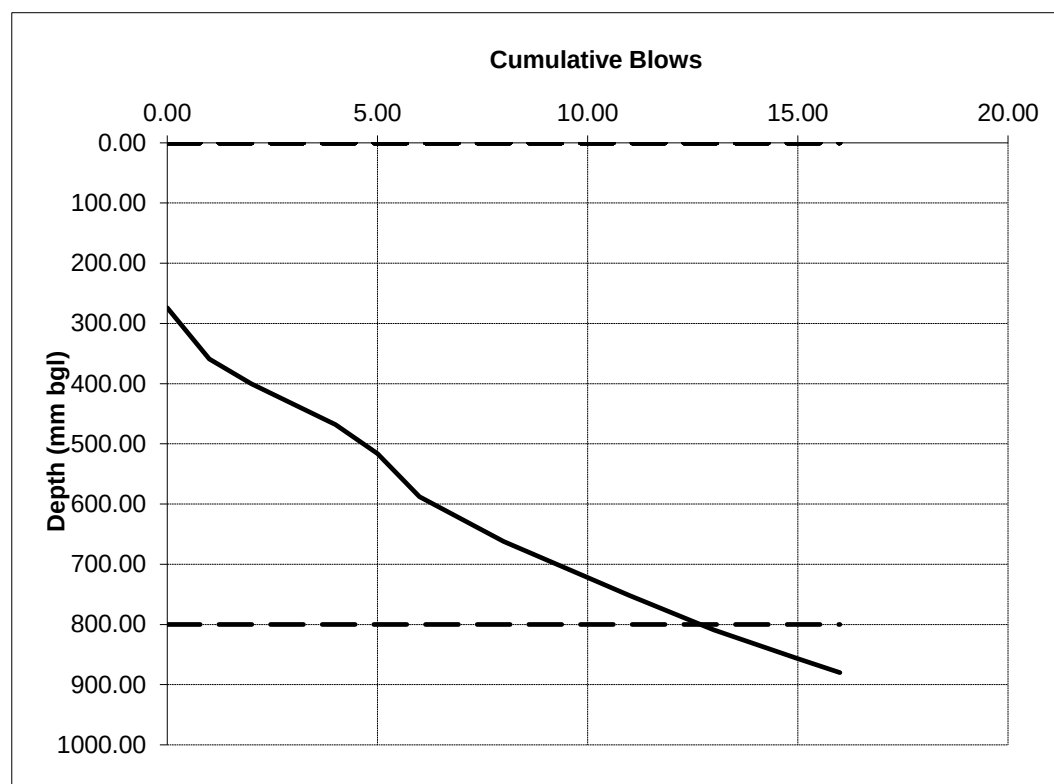
CBR Interpretation based on the TRL Equation: $\text{Log}_{10}(\text{CBR}) = 2.480 - [1.057 \times \text{Log}_{10}(\text{DCP Strength})]$

BWB**BWB****BWB**

CBR Interpretation based on the TRL Equation: $\text{Log}_{10}(\text{CBR}) = 2.480 - [1.057 \times \text{Log}_{10}(\text{DCP Strength})]$

BWB**BWB**[illegible]

CBR Interpretation based on the TRL Equation: $\text{Log}_{10}(\text{CBR}) = 2.480 - [1.057 \times \text{Log}_{10}(\text{DCP Strength})]$

BWB**BWB**[illegible]

