

GEO-ENVIRONMENTAL AUDIT

PHASE 1 Preliminary Risk Assessment

PHASE 2 Site Investigation

PHASE 3 Remediation Statement

Proposed Residential Development

Sigma Properties

Tweedale Street (53-61)

Rochdale

OL11 1AH

Author: Daniel Slattery
Client: Sigma Properties
Reference: rep-tjba-sigma-tweedale st-phs1_2_3env-270220.docx

Revision	Date	Reason
0	February 2020	Original to support planning application.
1	November 2023	Updated to support a new application for residential development.

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1. PHASE 1 - PRELIMINARY RISK ASSESSMENT

1.1. Introduction

T. J. Booth Associates have been appointed by Sigma Properties to undertake a Phase 1, 2 & 3 Environmental Audit to the above Development Site.

The Site is within an urban area in the centre of Rochdale, comprised on a predominantly residential area, with some local shops and amenities. Site centre co-ordinates are: E: 389548, N: 412569.

The plot has been vacant since c2003, when the existing terraced dwellings were demolished.

The revision 0 version of this report was undertaken for a planning application in 2020. The reporting comprised both phase 1 PRA & phase 2 site investigation elements.

The purpose of the report update is to accompany a new planning application for a residential development.

This report provides a desk-based study & intrusive ground investigation based on current UK guidance for environmental investigation within the construction industry. Principal to the assessment is the 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 BS 5930:2015, BS 10175:2011+A2:2017, CIRIA C665, and BS 8485:2015+A1:2019 et al.

1.2. Proposed Development

The proposal is for redevelopment of the Site into a residential end use.

4No. residential dwellings will be erected between the existing dwellings surrounding the Site.

The new properties will front directly onto Tweedale Street with car parking/yards to the rear.

1.3. Historic Maps

DATE	ON-SITE	OFF-SITE/SURROUNDING AREA
c1850	Site is part wooded area and part open fields adjacent to the Castlemere manor house but part of the wider Castlemere Estate.	Much of the local area comprises fields surrounding the Castlemere manor house, with further residential terraced dwellings in the wider area. Railway 200m south.
c1892	Site now taken up by 5 terraced dwellings fronting onto Tweedale Street with yards to the rear (south) side. Outhouses to rear yards.	Castlemere manor house remains to the north across what is now Tweedale Street, and some open land between the site and the railway, but the remainder of the land locally mainly comprises terraced dwellings, larger villa type dwellings, churches etc.
c1910	Outhouses now not shown on rear yards.	More urban infill in the wider area especially to the south east previously undeveloped.
c1930	No change.	Further minor urban infill.
c1958	No change.	No overall change.
c1978-85	No change.	Much change in the wider area. Demolition of many terraced dwellings especially to the north west & south west, and repositioning and widening of Manchester Road.
c1985-90	No change.	No overall change.
c1992	No change.	No overall change.
c1993-95	No change.	No overall change.
c2003	No change.	No overall change.

c2005	Dwellings now demolished and the Site is a vacant plot.	No overall change.
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1.4. Present Day Maps

Site Boundaries, Outlines of Structures and Buildings:	The Site is a vacant plot of land comprising soft landscaping with low cut vegetation. It is open to Tweedale Street to the front but fenced off (paladin) to the rear. No structures currently remain on-site. The east and west boundaries comprise masonry walls associated with the adjacent terraced dwellings and rear yard walls.
Ground Contours, Natural Drainage Features:	The Site and local area are relatively level. The surrounding area and is drained via the United Utilities public piped drainage/sewerage system.
Water Courses:	In the wider area, overall land elevation falls to the north & west towards the River Roch nominally 650m distant. The Rochdale Canal is approximately 750m south.
Below Ground Obstructions:	The former dwellings were located to the front of the Site in line with the existing neighbouring terraces, so there could be cellars beneath this part of the Site. It is likely a UU sewer will flow through the rear of the properties picking up foul & surface water combined from the neighbouring terraces.

1.5. Geology

Bedrock Geology:	The Site is underlain by undifferentiated Coal Measures (Westphalian Carboniferous), generally comprising thin horizons of sandstone & mudstone. A fault trending NE-SW lie nominally 75m south. Stratigraphic dip for the local area is nominally 5-10degs southwest.
Superficial Geology:	The Site is shown to be underlain by glacial till, the boundary of which terminates at the southeast boundary with no cover beyond it to the south.
Coal Seams.	The Arley coal seam sub-crops 300m east/northeast, but is considered to be too deep beneath the Site to pose a risk.

1.6. Boreholes Records

The closest accessible boreholes to the Site are approximately 200m N. The records suggest approximately up to 4m sand & gravel deposits on top of boulder clay.

1.7. Planning Data.

Past planning application for the land have been submitted but contained no data relevant to the environmental assessment.

1.8. Landmark Environmental Data

1.8.1. Agency & Hydrological

Contaminated land register entries & notices:	No records within a 250m radius.
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Pollutant incidents to controlled waters:	No records within a 250m radius.
Bedrock aquifer:	Secondary A.
Superficial aquifer:	Secondary undifferentiated.
Source protection zone:	Not within an SPZ.

1.8.2. WASTE

BGS recorded landfill sites:	Closest is Mandale Park 390m W.
Historical landfill sites:	Closest is Mandale Park 389m W.
Registered landfill sites:	No registered waste or landfill sites were recorded within a 250m radius.

1.8.3. HAZARDOUS SUBSTANCES

Planning hazardous substance consents:	No records within a 250m radius.
Planning hazardous substance enforcements:	No records within a 250m radius.

1.8.4. GEOLOGICAL

Mining Instability:	No records.
Potential for Collapsible Ground Stability Hazards:	Very low risk.
Potential for Compressible Ground Stability Hazards:	No hazard.
Potential for Ground Dissolution Stability Hazards:	No hazard.
Potential for Landslide Ground Stability Hazards:	Very low risk.
Potential for Running Sand Ground Stability Hazards:	Very low risk.
Potential for Shrinking or Swelling Clay Ground Stability Hazards:	No hazard.
Radon Potential - Radon Affected Areas:	Within an area where less than 1% of homes at or above the action level. ***RADON MAPS HAVE BEEN UPDATED AND THE SITE IS NOW WITHIN A 1-3% AREA.***
Radon Potential - Radon Protection Measures:	None required.

1.9. Coal Authority

Entries, Adits, Shafts.	No shafts within 20m of Site boundaries. Closest was 775m NW.
Past Recorded Underground Mining.	No recorded workings of coal beneath the Site.
Present/Future Underground Mining.	Not known to be a risk.

Unrecorded Shallow Workings: Probable/Potential Underground	None noted beneath the Site.
Past/Present/Future Mining/Opencast: Surface	None noted locally.
Mining Geology and Subsidence:	Not noted.
Hazards and Mine Gas:	Unknown.
Development High Risk Area:	The Site is NOT within a Development High Risk Area.
Abandonment Plan Data:	No data available.

1.10. Industry Profiles

N/A.

1.11. Site Reconnaissance

1.12. 24.03.2020

Details of Existing Structures:	The Site was accessed via the main road. It was vacant, and comprised a made ground surface, with vegetation recently cut. There was a small (nominally 500-600mm high) bund to the front and rear, presumably to stop vehicular intrusion. No structures were noted on site except from the masonry brick walls to the adjacent properties denoting the boundaries to the west and east sides, and the paladin fencing to the rear south side.
Adjacent Properties:	Residential dwellings terraces to the east & west. Tweedale Street (main road) to the front of the site (north side). Access road/alley forming the rear boundary. Local area is predominantly residential with some minor commercial (shops/amenities) to Tweedale Street.
Water Levels, Directions of Flow and Rates in Rivers:	None noted.
Old Mine or Quarry Workings:	None noted.
Obvious/Immediate Hazards to Health/Safety:	None.
Areas of Discoloured Soil, Polluted Water, Vegetation, and Significant Odours:	Made ground identified which is likely contaminated with minor contaminants but no visual or olfactory evidence of major contamination.
Relevant Ground Levels, Ground Water Levels, Positions of Wells and Springs:	Site is relatively level.

1.13. 22.11.2023

The Site was unchanged from the earlier 2020 reconnaissance, apart from slightly higher vegetation, and minor general tipping. Refer to photos in Appendix.

1.14. Identification of Source-Pathway-Receptor.

1.14.1. Summary

The Site was part of agricultural land/woods c1850s but was developed into terraced dwellings by the early 1890s. It remained in this state until between c2003-2005 when the buildings were demolished, and has remained vacant since.

The local area has been predominantly residential, generally undergoing mass construction of terraced dwellings between c1850 & 1890. There have been parts of the local area that have undergone further development and infill, but generally the area has remained residential apart from small shops & local amenities along the main roads. The largest change in the locality was in the late 1970s to early 1980s when many terraced dwellings were demolished, and Manchester Road was widened & repositioned in parts.

Due to local development including that of the Site, it is anticipated that past development/demolition construction processes may have contributed minor ground contamination over residential thresholds.

On Site reconnaissance the ground surface was noted to comprise MADE GROUND, however, no visual or olfactory evidence of major contamination was reported.

Although the Site is within an industrial town, there has been no large scale commercial or polluting industry within close proximity.

There are no landfill sites within influencing proximity of the development – the closest is Mandale Park 390m west.

Although there are coal seams beneath the Site at depth, these are considered too deep to have an impact at ground surface, and no evidence of workings have been noted locally.

