Varley Street Mine Shaft Capping Structural Philosophy & Calculations

Prepared for ISG PLC

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Revision History

Revision	Date	Revision Description		Name	Signature
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1.0 Introduction

1.1 Report Purpose

This mine shaft capping structural philosophy & calculation report has been compiled to support the Coal Authority (TCA) application and engineering appraisal in relation to the mine shaft grouting/recapping works to the 2No. mine shafts and grid drilling/grouting to consolidate potential mine workings at the Varley Street, Manchester site.
The site is being developed as a school, with associated infrastructure and landscaping in the north easter area of the site.

This report is to be read in conjunction with the identified Appendices and any other supporting information or documents submitted as part of the TCA application.

The appendices will eventually be revised to include evidence of completion and final information and issued to TCA for record and archiving.

1.2 The Site

Much of the below has been extracted from the supporting reports (appended) for context. Reference should be made to these for a detailed descriptions and details of the site. The majority has been copied from the Enviro Solution Phase 2 Geo-Environmental Site Assessment Report (2nd March 2022) within Appendix F and the LK Group Shallow Mining Site Investigation Works Report (June 2023) included within Appendix C.

Location

The site is located at Varley Street, Manchester, **M40 8EF**. The site is surrounded by Sawley Street to the North, Vickers Street to the East, James Street to the South and Nelson Street to the West and is centred on National Grid Reference for GR:386125 399605.

The site topography is approximately 139-141m Above Ordinance datum (AOD) and the site is approximately level. A site location plan is presented below (Ref: - VAR-RDG- XX-XX-DR-C-00203_RevP03). The site location plan has been included within Appendix B.

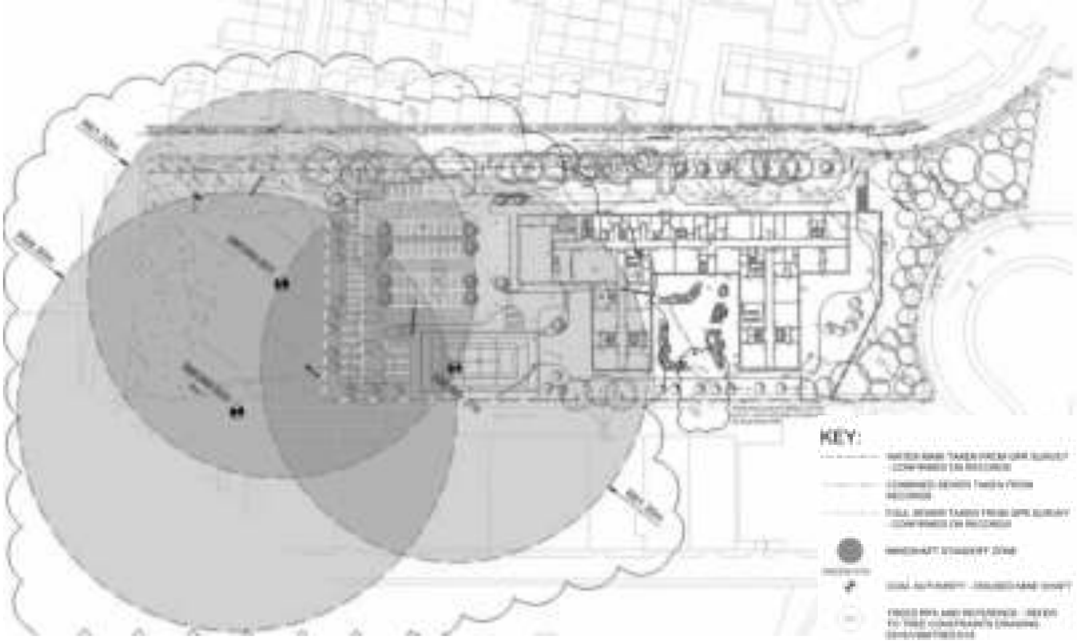


Figure 1 – Site Plan
(Extract from Ridge Drawing: - VAR-RDG-XX-XX-DR-C-00203_RevP03)

Description

The site covers approximately 22000m^2 (2.20 Hectares) with existing access at Nelson Street (West). The site is currently a vacant plot of waste land, formerly used as a school playing field. A relic tarmac games court is located in the western extent of the site and the rest of the site is rough grassland.

Sporadic trees are present along the permitter of the site but are more clustered along the eastern and southern boundaries.

The proposed development area is generally flat with little change in topographic level. Vehicle access is gained from Sawley Street. The site boundaries consist of metal fencing and chain link fencing on all sides.

The site was originally occupied by Park View Community School which was demolished sometime in the period between 2008 and 2012 with the site being unoccupied ever since. The original school was a two-storey red brick masonry structure with pitched roofs and ornate copings and feature chimneys, likely constructed in the early 1900s period.

The site is set within a largely residential on its bounds to the North / East and West. The South of the site is bordered by commercial units and industrial warehouses. Figure 2 below presents the current site.

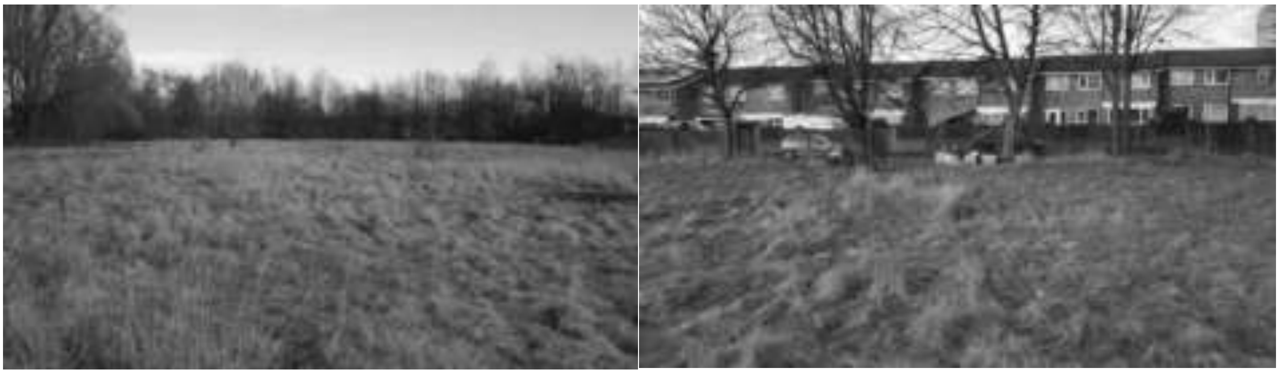


Figure 2 – Site Photograph looking North (Left) at the Northern Site Boundary and Entrance (Right)

History

Information within this section has been extracted from the Enviro Solution Phase 1 desktop study (March 2022) which has been obtained from historical ordinance Survey (OS) maps. The main history of the site and immediate surrounding area is summarised in Table 1 below. Copies of the historical OS maps are included within the phase 1 desktop study report, within Appendix E: -

Table 1 – Table of the Site History
(Historical OS Maps)

Date	Scale	On Site	Off Site
1848	1:10,560	The site is undeveloped and lies within an open field. Coal pit located in western portion of the site.	Chemical works 130m south and 160m southwest of the site.
1893	1:2,500	Eastern half of the site is developed with residential terraced housing.	Large residential development directly north of the site. Chemical works 10m south of the site. Floor cloth works 10m south of the site. Chemical works 60m south and 130m south of the site. Glass works 60m west of the site. Iron foundry 90m east of the site. Engineering works 105m north of the site. Tannery 200m north of the site. Railway line 250m north of the site.
1908	1:2,500	Timber yard built in eastern extent of the site. School built along western boundary.	Iron foundry 60m south. Brass foundry 200m south of the site. Soap and colour works 150m east of the site.

1922	1:2,500	No significant change.	Smelting works 10m south of the site.
1948	1:2,500	Travelling crane on site along Northern boundary. Timber yar extending southwest within the boundary. Day nursery built along south-western boundary.	Iron foundry 20m north of the site. Soap works converted to asbestos works 150m. east of the site. Rubber works 10m south of the site. Tar distillery 60m southwest of the site. Cabinet works 165m north of the site. Cotton mills 190m southwest of the site.
1965	1:2,500	Buildings demolished and site used as a playing field.	Chemical and rubber works converted to warehouses and depot 10m south of the site.
1978	1:2,500	No significant change.	Engineering works adjacent to the eastern boundary. Chemical works and iron foundries labelled as works. Tar distilleries demolished.
1986	1:2,500	No significant change.	No significant change.
2021	1:2,500	Site disused as a school playing field. School demolished.	Works demolished 130m south of the site.

Geology

A phase 1 desk study (Appendix E) and full Phase 2 Geo-Environmental site Assessment (Appendix F) has been completed by EnviroSolution Limited for the proposed new school project and included a number of window samples and trial pits. The below geology model has been extracted from the Phase 2 Geo-Environmental site Assessment and describes the various layers of geological strata following the intrusive investigations.

Made Ground

Made Ground was encountered in all of the exploratory boreholes typically beneath a 0.30m layer of topsoil. The Made Ground ranged in thickness between 0.50m and 3.30m and was generally thickest in the south-western half of the site thinning to the northeast.

The Made Ground can be described as reworked fill. It generally consists of a brown/ grey gravelly sandy reworked clays and grey/brown/black clayey sandy gravel with variable amounts of brick, tile, glass, concrete, sandstone fragments, slag and timber.

Evidence of hydrocarbon contamination was noted in TP1, WS7, TP7, TP13, TP14 and TP16 and a buried obstruction was encountered in TP19 at 0.70m bgl.

The recent intrusive ground investigation has proven that Made Ground is present beneath the site with a variable thickness of between 0.50m and 3.30m.

Diamicton

Diamicton deposits were encountered in 26 no. exploratory holes at the site. The diamicton generally consists of soft to stiff brown/ orange/ grey mottled clay. A thick (4.5m to 5.5m) band of fine sand was recorded in RT2 and RT1 respectively at depth of 10.0m and 11.0m bgl.

Uncorrected SPT N values recorded in the diamicton ranged between 8 and 32 which indicates a medium, becoming very high strength clay with an approximate undrained shear strength range of between 40kN/m^2 and 160kN/m^2 using the general approximation of:

Undrained shear strength = N x 5 (after Stroud, 1974).

The diamicton shows an increasing strength with depth. Based on these results, then it is considered that a Characteristic Shear Strength of 100kN/m^2 can be adopted for foundation design.

Bedrock

Bedrock of the Pennine Upper Coal Measures was encountered in 2 no. of the exploratory boreholes at depths of between 23.5m and 26.5m bgl. The depth to bedrock is shown to increase towards the north.

The Coal Measures consist of grey mudstone with minor sandstone bands. Minimal flakes of coal were noted in RT1 at 32.0m bgl.

The recorded borehole logs are shown in Appendix D. The recorded trial pit logs are included in Appendix E.

Groundwater

Groundwater inflows were recorded during the investigation in TP3 at 2.0m, TP7 at 1.70m, TP8 at 1.20m, TP16 at 1.50m, TP17 at 1.40m. In all cases, seepage into the trial pits was slow.

Groundwater was recorded in the monitoring wells (WS2, WS3, WS6 and WS7) at depths of between 0.85 and 4.95m bgl. It is considered that these strikes represent a perched water table.

Evidence of hydrocarbon contamination was noted in WS7 and TP14.

Table 2 – Geotechnical Model
(Extracted from the Phase II Geo-technical report by EnviroSolution Ltd)

Stratum	Depth to Base (m bgl)	Parameters/ Comments	
		Strength Parameters	Other Parameters/ Notes
Made Ground	0.40m – 2.5m	SPT N values 5 – 11	Brown/ grey gravelly sandy reworked clays and grey/ brown/ black clayey sandy gravel with variable amounts of brick, tile, glass, concrete, sandstone fragments, slag, and timber. Hydrocarbons noted in 6 no. locations
Diamicton/ Glaciofluvial Deposits	23.5 – 26.5m	SPT N values 8 – 32	Soft to stiff brown/ orange/ grey mottled clay, becoming stiff with depth. 4.5m to 5.5m thick sand layer at 10m to 11m bgl.
Pennine Upper Coal Measures	Not Proven	None recorded	Grey mudstones with subordinate sandstone bands. Occasional fragments of coal at 32m depth.

1.3 The Scheme

The development proposals can be seen within Appendix B but includes the construction of a new school with associated vehicle parking, play area, playing fields and landscaping.

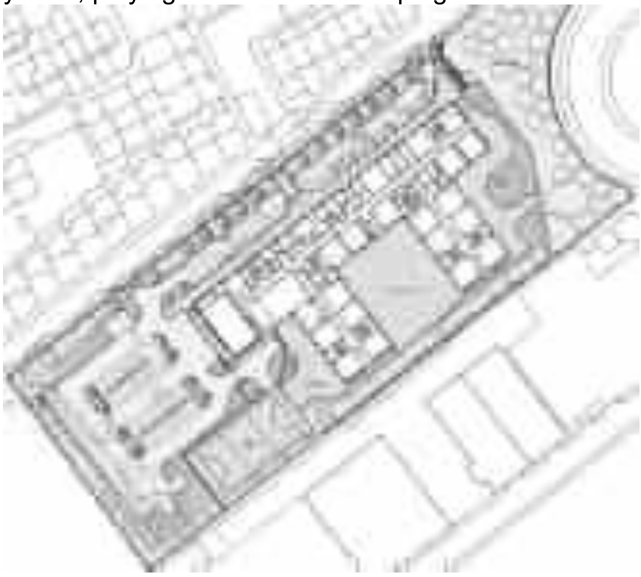


Figure 3 – Landscape General Arrangement
(Extract from DEP Landscapes: - VAR-DEP-XX-XX-DR-L-00001)

1.4 The Mine Shafts

Coal Authority Records

The site lies in an area where the Law Society and Coal Authority recommends a mining search be undertaken as the site lies within a Development High Risk Area for coal mining and could be affected by past or current coal mining. Therefore, a coal mining report was obtained as part of the Coal Mining Risk Assessment, undertaken by Enviro-solution Ltd and is included within Appendix D. The Coal mining risk assessment includes a coal authority coal mining report and records.

The coal authority records note that there are 5No. known shafts within 100m of the site boundary. 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.

Table 3 below presents the Coal Authority reference and grid reference. And other information from the TCA registers for mine entries. Figure 4 presents the mine shaft locations relative to the development.

Shafts 001 and 016 have been successfully located on site. Excavations local to mine shaft 002 were conducted at the site boundary and the shaft was not located, suggesting the shaft is likely to be located off site.

Table 3 – Mine Entries within 100m of the Site
(Extracted from LK Consulting report: - LKC 22 1670)

Entry Type	Reference	Grid Reference	Treatment Description	Mineral
Shaft	385399-011	E:385942 N:399577		Coal
Shaft (Shaft 1)	386399-001	~~E:386056 N:399531~~ E:386047.770 N:399534.864	This Shaft was located in 1974 and was found to be filled. The shaft was then drilled, and pressure grouted. Coordinates noted were recorded on site.	Coal
Shaft	386399-002	E:386062 N:399493		Coal
Shaft (Shaft 2)	386399-016	E:386108.2 N:399546		Coal
Shaft	386399-017	E:386002 N:399638		Coal

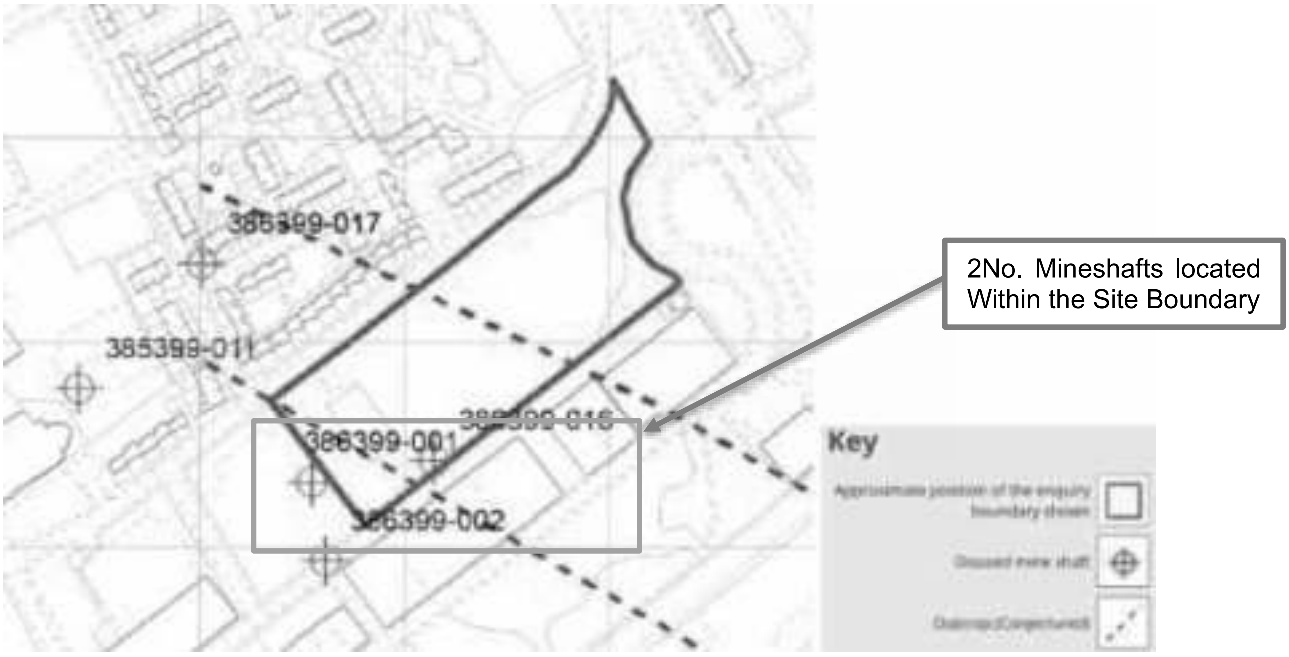

386399-017
385399-011
386399-001
386399-016
386399-002
2No. Mineshafts located Within the Site Boundary
Key
Approximate position of the enquiry boundary shown
Disused mine shaft
Outcrop (Conjectured)

Figure 4 – Plan Indicating Mine Shaft Entries Within 100m of the Site.
(Extracted from LK Consulting report: - LKC 22 1670)

Recorded Size

The below presents the pertinent information from the Coal Mining Report for the two mine shafts indicated within the site boundary and which form the contents of the remedial proposals outlined within this report. As part of the mine shaft treatment works, further confirmation surveys have been undertaken (clarified below in red).

Shaft Ref: 386399-001 (CCL Ref = Shaft 1)

- Treated / Untreated = Treated
- Shaft diameter = 2.1m (confirmed as 2.5m by site)
- Shaft Depth = 74m (confirmed as 73m by site)
- Departure = 8m

Shaft Ref: 386399-016 (CCL Ref = Shaft 2)

- Treated / Untreated = Untreated
- Shaft diameter = 2.5m
- Shaft Depth = Unknown (confirmed as 58m by site)
- Departure = 8m

The above will be confirmed by further investigations as part of the remedial works proposed.

Investigations (LKC May 2023)

Investigation works were also undertaken, targeted at locating the 3No. mine shafts within the proximity of the site. The investigations included a number of targeted trial pits to locate the mine shafts. The main findings have been extracted from the LK consulting report and are presented below. For specific findings, reference should be made to the LK consulting coal mining risk assessment report: - LK Consulting Report LKC 22 1670, included in Appendix C.

LK consult undertook site investigations in May 2023 which included: -

- 8No. open hole rotary boreholes to 40.00m below ground level (bgl). Referenced RH1 to RH8.
    - 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.
- A series of trial trenches using a 13tonne tracked machine with a 1.8m wide ditching bucket.
    - to locate and inspect 3No the mine shafts present on (Ref 386399-001/016) or very close to the site (Ref: 386399-002).
    - 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.

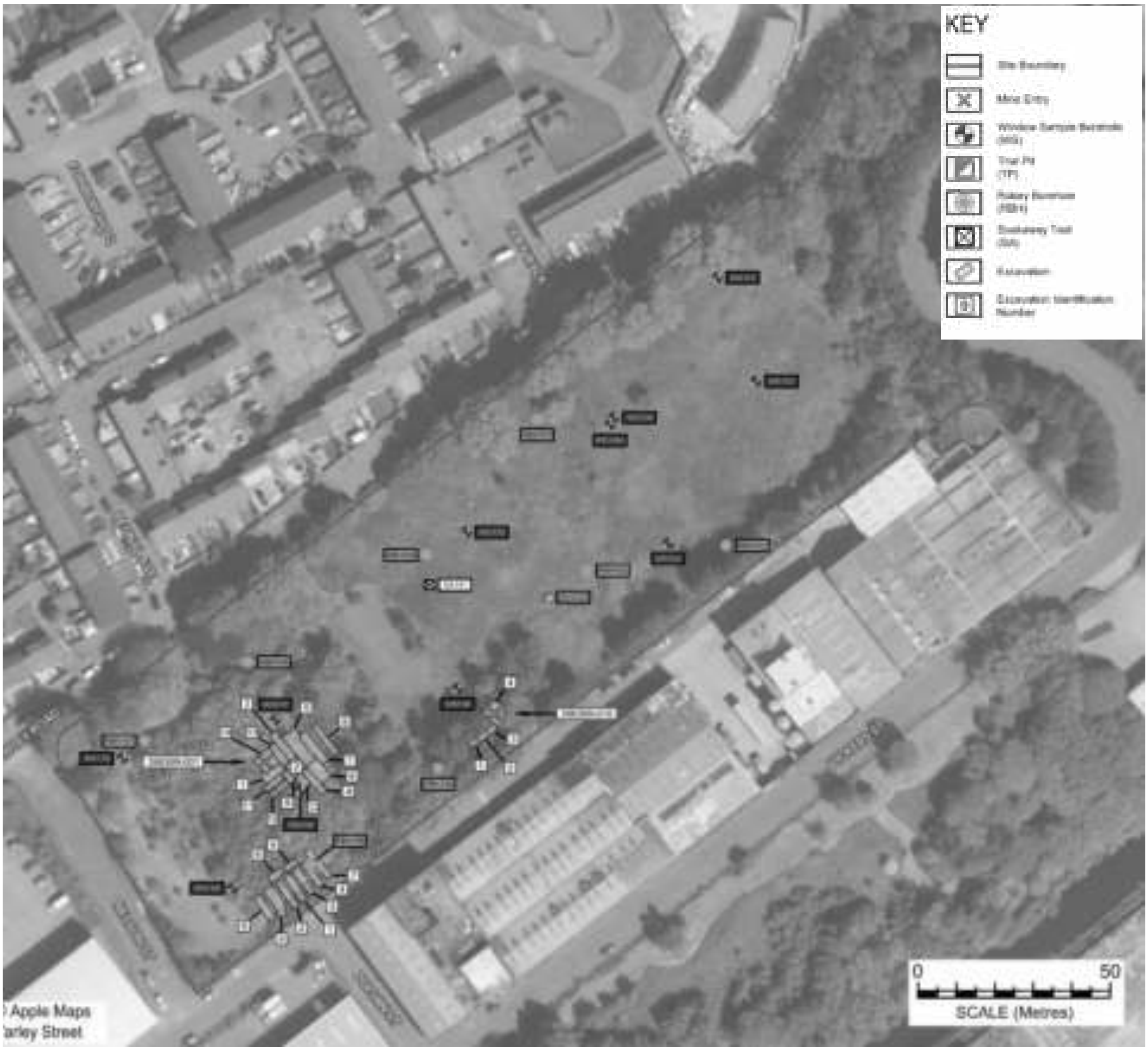

KEY
Site Boundary
Mine Entry
Window Sample Borehole (WS)
Trial Pit (TP)
Rotary Borehole (RBH)
Soakaway Test (SA)
Excavation
Excavation Identification Number
0
50
SCALE (Metres)
Apple Maps
Farley Street

Figure 5 – LKC Site Investigation Location Plan of May 2023
(Extracted from LK Consulting report: - LKC 22 1670)

A detailed report was produced based on the findings of the inspection trenches and reference should be made to LKC's Shallow Mining Site Investigation Works report (Ref: 22 1670 June 2023). The main findings at the two key mine shafts within the site boundary are extracted and presented below for convenience: -

Shaft Ref: 386399-001 (Our Ref = Mine Shaft 1)
Scope: -

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

Findings: -

- 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.

- The shaft was successfully located on site.
- Shaft location surveyed to be E:386048.6, N:399533.6 (assumed to be shaft centre)
- Subsequently, during the mine shaft treatment on site, the shaft was surveyed to be E:386047.770, N:399534.864
- Desk study suggested the shaft has not been treated. On site investigations confirm this.
- No evidence of the concrete cap.
- Collapse could occur, particularly when ground is disturbed, and loadings are increased (i.e. as part of earthworks and construction work.

Recommendations: -

- Proof drilling of the shaft to establish depth and fill material.
- Suitably filled with pressured grout.
- Shaft to be capped with a concrete slab, installed on suitable strata.
- Any future development in the western portion of the site will need to take into consideration the risk associated with the mine shafts and zones of influences in line with Coal Authority requirements. For zones of influence refer to the LKC report within Appendix C (page 12).
- Watching brief to be maintained to identify any potential features which may indicate the presence of shallow coal mining hazards. The watching brief should be maintained through the earthworks/reduced level dig and foundation works periods.

Shaft Ref: 386399-016 (Our Ref = Mine Shaft 2)

Scope: -

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

Findings: -

- 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.
- The shaft was successfully located on site.
- Shaft location surveyed to be E:386108.2, N:399546.0 (assumed to be shaft centre). These coordinates were also verified further as part of the mineshaft treatment works undertaken Early 2024.
- Desk study suggested the shaft had been previously treated. On site investigations confirm that grouting was present. However, the integrity of the treatment is unknown.
- No evidence of the concrete cap.
- Collapse could occur, particularly when ground is disturbed, and loadings are increased (i.e. as part of earthworks and construction work.

Recommendations: -

- Proof drilling of the shaft to establish depth and fill material.
- Suitably filled with pressured grout
- Shaft to be capped with a concrete slab, installed on suitable strata.
- Any future development in the western portion of the site will need to take into consideration the risk associated with the mine shafts and zones of influences in line with Coal Authority requirements. For zones of influence refer to the LKC report within Appendix C (page 12).
- Watching brief to be maintained to identify any potential features which may indicate the presence of shallow coal mining hazards. The watching brief should be maintained through the earthworks/reduced level dig and foundation works periods.

LKC report Findings & Recommendations

A summary of the findings is below, extracted only the key points from the Shallow workings report by LKC (Ref: LKC 22-1670 June 2023).

Shaft Ref: 386399-001 (Our Ref = Mine Shaft 1)

- Successfully located on site
- Desk study suggested the shaft had been previously treated. Investigations confirm that grouting was present. However, the integrity of the treatment is unknown.
- No evidence of a concrete cap.
- Collapse could occur, particularly when ground is disturbed, and loadings are increased (i.e. as part of earthworks and construction work.

Shaft Ref: 386399-016 (Our Ref = Mine Shaft 2)

- Successfully located on site
- Desk study suggested the shaft has not been treated. Investigations appear to confirm this.
- No evidence of a concrete cap.
- Collapse could occur, particularly when ground is disturbed, and loadings are increased (i.e. as part of earthworks and construction work.

Previous permits

Permit Ref:26624

This permit was granted to Manchester City Council on 9th May 2023 and was valid for 12months (expiring 9th May 2024). The permit allowed ground investigations by 8No. boreholes to 40m in depth to determine the presence of shallow workings and also included trial trenching to locate three recorded mine entries (TCA References: - 386399-001 / 002 and 016).

These works are now complete and whilst the permit is still open, the permit applies to the specific works scoped on the permit noted above so will not be valid for any future investigation works. It is not understood if a Permit Closure Summary Form has been submitted to close this permit.

Permit Ref:27171

This permit was submitted to Van-Elle (Piling / Grouting Contractor) under application reference (APP-004227) with the works start date proposed to be 14th August 2023 for a duration of 25 Days. The permit relates to mine workings treatment, with the following description of works: -

> *Consolidation of potential mine workings through a program of drilling and grouting on a 6m x 6m grid (closing to 4.25m grid if workings are encountered) to an average depth of 36m bgl or 12m of rock cover. Fill with 12:1 PFA/OPC grout. Completing confirmation and testing bores to assist with validation works.*

The permit application also relates to mine shaft treatment works, with the following description of works: -

> *Treatment of 2No. mineshafts, Ref 386339-001 (Potentials partially treated) and 386399-016 (untreated), assumed to be 75m deep and 2.5m wide and partially backfilled. The treatment will be from the base of the shaft (plus 5m solid) with 10:1 PFA/OPC grout. There will be 2 treatment BHs and 1 test BH.*

These works are now complete and permit closure has been requested with submission of this closure report (Refer to appendix K).

Permit Ref:27778

This permit was submitted by Clancy Consulting, along with this report, for permission to disturb or change coal mines or coal managed or owned by the Coal Authority. The permit was approved on 25th January 2024 for a period of 12 months, with the below works detailed:-

- New Capping to 2No. mine shafts within the site boundary (Ref:386399-001 & 386399-016).
- New mine shaft entry treatment works to 2No. mine shafts, consisting of pressurised Grout filling of the mine shafts within the site boundary (Ref:386399-001 & 386399-016) – **See Permit Ref: 27171**
- Ground stabilisation ground treatment local to the proposed building. This includes grout holes on an 6m by 6m grid. – **See Permit Ref: 27171**

The permit certificate was issued to Clanc y with the description:-

> *Treatment of two mine entries by digging down to shaft level, formation of a piling mat, installation of piles surrounding the shafts, fixing of reinforcement and casting of a new suspended reinforced concrete cap including backfilling (386399-001, 386399-016) within the Authority's interests at the identified site location above as shown on the Grant Permit Boundary (overleaf) for the period of 12 months from the granted date shown below. The granting of this Permit does not constitute advice given by the Authority in relation to the proposed operations. It is the Permit Holder's responsibility to obtain appropriate health, safety, environmental, technical and legal advice*.

Parameters For Design

To establish the design parameters, the coal authority records have been combined with the mine shaft site investigation information and is summarised in Table 4. Some items are to be confirmed on site but there is sufficient information to establish a design principle.

Table 4 – Mine Shaft Design Parameters Summary

	386399-001 (CCL Ref: Shaft 1)	**386399-016 (CCL Ref: Shaft 2)**
CCL Reference	Shaft 1	Shaft 2
Shaft Diameter	~~2.1m~~[2] 2.5m	2.5m
Shaft Depth	73m[1]	58[1]
Below Ground Level (bgl)	5.5m (GL at 58.400m[3])	2.6m (GL at 59.540m[3])
Treated / Untreated	Treated. Grouted boreholes identified by investigations onsite.	Untreated
Existing Cap	No	No
Mine Shaft Coordinates	E:386047.770 N:399534.864	E:386108.2 N:399546.0
Notes: [1] Items marked red have been confirmed by further on-site investigations during the remedial works phase. [2] Items ~~crossed~~ are items where the coal authority records are not accurate and on-site investigations take precedence. [3] Existing ground levels have been established from an onsite topographical survey. Spot levels have not been taken at the exacting location of the mine shaft so the level noted is the lowest recorded reading within proximity of the mine shaft (conservatively). This level will be used to establish invert to proposed cap and then calculate the buildups over for loading purposes.		

2.0 Design Philosophy

2.1 Proposals Overview

The proposals have been developed taking on board the principal requirements of TCA and the guidance laid out in the CIRIA guides (C758D & SP32).

The consolidation of potential existing mine workings involves the following sequence: -

- Undertake initial site strip across the site, removing organic material.
- Mark out the proposed 6m x 6m grid of grout column positions across the site in accordance with the Van-Elle drawing presented within Appendix H. Where min workings are encountered, this grid will be reduced to a 4.25m x 4.25m grid.
- Undertake drilling operations progressing from one position to the next. A treatment grid of 6m will be drilled, with boreholes extending to average 36m bgl or 12m of rock cover.
- Drilling will be conducted using hydraulic driven rotary percussive drill rig, advancing 101mm casing into the target seam to allow grouting and consolidation. 101mm diameter casing will also be advanced into the shaft to allow grouting and consolidation. Rotary percussive drilling techniques will be used with water as the flushing medium. The rigs will be fitted with a fully interlocked guard, which will be operation at all times that drilling is being carried out.
- Inject grout under confining pressures as the auger is removed, rising in stages up to ground level to stabilise the existing mine shaft fill material. The grout material will be a 12:1 PFA/OPC mix with minimum amount of clean water added to form a pumpable mix. Sand / aggregate may be added should voids be found. This mine shaft stabilisation is explained in detail within Appendix H. Sets of 4 grout cubes will be taken and tested at 7, 14 and 28 Day intervals to achieve a minimum strength of 1N/mm2 after 28days.
- During the works a gas monitor shall be used throughout the consolidation program to monitor for the presence of three harmful gases, carbon monoxide (CO), hydrogen sulphide (H2S) and Methane (CH4). Levels of airborne Oxygen (O2) will also be monitored. The gas alarms have visible and aural alarms should concentrations of any of these gases touch pre-determined trigger levels. Records of the gas monitoring shall be kept.

The Mine Shaft Stabilisation & Capping works solution involves the following sequence: -

- Excavate any existing backfill to uncover the existing mine shaft capping (for inspection/survey). This will be under a new permit from TCA (Ref: **27171**). The depth of excavation will be to suit the depths of the existing mine shafts which, from previous investigations, are approx. 5.5m (TCA Ref: 386399-001) and 2.6m (TCA Ref: 386399-016).
- Investigate and confirm the extent of any existing shaft plugging works. Shaft 1 (TCA Ref: 386399-001) was investigated and confirmed to have been grouted, whilst the investigations for shaft 2 (TCA Ref: 386399-016) suggest no grouting works have been conducted.
- Both shafts will require investigative drilling to establish the depths, which are expected to be in the order of 74m to 75m. Bore through any existing mine shaft fill material to the bottom of the existing shaft to confirm the depth.
- Inject grout under confining pressures as the auger is removed, rising in stages up to ground level to stabilise the existing mine shaft fill material. The grout material will be a 10:1 PFA/OPC mix with minimum amount of clean water added to form a pumpable mix. Sand / aggregate may be added should voids be found. This mine shaft stabilisation is explained in detail within Appendix H. Sets of 4 grout cubes will be taken and tested at 7, 14 and 28 Day intervals to achieve a minimum strength of 1N/mm2 after 28days.
- During the works a gas monitor shall be used throughout the consolidation program to monitor for the presence of three harmful gases, carbon monoxide (CO), hydrogen sulphide (H2S) and Methane (CH4). Levels of airborne Oxygen (O2) will also be monitored. The gas alarms have visible and aural alarms should concentrations of any of these gases touch pre-determined trigger levels. Records of the gas monitoring shall be kept.
- Install of a piling platform.
- Installation of 16 No. piles (8No. per shaft) around the mine shaft at a suitable clearance, socketing into bedrock at depth to form support for the new 450mm thick mine shaft capping. Piles are 450mm

and sleeved down to bedrock, designed to support the soil surcharges above in addition to a 65 kN/m^2 imposed load surcharge for future flexibility. Refer to Appendix I for the pile calculations.

- Cropping of the piles down to the required pile cut off level (75mm socket into the mine shaft capping).
- Install compressive packing layer over the existing mine shaft brickwork and below the existing capping slab.
- 50mm blinding to the extents of the new mine shaft capping to form a robust working platform.
- Installation of new reinforcement cage providing 75mm cover and H40 reinforcement at 200mm centres in accordance with the minimum rebar sizes presented in CIRIA 758D and the design within this report.
- Shutter and cast the new 6.6 x 6.6m C40/50 two way spanning capping slab (5.4m between support centres). The new provides a support span equating to 2.14 x the diameter of the shaft, understood to measure 2.5m (but will be confirmed by further investigations). The concrete mix will take account of the prevailing ground conditions, chemical aggressiveness, groundwater quality, the need for durability and the method of placement. The mine shaft capping slab will be complete with a 500x500 square penetration to enable future inspection and top up of the fill should this ever be required. The opening will be secured with minimum 2No. Stainless Steel bars cast into the mine shaft capping.
- A concrete ringed manhole will be positioned atop of the inspection hole, built up in segment rings and reducing in size up to the surface where a lockable cast iron cover will be installed. Where the mine shaft capping is below the football pitch, this cover will sit below the pitch buildup so as not to preclude its use but will be clearly indicated on all the relevant plans for record purposes, included in the Access & Maintenance Strategy.
- Back fill the open cut excavation with engineered / graded fill to the Manual for Specification of Highways Works Volume 1.
- A completion report will be compiled following completion of the works. The report will include drilling records, grouting records, testing records and a location plan showing the location of the boreholes and any test holes conducted. It will also summarise total length drilled, and quantities of grout materials.

We have developed the above to provide a robust solution and to ensure the integrity of the mine shaft.

2.2 Calculation Package Scope

The scope of this calculation package is to support the engineering appraisal required as part of the TCA permit application. It also serves to present compliance with Building Regulations Part A. It is intended to communicate and demonstrate the structural suitability of the capping proposals for the scheme.

2.3 Codes of Practice & Guidance Documents

The following codes of practice have been adopted in the design of the mine shaft capping slab: -

- Building Codes
  - BS EN 1990 + UK NA (2002)
  - BS EN 1991-1-1 + UK NA (2002) General Loading
  - BS EN 1991-1-3 + UK NA (2003) Snow Loading
  - BS EN 1991-1-4 + UK NA (2005) Wind Loading
  - BS EN 1992-1-1 + UK NA (2004) Concrete Structures
  - BS EN 1997-1 + UK NA (2003) Geotechnical Design
- Design Guides
  - CIRIA C758D – Abandoned Mine Workings Manual
  - CIRIA SP32- Construction Over Abandoned Mine Workings
  - The Coal Authority- Policy for Building Over or Within the Influencing Distance of a Mine Entry
  - IStructE - EC2 Manual for the design of Concrete Building Structures (2006)
  - IStructE - Standard Method of Detailing Structural Concrete (2021)

2.4 Reference Documents

The following reference documents have been used in the development of the design solution and also the calculations: -

- LKC Shallow Mining SI Works Report (Report Ref: LKC 22 1670 ¦ June 2023)
- Enviro Solution Coal Mining Risk Assessment (Report Ref: CI101-V2 ¦ March 2022)
- Enviro Solution Phase 1 Geo-Environmental Desk Study (March 2022)
- LKC Phase 2 Geo-Environmental Assessment Report (Report Ref: CL102-V1 ¦ March 2022)
- LKC Remediation Strategy (Report Ref: LKC 22 1670-B1-GI ¦ September 2023)

2.5 Method Breakdown

The mine shaft capping slab has been designed as a two-way spanning reinforced concrete flat slab spanning between CFA piles which are socketed into bedrock at depth (Socket length TBC). The design presented is based upon minimum imposed surcharge loads (Qk) and minimum earth surcharge loads (Gk) based on the exacting configurations which exist on site (with some redundancy included).

Our calculations are a verification for the minimum capping slab requirements outlined within CIRIA publication C758D with CIRIA SP32.

The following outline philosophy has been adopted in the design: -

1. Piled supports have been located a minimum 3Dia form the existing mine shaft face to reduce potential influences on the mine shaft. The piled supports are also 2500mm from one another, equating to 5.5Dia between piles.
2. The piled supports are formed from 450mm diameter CFA piles socketed into bedrock at depth. The pile reinforcement has been anchored into the RC capping slab using proprietary Ancon MBT Headed couplers.
3. The capping slab is 6.6m x 6.6m, equating to 2.6 x Dia which is greater than the required 2Dia required by CIRIA C758D.The capping slab is designed as a two-way spanning reinforced concrete flat slab spanning between the 450mm CFA piled supports. The supports are located to provide a clear span of 5.6m across the diagonal which equates to 2.24Dia.
4. The capping slab thickness was developed using the CIRIA guidance and adopts a minimum thickness of 450mm for both mine shaft caps.
5. In line with CIRIA SP32 clause 7.6, a concrete cover of 75mm has been adopted to the top, bottom, and sides of the capping slab and H40 reinforcement bars have been provided at t 200mm centres.
6. The above capping slab minimums have been verified by analysis and hand calculations (where appropriate) to ensure the site-specific design falls within the minimum limits. The minimum requirements from CIRIA SP32 governed.
7. The existing mine shaft is to be bored and stabalised to ensure the shaft is fully plugged.
8. The area surrounding the building is to be stabalised on a 6m x 6m grid.
9. All designs / covers have been developed assuming a design life of 120 years.
10. To verify the CIRIA slab minimums, a structural analysis model was built using FEA meshing. Tekla structural designer V.23.2.1.1 was used to establish pile loadings with spring supports modelled in place of the piles. Pile spring stiffnesses were adjusted to ensure the mine shaft cap was not sensitive to variants in the pile settlement assumptions; this is detailed within the mine shaft capping calculations.
11. The mine shaft grouting process and details have been outlined using guidance from the relevant codes (refer to CIRIA C758D).
12. In addition to the mine shaft caps selfweight, the mine shaft caps have been designed for a permanent load of 55 kN/m^2 (soil and buildups) and a variable load of 70 kN/m^2 (surcharges) at service limit state. These loads have been combined and factored in accordance with the relevant Eurocodes to establish the design envelope for the slab. The 70 kN/m^2 variable load was incorporated to provide as much future proofing as possible for the site.

3.0 Calculations

Coal Mine Shaft Treatment,
Varley Street, Manchester
1.0 Design Philosophy & Loading

1 Design Philosophy & Loading

1.1 Mine Shaft Capping Reference Plan

- Mine shafts location on site (extracted from DRWG NO. VAR-RDG-XX-XX-DR-C-00203_RevP03 by Ridge)
- The mine shafts are currently located within an open field, with a proposed new car park above and the proposed new building located away from the insertion of the mine shaft standoff zone, as shown in the extract below.

