History.

Revision	Date	Reason
0	Mar-21	Original

History. 1
Background. 1
Fieldwork. 2
Site Assessments. 3
Recommendations. 4
Appendix. 6
Location Plan. 6
Proposed Plan. 7
Existing Plan/Site Investigation Plan. 8
Trial pit and borehole logging (BS5930). 9
Existing Soil Analysis. ..... 11~~10~~
Soil Sample Certification. ..... 12~~11~~
Photographs. ..... 15~~12~~
B Regs, Approved Document A, Table 10, Diagram 23 & Clause 2E4. ..... 17~~14~~
BS:8004 Table 1. ..... 18~~15~~

Background.

Proposed develoment at Shore Street, Milnrow for the construction of 1No. detached residential dwelling (bungalow) with associated on site parking and sopft landscaping areas.

Planning permission for the site (*16/01242/FUL*) was obtained in April 2017 for the: "*Erection of a 2 bedroom bungalow together with 2 on site car spaces including the repair of existing dilapidated stone retaining wall to River Beal boundary*".

Included within the permission was a condition (4) to assess environmental risk at the site. Condition 4 of the permission, stated the following:

6 No development shall take place until an investigation and risk assessment (in addition to any assessment provided with the planning application) has been submitted to and approved in writing by the Local Planning Authority. The assessment shall investigate the nature and extent of any contamination on the site (whether or not it originates on the site). The assessment shall be undertaken by competent persons and a written report of the findings submitted to and approved in writing by the Local Planning Authority before any development takes place.

The submitted report shall include:

i) a survey of the extent, scale and nature of contamination
ii) an assessment of the potential risks to:
- o human health,
- o property (existing or proposed) including buildings, crops, livestock, pets, woodland, and service lines and pipes,
- o adjoining land,
- o groundwaters and surface waters,
- o ecological systems,
- o archaeological sites and ancient monuments;

iii) where unacceptable risks are identified, an appraisal of remedial options and proposal of the preferred option(s) to form a remediation strategy for the site.

The development shall thereafter be carried out in full accordance with the duly approved remediation strategy and a verification report submitted to and approved in writing by the Local Planning Authority before any of the building(s) hereby approved are first occupied.

Further to the above, Sub Surface North West Ltd were employed to undertake a Desk Study With Walkover Survey, report ref: 7043 September 2020.

Report recommendations included the following:

- Soil sampling due to sources such as on site made ground, hydrocarbons from a garage 30m north east and a domestic garage to the neighbouring site to the north.
- Ground gas migration from sources such as two historic landfill sites, & ten potential unregistered landfill sites.

Further to the Sub Surface North West Ltd reporting, T J Booth Associates have been empoloyed to undertake the Phase 2 Site Investigations. This report documents the intrusive ground investigation based on current UK guidance for environmental investigation within the construction industry.

Principal to the assessment is the final potential for contamination pollutant linkages via the CLR-11 source-pathway-receptor methodology. Assessment of potential pollution linkages is primarily undertaken in strict accordance with BS5930:2015 BS 10175:2011+A2:2017 CIRIA C665 and BS 8485:2015+A1:2019 et al.

Fieldwork.

SITE INVESTIGATION DESIGN.

Further to the requirement for soil sampling in the Subsurface North West Desk Study Report, soil sampling was undertaken in accordance with BS10175:2011+A1:2013 & R&D TECHNICAL REPORT P5-066/TR; which considers the upper 500mm is sufficient to categorise the ground profile for development with respect to:

- human/animal intake arising from ingestion and dermal contact;
- potential for wind entrainment leading to inhalation (of contaminated soils and dusts);
- or deposition onto neighbouring land;
- surface water run-off (e.g. due to flash flooding);
- uptake by shallow rooting plants (e.g. crops, ornamental and wild species);
- surface leaching to groundwater.

There is no definitive guidance on the number of samples required for soil representation in current guidance. However, R&D TECHNICAL REPORT P5-066/TR indicates that sample spacing should be between 10-25m for residential applications.

Considering the proposed area for soft landscaping, and the land available (not as hardstanding) predevelopment; nominally 2-3 soil samples representative of the upper 500mm of MADE GROUND would satisfy guidance criteria for sampling.

Soil samples should be tested for the following contaminant suites: metals, speciated PAH, inorganics & sulphates, SOM, and asbestos screening, and analysed against common threshold comparison data, specifically the Defra Category 4 Screening Levels (C4SLs) where available, then to the LQM/CIEH (S4ULs) thereafter.

Regarding the potential ground gas risk noted in the Sub Surface Desk Study, initial trial holes to assess the geology and further assessment of the desk study information was to be undertaken prior to potential borehole investigations.

SITE INVESTIGATIONS.

Site investigations were undertaken on the 11.02.2021 to assess the upper ground for geo-environmental purposes and to understand the geotechnical characteristics for foundation advice.

The site was levelled from Shore Street to the east side where it fell approximately 1.5 – 2m to the top of the site retaining wall which forms the bank of the River Beal.

The site had been stripped clean of vegetation, with 2 trees remaining to the south east side adjacent the river bank. The ground surface comprised made ground.

