VARLEY AND NELSON STREET
MANCHESTER

SHALLOW MINING
SITE INVESTIGATION WORKS

DRAFT

Job Number: LKC 22 1670
Date: June 2023
Client: ISG Ltd



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LK Consult Document Verification			
Site Address	Varley Street, Miles Platting, Manchester, M40 8EF		
Report Title	Shallow Mining and Mine Shaft Investigation Works		
Job Number	LKC 22 1670	**Document Ref.**	CL-602-LKC 22 1670-CMSI
Date Issued	13th June 2023	**Report Version**	R0
Prepared By	Ella Mcleod Hannah Moss	**Reviewed By**	Catherine Baranek

Revision Record			
Revision No.	**Date**	**Nature of Revision**	**Approved By**

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CONTENTS

1 Introduction 1

1.1 Background 1

1.2 Site Details 1

2 Summary of Previous Work 2

2.1 Coal Mining Risk Assessment undertaken by Envirosolution Ltd (ref. CL101b, dated 15th March 2022) 2

3 Investigation Works 6

3.1 Site Investigation Design and Methodology 6

4 Ground Conditions 7

4.1 Rotary Open Hole Drilling 7

4.2 Mine shaft Investigation 8

5 Conclusions and Recommendations 10

5.1 Shallow Coal Mining 10

5.2 Mine Shafts 11

5.3 Additional Advice 13

FIGURES

Figure 1: Site Location and Boundary Plan

Figure 2: Proposed Development Plan

Figure 3: SI Location Plan

Figure 4: Potential Zone of Influence Plan

APPENDICES

Appendix A: Coal Authority Permit

Appendix B: Rotary Drilling Logs

Appendix C: Logs and Photographic Record – Mine Shaft Investigation Works

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1 Introduction

1.1 Background

LK Consult Ltd (LKC) has been commissioned by ISG Ltd to carry out investigation works into the potential mining risks at Varley and Nelson Street, Manchester.

The following work has previously been undertaken for the site:

- Coal Mining Risk Assessment (CMRA) undertaken by Envirosolution Ltd (Ref: CL101b, dated 15th March 2022).

The Phase 1 and Phase 2 reports by LKC have not been summarised in this report as they relate to geotechnical and contamination risks rather than historical coal mining, and will be summarised in separate cover.

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 seams/workings and mine entries. 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 CIRIA758[1].

Ground conditions can change rapidly, especially in areas of Made Ground; however, it is assumed that that the ground conditions observed are typical and representative of the site as a whole. The ground conditions have been determined from a limited number of exploratory holes, therefore only a small percentage of the total area of the property has been investigated. Conclusions drawn from the ground investigation should be read in this context. LKC cannot accept responsibility for any situations resulting from locally unforeseen ground conditions occurring between exploratory holes.

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1.2 Site Details

A summary of the site details is presented in Table 1-1. Figures 1 and 2 indicate the site location, boundary and proposed development plan.

Location	Site is surrounded by Sawley Road to the north, Vickers Street to the east, James Street to the south and Nelson Street to the west. Centred at approximate National Grid Reference 386113E 399582N.
Area	Approx. 3200m^2.
Topography	139-141 metres Above Ordnance Datum (AOD). Site is approximately level.
Land Use	Vacant land.
Proposed Development	School with associated infrastructure and landscaping in the north eastern area of the site. No proposed development for the western area of site at this stage.

Table 1-1. Summary of site details.

[1] CIRIA2019: C758D Abandoned mine workings manual. ISBN: 978-0-860017-765-4

2 Summary of Desk Based Coal Mining Risk Assessment

A Coal Mining Risk Assessment undertaken by Envirosolution Ltd (ref. CL101b, dated 15th March 2022) is summarised below.

2.1.1 Geology

Artificial

No artificial deposits have been mapped across site.

Superficial

The superficial geology is mapped as Devensian Till (Diamicton).

Bedrock

The bedrock is mapped as the Pennine Upper Coal Measures Formation (interbedded mudstone, sandstone and siltstone). The bedrock has a regional dip to the southwest by 18°.

Two coal seams are shown to subcrop on the site, striking in a northwest to southeast direction. One is located in the northeast of the site and is anticipated to be the Bradford Four Foot seam. The second is located in the southwest of the site and it anticipated to be the Bradford Threequarters seam.

2.1.2 Coal Mining

A Consultants Coal Mining Report is included within the CMRA undertaken by Envirosolution Ltd. Table 2-1 Summarises the findings.

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Mining Activity and Geology	
Past underground mining	Yes: See Plate 2-2.
Probable unrecorded shallow workings	Yes.
Spine roadways at shallow depth	No spine roadway recorded at shallow depth.
Mine entries (within 100m)	Yes: See Plate 2-3.
Abandoned mine plan catalogue numbers	0, NW645, PO0.
Outcrops	Yes: Bradford Four Feet and Yard.
Geological faults, fissures and breaklines	No faults, fissures or breaklines recorded.
Opencast mines	None recorded within 500m of the enquiry boundary.
Coal Authority managed tips	None recorded within 500m of the enquiry boundary.
Investigative or Remedial Activity	
Site investigations	1no. recorded within 50m of the enquiry boundary.
Remediated sites	None recorded within 50m of the enquiry boundary.
Coal mining subsidence	Not received a damage notice or claim for the subject property, or any property within 50m, since 1994. No current Stop Notice delaying remedial works or repairs to property. Not aware of any request made to carry out preventative works before coal is worked.
Mine gas	None recorded within 500m of the enquiry boundary.
Mine water treatment schemes	None recorded within 500m of the enquiry boundary.
Licensing and Future Mining Activity	
Future underground mining	None recorded.
Coal mining licensing	None recorded within 200m of the enquiry boundary.
Court Orders	None recorded.
Section 46 notices	No notices have been given, stating that the land is at risk of subsidence.
Withdrawal of support notices	Not in an area where a notice to withdraw support has been given or where a notice has been given cancelling the entitlement to withdraw support.
Payments to owners of former copyhold land	Not in an area where a relevant notice has been published.

Table 2-1: Summary of Coal Authority Consultants Coal Mining Report.

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Plate 2-2 shows the past underground mining. This is defined by the Coal Authority as '*details of all recorded underground mining relative to the enquiry boundary. Only underground workings where the enquiry boundary is within 0.7 times the depth of the workings (zone of likely physical influence) allowing for seam inclination, will be included'.*

Colliery	Seam	Mineral	Coal Authority reference	Depth (m)	Direction to working	Dipping rate of seam worked (degrees)	Dipped direction of seam worked	Extraction thickness (cm)	Year last mined
unnamed	BRADFORD FOUR FEET	Coal	35CU	24	Beneath Property	18.4	South-West	120	1900
unnamed	PARKER	Coal	35BJ	253	North	17.9	South-West	80	1935
unnamed	PARKER	Coal	35BL	303	Beneath Property	18.0	South-West	80	1935
unnamed	PARKER	Coal	35BQ	369	Beneath Property	22.5	South	80	1935
unnamed	PARKER	Coal	35BR	371	North-West	7.8	South-West	80	1935
unnamed	CROMBOUKE	Coal	3597	607	North	16.9	South-West	120	1936
unnamed	ROGER	Coal	35AN	613	North	17.2	South-West	180	1964
unnamed	ROGER	Coal	35AM	626	North-West	16.2	South	180	1964
unnamed	ROGER	Coal	35AY	637	North-East	16.1	South-West	180	1961
unnamed	ROGER	Coal	35AL	642	North-West	17.4	South	180	1967
unnamed	CROMBOUKE	Coal	359F	643	Beneath Property	21.0	South-West	120	1924
unnamed	ROGER	Coal	35AZ	648	Beneath Property	20.8	South-West	180	1963
unnamed	ROGER	Coal	35B2	789	West	21.6	South	180	1965
unnamed	CROMBOUKE	Coal	359E	842	South	16.5	South-West	120	1932

Plate 2-2: Extract from Coal Authority Report showing past underground mining.

Plate 2-3 shows the mine entries within 100m of the site boundary.

Entry type	Reference	Grid reference	Treatment description	Mineral	Conveyancing details
Shaft	385399-011	385942 399577		Coal	
Shaft	386399-001	386056 399531	This shaft was located in 1974 and was found to be filled The shaft was then drilled and pressure grouted.	Coal	
Shaft	386399-002	386062 399493		Coal	
Shaft	386399-016	386115 399542		Coal	
Shaft	386399-017	386002 399638		Coal	

Plate 2-3: Extract from Coal Authority Report showing mine entries within 100m.

Shaft references 386399-016 and 386399-001 are shown to be located on site. Shaft reference 386399-002 is shown to be approximately 5m beyond the southwestern site boundary. The remaining shafts are located over 75m from site.

An extract from the Summary of Findings Plan provided within the Coal Authority Consultants Report is provided in Plate 2-4.

