



Milton Road, Bury

Coal Mining Investigation and Geotechnical Assessment

Job Number
LKC261326

Report Date
30th September 2026

Client
Bury Metropolitan Borough Council

DOCUMENT QUALITY ASSURANCE

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Report Title	Coal Mining Investigation and Geotechnical Assessment
Job Number	LKC261326
Client	Bury Metropolitan Borough Council

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Status	Final		
Written By	Hannah Moss		
Approved By	Colin Wardle		

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1. Introduction

LK Consult Ltd (LKC) has been commissioned to carry out a Shallow Coal Mining Site Investigation and Risk Assessment for Milton Road, Bury.

The following work has previously been undertaken:

- Desk Study with Walkover Survey undertaken by Sub Surface (ref: 8339) dated February 2026.
- Ground Investigation Report undertaken by Sub Surface (ref: 8339A) dated April 2026.
- Desk-based Coal Mining Risk Assessment, undertaken by LKC (Ref: LKC261326-A1-CMRA-Milton Road, Bury R0, dated September 2026).

This investigation has been undertaken to confirm the ground conditions below the site and allow an assessment of the potential for the site to be affected by shallow coal workings. The report will aim to confirm the risks from historical coal mining and recommend further assessment and / or remediation as required.

The assessment and interpretation of the factual data obtained as part of this investigation has been undertaken in line with currently accepted national and international guidelines including CIRIA758¹.

A summary of the site details is presented in **Error! Reference source not found.** Figure 1 indicates the site location and boundary plan. Figure 2 indicates the proposed development.

Location	Land north of Milton Road and west of Wordsworth Avenue. Centred at approximate National Grid Reference 377115E, 407725N.
Area	14,000m ² .
Topography	Site slopes up to the north - 99m AOD on southern site boundary, 105m AOD on northern site boundary.
Current Site Use	The site currently comprises vacant grassland surrounded by residential dwellings.
Proposed Development	Educational facility with associated parking areas, external play areas, habitat area, community garden and soft landscaping.

Table 1-1: Summary of site details.

2. Summary of Coal Mining Risk Assessment

2.1. Coal Mining Risk Assessment (CMRA) undertaken by LKC

Pertinent information relating to the geology of the site is summarised in Table 2.1.

Artificial Deposits	Artificial deposits (infilled ground) are mapped across the central and south-eastern portion of the site and extend offsite to the south. Historical mapping records clay excavation across the site.
Superficial Deposits	Devensian Till (Diamicton).
Bedrock	<p>The bedrock is mapped as the Peel Hall Rock (Sandstone) on the 1:10,000 mapping but is referred to as Pemberton Rock (Bardsley, Peel Hall) on the 1:50,000 mapping. The strata in the general area dips to the south-east at approximately 9.5°.</p> <p>The Mining Remediation Authority data maps the Ince New as subcropping east to west of the site. This is not shown on other mapping.</p> <p>Lower Yard seam (Pemberton Five Foot, Windmill, Park) c.125m the north-west. Expected to be at a depth of approximately 21m below rockhead on the northern boundary and 37m below rockhead on the southern site boundary</p>

Table 2-1: Summary of geology.

Extracts from geological mapping (Lancashire Sheet 95NE, Published 1926, Scale 1:10,560. Sheet 85 Published 2010, Scale 1:50,000 and Digital Geology, Published 2008, Scale 1:10,000, MRA mapping) are shown on Plate 2-1. These show the differences in geological mapping.