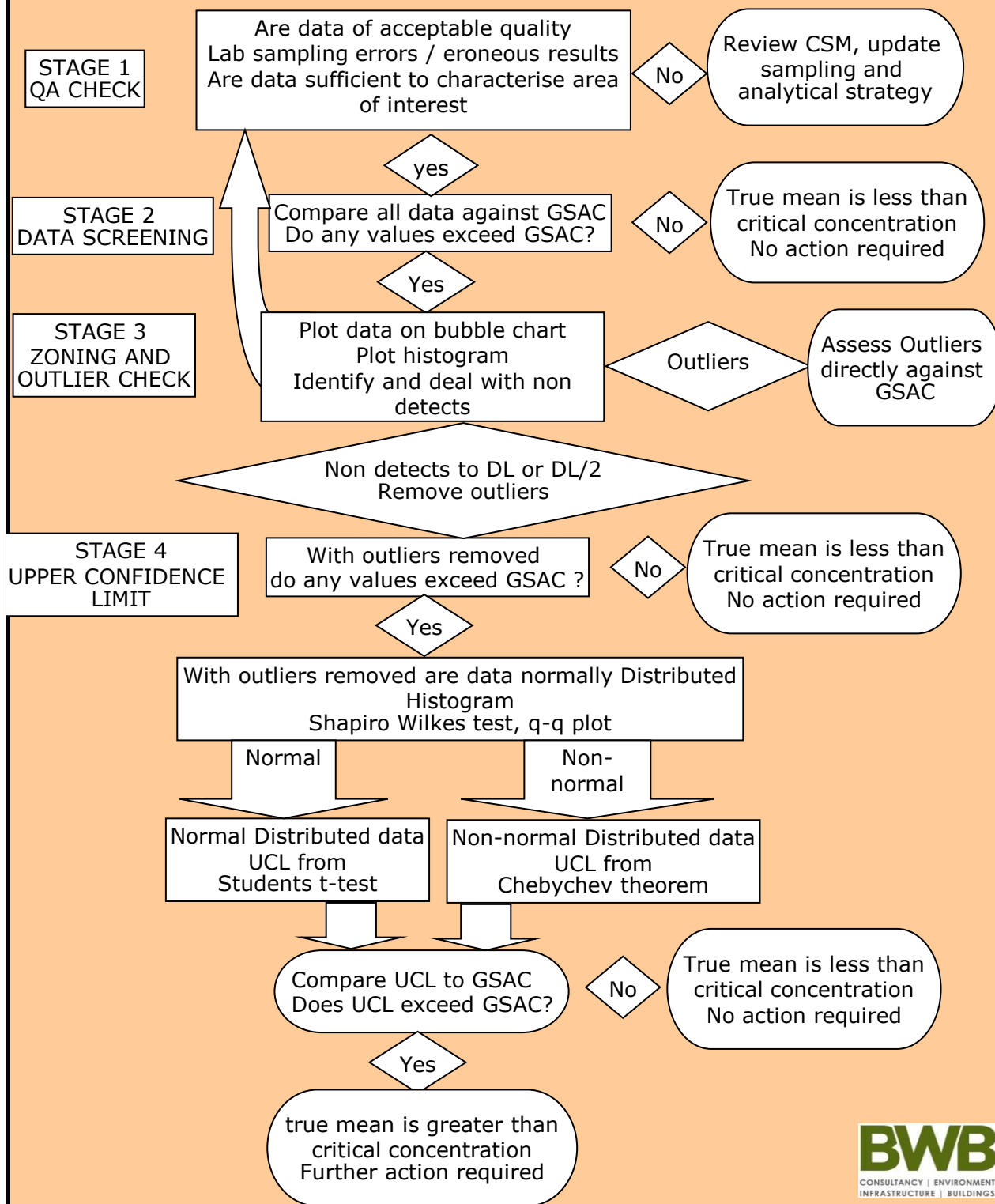
CBR Interpretation based on the TRL Equation: $\text{Log}_{10}(\text{CBR}) = 2.480 - [1.057 \times \text{Log}_{10}(\text{DCP Strength})]$

APPENDIX 13

CLEA SCREENING WORKSHEETS & DERIVATION OF BWB GSAC

STATISTICAL APPROACH FOR ASSESSING RISK TO HUMAN HEALTH FROM CONTAMINATED LAND 2008

CIEH/CLAIRE Guidance on Comparing Soil Contamination Data with a Critical Concentration May 2008



Human Health Generic QRA Worksheet



Plot L Kingsway	NTT2589
One population	

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GSAC Type	BWB_GSAC
Key Receptor/CSM (Residential/Commercial/POS)	Commercial
Organic Matter % (If unknown use 1%)	1

Exposure Pathway Selection	
(Residential/Commercial scenarios only)	
Soil Ingestion, dermal contact, particulate inhalation	TRUE
Ingestion of site grown vegetables and soil attached to vegetables	FALSE
Inhalation of vapours Indoors	TRUE
Inhalation of vapours Outdoors	TRUE

Default pathways	
Residential	Commercial
TRUE	TRUE
Optional	FALSE
TRUE	TRUE
TRUE	TRUE