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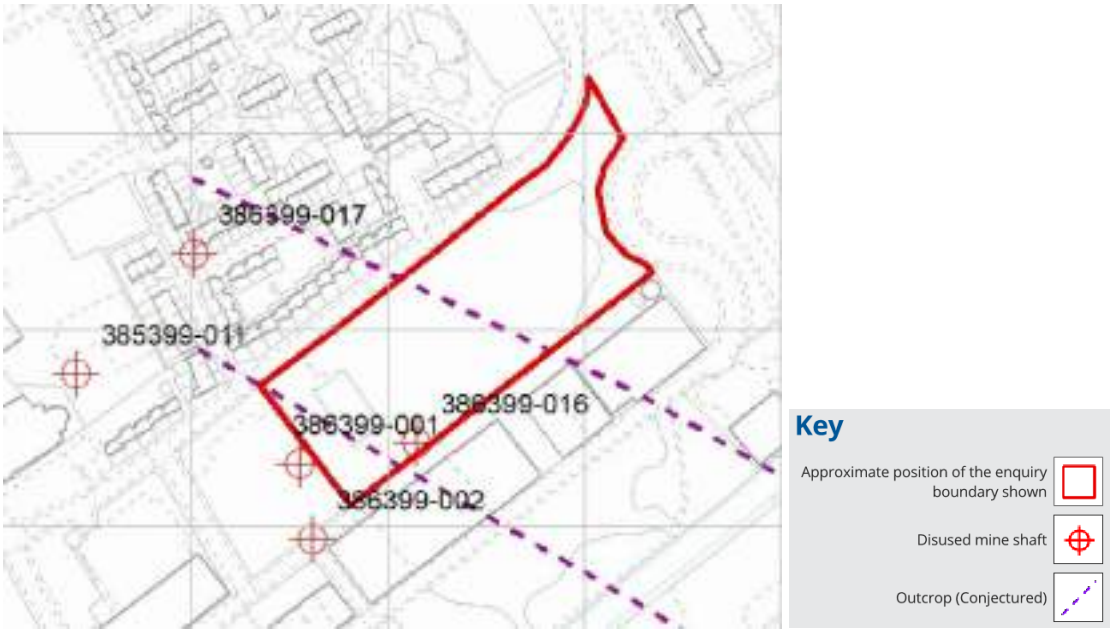


Plate 2-4: Extract from Summary of Findings Plan provided within the Coal Authority Consultants Report.

Information relating to the mine shaft references 386399-001, 386399-002 and 386399-016 from the Coal Authority Interactive Web Viewer is provided below:

Ref: 386399-001
Treated: True
Actual shaft diameter: 2.1
Shaft depth: 74m
Name: LANCS
Departure: 8m

Ref: 386399-002
Treated: False
Assumed shaft diameter: 2.5
Name: LANCS
Departure: 8m

Ref: 386399-016
Treated: False
Assumed shaft diameter: 2.5
Name: LANCS
Departure: 8m

Based on the review of information, the following intrusive investigation work was recommended:

Coal Mining Issue	Investigation Work
Underground coal mining (recorded at shallow depths)	Rotary drilling across the site to determine the depth of coal seams beneath the site and obtain evidence of unrecorded and recorded mine workings.
Underground coal mining (probable at shallow depths)	
Mine entries (shafts / adits)	Trenching / probing to locate the mine shafts.

Table 2-5: Summary of investigation requirements.

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3 Investigation Works

3.1 Site Investigation Design and Methodology

The following site investigation works were carried out by LKC in May 2023:

- 8no. open hole rotary boreholes to 40.00m below ground level (bgl) (RH1-RH8).
- Trial trenching for shaft references 386399-001, 386399-002 and 386399-016 using a 13 tonne tracked machine.

The Open Hole Rotary Drilling was carried out in 8no. locations to determine the depth of coal seams and the presence / absence of shallow workings across the site.

The boreholes were undertaken by Taylor Drilling Services Ltd using a Baretta T41 Rotary rig fitted with a PCD drill bit. All 8no. boreholes were sunk to a depth of 40mbgl.

The purpose of the trial trenching was to identify any anomalously deep made ground or other features which may be indicative of the presence of a mine shaft. Mine shaft fill material often includes colliery spoil, ash and clinker which is often visible when set within natural superficial deposits.

Upon completion, the trial trenches were backfilled with arisings and the boreholes grouted up.

A permit was granted by the Coal Authority (permit 26624) to undertake the coal mining investigation.

All site investigation locations are shown in Figure 3.

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4 Ground Conditions

4.1 Rotary Open Hole Drilling

The rotary borehole logs are provided in Appendix C. The investigation locations are shown on Figure 3.

4.1.1 Made Ground

Made ground comprising ash, brick and clay was encountered in all locations to a depth of 1.50mbgl.

4.1.2 Superficial

Natural light brown clay was recorded in RH1, RH3, RH7 between 0.70-14.00mbgl, with occasional sand lenses. Sandy clay was also recorded in all locations between 7.00-28.00mbgl.

4.1.3 Bedrock (Coal Measures)

Rockhead was encountered in all locations, with the shallowest depth (23.00mbgl) being recorded in RBH1. Bedrock comprised:

- Weathered mudstone encountered between 23.00-25.30mbgl in RH1.
- Light grey mudstone was recorded in all locations, generally between depths of 25.00-36.00mbgl. Mudstone was recorded to 40.00mbgl in RH1 only. Sandstone bands were also recorded within the mudstone in RH1-RH3.
- Light grey siltstone was recorded in RH2 and RH3 between depths of 36.8-38.00mbgl.
- Light grey / light brown sandstone was recorded in all locations between depths of 32.00-40.00mbgl.
- Intact **coal** encountered in all locations, from a depth of 34.00-36.00mbgl. between depths of 34.00-37.00mbgl respectively, The thickness of the coal ranged between 0.50-1.00m.

A summary is provided in Table 4-1, showing the depth to rockhead, top of coal seams (mbgl), and the thickness of cover above the coal seam for all locations.

Borehole	Bedrock		Coal	
Location	Depth to Rockhead (mbgl)	Thickness of rock cover above coal (m)	Depth Top (mbgl)	Thickness (m)
RH1	23.00	11	34.00	0.60
RH2	25.00	11	36.00	1.00
RH3	25.70	10	36.00	0.80
RH4	25.00	9	34.20	0.80
RH5	27.80	7	34.50	0.50
RH6	28.00	6	34.00	0.50
RH7	27.50	7	34.20	0.60
RH8	27.50	7	34.90	0.70

Table 4-1: Rotary Borehole Summary.

It should be noted that evidence for the presence of coal workings can include (but is not limited to) partial or total loss of flush, broken drilling, fast drilling or the sudden dropping of the drill string.

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No evidence of loss of flush, loss of flush, broken drilling, fast drilling or the sudden dropping of the drill string were recorded. However, as described above, intact coal seams were encountered, in which potential for workings cannot be ruled out. This is discussed further in Sections 5.

The intact coal is likely to represent the Bradford Four Feet or Bradford Three Quarters seam based on Coal Authority data and desk based assessments.

4.1.4 Ground Gas

No detectable concentrations of methane, carbon dioxide, carbon monoxide or hydrogen sulphide or any oxygen depletions were measured during the rotary drilling process.

4.2 Mine shaft Investigation

LKC attended site to undertake trenching in May 2023. A series of inspection trenches were excavated with a 13tonne excavator using a 1.80m wide ditching bucket.

A summary of pertinent findings for each shaft position is provided below. For full details on ground conditions, please refer to Appendix C for complete trench logs and photographs.

Locations are provided on Figure 3.

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Shaft Ref. 386399-001

A total of 14no. trenches were excavated to investigate Shaft Ref. 386399-001.

- Made ground was generally recorded to a maximum depth of 1.80mbgl across most of the area, and comprised horizons of sand and gravel, some horizons of clay, with ash, clinker brick, rootlets and coal fragments. Evidence of hydrocarbon contamination identified in Trenches 4, 6, 10 and 11.
- Natural strata comprised variably gravelly and sandy CLAY.
- Trench 14 – Deeper area of circular made ground recorded to 5.50mbgl (base of made ground not determined) consisting of predominantly ash. Underlain by stiff consistency grey CLAY with bands of shale / mudstone gravel, coal and occasional brick fragments. Diameter of feature is approximately 2.50m. Evidence of grouted boreholes identified. Likely to be mine shaft, with no evidence of a concrete cap.

Shaft Ref. 386399-016

A total of 4no. trenches were excavated to investigate Shaft Ref. 386399-016.

- Made ground was generally recorded to a maximum depth of 2.20mbgl, and comprised mostly horizons of sand and clay, with ash, clinker, ceramic, brick, rootlets and coal fragments.
- Natural strata comprised variably gravelly and sandy CLAY.
- Trench 4 – Circular area of deeper made ground recorded between 2.30-2.60mbgl (base of made ground not determined) consisting of gravel with bricks. Likely untreated mine shaft. Diameter of features approximately 2.50m. .

Shaft Ref. 386399-002

A total of 9no. trenches were excavated to investigate Shaft Ref. 386399-002.

- Made ground was generally recorded to a maximum depth of 1.20mbgl, and comprised horizons of sand and gravel, some horizons of clay, with ash, clinker brick, and tarmacadam fragments.
- Natural strata comprised variably gravelly and sandy CLAY.
- Deeper made ground was recorded in Trenches 8 and 9 to 3.00mbgl, comprising predominantly bricks. A basement floor was recorded at 3.00mbgl, and natural clay was recorded beneath this, therefore it is unlikely that the shaft is present in this location.
- No evidence of mine shaft identified. It is assumed that the mine shaft is located off site.

The locations are presented in Figure 3. The centre of the identified shafts are located at the following grid references:

- Shaft Ref. 386399-001 - 386048.6 E, 399533.6 N
- Shaft Ref. 386399-016 - 386108.2 E, 399546 N.

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5 Conclusions and Recommendations

The site is within a Development High Risk Area relating to recorded and probable shallow coal workings. In addition, 2no. mine shafts are recorded on site, and 1no. mine shaft is recorded adjacent to the southwest site boundary (offsite).

To investigate the above potential hazards a total of 8no. rotary open hole boreholes were sunk to 40mbgl across the site, and trenching to locate the mine shafts was undertaken.

5.1 Shallow Coal Mining

Intact coal seams were encountered in all locations between depths of 34-36mbgl. This is likely to represent the Bradford Four Feet coal seam, in line with desk based assessments. No evidence of workings were identified in the locations drilled.

All boreholes terminated at 40mbgl in sandstone, and in 40mbgl in mudstone in RH1.

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%[2].

The Coal Authority have recorded workings within the Bradford Four Feet coal seam at 24m depth below the site (extraction thickness of 1.2m).

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 C758D[3], 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° (unlikely on this site).

[2]CIRIA (2019). "Abandoned Mine Workings Manual". CIRIA C758D
[3]CIRIA (2019). "Abandoned Mine Workings Manual". CIRIA C758D

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- Strong groundwater flows within workings and rising or falling groundwater levels. The deep groundwater regime is unknown beneath the site.
- Where multi-seam extractions have taken place (unlikely on this site).