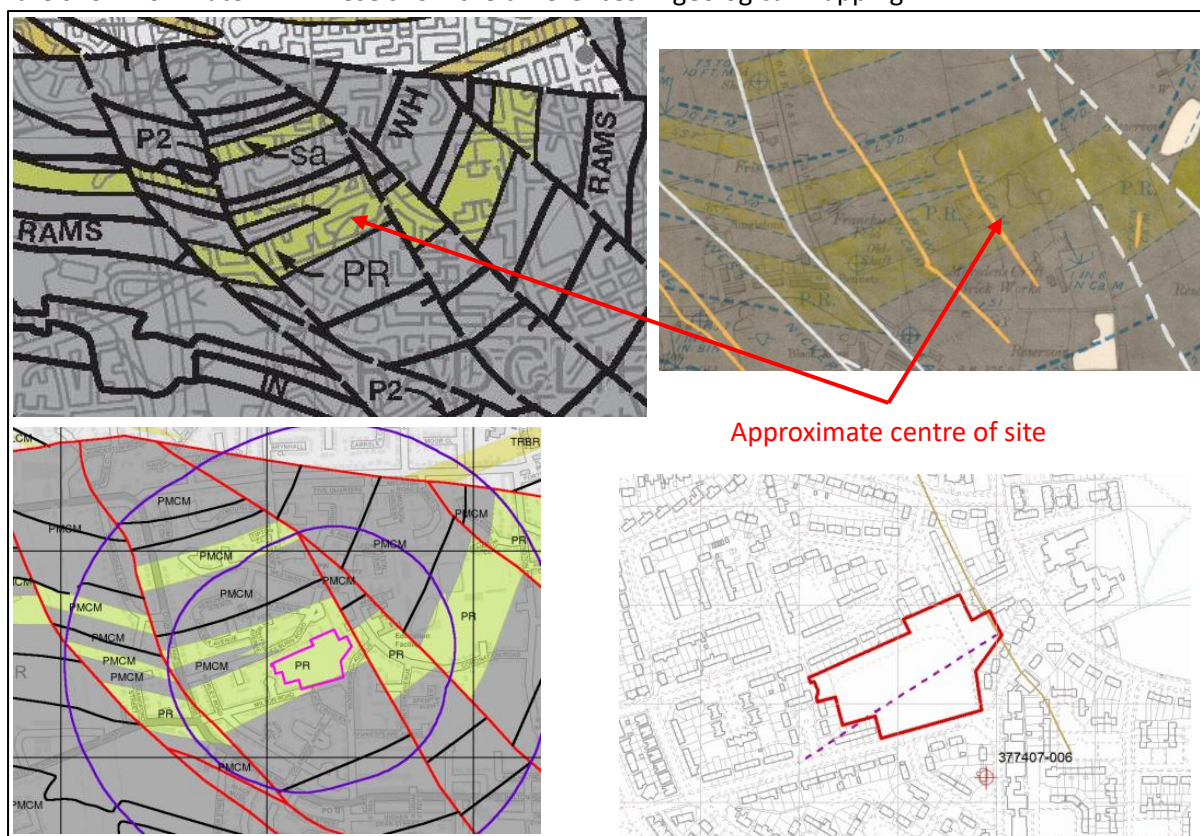


Plate 2-1: Extracts from geological mapping. Top left: 2010 1:50,000 sheet mapping, top right: 1926 1:10,560 sheet mapping (left), bottom left: 2008 1:10,000 digital mapping and bottom right: MRA mapping. Not to scale.

Plate 2-2 shows the development high risk areas.



Plate 2-2: Development High Risk Area

The southern part of the site lies within a Development High Risk Area, shown as 'Probable Shallow Coal Mine Workings'. The remainder of the site lies outside the Development High Risk Area.

Table 2-2 below summarises the potential risks associated with coal mining legacy for the proposed development site.

Coal Mining Issue	Potential Risk
Underground coal mining (recorded at shallow depths)	X
Underground coal mining (probable at shallow depths)	✓
Mine entries (shafts / adits)	?
Coal mining geology (fissures)	✓
Record of past mine gas emissions	?
Recorded coal mining surface hazard	X

Table 2-2: Potential Coal Mining Risks.

Notes:

✓ = Risk identified, X = No risk identified, ? = Possible risk identified.

Investigation work was recommended as well as a watching brief during groundworks.

3. Ground Investigation

3.1. Site Investigation Design and Methodology

The investigation was carried out on 27th July to 5th August 2026 and comprised the following:

- 3no. rotary boreholes to 35.00mbgl below ground level (mbgl) (RBH101-RBH103). Open hole to bedrock, with coring 10m into rock, followed by further open hole drilling to a maximum depth of 35mbgl.

The rotary open hole boreholes were drilled to determine the depth of coal seams and the presence / absence of shallow workings across the site.

Gas concentrations were monitored during drilling to detect any elevated concentration of mine gases.

Upon completion, the boreholes were grouted up.

All locations were surveyed to ordnance datum.

A permit was granted by the Coal Authority (permit 31877) to undertake the coal mining investigation.

Investigation work was carried out in line with CIRIA C758² and Mining Remediation Authority guidance.

All site investigation locations are shown in Figure 4. All profile logs are provided in Appendix A and are in line with BS14688-1³ and BS5930⁴.

4. Ground Conditions

4.1. Geology

The ground conditions beneath the site are summarised below. Logs are provided in Appendix B.

4.1.1 Made Ground

Made ground was recorded to 1.20mbgl in all 3no. locations.

The made ground comprised an upper layer of gravelly silty sand with occasional bricks, concrete fragments and rare clinker to a maximum depth of 0.60mbgl in all 3no. locations.

The sand layer was recorded over a layer of gravelly clayey sand with occasional brick fragments and clinker in RBH102 only between 0.60-1.20mbgl.

A layer of gravelly sandy silt with occasional brick fragments, concrete and clinker was recorded in RBH101 between 0.60-1.20mbgl. A gravelly sandy clay with occasional pockets of plant remains and clinker was recorded in RBH103 between 0.60-1.20mbgl.

4.1.2 Natural Strata

Superficial

Superficial strata clay to between 3.25mbgl and 4.50mbgl in RBH102 and RBH103. The superficial strata was encountered to a greater depth in RBH101 in the west of the site (to 9.50mbgl).

Bedrock

Rockhead was encountered in all 3no. locations and was shallowest in the north-east and east (minimum 3.25mbgl in RBH102), and was deeper in the west of site (9.50mbgl in RBH101) and comprised mudstone, sandstone and siltstone (predominantly mudstone and sandstone).

Coal was encountered in all 3no. boreholes:

- RBH101: intact **coal** at 22.50-27.30mbgl. Encountered during open hole drilling. It is considered likely the 4.80m related to coal and dark shale, which would be difficult to distinguish between during open hole drilling. It is more likely that a seam would be similar thickness the seam recorded at a similar depth in RBH103.
- RBH102: **coal** at 11.30-12.70mbgl, encountered during coring and recorded as extremely weak to very weak.
- RBH103: intact **coal** at 25.00-26.30mbgl. Encountered during open hole drilling.

Table 4-1 shows the depths and thicknesses of the coal seams and depth of voids / evidence of workings.

Location	Depth to bedrock (mbgl)	Depth to coal seam (mbgl)	Thickness of seam (m)	Bedrock cover above seam (m)
RBH101	9.50	22.50	1.40*	13.00
RBH102	3.25	11.30	1.40	8.00
RBH103	4.00	25.00	1.30	20.50

Table 4-1: Summary of coal seams. *see above text regarding coal thickness in RBH101.

No evidence of workings (i.e. loose drilling, broken ground or voids) was encountered during the rotary drilling.

The coal seam encountered at 22.50m depth in RBH101 and 25.00m depth in RBH103 is considered likely to represent the Lower Yard Seam. The depth recorded beneath the site is consistent with the desk study projection of the mapped Lower Yard Seam subcrop located approximately 125 m north of the site, assuming a southerly dip of 9.5°.