The investigations were undertaken with a 3.5t excavator, and comprised 2No trial holes (THs1-2), and 3 No. soil samples (S1-3). An existing shallow trial hole had been excavated to the centre of the site (TH3), as well as two soakaway test pits STP1-2. Refer to SI plan in the Appendix.

STRATIGRAPHY.

In summary, trial holes 1 & 2 were excavated to the maximum reach of the excavator arm which was 3400mm. In Both trial holes, a loose rubble fill (MADE GROUND) was noted to 3400mm depth. There was some soft brown very fine sandy SILT to the base of the TH1 which was assumed to the top of the virgin alluvial material beneath.

The same was noted in trial hole 2. The position of the hole meant that the soft brown very fine sandy SILT was noted at approximately 3200mm depth.to the east of the hole only. The loose fill above collapsing in made further observation difficult. For full trial hole logs refer to appendix.

It should be noted that although the virgin alluvial subsoil was not fully assessed in the trial holes, it was noted across Shore Street in excavations into the valley side. The excavations revealed alluvial material similar to that noted at the base of the trial holes, exhibiting a firm very fine sandy SILT and occasionally weathered bedrock outcrops.

SOIL TESTING.

Soil samples were taken in the upper made ground (S1-3), nominally representative of the upper 500m as encountered. The samples were sealed in 1kg white plastic snap top containers & amber jars, and sent to Eurofins Chemtest Ltd to be tested for contaminant suites which included metals, speciated PAH, inorganics & sulphates, SOM, and asbestos screening.

No visual or olfactory evidence of hydrocarbon contamination was noted on site, and thus hydrocarbon testing was not undertaken.

SOIL PROPERTIES

For foundation purposes the following presumed allowable bearing values are suggested in accordance with BS:8004, Table 1 appendix:

MADE GROUND	n/a	kN/sqm
Soft sandy SILT	<75	kN/sqm

No ground water was noted on trial hole investigations although it will be controlled by the river and therfore within approximately 1m of the base of the trial holes.

Site Assessments.

SOIL SAMPLING ASSESSMENT

On return the samples were analysed by T J Booth Associates to current best practice including assessment against threshold values for a residential end use.

The results indicated that made ground contain within elevated levels of lead, cyanide, benzo(a)anthracene, benzo(a)pyrene, benzo(b)flouranthene, chrysene, dibenz(ah)anthracene, and asbestos.

GAS MONITORING ASSESSMENT

Further to the initial gas risk assessment undertaken by Sub Surface North West Ltd which identified a moderate-low gas migration risk, and a subsequent recommendation for gas monitoring; T J Booth Associates further assessed the environmental information used within the desk study. The potential gas sources were assessed and found to be mitigated regarding risk to the Application Site. The gas sources, mitigating factors and final risk potential are tabulated below:

Potential Gas Migration Source	Distance (m)	Mitigating Factors	Risk
Refuse tip	166m NE	Site is minor, ie a point source, and is also 10-15m higher than the Application Site elevation	Very low
Ex Universal Laundry Lodge (mill pond)	191m SW	Site is minor, ie a point source, and is also designated to be infilled with inert waste only	Very low
Site at Buckley Hill Lane	355m SW	Over the 250m landfill-Application Site buffer zone	Very low
Halliwell Street	396m NW	Over the 250m landfill-Application Site buffer zone	Very low
Site at Buckley Hill Lane	461m NW	Over the 250m landfill-Application Site buffer zone	Very low
Little Lane off Harbour Lane	478m SW	Over the 250m landfill-Application Site buffer zone	Very low
Little Lane off Harbour Lane	488m SW	Over the 250m landfill-Application Site buffer zone	Very low

Recommendations.

FOUNDATION ADVICE

MADE GROUND was noted on site, with trial hole investigations revealing the depth in excess of 3-3.5m.

The made ground was noted as very loose, and due to the depth noted; the site will not be suitable for traditional strip foundations.

Foundation options could be as follows and where possible require the minimum of soil removal to landfill:

- Piled foundation or similar driven to a suitable bearing capacity & depth.
- Vibro ground improvement and reinforced concrete raft or ground beams.
- Made ground removal, sorting & re-compaction for an reinforced concrete raft.

REMEDIATION STATEMENT

Regarding soil contamination risk to the site, the proposed end use is residential and elevated contaminants have been recorded in the upper made ground profile.

The rear of the site is to comprise a soft landscaping finish and thus existing made ground represents a risk to future site receptors, and should be remediated in the form of removal and replacement where necessary to mitigate the risk.

Made ground may remain on site beneath permanent hardstandings such as buildings, drives, pathways etc; however, it is advised that a cover layer of clean inert soil is imported to be used to replace all areas in garden and soft landscaping areas ONLY, subject to the following:

- Made ground must be reduced to a minimum 600mm from finish levels and be replaced with 600mm of clean inert soil.

Imported soil should be clean/inert, and free from deleterious materials, and should be suitable for use in a residential end use setting. Imported soil should be able to pass testing of the following potential contaminant suites to current Defra

Category 4 Screening Levels (C4SLs) where available, and then to the LQM/CIEH (S4ULs), for use in a residential end use setting:

- metals, inorganics, PAH USEPA16 speciated, and asbestos screening.