As bedrock is unlikely to dip at >20^{o} and as multiple seams have not been extracted the 10t guidelines are considered appropriate.

Intact coal seams have been encountered in all locations with a thickness up to 1.0m. The Coal Authority have recorded worked coal within the Bradford Four Feet with an extraction thickness of 1.2m. 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.

This investigation has proven that the rock cover above the seam is between 6 and 11m.

Competent thick superficial deposits (>10m) can contribute to the mitigation of the extent of void migration and may provide a contribution to the rock cover equivalent to half its thickness (e.g. half the depth of the glacial till would be considered equivalent to rock of that thickness). However, the majority of the stability should be provided by actual rock cover and the Coal Authority adopts the rule of thumb that the rock cover contribution should be in excess of 80%.

12m of rock cover would be required to contribute 80% of the total cover (10t=15m) which is not present below the site.

Based on the above assessment, stabilisation work is recommended and should be designed by an appropriately experienced and qualified contractor using the information provided.

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5.2 Mine Shafts

LKC undertook trenching on site to investigate the 2no. on site mine shafts, and to confirm the absence / presence of the mine shaft located offsite to the southwest.

The 2no. mine shafts onsite were located.

Shaft reference 386399-001 was noted to be untreated and desk based studies suggest no treatment has occurred.

It was observed that shaft reference 386399-016 had previously been treated, as per the information in the previous desk study suggested as evidence of grouting was noted. However, the integrity of the treatment is unknown, and no evidence of a concrete cap was observed.

It is therefore assumed that collapse of the two shafts could occur, particularly when ground is disturbed and loadings are increased (i.e. as part of earthworks and construction work).

No evidence was identified to suggest that 386399-002 is within the site boundary, therefore it assumed to be offsite and has been included in the below risk assessment as it is considered to pose a risk to the development.

Potential shaft collapse is influenced by the ground and can be dependent on the strength and thickness of superficial deposits, bedrock properties, connected mine entries and hydrogeology.

The exterior zone of collapse is illustrated in Plate 5-1 (extract from C758[4]):

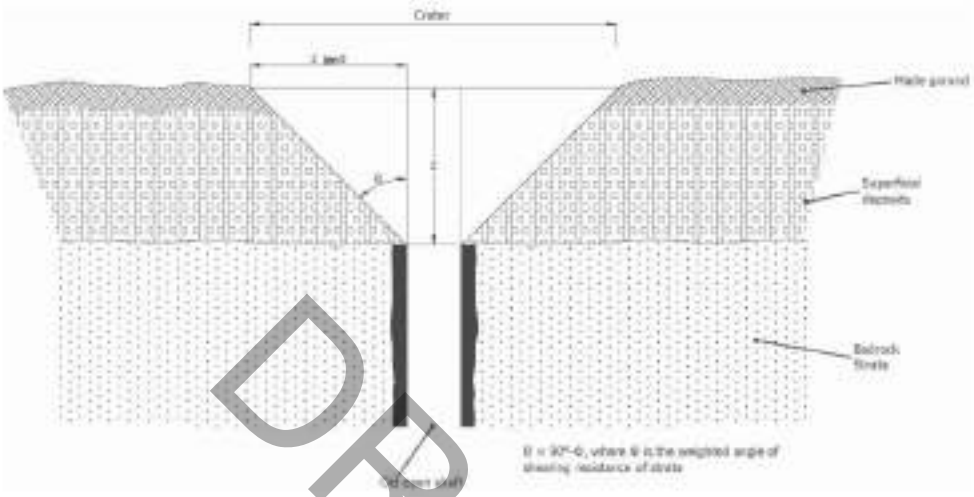


Plate 5-1: Extract from C758 showing exterior zone of collapse.

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The onsite rotary boreholes indicate superficial is 25m deep at it's shallowest, but was recorded between 25-28m across site. The superficial is mapped as Till, and onsite site investigation recorded superficial clay and sand.

The weighted angle of shearing resistance of the strata above the bedrock is assumed to be 25^{o} taking into account the anticipated ground conditions on site (using previous site investigation data) and guidance provided in BS8002-2015[5]. Assuming an average depth to bedrock of 25m to bedrock as a conservative measure, the zone of collapse and potential zone of influence has been calculated for each shaft as shown in Table 5-1.

Shaft Reference	Extent of Crater from Edge of Shaft (m)	Potential Zone of Influence from assumed centre of shaft (m)
386399-001	53.61	54.86
386399-002 (offsite)	53.61	62.86*
386399-016	53.61	54.86

Table 5-1: Summary of Potential Zone of Influence and Collapse Zones.
* Includes 8m departure distance.

A plan showing the Zone of Influence (ZOI) for each shaft is provided in Figure 4.

Shaft 386399-001 lies within the western area of the site where no development proposals are currently available. The zone of influence extends into the car park and sports court of the school development.

[4] CIRIA (2019). "Abandoned Mine Workings Manual". CIRIA C758
[5] BS8002:2015 Code of Practice for Earth Retaining Structures. 2015.

Shaft 386399-016 lies within the proposed sports court. The zone of influence extends into the car park, soft landscaping and the southwestern portion of the proposed building.

It is assumed that Shaft 386399-002 lies beyond the site boundary. The zone of influence extends in the western area where no development proposals are currently available and into the car park of the school development.

It is recommended that drilling and grouting of the onsite shafts (386399-001 and 386399-016) should be undertaken and a cap installed on competent strata. The design of this treatment should be undertaken by a suitably competent mining engineer.

Once the onsite shafts have been treated, the risk of collapse is very low. However, measures should be included within the design to ensure all reasonable precautions are taken to limit the effects of a potential collapse. This could include appropriate foundation design and geogrid below the car parking, sports court and soft landscaping. These precautions should also cover the risk associated with the offsite shaft where treatment is not possible.

No development is proposed in the far western portion of site at this stage. Any future development should take the above into consideration and further assessment may be required.

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5.3 Watching Brief

A watching brief should be undertaken 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.

5.4 Additional Advice

A Coal Authority permit would need to be obtained prior to any further coal mining treatment works being carried out on this site. Treatment of the shallow workings and mine entries will need to be agreed in advance of the works taking place with the Coal Authorities engineering department, the local authority and building control.

Figures

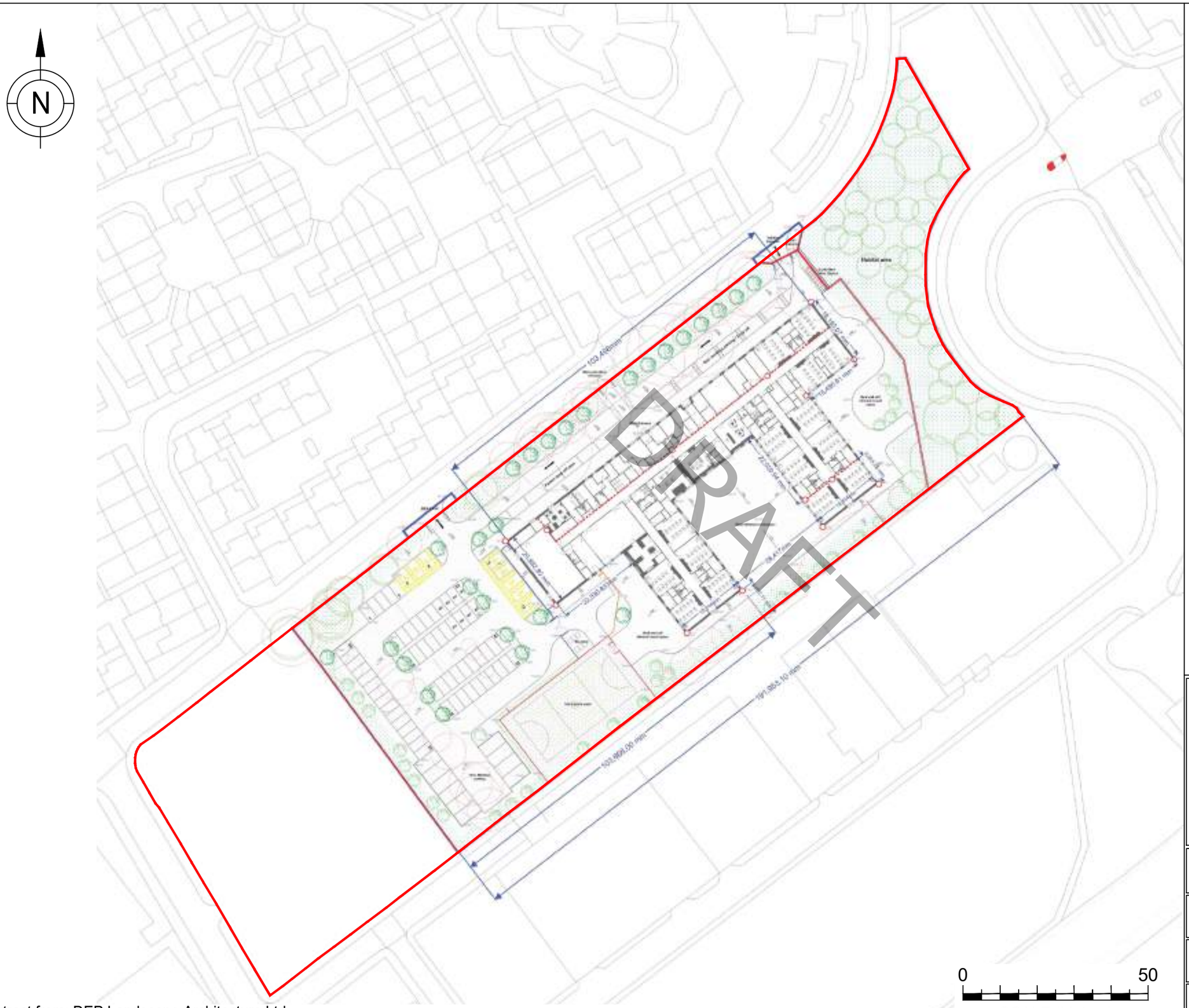
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Client: ISG Ltd				Title: Site Location & Boundary Plan	LK CONSULT
Site: Varley & Nelson Street, Manchester				Scale (see scale bar): 1:25,000 & 1:2,500 @ A4	Figure: 1
Job No.: LKC 22 1670	Drawn By: EM	Checked By: PD	Drawn: June 2023		Revision:



KEY

Site Boundary

LEGEND

Surfaces

Pedestrian asphalt, eg footpaths and hard play areas

Vehicular asphalt car parking areas, access roads and service yard

Porous pedestrian asphalt surface on build surface granite macro

Boundaries

Security Line, 2.4m Height (weldmesh fence (Colour TBC))

3.0m Close boarded timber fence

1.2m Vertical bar railings (Colour TBC)

1.2m Timber post and rail fencing

Soft Landscaping

Existing trees to be retained (TBC)

Existing trees to be removed (TBC)

Proposed tree planting - 14-16cm girth

Proposed tree planting - 10-12cm girth

Hedge hedge 0.6-0.8m height

Ornamental planting beds, 3-5L pots

Grass seeding: flowering meadow mix

Grass seeding: Amenity meadow mix

Landscape Features

Boundary treatment TBC

Cycle store

EV Charging Bays

Accessible parking bay

Parking bay

Key

Potential area of investigation

Line between Ground Bearing and Suspended Slab

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.

0 50

SCALE (Metres)

Extract from: DEP Landscape Architecture Ltd
Drawing Ref: Proposed Landscape Layout, No.VAR-DEP-XX-XX-DR-L-00001, Rev:P07 (02/02/2023)

LK CONSULT LIMITED

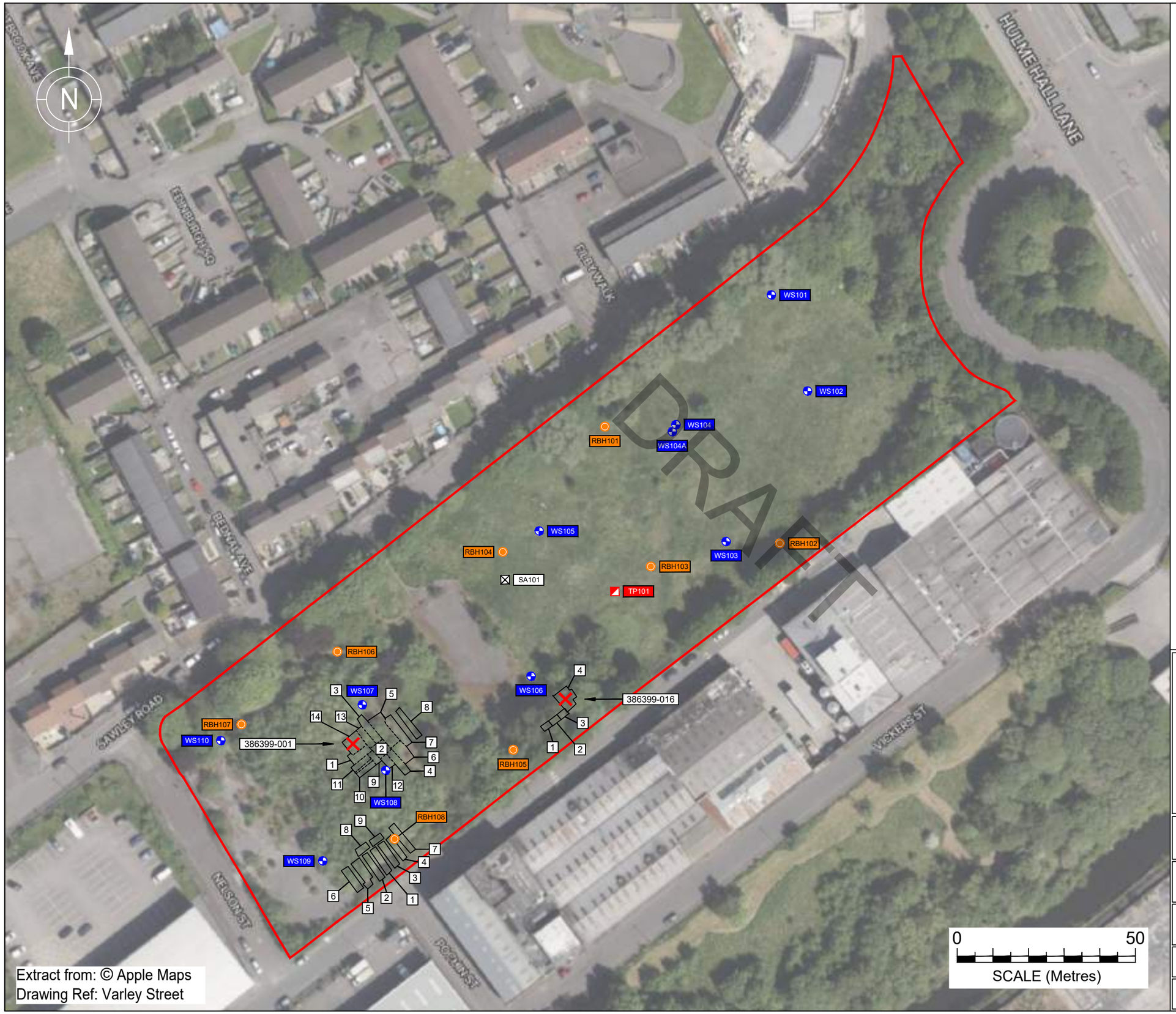
Client: ISG Ltd

Site: Varley & Nelson Street, Manchester

Title: Proposed Development Plan

Job No.:	Scale (See Scale Bar):	Figure:	Revision:
LKC 22 1670	See Scale Bar	2	

Drawn By:	Checked By:	Drawn:
AC	EM	Jun 2023



KEY

- Site Boundary
- Mine Entry
- Window Sample Borehole (WS)
- Trial Pit (TP)
- Rotary Borehole (RBH)
- Soakaway Test (SA)
- Excavation
- Excavation Identification Number

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 LIMITED

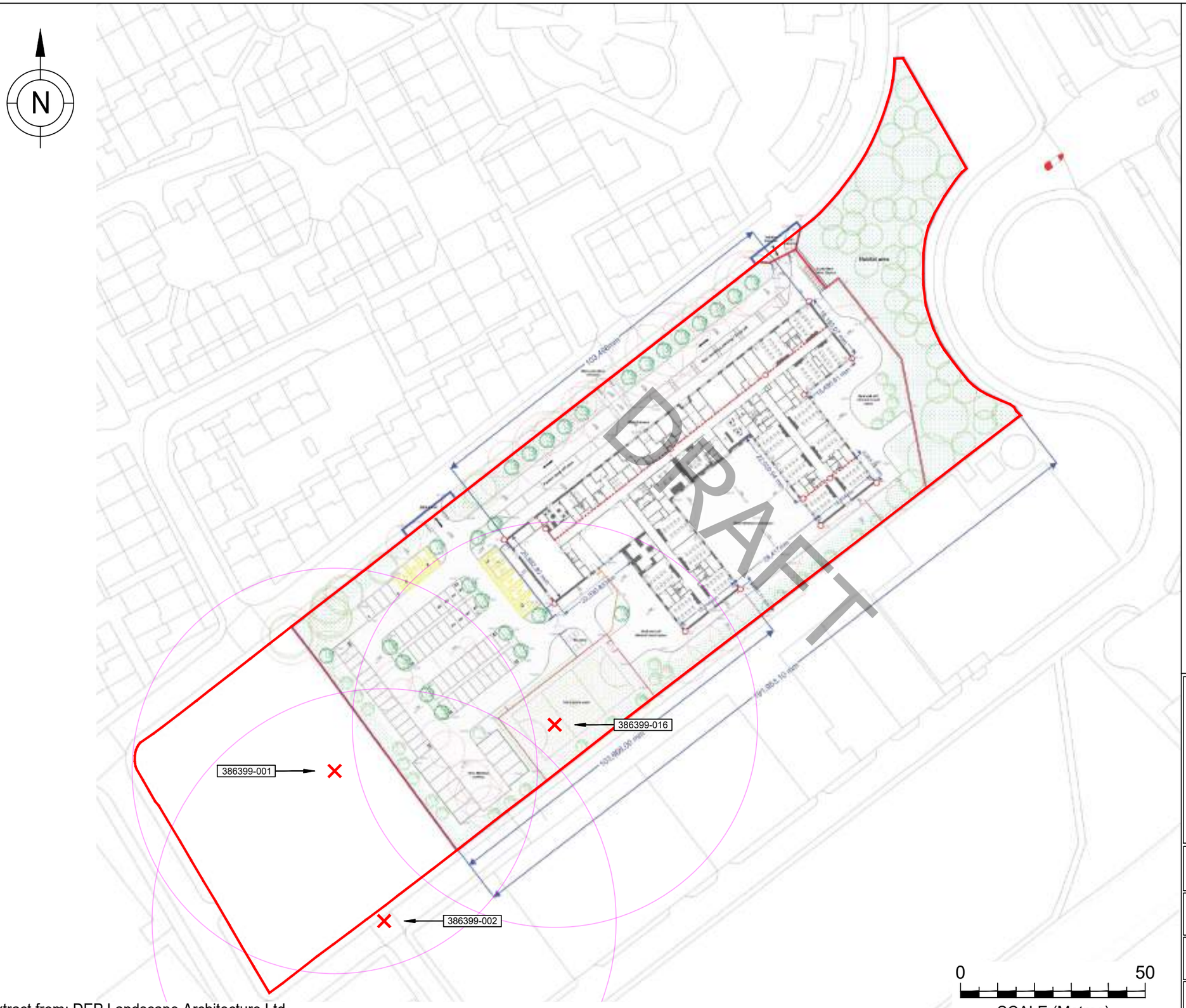
Client: ISG Ltd

Site: Varley & Nelson Street, Manchester

Title: Site Investigation Location Plan

Job No.:	Scale (See Scale Bar):	Figure:	Revision:
LKC 22 1670	See Scale Bar	3	

Drawn By:	Checked By:	Drawn:
AC	EM	Jun 2023



Extract from: DEP Landscape Architecture Ltd
Drawing Ref: Proposed Landscape Layout, No.VAR-DEP-XX-XX-DR-L-00001, Rev:P07 (02/02/2023)

0 50
SCALE (Metres)

KEY

- Site Boundary
- Mine Entry
- Zone of Influence

NOTE:

Zone of influence is based on the calculation of the exterior zone of collapse (CIRIA C758) & assumes 25m to rockhead, 25° angle of shear resistance, 2.5m shaft diameter & includes the departure distance of shaft reference 386399-002.