It is not clear from the available mapping which seam the shallower coal seam encountered in RBH102 between 11.30mbgl and 12.70mbgl relates to. Based on the vertical section presented on Sheet 85 (1:50,000 scale), it may represent the Stubbs Coal, located at base of the Peel Hall Rock which is mapped below site. Based on 1:50,000 scale mapping, it may also relate to the Pemberton Five Foot seam.

A discrepancy exists between the coal seams encountered across the site. The shallower seam identified in RBH102 was not encountered in the southern boreholes (RBH101 and RBH103), while the deeper seam encountered in RBH101 and RBH103 was not identified in RBH102. This may reflect natural variation within the Coal Measures sequence, with seams locally thinning, splitting, pinching out or being replaced by sedimentary deposits over relatively short distances. Alternatively, the differences may be due to unrecorded faulting causing displacement of the seams between borehole locations.

5. Geotechnical Assessment

5.1. Proposed Development

It is understood that the proposed development will comprise an educational facility with associated parking areas, external play areas, habitat area, community garden and soft landscaping.

The finished ground levels have not been provided and it is therefore anticipated that they will not vary significantly from current levels. However, should the development proposals or finished levels be altered then the comments/recommendations in this section may require revising.

The depths of any underground engineering works (sewers etc.) are unknown and therefore have not been considered in the following assessment. Any such works should be designed so as not to influence, or compromise, proposed or existing foundations or ground stability.

Given the nature of the proposed development the structure meets the criteria of Geotechnical Category 2 of Eurocode 7⁵.

5.2. Summary of Ground Conditions

Ground conditions identified at the site are detailed in Section 4.1, and typically comprises made ground to 1.20mbgl over natural cohesive superficial deposits of Glacial Till (Diamicton – clay) to depths of 3.25mbgl in the north-east of the site and 9.50mbgl in the west of the site. Beneath the Glacial Till is bedrock comprising Peel Hall Rock (Sandstone) and Pennine Middle Coal Measures (Mudstone, Siltstone, Sandstone) to the completion depths (35mbgl) investigated.

5.3. Foundation Conditions and Bearing Capacity

The site is within an area where coal may have been worked in the past and it is understood that it is preferred to utilise a piled foundation solution to support the development.

Rockcore samples were collected from selected depths within the boreholes to allow identification and logging of the rock as well as to select samples to be tested to obtain the unconfined compressive strength (UCS) and Point Load strength of the samples.

A sample from each borehole was tested for the UCS. Samples from RBH101 and RBH102 comprising siltstone returned a UCS of 11.3 MN/m² (RBH101) and 5.6MN/m² (RBH102). The sample tested from RBH103 was of the sandstone (probable Peel Hall Rock) and this returned a UCS of 40.2MN/m².

Point Loads were conducted on recovered samples from each of the boreholes. The universal conversion factor (K) for coal measure rocks to obtain an equivalent Uniaxial Compressive Strength (UCS) from the size-corrected point load index ($Is_{(50)}$) is typically 21.0 ($UCS = 21.0 \times Is_{(50)}$) based on extensive large-scale studies.

18 samples were tested from RBH101 with the $Is_{(50)}$ ranging between 0.01 and 1.28MPa, returning an average of 0.47MPa equating to an equivalent UCS of 9.87MN/m².

17 samples were tested from RBH102 with the $Is_{(50)}$ ranging between 0.01 and 1.19MPa, returning an average of 0.43MPa equating to an equivalent UCS of 9.03MN/m².

24 samples were tested from RBH103 with the $Is_{(50)}$ ranging between 0.01 and 1.62MPa, returning an average of 0.43MPa equating to an equivalent UCS of 8.82MN/m².

Based on the results of laboratory testing and descriptions of the recovered rock, a conservative UCS of 9MN/m² is considered appropriate for the coal measure rocks at this site.

Laboratory testing results are provided in Appendix B.

5.4. Ground Floor Slabs

A piled structure will generally have a suspended or piled floor due to the potential for differential settlement between the floor and the shell, however, should a ground bearing floor slab be preferred

for the development then this will require detailed design to accommodate variability of the formation and account for differential settlement.

5.5. Pavement Construction

Topsoil is not suitable for use as a sub-grade. Untreated made ground is considered unsuitable as a sub-grade due to its potential variability and potentially low strength/high compressibility. It should be removed to a depth of 0.5m below formation level and sorted to remove any unsuitable or deleterious materials. The sub formation should be rolled, and suitable excavated material can then be replaced, up to formation level, in fully compacted thin layers. Any deficit should be made up with suitable imported fill compacted as above. Following this treatment an overall design CBR of 2-5% should be available, although this will require confirmation through in-situ CBR tests.

It is recommended that testing is undertaken on the sub-grade to the areas of proposed pavement to assess the soils potential to be frost susceptible. Frost action can cause differential heaving, surface roughness and cracking, blocked drainage, and a reduction in Bearing Capacity during thaw periods. In areas of proposed roads and car parking it may be necessary to remove the frost susceptible soils and replace with non-frost susceptible material to the expected frost depth penetration.

5.6. Excavations

Site observations indicated that excavations should be feasible in the near surface with normal plant. It is anticipated that any obstructions will be grubbed out during the reduced level dig for the sub structure works.

The short and long-term stability of near vertically sided excavations cannot be guaranteed and random and sudden instability within these soils should be anticipated. Excavation that are in excess of 1.20m depth and where person entry is required should be supported or battered back in accordance with guidance contained in CIRIA R97⁶.

6. Risk Assessment

6.1. Underground Workings

Desk-based coal mining information records the Ince New seam outcropping in the centre of the site and would therefore be expected at rockhead in the south of site. A review of geological mapping did not provide sufficient evidence that any seam in the centre of the site is related to the Ince New seam, and this remains uncertain. The Lower Yard seam is recorded c.125m to the north of site and expected to dip below the site at shallow depth.

2no. coal seams have potentially been encountered on site.