Regarding gas risk, further assessment of the local history, landfill sites and other potential historic gas generating sources have revealed a very low risk for the site. All potential sources are either at higher level, filled with inert materials, or are over the buffer distance for landfill site & subsequent gas migration to be an issue.

In addition, although made ground was noted beneath the site it comprised building rubble with no organic material; and the virgin soils beneath comprised fine grained alluvial silts.

Gas risk is not considered a risk to the site, and therefore no further investigations or protective measures are required.

FURTHER INFORMATION

Should any suspected unidentified contamination be encountered throughout the groundworks or construction phase of the development: all works should cease, the relevant area isolated, and potential contamination assessed by professional & competent persons detailing further recommendations & remedial measures.

Following confirmation of existing site soil samples, if required, remedial measures should be validated and comprise the following:

- Soil import for gardens/soft landscaping areas should be sampled at the rate of 1:200m3 from a proven greenfield source, and 1:50m3 from an unknown/brownfield source; not less than 3 samples to be taken for each.
- Soil import should be tested for the following contamination suites: metals, inorganics, PAH USEPA16 speciated, and asbestos screening. Results will be analysed against Defra Category 4 Screening Levels (C4SLs) where available, and then to the LQM/CIEH (S4ULs), for use in a residential end use setting.

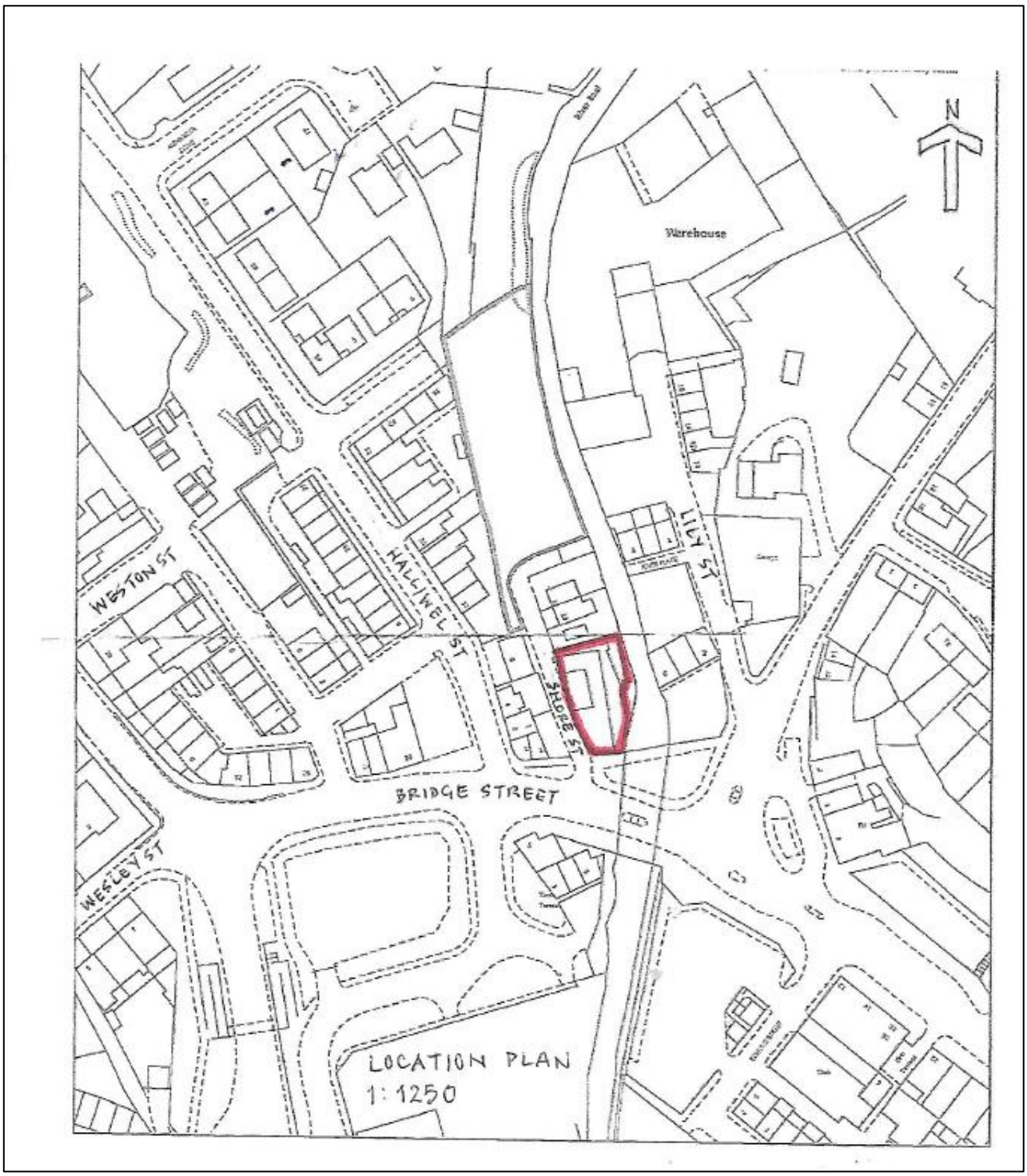
Following remedial measures, and only if required by the LPA or Building Control; the above should be analysed by suitably qualified & competent persons, and reported upon accordingly in a site completion/validation/verification report. The report should include documentary/photographic evidence of all remediation, and any subsoil/topsoil import sample results & subsequent import depth confirmation if required.