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 LIMITED

Client: ISG Ltd

Site: Varley & Nelson Street, Manchester

Title: Mine Shaft Zone of Influence Plan

Job No.:	Scale (See Scale Bar):	Figure:	Revision:
LKC 22 1670	See Scale Bar	4	A

Drawn By:	Checked By:	Drawn:
AC	HM	Jun 2023

Appendix A

Coal Authority Permit

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Appendix B

Rotary Borehole Logs

DRAFT

TAYLOR DRILLING SERVICES LTD

Rotary Drilling Journal

Core run mBGL From	Core run mBGL To	Description	Stratum Depth m	Core Size mm	Run Duration mins	Run Length m	Core Recovery m	Flush Return %	Casing Depth m	Casing Size	Time	Water Level mBGL
START OF SHIFT / BOREHOLE												
GL	0.2	TOP SOIL GRASS										
0.2	0.7	ASH-BRICK M/G										
0.7	7.0	L/B CLAY										
7.0	12.5	L/B CLAY + SANDS										
12.5	18.2	L/B SAND CLAY BANDS										
18.2	23.0	L/B CLAY SAND BANDS										
23.0	25.3	RED CLAY very weathered M/STONE.										
25.3	32.0	L/G M/STONE.										
32.0	34.0	L/G + L/B S/S M/S Bands										
34.0	34.6	Coal.										
34.6	40.0	L/G M/S WITH D/G Bands										
END OF SHIFT / BOREHOLE (complete / incomplete)												

Inspection Pit Dimensions

WATER ENCOUNTERED

	1	2
Time Struck		
Depth Struck m		
Casing Depth m		
Inflow		
Depth 5 min m		
Depth 10 min m		
Depth 15 min m		
Depth 20 min m		
Cut off at m		

Backfill

DIAMOND TOOL RECORDS

	Serial Number	Size	Type	Shift Meterage
Corebits		4"	PCD	
Casing Shoe		5"	PW	
Reaming Shell				

PENETRATION TESTING AND SAMPLING

Sample Test	Sample No.	Depth m From	Depth m To	Standard Penetration Tests SW	75	75	pen	75	75	75	75	pen

Casing	Size	Depth m
Start of Shift		
End of Shift		

Rig Type: BERETTA T41

Pumps & Additional Plant:

Flush Type: AIR MIST.

BDA No.:

Project No.:

Foreman: D. TAYLOR

Project: MILES PLATTING.

Assistant: J. TAYLOR

Day: WED

Date: 17-5-23

Foreman's Signature:

Move From:

BH No.: RH1

This is a site log only and the data are subject to amendment after checking and sample description by or under the supervision of an engineer or geologist

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TAYLOR DRILLING SERVICES LTD

Rotary Drilling Journal

Core run mBGL From	Core run mBGL To	Description	Stratum Depth m	Core Size mm	Run Duration mins	Run Length m	Core Recovery m	Flush Return %	Casing Depth m	Casing Size	Time	Water Level mBGL
START OF SHIFT / BOREHOLE												
GL	0·2	TOP SOIL.										
0·2	2·8	Reworked Grey Gravely Ash CLAY AND Brick (TP)										
2·8	9·5	L/B CLAY Sand lenses.										
9·5	18·5	L/B Sand.										
18·5	25·0	L/B CLAY WITH SAND Bands										
25·0	36·0	L/G M/S + S/S Bands										
36·0	37·0	Coal INTACT										
37·0	38·6	L/G SILTSTONE.										
38·6	40·0	L/G SANDSTONE										
END OF SHIFT / BOREHOLE (complete / incomplete)												

DRAFT

Inspection Pit Dimensions

WATER ENCOUNTERED

	1	2
Time Struck		
Depth Struck m		
Casing Depth m		
Inflow		
Depth 5 min m		
Depth 10 min m		
Depth 15 min m		
Depth 20 min m		
Cut off at m		

Backfill

DIAMOND TOOL RECORDS

	Serial Number	Size	Type	Shift Meterage
Corebits		4"	PCD	
Casing Shoe		5"	PW	
Reaming Shell				

PENETRATION TESTING AND SAMPLING

Sample Test	Sample No.	Depth m From	Depth m To	Standard Penetration Tests SW	75	75	pen	75	75	75	75	pen

Casing	Size	Depth m
Start of Shift		
End of Shift		

Rig Type: BERETTA T41

Pumps & Additional Plant:

Flush Type: AIR MIST

BDA No.:

Project No.:

Foreman: D. TAYLOR

Project: MILES PLATTING.

Assistant: J. TAYLOR

Day: THURS

Date: 18-5-23

Foreman's Signature:

Move From: RH1

BH No.: RH2.

This is a site log only and the data are subject to amendment after checking and sample description by or under the supervision of an engineer or geologist

TAYLOR DRILLING SERVICES LTD

Rotary Drilling Journal

Core run mBGL From	Core run mBGL To	Description	Stratum Depth m	Core Size mm	Run Duration mins	Run Length m	Core Recovery m	Flush Return %	Casing Depth m	Casing Size	Time	Water Level mBGL
START OF SHIFT / BOREHOLE												
GL	0·2	GRASS TOP SOIL										
0·2	1·0	BLACK ASHY / CLAY + BRICK										
1·0	10·0	L/B CLAY WITH SAND LENSES										
10·0	16·3	L/B SAND										
16·3	25·7	L/B CLAY + SANDS										
25·7	36·0	L/G M/S WITH S/S BAND										
36·0	36·8	COAL INTACT										
36·8	38·5	L/G SILTSTONE										
38·5	40	L/G SANDSTONE										
END OF SHIFT / BOREHOLE (complete / incomplete)												

Inspection Pit Dimensions

WATER ENCOUNTERED

	1	2
Time Struck		
Depth Struck m		
Casing Depth m		
Inflow		
Depth 5 min m		
Depth 10 min m		
Depth 15 min m		
Depth 20 min m		
Cut off at m		

Backfill

DIAMOND TOOL RECORDS

	Serial Number	Size	Type	Shift Meterage
Corabits		4"	PCD	
Casing Shoe		5"	PW	
Reaming Shell				

PENETRATION TESTING AND SAMPLING

Sample Test	Sample No.	Depth m From	Depth m To	Standard Penetration Tests SW	75	75	pen	75	75	75	75	pen

Casing	Size	Depth m
Start of Shift		
End of Shift		

Rig Type: BERETTA T41

Pumps & Additional Plant:

Flush Type: AIR MIST

BDA No.:

Project No.:

Foreman: D TAYLOR

Project: MILES PLATTING

Assistant: S PLUMPLEY

Day: THUR / FRI

Date: 19-5-23

Foreman's Signature:

Move From: RH2

BH No.: RH3

This is a site log only and the data are subject to amendment after checking and sample description by or under the supervision of an engineer or geologist

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TAYLOR DRILLING SERVICES LTD

Rotary Drilling Journal

Core run mBGL From	Core run mBGL To	Description	Stratum Depth m	Core Size mm	Run Duration mins	Run Length m	Core Recovery m	Flush Return %	Casing Depth m	Casing Size	Time	Water Level mBGL
START OF SHIFT / BOREHOLE												
GL	0.3	GRASS TOP SOIL										
0.3	1.0	M/G										
1.0	9.8	L/B CLAY SAND	Lenses									
9.8	17.8	L/B SAND										
17.8	25.0	L/B CLAY + SANDS										
25.0	34.2	L/G M/S										
34.2	35.0	Coal INTACT										
35.0	38.5	L/G SILTSTONE										
38.5	40.0	L/G SANDSTONE										
END OF SHIFT / BOREHOLE (complete / incomplete)												

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Inspection Pit Dimensions

WATER ENCOUNTERED

	1	2
Time Struck		
Depth Struck m		
Casing Depth m		
Inflow		
Depth 5 min m		
Depth 10 min m		
Depth 15 min m		
Depth 20 min m		
Cut off at m		

Backfill

DIAMOND TOOL RECORDS

	Serial Number	Size	Type	Shift Meterage
Corebits		4"	PCD	
Casing Shoe		5"	PW	
Reaming Shell				

PENETRATION TESTING AND SAMPLING

Sample Test	Sample No.	Depth m From	Depth m To	Standard Penetration Tests SW	75	75	pen	75	75	75	75	pen

Casing	Size	Depth m
Start of Shift		
End of Shift		

Rig Type: BERETTA T41

Pumps & Additional Plant:

Flush Type: AIR MIST

BDA No.:

Project No.:

Foreman: D. TAYLOR

Project: MILES PLATTING

Assistant: S. PLUMBLEY

Day: FRI

Date: 19/5/23

Foreman's Signature:

Move From: RH3

BH No: RH4

This is a site log only and the data are subject to amendment after checking and sample description by or under the supervision of an engineer or geologist