The Site is within a Radon Protection Area, where 1-3% of properties are affected. Locations in this area require no protection measures to new dwellings.

1.14.2. Potential Contaminants.

CURRENT SOURCE/S	ORIGINAL ASSOCIATED SOURCE	CONTAMINANT/S
Existing historic made ground on the Site surface.	Imported building materials and later demolition. Materials such as mortars & plasters, ash, heat resistant fixings/fittings/insulation, other material such as hardcore & planings etc.	Metals, PAHs, sulphates, inorganics, asbestos.

1.14.3. Potential Pathways.

PATHWAY	MEDIA
Soil and dust ingestion	Soil and indoor dust
Consumption of home-grown fruit and vegetables	Produce
Skin contact (indoors)	Indoor dust
Skin contact (outdoors)	Soil
Inhalation of dust (indoors)	Air
Inhalation of dust (outdoors)	Air
Vapours (indoors)	Air
Vapours (outdoors)	Air

1.14.4. Potential Receptors.

Receptors mainly comprise workers in the construction phase, and residents for the proposed end use.

Controlled waters: no receptors.

1.15. Preliminary Conceptual Model.

CURRENT SOURCE/S		ORIGINAL ASSOCIATED USAGE / LOCATION	CONTAMINANT TYPE	PATHWAY	RECEPTOR	POLLUTION LINKAGE	CONSEQUENCE	PROBABILITY	RISK
CHEMICAL (SOLID)	Existing made ground - surface/sub-soil.	Former terrace construction & demolition.	Metals, PAHs, inorganics, sulphates, asbestos.	Direct ingestion, aerial ingestion, dermal contact, drinking water.	Site construction operatives & future occupants. Site buildings.	Historical made ground will have to be investigated as it is likely that it comprises common contaminants above threshold values allowed for a residential usage.	Medium.	High likelihood.	High risk.
	Geological ground gas.	Radon sources in Namurian deposits underlying the Site.	Rn.	Diffusion through soil, substructure s, aerial inhalation.	Future occupants. Explosion, suffocation.	The Site is within a Class 2 radon area. No protective measures are required.	Minor.	Unlikely.	Low risk.
GROUND GAS RISK (VAPOURS)	Anthropogenic ground gas sources.	Minor fill of the Site including potential fill to cellars.	CH ₄ , CO ₂ , other trace gases.	Superficial geology locally is sand/sand & gravel.		Any infill will be negligible (max depth will be infilled cellars with general inert demolition rubble). No historic excavations or areas of fill noted on historic maps.	Medium.	Unlikely.	Low risk.
		Historic landfill sites in the wider area.				All historic landfill sites over 250m from the Site.	Medium.	Unlikely.	Low risk.
CHEMICAL (LIQUID)	Existing made ground - surface/sub-soil.	Former terrace construction & demolition.	Metals, PAHs, sulphates.	Permeation through soil into ground water, local watercourse s, or aquatic habitats.	Contaminated ground / surface water. Controlled Waters such as watercourses, canal, aquatic habitats & associated wildlife.	Unlikely to pose a significant risk. Metal & PAH contamination is expected to be minor, and these contaminants of concern are not as mobile as others. Made ground deposits are limited in area. There are also no groundwater extractions or source control areas locally. No significant controlled water receptors.	Medium.	Unlikely.	Low risk.

2. PHASE 2 - SITE INVESTIGATIONS & FINAL RISK ASSESSMENT.

2.1. Site Investigations

2.2. 24.03.2020.

Due to the end use and potential minor contamination noted within the conceptual model, a soil sampling regime was undertaken. BS10175:2011+A1:2013 & R&D TECHNICAL REPORT P5-066/TR considers the upper 500mm is sufficient to categorise the site soils 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 Site area, nominally 4 soil samples representative of the upper 500mm of MADE GROUND would satisfy guidance criteria for sampling.

No specific potential contamination hotspots were noted in the desk study, so samples were undertaken in nominal grid format.

Soil sampling was undertaken by T J Booth Associates and comprised 4No. samples of the upper soils (S1-4), refer to SI plan in appendix. The Site was vacant, comprising a made ground surface.

Soil samples were all representative of the upper 500mm of ground as encountered and comprised the following:

- S1 Brown sandy silty MADE GROUND, much fragments of brick, stone, slate & occasional glass.
- S2 Light brown sandy MADE GROUND, occasional fragments of brick & stone.
- S3 Brown sandy gravelly MADE GROUND, much fragments of brick, stone.
- S4 Brown silty/clayey MADE GROUND, much fragments of brick, stone, slate & occasional glass

Soil samples were sealed in 1kg white plastic snap top containers & amber jars, and sent to Chemtest Ltd to be tested for the following contaminant suites: metals, speciated PAH, inorganics & sulphates, SOM, and asbestos screening.

No visual or olfactory evidence of hydrocarbon contamination was suspected on Site or in the risk assessment.

2.3. Final Risk Assessments.

2.3.1. Human Health Risk.

2.3.1.1. Shallow soil contamination.

On return the samples were assessed by TJ Booth Associates to common threshold comparison data, specifically the Defra Category 4 Screening Levels (C4SLs), then to LQM/CIEH (S4ULs).

Testing of made ground revealed contaminant levels above residential threshold values with elevated levels of the following contaminants of concern, (refer to testing certificates, and full analysis spreadsheets in the Appendix):

Trial Hole/Soil Sample	Made ground horizon	Mitigation/Action
S1	Arsenic, lead	FURTHER ACTION
S2	Lead, dibenz[ah]anthracene	FURTHER ACTION

S3	dibenz[ah]anthracene	FURTHER ACTION
S4	dibenz[ah]anthracene	FURTHER ACTION

Due to above elevated levels noted, existing soil is considered to be mildly contaminated above threshold levels allowed for a residential end use. The existing soils will not be suitable for reuse with regard to human receptors and a suitable cover system will need to be employed.

2.3.1.2. Water pipes.

No particular contaminative risk included within the source-pathway-receptor methodology has been noted on-site either historically or currently, including industrial or other historic uses which would have introduced organic contaminants which would affect new potable water pipes.

As no sources of the risk chemicals in the PSRAS tables have been identified, there is no pollutant linkage.

Testing for PSRAS contaminants is therefore NOT advised or required in accordance with UK environment risk methodology or UU water supply pipe guidance.

2.3.2. Controlled Waters Risk.

Groundwater samples against the EQS & also drinking water standards (UK DWI 2016 & WHO 2022), and surface water/river sampling results are generally compared against the Environment Quality Standards for Freshwater (EQS).

2.3.2.1. Groundwater.

Risks to groundwater are considered low for the following reasons:

- The Site has had no former industrial or contaminative usage.
- Was formerly agricultural land prior to becoming terraces.
- The Site is underlain by a low vulnerability, secondary aquifer.
- Not in a source protection zone.
- No water abstractions in the local area.

2.3.2.2. Surface water/watercourses.

Risk to surface water is considered low for the following reasons:

- No watercourses adjacent or close to the Site.
- Low ground water risk at the Site (no watercourse baseflow issues etc).
- Nearest surface water feature is over 600m distant.

2.3.3. Ground Gas Risk.

2.3.3.1. Historic landfill sites.

There are no current or historic landfill sites within a 250m radius of the Site boundaries.

2.3.3.2. On-site refuse tips/infilled land.

None noted.

No credible risk is attributed to this source.

2.3.3.3. Radon.

The Site is in a class 2 radon probability area (1-3% above the action level), and as such, radon protective measures are not required in new development.

2.3.3.4. Alluvium.

No alluvium or peat deposits noted in the local area.

2.4. Final Conceptual Model.

CURRENT SOURCE/S		ORIGINAL ASSOCIATED USAGE / LOCATION	CONTAMINANT TYPE	PATHWAY	RECEPTOR	POLLUTION LINKAGE	CONSEQUENCE	PROBABILITY	RISK	MITIGATION PROPOSED
CHEMICAL (SOLID)	Existing made ground - surface/sub-soil.	Former terrace construction & demolition.	Metals, PAHs, inorganics, sulphates, asbestos.	Direct ingestion, aerial ingestion, dermal contact, drinking water.	Site construction operatives & future occupants. Site buildings.	Historical made ground has been investigated and found to comprise mild contamination including metals (arsenic & lead), and PAHs (dibenz[ah]anthracene), above threshold levels allowed for a residential threshold end use.	Medium.	High likelihood.	High risk.	Soils to comprise cover or removal in soft landscaped areas OR to comprise permanent hardstanding yard areas. This will ensure pathways are removed thus breaking the source-pathway-receptor pollutant linkages.

3. PHASE 3 - REMEDIATION STATEMENT

3.1. Basic Site Details

Full details included in the Phase 2 Site Investigation Introduction & subsequent sections.

3.2. Site & Remedial Objectives

Site investigations undertaken as part of the Phase 2, comprised soil sampling.

There is currently one remedial objective for the Site:

- General soil remediation.

The risk is specific to the end use.

3.3. Conceptual Model (Final) & Relevant Pollution Linkages

Refer to Phase 2 Site Investigation and Assessment section of the report for Final Conceptual Model.

A pollutant linkage was identified regarding the minor contamination of upper Site soil with metals noted.

To break the pollution linkage, either the source must be removed, or the pathways mitigated. It is not appropriate in this case to modify behaviour of or remove receptors.