Before any further work is undertaken, this report should be submitted to and agreed by Building Control or Planning as appropriate.

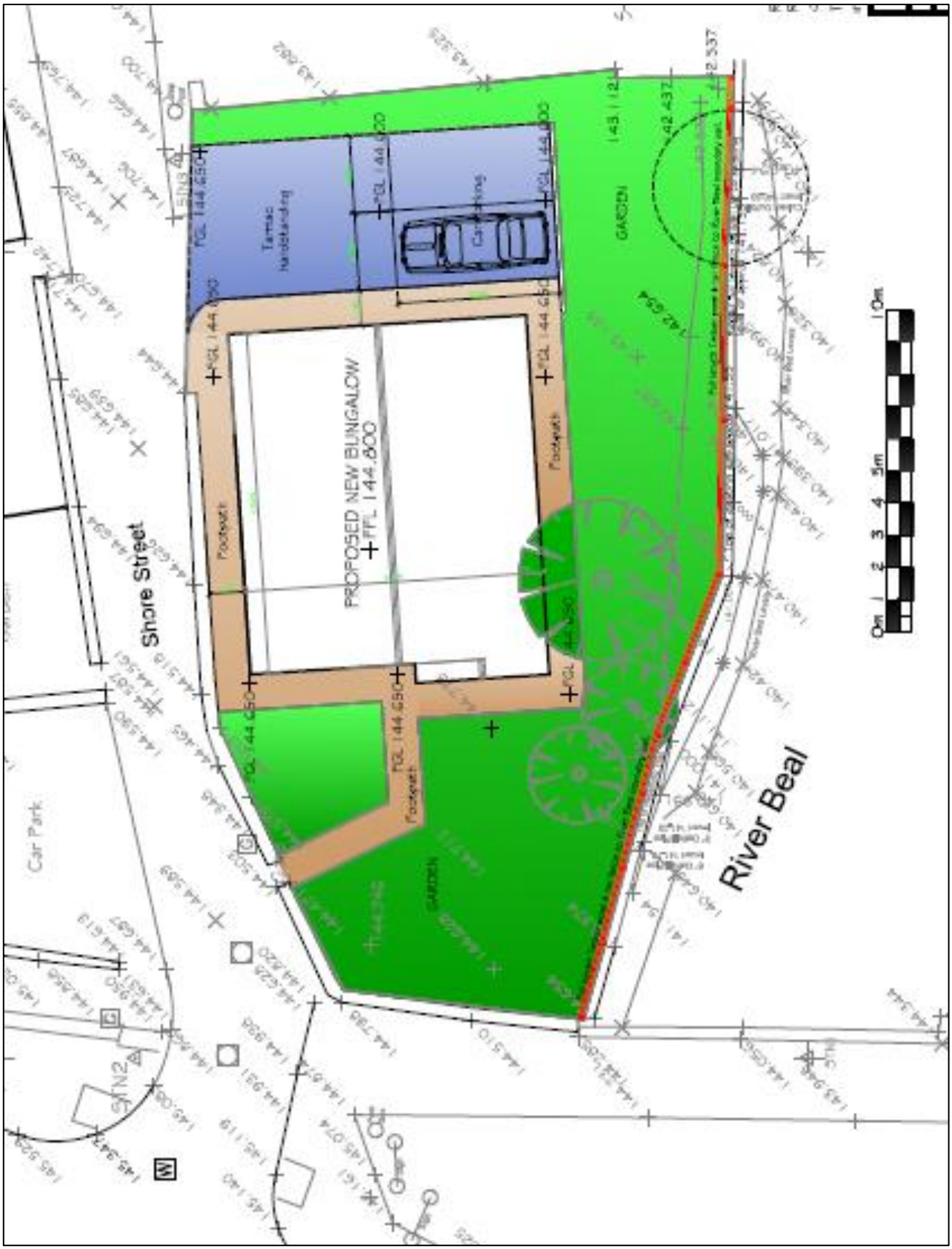
We trust that the above clear, but should you require further advice please contact the undersigned.

Appendix.

Location Plan.