TAYLOR DRILLING SERVICES LTD

Rotary Drilling Journal

Core run mBGL From	Core run mBGL To	Description	Stratum Depth m	Core Size mm	Run Duration mins	Run Length m	Core Recovery m	Flush Return %	Casing Depth m	Casing Size	Time	Water Level mBGL
START OF SHIFT / BOREHOLE												
GL	0.2	TOP SOIL										
0.2	1.2	ASHY CLAY M/G										
1.2	10.5	L/B CLAY SAND	Lenses									
10.5	18.5	L/B SAND										
18.5	27.8	L/B REDDISH CLAY WITH SAND BANDS										
27.8	34.5	L/G M/S										
34.5	35.0	COAL INTACT										
35.0	37.3	L/G SILTSTONE										
37.3	40.0	L/G SAND STONE										
END OF SHIFT / BOREHOLE (complete / incomplete)												

Inspection Pit Dimensions

WATER ENCOUNTERED

	1	2
Time Struck		
Depth Struck m		
Casing Depth m		
Inflow		
Depth 5 min m		
Depth 10 min m		
Depth 15 min m		
Depth 20 min m		
Cut off at m		

Backfill

DIAMOND TOOL RECORDS

	Serial Number	Size	Type	Shift Meterage
Corebits		4"	PCD	
Casing Shoe		5"	PW	
Reaming Shell				

PENETRATION TESTING AND SAMPLING

Sample Test	Sample No.	Depth m From	Depth m To	Standard Penetration Tests SW	75	75	pen	75	75	75	75	pen

Casing	Size	Depth m
Start of Shift		
End of Shift		

Rig Type: BERETTA T41

Pumps & Additional Plant:

Flush Type: AIR MIST

NVQ No.:

Foreman: D TAYLOR

Assistant: S PLUMBLEY.

Foreman's Signature:

Project No.:

Project: MILES PLATTING

Day: MON

Date: 22-5-23

Move From: RH4

BH No: RH5

This is a site log only and the data are subject to amendment after checking and sample description by or under the supervision of an engineer or geologist

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TAYLOR DRILLING SERVICES LTD

Rotary Drilling Journal

Core run mBGL From	Core run mBGL To	Description	Stratum Depth m	Core Size mm	Run Duration mins	Run Length m	Core Recovery m	Flush Return %	Casing Depth m	Casing Size	Time	Water Level mBGL
START OF SHIFT / BOREHOLE												
GL	0.2	TARMAC										
0.2	1.2	ASH/BRICK FILL										
1.2	13.2	L/B CLAY SAND Lenses										
13.2	18.7	L/B SAND										
18.7	28.0	L/B CLAY + SANDS										
28.0	34.0	L/G M/S										
34.0	34.3	COAT INTACT										
34.3	40.0	L/G SAND STONE										
END OF SHIFT / BOREHOLE (complete / incomplete)												

Inspection Pit Dimensions

WATER ENCOUNTERED

	1	2
Time Struck		
Depth Struck m		
Casing Depth m		
Inflow		
Depth 5 min m		
Depth 10 min m		
Depth 15 min m		
Depth 20 min m		
Cut off at m		

Backfill

DIAMOND TOOL RECORDS

	Serial Number	Size	Type	Shift Meterage
Corebits		4"	PCD	
Casing Shoe		5"	PW	
Reaming Shell				

PENETRATION TESTING AND SAMPLING

Sample Test	Sample No.	Depth m From	Depth m To	Standard Penetration Tests SW	75	75	pen	75	75	75	75	pen

Casing	Size	Depth m
Start of Shift		
End of Shift		

Rig Type: BERETTA T44

Pumps & Additional Plant:

Flush Type: AIR MIST

NVQ No.:

Project No.:

Foreman: D. TAYLOR

Project: MILES PLATTING

Assistant: S. PLUMBLEY

Day: MON/TUES

Date: 23-5-23

Foreman's Signature:

Move From: RH5

BH No.: RH6

This is a site log only and the data are subject to amendment after checking and sample description by or under the supervision of an engineer or geologist

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TAYLOR DRILLING SERVICES LTD

Rotary Drilling Journal

Core run mBGL From	Core run mBGL To	Description	Stratum Depth m	Core Size mm	Run Duration mins	Run Length m	Core Recovery m	Flush Return %	Casing Depth m	Casing Size	Time	Water Level mBGL
START OF SHIFT / BOREHOLE												
GL	0.2	TARMAC										
0.2	1.5	ASH BRICK M/G										
1.5	14.0	L/B CLAY WITH SAND LENSES										
14.0	20.0	L/B SAND										
20.0	27.5	L/B + RED CLAY WITH SAND										
27.5	34.2	L/G M/S										
34.2	34.8	COAL										
34.8	36.2	L/G M/S										
36.2	40.0	L/G SANDSTONE										
END OF SHIFT / BOREHOLE (complete / incomplete)												

Inspection Pit Dimensions

WATER ENCOUNTERED

	1	2
Time Struck		
Depth Struck m		
Casing Depth m		
Inflow		
Depth 5 min m		
Depth 10 min m		
Depth 15 min m		
Depth 20 min m		
Cut off at m		

Backfill

DIAMOND TOOL RECORDS

	Serial Number	Size	Type	Shift Meterage
Corebits		4"	PCD	
Casing Shoe		5"	RW	
Reaming Shell				

PENETRATION TESTING AND SAMPLING

Sample Test	Sample No.	Depth m From	Depth m To	Standard Penetration Tests SW	75	75	pen	75	75	75	75	pen

Casing	Size	Depth m
Start of Shift		
End of Shift		

Rig Type: BERETTA T44

Pumps & Additional Plant:

Flush Type: AIR MIST

NVQ No.:

Project No.:

Foreman: D. TAYLOR

Project: MILES PLATTING

Assistant: S. PLUMBLEY

Day: TUES

Date: 23-5-23

Foreman's Signature:

Move From: RH6

BH No: RH7

This is a site log only and the data are subject to amendment after checking and sample description by or under the supervision of an engineer or geologist

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TAYLOR DRILLING SERVICES LTD

Rotary Drilling Journal

Core run mBGL From	Core run mBGL To	Description	Stratum Depth m	Core Size mm	Run Duration mins	Run Length m	Core Recovery m	Flush Return %	Casing Depth m	Casing Size	Time	Water Level mBGL
START OF SHIFT / BOREHOLE												
GL	1.5	ASH BRICK M/G										
1.5	12.5	L/B CLAY SAND LENSES										
12.5	18.2	L/B SAND										
18.2	23.6	L/B + CLAY SAND BANDS										
23.6	27.5	RED/BROWN CLAY										
27.5	34.9	L/G M/S										
34.9	35.6	COAL INTACT										
35.6	40.0	L/G SANDSTONE										
END OF SHIFT / BOREHOLE (complete / incomplete)												

Inspection Pit Dimensions

WATER ENCOUNTERED

	1	2
Time Struck		
Depth Struck m		
Casing Depth m		
Inflow		
Depth 5 min m		
Depth 10 min m		
Depth 15 min m		
Depth 20 min m		
Cut off at m		

Backfill

DIAMOND TOOL RECORDS

	Serial Number	Size	Type	Shift Meterage
Corebits		4"	RCD	
Casing Shoe		5"	PW	
Reaming Shell				

PENETRATION TESTING AND SAMPLING

Sample Test	Sample No.	Depth m From	Depth m To	Standard Penetration Tests SW	75	75	pen	75	75	75	75	pen

Casing	Size	Depth m
Start of Shift		
End of Shift		

Rig Type: BORETTA T41

Pumps & Additional Plant:

Flush Type: AIR MIST

NVQ No.:

Project No.:

Foreman: D. TAYLOR

Project: MILES PLATTING

Assistant: S. PLUMBLEY

Day: THURS

Date: 25-5-23

Foreman's Signature:

Move From: RH7

BH No: RH8

This is a site log only and the data are subject to amendment after checking and sample description by or under the supervision of an engineer or geologist

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Appendix C

Logs and Photographic Record

– Mine Shaft Investigation

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Trench 1

Depth (m)	Strata
0.00-0.30	MADE GROUND: Dark brown gravelly silty SAND with frequent rootlets, occasional roots, brick fragments, coal, ash and tarmacadam fragments.
0.30-1.20 to 1.30	MADE GROUND: Light grey and light brown clayey SAND and GRAVEL predominantly comprising mudstone and shale with medium cobble content and rare brick fragments. Band of reworked CLAY between approximately 0.30-0.40m. Band of predominantly ash and clinker at approximately 0.50mbgl.
1.30-1.40 to 1.90	MADE GROUND: Firm consistency brown very sandy silty CLAY with occasional rootlets and occasional bands of shale gravel (probable reworked strata). Probable reworked strata to 1.90mbgl in north eastern end of trench.
1.40-2.20 to 2.50	Stiff consistency light grey becoming light brown very gravelly sandy silty CLAY with rare bands of black shale (perched water slowly seeping from bands). Clay is friable. North eastern end of trench excavated to 2.50mbl.
No groundwater encountered.	





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Trench 2

Depth (m)	Strata
0.00-0.40	MADE GROUND: Dark brown gravelly silty SAND with frequent rootlets, occasional roots, brick fragments, coal, ash and tarmacadam fragments.
0.40-1.80 to 2.00	MADE GROUND: Brown gravelly clayey SAND with frequent brick fragments, whole bricks, occasional ash, ceramic fragments, rootlets, bands of firm consistency brown clay and bands of predominantly ash and clinker. Brick wall encountered at 1.80mbgl running approximately parallel to metal fence located to the north east. Base of wall encountered at 2.90mbgl. Probable external wall of former school.
2.00-2.90	Stiff consistency brown and light grey slightly gravelly sand silty CLAY. Probable reworked to 2.90mbgl adjacent to brick wall.
Perched water slowly seeping into base of pit.	