A deeper and significantly thick intact coal seam (assumed to be the Lower Yard Seam) was identified in RBH101 west of site between 22.50-27.30mbgl (4.80m thick) below the centre and south-eastern part of site and another seam at a similar depth of 25.00-26.30mbgl in RBH103. A shallower coal seam has been identified in RBH102 in the north-east between 11.30-12.70mbgl (1.40m thick).

Although workings may not always be identified, it should be considered that boreholes may be sunk into 'pillars' of intact coal. Early 19th century workings using pillar and room methods left significant areas of coal intact with extraction ratios in the range of 30-70%. Later workings typically have extraction ratios of 50-60%⁷.

Shallow workings related ground subsidence events may manifest as localised crown hole collapses at the surface (which are related to workings roof failures), or can be associated with more extensive ground movements, typically associated with pillar collapse, floor heave, or a combination of roof and pillar failure. As there is limited evidence for structural damage caused by pillar failure compared with that resulting from roof collapses, the focus of engineering assessments of the potential instability at the surface has focussed on roof collapses as the more likely mechanism of failure.

The limit height on void migration, where no appreciable surface subsidence can result is termed 'acceptable cover'. The calculation of the amount of acceptable cover is determined by the worked thickness of the seam (t) and the amount of overlying rock cover (h). The acceptable cover criterion is generally referred to as ht.

According to CIRIA C758D⁸, from the examination of mines within Coal Measures, the height of collapse migration might exceptionally extend to 10t the height of the original extraction. As a result of this, the 10t criterion has been adopted by the industry as providing reasonable assurance against surface subsidence from roof collapses in old pillar and stall mines. However, there are documented cases, albeit rare, where migrations in excess of 20t have been observed.

CIRIA C758D, lists a number of circumstances where the acceptable cover criterion may need to be increased from 10t. These include:

- Where the strata dip is >20°.
- Strong groundwater flows within workings and rising or falling groundwater levels.
- Where multi-seam extractions have taken place.

The above circumstances are not expected; therefore, the 10t guidelines are considered appropriate.

The shallower seam recorded in RBH102 is between 11.30-12.70mbgl (1.4m thick). However, it should also be considered that typical roadway heights within workings could be 1.5m. Assuming a possible extracted thickness of 1.5m (allowing for possible roadways), then t=1.50m and the 10t height of rock cover will be 15m. Bedrock was recorded at 3.25m in this location, providing 8m of cover over the seam. Based on the above assessment, further work (i.e. proof drilling grouting) is required in the north of site (below proposed building footprint).

The seam is recorded as 1.30m in RBH103, with 20.5m of rock cover above. Assuming a possible extracted thickness of 1.5m (allowing for possible roadways), then t=1.50m and the 10t height of rock

cover will be 15m and there would be sufficient rock cover and no requirement for stabilisation work in the vicinity of RBH103 in the south of site.

This investigation has proven that the rock cover above the deeper seam where it is thickest is 13m in RBH101. If the seam thickness of 4.80m is representative which is not considered likely to be, 10t height of rock cover will be 48m and there is not considered to be a sufficient amount of rock cover above the seam. It is more likely to be around 1.40m thick as recorded in RBH103, then $t=1.50\text{m}$ and the 10t height of rock cover will be 15m and stabilisation work (i.e. proof drilling and grouting) would still be required in the west of site (below proposed building footprint).

No stabilisation work is considered to be required in the south based on current information.

6.2. Gas Risk Assessment

Gas monitoring in shallow boreholes was previously undertaken on 2no. occasions by Sub Surface Northwest Ltd in April 2026 (in the report version provided to LKC). No elevated methane or carbon dioxide concentrations were encountered, and gas protection measures were not considered to be required.

No shafts have been identified within 50m of site. No evidence of mine gas was identified during the rotary drilling, and no evidence of workings were recorded. The superficial clay deposits (however limited in parts of the site) and underlying impermeable mudstone bedrock are also likely to act as a barrier to any potential low levels of mine gas.

However, shallow coal is present below the site of viable working thickness and deeper workings in the Trencherbone seam have been recorded at 210m below the site and a fault is present either on site along the eastern boundary, or close to the eastern boundary. It is also possible that unrecorded faults are present on site given the variation in the ground conditions identified. Faults which may act as a pathway for gasses relating to deeper workings. Gas monitoring was only undertaken in shallow monitor wells (maximum 2.5mbgl) and limited gas monitoring data is available targeting the gas risk from the coal measures bedrock and below the proposed building footprint.

Given the above, LKC consider it a low likelihood that the site will be impacted by ground gas, however precautionary CS₂ gas protection measures recommended unless further gas monitoring is undertaken given the presence of shallow coal below the site.

7. Recommendations

Based on the finding of the Coal Mining Investigation and Risk Assessment, a potential risk of ground instability associated with historical coal mining has been identified and stabilisation work is recommended as detailed below.

7.1. Shallow Coal Mining

Proof drilling and grouting is required below all proposed buildings in the northern and western area of the building. See Figure 4.

Grouting work should be designed by an appropriately experienced and qualified contractor using the information provided. The scope should be agreed with the MRA prior to undertaking the work.

7.2. Watching Brief

In addition to the above, a watching brief should be carried out during groundworks to identify any potential features which may indicate the presence of shallow coal mining hazards.

The watching brief should cover the period in which any earthworks, reduce level dig or foundation excavation works are being undertaken. This should be undertaken by a suitably qualified coal mining engineer or consultant.

Such hazards may include, but not limited to, features such as unexplained depressions or voids, outcropping coal seams, localised areas of deep made ground (which could represent backfilled areas of coal mining related ground subsidence, crown holes or mine entries), or unexpected man-made items at depth (e.g. brickwork, concrete, timber or steelwork).

Mine entries may manifest during excavation works as circular, square or rectangular areas of deep made ground (typically several metres in size) set against the natural strata (e.g. Glacial Till or weathered rock). Mine shafts may also be covered with a large, thick concrete cap.