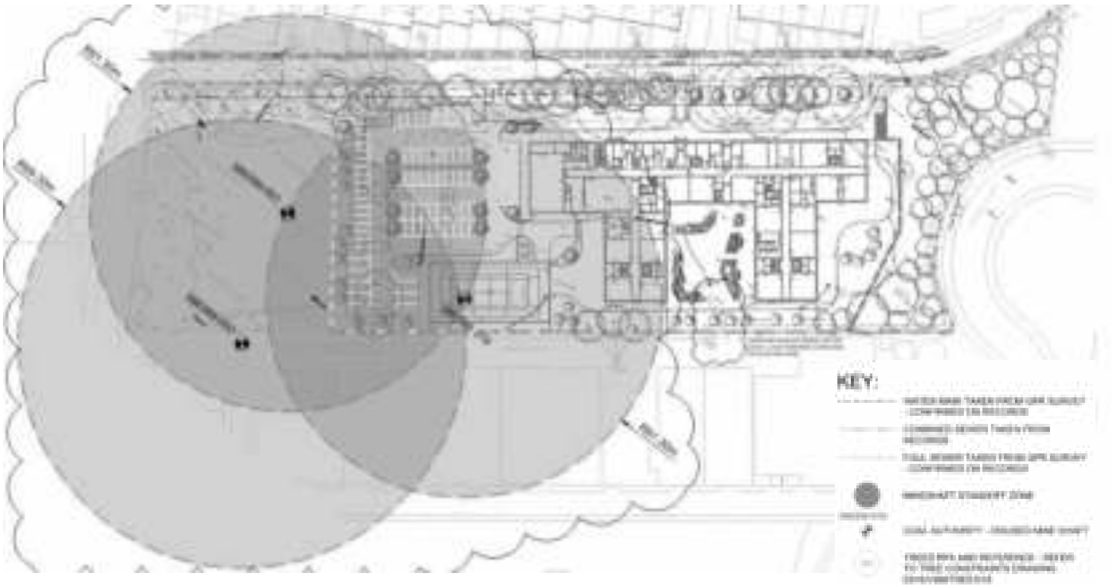


Figure 1 – Extract from Ridge Drawing: - VAR-RDG-XX-XX-DR-C-00203_RevP03

- Plan of mine shafts relative to the proposed building (DRWG NO. VAR-RDG-XX-XX-DR-C-00203_RevP03 by Ridge)
- Based on intrusive investigations and surveys, shaft numbers based on the key plan with geotechnical assessment (Appendix E)

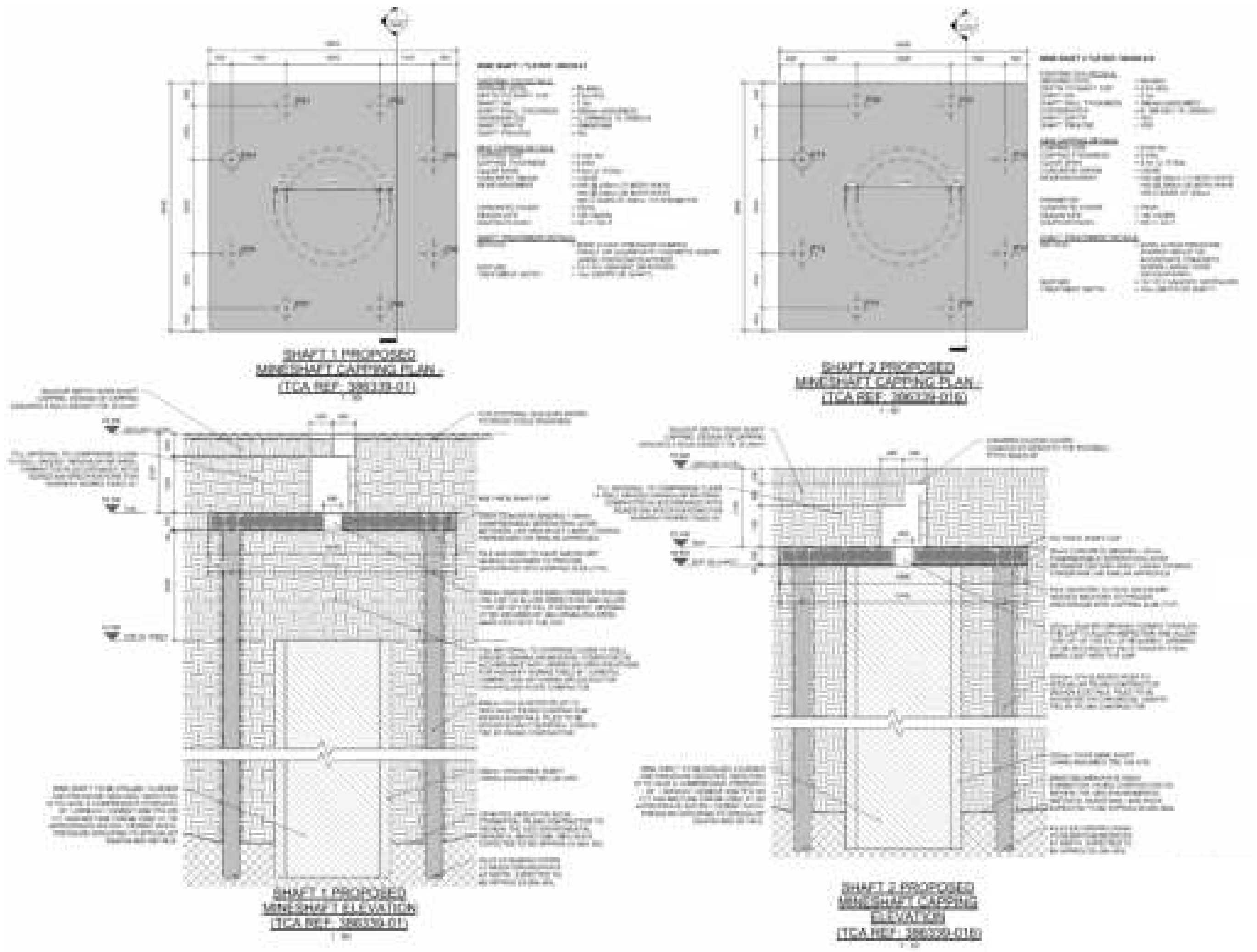

SHAFT 1 PROPOSED MINESHAFT CAPPING PLAN (TCA REF: 386339-01)
SHAFT 2 PROPOSED MINESHAFT CAPPING PLAN (TCA REF: 386339-01B)
SHAFT 1 PROPOSED MINESHAFT ELEVATION (TCA REF: 386339-01)
SHAFT 2 PROPOSED MINESHAFT CAPPING ELEVATION (TCA REF: 386339-01B)

Figure 2 – Extract from – VAR-CCL-ZZ-00-DR-S-400002-P01

1.2 Loading

Vertical Loading (General)

- In line with the CIRIA 758D (p.432), reinforced concrete cappings should be designed to carry the weight of overburden and any additional superimposed loads.
- The depth of overburden was surveyed on site in March 2022 and is summarised below:
  Shaft 1 – Surveyed to be 74.0m BGL (BGL is the depth below proposed ground level)
  Shaft 2 – Surveyed to be unknown BGL depth (BGL is the depth below proposed ground level)

Permanent Loading (Gk)

- For the design of this capping, the permanent loading from the soil above the slabs will be considered in addition to the proposed car park area buildup.
- The vertical soil loadings on top of the soil mine shaft cappings have been calculated using the survey from March 2022.
  Shaft 1 – overburden depth = 2.60m (Design considers 3.00m conservatively)
  Shaft 2 – overburden depth = 2.60m (Design considers 3.00m)

- The proposed finished levels have been taken from the Proposed finished levels by Ridge, as shown in the extract below.
- The buildup of the ground is assumed to be dense granular fill material weighing 20kN/m^3

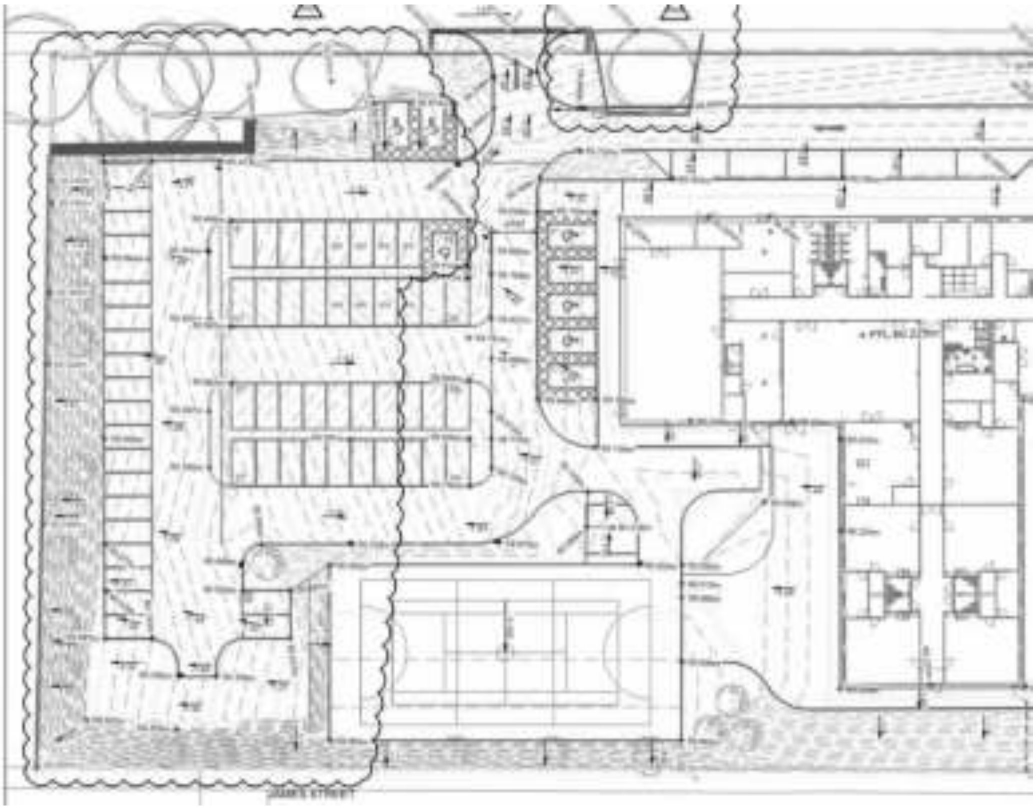


Figure 3 – Extract from - VAR-RDG-XX-XX-DR-C-00600(P03) - Proposed Finished Levels by Ridge

Assume a unit weight of 20kN/m^3 for all buildup and overburden soil (Average weighted conservatively)

$$G_K = \gamma \times z$$

$$where\colon z\ is\ the\ depth\ of\ the\ capping$$
$$\gamma\ is\ the\ saturated\ unit\ weight\ of\ the\ soil\ (kN/m^3)$$

$$z_{shaft\ 1\ and\ 2} = 3.60m\ (height\ from\ ground\ level\ to\ the\ top\ of\ capping\ slab)$$
$$G_{k_{shaft\ 1\ and\ 2}} = 20kN/m^3 \times 3.00m = 60kN/m^2$$

Variable Loading (Qk)

- For variable loading, a surcharge of 65kN/m^2 has been considered to provide flexibility should the area where the capping is located be developed in future. The area is futureproofed to take variable loads of up to 65kN/m^2.

$$Q_K = 65kN/m^2$$

1.3 Initial Slab Design

Slab Thickness

- According to CIRIA 758D (p.431), capping slabs should have a minimum thickness of 450mm and be designed to BS EN 1992-1-1:2004+ A1:2004. Based on the spans and limiting deflection to a S/200 under total load, the shaft cappings are as follows: -
  Shaft 1 (386399-001) thickness = 450mm
  Shaft 2 (386399-016) thickness = 450mm

Reinforcement

- In absence of specific reinforcement guidance in CIRIA 758D, the reinforcement guidance in CIRIA SP32 was followed. According to CIRIA (Figure 35 p.63), reinforcement should be minimum 40mm diameter and at 250-mm centres for shaft diameters ranging from 2.7m to 3.6m. The design adopts B40 bars at reinforcement at 200-mm centres.

Concrete Cover

- According to CIRIA 758D (p.431), a reinforcement cover of 75mm has been adopted to achieve a design life of 120 years.

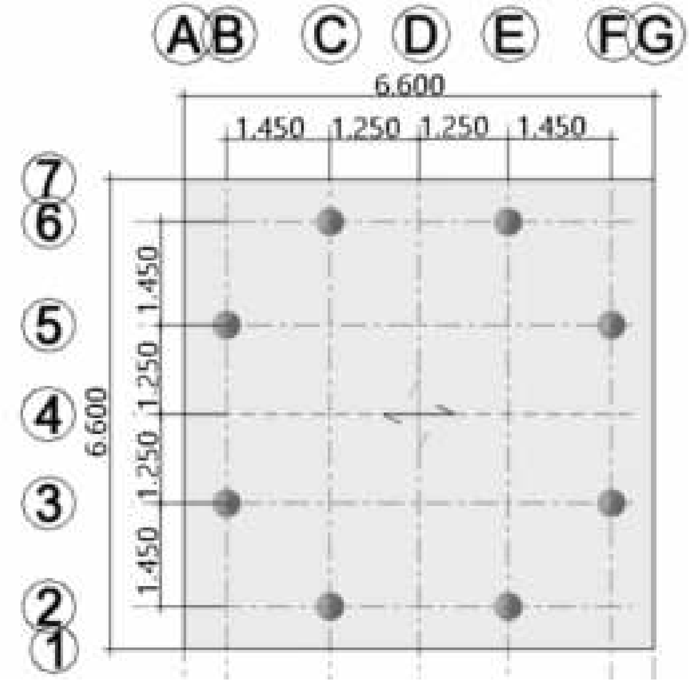
Piling Solution

- Due to the caps being located within a ‘High-Risk’ zone (CIRIA 758D, Table 14.3, p.424), both shaft caps were described to be piled to distribute vertical forced directly to the bedrock at depth. Piles are sleeved to mitigate surcharges to the existing mine shaft from the installation process particularly.

Design Life

- According to CIRIA 758D (p.431), the cappings should have a design life of 120 years.

Shaft Cap 1 Dimensions

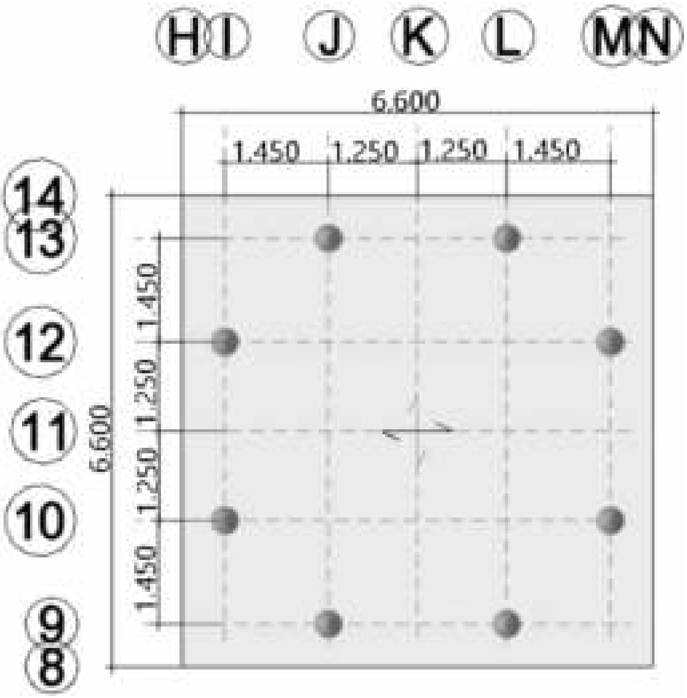


A
B
C
D
E
F
G
6.600
1.450
1.250
1.250
1.450
7
6
5
4
3
2
1
6.600
1.450
1.250
1.250
1.450

Figure 4 – Tekla Structural Designer Model Snapshot

Breadth: 6.60m
Width: 6.60m
Shaft Diameter: 2.50m (inside diameter)
Spacing between piles: 3Dia based on 450mm diameter piles (worst case)
Distance between pile centre of outside of shaft: 1.450m

Shaft Cap 2 Dimensions



H
I
J
K
L
M
N
6.600
1.450
1.250
1.250
1.450
14
13
12
11
10
9
8
6.600
1.450
1.250
1.250
1.450

Figure 5 – Tekla Structural Designer Model Snapshot

Breadth: 6.60m
Width: 6.60m
Shaft Diameter: 2.50m (inside diameter)
Spacing between piles: 3Dia based on 450mm diameter piles (worst case)
Distance between pile centre of outside of shaft: 1.450m

1.4 Analysis Input

Inputs and Assumptions

- A cracked section modification factor of 0.2 has been considered in the capping slab design. Cracked section modifications have been considered to give a realistic representation of the extent of the reduced section due to flexural cracking. The extent of cracking influences the load distribution to the piles.

- To provide a realistic representation of the settlement of piles in soil, linear spring supports were used in the analysis at the pile locations.

- Two spring stiffness ranges were tested to consider the analysis sensitivity to variations in spring stiffness to account for the inherent variability soil. Two different springs stiffnesses were considered and the worst-case analysis loadings considered for the design of the capping slab and for the derivation of the pile loadings. These spring stiffnesses were based on the anticipated settlements from the piling contractors' calculations which note 6 to 10mm displacement. The settlement calculations were based on an F_{rep} of 1000kN.

- As the piles are founded onto bedrock and the loadings per pile are quite light, the foundation is expected to be quite stiff.

- The following spring stiffnesses were tested: -
  - Spring 1 (Stiff Spring) = 5mm assumed settlement and used for the pile loadings and punching shear checks.
  - Spring 2 (Soft Spring) = 10mm assumed settlement and used for bending and deflection checks.

- Spring stiffness are applied directly to the support properties based upon an assumed load to displace the support 1000mm.

Spring 1 Stiffness (Stiff Spring):

$$Stiffness\ 1 = \frac{Approx.Design\ Force\ (kN)}{Deflection\ (mm)} = \frac{1000kN}{5mm} \times 1000 \qquad = 200000kN/m^2/m$$

Spring 2 Stiffness (Soft Spring):

$$Stiffness\ 1 = \frac{Approx.Design\ Force\ (kN)}{Deflection\ (mm)} = \frac{1000kN}{10mm} \times 1000 \qquad = 100000kN/m^2/m$$

1.5 Analysis Output

- The analysis has been undertaken using Tekla Structural Designer using Finite Element Analysis.
- The reinforced concrete cappings, as shown below, are modelled at actual levels due to varying levels of mineshafts, but not a representative distance apart. This has no effect on the design output but is modelled in this for visual purposes.
- The loadings applied to both cappings are the same, producing a more conservative design, and hence the same analysis output results:

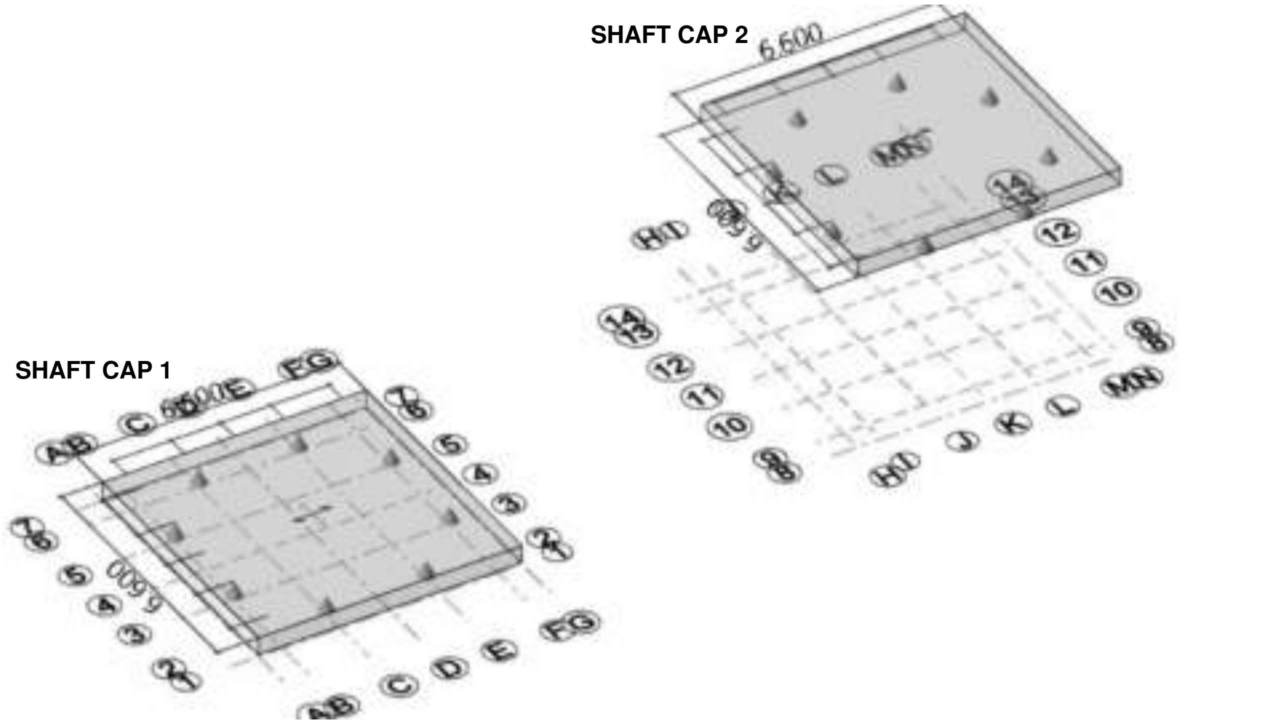
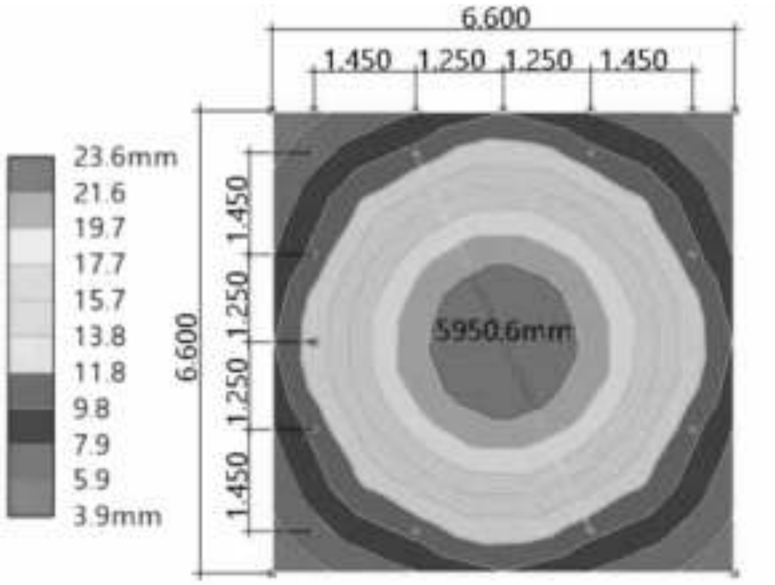


Figure 6 – Tekla Structural Designer Model Snapshot

SHAFT CAP 1 AND 2



Deflection Max = 23.5mm
Span = 5951m

Ratio = 5951/23.5 = 253.2

Ratio = S/254 > S/200

Therefore OK

(Serviceability Deflections (Combination 2 STR_1 - 1.35G + 1.5Q + 1.5RQ))

Mx Moments

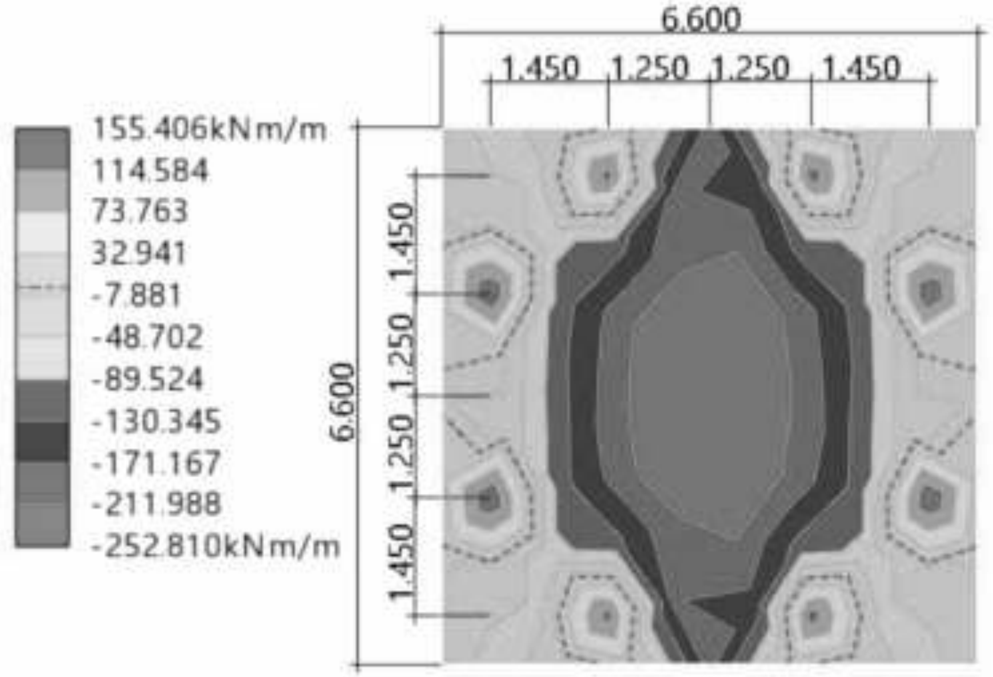


Figure 7 – ULS Moments X Direction (Combination 2 STR$_1$ - 1.35G + 1.5Q + 1.5RQ)

My Moments

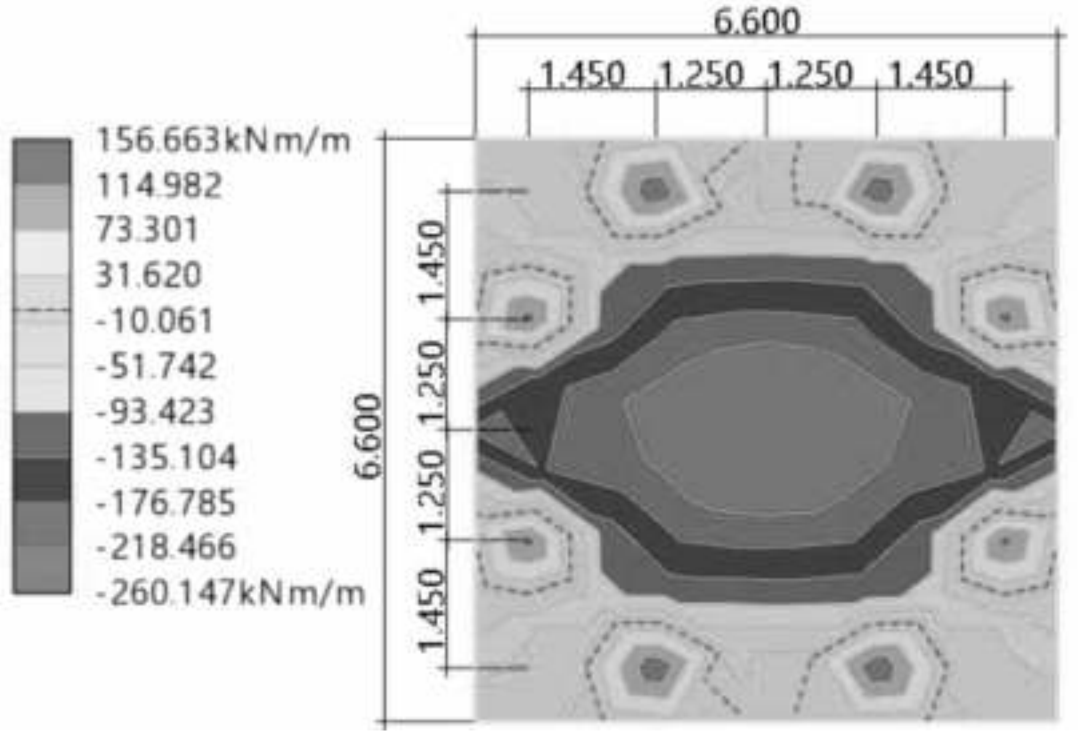


Figure 8 – ULS Moments Y Direction (Combination 2 STR$_1$ - 1.35G + 1.5Q + 1.5RQ)

Reactions (Gk)

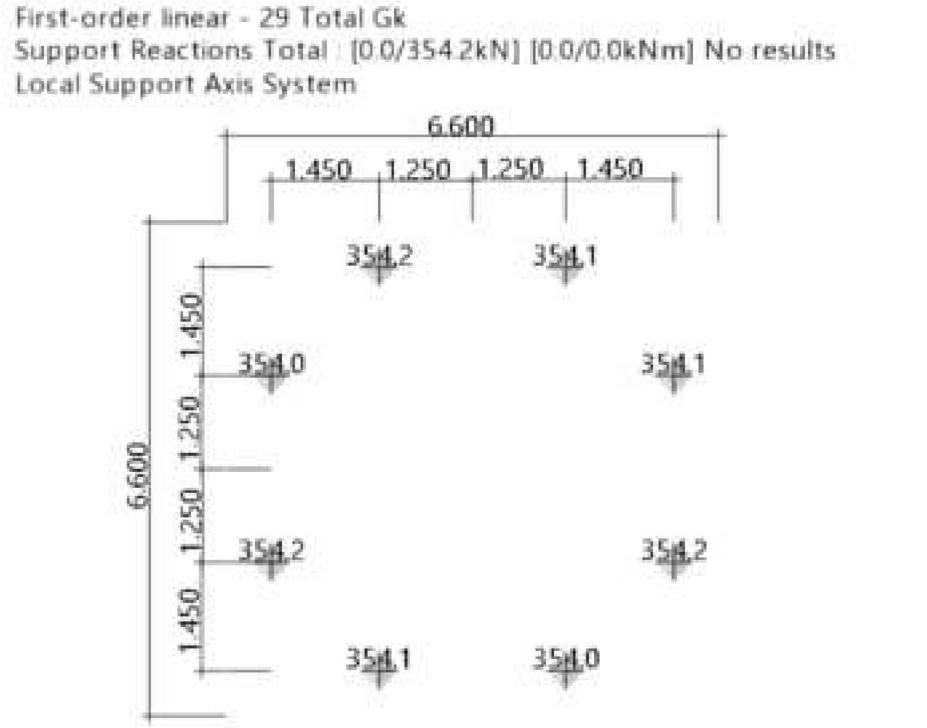

First-order linear - 29 Total Gk
Support Reactions Total : [0.0/354.2kN] [0.0/0.0kNm] No results
Local Support Axis System
6.600
1.450
1.250
1.250
1.450
354.2
354.1
354.0
354.1
354.2
354.2
354.1
354.0
6.600
1.450
1.250
1.250
1.450

Figure 9 – SLS Support Reactions Z Direction (Combination 29 Total Gk)

Reactions (Qk)

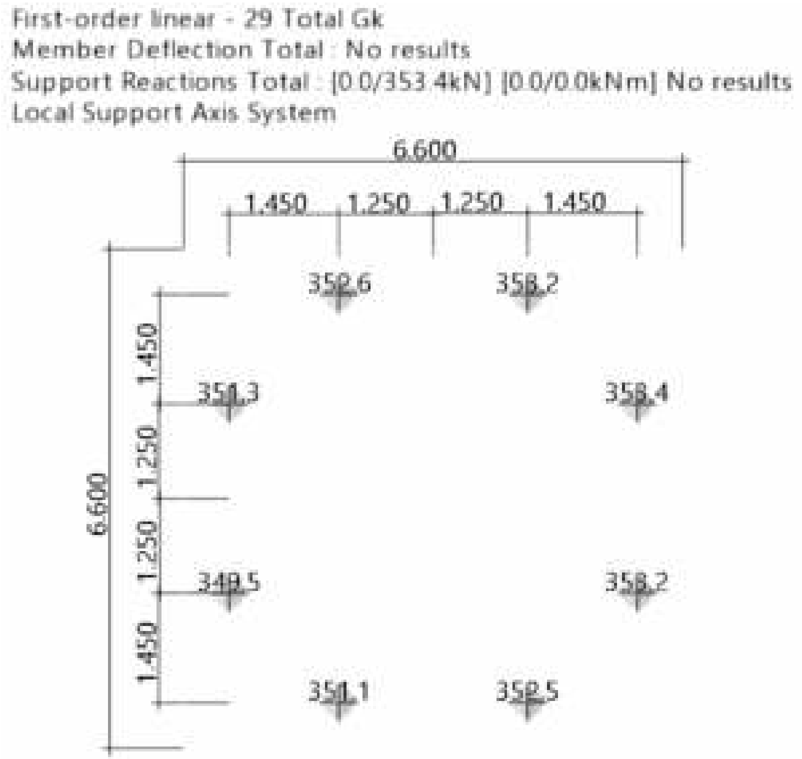
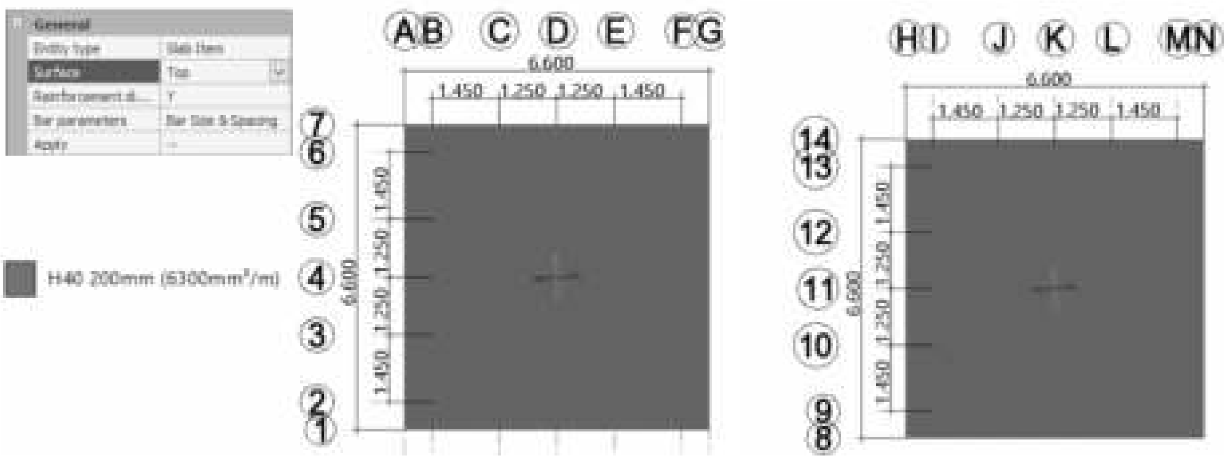

First-order linear - 29 Total Gk
Member Deflection Total : No results
Support Reactions Total : [0.0/353.4kN] [0.0/0.0kNm] No results
Local Support Axis System
6.600
1.450
1.250
1.250
1.450
352.6
353.2
354.3
353.4
349.5
353.2
351.1
352.5
6.600
1.450
1.250
1.250
1.450

Figure 10 – SLS Support Reactions Z Direction (Combination 30 Total Qk)

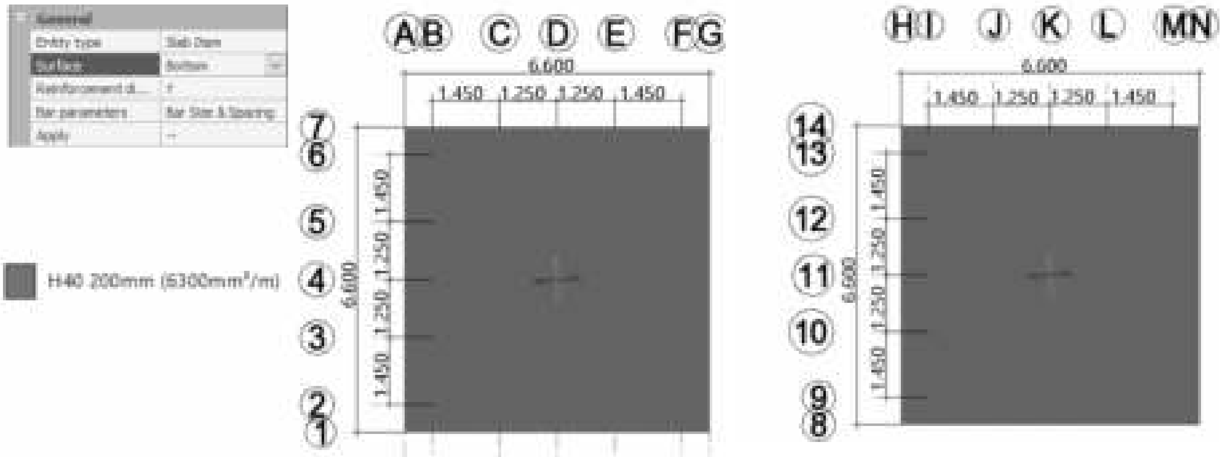
1.6 Design Input

- Design has been undertaken using Tekla Structural Designer using the in-built design tool:
- *Note: Shaft 1 results are presented on the left-hand side of the data and Shadt 2 results are presented on the right-hand side of the data.*
-


General
Entity type: Slab Item
Surface: Top
Reinforcement di...: Y
Bar parameters: Bar Size & Spacing
Apply: ...

H40 200mm (6300mm²/m)
AB
C
D
E
FG
6.600
1.450
1.250
1.250
1.450
7
6
5
4
3
2
1
HI
J
K
L
MN
14
13
12
11
10
9
8

Figure 11 – Analysis Model Reinforcement Input (Top reinforcement)


General
Entity type: Slab Item
Surface: Bottom
Reinforcement di...: Y
Bar parameters: Bar Size & Spacing
Apply: ...

H40 200mm (6300mm²/m)
AB
C
D
E
FG
6.600
1.450
1.250
1.250
1.450
7
6
5
4
3
2
1
HI
J
K
L
MN
14
13
12
11
10
9
8

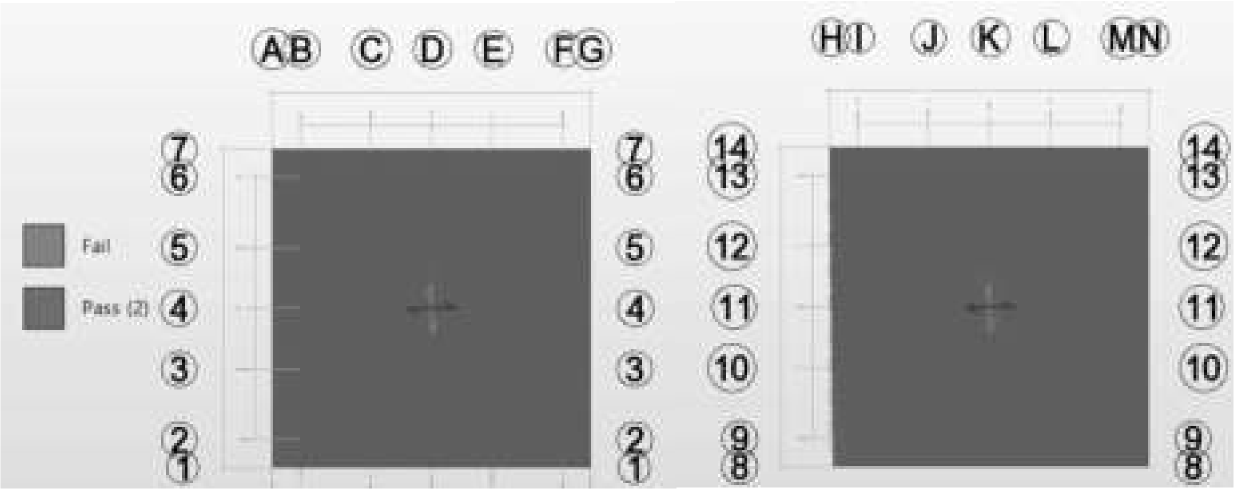
Figure 12 – Analysis Model Reinforcement Input (Top reinforcement)

Note: the reinforcement designed in the X direction is the same as the Y direction in the Top and Bottom surfaces.

1.7 Design Output

- The design has been output using Tekla Structural Designers built-in design tool to display the design status and overall utilisations of both capping designs:

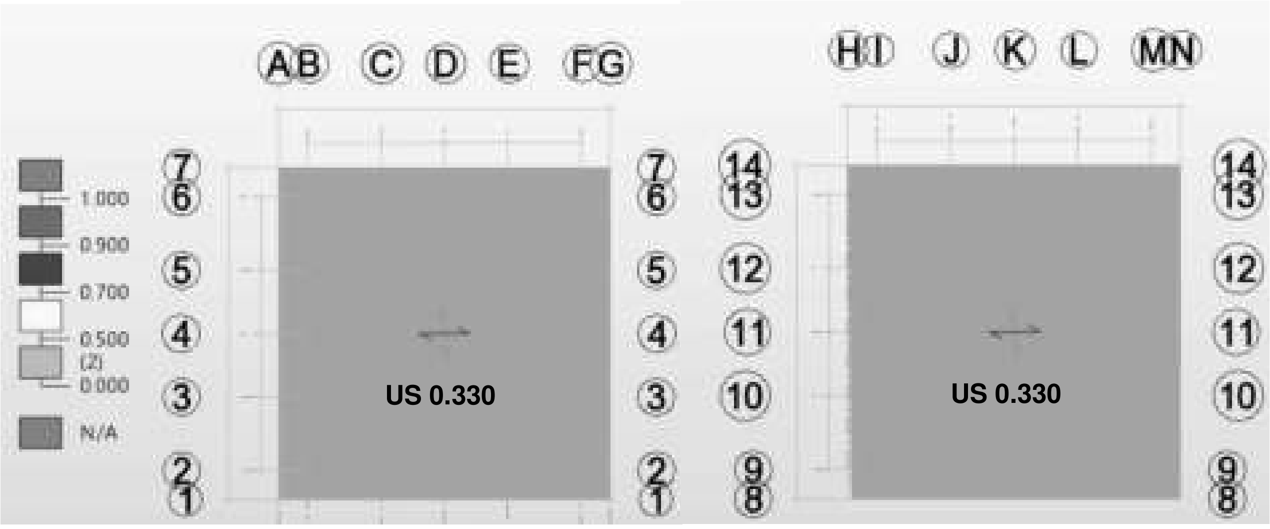
Pass/Fail



AB
C
D
E
FG
HI
J
K
L
MN
Fail
Pass (2)
7
6
5
4
3
2
1
14
13
12
11
10
9
8

Figure 13 – Analysis Model PASS/FAIL Output

Utilisation (Overall)



AB
C
D
E
FG
HI
J
K
L
MN
1.000
0.900
0.700
0.500
(2)
0.000
N/A
7
6
5
4
3
2
1
14
13
12
11
10
9
8
US 0.330
US 0.330

Figure 14 – Analysis Model Utilisations (Overall) Output

1.8 Punching Shear

- A punching shear check has been undertaken using the Concrete Centres spreadsheet (version 4.9) in accordance with BS EN 1992-1:2004.
- Strength Reaction Forces were extracted from the Tekla Structural Designer (TSD) model.
- Because of the position of the modelled supports, the worst-case punching shear condition is at the edge of the capping, as shown in the punching shear reference plan below.