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Trench 3

Depth (m)	Strata
0.00-0.80	MADE GROUND: Brown gravelly slightly clayey SAND with frequent rootlets, occasional roots, brick fragments, coal and ash. Increasing ash content with depth.
0.80-1.60	MADE GROUND: Light grey sandy GRAVEL with medium cobble content and rare brick fragments. Orangish brown clayey SAND (reworked) between 1.40-1.60mbgl in south eastern end of trench and between 1.00-1.90mbgl in central area of trench. Band of frequent sandstone cobbles at approximately 1.90mbgl in central area of trench. Made ground present to 2.40mbgl in north western end of trench.
1.60-2.40 to 3.50	Stiff consistency brown and light grey slightly gravelly sand silty CLAY. Becomes very stiff consistency with depth. Brick wall runs along south western wall of trench. North western end of trench excavated to 3.10mbgl. Central area of trench excavated to 3.50mbgl as possible evidence of infilled borehole encountered. Borehole bottomed out.
No groundwater encountered.	







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Trench 4

Depth (m)	Strata
0.00-1.10	MADE GROUND: Tarmacadam to 0.10m. Poor condition. MADE GROUND: Brown gravelly clayey SAND with occasional rootlets, occasional roots, brick fragments, ceramic fragments and coal with occasional bands of firm consistency clay. Predominantly ash and clinker with occasional whole bricks and brick fragments between 0.60-1.10mbgl.
1.10-1.60	MADE GROUND: Brown sandy CLAY with frequent bands of ash and clinker and bands of brick fragments.
1.60-2.50	Stiff consistency light brown and light grey slightly gravelly sand silty CLAY. Clay is friable. Brick wall encountered at 1.50mbgl in south western wall of trench. Small pocket of hydrocarbon contamination encountered at base of brick wall in south western wall of trench.
No groundwater encountered.	





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Trench 5

Depth (m)	Strata
0.00-1.10	MADE GROUND: Tarmacadam to 0.10m (along eastern side of trench only). Poor condition. MADE GROUND: Brown gravelly clayey SAND with occasional bands of firm consistency clay, bands of predominantly ash and clinker, brick fragments, rootlets and ash.
1.10-1.80	MADE GROUND: Grey sandy clayey GRAVEL with low cobble content (probable reworked weathered mudstone).
1.80-2.40 to 2.70	Stiff consistency light grey and light brown slightly gravelly sandy silty CLAY with occasional bands of sand. North western end of trench excavated to 2.70mbgl.
No groundwater encountered.	





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Trench 6

Depth (m)	Strata
0.00-0.40	MADE GROUND: Tarmacadam to 0.05m). Poor condition. MADE GROUND: Black SAND and GRAVEL predominantly comprising ash and clinker with occasional brick fragments.
0.40-1.10 to 1.70	MADE GROUND: Firm consistency brown sandy CLAY with occasional brick fragments and rootlets to 0.80mbgl in north western end of trench and to 0.60mbgl in south eastern end of pit. MADE GROUND: SAND and GRAVEL predominantly comprising ash, clinker, bricks with occasional bands of clay. Made ground present to 1.70mbgl in north western end of pit and to 1.10mbgl in south eastern end of pit. Pocket of hydrocarbon contamination encountered at 1.10mbgl in south western wall of trial trench.
1.80-2.50 to 2.60	0.20m band of organic very sandy CLAY with pockets of abundant rootlets at base of made ground. Stiff consistency light grey and light brown slightly gravelly sandy silty CLAY. South eastern end of trench excavated to 2.60mbgl.
No groundwater encountered.	





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Trench 7

Depth (m)	Strata
0.00-0.40	MADE GROUND: Tarmacadam to 0.05 to 0.10m. Poor condition. MADE GROUND: Black SAND and GRAVEL predominantly comprising ash and clinker.
0.40-0.80	MADE GROUND: Stiff consistency light brown and light grey mottled slightly gravelly slightly sandy CLAY with occasional brick fragments and rootlets.
0.80-1.40	MADE GROUND: Dark brown sandy GRAVEL with frequent brick fragments, ash, occasional bands of clay, ceramic fragments and slate.
1.40-2.90	Grey very gravelly CLAY to 2.00mbgl. Clay is friable. Clay is slightly organic to 1.60mbgl. Stiff consistency slightly gravelly slightly sandy CLAY with low cobble content.
No groundwater encountered.	





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Trench 8

Depth (m)	Strata
00-0.30	MADE GROUND: Dark grey SAND with frequent ash, occasional roots and rootlets.
0.30-1.10	MADE GROUND: Firm consistency light brown and light grey sandy CLAY (reworked).
1.10-1.40	Dark brown very sandy SILT with occasional rootlets. Possible remnant topsoil.
1.40-2.70 to 3.00	Stiff consistency grey becoming light brown slightly gravelly slightly sandy CLAY with occasional coal fragments. Band of grey very gravelly CLAY (friable) at approximately 1.40-1.70mbgl. Central area of trench excavated to 3.00mbgl.
No groundwater encountered.	





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Trench 9

Depth (m)	Strata
0.00-1.10	MADE GROUND: Tarmacadam to 0.10m (along eastern side of trench only). Poor condition. MADE GROUND: Brown gravelly clayey SAND with occasional bands of firm consistency clay, bands of predominantly ash and clinker, brick fragments, rootlets and ash.
1.80-2.00	Firm to stiff consistency slightly organic dark grey gravelly sandy silty CLAY.
2.00-2.90	Stiff consistency light grey and light brown slightly gravelly sandy silty CLAY.
No groundwater encountered.	



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Trench 10

Depth (m)	Strata
0.00-0.40	MADE GROUND: Brown very clayey SAND with occasional brick fragments and roots.
0.40-1.50	MADE GROUND: Dark grey very gravelly SAND with frequent ash, clinker, occasional coal, brick fragments and rare bands of clay.
1.50-2.90	Stiff consistency light grey and light brown slightly gravelly sandy silty CLAY. Area of bricks at 2.20mbgl (approximately 1.00m x 1.00m). Perched water slowly seeping from northern wall of pit at approximately 1.50mbgl with slight hydrocarbon odour.
No groundwater encountered.	





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Trench 11

Depth (m)	Strata
0.00-1.80	MADE GROUND: Dark brown clayey SAND with occasional bands of firm consistency clay, ash, brick fragments, slate, sandstone cobbles, ceramic fragments and rootlets. Perched water slowly seeping in from side wall in centre of trench with slight sheen and hydrocarbon odour.
1.80-2.10	Firm consistency slightly organic grey sandy silty CLAY with occasional rootlets.
2.10-2.50	Stiff consistency light grey and light brown slightly sandy silty CLAY.
No groundwater encountered.	



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Trench 12

Depth (m)	Strata
0.00-0.40	MADE GROUND: Brown gravelly SAND with frequent ash, occasional roots, rootlets and whole bricks.
0.40-0.70	MADE GROUND: Firm consistency light brown and light grey slightly gravelly slightly sandy CLAY with occasional brick fragments and rootlets.
0.70-1.50	MADE GROUND: Black SAND and GRAVEL predominantly comprising ash and clinker with occasional coal and brick fragments and whole bricks.
1.50-2.90	Stiff consistency grey becoming light grey and light brown slightly gravelly sandy silty CLAY. Brick wall encountered at 1.40mbgl in north eastern wall of trench.
No groundwater encountered.	





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Trench 13

Depth (m)	Strata
0.00-0.60	MADE GROUND: Brown very clayey SAND with occasional rootles, brick fragments and bands of firm consistency clay.
0.60-1.20	MADE GROUND: Black SAND and GRAVEL predominantly comprising ash and clinker.
1.20-1.80	MADE GROUND: Light brown clayey SAND with occasional rootlets and rare brick fragments becoming increasingly clayey with depth.
1.80-2.40	Dark grey and black sandy GRAVEL predominantly comprising organic shale and occasional coal in south eastern end of trench. Perched water slowly seeping from band. Organic grey very gravelly CLAY with occasional coal fragments in north western end of trench.
2.40-2.80	Stiff consistency light grey slightly gravelly slightly sandy CLAY.
No groundwater encountered.	





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Trench 14

Depth (m)	Strata
0.00-0.60	MADE GROUND: Brown very clayey SAND with occasional rootlets, brick fragments, whole bricks and bands of sandy clay.
0.60-0.80	MADE GROUND: Black SAND and GRAVEL predominantly comprising ash and clinker.
0.80-1.30	MADE GROUND: Light brown SAND and GRAVEL predominantly comprising mudstone and sandstone with occasional mudstone cobbles (reworked strata).
1.30-1.80	Firm consistency light brown very sandy silty CLAY with occasional rootlets.
1.80-3.00	Stiff to very stiff consistency light grey and light brown mottled slightly gravelly slightly sandy CLAY with low cobble content.

Additional comments:
Grouted borehole encountered at approximately 1.50mbgl. A further 2no. grouted boreholes encountered within area. Reworked ground visible around the grouted borehole. Upper 1.50mbgl of required ground comprised predominantly ash. Underlain by stiff consistency grey CLAY with bands of shale / mudstone gravel, coal and occasional brick fragments to 5.50mbg; (total depth not proven).
Area of reworked strata is approximately 2.50 x 2.50m.


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Grouted borehole visible in side wall. Red arrow points to grouted borehole.



Circular area of made round visule at base of trench. Red arrow points to feature.



Circular area of made round visule at base of trench. Red arrow points to feature.



Further grouted borhole encountered. Red arrow points to borehole.



2no. grouted borheoles visible in centre of photograph. Red arrows point to boreholes.



Grout encouneted in spoil reocvered from trial trench.

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Reworked strata recovered from trench.