3.4. Recommended Remediation:

Made Ground/Soil Risk:

While made ground may remain on site beneath permanent hardstandings such as buildings, roads, pavements & pathways etc; to mitigate the risk to receptors, it is advised that a cover layer of clean inert soil is imported for garden and soft landscaping areas ONLY.

Dependent on the final finished levels, existing made ground within proposed soft landscaping areas, should either be covered with 600mm of imported soil, or excavated to 600mm from finish levels and replaced with a clean imported cover soil to suit finishes. The 600mm cover system is adopted for the following reasons:

Root systems for shrubs are typically up to 600 mm;

Excavations are unlikely to be deeper than 600 mm in typical gardening activities;

Bio-turbation is typically limited to the top 600 mm of the soil profile;

Excavations by children or pets are unlikely to exceed 600 mm.

Imported soil should be clean/inert and free from deleterious materials and should be suitable for use in a residential end use setting. It should be able to pass testing of metals, speciated PAH, inorganics & sulphates, SOM, and asbestos screening 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.

Should the rear external garden areas comprise a permanent hardstanding/yards, then a simple cover system of 100mm MOT, 50mm coarse sand blinding & PCC paviour or similar flags will be sufficient to mitigate pathways & risk.

3.5. Verification (Phase 4 requirements)

Verification of the imported soil may be required for Planning or Building Control/Building Regulations submission. Should this be required, it will need to be undertaken by suitably qualified consultants and comprise the following:

- Import source material.
- Characterisation & suitability of material.
- Soil sampling should be undertaken as per YALPAG Guidelines as per the following ratios:

Virgin quarried materials, 1-2 samples to confirm inert nature.

Crushed hardcore, stone, brick, min 1 sample per 500cum.

Greenfield/manufactured, generally 1 sample per 250cum (min 3 samples).

Brownfield, generally 1 sample per 50cum (min 6 samples).

Samples 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.

- Verification depth.
- Reporting (including photographic evidence).

3.6. Additional Notes

Before any further work is undertaken, this report should be submitted to and agreed by the Local Planning Authority Contaminated Land Department/Building Control Department as necessary.

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

Signed.....



D.S. Slattery BSc (Hons).

T J Booth Associates.

Authorised...



T J Booth BSc (Hons), C. Eng. C. Env. MICE.

T J Booth Associates.

5. APPENDIX A: FIGURES

5.1. Location Plan

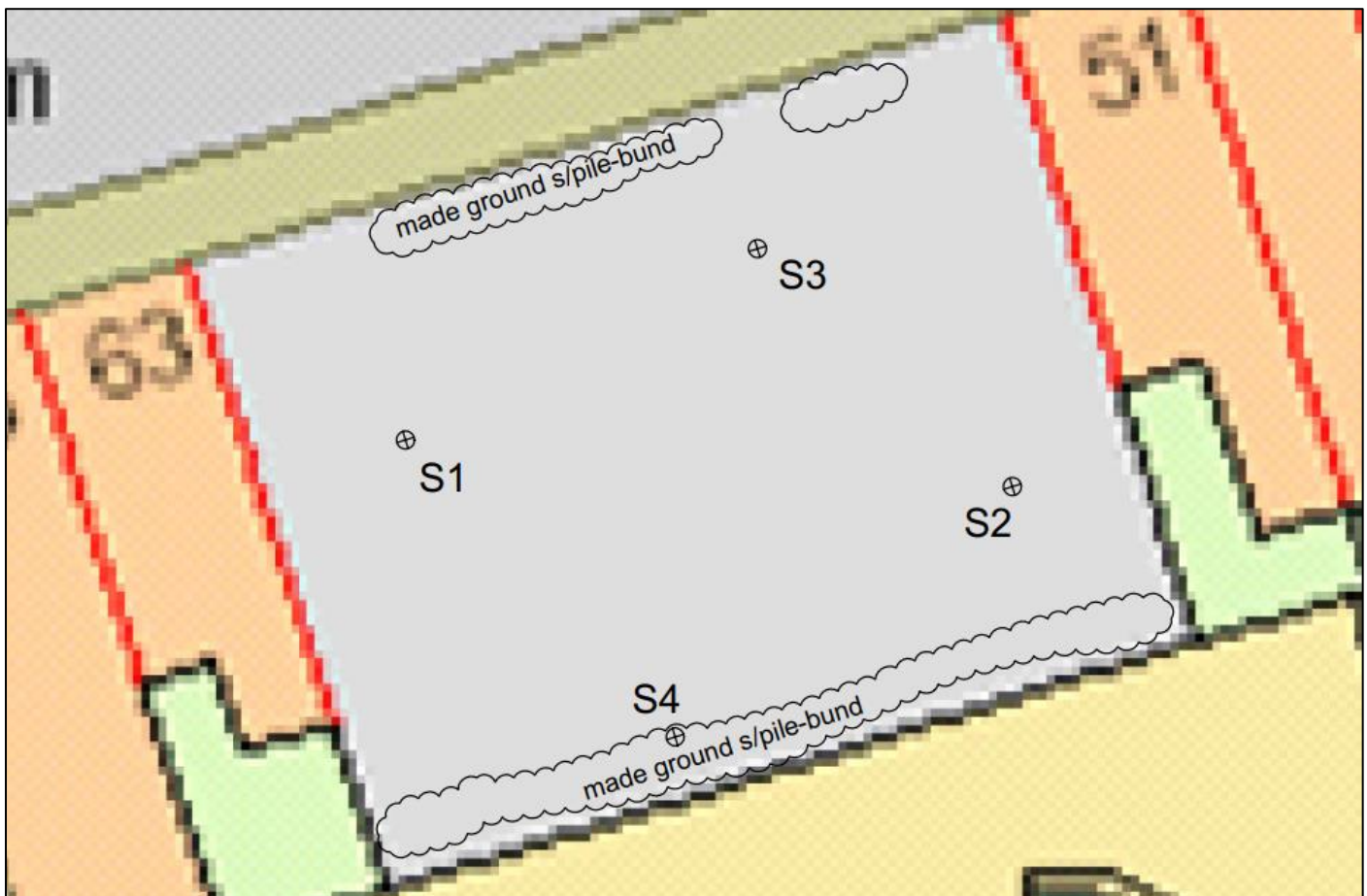


5.2. Proposed Development





5.3. Site Investigation Plan



5.4. TJBA Soil Analysis

Client / Site		Sigma - Tweedale Street, Rochdale						
Sampling Date		24.03.2020						
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	4	47	22.5	42.5	37	FAIL	S1
	Boron as B, hot water sol dw	4	0.96	0.705	0.933	290	PASS	
	Cadmium as Cd, dry weight	4	0.88	0.468	0.813	22	PASS	
	chromium as Cr(III) dry weight	4	26	21.50	26.00	910	PASS	
	Chromium as Cr(VI), dry weight	4	0.5	0.5	0.5	21	PASS	
	Copper, as Dry Weight	4	170	82.75	154.9	2400	PASS	
	Lead, as Dry Weight	4	260	169.8	251	200	FAIL	S1, S2
	Mercury as Hg, dry weight	4	0.48	0.335	0.464	1.2	PASS	
	Nickel as Ni, dry weight	4	58	36	55	130	PASS	
	Selenium as Se, dry weight	4	0.51	0.388	0.494	250	PASS	
	Zinc as Zn, dry weight	4	190	111.5	181	3700	PASS	
INORGANIC	Cyanide (Total)	4	0.5	0.5	0.5	2.5	PASS	DS2
	Sulphate (Total) as SO4	4	0.24	0.178	0.233	0.24	comment	
	Sulphide	4	8.3	5.95	8.075	250	PASS	
	pH	4	9.7	8.5	9.49	6 to 8	ALKALINE	
	Sulphur (Elemental)	4	8.2	4.9	7.84	100	PASS	
	Asbestos Identification	4	0	0	0	0	PASS	
ORGANIC	SOM	4	6	6	6			
	PAH acenaphthene	4	0.37	0.168	0.33	1100	PASS	S2, S3, S4
	PAH acenaphthylene	4	0.24	0.135	0.219	920	PASS	
	PAH anthracene	4	1	0.64	0.955	11000	PASS	
	PAH benz[a]anthracene	4	2.5	2.075	2.485	13	PASS	
	PAH benzo[a]pyrene	4	2.8	1.8	2.77	5	PASS	
	PAH benzo[b]flouranthene	4	3.3	2.175	3.27	3.7	PASS	
	PAH benzo[g,h,i]perylene	4	1.9	1.25	1.87	350	PASS	
	PAH benzo[k]flouranthene	4	1.6	1.075	1.585	100	PASS	
	PAH chrysene	4	2.7	2	2.67	27	PASS	
	PAH dibenz[ah]anthracene	4	1.2	0.635	1.151	0.3	FAIL	
	PAH flouranthene	4	5.3	3.825	5.27	890	PASS	
	PAH flourene	4	0.5	0.2	0.44	860	PASS	
	PAH indeno[123-cd]pyrene	4	1.4	1	1.4	41	PASS	
	PAH napthalene	4	0.69	0.248	0.602	13	PASS	
	PAH phenanthrene	4	3.7	2.775	3.7	440	PASS	
	PAH pyrene	4	5.4	4.025	5.385	2000	PASS	
	PAH PAH (Total - SUM EPA16)	4	34	23.63	33.7	1	comment	
	SVOC phenol	4	0.3	0.3	0.3	380	PASS	

5.5. Chemtest Ltd Certificates



The right chemistry to deliver results

Chemtest Ltd.