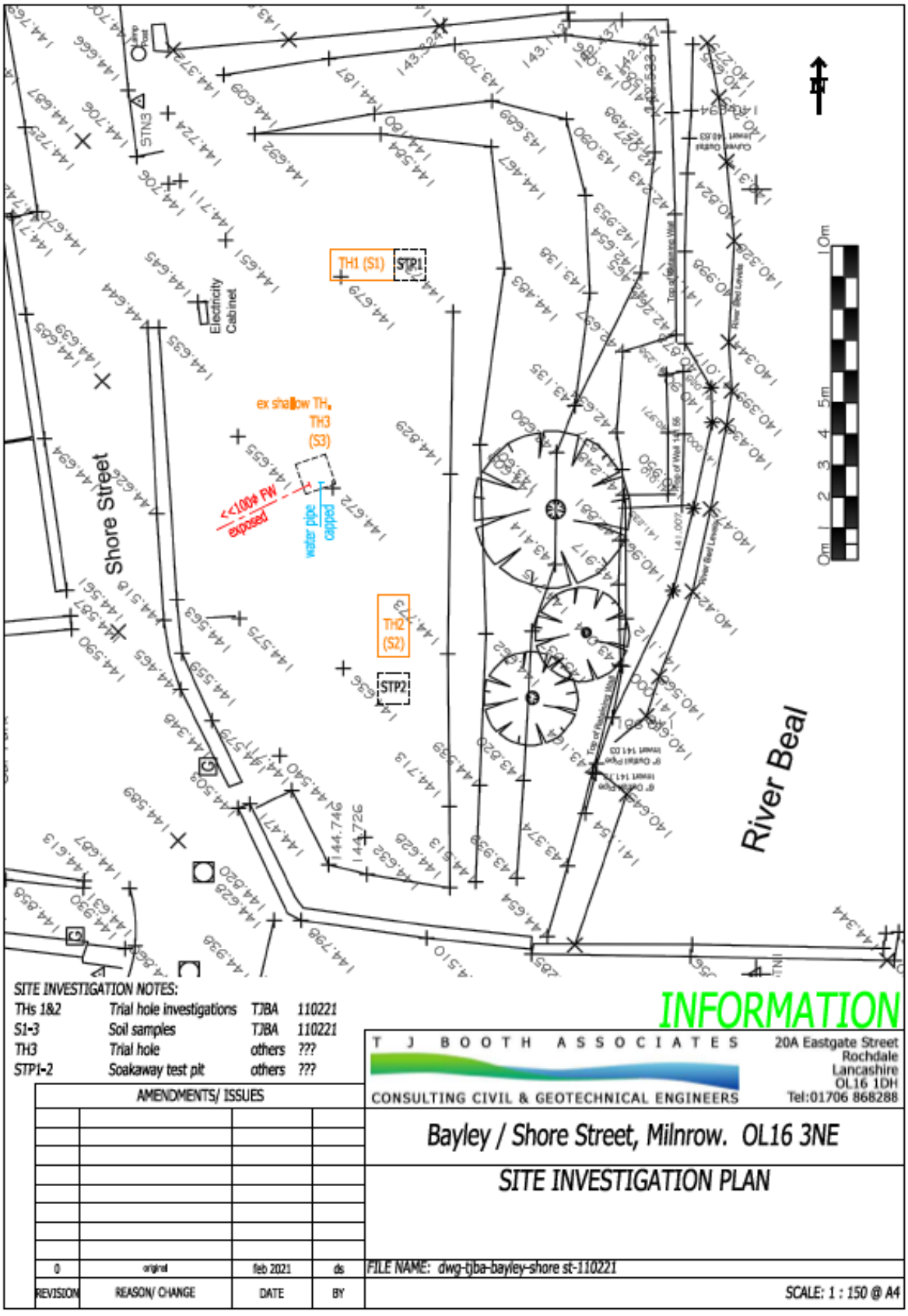


Proposed Plan.



T J Booth Associates. Consulting Engineers 20A Eastgate St, Rochdale OL16 1DH	Project: Bayley / Shore Street, Milnrow.				Job Ref.: rep-tjba-bayley-shore st-phs 2-110221	
	Section: Phase 2 Site Investigation Report				Sheet no./rev.: 8 / 0	
	Calc. by: DS	Date: 15/02/2021	Chk'd by: tjb	Date: 02/03/2021	App'd by:	Date:

Existing Plan/Site Investigation Plan.



Trial pit and borehole logging (BS5930)

TRIAL PIT LOG

Trial pit reference TP2 Sheet 1 of 1

Water	Reduced Level (m)	Legend	Depth (m)	Description
	144.65			
	141.25	X X X

T J Booth Associates. Consulting Engineers 20A Eastgate St, Rochdale OL16 1DH	Project Bayley / Shore Street, Milnrow.			Job Ref. rep-tjba-bayley-shore st-phs 2-110221	
	Section Phase 2 Site Investigation Report			Sheet no./rev. 10 / 0	
	Calc. by DS	Date 15/02/2021	Chk'd by tjb	Date 02/03/2021	App'd by Date

TRIAL PIT LOG

Trial pit reference TP2 Sheet 1 of 1

Water	Reduced Level (m)	Legend	Depth (m)	Description
	144.65			
	141.25	X X X X X X X X X X X X X X X X X X X X X X X X X X	(3.40) 3.40	Loose black MADE GROUND comprising full pieces of brick, stone & concrete, with finer fragments of mortar/plaster in a sand & gravel sized matrix. (S2). Soft brown very fine sandy SILT from 3200 at east side of trench only.
				Trial pit ends

Not shown to scale

Additional notes:

TRIAL PIT LOG

Trial pit reference TP3 Sheet 1 of 1

Water	Reduced Level (m)	Legend	Depth (m)	Description
	144.67			
	143.97	X X X X X X X X	(0.70) 0.70	Loose black MADE GROUND comprising full pieces of brick, stone & concrete, with finer fragments of mortar/plaster in a sand & gravel sized matrix. (S3)
				Trial pit ends

Not shown to scale

Additional notes:

T J Booth Associates. Consulting Engineers 20A Eastgate St, Rochdale OL16 1DH	Project: Bayley / Shore Street, Milnrow.				Job Ref.: rep-tjba-bayley-shore st-phs 2-110221	
	Section: Phase 2 Site Investigation Report				Sheet no./rev.: 11 / 0	
	Calc. by: DS	Date: 15/02/2021	Chk'd by: tjb	Date: 02/03/2021	App'd by:	Date:

Existing Soil Analysis.

Client / Site	***Bayley - Shore Street, Milnrow***
Sampling Date	***11.02.2021***

Comparison of Contamination Test Results with Thresholds (mg/kg)

Contaminant		No	Max	Mean	t 95	RESIDENTIAL (with or without plant uptake)		
							Pass/Fail	Comment
METALS	Arsenic as As, dry weight	3	17	15.667	16.9	37	PASS	
	Boron as B, hot water sol dw	3	0.61	0.5	0.596	290	PASS	
	Cadmium as Cd, dry weight	3	0.93	0.5167	0.868	22	PASS	
	chromium as Cr(III) dry weight	3	21	19.33	20.90	910	PASS	
	Chromium as Cr(VI), dry weight	3	0.5	0.5	0.5	21	PASS	
	Copper, as Dry Weight	3	140	88.333	132.6	2400	PASS	
	Lead, as Dry Weight	3	670	536.67	653	200	FAIL	
	Mercury as Hg, dry weight	3	0.44	0.3867	0.434	1.2	PASS	
	Nickel as Ni, dry weight	3	26	23	25.9	130	PASS	
	Selenium as Se, dry weight	3	0.2	0.2	0.2	250	PASS	
	Zinc as Zn, dry weight	3	300	220	292	3700	PASS	
INORGANIC	Cyanide (Total)	3	5.5	4.9	5.46	2.5	comment	
	Sulphate (Total) as SO4	3	0.16	0.1467	0.159	0.24	PASS	
	Sulphide	3	22	9.4333	20.3	250	PASS	
	pH	3	8.7	8.6333	8.7	6 to 8	ALKALINE	
	Sulphur (Elemental)	3	21	19	20.7	100	PASS	
	Asbestos Identification	3	1	0.3333	0.9	0	FAIL	
ORGANIC	SOM	3	6	4.8333	6			
PAH	acenaphthene	3	5.9	3.0333	5.62	1100	PASS	
PAH	acenaphthylene	3	1.3	0.6567	1.227	920	PASS	
PAH	anthracene	3	16	7.23	14.94	11000	PASS	
PAH	benzo[a]anthracene	3	36	18.767	34.3	13	FAIL	
PAH	benzo[a]pyrene	3	34	18.8	32.7	5	FAIL	
PAH	benzo[b]fluoranthene	3	39	21.633	37.5	3.7	FAIL	
PAH	benzo[g,h,i]perylene	3	20	11.997	19.5	350	PASS	
PAH	benzo[k]fluoranthene	3	18	9.58	17.2	100	PASS	
PAH	chrysene	3	36	19.167	34.4	27	FAIL	
PAH	dibenz[ah]anthracene	3	6.7	3.7767	6.47	0.3	FAIL	
PAH	fluoranthene	3	81	43.267	77.5	890	PASS	
PAH	fluorene	3	5.1	2.5333	4.83	860	PASS	
PAH	indeno[123-cd]pyrene	3	24	14	23.3	41	PASS	
PAH	napthalene	3	1.9	0.91	1.783	13	PASS	
PAH	phenanthrene	3	59	28.467	55.6	440	PASS	
PAH	pyrene	3	76	39.567	72.4	2000	PASS	
PAH	PAH (Total - SUM EPA16)	3	460	242	439	1	comment	
SVOC	phenol	3	0.3	0.3	0.3	380	PASS	

Soil Sample Certification.

eurofins | Chemtest
Eurofins Chemtest Ltd
Depot Road
Newmarket
CB8 0AL
Tel: 01638 606070
Email: info@chemtest.com

UKAS TESTING 2183

Final Report

Report No.:	21-04473-1		
Initial Date of Issue:	22-Feb-2021		
Client	TJ Booth Associates		
Client Address:	20a Eastgate Street Rochdale Lancs OL16 1DH		
Contact(s):	Daniel Slattery		
Project	Bayley - Shore St Shore Street, Milnrow, OL16 3NE		
Quotation No.:	Q19-18321	**Date Received:**	15-Feb-2021
Order No.:		**Date Instructed:**	15-Feb-2021
No. of Samples:	3		
Turnaround (Wkdays):	10	**Results Due:**	26-Feb-2021
Date Approved:	22-Feb-2021		
Approved By:			
Details:	Glynn Harvey, Technical Manager		