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Trench 1

Depth (m)	Strata
0.00 to 1.00	MADE GROUND: Tarmacadam to 0.10m. MADE GROUND: Dark grey SAND predominantly comprising ash and clinker with frequent brick fragments, occasional coal, glass fragments rare metal (pipe) and concrete. Brick wall encountered in northern wall of trench running approximately parallel with southern site boundary. Top of wall encountered at approximately 1.10m. Base not encountered. Made ground present to 2.30m in northern 1.50m of trench adjacent to brick wall. Made ground comprises dark brown clayey SAND with occasional rootlets, coal and brick fragments (frequent brick fragments in upper 1.00m).
1.00-1.30	MADE GROUND: Firm consistency slightly organic light grey slightly gravelly very sandy CLAY with occasional rootlets, brick fragments and bands of sand.
1.30-1.60	Stiff to very stiff consistency light brown and light grey mottled slightly gravelly slightly sandy CLAY.
No groundwater encountered.	





Trench 2

Depth (m)	Strata
0.00 to 0.60	MADE GROUND: Tarmacadam to 0.05-0.10m. MADE GROUND: Dark greyish brown slightly silty gravelly SAND with frequent ash, coal, brick fragments and occasional rootlets.
0.60-1.20	MADE GROUND: Dark grey SAND and GRAVEL predominantly comprising ash and clinker with occasional brick fragments. Brick wall encountered in northern wall of trench running approximately parallel with southern site boundary. Top of wall encountered at approximately 1.10m. Base not encountered. Ceramic pipe encountered in northern end of pit at approximately 1.00m running perpendicular to brick wall. Made ground present to 1.50m in northern 1.50m of trench adjacent to brick wall. Made ground comprises brown SAND and GRAVEL predominantly comprising brick fragments, occasional roots, rootlets, ash and ceramic fragments.
1.20-1.50	Soft to firm consistency slightly organic grey very sandy gravelly CLAY (friable) between 1.20-1.30m. Stiff to very stiff consistency light brown and light grey mottled slightly gravelly slightly sandy silty CLAY.
No groundwater encountered.	





Trench 3

Depth (m)	Strata
0.00 to 0.30	MADE GROUND: Tarmacadam to 0.05-0.10m. MADE GROUND: Dark grey SAND and GRAVEL predominantly comprising ash and clinker with occasional brick fragments. Cable runs along eastern wall of pit and runs to the west at approximately 0.30m.
0.30-1.00	MADE GROUND: Light brown gravelly sandy CLAY with occasional brick fragments, tarmacadam fragments, ash, ceramic fragments and rootlets. Sand is fine to coarse. Gravel is fine to coarse, sub-angular to sub-rounded comprising mudstone and sandstone. Brick wall encountered in northern wall of trench running approximately parallel with southern site boundary. Top of wall encountered at approximately 1.10m. Base not encountered. Made ground in northern 1.50m of trench adjacent to brick wall comprises brown SAND and GRAVEL predominantly comprising brick fragments, occasional roots, rootlets, ash and ceramic fragments. Made ground present to 3.20m in south eastern corner (approx. 0.40m wide at base of SE corner) of pit (total depth not proven). Made ground comprises light brown sandy CLAY with occasional brick fragments and bands of predominantly ash.
1.00-1.80	Stiff to very stiff consistency light brown and light grey mottled slightly gravelly slightly sandy silty CLAY.
No groundwater encountered.	







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Trench 4

Depth (m)	Strata
0.00 to 0.40	MADE GROUND: Tarmacadam to 0.05m. MADE GROUND: Brown gravelly SAND with frequent brick fragments, occasional ash, coal and rootlets. Pipe runs through southern end of trench parallel to southern site boundary at approximately 0.50m. Cable runs along western wall of trench at approximately 0.30m. Bricks in SW corner of trench – possible manhole.
0.40-1.30	MADE GROUND: Light brown gravelly sandy CLAY with frequent brick fragments, occasional roots, rootlets and whole bricks. Brick wall encountered in eastern wall of trench at approximately 1.00m, approximately 4.00m from southern site boundary. Southern end of trench – made ground strata as above present to 0.80m underlain by natural superficial clay. Western wall of trench – made ground strata as above present to 1.60mbgl.
1.30-1.80	Firm becoming stiff consistency light brown and light grey mottled slightly gravelly slightly sandy CLAY with occasional rootlets.
No groundwater encountered.	





Trench 5

Depth (m)	Strata
0.00 to 0.40	MADE GROUND: Tarmacadam to 0.05-0.10m. MADE GROUND: Brown gravelly slightly silty SAND with occasional brick fragments, whole bricks, ash and ceramic fragments.
0.40-1.20	MADE GROUND: Dark greyish brown slightly silty SAND and GRAVEL with frequent ash, clinker and brick fragments. Ceramic pipe runs approximately E-W at approximately 1.20m. Western wall of trench – made ground to 1.60mbgl. Made ground comprises brown sandy gravel predominantly comprising bricks with occasional roots and rootlets. Brick wall encountered in northern art of trench at approximately 1.10m. Base encountered at 3.00mbgl.
1.30-1.80	Firm becoming stiff consistency light brown and light grey mottled slightly gravelly slightly sandy CLAY with occasional rootlets.
No groundwater encountered.	





Trench 6

Depth (m)	Strata
0.00 to 0.80	MADE GROUND: Tarmacadam to 0.10m. MADE GROUND: Dark greyish brown gravelly SAND with frequent ash, clinker, brick fragments and occasional tarmacadam fragments.
0.80-1.00	Dark grey slightly organic slightly gravelly very sandy CLAY (clay is friable).
1.00-1.60	Stiff consistency light brown and light grey mottled slightly gravelly slightly sandy CLAY with occasional rootlets. Brick wall encountered in north eastern corner of trench at 1.00mbgl. Possible manhole in western side of trench (brick) at 1.40mbgl - ceramic drains run from north and east. Northern part of trench excavated to 2.30m..
No groundwater encountered.	





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Trench 7

Depth (m)	Strata
0.00 to 0.80	MADE GROUND: Tarmacadam to 0.05m. MADE GROUND: Dark greyish brown gravelly SAND with frequent brick fragments, occasional ash, whole bricks, slate, concrete fragments, coal and rare ceramic fragments.
0.80-1.60	Stiff consistency light brown and light grey mottled slightly gravelly slightly sandy CLAY with occasional rootlets.
No groundwater encountered.	





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Trenches 8 & 9

Depth (m)	Strata
0.00 to 3.00	MADE GROUND: Predominantly brick fragments and whole bricks with frequent rootlets, occasional ceramic fragments and rare slate. Top of brick wall encountered at 1.10mbgl. Basement floor encountered at 3.00mbgl (approximately 0.10 concrete underlain by 0.30 bricks).
3.40-4.00	Very stiff consistency light grey and light brown mottled slightly gravelly slightly sandy CLAY. Trenches collapsing and perched water present at base of trenches. Natural clay visible photos provided of strata recovered from excavator bucket.
Perched water encountered beneath basement floors.	





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Trench 1

Depth (m)	Strata
0.00 to 0.40	MADE GROUND: Brown slightly gravelly very silty SAND with occasional roots, rootlets, whole bricks and brick fragments.
0.40-1.20	MADE GROUND: Firm consistency brown and light grey slightly mottled gravelly very sandy CLAY with occasional bands of ash and clinker and occasional brick fragments. Ceramic drain encountered at 1.00mbgl in SE end of pit. Band of predominantly ash between 1.00-1.20mbgl.
1.20-2.20	MADE GROUND: Stiff consistency brown and light grey mottled gravelly sandy CLAY with low cobble content and occasional brick fragments.
2.20-2.80	Stiff consistency brown and light grey mottled gravelly sandy CLAY with low cobble content and occasional brick fragments.
No groundwater encountered.	



Trench 2

Depth (m)	Strata
0.00 to 0.80	MADE GROUND: Brown very clayey SAND with occasional whole bricks, brick fragments, ceramic fragments, bands of sandy clay, concrete fence posts and rare timber sleepers.
0.80-1.80	MADE GROUND: Blackish brown SAND and GRAVEL predominantly comprising ash and clinker with occasional coal and burnt shale.
1.80-2.40	Firm becoming stiff consistency light brown and light grey mottled slightly CLAY
2.20-2.80	Stiff consistency brown and light grey mottled slightly gravelly slightly sandy CLAY with low cobble content and occasional brick fragments.
No groundwater encountered.	



Trench 3

Depth (m)	Strata
0.00 to 0.50	MADE GROUND: Brown very clayey SAND with occasional rootlets , roots, brick fragments, slate, coal and ceramic fragments.
0.50-1.20	MADE GROUND: Firm to stiff consistency light brown and light grey mottled slightly gravelly sandy CLAY with occasional whole bricks, brick fragments, ceramic fragments, coal and ash. Band of predominantly ash between 1.00-1.20mbgl.
1.20-1.60	MADE GROUND: Stiff consistency light brown and light grey mottled slightly gravelly sandy CLAY. Sand is fine to coarse. Probable reworked strata.
1.60-1.90	Stiff consistency light brown and light grey mottled slightly gravelly sandy CLAY.
No groundwater encountered.	



Trench 4

Depth (m)	Strata
0.00 to 1.30	MADE GROUND: Brown slightly gravelly very clayey SAND with occasional rootlets , roots and brick fragments. Ceramic drain encountered at 1.00mbgl. Band of predominantly ash at approximately 1.20-1.30mbgl.
1.30-2.10	MADE GROUND: Stiff consistency light brown and light grey mottled slightly gravelly slightly sandy CLAY with medium cobble content, occasional brick fragments and bands of shale gravel. Cobbles are sub-angular of laminated mudstone.
2.10-2.60	Stiff consistency light brown and light grey mottled slightly gravelly sandy CLAY. Made ground visible in central area of pit from 2.10mbgl. At 2.30mbgl, distinct circular area of made ground visible. Trench extended to the north to expose area of made ground. Made ground comprises grey sandy slightly clayey GRAVEL with medium cobble content, occasional whole bricks and brick fragments. Circular area of made ground is approximately 2.50m in diameter.
No groundwater encountered.	



Circular area of made ground visible at base of pit. Red arrow points to feature.



Trench extended to the north west. Red arrow points to potential shaft.



Trench extended to the north east. Full circular area of made ground visible. Red arrow points to feature.

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