Generic Assessment Criteria



**Plot L Kingsway
NTT2589**

**Commercial
mg/kg**

Source

Arsenic	6.40E+02	BWB_GSAC
Barium	2.21E+04	BWB_GSAC
Beryllium	1.24E+01	BWB_GSAC
Boron	2.36E+05	BWB_GSAC
Cadmium	2.30E+02	BWB_GSAC
Chromium III	8.84E+03	BWB_GSAC
Chromium VI	3.48E+01	BWB_GSAC
Copper	6.33E+04	BWB_GSAC
Lead	2.33E+03	DEFRA_C4SL
Inorganic Mercury	3.60E+03	BWB_GSAC
Nickel	1.04E+03	BWB_GSAC
Selenium	1.30E+04	BWB_GSAC
Vanadium	6.63E+03	BWB_GSAC
Zinc	7.33E+05	BWB_GSAC
Cyanide (Free)	4.30E+01	BWB_GSAC
Cyanide (Complex)	2.13E+02	BWB_GSAC
Phenols (Total)	2.65E+04	BWB_GSAC
Benzene	2.81E+01	BWB_GSAC
Toluene	5.92E+04	BWB_GSAC
Ethyl benzene	6.05E+03	BWB_GSAC
Total Xylene	6.28E+03	BWB_GSAC
TPH (EC5-6) aliphatic	3.31E+03	BWB_GSAC
TPH (>EC6-8) aliphatic	8.04E+03	BWB_GSAC
TPH (>EC8-10) aliphatic	2.04E+03	BWB_GSAC
TPH (>EC10-12) aliphatic	9.33E+03	BWB_GSAC
TPH (>EC12-16) aliphatic	4.51E+04	BWB_GSAC
TPH (>EC16-35) aliphatic	1.59E+06	BWB_GSAC
TPH (>EC35-44) aliphatic	1.59E+06	BWB_GSAC
TPH (>EC6-7) aromatic (benzene)	4.36E+01	BWB_GSAC
TPH (>EC7-8) aromatic (toluene)	5.90E+04	BWB_GSAC
TPH (>EC8-10) aromatic	3.35E+03	BWB_GSAC
TPH (>EC10-12) aromatic	1.31E+04	BWB_GSAC
TPH (>EC12-16) aromatic	3.22E+04	BWB_GSAC
TPH (>EC16-21) aromatic	2.82E+04	BWB_GSAC
TPH (>EC21-35) aromatic	2.84E+04	BWB_GSAC
TPH (>EC35-44) aromatic	2.84E+04	BWB_GSAC
Naphthalene	2.04E+02	BWB_GSAC
Acenaphthylene	8.45E+04	BWB_GSAC
Acenaphthene	8.50E+04	BWB_GSAC
Fluorene	6.35E+04	BWB_GSAC
Phenanthrene	2.19E+04	BWB_GSAC
Anthracene	5.25E+05	BWB_GSAC
Fluoranthene	2.26E+04	BWB_GSAC
Pyrene	5.43E+04	BWB_GSAC
Benzo(a)anthracene	1.71E+02	BWB_GSAC
Chrysene	3.54E+02	BWB_GSAC
Benzo(b)fluoranthene	4.52E+01	BWB_GSAC
Benzo(k)fluoranthene	1.20E+03	BWB_GSAC
Benzo(a)pyrene	3.60E+01	BWB_GSAC
Indeno(1,2,3-c,d)pyrene	5.12E+02	BWB_GSAC
Dibenzo(a,h)anthracene	3.60E+00	BWB_GSAC
Benzo(g,hi)perylene	4.02E+03	BWB_GSAC

Generic Assessment Criteria**Plot L Kingsway
NTT2589****Commercial
mg/kg****Source**

Tetrachloroethene (PCE)	1.97E+01	BWB_GSAC
Trichloroethene (TCE)	1.30E+00	BWB_GSAC
<i>cis</i> -1,2-Dichloroethene	1.45E+01	BWB_GSAC
Vinyl Chloride (VC)	6.29E-02	BWB_GSAC
1,1,2,2-Tetrachloroethane (PCA)	2.90E+02	BWB_GSAC
1,1,1-Trichloroethane (TCA)	7.00E+02	BWB_GSAC
1,2-Dichloroethane	7.11E-01	BWB_GSAC
Carbon Tetrachloride	3.04E+00	BWB_GSAC
Carbon disulphide	1.16E+01	BWB_GSAC