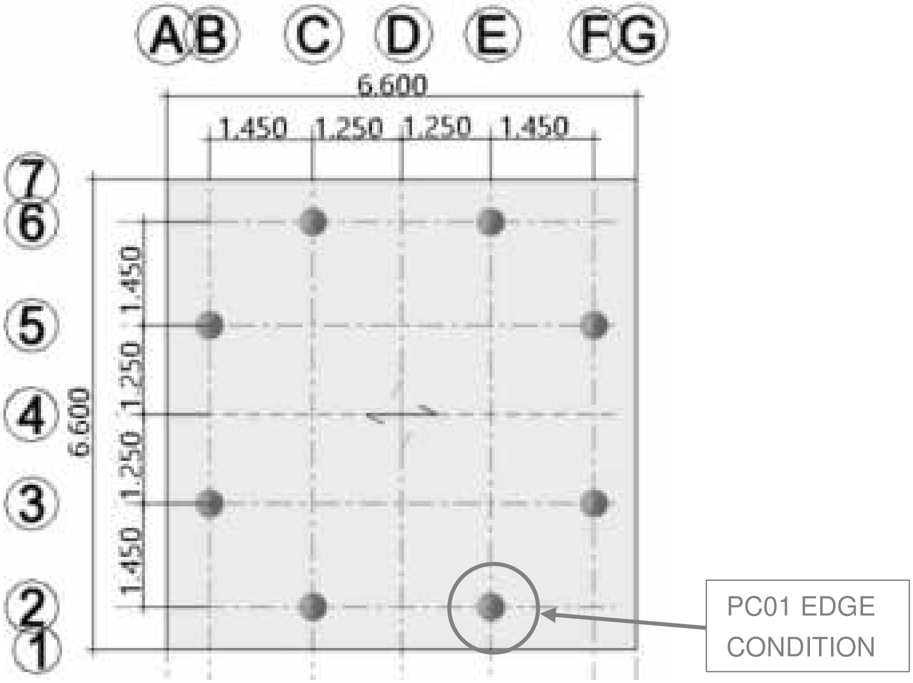


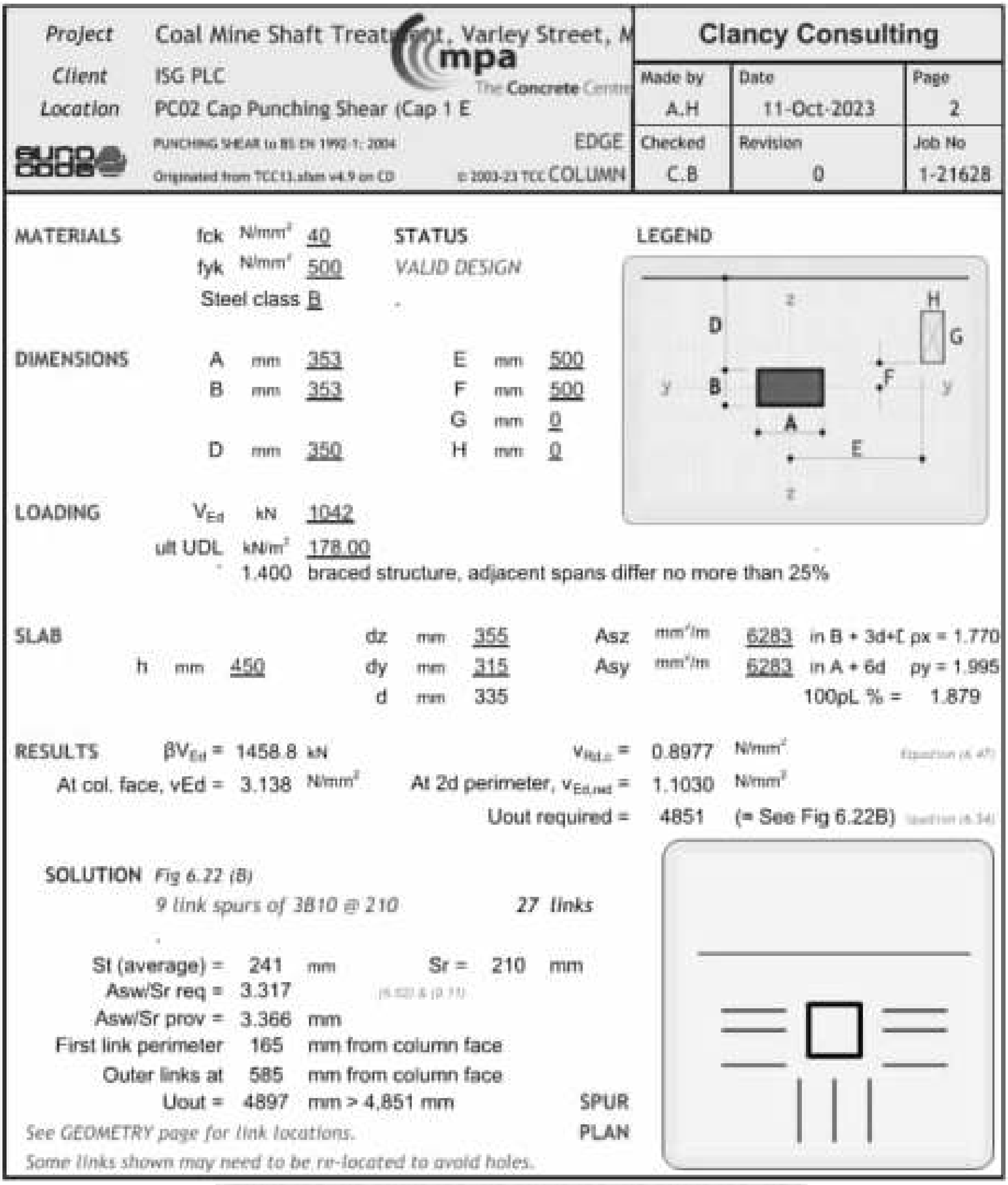
Figure 15 – Shaft Cap 1 Punching Shear Reference Plan

Spreadsheet Input

- Concrete Class: 32/40
- Steel Reinforcement Provided: B40 @ 200mm c/c ($A_{s,prov}$ = 6283mm^2/m)
- Capping thickness: 450mm
- Cover: 75mm
- Equivalent area of 450mm diameter pile (worst case): $\frac{\pi d}{4} = \frac{\pi \times 450}{4} = 353mm$
- Worst case strength reaction force output from TSD: 1042Kn
- UDL: $(ULS) \ = (1.35 \times 60) + (1.5 \times 65) = 178.5kN/m^2$

Spreadsheet Output

PC01 Worst Case Edge Punching



Project	Coal Mine Shaft Treatment, Varley Street, M	Clancy Consulting		
Client	ISG PLC	Made by	Date	Page
Location	PC02 Cap Punching Shear (Cap 1 E	A.H	11-Oct-2023	2
	PUNCHING SHEAR to BS EN 1992-1: 2004 EDGE	Checked	Revision	Job No
	Originated from TCC13.xlsm v4.9 on CD © 2003-23 TCC COLUMN	C.B	0	1-21628

MATERIALS
fck N/mm² 40
fyk N/mm² 500
Steel class B

STATUS
VALID DESIGN

LEGEND

DIMENSIONS
A mm 353
B mm 353
D mm 350
E mm 500
F mm 500
G mm 0
H mm 0

LOADING
V_{Ed} kN 1042
ult UDL kN/m² 178.00
1.400 braced structure, adjacent spans differ no more than 25%

SLAB
h mm 450
dz mm 355
dy mm 315
d mm 335
Asz mm²/m 6283 in B + 3d+[px = 1.770
Asy mm²/m 6283 in A + 6d py = 1.995
100pL % = 1.879

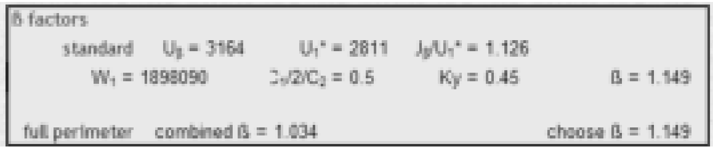
RESULTS
βV_{Ed} = 1458.8 kN
At col. face, vEd = 3.138 N/mm²
$v_{Rd,c}$ = 0.8977 N/mm² Equation (6.47)
At 2d perimeter, $v_{Ed,red}$ = 1.1030 N/mm²
Uout required = 4851 (= See Fig 6.22B) Equation (6.54)

SOLUTION *Fig 6.22 (B)*
9 link spurs of 3B10 @ 210 ***27 links***

St (average) = 241 mm
Sr = 210 mm
Asw/Sr req = 3.317 (6.52) & (9.11)
Asw/Sr prov = 3.366 mm
First link perimeter 165 mm from column face
Outer links at 585 mm from column face
Uout = 4897 mm > 4,851 mm

SPUR
PLAN

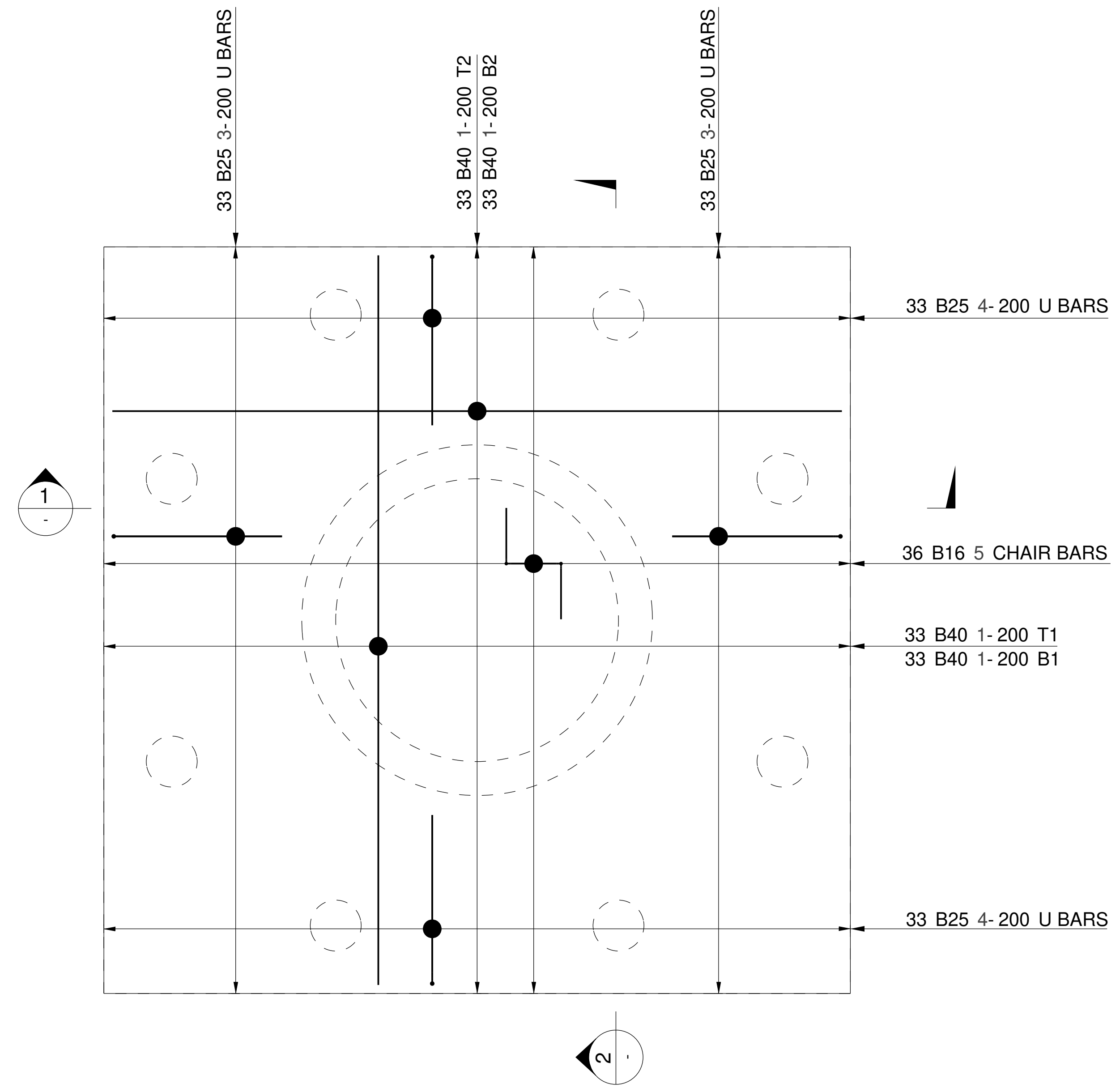
See GEOMETRY page for link locations.
Some links shown may need to be re-located to avoid holes.



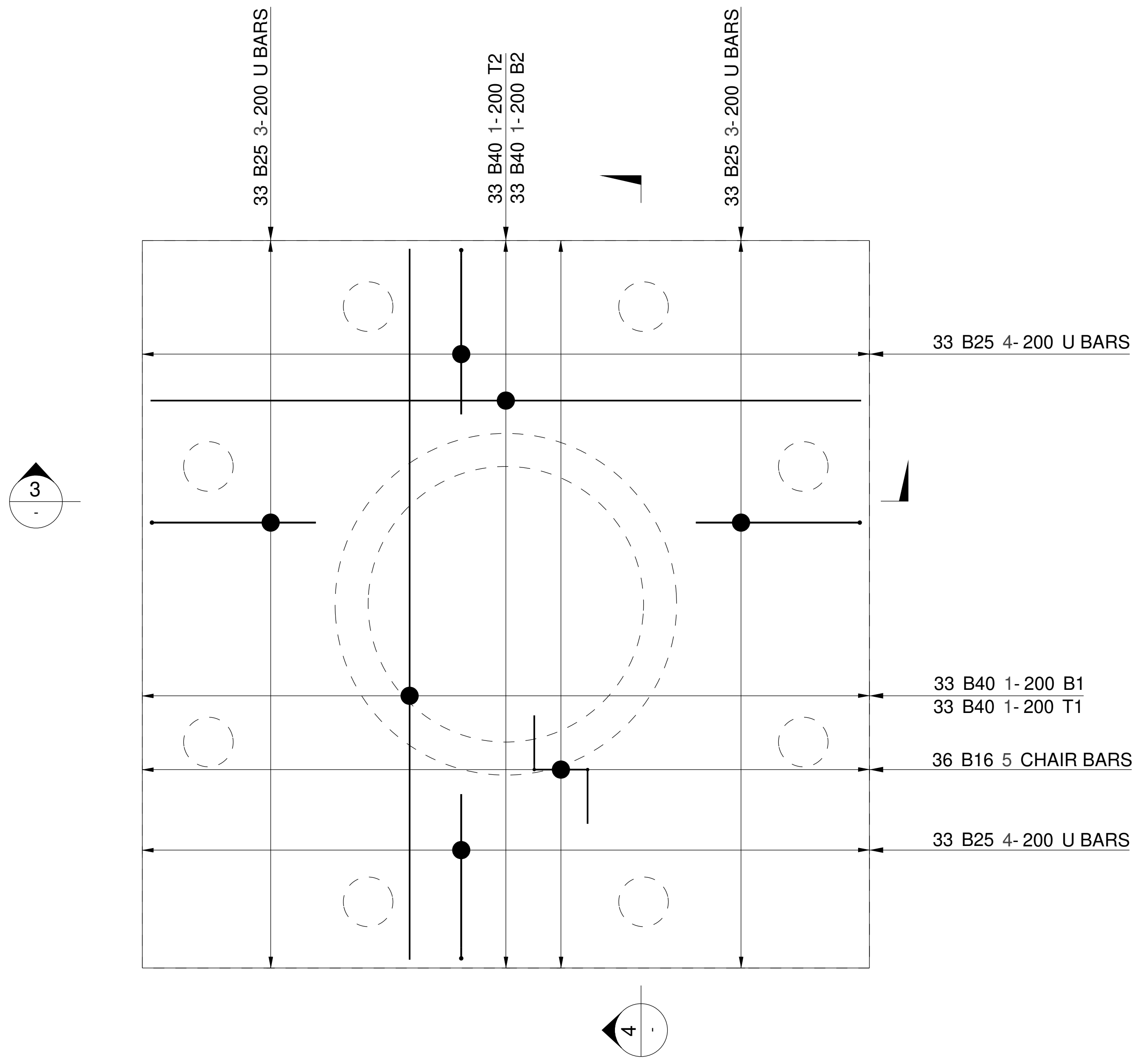
ß factors
standard U_0 = 3164 U_1^* = 2811 J_0/U_1^* = 1.126
W_1 = 1898090 $C_1/2/C_2$ = 0.5 Ky = 0.45 ß = 1.149
full perimeter combined ß = 1.034 choose ß = 1.149

Appendices

Appendix A Clancy Reinforcement Details


33 B25 3- 200 U BARS
33 B40 1- 200 T2
33 B40 1- 200 B2
33 B25 3- 200 U BARS
33 B25 4- 200 U BARS
36 B16 5 CHAIR BARS
33 B40 1- 200 T1
33 B40 1- 200 B1
33 B25 4- 200 U BARS
1
2

MINESHAFT 1 CAPPING
SCALE 1:50


33 B25 3- 200 U BARS
33 B40 1- 200 T2
33 B40 1- 200 B2
33 B25 3- 200 U BARS
33 B25 4- 200 U BARS
33 B40 1- 200 B1
33 B40 1- 200 T1
36 B16 5 CHAIR BARS
33 B25 4- 200 U BARS
3
4

MINESHAFT 2 CAPPING
SCALE 1:50

NOTES:

1. FOR GENERAL NOTES REFER TO DRAWING NO. VAR-CCL-ZZ-00-DR-S-40002.
2. COVER TO REINFORCEMENT TO BE

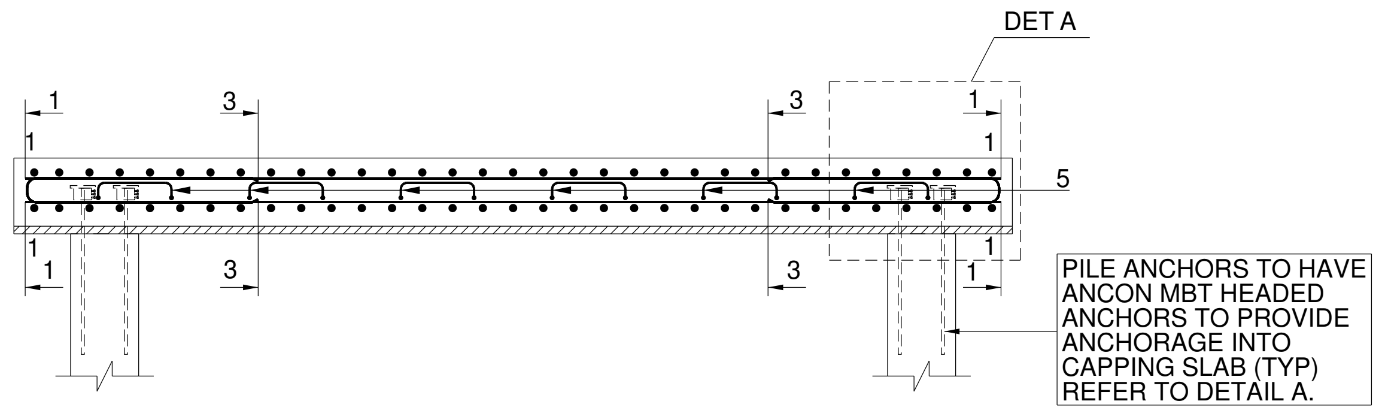
   TOP = 75mm SIDE = 75mm
   BOTTOM = 100mm
3. ALL REINFORCEMENT TO BE MINIMUM GRADE 500B BS 4449:2005
4. ALL BAR BENDING TO BE IN ACCORDANCE WITH BS 8666:2005
5. REFER TO BAR BENDING SCHEDULE VAR-CCL-ZZ-SH-S-48001.
6. MINIMUM LAPS FOR REINFORCEMENT TO BE:

   B10 -600mm
   B20 -1200mm
   B25 -1500mm
   B32 -1920mm
   B40 -2400mm
7. REBAR CALL OFF

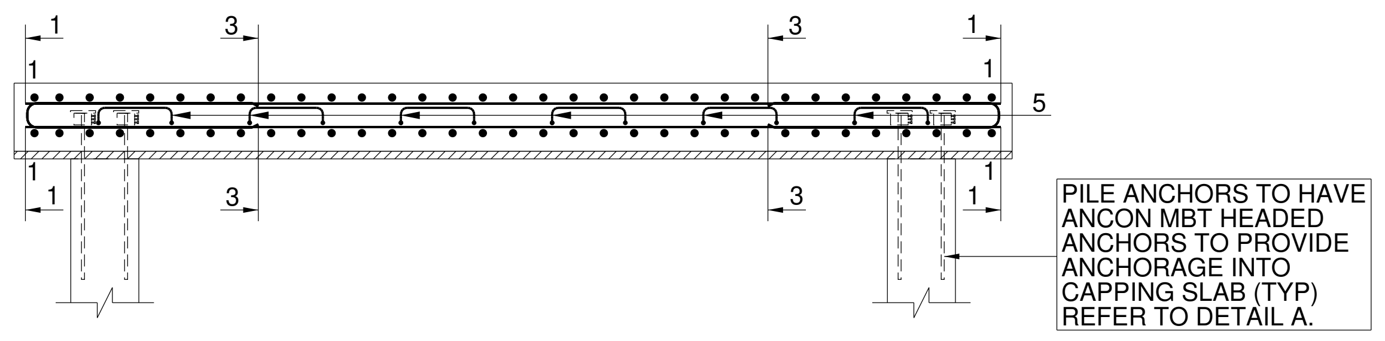
   1 B10 101 150 T1

   BAR LAYER
   BAR SPACING
   BAR MARK
   BAR TYPE & DIA
   NUMBER OF BARS
8. ABBREVIATIONS

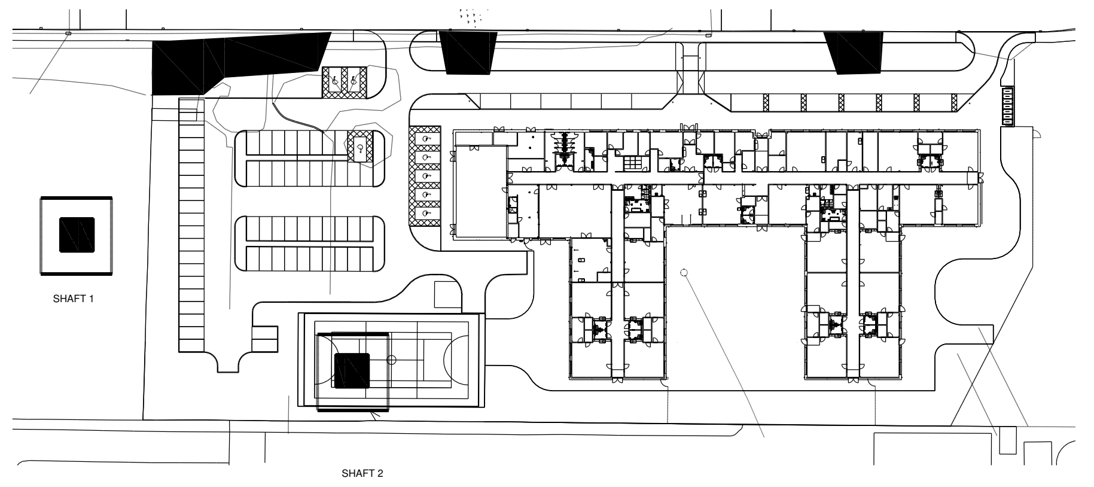
   B - BOTTOM
   T - TOP
   NF- NEAR FACE
   FF - FAR FACE
   EF - EACH FACE
   SF - SIDE FACE
   AP - ALTERNATE PLACE
   STG - STAGGERED
   ADD'L - ADDITIONAL
   PJ - POUR JOINT
   CJ - CONSTRUCTION JOINT


DET A
1
3
3
1
5
PILE ANCHORS TO HAVE ANCON MBT HEADED ANCHORS TO PROVIDE ANCHORAGE INTO CAPPING SLAB (TYP) REFER TO DETAIL A.

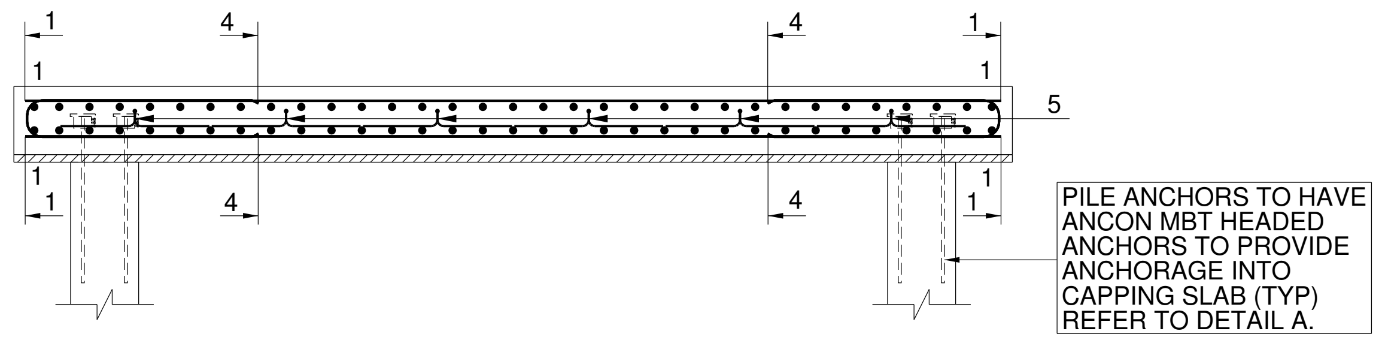
SECTION 1-1
SCALE 1:50


1
3
3
1
5
PILE ANCHORS TO HAVE ANCON MBT HEADED ANCHORS TO PROVIDE ANCHORAGE INTO CAPPING SLAB (TYP) REFER TO DETAIL A.

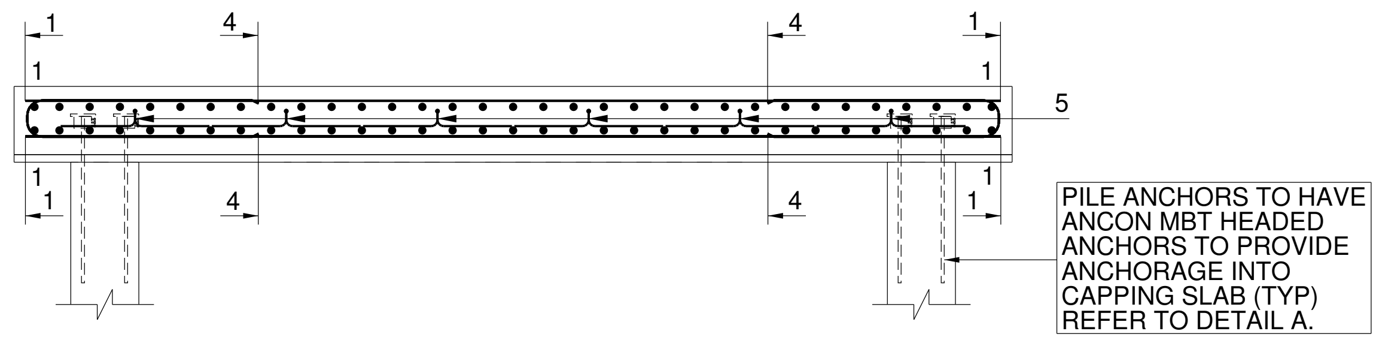
SECTION 3-3
SCALE 1:50


SHAFT 1
SHAFT 2

KEYPLAN
SCALE 1:1500


1
4
4
1
5
PILE ANCHORS TO HAVE ANCON MBT HEADED ANCHORS TO PROVIDE ANCHORAGE INTO CAPPING SLAB (TYP) REFER TO DETAIL A.

SECTION 2-2
SCALE 1:50

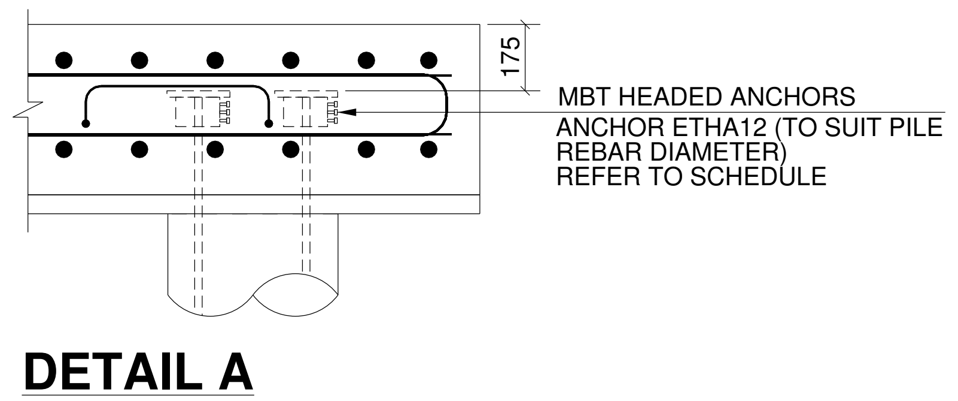

1
4
4
1
5
PILE ANCHORS TO HAVE ANCON MBT HEADED ANCHORS TO PROVIDE ANCHORAGE INTO CAPPING SLAB (TYP) REFER TO DETAIL A.

SECTION 4-4
SCALE 1:50

PILE HEADED ANCHOR SCHEDULE

REF.	NO. OF PILES	NO. OF BARS PER PILE	REBAR SIZE	TOTAL	MANUFACTURER	TYPE
SHAFT 1	8	6	H12	48	ANCON	ETHA12H
SHAFT 2	8	6	H12	48	ANCON	ETHA12H

IN ABEYANCE, WAITING PILE DESIGNERS PILE REINFORCEMENT SIZE AND NUMBERS


175
MBT HEADED ANCHORS
ANCHOR ETHA12 (TO SUIT PILE REBAR DIAMETER) REFER TO SCHEDULE

DETAIL A
SCALE 1:20

Rev	Date	Description	By	Check	App.
C01	06.02.24	ISSUED FOR CONSTRUCTION	GCM	CE	CB

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DO NOT THAW LAYERS THAT HAVE BEEN FROZEN.

Client
ISG LTD

Project
VARLEY STREET
SEN SCHOOL

Office
MANCHESTER

Discipline
STRUCTURAL

Title
MINESHAFT CAPPING
RC DETAILS

Scale @ A1
As Indicated

Status
CONSTRUCTION

clancy consulting

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Originator	Job Number	Discipline	Building/Zone
CCL	VAR	S	ZZ
Type	Level	Drawing No.	Revision
DR	00	48001	C01

CLANCY PROJECT NUMBER:-
1/21628

Birmingham 0121 200 7800 . Glasgow 0141 222 1720 . Liverpool 0151 227 5300 . London 020 3077 0970 . Manchester 0161 613 6000 . Newcastle 0191 221 0702 . Norwich 01603 305190 . Prestwick 01292 475375 . Reading 0118 941 7888

Project:	**VARLEY STREET SEN SCHOOL**	**VAR-CCL-ZZ-00-SH-S-48001**			
Job No:	**1-21628**	Prepared By:	**GCM**	Sheet No:	**1 of 1**
Site Ref:	**MINESHAFT CAPPING RC DETAILS**	Prepared Date:	**06.02.24**	Rev :	**C01**
BAR BENDING SCHEDULE		Checked By:	**CE**	Rev Date:	**06.02.24**

Member	Bar Mark	Type	Size	No. of mbrs	No. of bars in each	Total	Length of each bar (mm)+	Shape Code	A*	B*	C*	D*	E/R*	Rev letter	Weight (kg)
MINESHAFT 1 CAPPING	1	B	40	1	132	132	6450	00	6450						8398
	3	B	25	1	66	66	3100	13	1500	185	1500				784
	4	B	25	1	66	66	3150	13	1500	265	1500				797
	5	B	16	1	36	36	1600	98	500	115	500	500			91
MINESHAFT 2 CAPPING	1	B	40	1	132	132	6450	00	6450						8398
	3	B	25	1	66	66	3100	13	1500	185	1500				784
	4	B	25	1	66	66	3150	13	1500	265	1500				797
	5	B	16	1	36	36	1600	98	500	115	500	500			91
HEADED ANCHOR COUPLERS ALSO REQUIRED. REFER TO DRAWING FOR SCHEDULE.															

This Schedule complies with BS8666:2005 *Specified in multiples of 5mm +Specified in multiples of 25m

Diameter	mm	6	8	10	12	16	20	25	32	40	50		ALL BARS THIS SHEET
Wieght	kg	0	0	0	0	181	0	3161	0	16796	0		TOTAL (kg) **20139**

Appendix B Supporting Drawings

SAFETY, HEALTH & ENVIRONMENT (SHE) INFORMATION

In addition to hazards/risks normally associated with the types of work detailed on this drawing, note the following:

CONSTRUCTION
1. UNCHARTED SERVICES MAYBE PRESENT. KNOWN SERVICES ARE SHOWN ON THIS DRAWING.
2. WORKING OVER EX COAL MINES - COAL AUTHORITY REPORT TO BE USED AND CONTRACTOR TO HAVE SAFE WORK AND GROUND MONITORING METHODS IN PLACE.

MAINTENANCE / CLEANING
1. REFER TO

DECOMMISSIONING / DEMOLITION
1. REFER TO

PROPOSED LEVELS ARE BASED ON
THE DEP LANDSCAPE GA -
VAR-DEP-XX-XX-DR-L-00001

KEY

—	PROPOSED SURFACE MAJOR CONTOUR (0.2m)
- - -	PROPOSED SURFACE MINOR CONTOUR (0.05m)
-1:34 →	SLOPE GRADIENT (FALL)
× 135.200m	EXISTING SPOT LEVEL
× 135.200m	PROPOSED SPOT LEVEL
0.6m	FLAG ON EDGE RETAINED HEIGHT
1.45m	RETAINING WALL RETAINED HEIGHT
▬	FLAG ON EDGE
▬	RETAINING WALL
■ ■ ■	ASSUMED LIMIT OF WORKS
■ ■ ■	SITE BOUNDARY

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SAWLEY ROAD
JAMES STREET
T9:C2
T10:B2
T11:B2
T12:B2
T13:B2
T15:B2
T22:B2
C02
FFL:60.225m
58.249m
58.458m
58.459m
58.384m
58.342m
58.430m
58.865m
59.133m
59.419m
59.880m
59.975m
59.653m
60.333m
60.554m
60.497m
60.446m
60.381m
ev
1:80
-1:115
-1:100
2 0 2 4 6 8 10
SCALE 1:250
m

No	DATE	DRAWN	REV'D ENG.	AMENDMENT
C02	03.11.23	JF	AM	CONSTRUCTION ISSUE
C01	23.10.23	JF	AM	CONSTRUCTION ISSUE

No	DATE	DRAWN	REV'D ENG.	AMENDMENT
P05	12.10.23	JF	PB	STAGE 4 ISSUE
P04	10.10.23	JF	PB	STAGE 4 ISSUE
P03	26.07.23	JF	PR	TREE RPA AMENDED AND CAR PARK LAYOUT AMENDED
P02	30.06.23	JF	PB	STAGE 4 ISSUE
P01	16.02.23	JF	PB	PRELIMINARY ISSUE

STATUS
A

PURPOSE OF ISSUE
CONSTRUCTION

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RIDGE

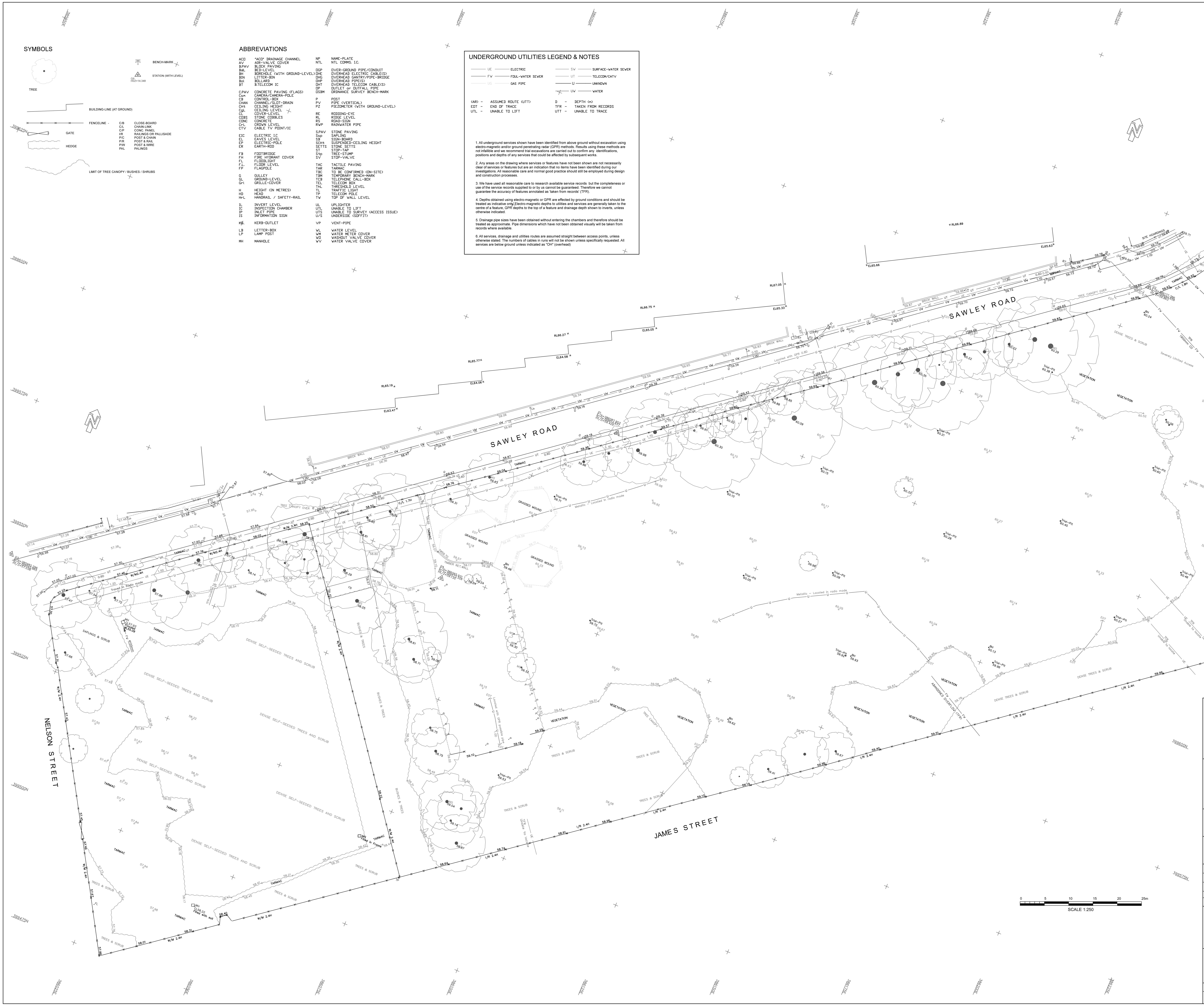
CLIENT ISG

PROJECT
VARLEY STREET,
SEN SCHOOL

DRAFTER JF
ENGINEER PB

PROPOSED FINISHED LEVELS

SCALE	SHEET	DRAWING No	REV
1:250	A1	VAR-RDG-XX-XX-DR-C-00600	C02


SYMBOLS
TREE
BENCH-MARK
G9
Ht/Z=14.348
STATION (WITH LEVEL)
BUILDING-LINE (AT GROUND)
FENCELINE -
C/B CLOSE-BOARD
C/L CHAIN-LINK
C/P CONC. PANEL
I/R RAILINGS OR PALLISADE
P/C POST & CHAIN
P/R POST & RAIL
P/W POST & WIRE
PAL PALINGS
GATE
HEDGE
LIMIT OF TREE CANOPY / BUSHES / SHRUBS
SAWLEY ROAD
SAWLEY ROAD
VICKERS STREET
NELSON STREET
JAMES STREET
TARMAC
GRASS
GRASSED MOUND
VEGETATION
DENSE TREES & SCRUB
DENSE SELF-SEEDED TREES AND SCRUB
SAPLINGS & SCRUB
TREES & SCRUB
BUSHES & TREES
TREE CANOPY OVER
BRICK WALL
SITE HOARDINGS
Trial-Pit
Metallic - Located in radio mode
Located with GPR 0.80
386000E
386025E
386050E
399625N
399600N
399575N
386250E
0
5
10
15
20
25m
SCALE 1:250

ABBREVIATIONS

ACO	"ACO" DRAINAGE CHANNEL
AV	AIR-VALVE COVER
B.PAV	BLOCK PAVING
BdL	BED-LEVEL
BH	BOREHOLE (WITH GROUND-LEVEL)
BIN	LITTER-BIN
Bol	BOLLARD
BT	B.TELECOM IC
C.PAV	CONCRETE PAVING (FLAGS)
Cam	CAMERA/CAMERA-POLE
CB	CONTROL-BOX
CHAN	CHANNEL/SLOT-DRAIN
CHt	CEILING HEIGHT
CgL	CEILING LEVEL
CL	COVER-LEVEL
COBS	STONE COBBLES
CONC	CONCRETE
CrL	CROWN LEVEL
CTV	CABLE TV POINT/IC
EIC	ELECTRIC I.C
EL	EAVES LEVEL
EP	ELECTRIC-POLE
ER	EARTH-ROD
FB	FOOTBRIDGE
FH	FIRE HYDRANT COVER
FL	FLOODLIGHT
F.L.	FLOOR LEVEL
FP	FLAGPOLE
G	GULLEY
GL	GROUND-LEVEL
Grl	GRILLE-COVER
H	HEIGHT (IN METRES)
HD	HEAD
HrL	HANDRAIL / SAFETY-RAIL
IL	INVERT LEVEL
IC	INSPECTION CHAMBER
IP	INLET PIPE
IS	INFORMATION SIGN
KO	KERB-OUTLET
LB	LETTER-BOX
LP	LAMP POST
MH	MANHOLE
NP	NAME-PLATE
NTL	NTL COMMS. I.C.
OGP	OVER-GROUND PIPE/CONDUIT
OHE	OVERHEAD ELECTRIC CABLE(S)
OHG	OVERHEAD GANTRY/PIPE-BRIDGE
OHP	OVERHEAD PIPE(S)
OHT	OVERHEAD TELECOM CABLE(S)
OP	OUTLET or OUTFALL PIPE
OSBM	ORDNANCE SURVEY BENCH-MARK
P	POST
PV	PIPE (VERTICAL)
PZ	PIEZOMETER (WITH GROUND-LEVEL)
RE	RODDING-EYE
RL	RIDGE LEVEL
RS	ROAD-SIGN
RWP	RAINWATER PIPE
S.PAV	STONE PAVING
Sap	SAPLING
SB	SIGN-BOARD
SCHt	SUSPENDED-CEILING HEIGHT
SETTS	STONE SETTS
ST	STOP-TAP
Stp	TREE-STUMP
SV	STOP-VALVE
TAC	TACTILE PAVING
TAR	TARMAC
TBC	TO BE CONFIRMED (ON-SITE)
TBM	TEMPORARY BENCH-MARK
TCB	TELEPHONE CALL-BOX
TEL	TELECOM BOX
ThL	THRESHOLD LEVEL
TL	TRAFFIC LIGHT
TP	TELECOM POLE
TW	TOP OF WALL LEVEL
UL	UPLIGHTER
UTL	UNABLE TO LIFT
UTS	UNABLE TO SURVEY (ACCESS ISSUE)
U/S	UNDERSIDE (SOFFIT)
VP	VENT-PIPE
WL	WATER LEVEL
WM	WATER METER COVER
WO	WASHOUT VALVE COVER
WV	WATER VALVE COVER

UNDERGROUND UTILITIES LEGEND & NOTES

UE	ELECTRIC	SW	SURFACE-WATER SEWER
FW	FOUL-WATER SEWER	UT	TELECOM/CATV
UG	GAS PIPE	U	UNKNOWN
		UW	WATER

(AR) - ASSUMED ROUTE (UTT)
EOT - END OF TRACE
UTL - UNABLE TO LIFT
D - DEPTH (m)
TFR - TAKEN FROM RECORDS
UTT - UNABLE TO TRACE

1. All underground services shown have been identified from above ground without excavation using electro-magnetic and/or ground penetrating radar (GPR) methods. Results using these methods are not infallible and we recommend trial excavations are carried out to confirm any identifications, positions and depths of any services that could be affected by subsequent works.