Depot Road

Newmarket

CB8 0AL

Tel: 01638 606070

Email: info@chemtest.com

Final Report

Report No.:	20-09586-1		
Initial Date of Issue:	06-Apr-2020		
Client	TJ Booth Associates		
Client Address:	20a Eastgate Street Rochdale Lancs OL16 1DH		
Contact(s):	Daniel Slattery		
Project	Sigma - Tweedale Street, Rochdale		
Quotation No.:	Q19-18321	Date Received:	26-Mar-2020
Order No.:		Date Instructed:	27-Mar-2020
No. of Samples:	4		
Turnaround (Wkdays):	5	Results Due:	02-Apr-2020
Date Approved:	04-Apr-2020		
Approved By:			
Details:	Glynn Harvey, Technical Manager		



The right chemistry to deliver results

Project: Sigma - Tweedale Street, Rochdale

Results - Soil

Client: TJ Booth Associates	Chemtest Job No.:				20-09586	20-09586	20-09586	20-09586
Quotation No.: Q19-18321	Chemtest Sample ID.:				993039	993040	993041	993042
Order No.:	Client Sample Ref.:				S1	S2	S3	S4
	Client Sample ID.:				1	2	3	4
	Sample Type:				SOIL	SOIL	SOIL	SOIL
	Top Depth (m):				0.5	0.5	0.5	0.5
	Date Sampled:				24-Mar-2020	24-Mar-2020	24-Mar-2020	24-Mar-2020
	Asbestos Lab:				DURHAM	DURHAM	DURHAM	DURHAM
Determinand	Accred.	SOP	Units	LOD				
ACM Type	U	2192		N/A	-	-	-	-
Asbestos Identification	U	2192	%	0.001	No Asbestos Detected	No Asbestos Detected	No Asbestos Detected	No Asbestos Detected
ACM Detection Stage	U	2192		N/A	-	-	-	-
Moisture	N	2030	%	0.020	27	13	24	16
pH	U	2010		4.0	8.3	9.7	7.7	8.3
Boron (Hot Water Soluble)	U	2120	mg/kg	0.40	0.96	0.60	0.48	0.78
Sulphur (Elemental)	U	2180	mg/kg	1.0	1.9	3.7	8.2	5.8
Cyanide (Total)	U	2300	mg/kg	0.50	< 0.50	< 0.50	< 0.50	< 0.50
Thiocyanate	U	2300	mg/kg	5.0	6.5	6.0	6.1	< 5.0
Sulphide (Easily Liberatable)	N	2325	mg/kg	0.50	6.8	5.0	8.3	3.7
Sulphate (Total)	U	2430	mg/kg	100	1300	2400	1500	1900
Arsenic	U	2450	mg/kg	1.0	47	17	12	14
Cadmium	U	2450	mg/kg	0.10	0.33	0.43	0.23	0.88
Chromium	U	2450	mg/kg	1.0	26	20	14	26
Copper	U	2450	mg/kg	0.50	170	62	30	69
Mercury	U	2450	mg/kg	0.10	0.48	0.37	0.18	0.31
Nickel	U	2450	mg/kg	0.50	58	29	19	38
Lead	U	2450	mg/kg	0.50	200	260	69	150
Selenium	U	2450	mg/kg	0.20	0.40	0.27	0.51	0.37
Zinc	U	2450	mg/kg	0.50	80	130	46	190
Chromium (Hexavalent)	N	2490	mg/kg	0.50	< 0.50	< 0.50	< 0.50	< 0.50
Organic Matter	U	2625	%	0.40	17	4.7	9.7	9.1
Naphthalene	U	2700	mg/kg	0.10	< 0.10	< 0.10	< 0.10	0.69
Acenaphthylene	U	2700	mg/kg	0.10	< 0.10	< 0.10	< 0.10	0.24
Acenaphthene	U	2700	mg/kg	0.10	< 0.10	< 0.10	< 0.10	0.37
Fluorene	U	2700	mg/kg	0.10	< 0.10	< 0.10	< 0.10	0.50
Phenanthrene	U	2700	mg/kg	0.10	1.4	3.7	2.3	3.7
Anthracene	U	2700	mg/kg	0.10	0.30	1.0	0.56	0.70
Fluoranthene	U	2700	mg/kg	0.10	1.7	5.3	3.2	5.1
Pyrene	U	2700	mg/kg	0.10	1.9	5.3	3.5	5.4
Benzo[a]anthracene	U	2700	mg/kg	0.10	1.9	2.4	1.5	2.5
Chrysene	U	2700	mg/kg	0.10	1.3	2.7	1.5	2.5
Benzo[b]fluoranthene	U	2700	mg/kg	0.10	< 0.10	3.1	2.2	3.3
Benzo[k]fluoranthene	U	2700	mg/kg	0.10	< 0.10	1.5	1.1	1.6
Benzo[a]pyrene	U	2700	mg/kg	0.10	< 0.10	2.6	1.7	2.8
Indeno(1,2,3-c,d)Pyrene	U	2700	mg/kg	0.10	< 0.10	1.4	1.1	1.4
Dibenz(a,h)Anthracene	U	2700	mg/kg	0.10	< 0.10	1.2	0.37	0.87

Project: Sigma - Tweedale Street, Rochdale

Client: TJ Booth Associates	Chemtest Job No.:				20-09586	20-09586	20-09586	20-09586
Quotation No.: Q19-18321	Chemtest Sample ID.:				993039	993040	993041	993042
Order No.:	Client Sample Ref.:				S1	S2	S3	S4
	Client Sample ID.:				1	2	3	4
	Sample Type:				SOIL	SOIL	SOIL	SOIL
	Top Depth (m):				0.5	0.5	0.5	0.5
	Date Sampled:				24-Mar-2020	24-Mar-2020	24-Mar-2020	24-Mar-2020
	Asbestos Lab:				DURHAM	DURHAM	DURHAM	DURHAM
Determinand	Accred.	SOP	Units	LOD				
Benzo[g,h,i]perylene	U	2700	mg/kg	0.10	< 0.10	1.7	1.3	1.9
Total Of 16 PAH's	U	2700	mg/kg	2.0	8.5	32	20	34
Total Phenols	U	2920	mg/kg	0.30	< 0.30	< 0.30	< 0.30	< 0.30