Determinand	Number of tests	Range (mg/kg)	Commercial GSAC (mg/kg)	Detection Limit (mg/kg)	Min	Max	No. of Exceedances	No. Non detects	< or not
Arsenic	13	1.1 to 16	6.40E+02	1	1.1	16	0	0	
Barium	13	19 to 160	2.21E+04	1	19	160	0	0	
Beryllium	13	0.18 to 0.75	1.24E+01	0.06	0.18	0.75	0	0	
Boron	13	<0.2 to 1.9	2.36E+05	0.2	0.2	1.9	0	7	<
Cadmium	13	<0.2 to 0.4	2.30E+02	0.2	0.2	0.4	0	11	<
Chromium III	13	8.3 to 20	8.84E+03	1	8.3	20	0	0	
Chromium VI	13	<4 to 4	3.48E+01	4	4	4	0	13	<
Copper	13	9.7 to 58	6.33E+04	1	9.7	58	0	0	
Lead	13	4.4 to 120	2.33E+03	1	4.4	120	0	0	
Inorganic Mercury	13	<0.3 to 0.4	3.60E+03	0.3	0.3	0.4	0	11	<
Nickel	13	8.4 to 19	1.04E+03	1	8.4	19	0	0	
Selenium	13	<1 to 1	1.30E+04	1	1	1	0	13	<
Vanadium	13	9.3 to 28	6.63E+03	1	9.3	28	0	0	
Zinc	13	16 to 95	7.33E+05	1	16	95	0	0	
Cyanide (Free)	13	<1 to 1	4.30E+01	1	1	1	0	13	<
Cyanide (Complex)	13	<1 to 1	2.13E+02	1	1	1	0	13	<
Phenols (Total)	13	<1 to 1	2.65E+04	1	1	1	0	13	<
Benzene	5	<0.001 to 0.001	2.81E+01	0.001	0.001	0.001	0	5	<
Toluene	5	<0.001 to 0.001	5.92E+04	0.001	0.001	0.001	0	5	<
Ethyl benzene	5	<0.001 to 0.001	6.05E+03	0.001	0.001	0.001	0	5	<
Total Xylene	5	0.002 to 0.002	6.28E+03	0.001	0.002	0.002	0	0	
TPH (EC5-6) aliphatic	5	<0.001 to 0.001	3.31E+03	0.001	0.001	0.001	0	5	<
TPH (>EC6-8) aliphatic	5	<0.001 to 0.001	8.04E+03	0.001	0.001	0.001	0	5	<
TPH (>EC8-10) aliphatic	5	<0.001 to 0.001	2.04E+03	0.001	0.001	0.001	0	5	<
TPH (>EC10-12) aliphatic	5	<1 to 1	9.33E+03	1	1	1	0	5	<
TPH (>EC12-16) aliphatic	5	<2 to 5.2	4.51E+04	2	2	5.2	0	3	<
TPH (>EC16-35) aliphatic	5	<16 to 288	1.59E+06	16	16	288	0	2	<
TPH (>EC35-44) aliphatic	0	<0 to 0	1.59E+06		0	0	0	200	<
TPH (>EC6-7) aromatic (benzene)	5	<0.001 to 0.001	4.36E+01	0.001	0.001	0.001	0	5	<
TPH (>EC7-8) aromatic (toluene)	5	<0.001 to 0.001	5.90E+04	0.001	0.001	0.001	0	5	<
TPH (>EC8-10) aromatic	5	<0.001 to 0.001	3.35E+03	0.001	0.001	0.001	0	5	<
TPH (>EC10-12) aromatic	5	<1 to 6	1.31E+04	1	1	6	0	3	<
TPH (>EC12-16) aromatic	5	<2 to 72	3.22E+04	2	2	72	0	1	<
TPH (>EC16-21) aromatic	5	<10 to 350	2.82E+04	10	10	350	0	3	<
TPH (>EC21-35) aromatic	5	<10 to 1400	2.84E+04	10	10	1400	0	1	<
TPH (>EC35-44) aromatic	0	<0 to 0	2.84E+04		0	0	0	200	<
Naphthalene	13	<0.05 to 3.8	2.04E+02	0.05	0.05	3.8	0	11	<
Acenaphthylene	13	<0.05 to 0.64	8.45E+04	0.05	0.05	0.64	0	12	<
Acenaphthene	13	<0.05 to 6	8.50E+04	0.05	0.05	6	0	10	<
Fluorene	13	<0.05 to 4.5	6.35E+04	0.05	0.05	4.5	0	10	<
Phenanthrene	13	<0.05 to 32	2.19E+04	0.05	0.05	32	0	7	<
Anthracene	13	<0.05 to 8	5.25E+05	0.05	0.05	8	0	10	<
Fluoranthene	13	<0.05 to 43	2.26E+04	0.05	0.05	43	0	7	<
Pyrene	13	<0.05 to 39	5.43E+04	0.05	0.05	39	0	7	<
Benzo(a)anthracene	13	<0.05 to 24	1.71E+02	0.05	0.05	24	0	7	<
Chrysene	13	<0.05 to 20	3.54E+02	0.05	0.05	20	0	7	<
Benzo(b)fluoranthene	13	<0.05 to 26	4.52E+01	0.05	0.05	26	0	8	<
Benzo(k)fluoranthene	13	<0.05 to 10	1.20E+03	0.05	0.05	10	0	8	<
Benzo(a)pyrene	13	<0.05 to 20	3.60E+01	0.05	0.05	20	0	8	<
Indeno(1,2,3-c,d)pyrene	13	<0.05 to 9.6	5.12E+02	0.05	0.05	9.6	0	8	<
Dibenzo(a,h)anthracene	13	<0.05 to 2.7	3.60E+00	0.05	0.05	2.7	0	12	<
Benzo(g,h,i)perylene	13	<0.05 to 12	4.02E+03	0.05	0.05	12	0	8	<
Tetrachloroethene (PCE)	0	0 to 0	1.97E+01	0.001	0	0	0	0	
Trichloroethene (TCE)	0	0 to 0	1.30E+00	0.001	0	0	0	0	
cis-1,2-Dichloroethene	0	0 to 0	1.45E+01	0.001	0	0	0	0	
Vinyl Chloride (VC)	0	0 to 0	6.29E-02	0.001	0	0	0	0	
1,1,2,2-Tetrachloroethane (PCA)	0	0 to 0	2.90E+02	0.001	0	0	0	0	
1,1,1-Trichloroethane (TCA)	0	0 to 0	7.00E+02	0.001	0	0	0	0	
1,2-Dichloroethane	0	0 to 0	7.11E-01	0.001	0	0	0	0	
Carbon Tetrachloride	0	0 to 0	3.04E+00	0.001	0	0	0	0	
Carbon disulphide	0	0 to 0	1.16E+01	0.001	0	0	0	0	