2. Any areas on the drawing where services or features have not been shown are not necessarily clear of services or features but are an indication that no items have been identified during our investigations. All reasonable care and normal good practice should still be employed during design and construction processes.

3. We have used all reasonable care to research available service records but the completeness or use of the service records supplied to or by us cannot be guaranteed. Therefore we cannot guarantee the accuracy of features annotated as 'taken from records' (TFR).

4. Depths obtained using electro-magnetic or GPR are effected by ground conditions and should be treated as indicative only. Electro-magnetic depths to utilities and services are generally taken to the centre of a feature, GPR depths to the top of a feature and drainage depth shown to inverts, unless otherwise indicated.

5. Drainage pipe sizes have been obtained without entering the chambers and therefore should be treated as approximate. Pipe dimensions which have not been obtained visually will be taken from records where available.

6. All services, drainage and utilities routes are assumed straight between access points, unless otherwise stated. The numbers of cables in runs will not be shown unless specifically requested. All services are below ground unless indicated as "OH" (overhead)

NOTES

1. This survey has been presented at the survey scale indicated below with its accuracy commensurate with that scale.
2. All heights and levels in metres (u.o.n.)
3. All levels are at ground u.o.n.

CONTROL STATIONS

REF	EASTING	NORTHING	LEVEL	TYPE
G1	386087.903	399614.837	59.429	NAIL
G2	386177.386	399684.658	59.863	NAIL
G3	385982.296	399543.865	57.038	NAIL
G4	386065.931	399573.328	59.130	NAIL

SURVEY GRID

ORDNANCE SURVEY OSGB36 NATIONAL GRID AT STATION G1.
GPS OBSERVATIONS ON ETRS89 TRANSFORMED USING OSTN02.
SURVEY THEN TRANSFORMED TO A SCALE FACTOR OF 1.000000 FROM STATION G1

LEVEL DATUM

ORDNANCE SURVEY DATUM NEWLYN (ODN) BY GPS OBSERVATIONS AT STATION G1
TRANSFORMED FROM ETRS89 USING OSGM02 GEOID

REV.	DESCRIPTION	BY	CHK	DATE
02	SURVEY AREA EXTENDED TO SOUTH-WEST	GES	MW	07/03/22
01	RESULTS OF UNDERGROUND UTILITIES SURVEY ADDED	GES	MW	27/01/22
0	TOPOGRAPHICAL SURVEY	GES	TC	24/01/22

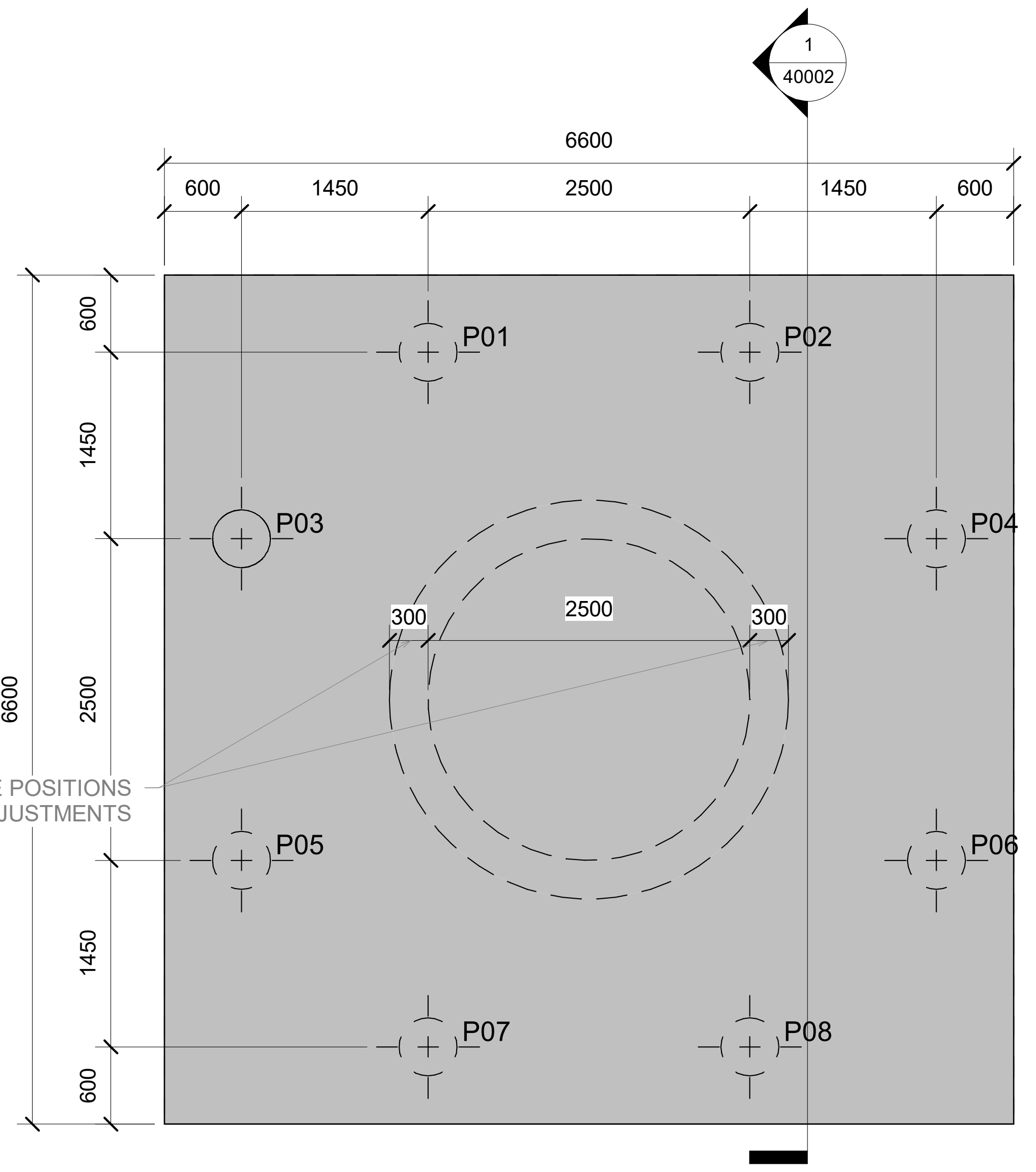
DRAWN GES
CHECKED TC
DATE 07 MARCH 2022

TITLE

TOPOGRAPHICAL & UTILITIES SURVEY AT
SAWLEY ROAD (EAST OF VARLEY STREET)
MILES PLATTING, MANCHESTER M40 8EE

enviro|solution
AMERICA HOUSE
RUMFORD COURT
RUMFORD PLACE
LIVERPOOL L3 9DD
TEL 0151-291-6451
www.envirosolution.co.uk

CAD FILE 01088_Rev02
SCALE 1 : 250
SHT. SIZE A0
DRAWING No 01088
REVISION 02



TBC BY SITE. PILE POSITIONS MAY REQUIRE ADJUSTMENTS

SHAFT 1 PROPOSED MINESHAFT CAPPING PLAN - (TCA REF: 386339-01)

1 : 50

MINE SHAFT 1 TCA REF: 386339-01

EXISTING TCA DETAILS:

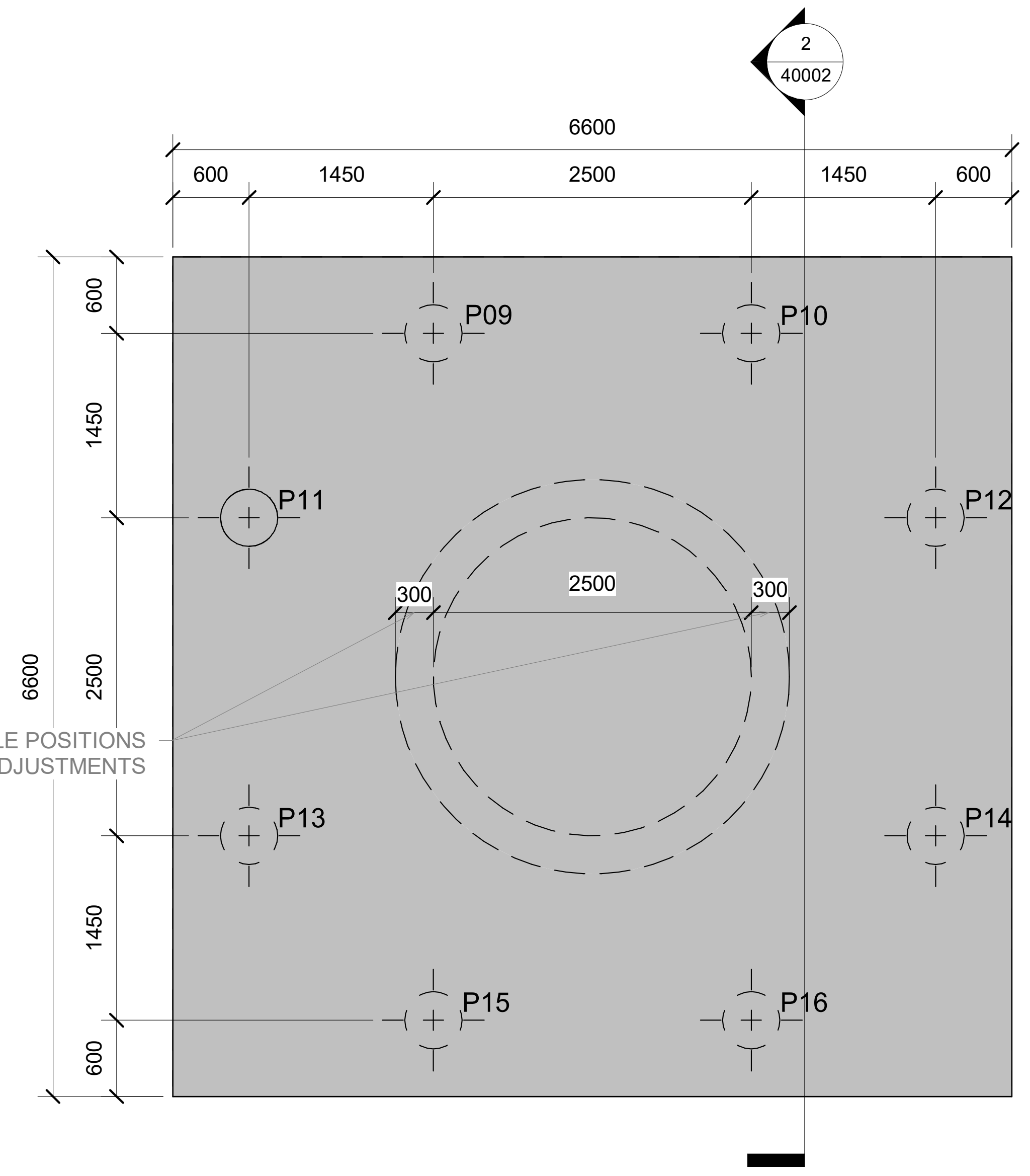
GROUND LEVEL	= 58.400m
DEPTH TO SHAFT TOP	= 5.5m BGL
SHAFT DIA	= 2.5m
SHAFT WALL THICKNESS	= 300mm (ASSUMED)
COORDINATES	= E: 386048.6 N: 399533.6
SHAFT DEPTH	= UNKNOWN
SHAFT TREATED	= NO

NEW CAPPING DETAILS:

CAPPING SIZE	= 6.6x6.6m
CAPPING THICKNESS	= 0.45m
CLEAR SPAN	= 5.4m (2.15 Dia)
CONCRETE GRADE	= C40/50
REINFORCEMENT	= H40 @ 200c/c (T) BOTH WAYS H40 @ 200c/c (B) BOTH WAYS H25 U-BARS AT 200c/c TO PERIMETER
CONCRETE COVER	= 75mm
DESIGN LIFE	= 100 YEARS
SULPHATE/ACEC	= DS-1 / AC-1

SHAFT TREATEMENT DETAILS:

METHOD	= BORE & HIGH PRESSURE PUMPED GROUT OR AGGREGATE CONCRETE WHERE LARGE VOIDS ENCOUNTERED
MIXTURE	= 10:1 FLY ASH/OFC OR PFA/OPC
TREATMENT DEPTH	= 74m (DEPTH OF SHAFT)



TBC BY SITE. PILE POSITIONS MAY REQUIRE ADJUSTMENTS

MINE SHAFT 2 TCA REF: 386389-016

EXISTING TCA DETAILS:

GROUND LEVEL	= 59.540m
DEPTH TO SHAFT TOP	= 2.6m BGL
SHAFT DIA	= 2.5m
SHAFT WALL THICKNESS	= 300mm (ASSUMED)
COORDINATES	= E: 386108.2 N: 399546.0
SHAFT DEPTH	= 74m
SHAFT TREATED	= YES

NEW CAPPING DETAILS:

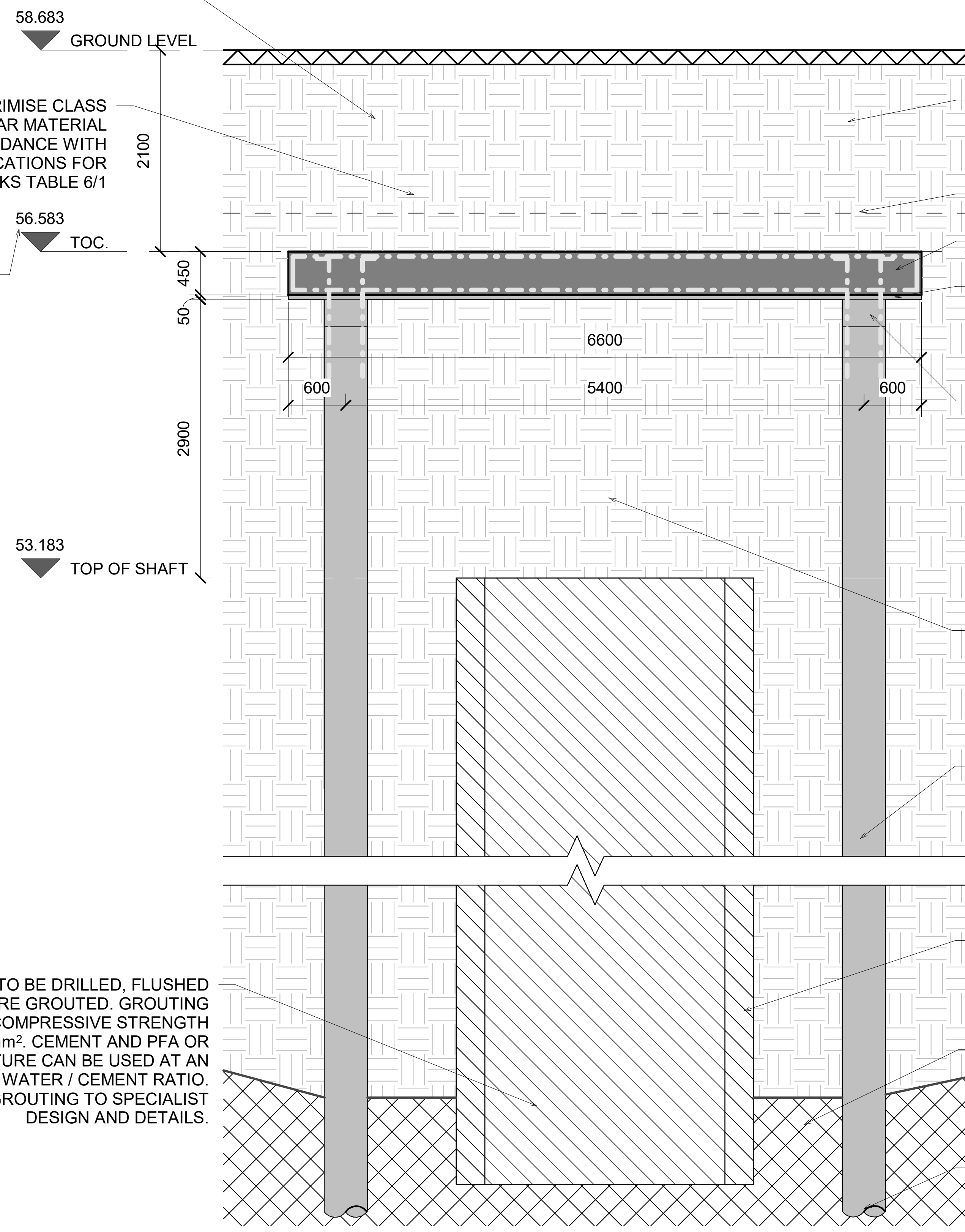
CAPPING SIZE	= 6.6x6.6m
CAPPING THICKNESS	= 0.45m
CLEAR SPAN	= 5.4m (2.15 Dia)
CONCRETE GRADE	= C40/50
REINFORCEMENT	= H40 @ 200c/c (T) BOTH WAYS H40 @ 200c/c (B) BOTH WAYS H25 U-BARS AT 200c/c TO PERIMETER
CONCRETE COVER	= 75mm
DESIGN LIFE	= 100 YEARS
SULPHATE/ACEC	= DS-1 / AC-1

SHAFT TREATEMENT DETAILS:

METHOD	= BORE & HIGH PRESSURE PUMPED GROUT OR AGGREGATE CONCRETE WHERE LARGE VOIDS ENCOUNTERED
MIXTURE	= 10:1 FLY ASH/OFC OR PFA/OPC
TREATMENT DEPTH	= 74m (DEPTH OF SHAFT)

SHAFT 2 PROPOSED MINESHAFT CAPPING PLAN - (TCA REF: 386339-016)

1 : 50



BUILDUP DEPTH OVER SHAFT CAPPING. DESIGN OF CAPPING ASSUMES A BULK DENSITY OF 20 kN/m³

FILL MATERIAL TO COMPRIMISE CLASS 1A WELL GRADED GRANULAR MATERIAL COMPACTED IN ACCORDANCE WITH SERIES 600 SPECIFICATIONS FOR HIGHWAY WORKS TABLE 6/1

TBC ON SITE

FOR EXTERNAL BUILDUPS REFER TO RIDGE CIVILS DRAWINGS

INDICATIVE PILING MAT LEVEL

450 THICK SHAFT CAP

50mm CONCRETE BINDING + 50mm COMPRESSIBLE SEPERATION LAYER BETWEEN CAP AND SHAFT LINING. FOSROC FIBREBOARD OR SIMILAR APPROVED

PILE ANCHORS TO HAVE ANCON MBT HEADED ANCHORS TO PROVIDE ANCHORAGE INTO CAPPING SLAB (TYP)

FILL MATERIAL TO COMPRISE CLASS 1A WELL GRADED GRANULAR MATERIAL COMPACTED IN ACCORDANCE WITH SERIES 600 SPECIFICATIONS FOR HIGHWAY WORKS TABLE 6/1. CAREFUL COMPACTION WITH HAND OR EXCAVATOR CONTROLLED PLATE COMPACTOR

450mm SFA END BEARING PILES TO SPECIALIST PILING CONTRACTOR DESIGN & DETAILS. PILES TO BE SOCKETED INTO BEDROCK. LENGTH TBC BY PILING CONTRACTOR

300mm THICK MINE SHAFT LINING ASSUMED TBC ON SITE

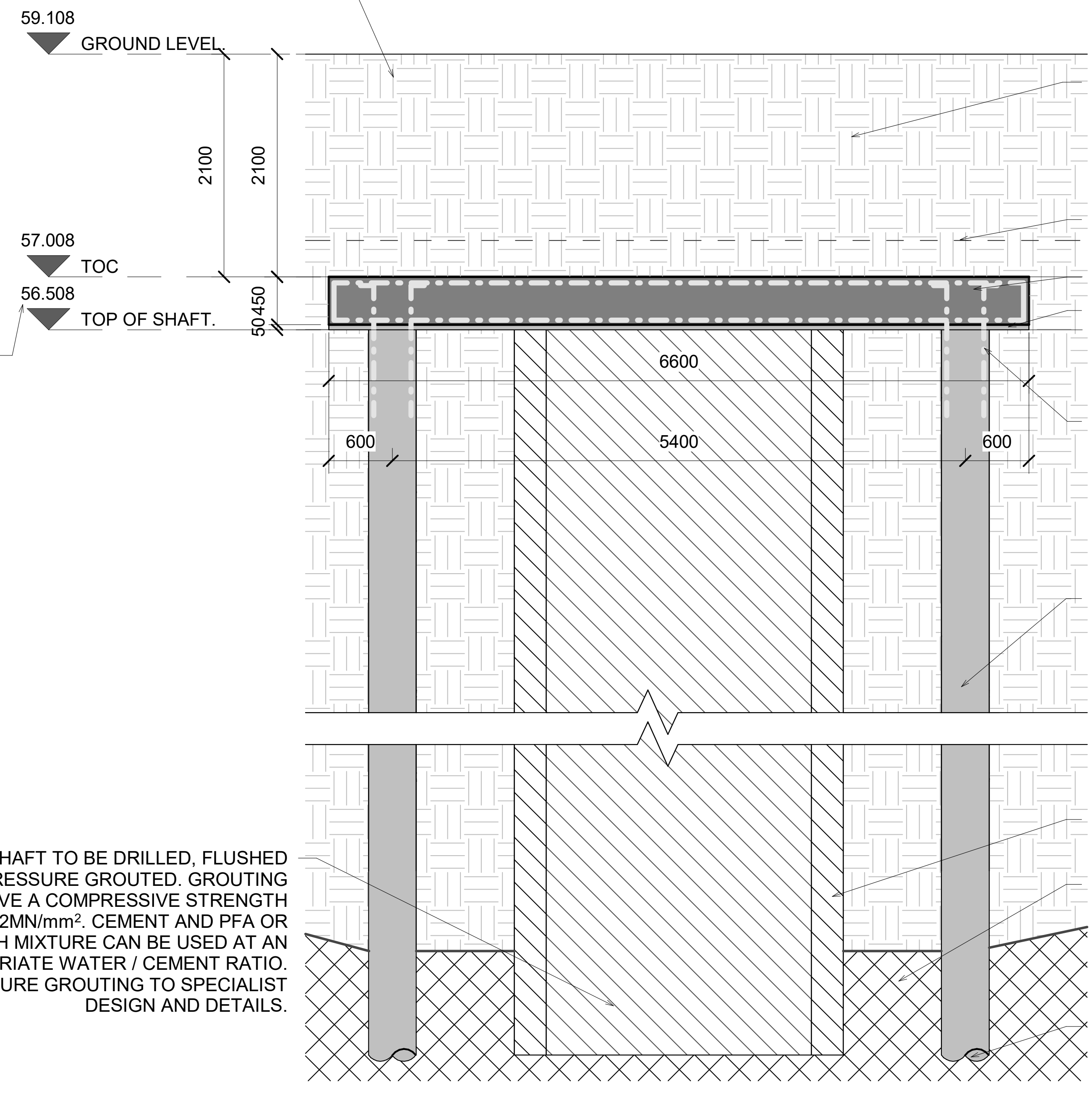
MINE SHAFT TO BE DRILLED, FLUSHED AND PRESSURE GROUTED. GROUTING IS TO HAVE A COMPRESSIVE STRENGTH OF 1-2MN/mm². CEMENT AND PFA OR FLY ASH MIXTURE CAN BE USED AT AN APPROPRIATE WATER / CEMENT RATIO. PRESSURE GROUTING TO SPECIALIST DESIGN AND DETAILS.

DENOTES INDICATIVE ROCK FORMATION. PILING CONTRACTOR TO REVIEW THE GEO-ENVIROMENTAL REPORTS. MUDSTONE / BED ROCK EXPECTED TO BE APPROX 25-28m BGL

PILES EXTENDING DOWN TO MUDSTONE/BEDROCK AT DEPTH. EXPECTED TO BE APPROZ 25-28m BGL.

SHAFT 1 PROPOSED MINESHAFT ELEVATION (TCA REF: 386339-01)

1 : 50



BUILDUP DEPTH OVER SHAFT CAPPING. DESIGN OF CAPPING ASSUMES A BULK DENSITY OF 20 kN/m³

TBC ON SITE

FILL MATERIAL TO COMPRIMISE CLASS 1A WELL GRADED GRANULAR MATERIAL COMPACTED IN ACCORDANCE WITH SERIES 600 SPECIFICATIONS FOR HIGHWAY WORKS TABLE 6/1

INDICATIVE PILING MAT LEVEL

450 THICK SHAFT CAP

50mm CONCRETE BINDING + 50mm COMPRESSIBLE SEPERATION LAYER BETWEEN CAP AND SHAFT LINING. FOSROC FIBREBOARD OR SIMILAR APPROVED

PILE ANCHORS TO HAVE ANCON MBT HEADED ANCHORS TO PROVIDE ANCHORAGE INTO CAPPING SLAB (TYP)

450mm SFA END BEARING PILES TO SPECIALIST PILING CONTRACTOR DESIGN & DETAILS. PILES TO BE SOCKETED INTO BEDROCK. LENGTH TBC BY PILING CONTRACTOR

300mm THICK MINE SHAFT LINING ASSUMED. TBC ON SITE

MINE SHAFT TO BE DRILLED, FLUSHED AND PRESSURE GROUTED. GROUTING IS TO HAVE A COMPRESSIVE STRENGTH OF 1-2MN/mm². CEMENT AND PFA OR FLY ASH MIXTURE CAN BE USED AT AN APPROPRIATE WATER / CEMENT RATIO. PRESSURE GROUTING TO SPECIALIST DESIGN AND DETAILS.

DENOTES INDICATIVE ROCK FORMATION. PILING CONTRACTOR TO REVIEW THE GEO-ENVIROMENTAL REPORTS. MUDSTONE / BED ROCK EXPECTED TO BE APPROX 25-28m BGL

PILES EXTENDING DOWN TO MUDSTONE/BEDROCK AT DEPTH. EXPECTED TO BE APPROX 25-28m BGL.

FINAL PILE CUT OFF LEVEL TBC. AWAITING SITE CONFIRMATION OF TOP OF SHAFT LEVEL

SHAFT 2 PROPOSED MINESHAFT CAPPING ELEVATION (TCA REF: 386339-016)

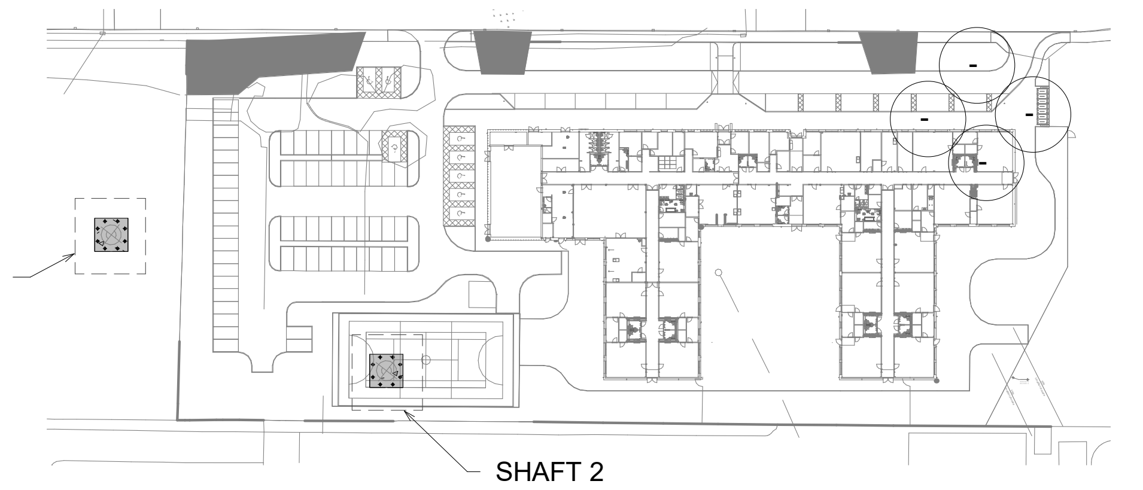
1 : 50

NOTES

1. THIS DRAWING IS TO BE READ IN CONJUNCTION WITH ALL OTHER RELEVENT ARCHITECTURAL, ENGINEERING DRAWINGS AND SPECIFICATIONS.
2. DO NOT SCALE FROM THIS DRAWING. ANY AMBIGUITIES OR ERRORS ON DRAWINGS SHALL BE BROUGHT TO THE ENGINERS ATTENTION IMMEDIATELY. ALL DIMENSIONS TO BE CHECKED/VERIFIED ON SITE.
3. ALL LEVELS IN METERS, ALL DIMENSIONS IN MILLIMIETERS UNLESS NOTED OTHERWISE.
4. THIS DRAWING IS TO BE READ IN CONJUNCTION WITH THE MINE SHAFT CAPPING PHILOSOPHY AND CALCULATIONS. CCL REF: VAR-CCL-XX-XX-RP-S-40001.
5. FOR GROUND CONDITIONS AND GEO-ENVIRONMENTAL ASSESSMENT REFER TI TGE FOLLOWING REPORTS
   - a. ENVIRO SOLUTION PHASE 1 ENVIRONMENTAL SITE ASSESSMENT REPORT (REF: CL101 DATED 02.03.22).
   - b. ENVIRO SOLUTION PHASE 2 GEO-ENVIRONMENTAL SITE ASSESSMENT REPORT (REF: CL102 V1 DATED 02.03.22).
6. FOR COAL MINING RISK AND MINE
   - a. ENVIRO SOLUTION COAL MINING RISK ASSESSMENT REPORT (REF: CL101b DATED 15.03.22).
   - b. LK GROUP SHALLOW MINING SITE INVESTIGATION WORKS REPORT (REF: LKC 22 1670 DATED JUNE 2023).

PILING NOTES

1. PILES ARE TO BE DESIGNED BY THE SPECIALIST SUBCONTRACTOR. DESIGN IS TO BE BASED ON THE UNFACTORED VERTICAL LOADS AND SHEARS SHOWN IN THE PILE SCHEDULE INCLUDED ON THIS DRAWING.
2. PILE TYPE AND DIAMETER TO BE CONFIRMED BY THE SPECIALIST PILING CONTRACTOR. THE PILE LAYOUT HAS BEEN DEVELOPED ON THE BASIS OF 450MM DIAMETER CFA SLEEVED PILES. HOWEVER, PILE SIZE, TYPE AND LENGTHS ARE SUBJECT TO DESIGN CONFIRMATION BY THE PILING CONTRACTOR TO THE PERFORMANCE SPECIFICATION/REQUIREMENT BY CLANCY.
3. PILING SHALL COMPLY WITH THE CURRENT EDITION OF 'SPECIFICATION FOR PILING AND EMBEDDED RETAINING WALLS' (SPERW).
4. THE FOLLOWING SITE INVESTIGATIONS ARE PROVIDED FOR DESIGN: PHASE 2 GEO-ENVIRONMENTAL SITE ASSESSMENT REPORT BY ENVIRO SOLUTION (REF CL02 V1 02/03/22).
5. PERMITTED PILE SETTLEMENT AT DVL = 10mm.
6. PILES SHALL BE DESIGNED IN ACCORDANCE WITH BS EN 1997-1& BS EN 1992:1.
7. DESIGN FACTOR OF SAFETY IN ACCORDANCE WITH BS EN 1997:1 AND THE U.K NATIONAL ANNEX.
8. FOR BURIED CONCRETE THE SULPHATE AND PH TESTING REQUIRE DESIGN SULPHATE CLASS OF DS-1 AND AN ACEC CLASSIFICATION OF AC-1 BASED ON SAMPLING CARRIED OUT OVER PART OF THE SITE TO DATE.
9. THE SPECIALIST CONTRACTOR SHALL BE RESPONSIBLE FOR SPECIFYING STARTER BARS. PILES TO BE DESIGNED WITH A PINNED HEAD CONNECTION USING A MINIMUM SINGLE 16mm DIAMETER BAR TO BE PROVIDED FROM THE HEAD OF EACH PILE. THE SPECIALIST CONTRACTOR SHALL ALSO SPECIFY THE TENSION BAR IN ANY PILES REQUIRING TENSILE CAPACITY.
10. SUBMISSION OF INFORMATION: AS REQUIRED BY SPERW, TABLE B1.1 AND ELSEWHERE, AS APPROPRIATE FOR THE PILE TYPE, MATERIALS AND TESTS SPECIFIED.
11. THE PILING CONTRACTOR SHALL DEMONSTRATE THE ADEQUACY OF THE PILES BY CALCULATION AND TESTING TO THE SATISFACTION OF BOTH THE ENGINEER AND BUILDING CONTROL.
12. WHERE PILE DESIGN IS TO BE JUSTIFIED BY TESTING, THE PILING CONTRACTOR SHALL SUBMIT THEIR TESTING PROPOSAL FOR ACCEPTANCE. A MINIMUM OF 1 WORKING TEST PILE TO BE UNDERTAKEN.
13. UNLESS AGREED OTHERWISE, ALL PILES SHALL BE INTEGRITY TESTED USING AN APPROVED METHOD. PILES SHALL BE PREPARED TO SUIT THE TEST METHOD. THE RESULTS OF THE INTEGRITY TESTING AND SUMMARY STATEMENT CONFIRMING ADEQUACY OF THE PILING SHALL BE PROVIDED TO THE ENGINEER WITHIN 7 DAYS OF TESTING PRIOR TO UNDERTAKING THE CAPPING WORKS.
14. CONCRETE SHALL BE IN ACCORDANCE WITH BS EN 1992 AND SPERW, SECTION B19AND IN ACCORDANCE WITH THE CONCRETE CLASSIFICATION REQUIREMENTS FROM THE SITE INVESTIGATIONS.
15. COMPRESSIVE STRENGTH TESTING OF CONCRETE REQUIRED AS SPERW, CLAUSE B19.8.
16. STEEL REINFORCEMENT TO BE IN ACCORDANCE WITH BS 4449, RIBBED BAR, GRADE B500B, SUPPLIED BY A COMPANY HOLDING A VALID CERTIFICATE OF APPROVAL ISSUED UNDER A PRODUCT CERTIFICATION SCHEME OPERATED BY A THIRD PARTY CERTIFICATION BODY WITH APPROPRIATE CATEGORY 2 ACCREDITATION FROM THE UNITED KINGDOM ACCREDITATION SERVICE (UKAS) SUCH AS CARES.
17. REINFORCEMENT THAT IS MORE THAN 50mm ABOVE CUT-OFF LEVEL SHALL BE DEBONDED AND THE DEBONDING AGENT CLEANED OFF WHEN PILE IS TRIMMED.
18. COVER SHALL MEET THE REQUIREMENTS OF BS 8500 FOR A DESIGN WORKING LIFE OF 120 YEARS AND THE GROUND CONDITIONS IN THE SI REPORT. THE CONTRACTOR SHALL ENSURE THAT THE COVER IS MAINTAINED USING A SUITABLE INSTALLATION METHOD.
19. THE CONTRACTOR IS RESPONSIBLE FOR LOCATING ALL SERVICES AND INFORMING THE MAIN CONTRACTOR OF ANY CLASHES WITH THE PILING WORKS.
20. THE CONTRACTOR IS TO ENSURE ACCESS TO THE SITE IS ADEQUATE FOR PLANT AND MATERIALS. METHOD OF PILE TESTING IS TO BE AGREED WITH THE ENGINEER. ALL PILES TO BE INTEGRITY TESTED AND AT LEAST 1 PRELIMINARY PILE TEST AND AT LEAST 1 WORKING PILE TEST TO BE UNDERTAKEN. THE PILING SHALL BE GUARANTEED FOR A MINIMUM PERIOD OF 12 YEARS FROM COMPLETION. THIS SHALL BE AN INSURANCE BACKED GUARANTEE, ADMINISTERED BY AN INDEPENDENT INSURANCE PROTECTION COMPANY. PROVIDE CERTIFICATES/ GUARANTEES AT COMPLETION OF PILING WORKS



KEY PLAN

1 : 1500

Structural Piling Schedule

REF	PILE DIA (mm)	Gk (kN)	Qk (kN)	Wk (+/- kN)	EHF GK (+/- kN)	EHF QK (+/- kN)	SHEAR (W)	AD (kN)	PILE CUT-OFF LEVEL (m)
P01	450	575	575	-	-	-	15	-	56.208
P02	450	575	575	-	-	-	15	-	56.208
P03	450	575	575	-	-	-	15	-	56.208
P04	450	575	575	-	-	-	15	-	56.208
P05	450	575	575	-	-	-	15	-	56.208
P06	450	575	575	-	-	-	15	-	56.208
P07	450	575	575	-	-	-	15	-	56.208
P08	450	575	575	-	-	-	15	-	56.208
P09	450	575	575	-	-	-	15	-	56.633
P10	450	575	575	-	-	-	15	-	56.633
P11	450	575	575	-	-	-	15	-	56.633
P12	450	575	575	-	-	-	15	-	56.633
P13	450	575	575	-	-	-	15	-	56.633
P14	450	575	575	-	-	-	15	-	56.633
P15	450	575	575	-	-	-	15	-	56.633
P16	450	575	575	-	-	-	15	-	56.633

SAFETY HEALTH AND ENVIRONMENTAL INFORMATION BOX

Construction Risks	Maintenance/Cleaning Risks	Demolition/Adaptation Risks
1. THE EXISTING MINE SHAFTS MAY BE IN POOR CONDITION. NO PLANT IS TO TRACK DIRECTLY OVER THE SHAFT DURING THE CONSTRUCTION WORKS. PILING RIG IS TO INSTALL PILES SO THE MAST IS THE CLOSEST TO THE SHAFT. 2. DURING THE MINE SHAFT WORKS, THE MAIN CONTRACTOR IS TO HAVE REVIEWED THE RECOMMENDATIONS OF THE COAL MINING RISK ASSESSMENT AND HAVE GROUND MONITORING METHODS IN PLACE. 3. UNCHARTERED SERVICES MAY BE PRESENT LOCAL TO THE MINE SHAFTS. FOR EXISTING SERVICES, REFER TO VAR-RDG-XX-XX-DR-C-00600.	1. CHAMBERS ARE LOCATED CENTRALLY (APPROX) TO THE MINE SHAFT AND MINE SHAFT CAPPING TO FACILITATE ACCESS FOR INEPECTION OF THE MINE SHAFT VIA A 500X500 PENETRATION THROUGH THE CAPPING SLAB. THE CHAMBER COVER LOCAL TO THE FOOTBALL PITCH IS CONCEALED BELOW THE FINISHES (APPROX -400MM). CARE TO BE TAKEN WHEN LOCATING ON SITE.	1. DEMOLITION CONTRACTOR TO NOTE THAT IN ADDITION TO THE SHAFT CAPS SELFWEIGHT, THE MINE SHAFT CAPCS HAVE BEEN DESIGNED FOR A PERMANENT LOAD OF 55kN/m2 (SOIL & BUILDUPS) AND A VARIABLE LOAD OF 70kN/m2 (SURCHARGES) AT SERVICE LIMIT STATE. ALL LOADINGS MUST SIT WITHIN THESE BOUNDS.

IN ADDITION TO THE HAZARDS / RISKS NORMALLY ASSOCIATED WITH THE TYPE OF WORK DETAILED ON THIS DRAWING - THE CONTRACTOR IS TO TAKE NOTE OF THE ABOVE & ALSO THE HAZARDS IDENTIFIED IN THE RISK ASSESSMENT DOCUMENT.
IT IS ASSUMED THAT ALL WORKS DETAILED ON THIS DRAWING WILL BE PERFORMED BY A COMPETENT CONTRACTOR WORKING, WHERE APPROPRIATE, TO AN APPROVED METHOD STATEMENT.

REV	DATE	DESCRIPTION	BY	Chk	App
P02	30.11.23	INCORPORATING MAIN CONTRACTOR COMMENTS	ZB	CB	CB
P01	26.10.23	PRELIMINARY ISSUE	ZB	CB	CB

COPYRIGHT: THE COPYRIGHT OF THIS DRAWING IS VESTED IN CLANCY CONSULTING.
IT SHALL NOT BE USED WITHOUT PERMISSION BY ANYONE FOR ANY PURPOSE.
THIS DRAWING IS TO BE READ IN CONJUNCTION WITH ALL OTHER ENGINEER'S AND ARCHITECT'S DRAWINGS, DETAILS & SPECIFICATION.
DO NOT SCALE THIS DRAWING ELECTRONICALLY OR MANUALLY. WORK TO FIGURED DIMENSIONS ONLY. ALL DIMENSIONS ARE IN MILLIMETRES UNLESS STATED OTHERWISE.
THIS DRAWING WAS PRODUCED USING REVIT VERSION 2021. IT IS NOT TO BE EXPORTED AND USED IN AUTOCAD. ANY EXPORTED AUTOCAD DWG FORMAT PRODUCED FROM THIS SHEET IS TO BE USED FOR INFORMATION PURPOSES ONLY.