If any of the above features are identified during the course of the development works then work should be stopped to allow the mining engineer / consultant to assess them and if necessary, design further or additional investigation and / or remediation works.

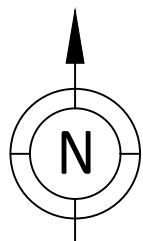
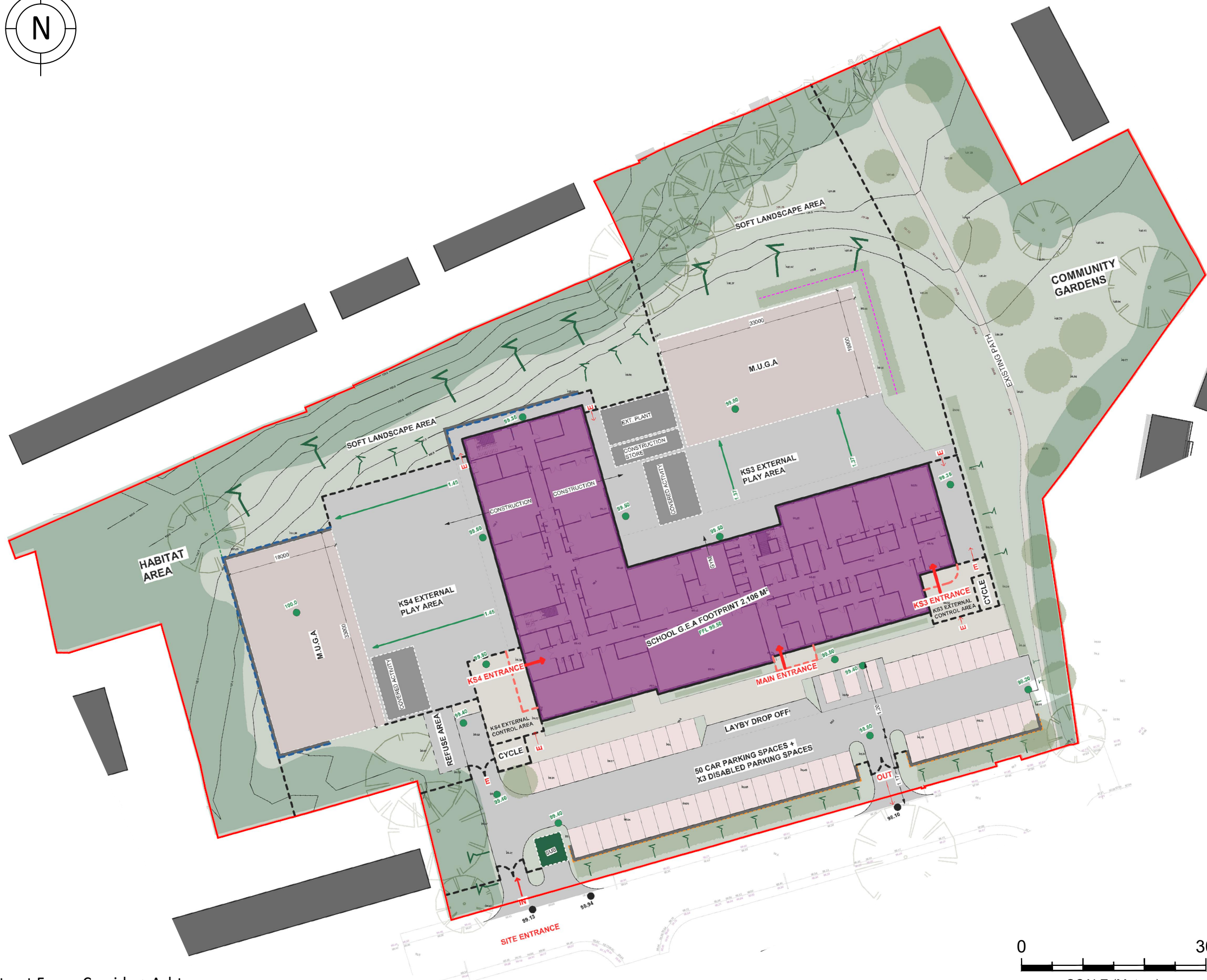
7.3. Gas

LKC consider it a low likelihood that the site will be impacted by ground gas, however precautionary CS₂ gas protection measures unless further gas monitoring is undertaken given the presence of shallow coal below the site.

Figures



Client: Bury Council				Title: Site Location & Boundary Plan		 LK CONSULT	
Site: Milton Road, Bury				Scale (see scale bar): 1:25,000 & 1:1,500 @ A4			
Doc No.: LKC261326		Drawn By: MB	Checked By: PD	Drawn: Jun 2026	Figure: 1		



KEY

Site Boundary

LEGEND

SITE BOUNDARY

BUILDINGS

INDICATIVE EXTENT OF EXISTING TREES/ HEDGEROWS

NEW TREES/ SHRUBS

FENCE/ SECURITY LINE

SOFT LANDSCAPE SCREEN WALL

RETAINING STRUCTURE

LOW LEVEL DWARF WALL

HARDSCAPE

SOFTSCAPE

EXISTING SITE LEVELS

PROPOSED SITE LEVELS

SLOPED EMBANKMENT

SECURE ENTRY POINT

Sampling Locations and features annotated by LK Consult Ltd are approximate and are based upon observed measurements unless otherwise stated. Do not scale from this drawing and work from marked dimensions only. All dimensions and features should be confirmed on site by the Contractor. Where this drawing includes information provided to LK Consult Ltd by others, LK Consult Ltd gives no warranty, representation or assurance as to the accuracy of such information.