APPENDIX 14

SOIL CHEMICAL RESULTS SUMMARY

Determinand	Number of tests	Range (mg/kg)	Residential GSAC (mg/kg)	Detection Limit (mg/kg)	Min	Max	No. of Exceedances	No. Non detects	< or not
Arsenic	13	1.1 to 16	3.24E+01	0.2	1.1	16	0	0	
Barium	13	19 to 160	1.34E+03	1.5	19	160	0	0	
Beryllium	13	0.18 to 0.75	1.70E+00	0.2	0.18	0.75	0	0	
Boron	13	<0.2 to 1.9	2.91E+02	0.2	0.2	1.9	0	7	<
Cadmium	13	0.2 to 0.4	1.03E+01	0.1	0.2	0.4	0	0	
Chromium III	13	8.3 to 20	6.17E+02	0.15	8.3	20	0	0	
Chromium VI	13	4 to 4	4.25E+00	1	4	4	0	0	
Copper	13	9.7 to 58	2.10E+03	0.2	9.7	58	0	0	
Lead	13	4.4 to 120	2.00E+02	0.3	4.4	120	0	0	
Inorganic Mercury	13	0.3 to 0.4	3.99E+01	0.03	0.3	0.4	0	0	
Nickel	13	8.4 to 19	1.27E+02	0.2	8.4	19	0	0	
Selenium	13	1 to 1	2.53E+02	0.5	1	1	0	0	
Vanadium	13	9.3 to 28	2.91E+02	0.8	9.3	28	0	0	
Zinc	13	16 to 95	3.74E+03	1	16	95	0	0	
Cyanide (Free)	13	1 to 1	4.30E+01	0.1	1	1	0	0	
Cyanide (Complex)	13	1 to 1	2.13E+02	0.1	1	1	0	0	
Phenols (Total)	13	1 to 1	9.18E+01	0.3	1	1	0	0	
Benzene	5	0.001 to 0.001	7.93E-02	0.01	0.001	0.001	0	0	
Toluene	5	0.001 to 0.001	1.19E+02	0.01	0.001	0.001	0	0	
Ethyl benzene	5	0.001 to 0.001	3.77E+01	0.01	0.001	0.001	0	0	
Total Xylene	5	0.002 to 0.002	4.28E+01	0.01	0.002	0.002	0	0	
TPH (EC5-6) aliphatic	5	0.001 to 0.001	2.86E+01	0.01	0.001	0.001	0	0	
TPH (>EC6-8) aliphatic	5	0.001 to 0.001	6.99E+01	0.01	0.001	0.001	0	0	
TPH (>EC8-10) aliphatic	5	0.001 to 0.001	1.80E+01	0.01	0.001	0.001	0	0	
TPH (>EC10-12) aliphatic	5	1 to 1	8.79E+01	1.5	1	1	0	0	
TPH (>EC12-16) aliphatic	5	2 to 5.2	6.43E+02	1.2	2	5.2	0	0	
TPH (>EC16-35) aliphatic	5	16 to 288	4.43E+04	1.5	16	288	0	0	
TPH (>EC35-44) aliphatic	0	0 to 0	4.43E+04	3.4	0	0	0	0	
TPH (>EC6-7) aromatic (benzene)	5	0.001 to 0.001	7.93E-02	0.01	0.001	0.001	0	0	
TPH (>EC7-8) aromatic (toluene)	5	0.001 to 0.001	1.19E+02	0.01	0.001	0.001	0	0	
TPH (>EC8-10) aromatic	5	0.001 to 0.001	2.04E+01	0.01	0.001	0.001	0	0	
TPH (>EC10-12) aromatic	5	1 to 6	5.47E+01	0.9	1	6	0	0	
TPH (>EC12-16) aromatic	5	2 to 72	1.31E+02	0.5	2	72	0	0	