Client
ISG LTD

Project
VARLEY STREET
SEN SCHOOL

Office
MANCHESTER

Title
MINESHAFT CAPPING SLAB
& PILE GA

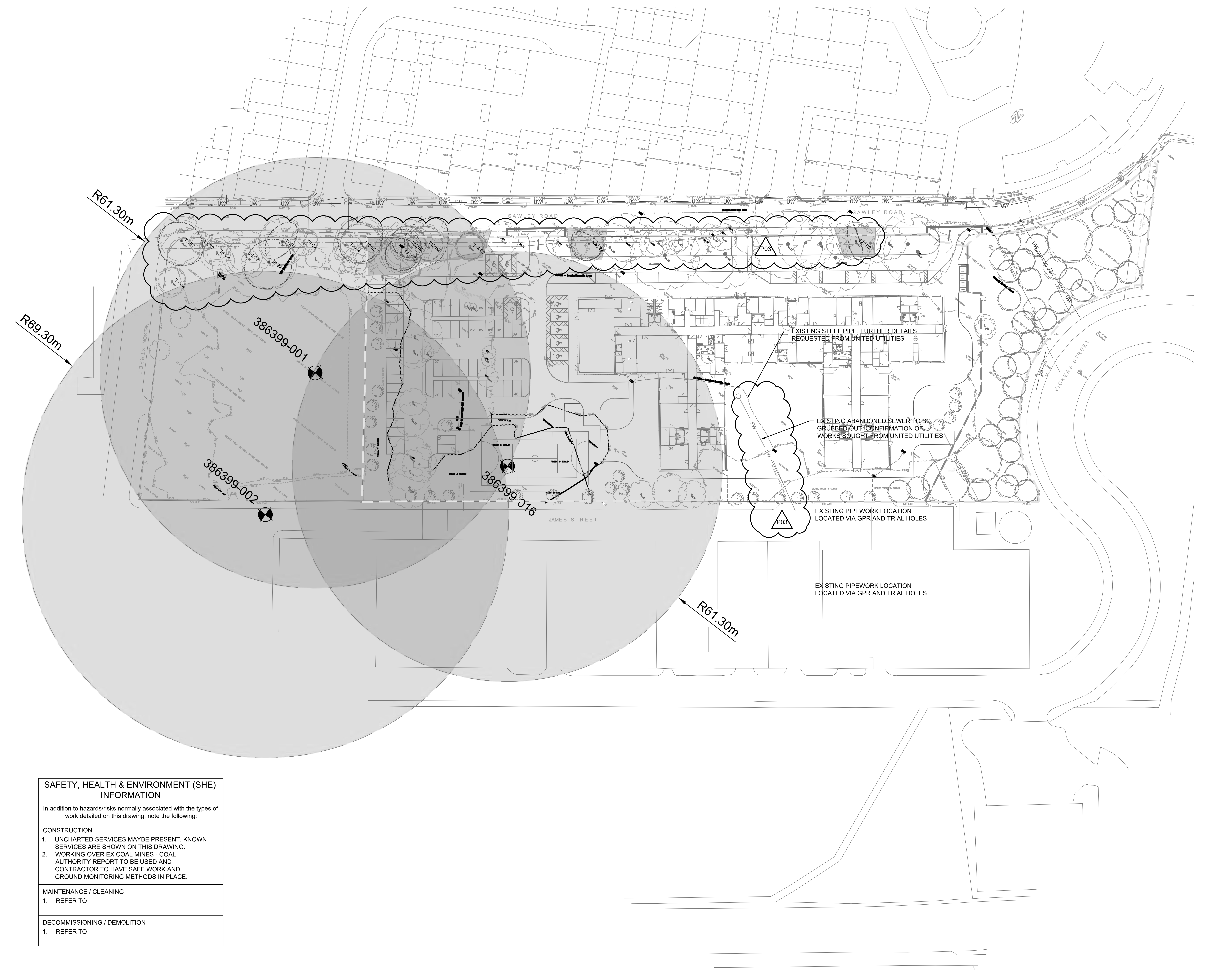
Scale @ A1
As indicated

Status
PRELIMINARY

clancy
consulting

CCL Project No. 1-21628
www.clancy.co.uk

Project Ref	Originator	Volume	Level
VAR	CCL	ZZ	00
File Type	**Discipline**	**Drawing No.**	**Revision**
DR	S	40002	P02



EXISTING STEEL PIPE, FURTHER DETAILS REQUESTED FROM UNITED UTILITIES

EXISTING ABANDONED SEWER TO BE GRUBBED OUT. CONFIRMATION OF WORKS SOUGHT FROM UNITED UTILITIES

EXISTING PIPEWORK LOCATION LOCATED VIA GPR AND TRIAL HOLES

EXISTING PIPEWORK LOCATION LOCATED VIA GPR AND TRIAL HOLES

SAFETY, HEALTH & ENVIRONMENT (SHE) INFORMATION

In addition to hazards/risks normally associated with the types of work detailed on this drawing, note the following:

CONSTRUCTION

1. UNCHARTED SERVICES MAYBE PRESENT. KNOWN SERVICES ARE SHOWN ON THIS DRAWING.
2. WORKING OVER EX COAL MINES - COAL AUTHORITY REPORT TO BE USED AND CONTRACTOR TO HAVE SAFE WORK AND GROUND MONITORING METHODS IN PLACE.

MAINTENANCE / CLEANING

1. REFER TO

DECOMMISSIONING / DEMOLITION

1. REFER TO

DISCLAIMER NOTES:

- THIS DOCUMENT IS COPYRIGHT OF THE ORIGINATOR AND MUST BE TREATED AS CONFIDENTIAL
- THIS DOCUMENT MUST NOT BE ALTERED, REPRODUCED OR DISTRIBUTED WITHOUT PRIOR WRITTEN CONSENT OF THE ORIGINATOR
- THIS DOCUMENT MUST NOT BE ALTERED - THE ORIGINATOR ACCEPTS NO RESPONSIBILITY FOR ANY DISCREPANCIES ARISING AS A RESULT OF THE ORIGINATORS INFORMATION BEING ALTERED BY OTHERS
- ANY DISCREPANCY MUST BE REPORTED TO THE ORIGINATOR
- DO NOT SCALE THIS DOCUMENT - USE FIGURED DIMENSIONS ONLY
- ALL DIMENSIONS MUST BE CHECKED ON SITE PRIOR TO COMMENCEMENT OF ANY RELATED WORKS
- THIS DOCUMENT MUST BE READ IN CONJUNCTION WITH ALL SUPPORTING DOCUMENTS PRODUCED BY THE ORIGINATOR AND OTHER PROJECT DISCIPLINES
- THE ORIGINATOR ACCEPTS NO RESPONSIBILITY FOR THE ACCURACY OF BACKGROUND INFORMATION PRODUCED BY THIRD PARTIES - THIS MUST BE TREATED AS INDICATIVE ONLY
- USERS OF THIS DOCUMENT ARE RESPONSIBLE FOR CHECKING WHICH REVISION IS CURRENT
- THE DOCUMENT STATUS "INFORMATION" OR "PRELIMINARY", INDICATES THAT THIS DRAWING IS FOR REFERENCE PURPOSES ONLY - THE ORIGINATOR WILL ACCEPT NO RESPONSIBILITY FOR THE COMPLETENESS OF INFORMATION UNDER THIS STATUS
- THE DOCUMENT STATUS "RECORD" OR "AS BUILT" HAS BEEN PREPARED, IN PART, BASED UPON INFORMATION FURNISHED BY OTHERS. WHILE THIS INFORMATION IS BELIEVED TO BE RELIABLE, THE ORIGINATOR ASSUMES NO RESPONSIBILITY FOR THE ACCURACY OF THIS "RECORD" OR "AS BUILT" DOCUMENT OR FOR ANY ERRORS OR OMISSIONS THAT MAY HAVE BEEN INCORPORATED INTO IT AS A RESULT OF INCORRECT INFORMATION PROVIDED TO THE ORIGINATOR. THOSE RELYING ON THE "RECORD" OR "AS BUILT" DOCUMENT ARE ADVISED TO OBTAIN INDEPENDENT VERIFICATION OF ITS ACCURACY

DRAWING NOTES:

CDM REGULATIONS 2015

SIGNIFICANT OR NON-OBVIOUS RISKS AND RISKS WHICH ARE DIFFICULT TO MANAGE ARE IDENTIFIED ON THIS DRAWING USING THE FOLLOWING SYMBOL IDENTIFIED TO THE RIGHT WITH BRIEF ACCOMPANYING TEXT. FOR FURTHER DETAILS OF THE RISKS IDENTIFIED BY DESIGNERS, REFERENCE SHOULD BE MADE TO CDM HAZARD REGISTER. ⚠

KEY:

— UW — UW —	WATER MAIN TAKEN FROM GPR SURVEY - CONFIRMED ON RECORDS
— CWS — CWS —	COMBINED SEWER TAKEN FROM RECORDS
— FW — FW —	FOUL SEWER TAKEN FROM GPR SURVEY - LOCATED VIA TRIAL PIT
— UT —	TELECOMS TAKEN FROM GPR SURVEY
— U —	UNIDENTIFIED TAKEN FROM GPR SURVEY
— UE —	ELECTRICAL TAKEN FROM GPR SURVEY
●	MINESHAFT STANDOFF ZONE
386399-016 ⊗	COAL AUTHORITY - DISUSED MINE SHAFT
T22	TREES UNDER RPA
▨	AREA OF TREES UNDER RPA FENCED BOUNDARY

5 0 5 10 15 20 25
SCALE 1:500 m

REV	DESCRIPTION	DATE	BY	CHKD
P03	TREE RPA UPDATED WITH FENCE BOUNDARY - EXISTING FWS LOCATED VIA TRIAL PIT	26.07.23	JF	PR
P02	MINESHAFT ZONE OF INFLUENCE UPDATED INLINE WITH SI REPORT	19.06.23	JF	PB
P01	FIRST ISSUE	08.02.23	JF	PB

ORIGINATOR:

RIDGE

5TH FLOOR
BELVEDERE HOUSE
12 BOOTH STREET
MANCHESTER, M2 4AW

TEL: 0161 833 9579
WWW.RIDGE.CO.UK

CLIENT:
ISG

IN ASSOCIATION WITH:

PROJECT:
VARLEY STREET SEN SCHOOL

TITLE:
SITE CONSTRAINTS PLAN

ENG/TECH:	CSE:	ICSE:	SCALE: 1:500 @ A1
JF	PR	PB	STATUS ISSUE: S2

STATUS: INFORMATION

UNLESS ISSUED FOR CONSTRUCTION - WORKS AT CLIENT/CONTRACTORS RISK

SUITABILITY: S2 - Issued for Information

PROJECT:	ORG:	ZONE:	LEVEL:	TYPE:	ROLE:	NUMBER:	REV:
VAR	RDG	XX	XX	DR	C	00201	P03

Appendix C Shallow Mining SI Works Report (LKC 22 1670 ¦ June 2023)

VARLEY AND NELSON STREET
MANCHESTER

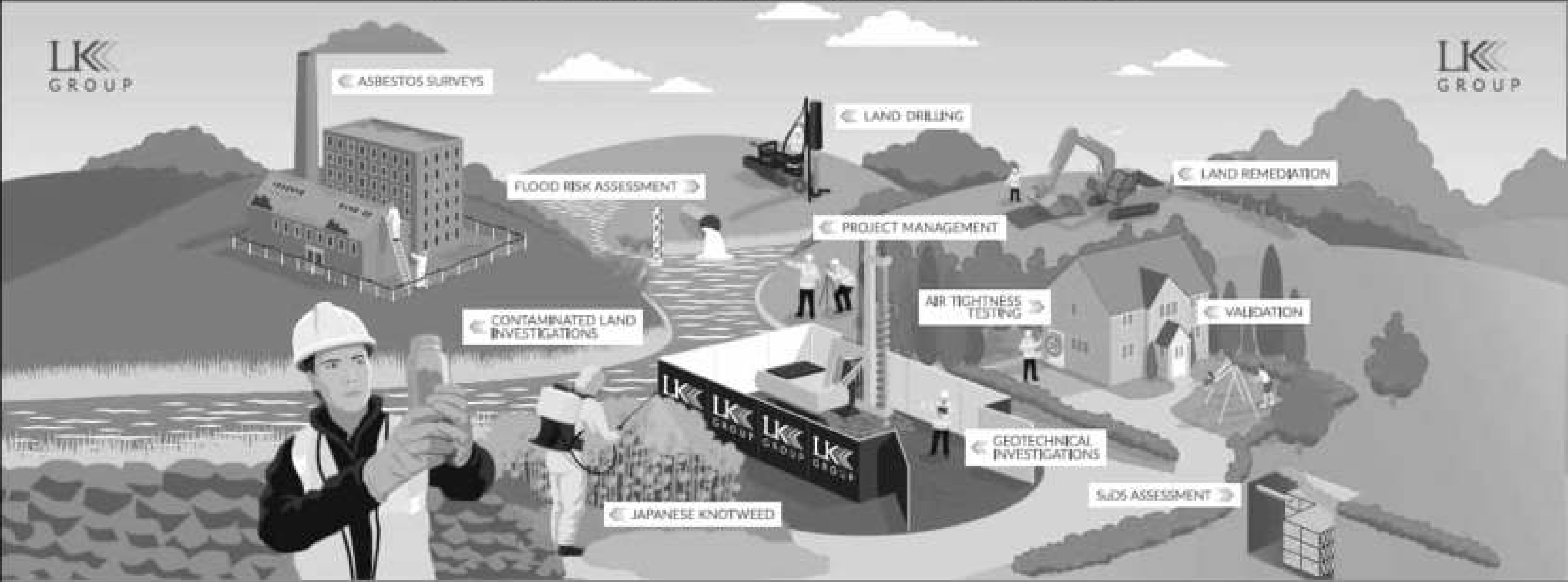
SHALLOW MINING
SITE INVESTIGATION WORKS

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

INCREASING LAND VALUE

LK GROUP

INCREASING LAND VALUE


LK GROUP
ASBESTOS SURVEYS
LAND DRILLING
FLOOD RISK ASSESSMENT
LAND REMEDIATION
PROJECT MANAGEMENT
AIR TIGHTNESS TESTING
VALIDATION
CONTAMINATED LAND INVESTIGATIONS
GEOTECHNICAL INVESTIGATIONS
SuDS ASSESSMENT
JAPANESE KNOTWEED
LK GROUP

LK GROUP

LK Consult

Document Verification

Site Address	Varley and Nelson 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
R1	20th June 2023	Update based on comments from R0	CB

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This report has been prepared by LK Consult (LKC) who have exercised such professional skill, care and diligence as may reasonably be expected of a properly qualified and competent consultant, experienced in preparing reports of a similar scope.

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This report is issued on the condition that LKC will not be held liable for any loss arising from ground conditions between sampling points (i.e. boreholes/trial pits/hand augers/surface samples) which have not been shown by the sampling points or related testing carried out during the investigation, nor for any loss arising from conditions below the maximum depth of the investigation. Opinions on such conditions, where given, are for general guidance only.

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PLANS AND FIGURES

Figure 1: Site Location and Boundary Plan
Figure 2: Proposed Development Plan
Figure 3: SI Location Plan
VAR-RDG-XX-XX-DR-C-00201_P03 – Site Constraints Plan

APPENDICES

Appendix A: Coal Authority Permit
Appendix B: Rotary Drilling Logs
Appendix C: Logs and Photographic Record – Mine Shaft Investigation Works

1 Introduction

1.1 Background

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

The following work relating to coal mining has previously been undertaken for the site:

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

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.

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.

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[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.

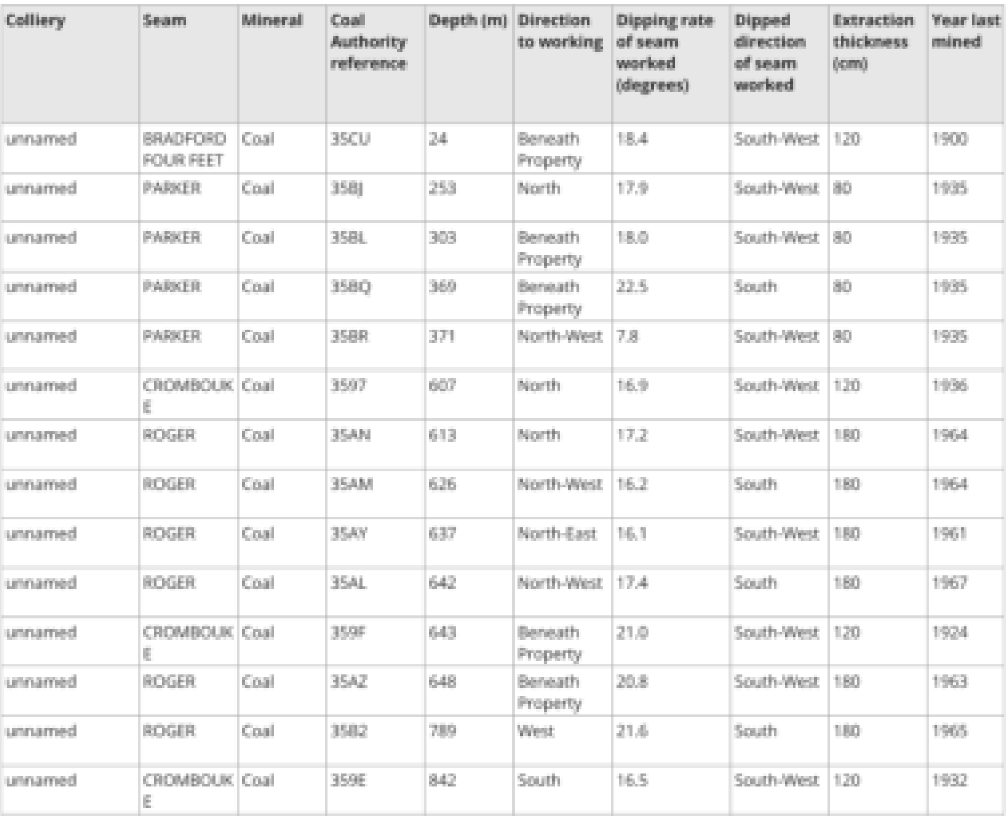
2.1.2 *Coal Mining*

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

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.

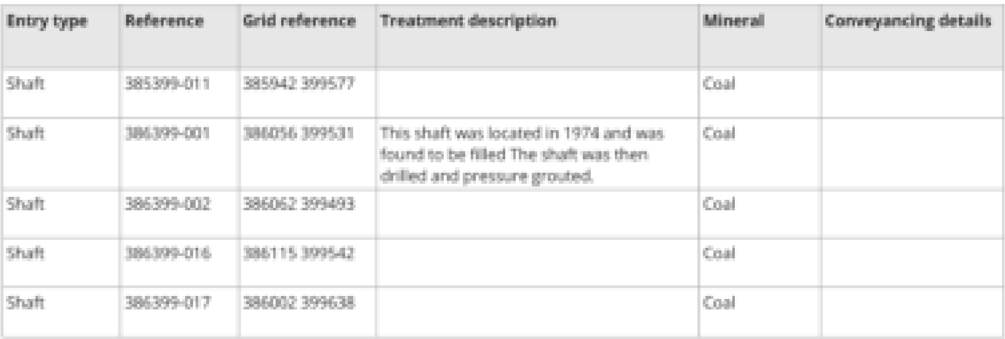
Plate 2-2 shows the past underground mining. This is defined by the Coal Authority as ‘*details of all recorded underground mining relative to the enquiry boundary. Only underground workings where the enquiry boundary is within 0.7 times the depth of the workings (zone of likely physical influence) allowing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

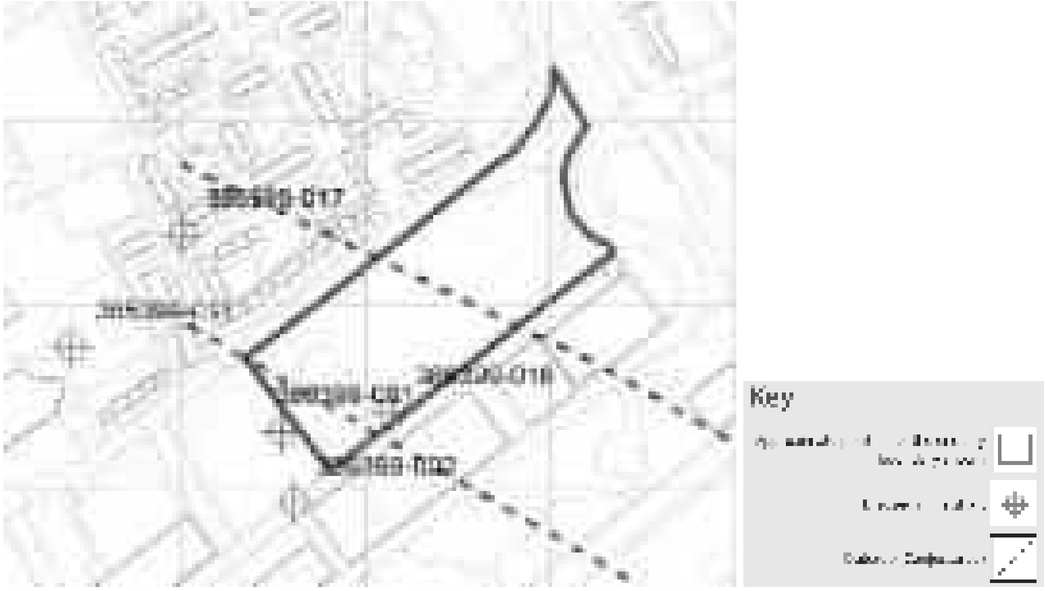


Plate 2-4: Extract from Summary of Findings Plan provided within the Coal Authority Consultants Report.

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
Departure: 8m

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

Ref: 386399-016
Treated: False
Assumed shaft diameter: 2.5
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.

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.

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. 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.

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 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.

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.

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). Evidence of workings at this depth were not identified during this investigation.

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).

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

- 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.

As bedrock is unlikely to dip at >20° and as multiple seams have not been recorded below the site 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 (i.e. grouting) is recommended and should be designed by an appropriately experienced and qualified contractor using the information provided. The scope should be agreed with the Coal Authority prior to undertaking the work.

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.

Desk study information suggests shaft reference 386399-016 has previously been treated. Evidence of treatment was observed during the investigation (grouting 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]):

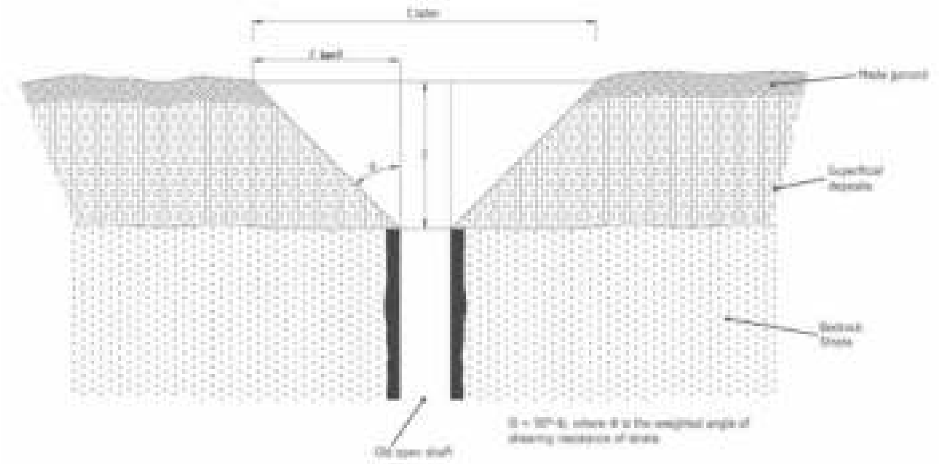

Plate 5-1: Extract from C758 showing exterior zone of collapse.

The onsite rotary boreholes record superficial to 25-28mbgl 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° taking into account the recorded ground conditions on site (using previous site investigation data) and guidance provided in BS8002-2015[5]. Assuming an average depth to bedrock of 28m 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	60.05	61.30
386399-002 (offsite)	60.05	69.30*
386399-016	60.05	61.30

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 shown on drawing VAR-RDG-XX-XX-DR-C-00201_P03.

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.

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[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 proof drilling of the onsite shafts (386399-001 and 386399-016) is undertaken to establish the depth of shaft and fill material. The shafts should be suitably filled, and a fully designed and structurally adequate cap installed on competent strata. The design of this treatment should be undertaken by a suitably qualified structural engineer.

Once onsite shafts 386399-001 and 386399-016 have been appropriately treated, the risk of collapse is very low. The estimated zone of influence calculated above is expected to be overly conservative.

Shaft 386399-002 cannot be treated as it is assumed to lie beyond the site boundary. The risk of collapse associated with shaft is therefore assumed to be higher. The zone of collapse extends into the southern corner of the site (proposed car parking and soft landscaping) but does not extend to the proposed building.

Ground improvement work (vibro stone columns) is proposed below the proposed building. The building foundations will comprise pads with supporting strips.

Given the distance of the building from the nearest mine shaft (386399-016) is 34m (from approximately the centre of shaft to edge of building) and the risk of collapse is very low once the shaft has been appropriately treated, there is not considered to be a significant risk to the proposed building and no further engineered foundations other that those already proposed are considered to be necessary.

The car parking, soft landscaping and sports court in the southern area (closer to the shaft) could be at risk, particularly the area within the zone of collapse of 386399-002 which will not be treated as part of the development. Precautions should be taken to limit the risk of ground instability. This could include the installation geo-grid below the sport court, car parking and soft landscaping within the potential zones of collapse.

The recommendations should be agreed with the Coal Authority prior to carrying out any work on site.

No development is proposed in the far western portion of site at this stage. Any future development scheme will need to be designed to take into consideration the risk associated with the mine shafts and zone of influences in line with Coal Authority requirements.

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).

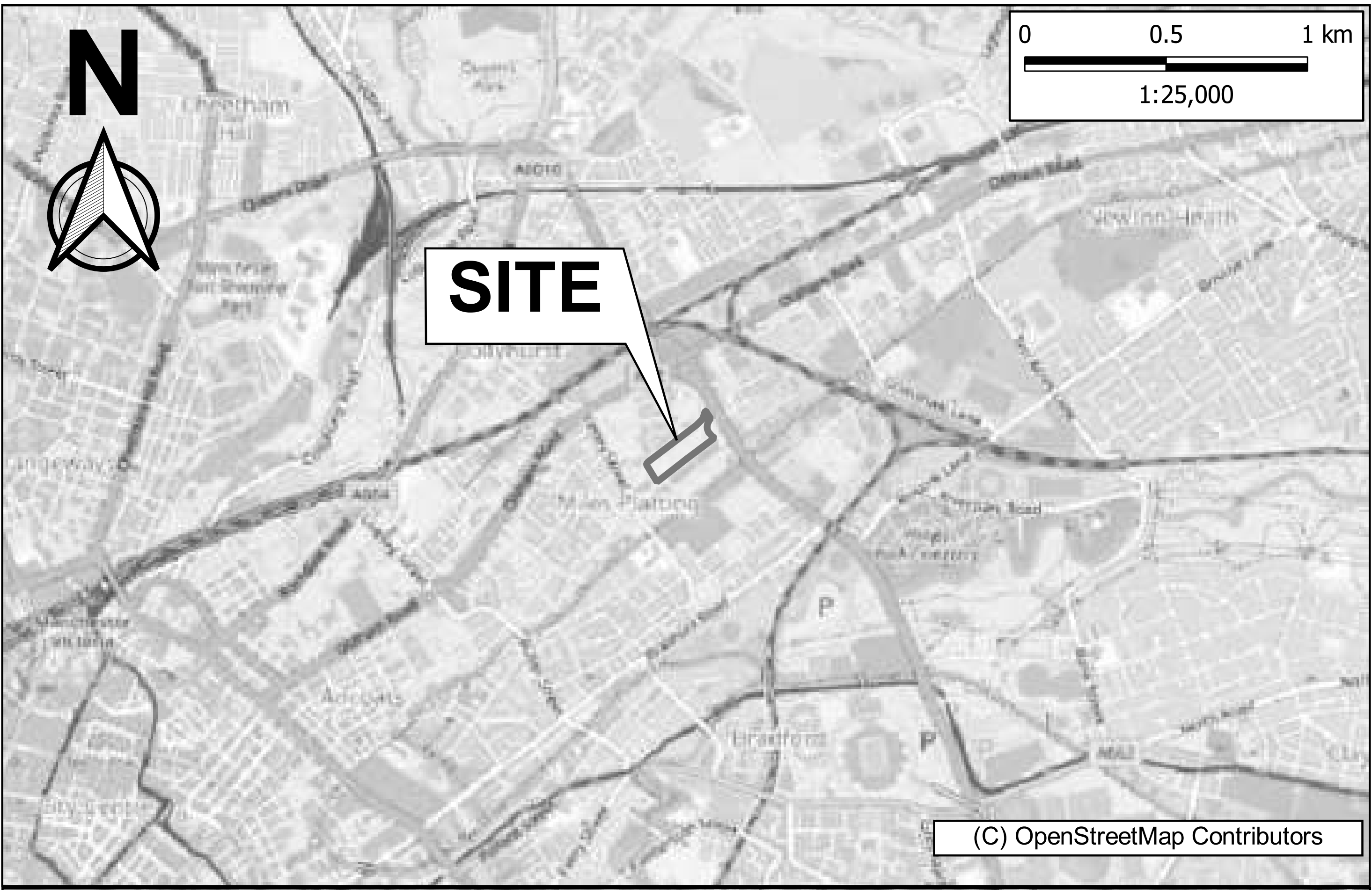
Mine entries may manifest during excavation works as circular, square or rectangular areas of deep Made Ground (typically several metres in size) set against the natural strata (e.g. Glacial Till or weathered rock). Mine shafts may also be covered with a large, thick concrete cap.

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.

Plans and Figures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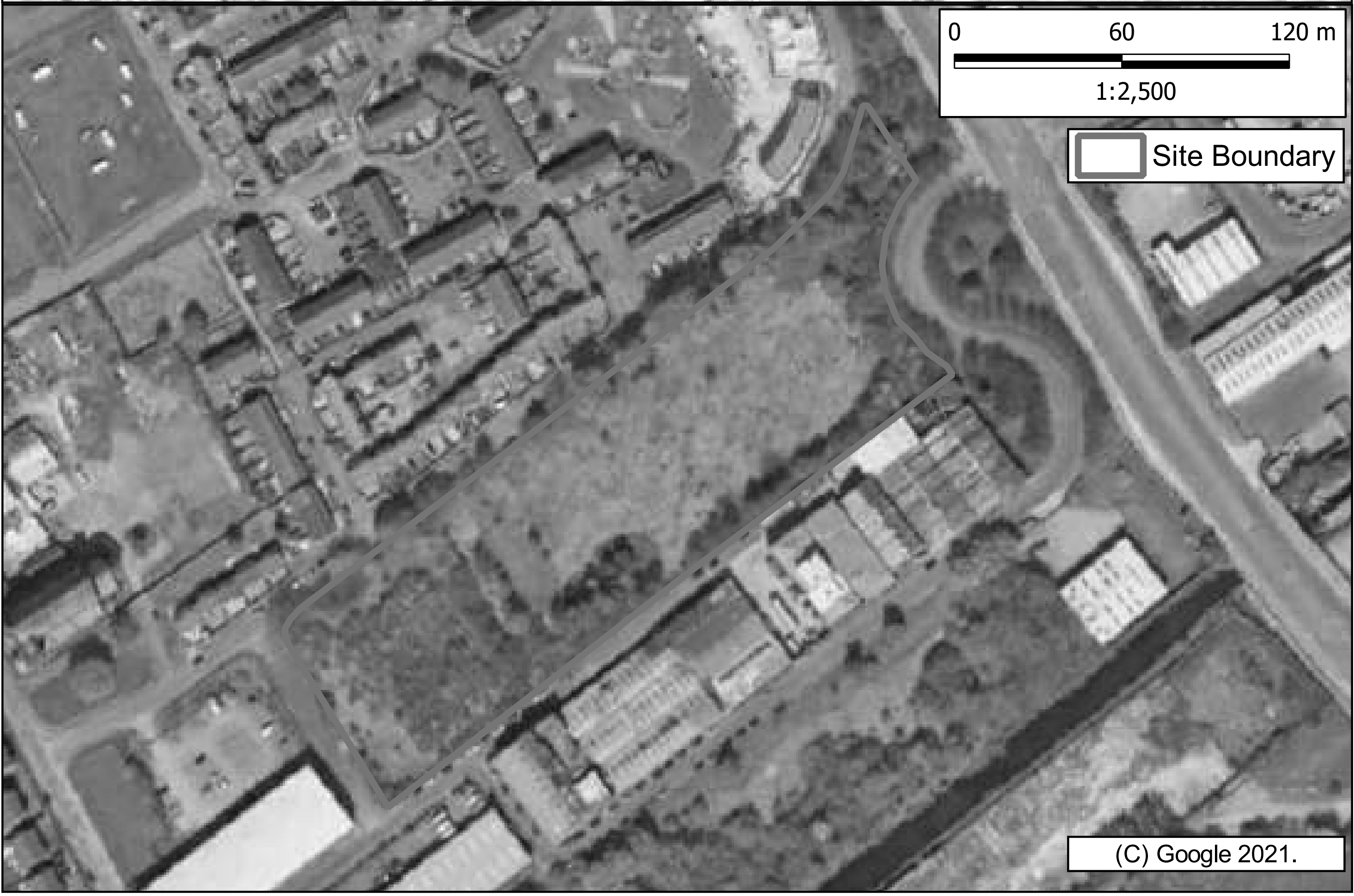
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Site Boundary

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

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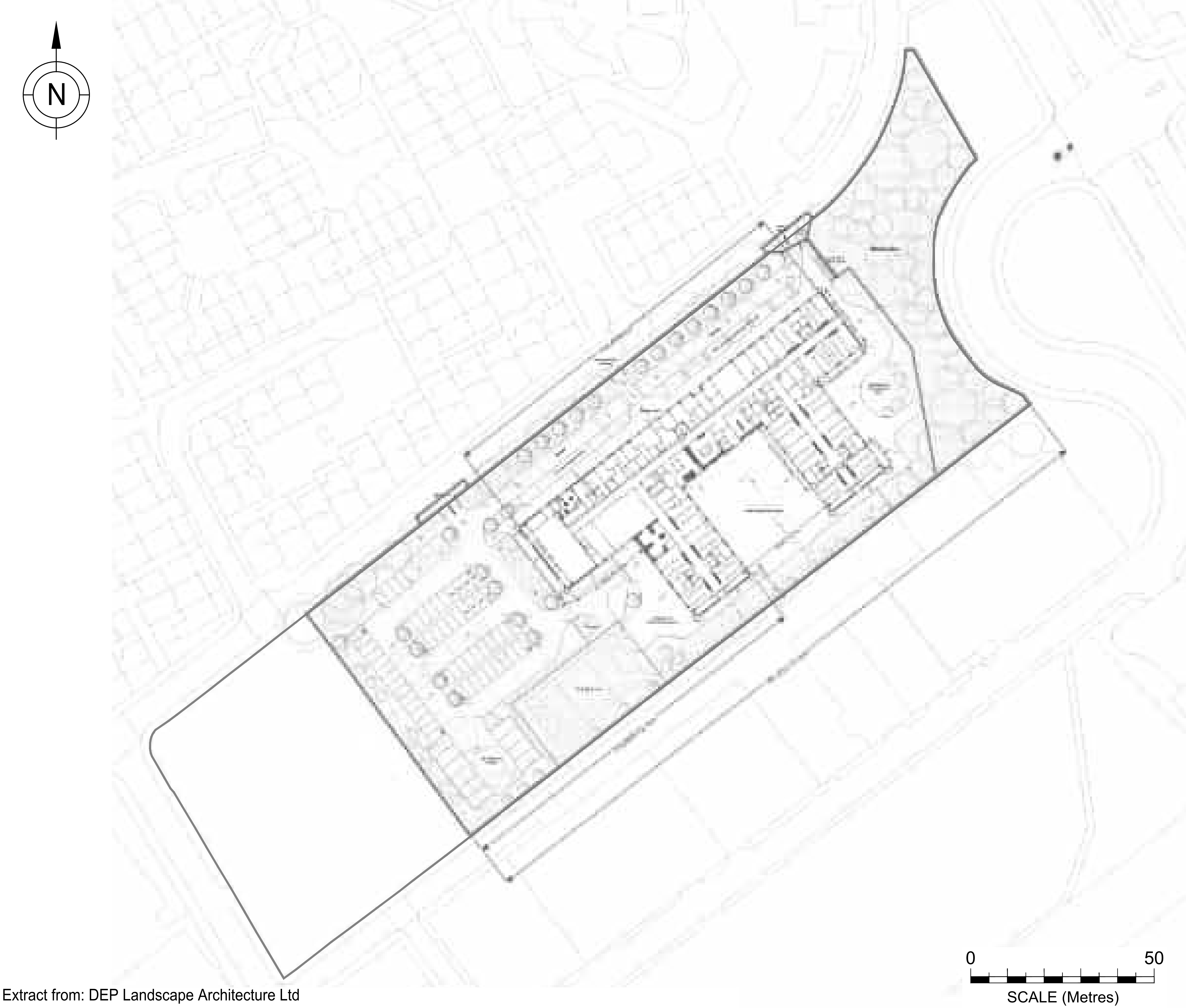

Extract from: DEP Landscape Architecture Ltd
Drawing Ref: Proposed Landscape Layout, No.VAR-DEP-XX-XX-DR-L-00001, Rev:P07 (02/02/2023)

KEY

Site Boundary

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:
Proposed Development Plan

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

Drawn By:	Checked By:	Drawn:
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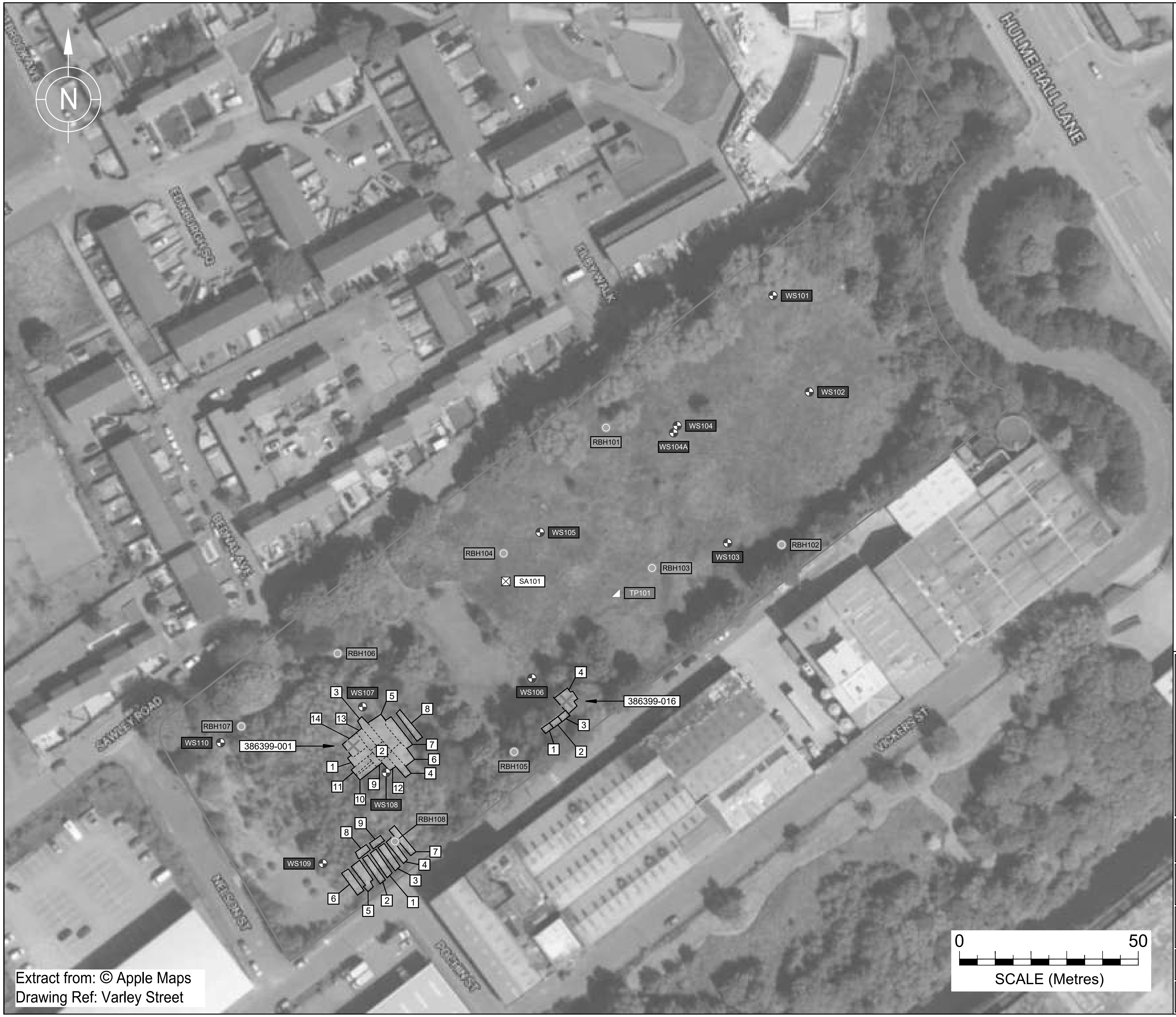
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RBH107
WS110
386399-001
2
7
6
4
1
11
9
12
10
WS108
SAWLEY ROAD
VICKERS ST
RBH108
9
8
7
4
WS109
3
6
2
1
5
0
50
SCALE (Metres)

Extract from: © Apple Maps
Drawing Ref: Varley Street

KEY

▭	Site Boundary
✕	Mine Entry
◐	Window Sample Borehole (WS)
◩	Trial Pit (TP)
◎	Rotary Borehole (RBH)
☒	Soakaway Test (SA)
▱	Excavation
9	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

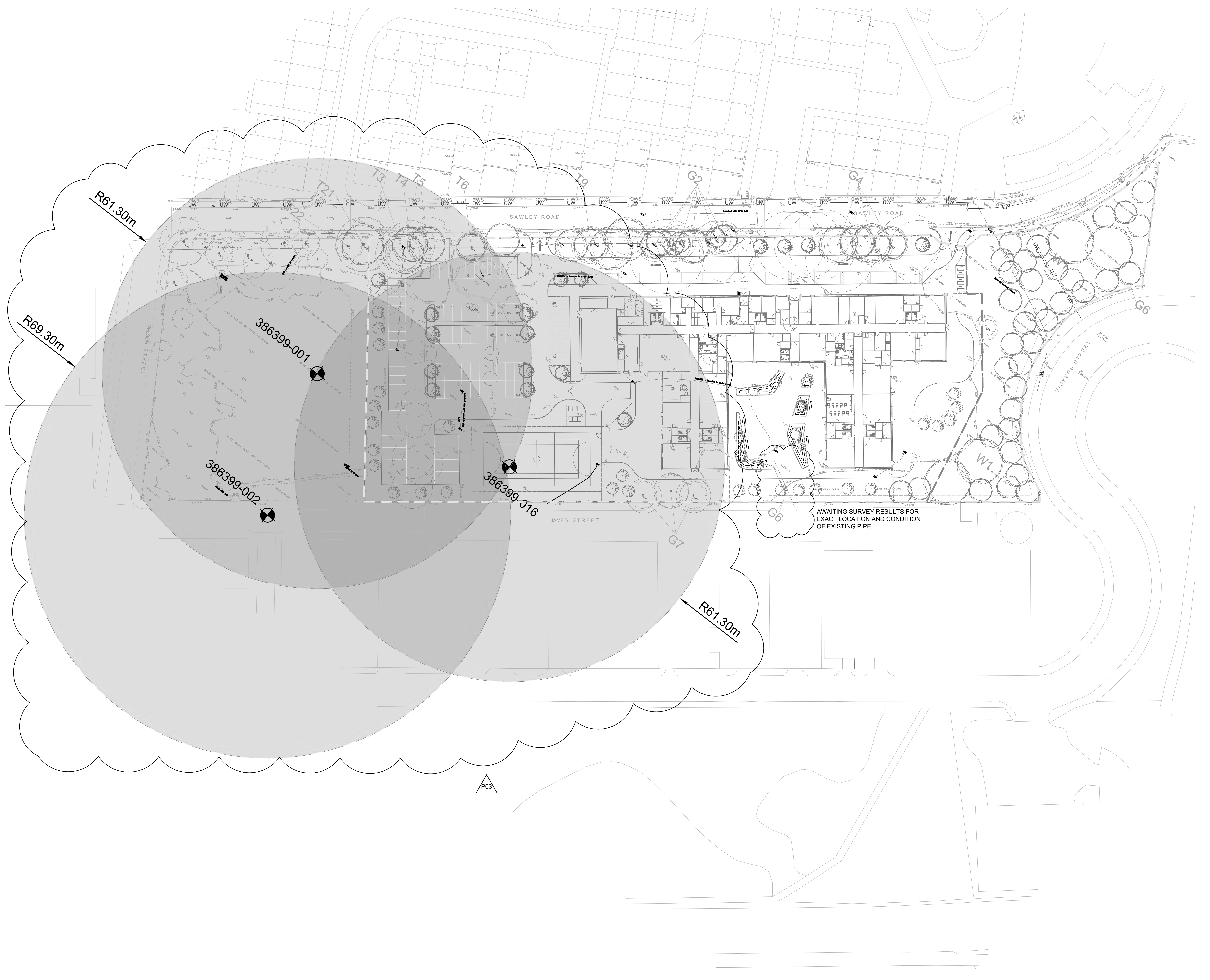
Client:
ISG Ltd

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



AWAITING SURVEY RESULTS FOR EXACT LOCATION AND CONDITION OF EXISTING PIPE

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DRAWING NOTES:

CDM REGULATIONS 2015

SIGNIFICANT OR NON-OBVIOUS RISKS AND RISKS WHICH ARE DIFFICULT TO MANAGE ARE IDENTIFIED ON THIS DRAWING USING THE FOLLOWING SYMBOL IDENTIFIED TO THE RIGHT WITH BRIEF ACCOMPANYING TEXT. FOR FURTHER DETAILS OF THE RISKS IDENTIFIED BY DESIGNERS, REFERENCE SHOULD BE MADE TO CDM HAZARD REGISTER. ⚠

KEY:

—— UW —— UW ——	WATER MAIN TAKEN FROM GPR SURVEY - CONFIRMED ON RECORDS
—— CWS —— CWS ——	COMBINED SEWER TAKEN FROM RECORDS
—— FW —— FW ——	FOUL SEWER TAKEN FROM GPR SURVEY - CONFIRMED ON RECORDS
●	MINESHAFT STANDOFF ZONE
386399-016 ⊕	COAL AUTHORITY - DISUSED MINE SHAFT
W1	TREES RPA AND REFERENCE - REFER TO TREE CONSTRAINTS DRAWING E616/VSM/TREE/01A

5 0 5 10 15 20 25
SCALE 1:500 m

REV	DESCRIPTION	DATE	BY	CHKD
P03	MINESHAFT ZONE OF INFLUENCE UPDATED INLINE WITH SI REPORT	21.06.23	JF	PB
P02	MINESHAFT ZONE OF INFLUENCE UPDATED INLINE WITH SI REPORT	19.06.23	JF	PB
P01	FIRST ISSUE	08.02.23	JF	PB

ORIGINATOR:

RIDGE

5TH FLOOR
BELVEDERE HOUSE
12 BOOTH STREET
MANCHESTER, M2 4AW

TEL: 0161 833 9579
WWW.RIDGE.CO.UK

CLIENT:
ISG

IN ASSOCIATION WITH:

PROJECT:
VARLEY STREET SEN SCHOOL

TITLE:
SITE CONSTRAINTS PLAN

ENG/TECH:	CSE:	ICSE:	SCALE: 1:500 @ A1
JF	PR	PB	STATUS ISSUE: S2

STATUS:
INFORMATION

UNLESS ISSUED FOR CONSTRUCTION - WORKS AT CLIENT/CONTRACTORS RISK

SUITABILITY: S2 - Issued for Information

PROJECT:	ORG:	ZONE:	LEVEL:	TYPE:	ROLE:	NUMBER:	REV:
VAR	RDG	XX	XX	DR	C	00201	P03

Appendix A

Coal Authority Permit

The Coal
Authority

Permit to Enter or Disturb Coal Authority Interests

Permit 26624

Name and Address of Permit Holder:

Manchester City Council
Town Hall Extension
Mount Street
Manchester
M2 5DB

Site Location:

Varely and Nelson Street
Nelson Street
Miles Platting
Manchester
M40 8BB

This certificate hereby grants the above named Permit Holder a Permit to carry out:-

Ground investigation by eight boreholes to 40m to determine presence of shallow mine workings and trial trenching to locate three recorded mine entries (Coal Authority references 386399-001, -002, and -016) all within the Authority's interests at the identified site location above as shown on the Grant Permit Boundary (overleaf) for the period of **12 months** from the granted date shown below. *The granting of this Permit does not constitute advice given by the Authority in relation to the proposed operations. It is the Permit Holder's responsibility to obtain appropriate health, safety, environmental, technical and legal advice.*

Conditions:

- *Manned entry (i.e.) into mine entries/workings) is strictly prohibited.*
- *Water flush drilling only*
- *Gas Monitoring for CO, CH_4, CO_2, O_2, and H_2S at borehole and drill rig*
- *Operators undertaking the work must be in possession of this certificate and the Permit boundary plan at the time of works*
- *Appropriate borehole reinstatement and sealing without delay and to withstand site level changes*

Signed: [redacted] Granted Date: ***09/05/2023***

For and on behalf of The Coal Authority

Nominated Representative: Leigh Sharpe, Permitting Manager;

The Coal Authority, Permitting Office, 200 Lichfield Lane, Mansfield, Notts, NG18 4RG

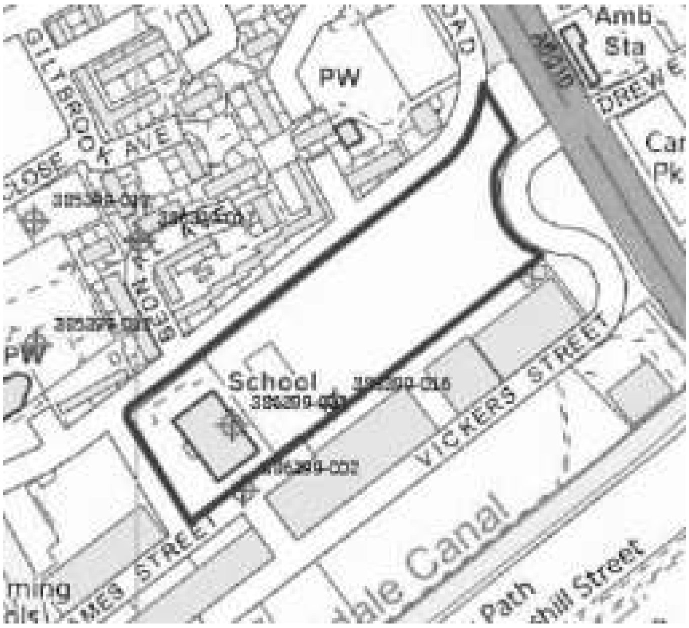
Tel: 01623 637450; E-Mail: permissions@coal.gov.uk

The Coal
Authority

Granted Permit Boundary

Permit Ref: 26624

Permit Boundary:


PW
Amb
Sta
DREW
Car
Pk
GILTBROOK AVE
CLOSE
PW
School
VICKERS STREET
STREET
Canal
Path
Street

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Appendix B

Rotary Borehole Logs

TDS 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	230	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	340	L/G + L/B s/s m/s Bands										
340	34.6	Coal										
34.6	400	L/G m/s WITH O/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	SW	75	75	pen	75	75	75	75	pen

Standard Penetration Tests

Casing	Size	Depth m
Start of Shift		
End of Shift		

Rig Type: BERETTA T41

Pumps & Additional Plant:

Flush Type: AIR MIST

BDA No.:

Foreman: D. TAYLOR

Assistant: J. TAYLOR

Foreman's Signature:

Project No.:

Project: MILES PLATTING

Day: WED

Move From:

Date: 17-5-23

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

T DS 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)												

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

Assistant: J. TAYLOR

Foreman's Signature:

Project: MILES PLATTINS.

Day: THURS

Date: 18-5-23

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"

TDS 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
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.

Assistant: S. PLUMPLEY

Foreman's Signature:

Project: MILES PLATTING

Day: THUR / FRI

Date: 19-5-23

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

TAYLOR DRILLING SERVICES LTD

Rotary Drilling Journal

Core run mBGL		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
From	To											
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	178	L/B SAND										
178	25.0	L/B CLAY + SANDS										
25.0	342	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)												

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		Standard Penetration Tests								
		From	To	SW	75	75	pen	75	75	75	75	pen

Casing	Size	Depth m
Start of Shift		
End of Shift		

Rig Type: BERETTA TWI

Pumps & Additional Plant:

Flush Type: AIR MIST

BDA No.:

Foreman: D. TAYLOR

Assistant: S. PLUMBLEY

Foreman's Signature:

Project No.:

Project: MILES PLATTING

Day: FRI

Date: 19/5/23

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										
278	345	L/G M/S										
345	35.0	COAL INTACT										
35.0	37.3	L/G SILT STONE										
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	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 PLATTINS

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

TAYLOR DRILLING SERVICES LTD

Rotary Drilling Journal

Core run mBGL		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
From	To											
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										
34.5	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		Standard Penetration Tests								
		From	To	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 PLATTINS

Day: MON/TUES

Date: 23-5-23

Move From: RHS

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

TDS 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"	PW	
Reaming Shell				

PENETRATION TESTING AND SAMPLING

Sample Test	Sample No.	Depth m From	Depth m To	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.:

Foreman: D. TAYLOR

Assistant: S. PLUMBLEY

Foreman's Signature:

Project No.:

Project: MILES PLATTING

Day: TUES

Date: 23-5-23

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

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	23.0	L/B + CLAY SAND BANDS										
23.0	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	SW	75	75	pen	75	75	75	75	pen

Casing	Size	Depth m
Start of Shift		
End of Shift		

Rig Type BERETTA T41

NVQ No.

Project No.

Foreman D. TAYLOR.

Project MILES PLATTING

Pumps & Additional Plant

Assistant S. PLUMBLEY

Day THURS

Date 25-5-23

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

Flush Type AIR MIST

Foreman's Signature

Move From RH7

BH No RH8

Appendix C

Logs and Photographic Record

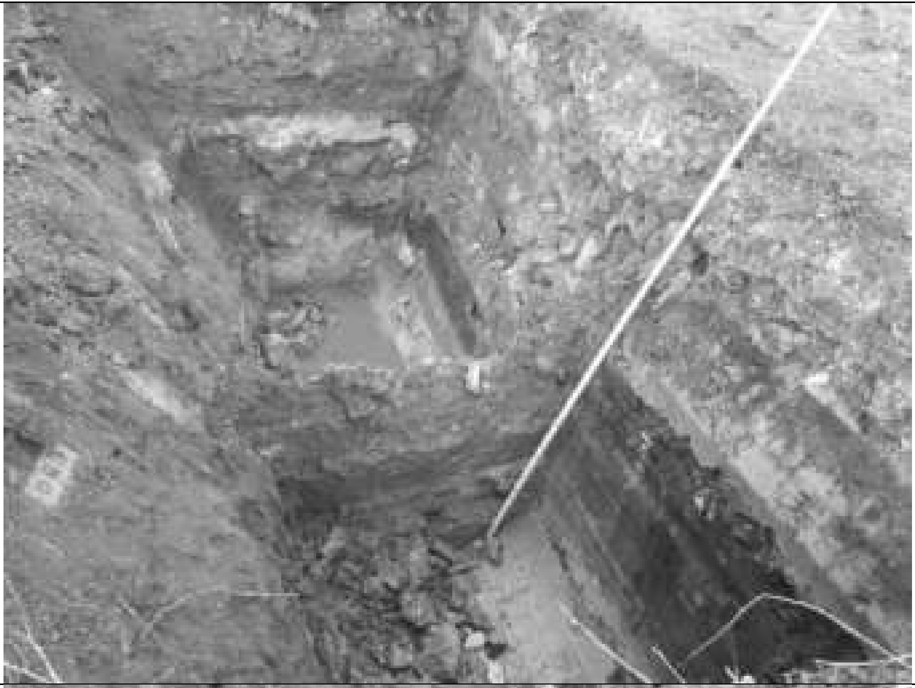
– Mine Shaft Investigation

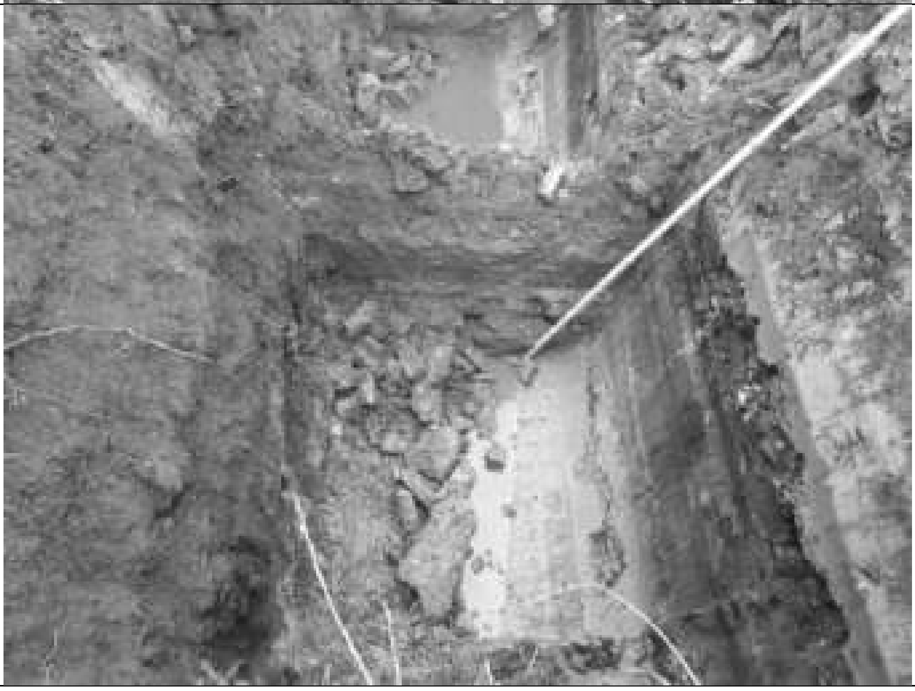
Trench 1

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.	

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.	

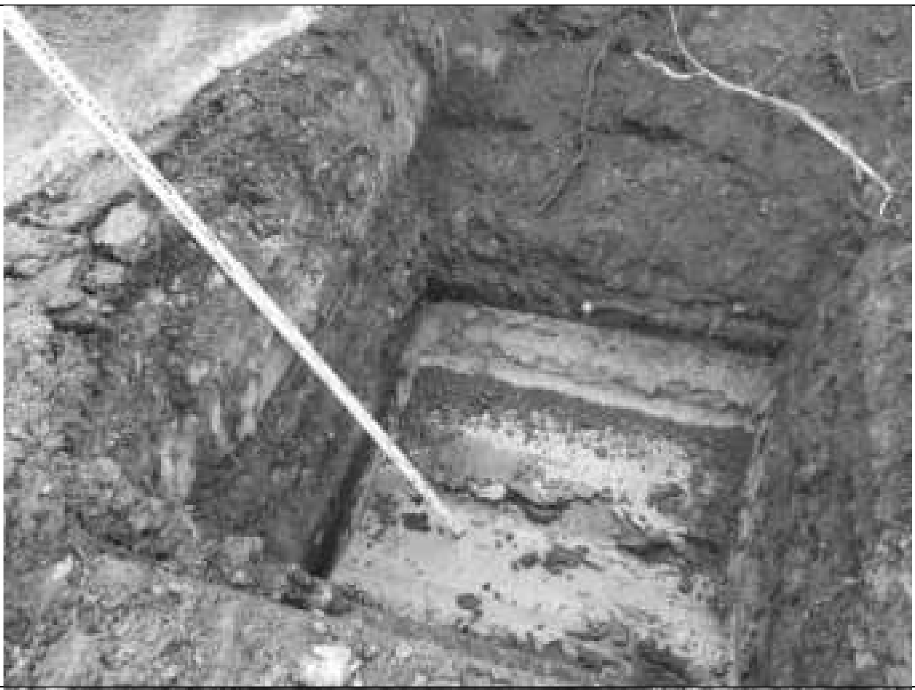
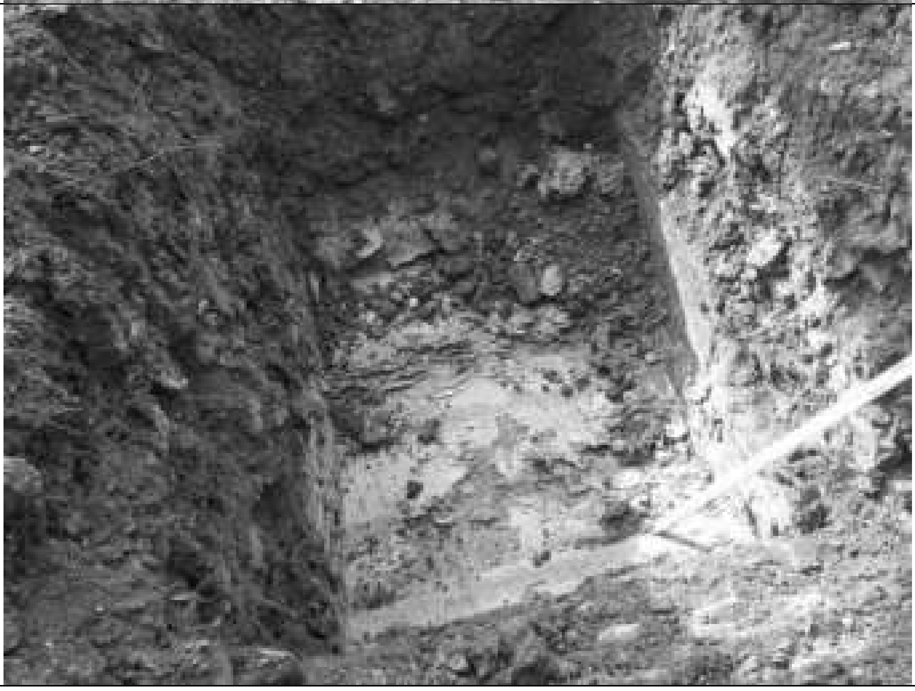




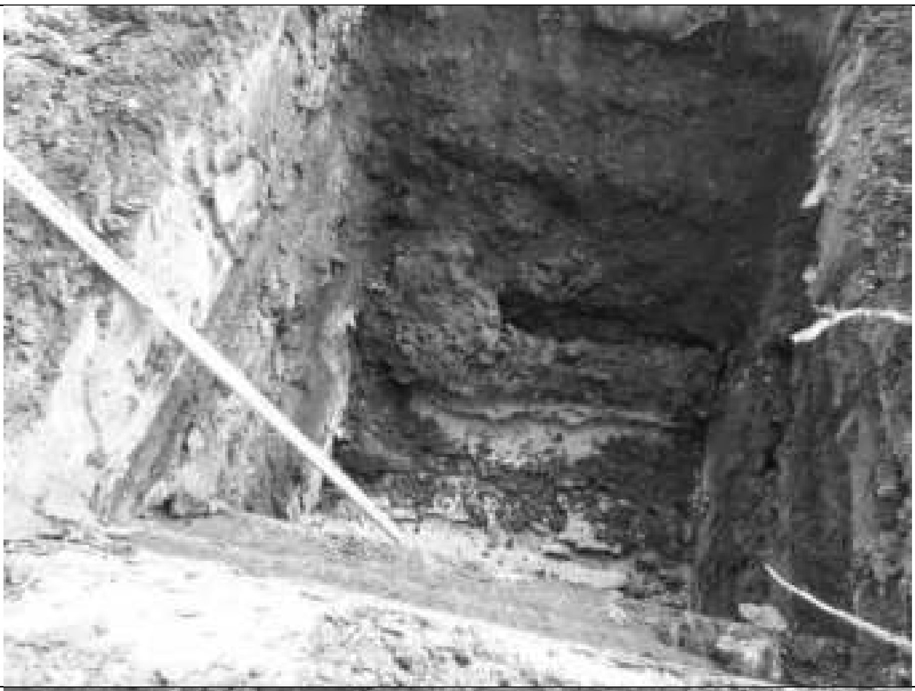
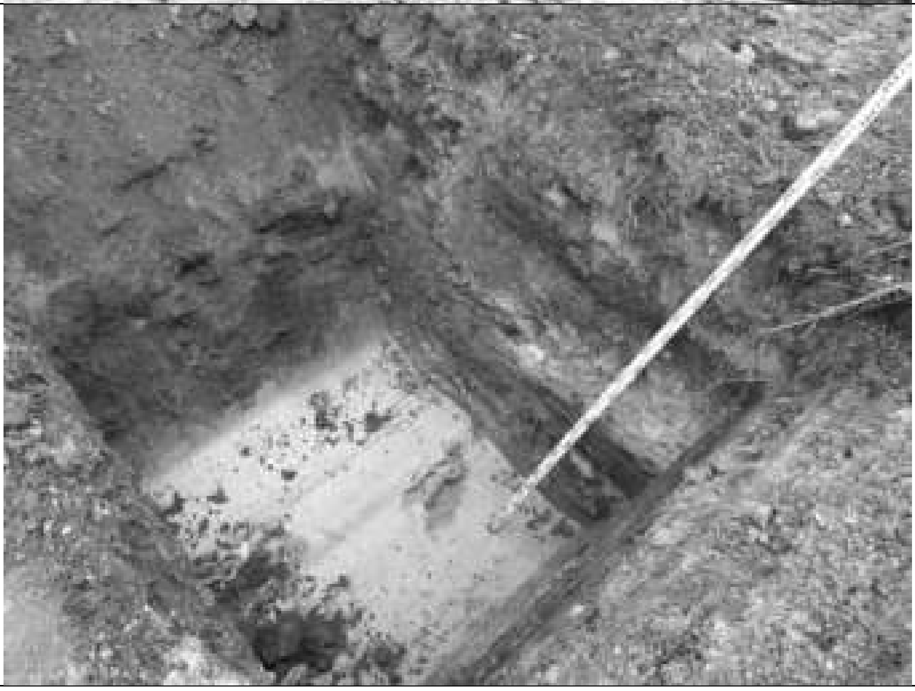
Trench 3

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.	

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.	
	
	

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.	
	
	

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.	

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.	

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.	

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.	

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.	

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.	

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.	

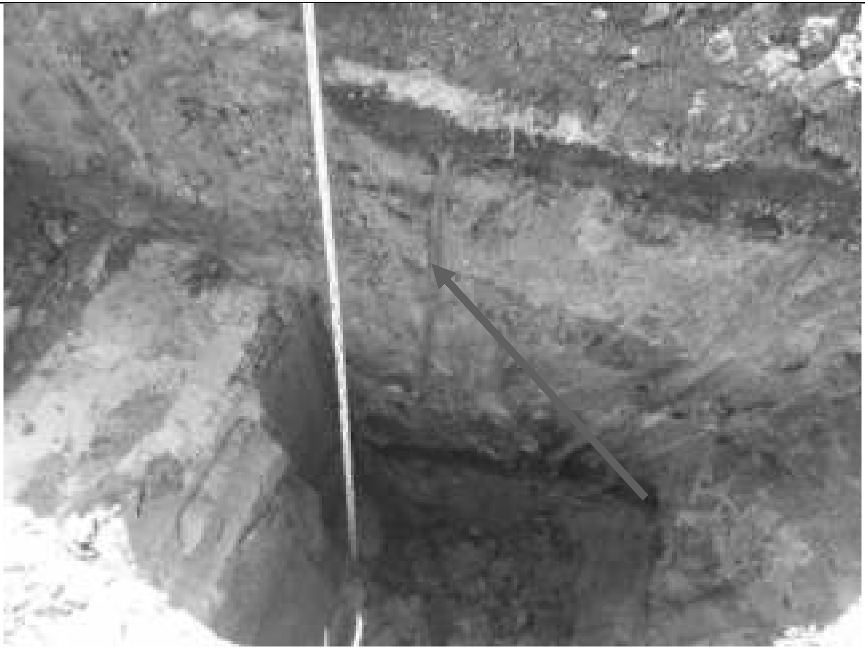
Trench 13

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.	

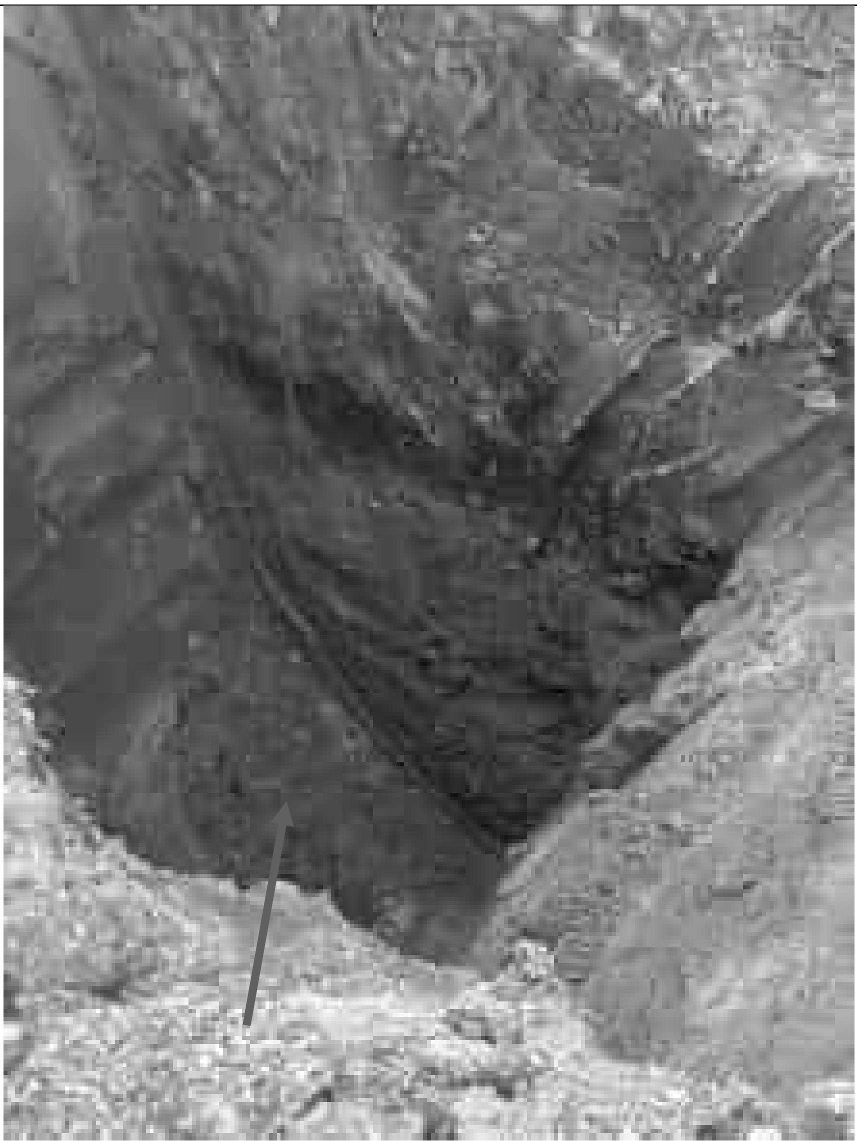
Trench 14

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.



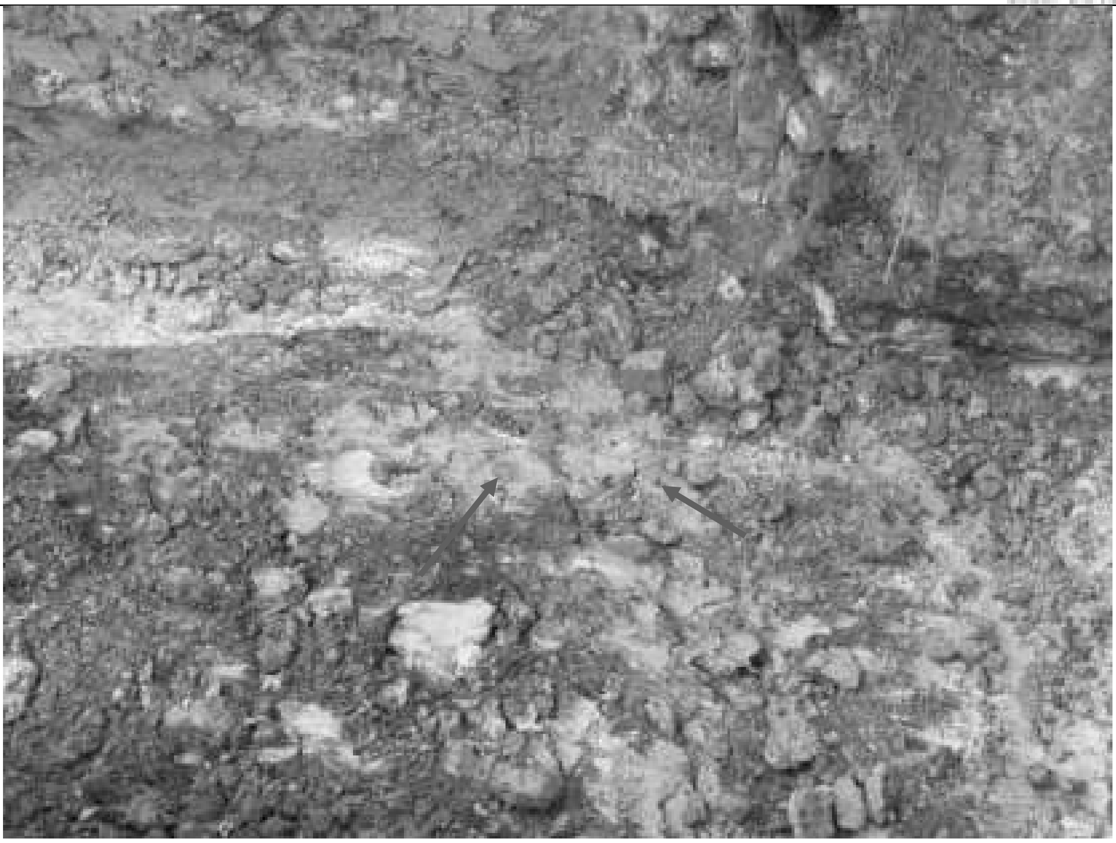
Grouted borehole visible in side wall. Red arrow points to grouted borehole.



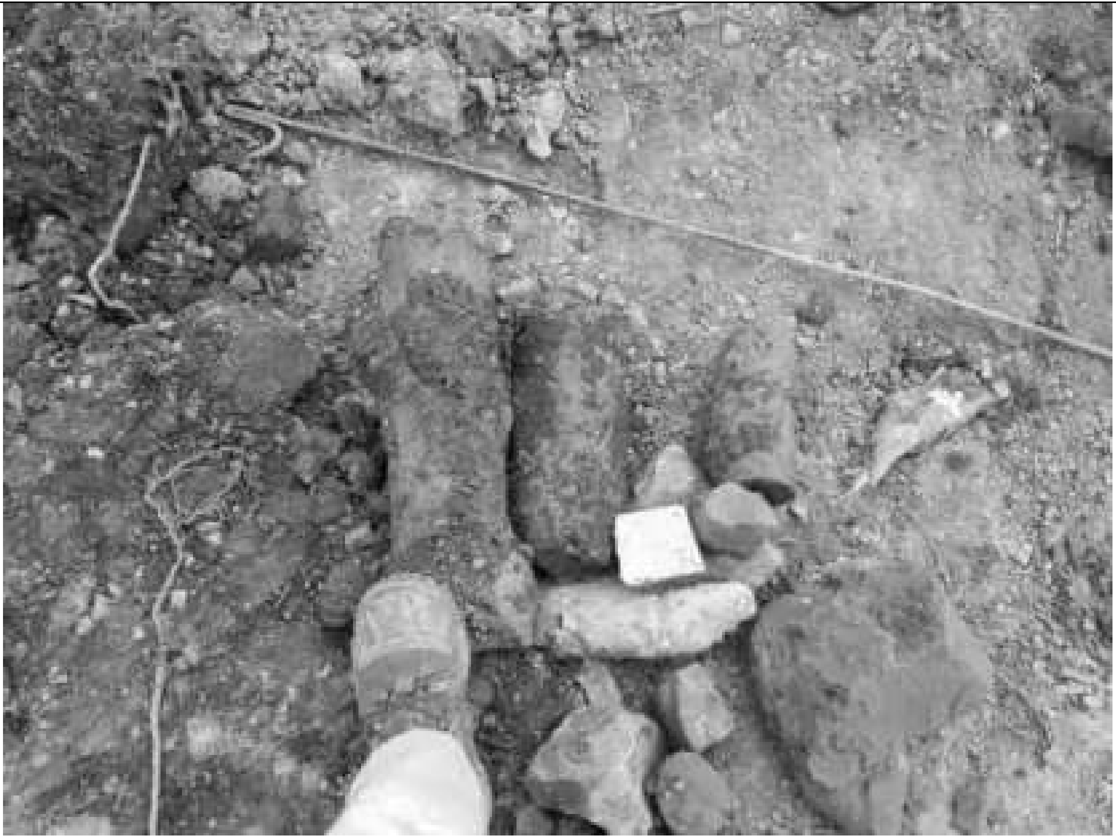
Circular area of made round visule at base of trench. Red arrow points to feature.

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

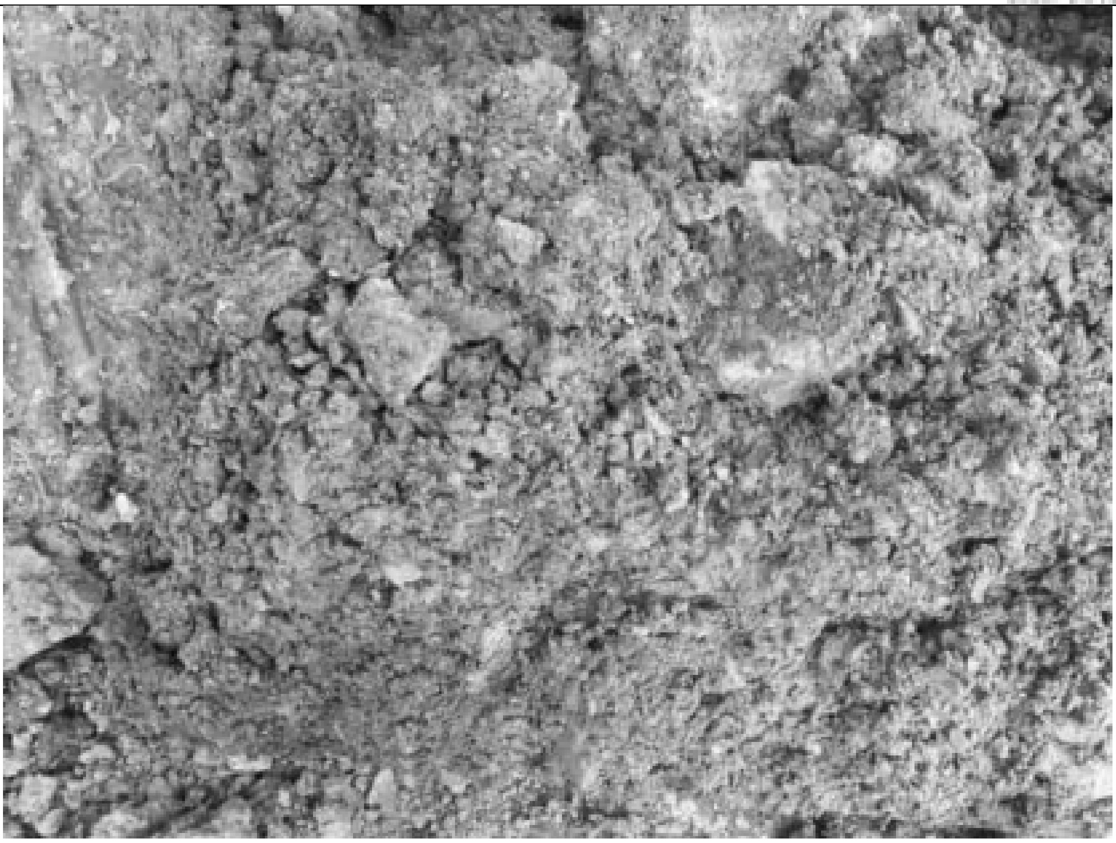
Further grouted borhole encountered. Red arrow points to borehole.



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



Grout encouneted in spoil reocvered from trial trench.

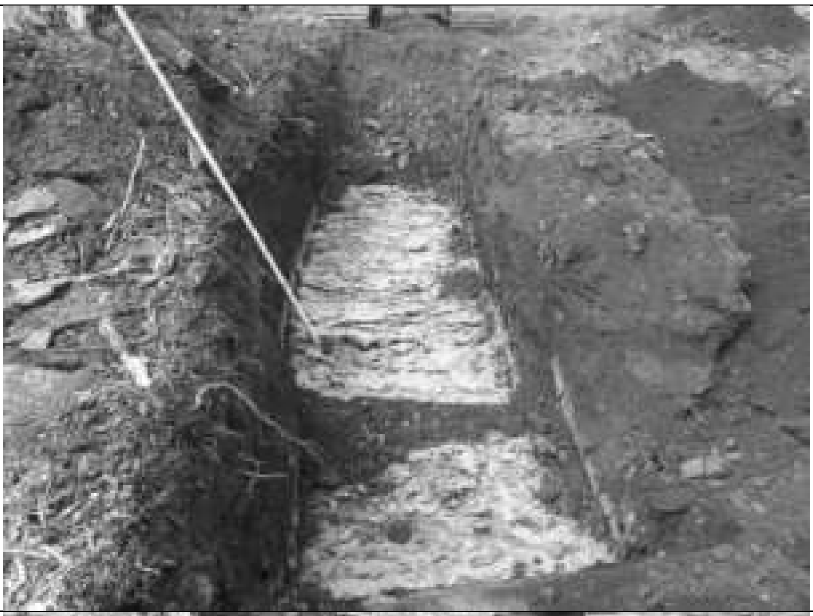
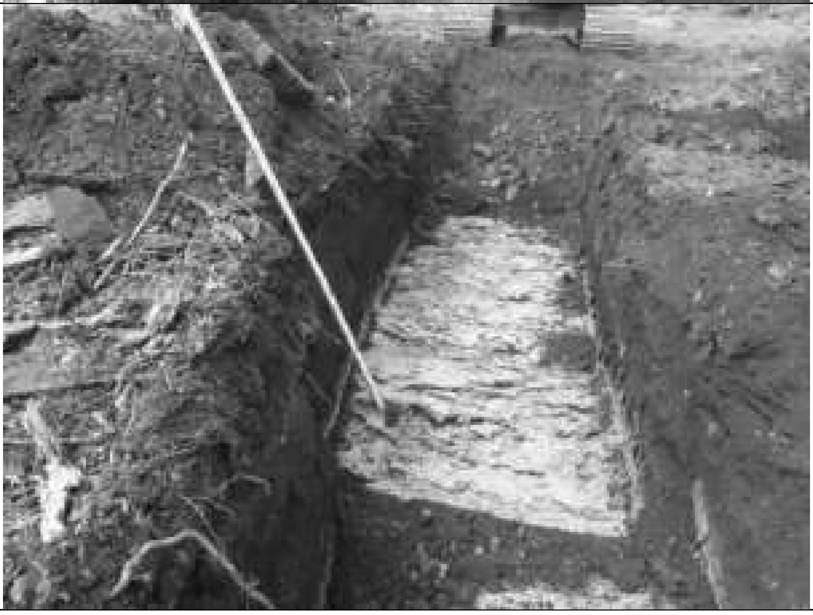


Reworked strata recovered from trench.

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.	