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Client:

Bury Council

Site:

Milton Road, Bury

Title:

Proposed Development Plan

Job No.:

LKC261326

Scale (See Scale Bar):

See Scale Bar

Figure:

2

Revision:

Drawn By:

AC

Checked By:

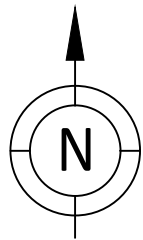
MB

Drawn:

Jun 2026

Extract From: Cassidy + Ashton

Drawing Ref: Proposed Site Plan, No.1004, Rev:P1 (08/06/2026)



KEY

-  Site Boundary
-  Rotary Borehole (RB)

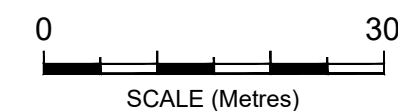
Sampling Locations and features annotated by LK Consult Ltd are approximate and are based upon observed measurements unless otherwise stated. Do not scale from this drawing and work from marked dimensions only. All dimensions and features should be confirmed on site by the Contractor. Where this drawing includes information provided to LK Consult Ltd by others, LK Consult Ltd gives no warranty, representation or assurance as to the accuracy of such information.

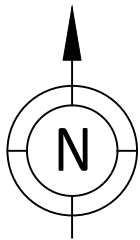
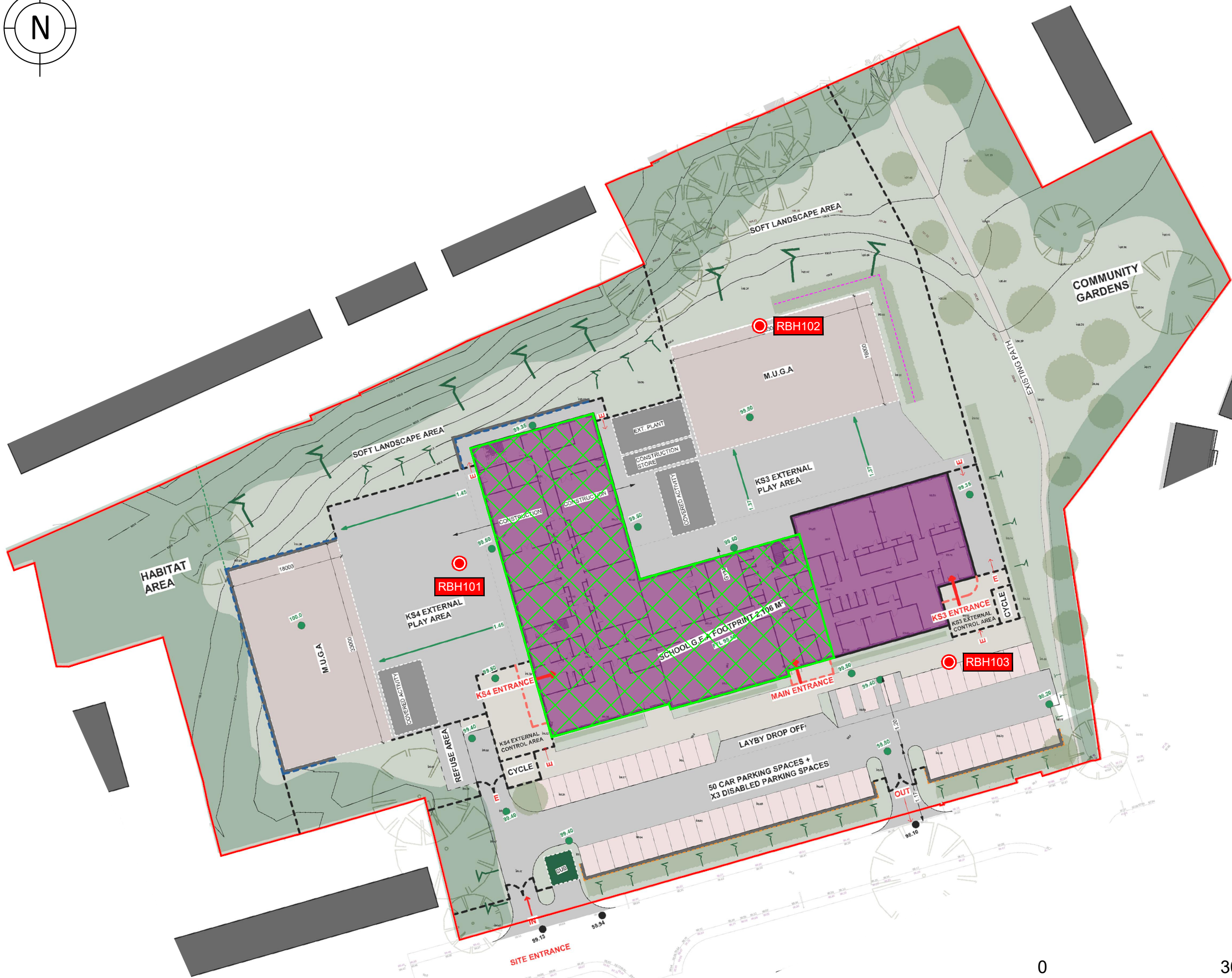


LK CONSULT

Client:		Bury Council	
Site:		Milton Road, Bury	
Title:		Site Investigation Location Plan	
Job No.:	LKC261326	Scale (See Scale Bar):	See Scale Bar
Drawn By:	AC	Checked By:	JL
		Drawn:	Aug 2026
		Figure:	3
		Revision:	

Extract From: Cassidy + Ashton
Drawing Ref: Proposed Site Plan, No.1004, Rev:P1 (08/06/2026)





KEY

- Site Boundary
- Rotary Borehole (RB)
- Area Requiring Proof Drilling & Grouting

NOTE:

Grouting should extend to the deepest coal seams identified during the investigation.

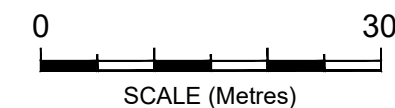
The area identified requires grouting based on current investigation work. If there is no evidence of coal or workings, grouting will not be required. Grouting should extend until there is no evidence of coal/workings.