Results - Soil

Project: Bayley - Shore St Shore Street, Milnrow, OL16 3NE

Client: TJ Booth Associates				Chemtest Job No.:	21-04473	21-04473	21-04473
Quotation No.: Q19-18321				Chemtest Sample ID.:	1141700	1141701	1141702
				Client Sample ID.:	S1	S2	S3
				Sample Location:	TH1	TH2	TH3
				Sample Type:	SOIL	SOIL	SOIL
				Top Depth (m):	0.00	0.00	0.00
				Bottom Depth (m):	0.50	0.50	0.40
				Date Sampled:	11-Feb-2021	11-Feb-2021	11-Feb-2021
				Asbestos Lab:	COVENTRY	COVENTRY	COVENTRY
Determinand	**Accred.**	**SOP**	**Units**	**LOD**			
ACM Type	U	2192		N/A	-	-	Fibres/Clumps
Asbestos Identification	U	2192		N/A	No Asbestos Detected	No Asbestos Detected	Chrysotile
ACM Detection Stage	U	2192		N/A	-	-	Stereo Microscopy
Moisture	N	2030	%	0.020	11	12	9.0
pH	U	2010		4.0	8.7	8.7	8.5
Boron (Hot Water Soluble)	U	2120	mg/kg	0.40	0.47	0.42	0.61
Sulphur (Elemental)	U	2180	mg/kg	1.0	18	18	21
Cyanide (Total)	U	2300	mg/kg	0.50	5.5	4.1	5.1
Thiocyanate	U	2300	mg/kg	5.0	< 5.0	< 5.0	< 5.0
Sulphide (Easily Liberatable)	N	2325	mg/kg	0.50	5.0	1.3	22
Sulphate (Total)	U	2430	mg/kg	100	1500	1300	1600
Arsenic	U	2450	mg/kg	1.0	14	16	17
Cadmium	U	2450	mg/kg	0.10	0.31	0.31	0.93
Chromium	U	2450	mg/kg	1.0	17	21	20
Copper	U	2450	mg/kg	0.50	59	66	140
Mercury	U	2450	mg/kg	0.10	0.44	0.38	0.34
Nickel	U	2450	mg/kg	0.50	18	26	25
Lead	U	2450	mg/kg	0.50	670	500	440
Selenium	U	2450	mg/kg	0.20	< 0.20	< 0.20	0.25
Zinc	U	2450	mg/kg	0.50	140	220	300
Chromium (Hexavalent)	N	2490	mg/kg	0.50	< 0.50	< 0.50	< 0.50
Organic Matter	U	2625	%	0.40	3.8	5.9	7.6
Naphthalene	U	2700	mg/kg	0.10	< 0.10	1.9	0.73
Acenaphthylene	U	2700	mg/kg	0.10	< 0.10	0.57	1.3
Acenaphthene	U	2700	mg/kg	0.10	< 0.10	3.1	5.9
Fluorene	U	2700	mg/kg	0.10	< 0.10	2.4	5.1
Phenanthrene	U	2700	mg/kg	0.10	1.4	25	59
Anthracene	U	2700	mg/kg	0.10	0.29	5.4	16
Fluoranthene	U	2700	mg/kg	0.10	2.8	46	81
Pyrene	U	2700	mg/kg	0.10	2.7	40	76
Benzo[a]anthracene	U	2700	mg/kg	0.10	1.3	19	36
Chrysene	U	2700	mg/kg	0.10	1.5	20	36
Benzo[b]fluoranthene	U	2700	mg/kg	0.10	1.9	24	39
Benzo[k]fluoranthene	U	2700	mg/kg	0.10	0.74	10	18

Results - Soil

Project: Bayley - Shore St Shore Street, Milnrow, OL16 3NE

Client: TJ Booth Associates					Chemtest Job No.:	21-04473	21-04473
Quotation No.: Q19-18321					Chemtest Sample ID.:	1141700	1141701	1141702
					Client Sample ID.:	S1	S2	S3
					Sample Location:	TH1	TH2	TH3
					Sample Type:	SOIL	SOIL	SOIL
					Top Depth (m):	0.00	0.00	0.00
					Bottom Depth (m):	0.50	0.50	0.40
					Date Sampled:	11-Feb-2021	11-Feb-2021	11-Feb-2021
					Asbestos Lab:	COVENTRY	COVENTRY	COVENTRY
Determinand	**Accred.**	**SOP**	**Units**	**LOD**				
Benzo[a]pyrene	U	2700	mg/kg	0.10		1.4	21	34
Indeno(1,2,3-c,d)Pyrene	U	2700	mg/kg	0.10		1.0	17	24
Dibenz(a,h)Anthracene	U	2700	mg/kg	0.10		0.23	4.4	6.7
Benzo[g,h,i]perylene	U	2700	mg/kg	0.10		0.99	15	20
Total Of 16 PAH's	U	2700	mg/kg	2.0		16	250	460
Total Phenols	U	2920	mg/kg	0.30		< 0.30	< 0.30	< 0.30

Photographs.