Trench 4

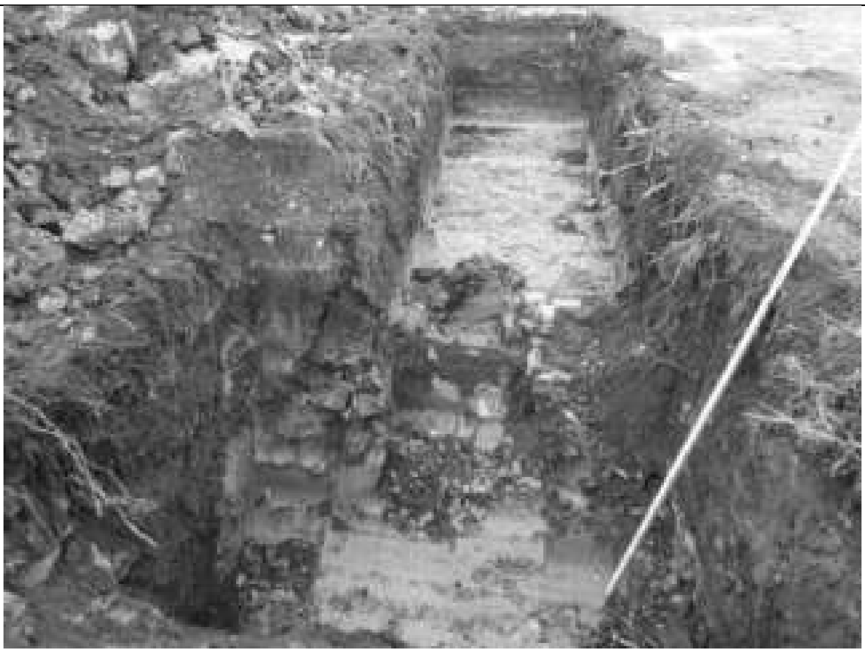
Depth (m)	Strata
0.00 to 0.40	MADE GROUND: Tarmacadam to 0.05m. MADE GROUND: Brown gravelly SAND with frequent brick fragments, occasional ash, coal and rootlets. Pipe runs through southern end of trench parallel to southern site boundary at approximately 0.50m. Cable runs along western wall of trench 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

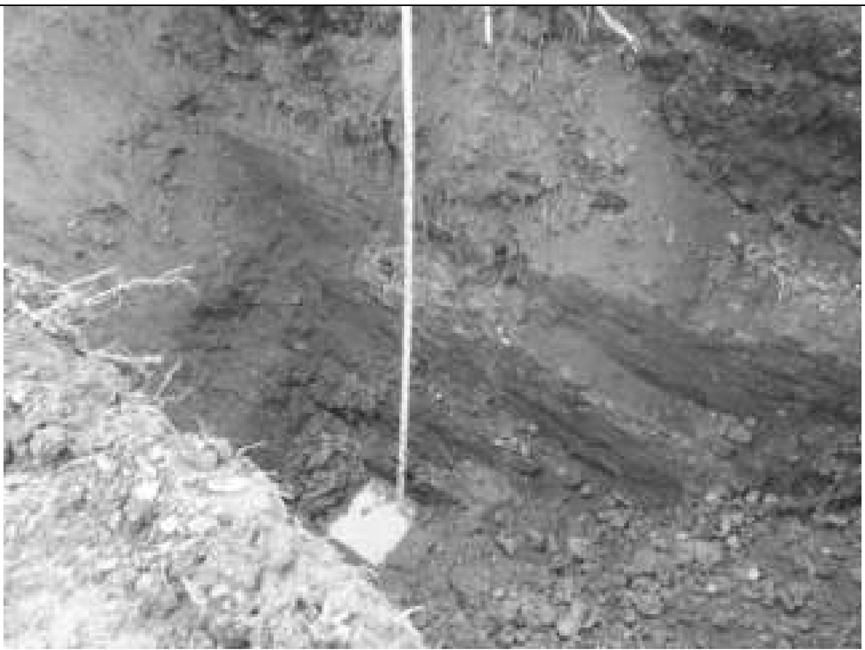
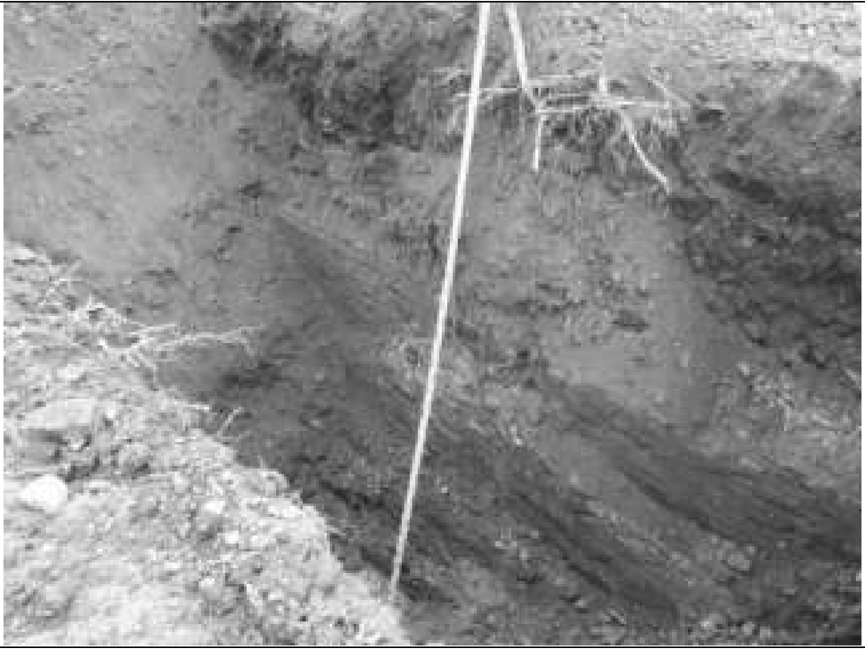
Depth (m)	Strata
0.00 to 0.80	MADE GROUND: Tarmacadam to 0.10m. MADE GROUND: Dark greyish brown gravelly SAND with frequent ash, clinker, brick fragments and occasional tarmacadam fragments.
0.80-1.00	Dark grey slightly organic slightly gravelly very sandy CLAY (clay is friable).
1.00-1.60	Stiff consistency 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.	



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.	

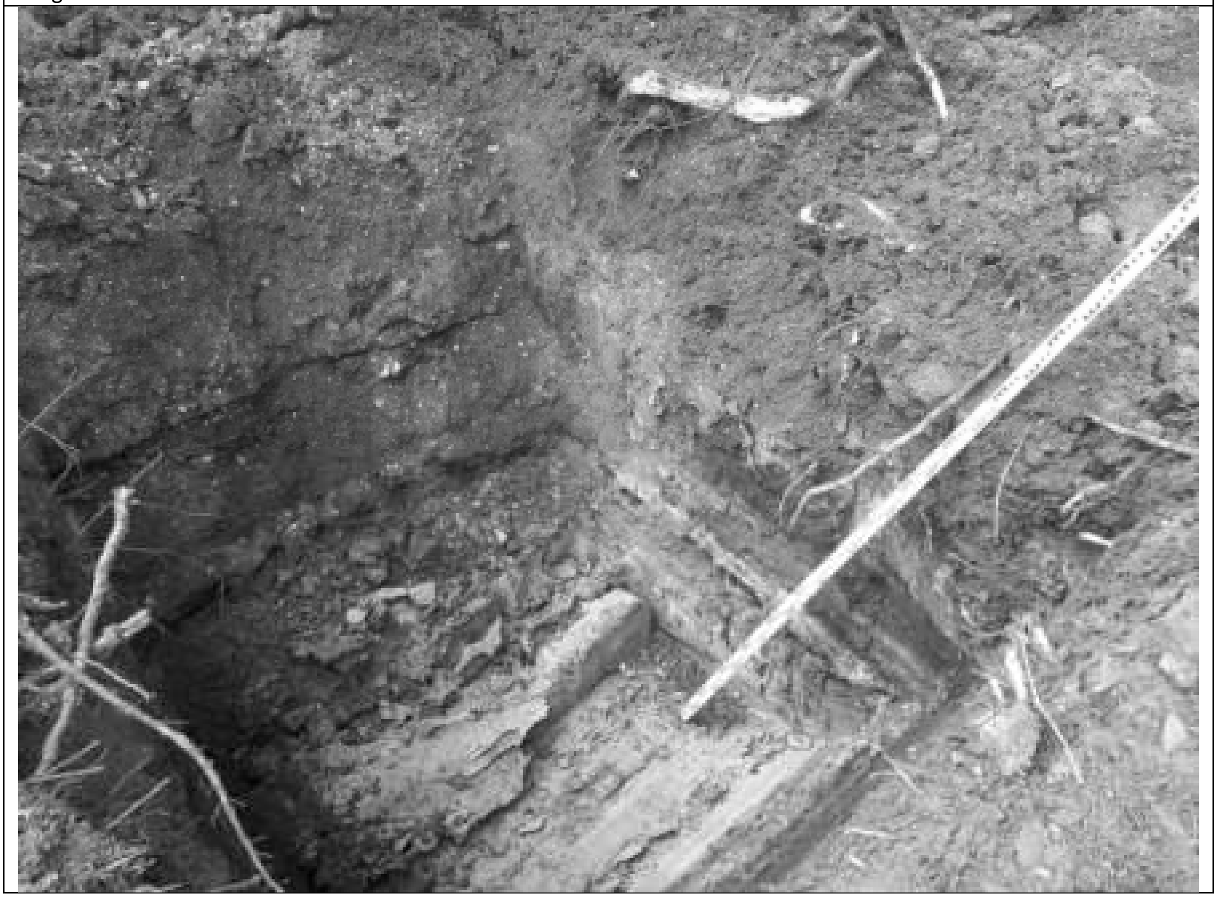
Trenches 8 & 9

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.	
	
	

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

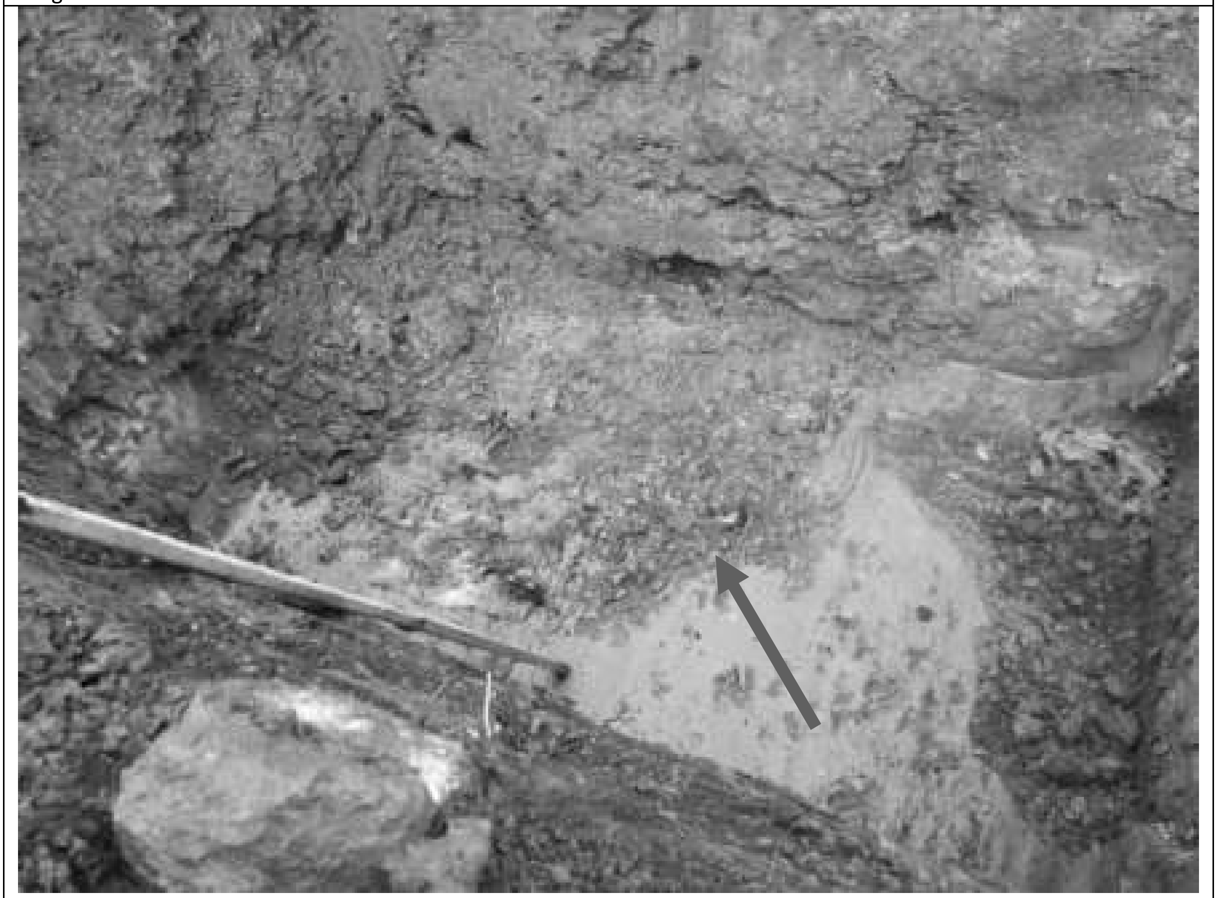
Depth (m)	Strata
0.00 to 0.80	MADE GROUND: Brown very clayey SAND with occasional whole bricks, brick fragments, ceramic fragments, bands of sandy clay, concrete fence posts and rare timber sleepers.
0.80-1.80	MADE GROUND: Blackish brown SAND and GRAVEL predominantly comprising ash and clinker with occasional 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

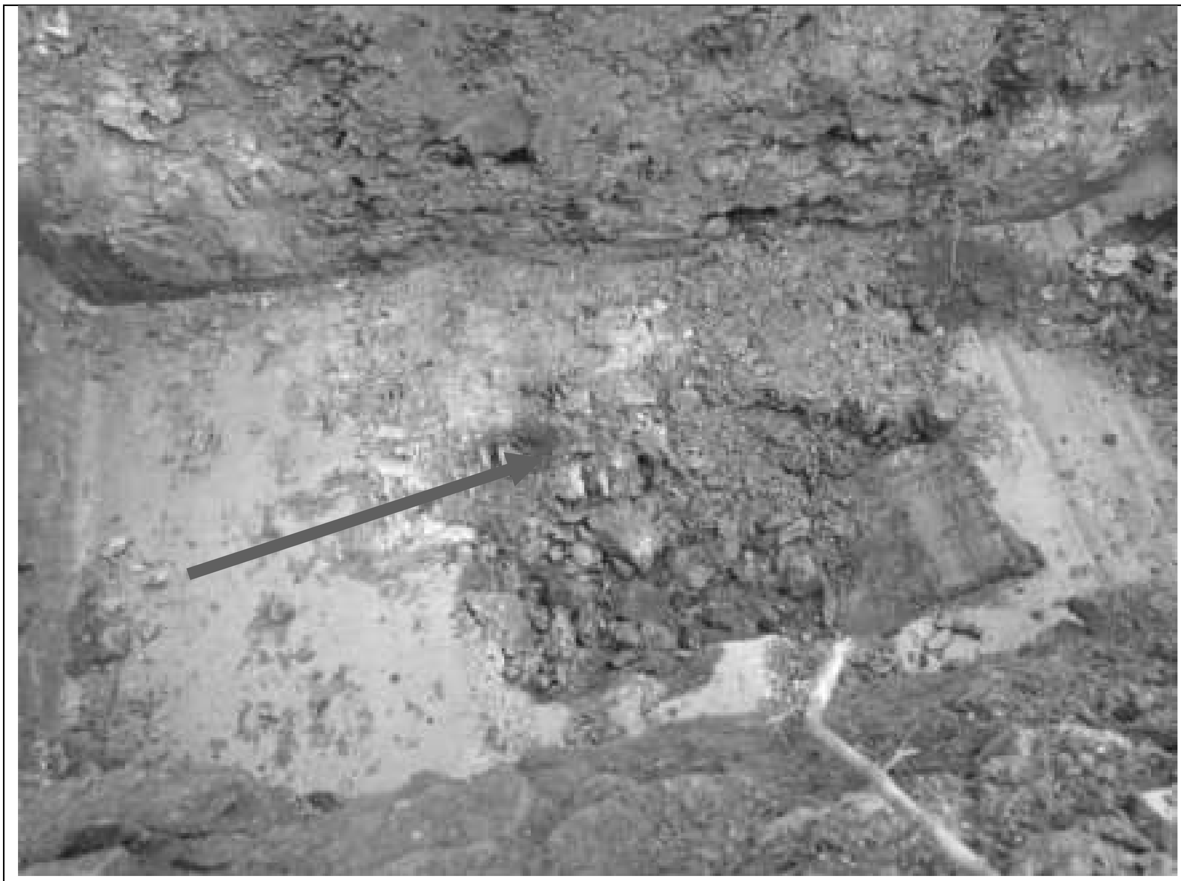
Depth (m)	Strata
0.00 to 0.50	MADE GROUND: Brown very clayey SAND with occasional rootlets , roots, brick fragments, slate, coal and ceramic fragments.
0.50-1.20	MADE GROUND: Firm to stiff consistency light brown and light grey mottled slightly gravelly sandy CLAY with occasional whole bricks, brick 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

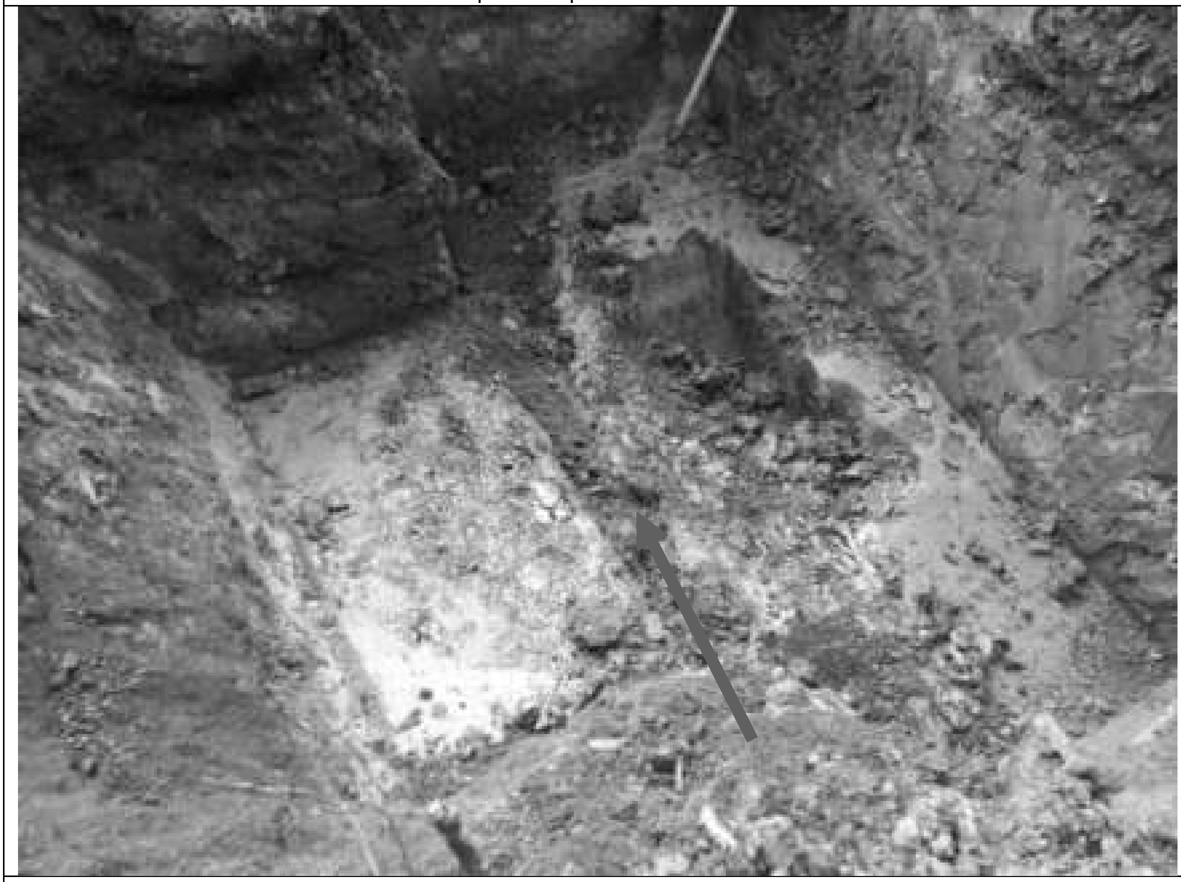
Depth (m)	Strata
0.00 to 1.30	MADE GROUND: Brown slightly gravelly very clayey SAND with occasional rootlets , roots and brick fragments. Ceramic drain encountered at 1.00mbgl. Band of predominantly ash at approximately 1.20-1.30mbgl.
1.30-2.10	MADE GROUND: Stiff consistency light brown and light grey 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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- Geotechnical
- Contaminated Land
- Flood Risk and Drainage
- Asbestos
- Invasive Species
- Land Remediation
- Project Management
- Land Drilling

Appendix D Coal Mining Risk Assessment (CI101-V2 ¦ March 2022)

COAL MINING RISK ASSESSMENT

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Date:

15th March 2022

EnviroSolution Ltd
Document Verification

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Report Title	Coal Mining Risk Assessment		
Job Number	CL101r	**Document Ref.**	CL101r
Date Issued	15th March 2022	**Report Version**	1
Prepared by	Tom Craig MSc, BSc (Hons), FGS	**Signature**	
Checked by	Phil Shelton PhD BSc CEng MIMMM FGS	**Signature**	

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Appendix B – Coal Authority Report
Appendix C – Historic OS Maps
Appendix D – Geological Maps
Appendix E – BGS Borehole Logs
Appendix F – Coal Resource Map
Appendix G – Coal Mining Summary Map
Appendix H – Hazard Zonation Map

1 Introduction

1.1 Site Location and Description

The site is located at Varley Street, Miles Platting, Manchester, M40 8EF. The British National Grid Reference for the approximate site centre is GR: 386125 399605.

The site is irregular in shape and covers an approximate area of 22,200 square metres. The site is currently a vacant plot of waste land formerly used as a school playing field. A tarmac games court is located in the central area of the site. The land to the northeast of this is rough grassland. The land to the southwest of this is tarmacadam hardstanding.

The proposed development area is generally flat with little change in topographic level. Vehicle access is gained from Sawley Road to the north-eastern section or via a double gate along Nelson Street to the south-western section.

A plan showing the location of the site is shown in **Figure 1** and **Appendix A**.

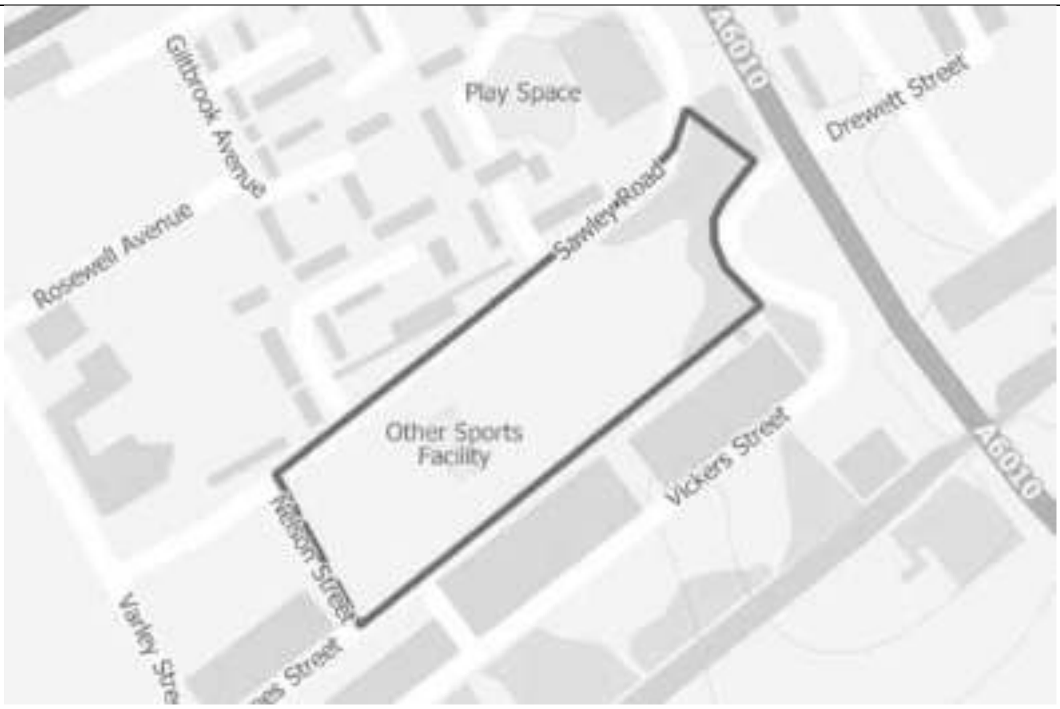

Gillbrook Avenue
Play Space
A6010
Drewett Street
Sawley Road
Rosewell Avenue
Other Sports Facility
Vickers Street
A6010
Nelson Street
Varley Stre
Street

Figure 1) Site Location Map

1.2 Development Proposal

It is understood that the development proposal includes the construction of up to two schools with parking, playing fields and ancillary development.

No formal development layouts have been provided.

1.3 Scope of Coal Mining Risk Assessment

EnviroSolution Ltd has been commissioned to prepare a Coal Mining Risk Assessment Report (CMRA) for the proposed development site, in order to provide the Local Planning Authority with information on the coal mining legacy risk(s), an assessment of their potential impact on land stability, and provide recommendations for the need to carry out any further investigations (including intrusive boreholes) to address these risk(s).

The CMRA has been undertaken in accordance with the principles of best practice including the Coal Authority's guidance document "Risk Based Approach to Development Management - Resources for Developers Version 3" (2014) (Ref. 1), CIRIA "SP32 Construction over Abandoned Mine Workings" (2002) (Ref. 2) and CIRIA "C758D Abandoned Mine Workings Manual" (2019) (Ref. 3).

The purpose of the CMRA Report is to:

- present a desk-based review of available information on the coal mining issues that are relevant to the application site;
- use that information to identify and assess the risks to the proposed development from coal mining legacy, including the cumulative impact issues;
- set out appropriate mitigation measures to address the coal mining legacy issues affecting the site, including any necessary remedial works and/or demonstrate how coal mining issues have influenced the proposed development; and
- demonstrate to the Local Planning Authority that the application site is, or can be made, safe and stable to meet the requirements of National Planning Policy with regard to development on unstable land.

1.4 Sources of Information

This report is based on current information of past mining activities relevant to the site. The following information sources have been used:

- Consultants Mining Report dated 7th January 2022 (Ref: 51002883792001 **Appendix B**);
- Consultants Mining Report dated 3rd March 2022 (Ref: 51002948577001 **Appendix B**);
- BGS Geoindex geological map;
- BGS geological 1:50,000 England and Wales Sheet 85 Manchester;
- Coal Authority Interactive Website;
- Historical Ordnance Survey maps.

2 Environmental Setting

2.1 Historic Coal Mining Activity

The development site and surrounding area has been reviewed with reference to historical Ordnance Survey (OS) maps. The history of the site and immediate surrounding area are summarised in Table 1. Copies of the historical OS maps are included in **Appendix C**.

Table 1 - Historic Mapping Review

Date	Scale	Historic Mining Activity
1848	1:10,560	- Site is largely undeveloped. - Coal pit located within the south-western area of the site boundary. - Coal pits 140m south, 250m southeast and 450m east of the site. - Colliery 650m west of the site.
1893	1:2,500	- Coal pit no longer marked on map. - Site is developed with residential dwellings in north-eastern corner of the site. - Surrounding land largely developed with residential and industrial land use.
1922	1:2,500	- Timber yard in north-eastern corner of the site. - School built on site.

2.2 Geological Context

The BGS geological mapping (Geoindex and BGS Sheet 85 Manchester) show that the site is directly underlain by diamicton which is of Quaternary age. Diamicton generally consists of unsorted clays, silts, sands and gravels.

The underlying bedrock consists of the Pennine Upper Coal Measures Formation which is of Carboniferous age. The Pennine Upper Coal Measures Formation generally consists of interbedded grey mudstones and siltstones with pale grey sandstones and numerous coal seams but no mudstones containing marine fossils. According to the BGS geological sheet, the bedrock has a regional dip of about 18° towards the southwest – **See Appendix D**.

The nearest geological fault is located 670m northwest of the site.

Two BGS borehole records (ref: SJ89NE195 and SJ89NE194) have been obtained from BGS online records, relating to locations within the site boundary – see **Appendix E**. The boreholes show about 2m of Made Ground overlying thick deposits of diamicton consisting of generally stiff clays with occasional lenses of sand. A 4m thick layer of sand is recorded at a depth of 12m bgl. Bedrock was recoded at depths of 25.0m and 27.5m bgl. The locations of the boreholes are shown in **Figure 2**.

Two coal subcrops are shown to intersect the site, which strike from northwest to southeast (see **Figure 2**). These include the Bradford 4 Foot, which passes through the north-eastern section of the site and the overlying Bradford Threequarters, which cuts the south-western section.

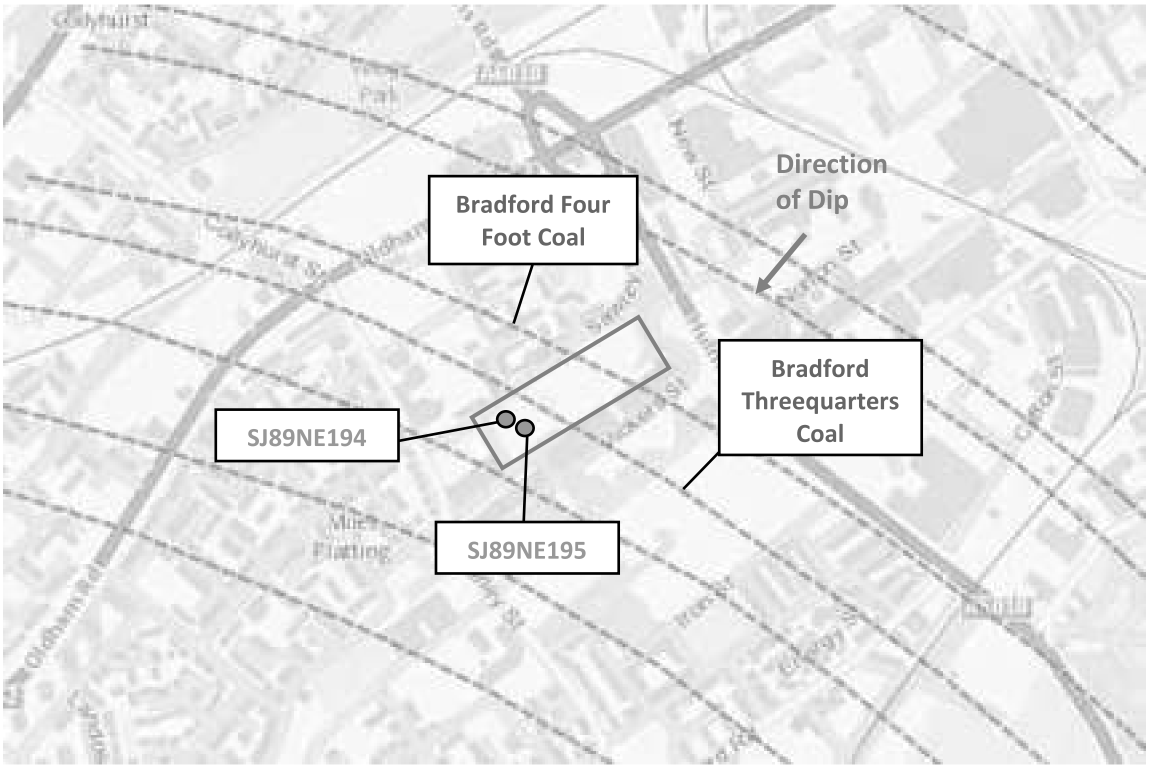


Figure 2) Coal Seam Location Map (Coal Authority Interactive Viewer)

The site is situated within a Secondary Opencast Coal Resource Area (**Appendix F**). The Secondary Opencast Coal Resource Area is defined by the BGS as “A zone in which opencast coal resources are present at surface but the coals are generally thinner and less concentrated in vertical and areal distribution”. Notwithstanding this, it is considered to be very unlikely that there will be any interest in developing open cast coal mining operations at this location in the short or medium-term.

3 Identification and Assessment of Site-Specific Coal Mining Risks

Table 2 below summarises the potential risks associated with coal mining legacy for the proposed development site, which have been identified from list sources of information.

Table 2 - Coal Mining Hazards Summary

Coal Mining Issues	Yes	No
Coal outcrops	X	
Underground coal mining (recorded at shallow depths)	X	
Underground coal mining (probable at shallow depths)	X	
Recorded mine entries (shafts and adits)	X	
Unrecorded mine entries (shafts and adits)	X	
Coal mining geology (fissures)		X
Record of past gas emissions		X
Recorded coal mining surface hazard		X
Surface mining (opencast workings)		X

The Coal Authority Interactive Map Viewer (**Appendix G**) has identified that the south-western half of the site lies within a Development High Risk Area. This is associated with a number of coal mining related issues including:

- recorded mine workings (in the Bradford Four Foot Coal which is 1.2m thick (although the Coal Authority interactive viewer map indicates that it could alternatively be the Bradford Threequarters Coal);
- unrecorded workings at shallow depth that might also include the Bradford Threequarters Coal;
- the presence of recorded mine shafts (Ref: 386399-001 and 386399-016) within the site boundary;
- the presence of a third recorded mine shaft (Ref: 386399-002) shown to be in close proximity to the south-western site boundary.

The reports obtained from the Coal Authority (Consultants Coal Mining Report, reference 51002883792001, dated 7th January 2022 and 51002948577001, dated 3rd March 2022) has revealed that the property is in a surface area that is affected by recorded underground mining in 4 no. seams of coal at depths of between 23m and 842m bgl.

Using the generally accepted 'rule-of-thumb' guidance that a competent rock strata thickness equivalent to at least ten times the extraction thickness provides adequate protection against crown-hole development and surface instability (Refs 2 and 3), it can be concluded that the recorded workings in the Bradford Four Foot Coal could result in surface subsidence or crown-hole development. EnviroSolution note a discrepancy in the labelling of the Bradford Threequarters (or Yard) as the Bradford 4 Foot Coal within the Coal Authority report which contradicts the Coal Authority Interactive Viewer.

The Coal Authority report states that the property is in an area where they believe there is coal at or close to the surface that may have been worked in the past (Bradford 4 Foot Coal and Bradford Threequarters Coal). The Coal Authority has drawn attention to this and has stated that the presence of unrecorded shallow coal should be considered. It is also concluded that if the shallow coal seams have been worked in the past, they could present a risk of surface subsidence.

The Coal Authority report states that they are aware of 5 no. recorded mine entries within 100m of the development site boundary. The mine shaft information is summarised in Table 3 below.

Table 3 - Mine Shaft Summary

Reference	Treatment Details	Mineral	Distance from Site
385311-011		Coal	72m NW
386399-001	The shaft was located in 1974 and was found to be filled. The shaft was then drilled and pressure grouted.	Coal	On Site
386399-002		Coal	1m SW
386399-016		Coal	On Site
386399-017		Coal	73m N

The location of the shafts is shown in **Figure 3**. Records from 2 no. historic boreholes located within the site (see **Appendix E**) shows that the drift thickness at the shaft location is between 25m and 27m. It is therefore considered that the zones of influence around shaft 386399-002 intersects the site and therefore pose a risk of surface subsidence. This is in addition to shaft 386399-001, which lies within the site boundary. See **Figure 4**.

The Coal Authority mining report states the property is not within the boundary of a historic or current opencast site, and there are no license requests outstanding to remove coal via this method in the future. The risk posed to the site from opencast mining methods is therefore considered to be negligible.

A full mining hazard plan is shown in **Appendix H**.

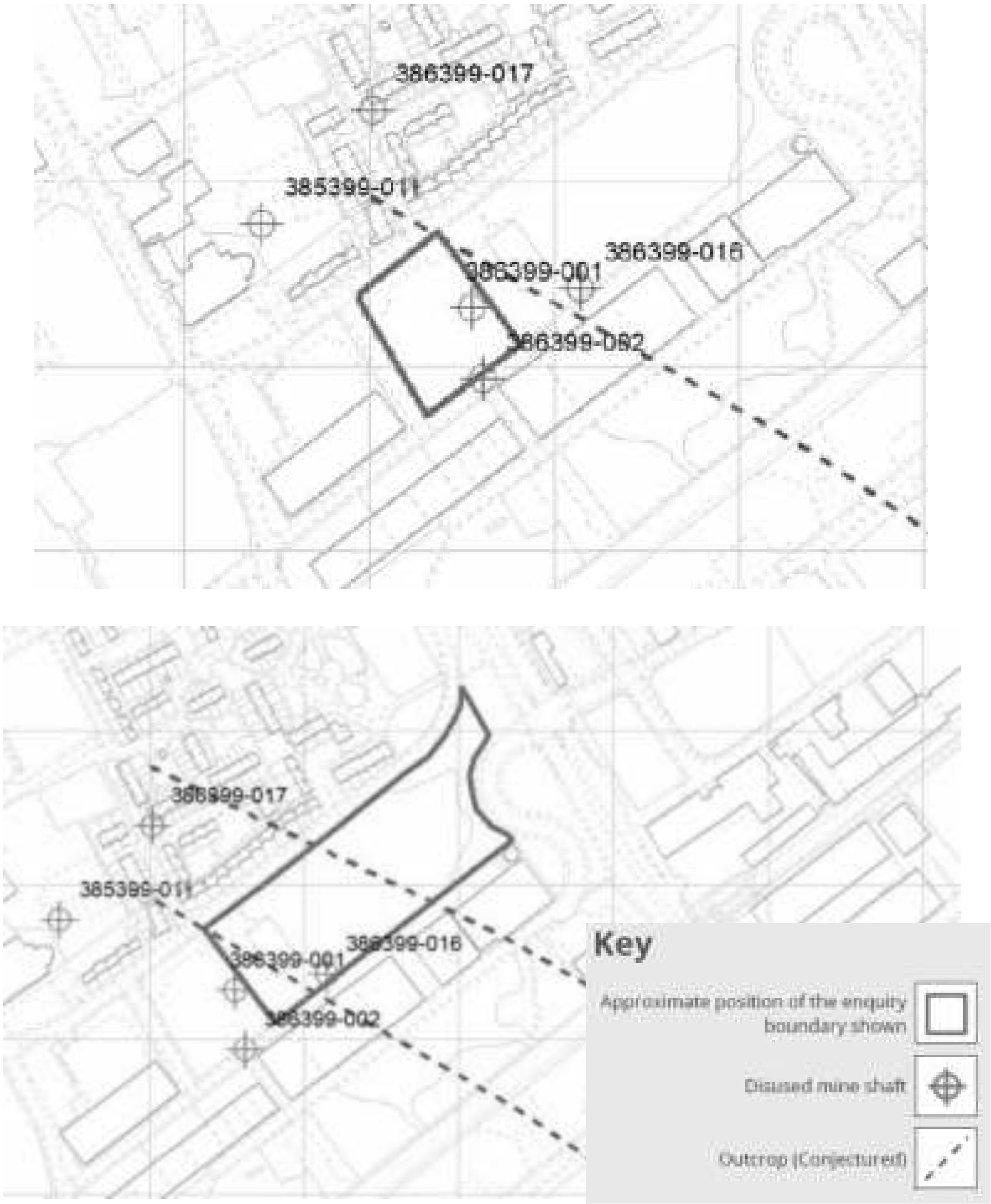

386399-017
385399-011
386399-016
386399-001
386399-002
386399-017
385399-011
386399-001
386399-016
386399-002
Key
Approximate position of the enquiry boundary shown
Disused mine shaft
Outcrop (Conjectured)

Figure 3) Coal Mining Summary Maps

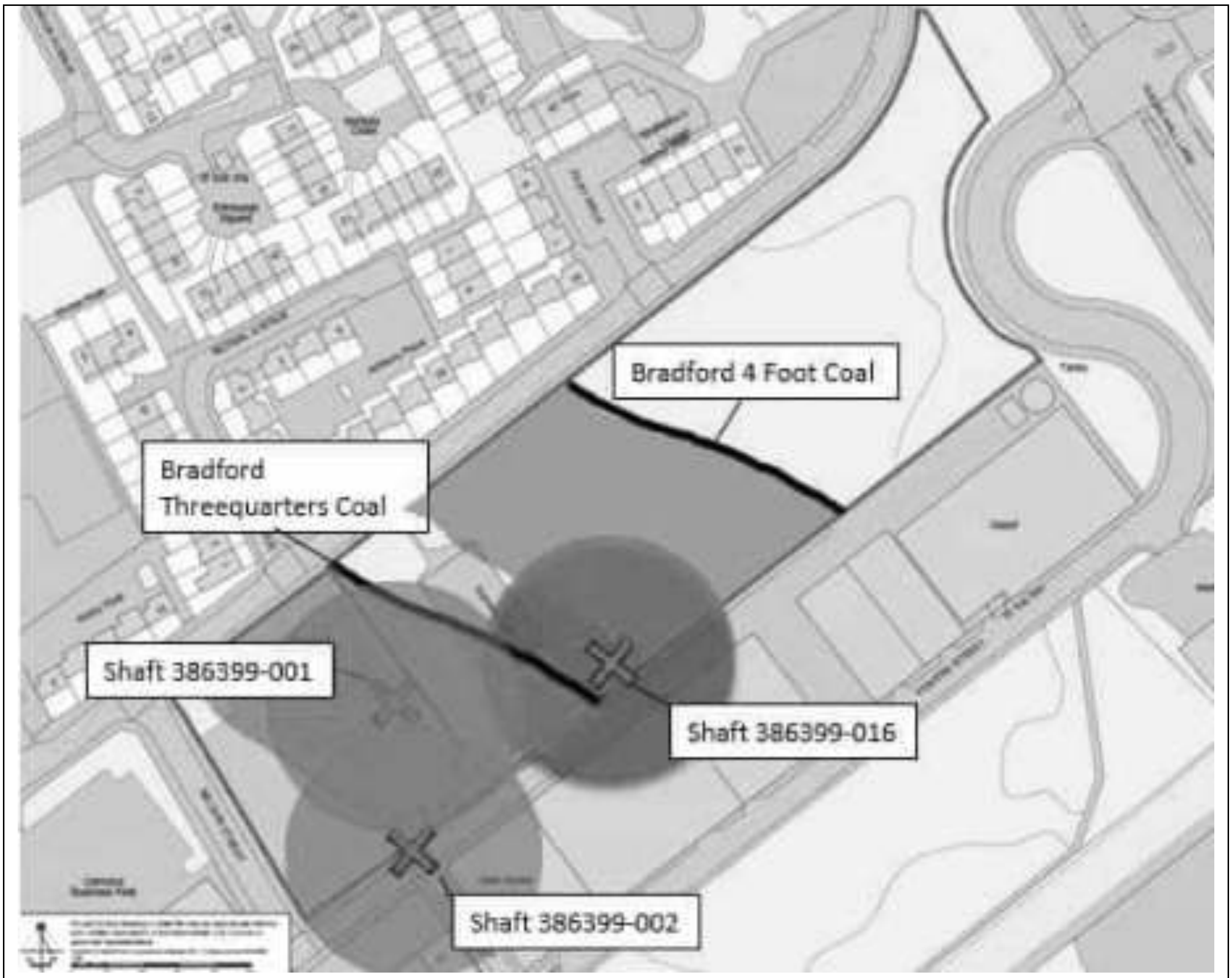

Bradford 4 Foot Coal
Bradford Threequarters Coal
Shaft 386399-001
Shaft 386399-016
Shaft 386399-002

Figure 4) Potential Hazard Zones

4 Proposed Mitigation Strategy

- The site layout could be produced where no built development lies within the hazard zones around the shafts or down dip of the coal workings/ seams.

- No above-ground built development should take place within the hazard zones around the shafts or down dip of the coal workings/ seams without undertaking physical investigation and/or mitigation measures if required.

- A programme of trial trenching should be undertaken around the location of Shaft 386399-001 and along the site boundary in proximity to Shaft 386399-002 to look for evidence of the shafts and/ or evidence of historic treatment works.

- Shaft 386399-016 should be located and treated via a programme of probe drilling and capping. This should also be undertaken if built development is proposed above Shaft 386399-001. During drilling works, it will be necessary to continuously monitor for ground gases. In order to undertake these works it will be necessary to obtain a drilling permit from The Coal Authority.

- No construction works should take place over, or within 25m of the of the abandoned mine shaft (Shaft 386399-016) unless treated.

- In any proposed areas of soft landscaping, play areas or car parking where they intersect the hazard zones, then a durable geotextile/ geogrid could be used to provide immediate protection against surface instability. This could be placed in conjunction with the formation of the surfacing.

- It is recommended that a minimum of 6 no. rotary boreholes are advanced to a minimum depth of 35m below ground level in the hazard areas. Water flush should be used to safeguard against oxidation and potential spontaneous combustion of shallow coal. In order to undertake these works it will be necessary to obtain a drilling permit from The Coal Authority.

- The possibility of unrecorded mine shafts has been highlighted in the Coal Authority report. Historical maps do not show evidence of shafts within the site boundary. The potential risk can be dealt with through vigilance during the earthworks stage of construction.

5 Conclusions

The Coal Mining Risk Assessment for the site at Varley Street in Manchester has concluded that the risk associated with coal mining related issues is significant. Information obtained from the Coal Authority and the assessment made by EnviroSolution has concluded that risks remain, including potential recorded shallow abandoned coal mine workings, unrecorded workings and recorded and unrecorded coal mine shafts.