Sampling Locations and features annotated by LK Consult Ltd are approximate and are based upon observed measurements unless otherwise stated. Do not scale from this drawing and work from marked dimensions only. All dimensions and features should be confirmed on site by the Contractor. Where this drawing includes information provided to LK Consult Ltd by others, LK Consult Ltd gives no warranty, representation or assurance as to the accuracy of such information.



LK CONSULT

Client:		Bury Council	
Site:		Milton Road, Bury	
Title:		Grouting Zone Plan	
Job No.:	LKC261326	Scale (See Scale Bar):	See Scale Bar
Drawn By:	AC	Checked By:	HM
		Drawn:	Sep 2026
		Figure:	4
		Revision:	



Appendix A – Profile Logs







RBH102

Sheet 1 of 4

Client Bury Council	Consultant LK Consult	Contractor Taylor Drilling
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[illegible]

Continued on next page

Rotary open hole 1.20-3.00mbgl.
Rotary core 3.00-13.00mbgl.
Rotary open hole 13.00-35.00mbgl.
Groundwater not determined due to water flush.
NI = Non intact.
AZCL = Assumed zone of core loss ...

Logger
JL

Created using Pebble Geo





Appendix B – Geotechnical Laboratory Testing Results

TEST REPORT

Client LK Consult Ltd

Address Unit 29 Eton Business Park
Eton Hill Road
Radcliffe
Greater Manchester
M26 2ZS

Contract LKC 26 1326, Milton Road, Radcliffe

Job Number MRN 26004/69
Date of Issue 15 September 2026
Page 1 of 2

Approved Signatories

S J Hutchings, O P Davies

Notes

- 1 All remaining samples and remnants from this contract will be disposed 28 days from the date of this report unless you notify us to the contrary.
- 2 Result certificates, in this report, not bearing a UKAS mark, are not included in our UKAS accreditation schedule.
- 3 Opinions and interpretations expressed herein are outside the scope of our UKAS accreditation.
- 4 Certified that the samples have been examined and tested in accordance with the terms of the contract/order and unless otherwise stated conform to the standards/specifications quoted.
- 5 The results included within the report are representative of the samples submitted for analysis.
- 6 This certificate should not be reproduced, except in full, without the express permission of the laboratory.

MURRAY RIX

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TEST CERTIFICATE

DETERMINATION OF THE COMPRESSIVE STRENGTH OF INTACT ROCK CORE SPECIMENS

ASTM D7012 - 23 Method C

CLIENT	LK Consult Ltd
SITE	LKC 26 1326, Milton Road, Radcliffe
JOB NUMBER	MRN 26004/69

DATE RECEIVED	21-Aug-26	DATE SAMPLED	10-Aug-26
DATE TESTED	25-Aug-26	SAMPLED BY	Client
MATERIAL TESTED	Rock Core	LOADING RATE	1 kN/min

Sample Number	Sample Label	Tested By	Diameter (mm)	Length* (mm)	L/D Ratio	Moisture Condition	Method of Preparation	Load at Failure (kN)	Compressive Strength (N/mm ²)	Description after Test
6193201	RBH101 12.00-13.20m	P.H.	86	173	2	As received	ASTM D4543	65.6	11.3	Split vertically top to bottom with no visible end defects
6193202	RBH102 6.00-9.00m	P.H.	85	170	2	As received	ASTM D4543	31.3	5.6	Split vertically top to bottom with no visible end defects
6193203	RBH103 7.50-9.00m	P.H.	86	172	2	As received	ASTM D4543	233.5	40.2	Split vertically top to bottom with no visible end defects

Comments / Deviation from standard method / Abnormalities noted during visual inspection.

*Length after specimen preparation

NAME O.P. Davies BA (Hons)
(Director)

SIGNED



DATE: 15-Sep-26

Client	Bury Council
Site	Milton Road, Bury
Job No.	LKC261326

Exploratory Hole: RBH101

Depth (m)	Test Type*	W (mm)	D (mm)	Load (P) (kN)	D_E^2 (mm ²)	I_s (Mpa)	F	$I_{s(50)}$ (MPa)
10.05-10.20	D	142.59	92.71	1.840	8595	0.21	1.32	0.28
//	D	92.46	92.71	2.600	8595	0.30	1.32	0.40
10.92-11.07	D	151.91	88.36	3.100	7807	0.40	1.29	0.51
//	A	31.74	88.36	2.320	3571	0.65	1.08	0.71
11.25-11.39	D	152.01	86.85	7.530	7508	1.00	1.28	1.28
//	D	144.14	86.85	5.350	20776	0.26	1.61	0.41
14.45-14.59	D	151.61	88.24	5.660	22986	0.25	1.65	0.41
//	D	103.57	88.24	6.930	11636	0.60	1.41	0.84
14.58-14.72	A	138.26	90.53	0.280	15930	0.02	1.52	0.03
//	D	122.25	90.53	0.030	8196	0.00	1.34	0.01
14.69-14.82	D	139.47	86.60	1.590	750	0.21	1.28	0.27
//	A	92.94	86.60	4.164	10248	0.39	1.37	0.53
17.86-17.95	A	96.73	85.36	4.910	10513	0.65	1.38	0.65
//	D	81.52	85.36	7.250	7286	1.27	1.27	1.27
15.88-16.04	D	148.41	90.02	0.660	8104	0.11	1.30	0.11
//	A	82.25	90.02	3.430	9427	0.36	1.35	0.49
15.00-15.15	D	180.00	87.12	1.830	7590	0.24	1.28	0.31
//	A	94.53	87.12	0.170	9376	0.02	1.35	0.02