TPH (>EC16-21) aromatic	5	10 to 350	2.47E+02	0.6	10	350	1	0	
TPH (>EC21-35) aromatic	5	10 to 1400	8.90E+02	1.4	10	1400	1	0	
TPH (>EC35-44) aromatic	0	0 to 0	8.90E+02	1.4	0	0	0	0	
Naphthalene	13	0.05 to 3.8	1.55E+00	0.1	0.05	3.8	2	0	
Acenaphthylene	13	0.05 to 0.64	1.68E+02	0.1	0.05	0.64	0	0	
Acenaphthene	13	0.05 to 6	2.05E+02	0.1	0.05	6	0	0	
Fluorene	13	<0.05 to 4.5	1.63E+02	0.1	0.05	4.5	0	1	<
Phenanthrene	13	0.05 to 32	9.17E+01	0.1	0.05	32	0	0	
Anthracene	13	0.05 to 8	2.26E+03	0.1	0.05	8	0	0	
Fluoranthene	13	0.05 to 43	2.57E+02	0.1	0.05	43	0	0	
Pyrene	13	0.05 to 39	5.63E+02	0.1	0.05	39	0	0	
Benzo(a)anthracene	13	<0.05 to 24	5.41E+00	0.1	0.05	24	1	1	<
Chrysene	13	0.05 to 20	1.16E+01	0.1	0.05	20	1	0	
Benzo(b)fluoranthene	13	0.05 to 26	1.90E+00	0.1	0.05	26	1	0	
Benzo(k)fluoranthene	13	0.05 to 10	5.51E+01	0.1	0.05	10	0	0	
Benzo(a)pyrene	13	0.05 to 20	1.60E+00	0.1	0.05	20	1	0	
Indeno(1,2,3-c,d)pyrene	13	0.05 to 9.6	2.04E+01	0.1	0.05	9.6	0	0	
Dibenzo(a,h)anthracene	13	0.05 to 2.7	1.70E-01	0.1	0.05	2.7	1	0	
Benzo(g,h,i)perylene	13	0.05 to 12	2.12E+02	0.1	0.05	12	0	0	
Tetrachloroethene (PCE)	1	<0.001 to 0.001	1.22E-01	0.001	0.001	0.001	0	1	<
Trichloroethene (TCE)	0	0 to 0	1.15E-02	0.001	0	0	0	0	
cis-1,2-Dichloroethene	0	0 to 0	1.12E-01	0.001	0	0	0	0	
Vinyl Chloride (VC)	0	0 to 0	4.73E-04	0.001	0	0	0	0	
1,1,2,2-Tetrachloroethane (PCA)	1	<0.001 to 0.001	1.37E+00	0.001	0.001	0.001	0	1	<
1,1,1-Trichloroethane (TCA)	0	0 to 0	6.21E+00	0.001	0	0	0	0	
1,2-Dichloroethane	0	0 to 0	5.33E-03	0.001	0	0	0	0	
Carbon Tetrachloride	0	0 to 0	1.80E-02	0.001	0	0	0	0	
Carbon disulphide	0	0 to 0	1.01E-01	0.001	0	0	0	0	

APPENDIX 15

SOIL LEACHATE RESULTS SUMMARY

*EQS Standard: Phenol and Benzene annual average of 300µg/l; Toluene 500µg/l for Freshwater, 400µg/l for Saltwater; 1,1,1-TCA 1,000µg/l.

Project Name:	Plot L, Kingsway Business Park, Rochdale
Project Number:	NTT2589
Assessment for:	Soil Leachate Assessment
Laboratory:	I2
Receptor:	Freshwater
Receptor Water Hardness:	<40 (No Data)

100 = Assessment Criteria Exceedance)