6. APPENDIX B: PHOTOS

6.1. Reconnaissance 2020

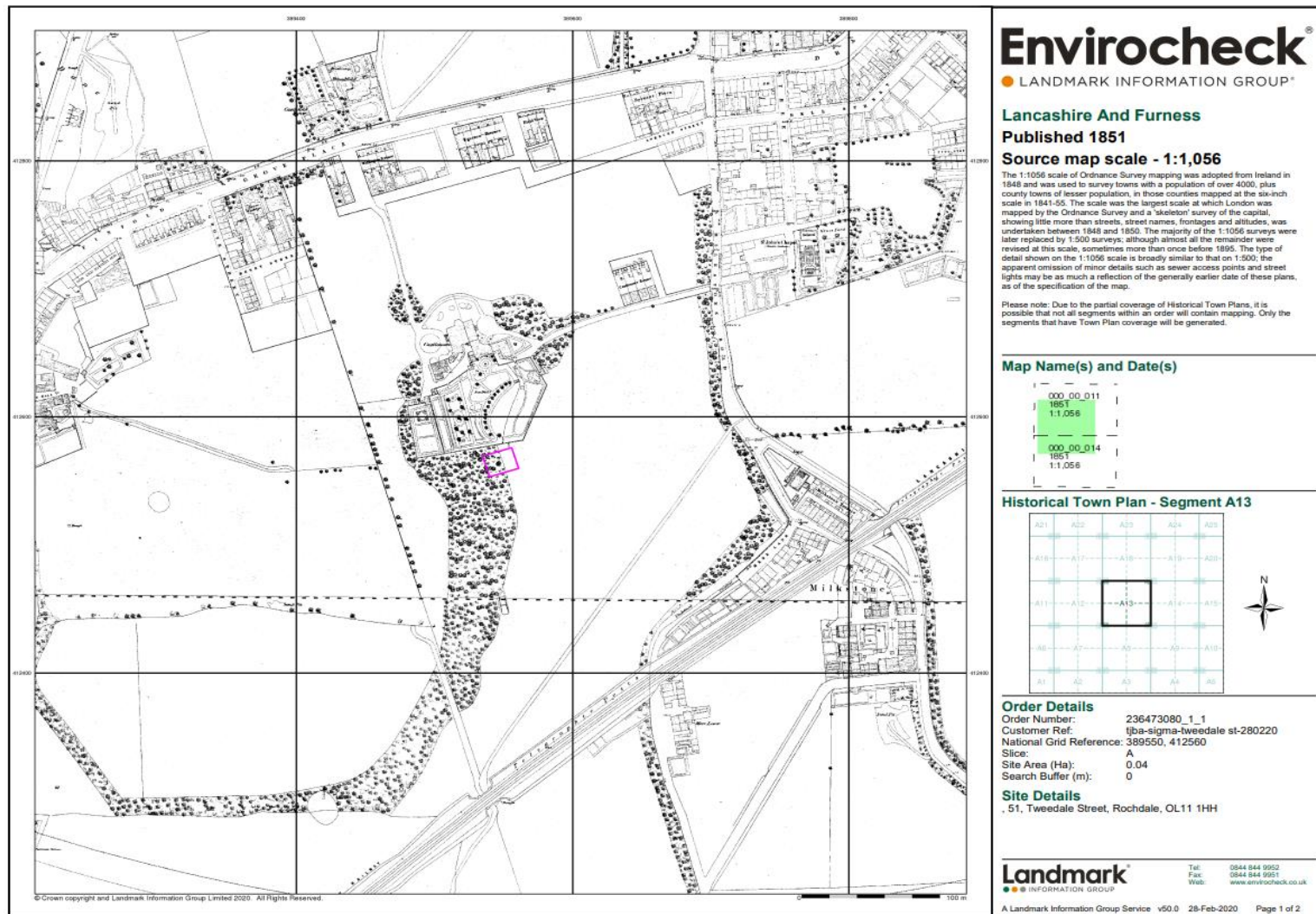


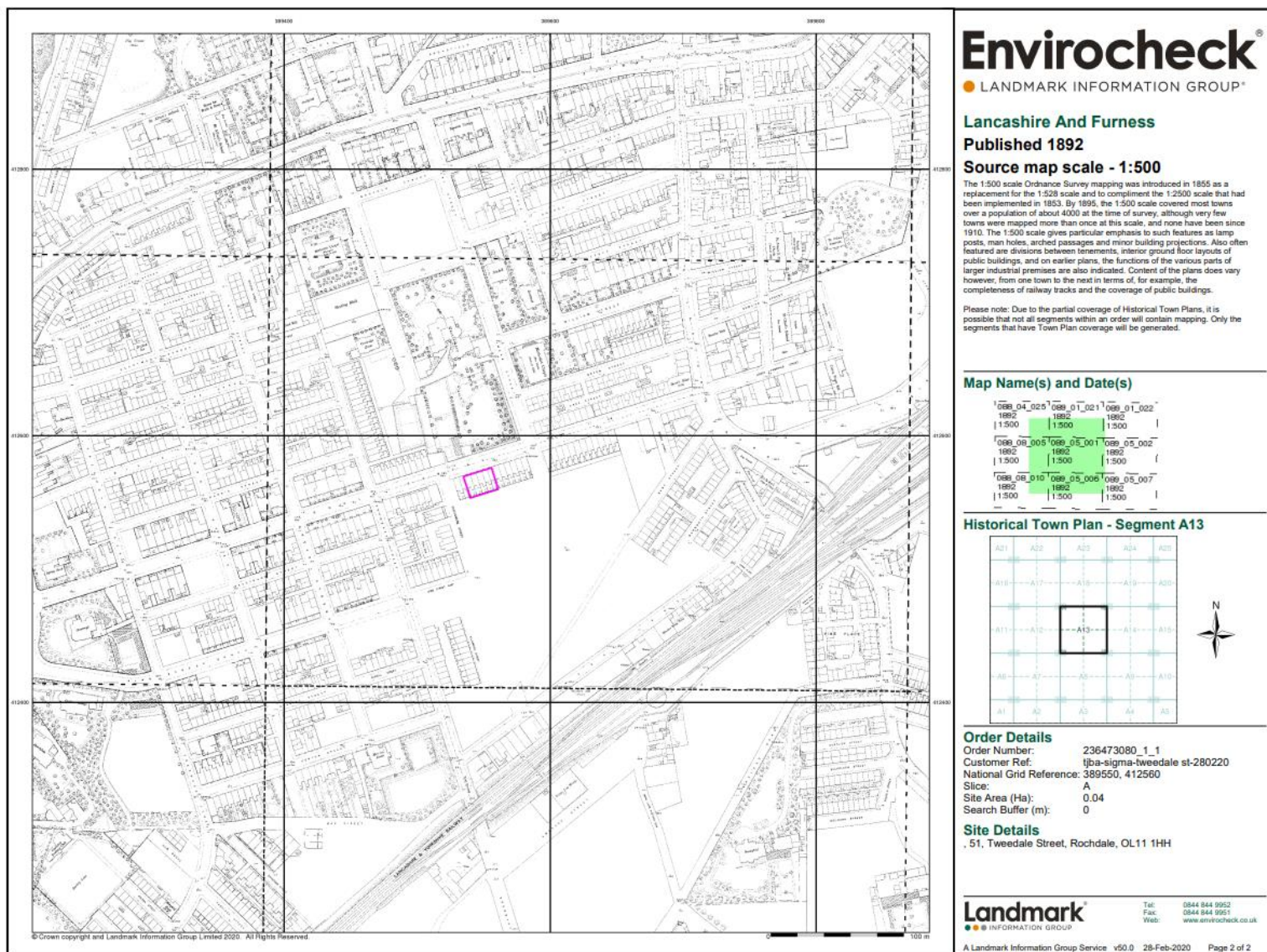


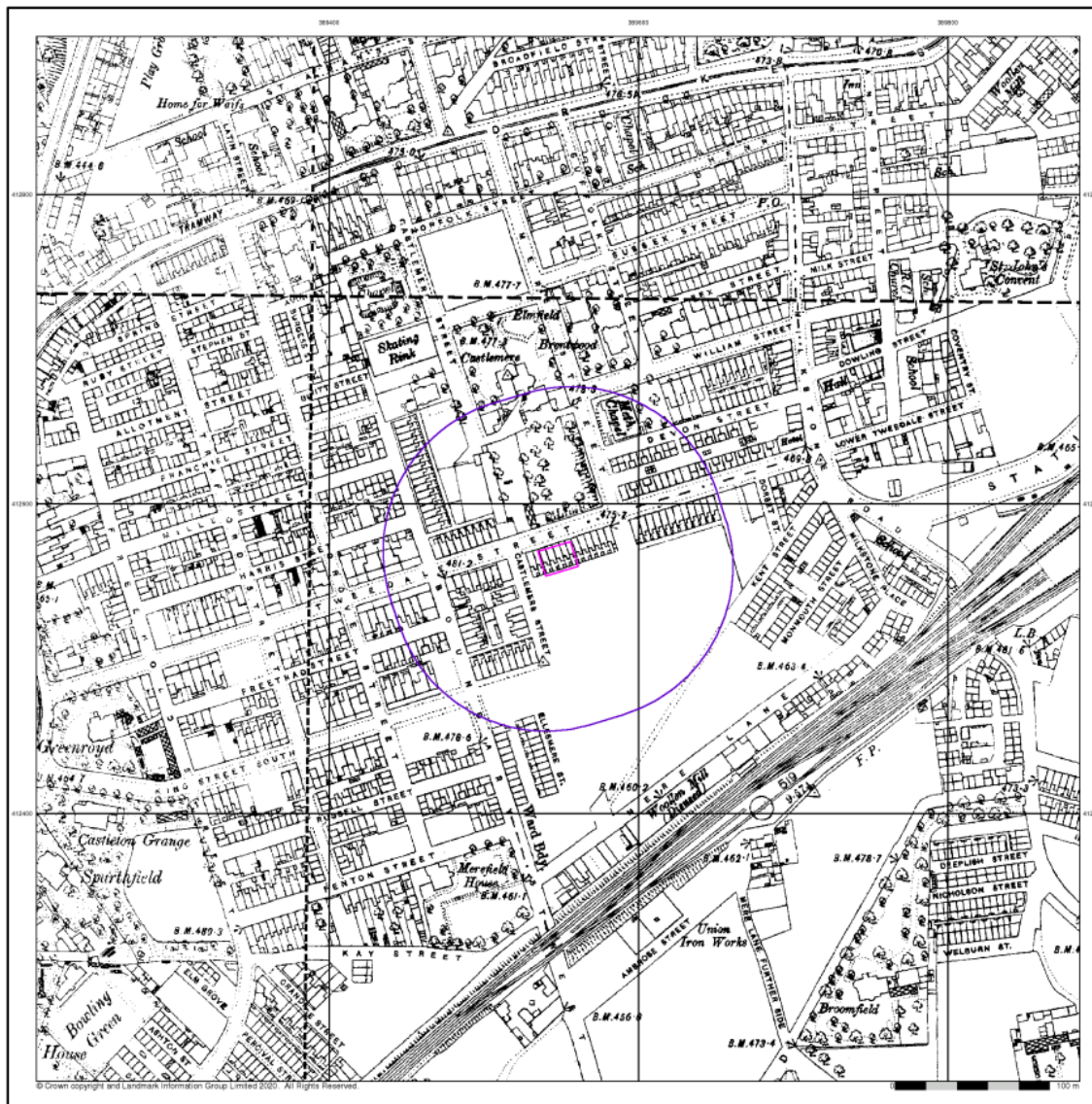
6.2. Reconnaissance 2023



7. APPENDIX C: LANDMARK & OTHER MAPS







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Lancashire And Furness

Published 1890 - 1893

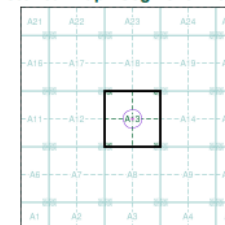
Source map scale - 1:2,500

The historical maps shown were reproduced from maps predominantly held at the scale adopted for England, Wales and Scotland in the 1840's. In 1854 the 1:2,500 scale was adopted for mapping urban areas and by 1896 it covered the whole of what were considered to be the cultivated parts of Great Britain. The published date given below is often some years later than the surveyed date. Before 1938, all OS maps were based on the Cassini Projection, with independent surveys of a single county or group of counties, giving rise to significant inaccuracies in outlying areas.