Tested: Luke Crompton

Checked: Colin Wardle

Date: 21/08/2026

Date: 21/08/2026

Client	Bury Council
Site	Milton Road, bury
Job No.	LKC261326

Exploratory Hole: RBH102

Depth (m)	Test Type*	W (mm)	D (mm)	Load (P) (kN)	D_E^2 (mm ²)	I_s (Mpa)	F	$I_{s(50)}$ (MPa)
11.19-11.24	A	55.77	68.36	0.420	4854	0.09	1.16	0.10
11.19-11.24	D	30.29	68.36	0.330	4673	0.07	1.15	0.08
9.08-9.17	A	105.55	85.56	4.180	11498	0.36	1.41	0.51
9.08-9.17	D	102.67	85.56	3.730	7321	0.51	1.27	0.65
9.19-9.35	D	162.00	86.67	2.640	7512	0.35	1.28	0.45
9.19-9.35	A	95.39	86.67	1.120	10526	0.11	1.38	0.15
6.24-6.37	D	131.94	87.92	5.460	7730	0.71	1.29	0.91
6.24-6.37	A	110.12	87.92	7.680	12327	0.62	1.43	0.89
7.73-7.87	D	170.00	82.49	3.640	28900	0.13	1.73	0.22
7.73-7.87	D	98.17	82.49	2.560	9637	0.27	1.35	0.36
8.44-8.58	D	150.00	92.41	3.330	8540	0.39	1.32	0.51
8.44-8.58	A	72.42	92.41	4.050	8521	0.48	1.32	0.63
3.94-4.00	A	77.32	86.34	0.050	8500	0.01	1.32	0.01
6.80-6.91	D	190.00	86.80	2.180	7534	0.29	1.28	0.37
6.80-6.91	D	90.02	86.80	0.560	7534	0.07	1.28	0.10
4.22-4.41	D	180.00	86.09	6.890	7411	0.93	1.28	1.19
4.22-4.41	A	84.59	86.09	1.320	9272	0.14	1.34	0.19

Tested: Luke Crompton

Checked: Coin Wardle

Date: 21/08/2026

Date: 21/08/2026

Client	Bury Council
Site	Milton Road, Bury
Job No.	LKC261326

Exploratory Hole: RBH103

Depth (m)	Test Type*	W (mm)	D (mm)	Load (P) (kN)	D_E^2 (mm ²)	I_s (Mpa)	F	$I_{s(50)}$ (MPa)
5.19-5.27	A	80.95	84.76	4.930	8736	0.56	1.33	0.75
5.19-5.27	D	65.71	84.76	1.560	7184	0.22	1.27	0.28
5.45-5.53	A	87.40	86.67	0.090	9645	0.01	1.35	0.01
5.45-5.53	D	37.45	86.67	0.030	7512	0.00	1.28	0.01
4.96-5.04	A	88.72	84.03	6.220	9492	0.66	1.35	0.89
4.96-5.04	D	76.32	84.03	2.040	5825	0.35	1.21	0.42
6.61-6.65	A	68.88	88.74	8.320	7783	1.07	1.29	1.38
6.61-6.65	D	62.00	88.74	0.430	7875	0.05	1.29	0.07
7.17-7.17	D	111.45	97.34	4.810	9475	0.51	1.35	0.68
7.17-7.17	A	54.55	97.37	8.780	6763	1.30	1.25	1.62
8.12-8.24	A	121.48	92.58	0.260	14320	0.02	1.48	0.03
8.12-8.27	D	88.81	92.58	0.080	8571	0.01	1.32	0.01
14.00-14.15	D	85.16	137.76	1.940	18978	0.10	1.58	0.16
14.00-14.15	D	89.51	137.76	0.890	18978	0.05	1.58	0.07
14.71-14.84	A	118.33	87.91	1.730	13245	0.13	1.46	0.19
14.71-14.84	D	97.96	87.91	2.290	7728	0.30	1.29	0.38
12.65-12.73	A	87.84	86.89	2.910	9718	0.30	1.36	0.41
12.65-12.73	D	89.72	86.89	4.180	8050	0.52	1.30	0.68
10.00-10.08	A	84.81	79.90	1.650	8628	0.19	1.32	0.25
10.00-10.08	D	82.08	79.90	0.550	6384	0.09	1.23	0.11

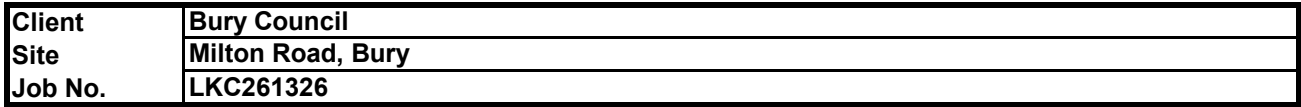
Tested: Luke Crompton

Checked: Colin Wardle

Date: 21/08/2026

Date: 21/08/2026

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[illegible]

Date: 21/08/2026

Appendix C – References

¹ CIRIA, September 2019, "Abandoned Mine Workings Manual", C758D.

² CIRIA, September 2019, "Abandoned Mine Workings Manual", C758D.

³ The British Standards Institution (BSI Standards), March 2018, "Geotechnical investigation and testing. Identification and classification of soil - Part 1: Identification and description", BS EN ISO 14688-1:2018.

⁴ The British Standards Institution (BSI Standards), May 2020, "Code of practice for ground investigations", BS 5930:2015+A1:2020.

⁵ European Commission, 2004 & 2007, "Eurocode 7: Geotechnical Design – Part 1 – General rules" & "Part 2: Ground investigation and testing", EN 1997-1:2004 & EN 1997-2:2007.

⁶ CIRIA, 2001, "Trenching practice", REP R 97, 2nd Edition.

⁷ CIRIA, September 2019, "Abandoned Mine Workings Manual", C758D.

⁸ CIRIA, September 2019, "Abandoned Mine Workings Manual", C758D.

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