50 = M-BAT Bioavailability Assessment Required

Contaminant		Units	Detection Limit	Guideline Concentration	Source	Number of Samples	Min	Max	No of Exceedences	TP06	TP07	TP08	TP16	TP02	
										0.300.40	0.200.30	0.200.30	0.700.80	0.300.40	
Heavy Metals	Arsenic	µg/l	1.1	50	EQS Freshwater	5	1.10	15.00	0	1.70	1.10	2.70	15.00	1.10	
	Barium	mg/l	0.05	700	UK DWS	5	0.00	0.03	0	0.01	0.00	0.03	0.02	0.00	
	Beryllium	µg/l	0.2	None Available		5	0.20	0.20	0	0.20	0.20	0.20	0.20	0.20	
	Cadmium	µg/l	0.08	0.08	EQS Freshwater	5	0.08	0.08	0	0.08	0.08	0.08	0.08	0.08	
	Chromium III	µg/l	0.4	4.7	EQS Freshwater	5	0.90	4.30	0	2.40	1.80	1.40	4.30	0.90	
	Chromium VI	µg/l	0	3.4	EQS Freshwater	0	0.00	0.00	0						
	Copper	µg/l	0.7	1	EQS Freshwater	5	12.00	35.00	5	22.00	12.00	28.00	35.00	14.00	
	Lead	µg/l	1	1.2	EQS Freshwater	5	1.00	4.20	3	4.20	1.00	1.90	3.30	1.00	
	Mercury	µg/l	0.5	0.07	EQS Freshwater	5	0.50	0.50	5	0.50	0.50	0.50	0.50	0.50	
	Nickel	µg/l	0.3	4	EQS Freshwater	5	1.40	3.90	0	3.00	2.50	3.90	3.70	1.40	
	Selenium	µg/l	4	10	UK DWS	5	4.00	4.40	0	4.00	4.00	4.00	4.40	4.00	
	Vanadium	µg/l	1.7	None Available		5	1.70	20.00	0	3.00	1.70	7.00	20.00	3.80	
	Zinc	µg/l	0.4	10.9	EQS Freshwater	5	5.50	14.00	2	6.20	13.00	14.00	6.60	5.50	
	Sulphate	mg/l	45	400	EQS Freshwater	0	0.00	0.00	0						
	Boron	mg/l	10	2000	EQS Freshwater	5	0.05	0.12	0	0.06	0.06	0.05	0.12	0.06	
Inorganics	pH	µg/l	0.00			0	0.00	0.00	0	6.9	6.3	7.8	9.4	6.5	0
	Cyanide (total)	µg/l	10	1	EQS Freshwater	5	10.00	10.00	5	10.00	10.00	10.00	10.00	10.00	
	Phenol*	µg/l	10	7.7	EQS Freshwater	0	0.00	0.00	0						

APPENDIX 16

CIRIA RISK CLASSIFICATION SCHEME

BWB Preliminary Risk Assessment Methodology (After NHBC Guidance for the Safe Development of Housing on Land Affected by Contamination (2008))

NHBC Guidance for the Safe Development of Housing on Land Affected by Contamination (2008) sets out a methodology for the estimation of risk.

At Phase 1 the risk estimation will take the form of a qualitative risk assessment, which will be entirely based on the conceptual model for each potential end-use of the site. Comments on level of uncertainty will also need to be included for each source-pathway-target linkage to allow the confidence in the assessed risks to be understood. The results of the qualitative risk assessment will allow the risk evaluation to be concisely described in the following chapters.

The methodology for risk evaluation is a qualitative method for interpreting the output for the risk estimation stage of the assessment. It involves the classification of the:

- **the magnitude of the potential consequence** (i.e. severity).
[takes into account both the potential severity of the hazard and the sensitivity of the receptor]
- **the magnitude of probability** (i.e. likelihood).
[takes into account both the presence of the hazard and receptor and the integrity of the pathway]

Classification of Consequence

Classification	Definition	Examples
Severe (Sv)	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.	<i>Significant harm to humans is defined in circular 01/2006 as death, disease*, serious injury, genetic mutation, birth defects or the impairment of reproductive functions.</i> <i>Major fish kill in surface water from large spillage of contaminants from site.</i> <i>Highly elevated concentrations of List I and II substances present in groundwater close to small potable abstraction (high sensitivity).</i> <i>Explosion, causing building collapse (can also equate to immediate human health risk if buildings are occupied).</i>
Medium (Md)	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	<i>Significant harm to humans is defined in circular 01/2006 as death, disease*, serious injury, genetic mutation, birth defects or the impairment of reproductive functions.</i> <i>Damage to building rendering it unsafe to occupy e.g. foundation damage resulting in instability.</i> <i>Ingress of contaminants through plastic potable water pipes..</i>

	maintenance of the population. Significant damage to crops, buildings or property.	
Mild (Mi)	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.	<i>Exposure could lead to slight short-term effects (e.g. mild skin rash).</i> <i>Surface spalling of concrete.</i>
Minor (Mr)	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.	<i>The presence of contaminants at such concentration that protective equipment is required during site works.</i> <i>The loss of plants in a landscaping scheme.</i> <i>Discolouration of concrete.</i>

* For these purposes, disease is to be taken to mean an unhealthy condition of the body or a part of it and can include, for example, cancer, liver dysfunction or extensive skin ailments. Mental dysfunction is included only insofar as it is attributable to the effects of a pollutant on the body of the person concerned.