Map Name(s) and Date(s)

089_04 1893 1:2,500	089_01 1893 1:2,500
089_08 1893 1:2,500	089_05 1893 1:2,500

Historical Map - Segment A13



Order Details

Order Number: 236473080_1_1
Customer Ref: tjba-sigma-tweedale st-280220
National Grid Reference: 389550, 412560
Slice: A
Site Area (Ha): 0.04
Search Buffer (m): 100

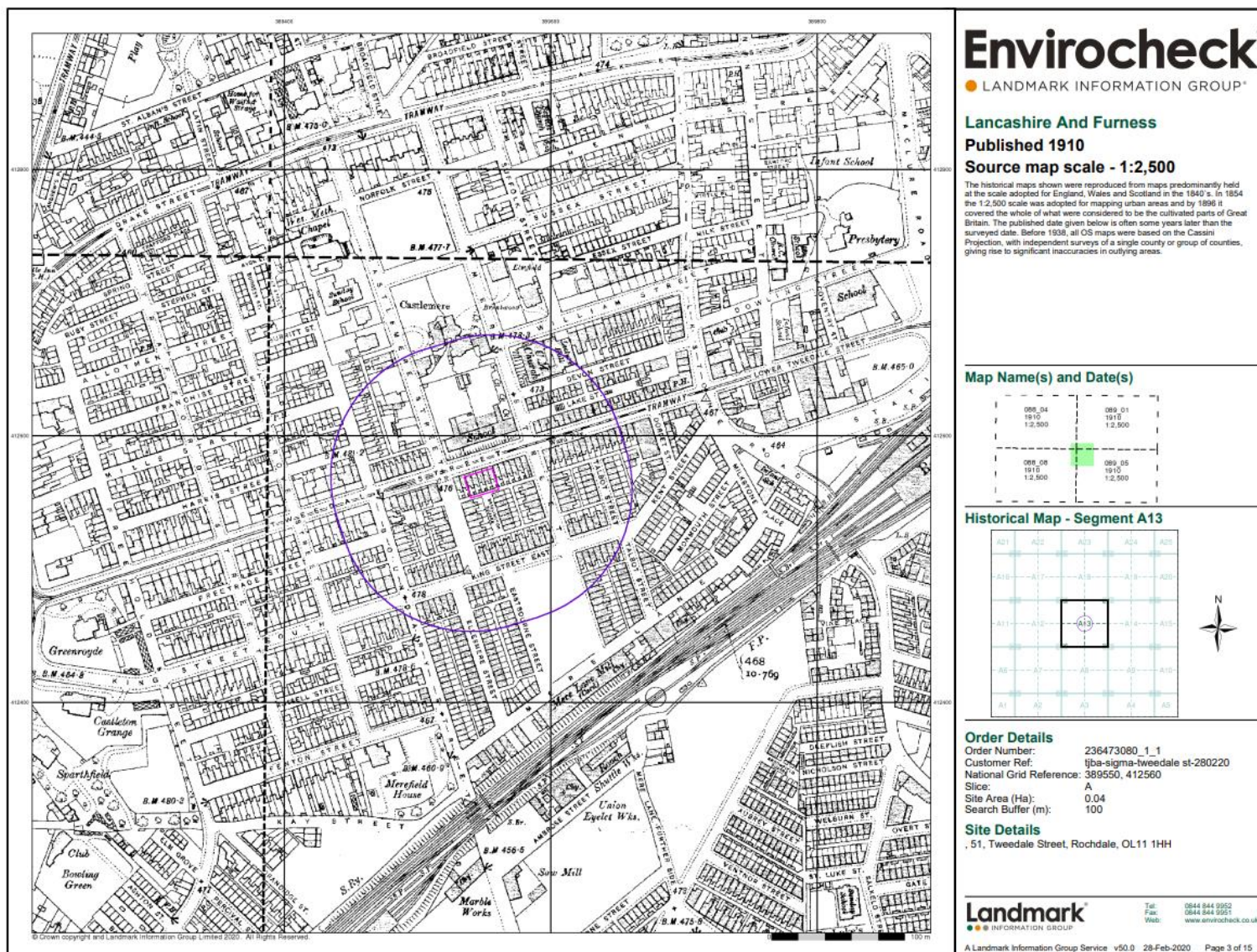
Site Details

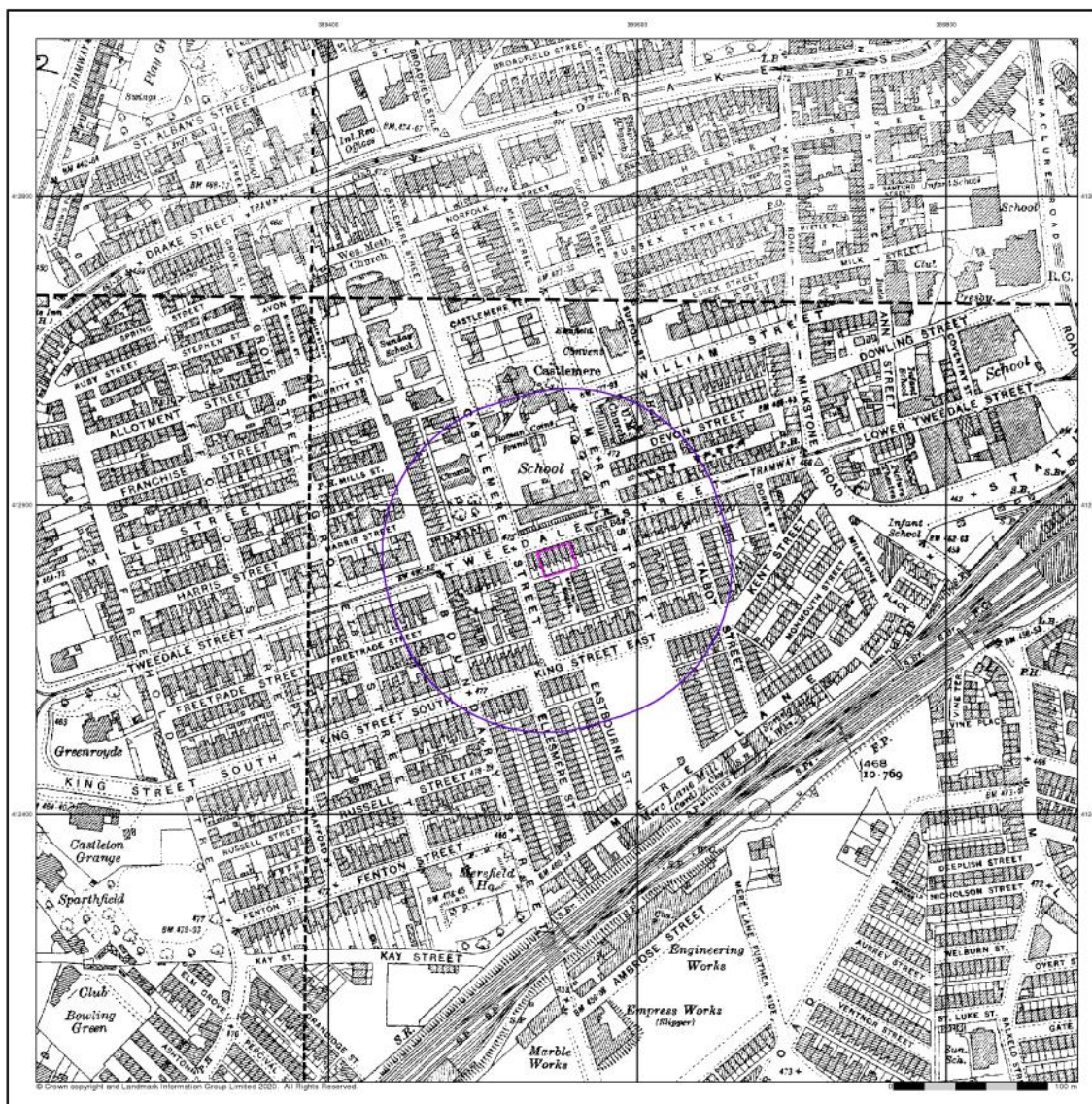
, 51, Tweedale Street, Rochdale, OL11 1HH

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Lancashire And Furness

Published 1930

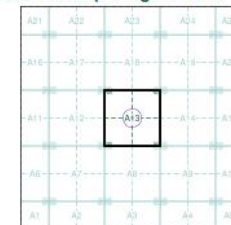
Source map scale - 1:2,500

The historical maps shown were reproduced from maps predominantly held at the scale adopted for England, Wales and Scotland in the 1840's. In 1854 the 1:2,500 scale was adopted for mapping urban areas and by 1890 it covered the whole of what were considered to be the cultivated parts of Great Britain. The published date given below is often some years later than the surveyed date. Before 1938, all OS maps were based on the Cassini Projection, with independent surveys of a single county or group of counties, giving rise to significant inaccuracies in outlying areas.