TH1



TH2



VIEW FROM NORTH EAST TO SOUTH WEST.



VIEW FROM NORTH TO SOUTH.



B Regs, Approved Document A, Table 10, Diagram 23 & Clause 2E4.

Table 10 Minimum width of strip footings

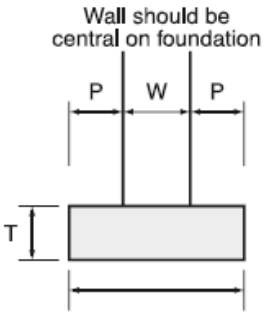
Type of ground (including engineered fill)	Condition of ground	Field test applicable	Total load of load-bearing walling not more than (kN/linear metre)					
			20	30	40	50	60	70
			Minimum width of strip foundations (mm)					
I Rock	Not inferior to sandstone, limestone or firm chalk	Requires at least a pneumatic or other mechanically operated pick for excavation	In each case equal to the width of wall					
II Gravel or sand	Medium dense	Requires pick for excavation. Wooden peg 50mm square in cross section hard to drive beyond 150mm	250	300	400	500	600	650
III Clay Sandy clay	Stiff Stiff	Can be indented slightly by thumb	250	300	400	500	600	650
IV Clay Sandy clay	Firm Firm	Thumb makes impression easily	300	350	450	600	750	850
V Sand Silty sand Clayey sand	Loose Loose Loose	Can be excavated with a spade. Wooden peg 50mm square in cross section can be easily driven	400	600				
VI Silt Clay Sandy clay Clay or silt	Soft Soft Soft Soft	Finger pushed in up to 10mm	450	650				
VII Silt Clay Sandy clay Clay or silt	Very soft Very soft Very soft Very soft	Finger easily pushed in up to 25mm	Refer to specialist advice					

Note: Foundations on soil types V and VI do not fall within the provisions of this section if the total load exceeds 30kN/m.

The table is applicable only within the strict terms of the criteria described within it.

Diagram 23 Foundation dimensions

See para 2E2c



The minimum thickness of the foundation (T) should either be P or 150mm, whichever is greater

Foundation width should be not less than the appropriate dimension in Table 10

Trench fill foundations may be used as an alternative to strip foundations.

Minimum depth of strip foundations

2E4 Except where strip foundations are founded on rock, the strip foundations should have a minimum depth of 0.45m to their underside to avoid the action of frost. This depth, however, will commonly need to be increased in areas subject to long periods of frost or in order to transfer the loading onto satisfactory ground.

In clay soils subject to volume change on drying ('shrinkable clays', with Modified Plasticity Index greater than or equal to 10%), strip foundations should be taken to a depth where anticipated ground movements will not impair the stability of any part of the building taking due consideration of the influence of vegetation and trees on the ground. The depth to the underside of foundations on clay soils should not be less than 0.75m on low shrinkage clay soils, 0.9m on medium shrinkage clay soils and 1.0m on high shrinkage clay soils, although these depths may need to be increased in order to transfer the loading onto satisfactory ground, or where there are trees nearby.

BS:8004 Table 1.

Table 1 — Presumed allowable bearing values under static loading (see 1.2.3 and 1.2.4)

NOTE These values are for preliminary design purposes only, and may need alteration upwards or downwards. No addition has been made for the depth of embedment of the foundation (see 2.1.2.3.2 and 2.1.2.3.3).

Category	Types of rocks and soils	Presumed allowable bearing value		Remarks
		kN/m^2 [a]	kgf/cm^2 [a] tonf/ft^2	
Rocks	Strong igneous and gneissic rocks in sound condition	10 000	100	These values are based on the assumption that the foundations are taken down to unweathered rock. For weak, weathered and broken rock, see 2.2.2.3.1.12
	Strong limestones and strong sandstones	4 000	40	
	Schists and slates	3 000	30	
	Strong shales, strong mudstones and strong siltstones	2 000	20	
Non-cohesive soils	Dense gravel, or dense sand and gravel	> 600	> 6	Width of foundation not less than 1 m. Groundwater level assumed to be a depth not less than below the base of the foundation. For effect of relative density and groundwater level, see 2.2.2.3.2
	Medium dense gravel, or medium dense sand and gravel	< 200 to 600	< 2 to 6	
	Loose gravel, or loose sand and gravel	< 200	< 2	
	Compact sand	> 300	> 3	
	Medium dense sand	100 to 300	1 to 3	
	Loose sand	< 100	< 1	
		Value depending on degree of looseness		
Cohesive soils	Very stiff boulder clays and hard clays	300 to 600	3 to 6	Group 3 is susceptible to long-term consolidation settlement (see 2.1.2.3.3). For consistencies of clays, see Table 5
	Stiff clays	150 to 300	1.5 to 3	
	Firm clays	75 to 150	0.75 to 1.5	
	Soft clays and silts	<75	<0.75	
	Very soft clays and silts	Not applicable		
Peat and organic soils		Not applicable		See 2.2.2.3.4
Made ground or fill		Not applicable		See 2.2.2.3.5

[a] 107.25 kN/m^2 = 1.094 kgf/cm^2 = 1 tonf/ft^2.