The classification of consequence does not take into account the probability of the consequence being realised. Therefore there may be more than one consequence for a particular pollutant linkage. Both a severe and medium classification can result in death. Severe relates to short term (acute) risk while medium relates to long term (chronic) risk. Mild relates to significant harm but to less sensitive receptors. Minor classification relates to harm which is not significant but could have a financial cost.

Classification of Probability

Classification	Definition	Examples
High likelihood (Hi)	There is a pollutant linkage and an event that either appears very likely in the short term and almost inevitable in the long term, or there is evidence at the receptor or harm or pollution	<i>a) Elevated concentrations of toxic contaminants are present in soils in the top 0.5m in a residential garden.</i> <i>b) Ground/groundwater contamination could be present from chemical works, containing a number of USTs, having been in operation on the same site for over 50 years.</i>
Likely (Li)	There is a 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.	<i>a) Elevated concentrations of toxic contaminants are present in soils at depths of 0.5-1.0m in a residential garden, or the top 0.5m in public open space.</i> <i>b) Ground/groundwater contamination could be present from an industrial site containing a UST present between 1970 and 1990. The tank is known to be single skin. There is no evidence of leakage although there are no records of integrity tests.</i>
Low likelihood (Lw)	There is a pollutant linkage and circumstances are possible under which an event could occur. However, it is by no means certain that even over a longer period such event would take place and is less	<i>a) Elevated concentrations of toxic contaminants are present in soils at depths >1m in a residential garden, or 0.5-1.0m in public open space.</i> <i>b) Ground/groundwater contamination could</i>

	likely in the short term.	<i>be present on a light industrial unit constructed in the 1990s containing a UST in operation over the last 10 years – the tank is double skinned but there is no integrity testing or evidence of leakage.</i>
Unlikely (UI)	There is a pollutant linkage but circumstances are such that it is improbable that an event would occur even in the very long term.	<i>a) Elevated concentrations of toxic contaminants are present below hardstanding.</i> <i>b) Light industrial unit <10 yrs old containing a doubleskinned UST with annual integrity testing results available.</i>

The classification gives a guide as to the severity and consequence of identified risk when compared with other risk presented on the site. It should be noted that if a risk is identified it cannot be classified as “no risk” but as “very low risk”. Differing stakeholders may have a different view on the acceptability of a risk.

Risk Evaluation Matrix

		Consequence			
		Severe (Sv)	Medium (Md)	Mild (Mi)	Minor (Mr)
Probability	High likelihood (Hi)	Very high risk (VH)	High Risk (H)	Moderate Risk (M)	Mod/low risk (M/L)
	Likely (Li)	High risk (H)	Moderate risk (M)	Mod/low risk (M/L)	Low risk (L)
	Low likelihood (Lw)	Moderate risk (M)	Mod/low risk (M/L)	Low risk (L)	Very low risk (VL)
	Unlikely (UI)	Mod/low risk (M/L)	Low risk (L)	Very low risk (VL)	Very low risk (VL)

Risk Categorisations

Very high risk (VH)	There is a high probability that severe harm could arise to a designated receptor from an identified hazard, OR, there is evidence that severe harm to a designated receptor is currently happening. This risk, if realised, is likely to result in a substantial liability. Urgent investigation (if not undertaken already) and remediation are likely to be required.
High risk (H)	Harm is likely to arise to a designated receptor from an identified hazard. Realisation of the risk is likely to present a substantial liability. Urgent investigation (if not undertaken already) is required and remedial works may be necessary in the short-term and are likely over the longer-term.
Moderate risk (M)	It is possible that harm could arise to a designated receptor from an identified hazard. However, it is either relatively unlikely that any such harm would be severe, or if any harm were to occur it is more likely that the harm would be relatively mild. Investigation (if not already undertaken) is normally required to clarify the risk and to determine the potential liability. Some remedial works may be required in the longer-term.
Low risk (L)	It is possible that harm could arise to a designated receptor from an identified hazard, but it is likely that this harm, if realised, would at worst normally be mild.
Very low risk (VL)	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.

Reference

Rudland, D J, Lancefield, R M, Mayell, P N; 2001; Contaminated land Risk Assessment. A guide to Good Practice; CIRIA Report C552.

The NHBC (National House-Building Council) the Environment Agency and the Chartered Institute of Environmental Health, 2008, Guidance for the Safe Development of Housing on Land Affected by Contamination R&D66:

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