Map Name(s) and Date(s)

089_04 1930 1:2,500	089_01 1930 1:2,500
089_06 1930 1:2,500	089_05 1930 1:2,500

Historical Map - Segment A13



Order Details

Order Number: 236473080_1.1
 Customer Ref: tjba-sigma-tweedale st-280220
 National Grid Reference: 389550, 412560
 Slice: A
 Site Area (Ha): 0.04
 Search Buffer (m): 100

Site Details

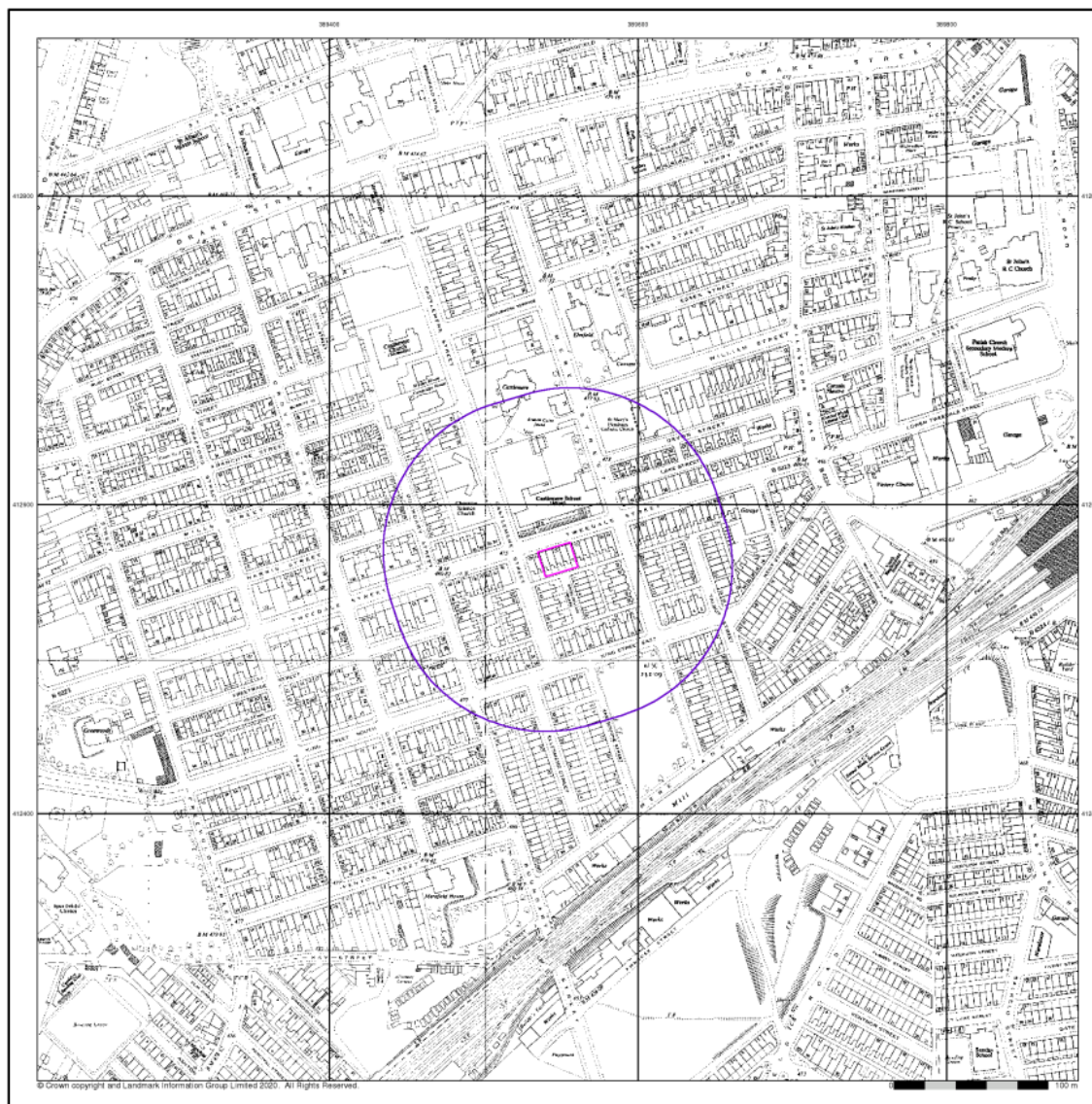
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Ordnance Survey Plan

Published 1958

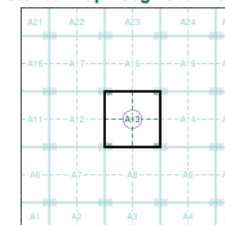
Source map scale - 1:2,500

The historical maps shown were reproduced from maps predominantly held at the scale adopted for England, Wales and Scotland in the 1840's. In 1854 the 1:2,500 scale was adopted for mapping urban areas and by 1890 it covered the whole of what were considered to be the cultivated parts of Great Britain. The published date given below is often some years later than the surveyed date. Before 1938, all OS maps were based on the Cassini Projection, with independent surveys of a single county or group of counties, giving rise to significant inaccuracies in outlying areas.

Map Name(s) and Date(s)



Historical Map - Segment A13



Order Details

Order Number: 236473080_1_1
 Customer Ref: tjba-sigma-tweedale st-280220
 National Grid Reference: 389550, 412560
 Slice: A
 Site Area (Ha): 0.04
 Search Buffer (m): 100

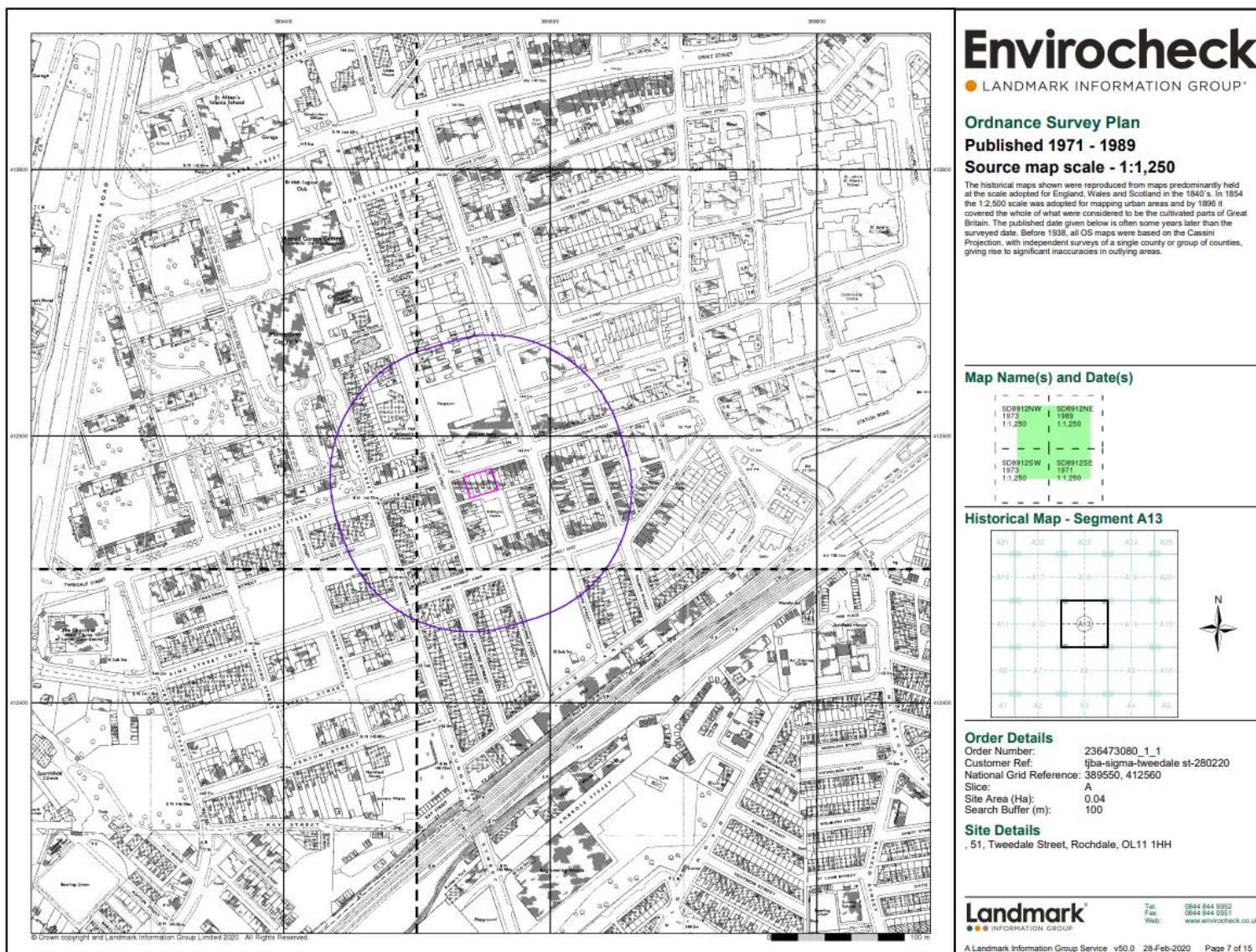
Site Details

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Additional SIMs

Published 1978 - 1985

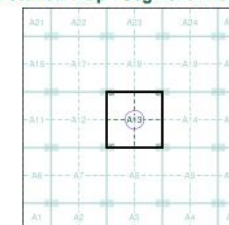
Source map scale - 1:1,250

The SIM cards (Ordnance Survey's 'Survey of Information on Microfilm') are further, minor editions of mapping which were produced and published in between the main editions as an area was updated. They date from 1947 to 1994, and contain detailed information on buildings, roads and land-use. These maps were produced at both 1:2,500 and 1:1,250 scales.

Map Name(s) and Date(s)

SD8912NW	SD8912NE
1978	1978
1:1,250	1:1,250
SD8912SW	SD8912SE
1978	1984
1:1,250	1:1,250

Historical Map - Segment A13



Order Details

Order Number: 236473080_1.1
 Customer Ref: tjba-sigma-tweedale st-280220
 National Grid Reference: 389550, 412560
 Slice: A
 Site Area (Ha): 0.04
 Search Buffer (m): 100

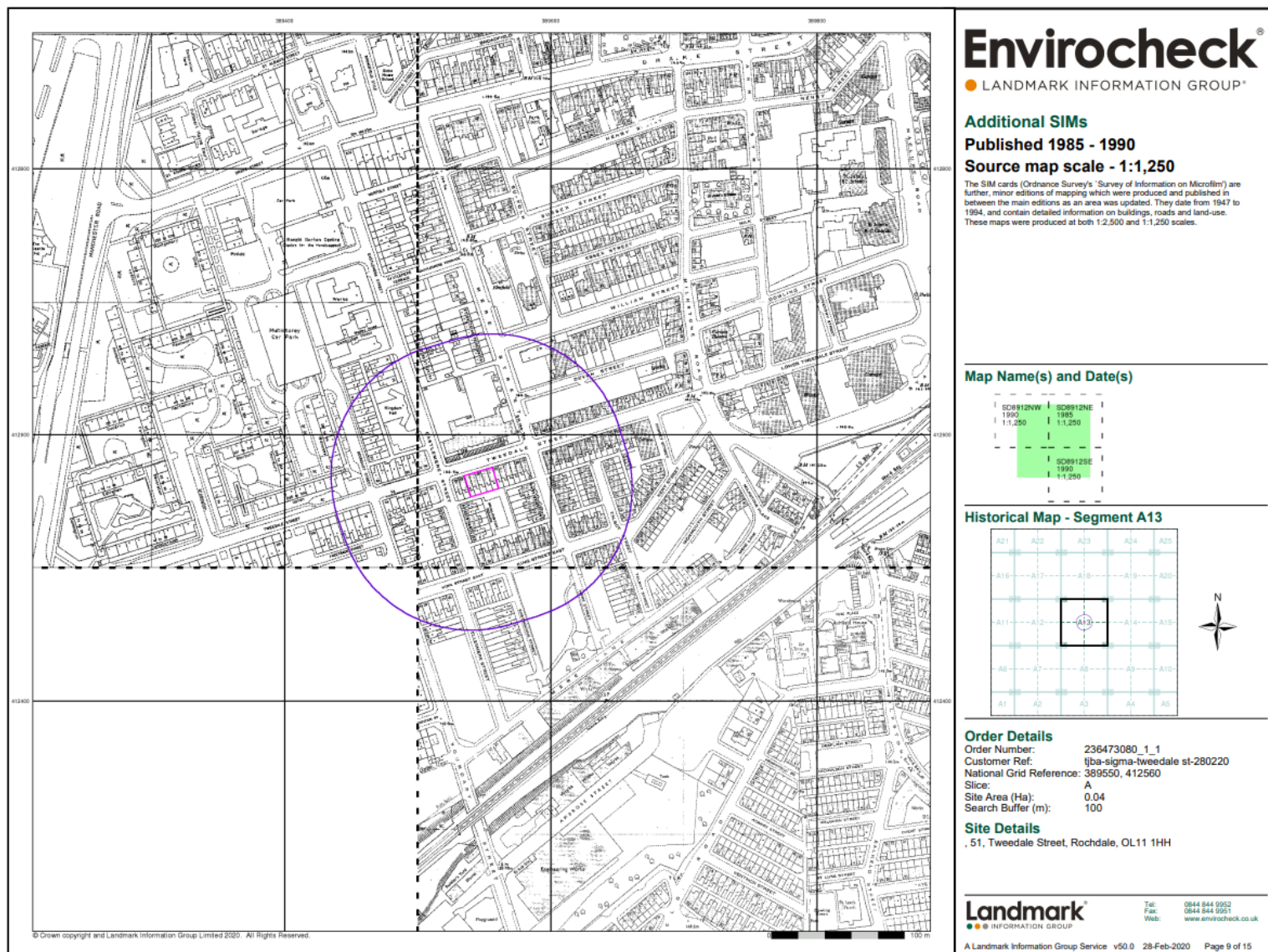
Site Details

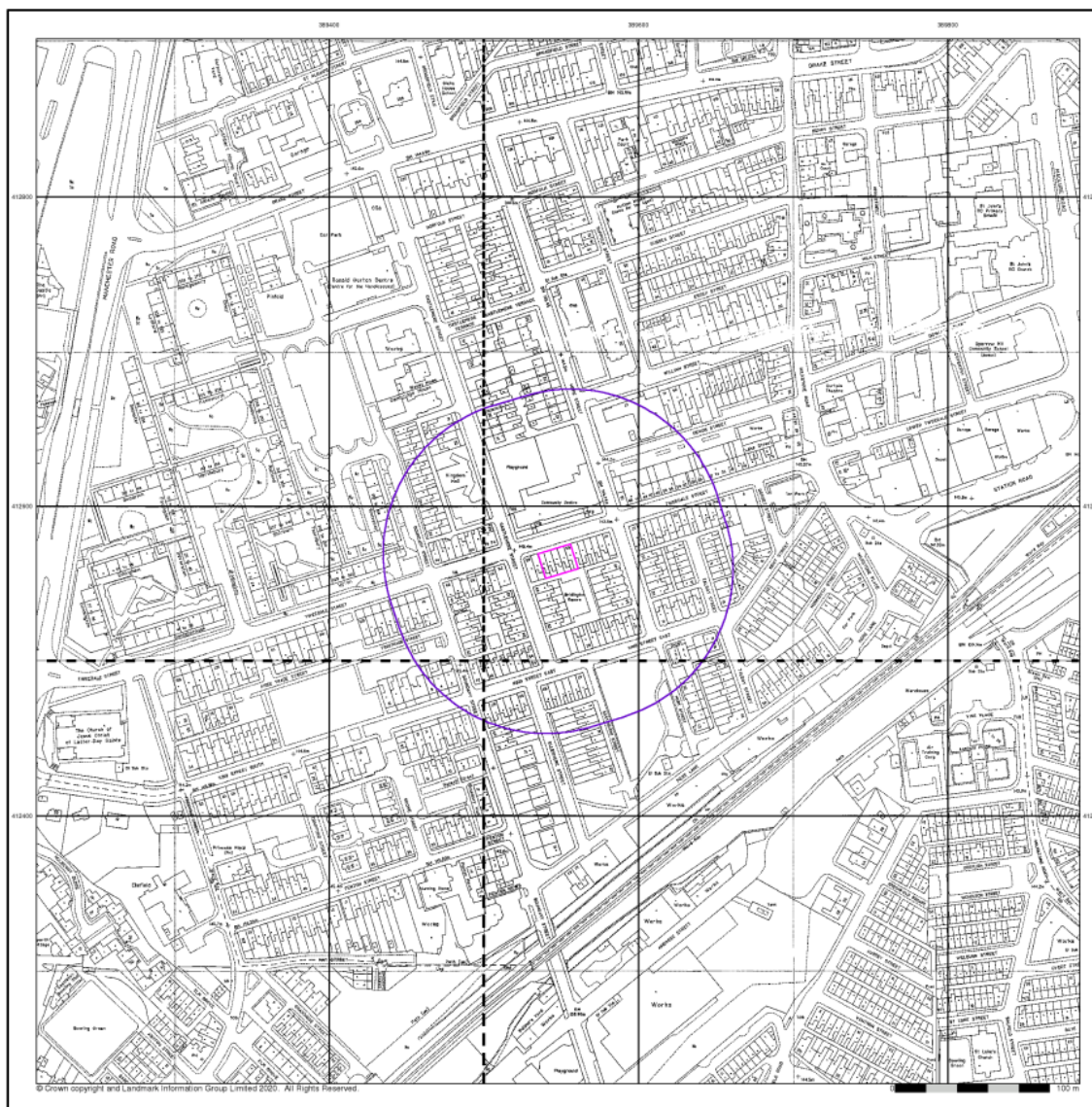
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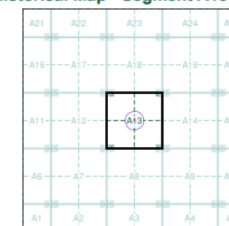
Large-Scale National Grid Data
Published 1992
Source map scale - 1:1,250

'Large Scale National Grid Data' superseded SIM cards (Ordnance Survey's 'Survey of Information on Microfilm') in 1992, and continued to be produced until 1999. These maps were the forerunners of digital mapping and so provide detailed information on houses and roads, but tend to show less topographic features such as vegetation. These maps were produced at both 1:2,500 and 1:1,250 scales.

Map Name(s) and Date(s)

SD8912NW	SD8912NE
1992	1992
1:1,250	1:1,250
SD8912SW	SD8912SE
1992	1992
1:1,250	1:1,250

Historical Map - Segment A13



Order Details

Order Number: 236473080_1_1
 Customer Ref: tjba-sigma-tweedale st-280220
 National Grid Reference: 389550, 412560
 Slice: A
 Site Area (Ha): 0.04
 Search Buffer (m): 100

Site Details

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