The principal risks to the development arise from:

- the presence of recorded shallow mine workings;
- the potential presence of unrecorded shallow mine workings associated with coal seams of workable thickness that are expected to be present beneath the site area;
- recorded mine entries;
- unrecorded mine entries;
- mine gas.

It is therefore recommended that further intrusive ground investigations are undertaken. These might include the drilling of up to 6 no. rotary probe boreholes across the site to determine the proximate coal seam positions along with obtaining evidence of unrecorded and recorded coal mine workings and a programme of probe drilling to locate mine shaft 396399-016. A trial trenching programme should be undertaken to find evidence of Shafts 386399-001 and 386399-002. Additional mitigation measures would be required for the area that lies within the zone(s) of influence around the mineshaft(s). This may include utilising a geotextile layer for soft play areas or relocating buildings from this area.

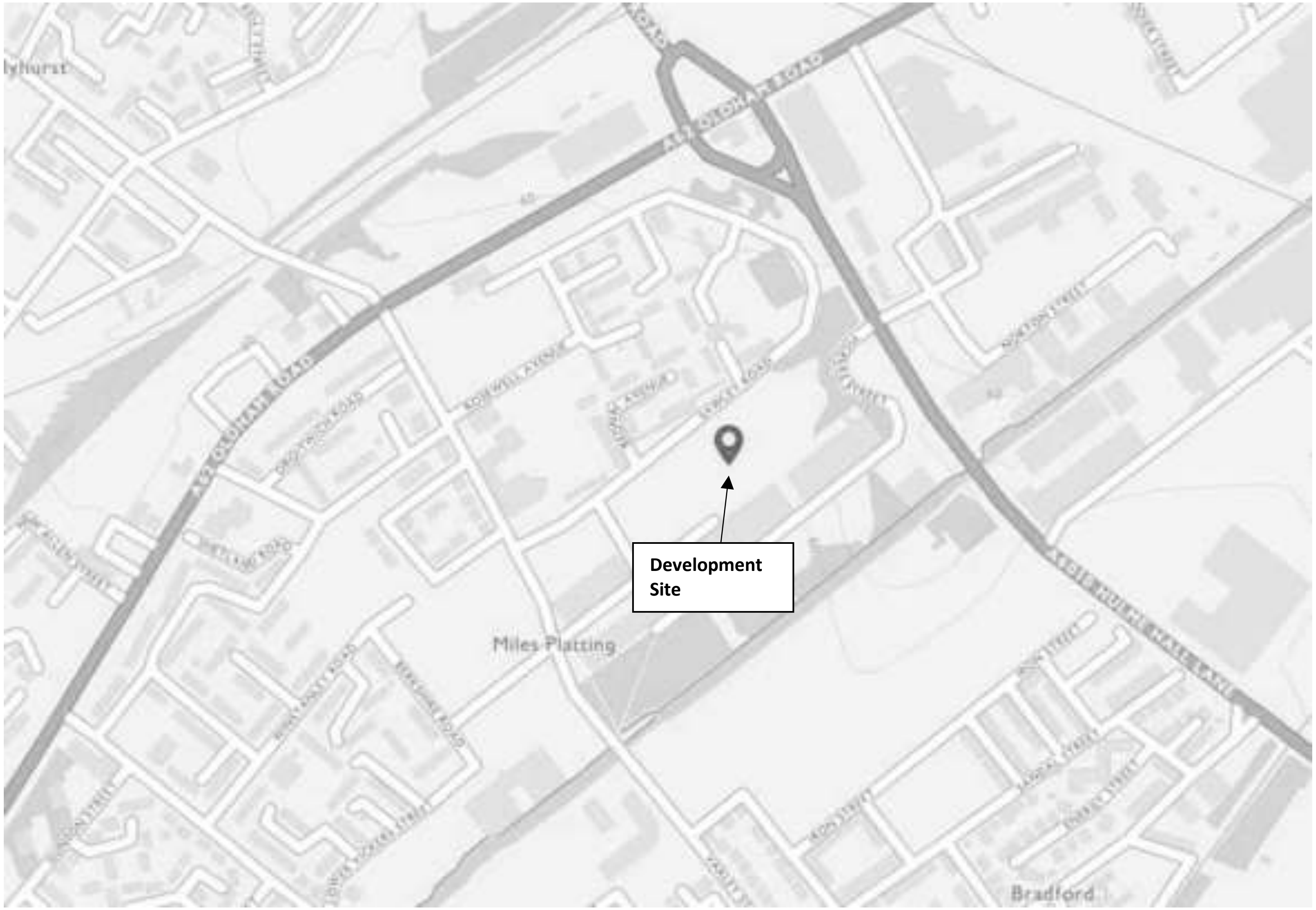
Prior to the commencement of intrusive works, a Coal Authority Permit will be required for intrusive activities, that will disturb or enter any coal seams, coal mine workings or coal mine entries (shafts and adits). The scope of works for the investigation will need to be submitted and approved by the local authority prior to the commencement of the intrusive works.

It is also recommended that consultations are made with the Coal Authority in order to confirm agreement on the constraints to various types of site development above recorded shafts and their zones of influence.

6 References

1. Coal Authority, 2014, Risk Based Approach to Development Management Resources for Developers, Version 3.
2. CIRIA, 2002, SP32 Construction over Abandoned Mine Workings.
3. CIRIA, 2019, C758D Abandoned Mine Workings Manual.
4. CIRIA, Publication C665, Assessing risks posed by hazardous ground gases to buildings.

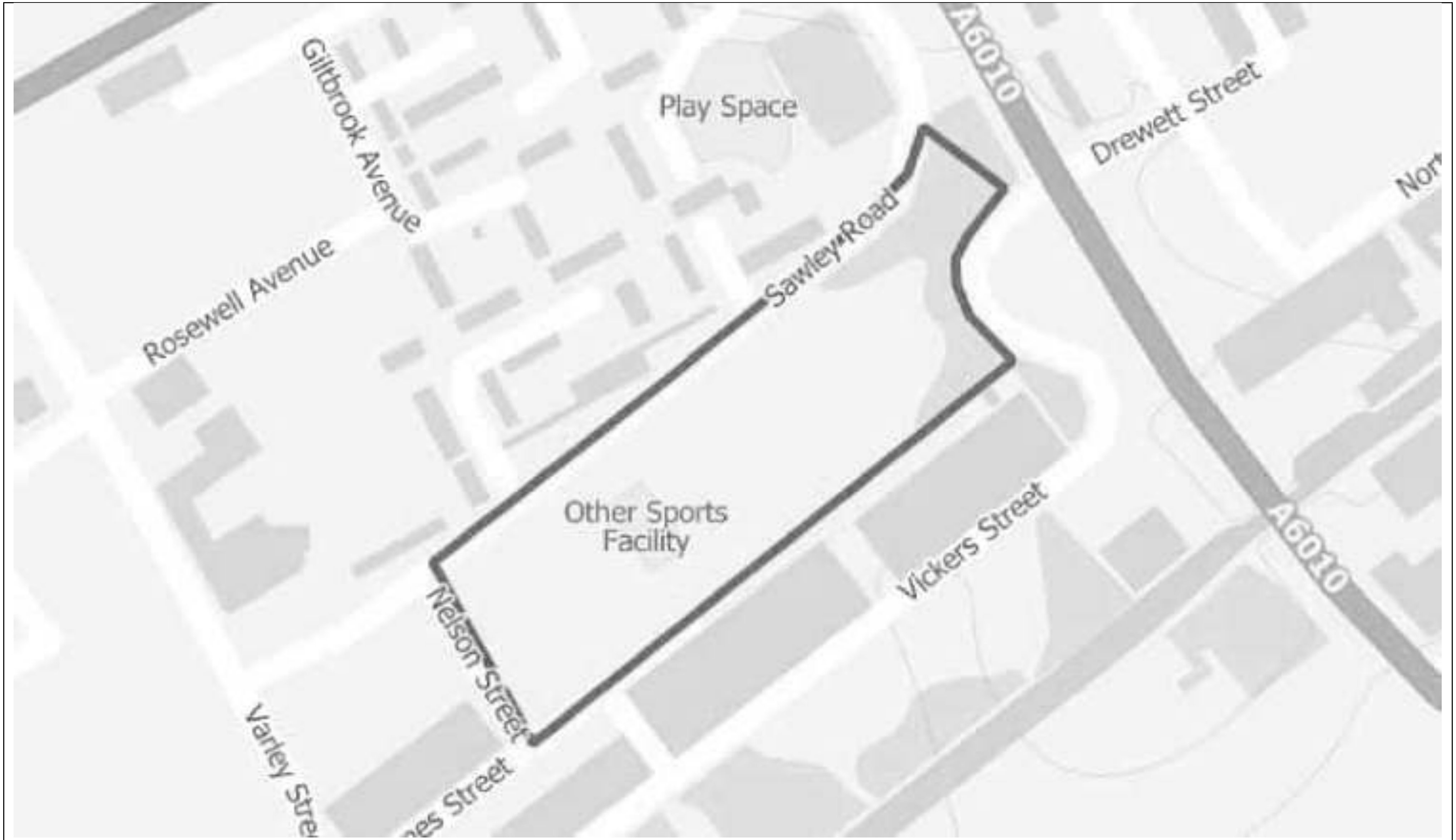
Appendix A – Site Location


lyhurst
A62 OLDHAM ROAD
A62 OLDHAM ROAD
Miles Platting
A6010 HULME HALL LANE
Bradford

Development Site

enviro | solution

Site Location Map


Play Space
Gillbrook Avenue
Rosewell Avenue
Sawley Road
A6010
Drewett Street
Nort
Other Sports Facility
Vickers Street
Nelson Street
Varley Stre
es Street
A6010

enviro | solution

Existing Site Plan

Appendix B – Coal Authority Report

The Coal
Authority

Consultants

Coal Mining Report

Varley Street
Manchester
M40 8EE

Date of enquiry:	**7 January 2022**
Date enquiry received:	**7 January 2022**
Issue date:	**7 January 2022**
Our reference:	**51002883792001**
Your reference:	**ES070122**

Consultants
Coal Mining Report

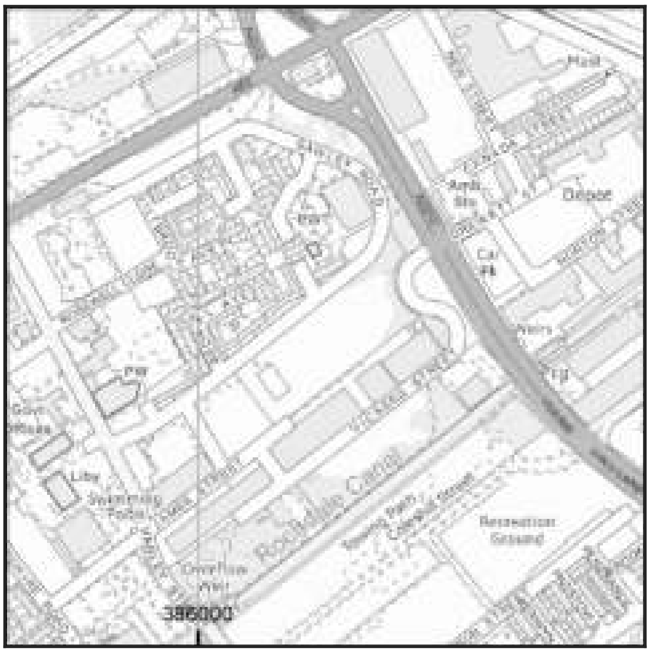
This report is based on and limited to the records held by the Coal Authority at the time the report was produced.

Client name

EnviroSolution Limited

Enquiry address

Varley Street
Manchester
M40 8EE



Rochdale Canal
Depot
Works
Lby
Swimming Pools
Reservation Ground
Overflow Weir
386000
PW
Govt Offices

Approximate position of property

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200 Lichfield Lane
Mansfield
Nottinghamshire
NG18 4RG

www.groundstability.com

@coalauthority
/company/the-coal-authority
/thecoalauthority
/thecoalauthority

Section 1 – Mining activity and geology

Past underground mining

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

Probable unrecorded shallow workings
Yes.

Spine roadways at shallow depth
No spine roadway recorded at shallow depth.

Mine entries

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	

Abandoned mine plan catalogue numbers

The following abandoned mine plan catalogue numbers intersect with some, or all, of the enquiry boundary:

11471	NW1171	NW1172
0	NW645	PO0
2655	NW644	

Please contact us on 0345 762 6848 to determine the exact abandoned mine plans you require based on your needs.

Outcrops

Seam name	Mineral	Seam workable	Distance to outcrop (m)	Direction to outcrop	Bearing of outcrop
BRADFORD FOUR FEET	Coal	Yes	Within	N/A	120
YARD	Coal	Yes	Within	N/A	115

Geological faults, fissures and breaklines

No faults, fissures or breaklines recorded.

Opencast mines

None recorded within 500 metres of the enquiry boundary.

Coal Authority managed tips

None recorded within 500 metres of the enquiry boundary.

Section 2 – Investigative or remedial activity

Please refer to the 'Summary of findings' map (on separate sheet) for details of any activity within the area of the site boundary.

Site investigations
None recorded within 50 metres of the enquiry boundary.

Remediated sites
None recorded within 50 metres of the enquiry boundary.

Coal mining subsidence
The Coal Authority has not received a damage notice or claim for the subject property, or any property within 50 metres of the enquiry boundary, since 31 October 1994.

There is no current Stop Notice delaying the start of remedial works or repairs to the property.

The Coal Authority is not aware of any request having been made to carry out preventive works before coal is worked under section 33 of the Coal Mining Subsidence Act 1991.

Mine gas
None recorded within 500 metres of the enquiry boundary.

Mine water treatment schemes
None recorded within 500 metres of the enquiry boundary.

Section 3 – Licensing and future mining activity

Future underground mining
None recorded.

Coal mining licensing
None recorded within 200 metres of the enquiry boundary.

Court orders
None recorded.

Section 46 notices
No notices have been given, under section 46 of the Coal Mining Subsidence Act 1991, stating that the land is at risk of subsidence.

Withdrawal of support notices
The property is in an area where a notice to withdraw support was given in 1955.

The property is not in an area where a notice has been given under section 41 of the Coal Industry Act 1994, cancelling the entitlement to withdraw support.

Payments to owners of former copyhold land
The property is not in an area where a relevant notice has been published under the Coal Industry Act 1975/Coal Industry Act 1994.

Section 4 – Further information

The following potential risks have been identified and as part of your risk assessment should be investigated further.

Development advice

The site is within an area of historical coal mining activity. Should you require advice and/or support on understanding the mining legacy, its risks to your development or what next steps you need to take, please contact us.

For further information on specific site or ground investigations in relation to any issues raised in Section 4, please call us on 0345 762 6848 or email us at groundstability@coal.gov.uk.

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Section 5 – Data definitions

The datasets used in this report have limitations and assumptions within their results. For more guidance on the data and the results specific to the enquiry boundary, please **call us on 0345 762 6848** or **email us at groundstability@coal.gov.uk.**

Past underground coal mining
Details of all recorded underground mining relative to the enquiry boundary. Only past 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.

Probable unrecorded shallow workings
Areas where the Coal Authority believes there to be unrecorded coal workings that exist at or close to the surface (less than 30 metres deep).

Spine roadways at shallow depth
Connecting roadways either, working to working, or, surface to working, both in-seam and cross measures that exist at or close to the surface (less than 30 metres deep), either within or within 10 metres of the enquiry boundary.

Mine entries
Details of any shaft or adit either within, or within 100 metres of the enquiry boundary including approximate location, brief treatment details where known, the mineral worked from the mine entry and conveyance details where the mine entry has previously been sold by the Authority or its predecessors British Coal or the National Coal Board.

Abandoned mine plan catalogue numbers
Plan numbers extracted from the abandoned mines catalogue containing details of coal and other mineral abandonment plans deposited via the Mines Inspectorate in accordance with the Coal Mines Regulation Act and Metalliferous Mines Regulation Act 1872. A maximum of 9 plan extents that intersect with the enquiry boundary will be included. This does not infer that the workings and/or mine entries shown on the abandonment plan will be relevant to the site/property boundary.

Outcrops
Details of seam outcrops will be included where the enquiry boundary intersects with a conjectured or actual seam outcrop location (derived by either the British Geological Survey or the Coal Authority) or intersects with a defined 50 metres buffer on the coal (dip) side of the outcrop. An indication of whether the Coal Authority believes the seam to be of sufficient thickness and/or quality to have been worked will also be included.

Geological faults, fissures and breaklines
Geological disturbances or fractures in the bedrock. Surface fault lines (British Geological Survey derived data) and fissures and breaklines (Coal Authority derived data) intersecting with the enquiry boundary will be included. In some circumstances faults, fissures or breaklines have been known to contribute to surface subsidence damage as a consequence of underground coal mining.

Opencast mines
Opencast coal sites from which coal has been removed in the past by opencast (surface) methods and where the enquiry boundary is within 500 metres of either the licence area, site boundary, excavation area (high wall) or coaling area.

Coal Authority managed tips
Locations of disused colliery tip sites owned and managed by the Coal Authority, located within 500 metres of the enquiry boundary.

Site investigations
Details of site investigations within 50 metres of the enquiry boundary where the Coal Authority has received information relating to coal mining risk investigation and/or remediation by third parties.

Remediated sites
Sites where the Coal Authority has undertaken remedial works either within or within 50 metres of the enquiry boundary following report of a hazard relating to coal mining under the Coal Authority's Emergency Surface Hazard Call Out procedures.

Coal mining subsidence
Details of alleged coal mining subsidence claims made since 31 October 1994 either within or within 50 metres of the enquiry boundary. Where the claim relates to the enquiry boundary confirmation of whether the claim was accepted, rejected or whether liability is still being determined will be given. Where the claim has been discharged, whether this was by repair, payment of compensation or a combination of both, the value of the claim, where known, will also be given.

Details of any current 'Stop Notice' deferring remedial works or repairs affecting the property/site, and if so the date of the notice.

Details of any request made to execute preventative works before coal is worked under section 33 of the Coal Mining Subsidence Act 1991. If yes, whether any person withheld consent or failed to comply with any request to execute preventative works.

Mine gas
Reports of alleged mine gas emissions received by the Coal Authority, either within or within 500 metres of the enquiry boundary that subsequently required investigation and action by the Coal Authority to mitigate the effects of the mine gas emission.

Mine water treatment schemes
Locations where the Coal Authority has constructed or operates assets that remove pollutants from mine water prior to the treated mine water being discharged into the receiving water body.

These schemes are part of the UK's strategy to meet the requirements of the Water Framework Directive. Schemes fall into 2 basic categories: Remedial – mitigating the impact of existing pollution or Preventative – preventing a future pollution incident.

Mine water treatment schemes generally consist of one or more primary settlement lagoons and one or more reed beds for secondary treatment. A small number are more specialised process treatment plants.

Future underground mining
Details of all planned underground mining relative to the enquiry boundary. Only those future 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.

Coal mining licensing
Details of all licenses issued by the Coal Authority either within or within 200 metres of the enquiry boundary in relation to the under taking of surface coal mining, underground coal mining or underground coal gasification.

Court orders
Orders in respect of the working of coal under the Mines (Working Facilities and Support) Acts of 1923 and 1966 or any statutory modification or amendment thereof.

Section 46 notices
Notice of proposals relating to underground coal mining operations that have been given under section 46 of the Coal Mining Subsidence Act 1991.

Withdrawal of support notices
Published notices of entitlement to withdraw support and the date of the notice. Details of any revocation notice withdrawing the entitlement to withdraw support given under Section 41 of the Coal Industry Act 1994.

Payment to owners of former copyhold land
Relevant notices which may affect the property and any subsequent notice of retained interests in coal and coal mines, acceptance or rejection notices and whether any compensation has been paid to a claimant.

Summary of findings

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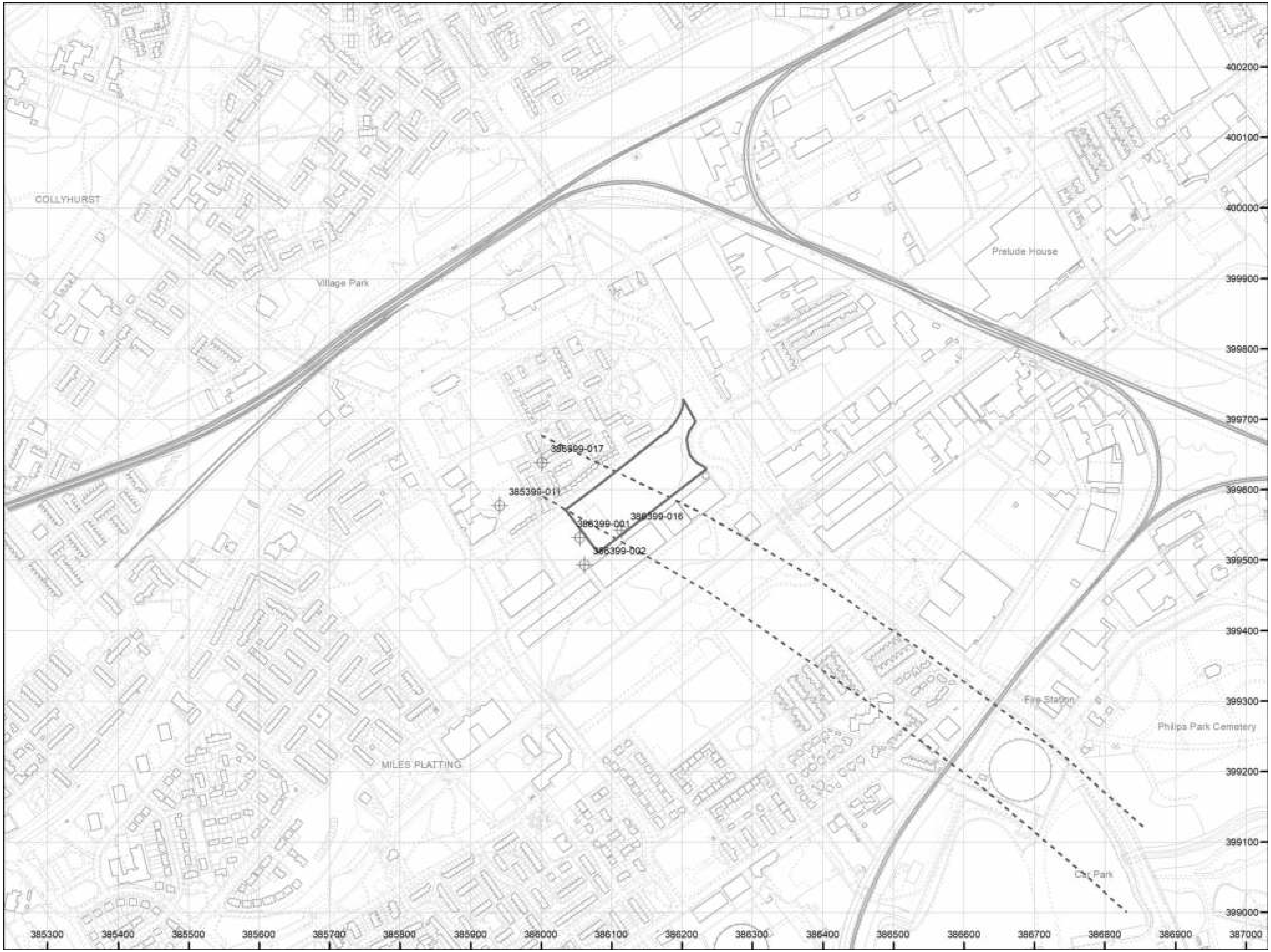
The map highlights any specific surface or subsurface features within or near to the boundary of the site.

Key

Approximate position of the enquiry boundary shown	☐
Disused mine shaft	⊕
Outcrop (Conjectured)	- - -


COLLYHURST
Village Park
Prelude House
386399-017
385399-011
386399-001
386399-016
386399-002
MILES PLATTING
Fire Station
Philips Park Cemetery
Car Park
400200
400100
400000
399900
399800
399700
399600
399500
399400
399300
399200
399100
399000
385300
385400
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385800
385900
386000
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386200
386300
386400
386500
386600
386700
386800
386900
387000

How to contact us

0345 762 6848 (UK)
+44 (0)1623 637 000 (International)
www.groundstability.com

The Coal
Authority

Consultants
Coal Mining Report

Land At Varley Street/ Nelson Street
Manchester
M40 8EF

Date of enquiry:	**3 March 2022**
Date enquiry received:	**3 March 2022**
Issue date:	**3 March 2022**
Our reference:	**51002948577001**
Your reference:	**ES030322**

Consultants
Coal Mining Report

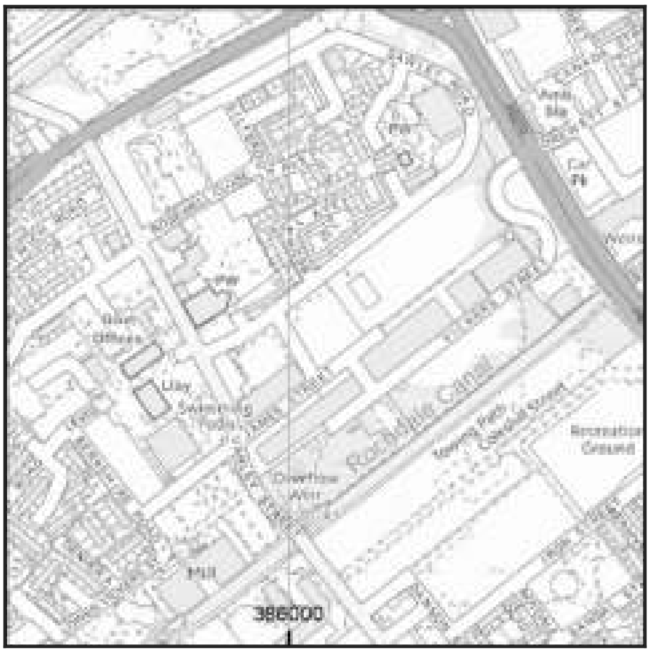
This report is based on and limited to the records held by the Coal Authority at the time the report was produced.

Client name

EnviroSolution Limited

Enquiry address

Land At Varley Street/ Nelson Street
Manchester
M40 8EF



Approximate position of property

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How to contact us

0345 762 6848 (UK)
+44 (0)1623 637 000 (International)

200 Lichfield Lane
Mansfield
Nottinghamshire
NG18 4RG

www.groundstability.com

@coalauthority
/company/the-coal-authority
/thecoalauthority
/thecoalauthority

Section 1 – Mining activity and geology

Past underground mining

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	23	Beneath Property	18.4	South-West	120	1900
unnamed	PARKER	Coal	35BL	342	North-East	18.0	South-West	80	1935
unnamed	PARKER	Coal	35BR	373	North	7.8	South-West	80	1935
unnamed	PARKER	Coal	35BQ	401	Beneath Property	22.5	South	80	1935
unnamed	ROGER	Coal	35AM	626	North	16.2	South	180	1964
unnamed	CROMBOUKE	Coal	3597	628	North	16.9	South-West	120	1936
unnamed	ROGER	Coal	35AN	634	North	17.2	South-West	180	1964
unnamed	ROGER	Coal	35AY	636	North-East	16.1	South-West	180	1961
unnamed	ROGER	Coal	35AL	642	North	17.4	South	180	1967
unnamed	CROMBOUKE	Coal	359F	713	Beneath Property	21.0	South-West	120	1924
unnamed	ROGER	Coal	35AZ	723	Beneath Property	20.8	South-West	180	1963
unnamed	ROGER	Coal	35B2	788	West	21.6	South	180	1965
unnamed	CROMBOUKE	Coal	359E	842	South	16.5	South-West	120	1932

Probable unrecorded shallow workings

Yes.

Spine roadways at shallow depth

No spine roadway recorded at shallow depth.

Mine entries

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	

Abandoned mine plan catalogue numbers

The following abandoned mine plan catalogue numbers intersect with some, or all, of the enquiry boundary:

11471	NW1171	NW1172
0	NW645	PO0
NW1167	2655	NW644

Please contact us on 0345 762 6848 to determine the exact abandoned mine plans you require based on your needs.

Outcrops

Seam name	Mineral	Seam workable	Distance to outcrop (m)	Direction to outcrop	Bearing of outcrop
BRADFORD FOUR FEET	Coal	Yes	Within	N/A	120

Geological faults, fissures and breaklines

No faults, fissures or breaklines recorded.

Opencast mines

None recorded within 500 metres of the enquiry boundary.

Coal Authority managed tips

None recorded within 500 metres of the enquiry boundary.

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Section 2 – Investigative or remedial activity

Please refer to the 'Summary of findings' map (on separate sheet) for details of any activity within the area of the site boundary.

Site investigations
None recorded within 50 metres of the enquiry boundary.

Remediated sites
None recorded within 50 metres of the enquiry boundary.

Coal mining subsidence
The Coal Authority has not received a damage notice or claim for the subject property, or any property within 50 metres of the enquiry boundary, since 31 October 1994.

There is no current Stop Notice delaying the start of remedial works or repairs to the property.

The Coal Authority is not aware of any request having been made to carry out preventive works before coal is worked under section 33 of the Coal Mining Subsidence Act 1991.

Mine gas
None recorded within 500 metres of the enquiry boundary.

Mine water treatment schemes
None recorded within 500 metres of the enquiry boundary.

Section 3 – Licensing and future mining activity

Future underground mining
None recorded.

Coal mining licensing
None recorded within 200 metres of the enquiry boundary.

Court orders
None recorded.

Section 46 notices
No notices have been given, under section 46 of the Coal Mining Subsidence Act 1991, stating that the land is at risk of subsidence.

Withdrawal of support notices
The property is in an area where a notice to withdraw support was given in 1955.

The property is not in an area where a notice has been given under section 41 of the Coal Industry Act 1994, cancelling the entitlement to withdraw support.

Payments to owners of former copyhold land
The property is not in an area where a relevant notice has been published under the Coal Industry Act 1975/Coal Industry Act 1994.

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Section 4 – Further information

The following potential risks have been identified and as part of your risk assessment should be investigated further.

Development advice

The site is within an area of historical coal mining activity. Should you require advice and/or support on understanding the mining legacy, its risks to your development or what next steps you need to take, please contact us.

For further information on specific site or ground investigations in relation to any issues raised in Section 4, please call us on 0345 762 6848 or email us at groundstability@coal.gov.uk.

Section 5 – Data definitions

The datasets used in this report have limitations and assumptions within their results. For more guidance on the data and the results specific to the enquiry boundary, please **call us on 0345 762 6848** or **email us at groundstability@coal.gov.uk.**

Past underground coal mining
Details of all recorded underground mining relative to the enquiry boundary. Only past 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.

Probable unrecorded shallow workings
Areas where the Coal Authority believes there to be unrecorded coal workings that exist at or close to the surface (less than 30 metres deep).

Spine roadways at shallow depth
Connecting roadways either, working to working, or, surface to working, both in-seam and cross measures that exist at or close to the surface (less than 30 metres deep), either within or within 10 metres of the enquiry boundary.

Mine entries
Details of any shaft or adit either within, or within 100 metres of the enquiry boundary including approximate location, brief treatment details where known, the mineral worked from the mine entry and conveyance details where the mine entry has previously been sold by the Authority or its predecessors British Coal or the National Coal Board.

Abandoned mine plan catalogue numbers
Plan numbers extracted from the abandoned mines catalogue containing details of coal and other mineral abandonment plans deposited via the Mines Inspectorate in accordance with the Coal Mines Regulation Act and Metalliferous Mines Regulation Act 1872. A maximum of 9 plan extents that intersect with the enquiry boundary will be included. This does not infer that the workings and/or mine entries shown on the abandonment plan will be relevant to the site/property boundary.

Outcrops
Details of seam outcrops will be included where the enquiry boundary intersects with a conjectured or actual seam outcrop location (derived by either the British Geological Survey or the Coal Authority) or intersects with a defined 50 metres buffer on the coal (dip) side of the outcrop. An indication of whether the Coal Authority believes the seam to be of sufficient thickness and/or quality to have been worked will also be included.

Geological faults, fissures and breaklines
Geological disturbances or fractures in the bedrock. Surface fault lines (British Geological Survey derived data) and fissures and breaklines (Coal Authority derived data) intersecting with the enquiry boundary will be included. In some circumstances faults, fissures or breaklines have been known to contribute to surface subsidence damage as a consequence of underground coal mining.

Opencast mines
Opencast coal sites from which coal has been removed in the past by opencast (surface) methods and where the enquiry boundary is within 500 metres of either the licence area, site boundary, excavation area (high wall) or coaling area.

Coal Authority managed tips
Locations of disused colliery tip sites owned and managed by the Coal Authority, located within 500 metres of the enquiry boundary.

Site investigations
Details of site investigations within 50 metres of the enquiry boundary where the Coal Authority has received information relating to coal mining risk investigation and/or remediation by third parties.

Remediated sites
Sites where the Coal Authority has undertaken remedial works either within or within 50 metres of the enquiry boundary following report of a hazard relating to coal mining under the Coal Authority's Emergency Surface Hazard Call Out procedures.

Coal mining subsidence
Details of alleged coal mining subsidence claims made since 31 October 1994 either within or within 50 metres of the enquiry boundary. Where the claim relates to the enquiry boundary confirmation of whether the claim was accepted, rejected or whether liability is still being determined will be given. Where the claim has been discharged, whether this was by repair, payment of compensation or a combination of both, the value of the claim, where known, will also be given.

Details of any current 'Stop Notice' deferring remedial works or repairs affecting the property/site, and if so the date of the notice.

Details of any request made to execute preventative works before coal is worked under section 33 of the Coal Mining Subsidence Act 1991. If yes, whether any person withheld consent or failed to comply with any request to execute preventative works.

Mine gas
Reports of alleged mine gas emissions received by the Coal Authority, either within or within 500 metres of the enquiry boundary that subsequently required investigation and action by the Coal Authority to mitigate the effects of the mine gas emission.

Mine water treatment schemes
Locations where the Coal Authority has constructed or operates assets that remove pollutants from mine water prior to the treated mine water being discharged into the receiving water body.

These schemes are part of the UK's strategy to meet the requirements of the Water Framework Directive. Schemes fall into 2 basic categories: Remedial – mitigating the impact of existing pollution or Preventative – preventing a future pollution incident.

Mine water treatment schemes generally consist of one or more primary settlement lagoons and one or more reed beds for secondary treatment. A small number are more specialised process treatment plants.

Future underground mining
Details of all planned underground mining relative to the enquiry boundary. Only those future 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.

Coal mining licensing
Details of all licenses issued by the Coal Authority either within or within 200 metres of the enquiry boundary in relation to the under taking of surface coal mining, underground coal mining or underground coal gasification.

Court orders
Orders in respect of the working of coal under the Mines (Working Facilities and Support) Acts of 1923 and 1966 or any statutory modification or amendment thereof.

Section 46 notices
Notice of proposals relating to underground coal mining operations that have been given under section 46 of the Coal Mining Subsidence Act 1991.

Withdrawal of support notices
Published notices of entitlement to withdraw support and the date of the notice. Details of any revocation notice withdrawing the entitlement to withdraw support given under Section 41 of the Coal Industry Act 1994.

Payment to owners of former copyhold land
Relevant notices which may affect the property and any subsequent notice of retained interests in coal and coal mines, acceptance or rejection notices and whether any compensation has been paid to a claimant.

Summary of findings

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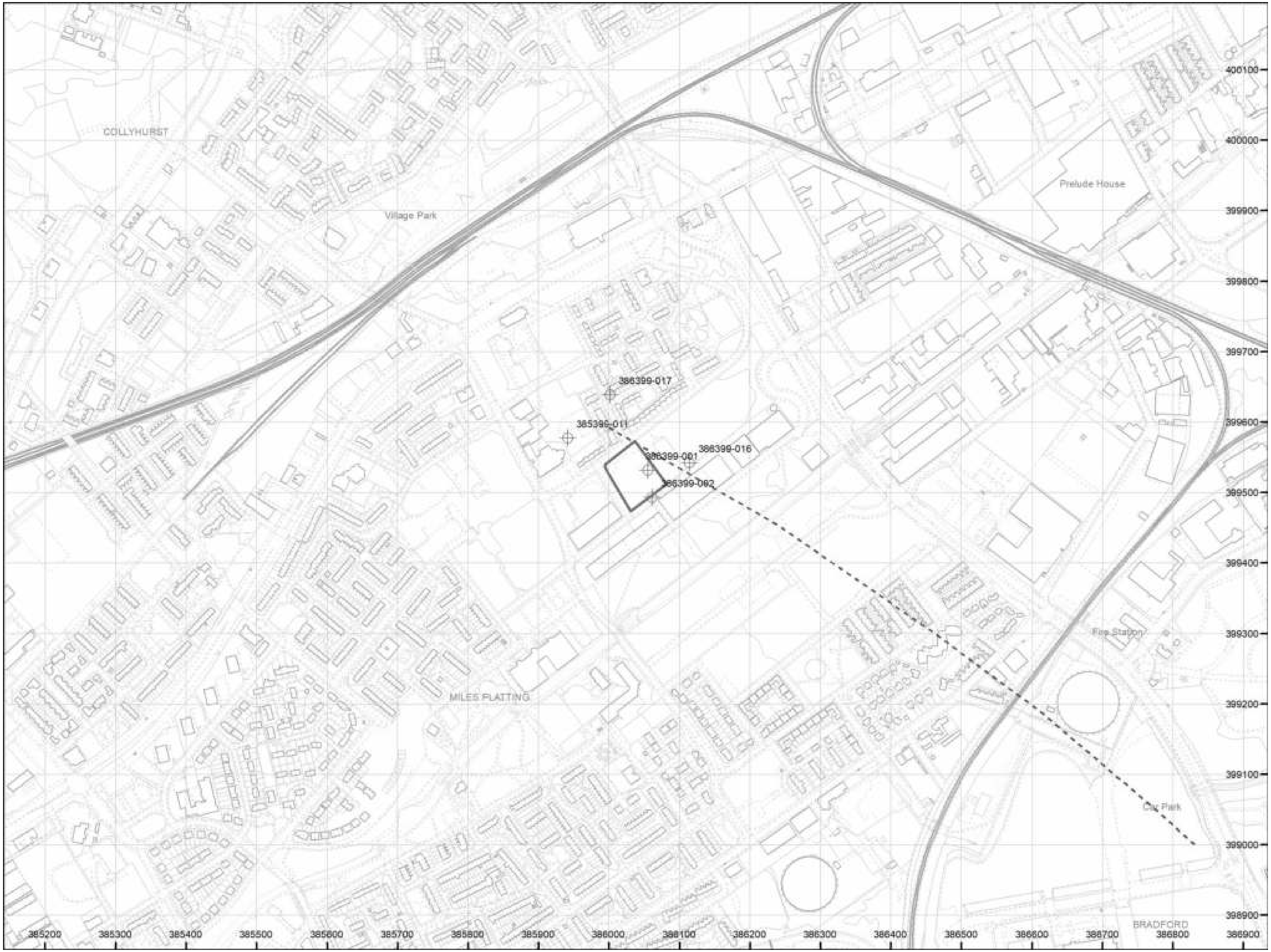
The map highlights any specific surface or subsurface features within or near to the boundary of the site.

Key

Approximate position of the enquiry boundary shown	☐
Disused mine shaft	⌖
Outcrop (Conjectured)	⋰


COLLYHURST
Village Park
Prelude House
386399-017
385399-011
386399-001
386399-016
386399-002
MILES PLATTING
Fire Station
Car Park
BRADFORD
400100
400000
399900
399800
399700
399600
399500
399400
399300
399200
399100
399000
398900
385200
385300
385400
385500
385600
385700
385800
385900
386000
386100
386200
386300
386400
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386600
386700
386800
386900

How to contact us

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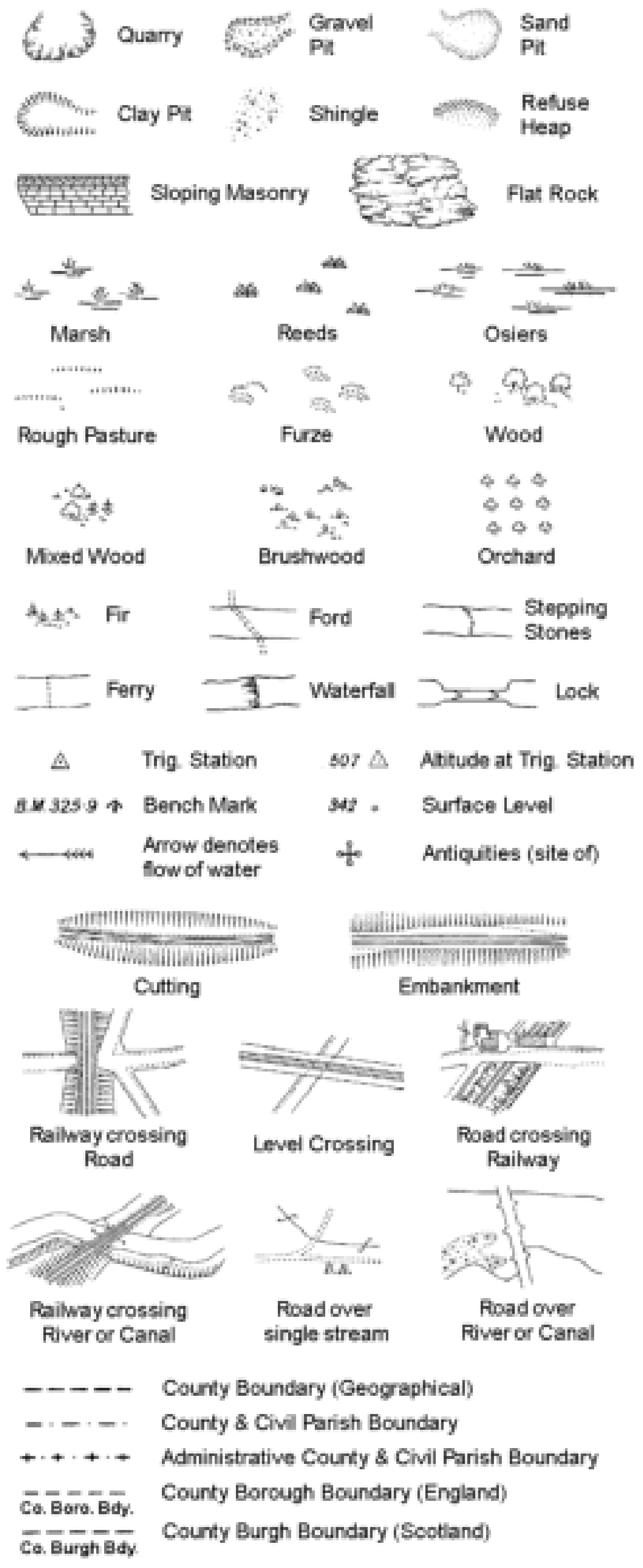
+44 (0)1623 637 000 (International)
www.groundstability.com

Appendix C – Historic Maps

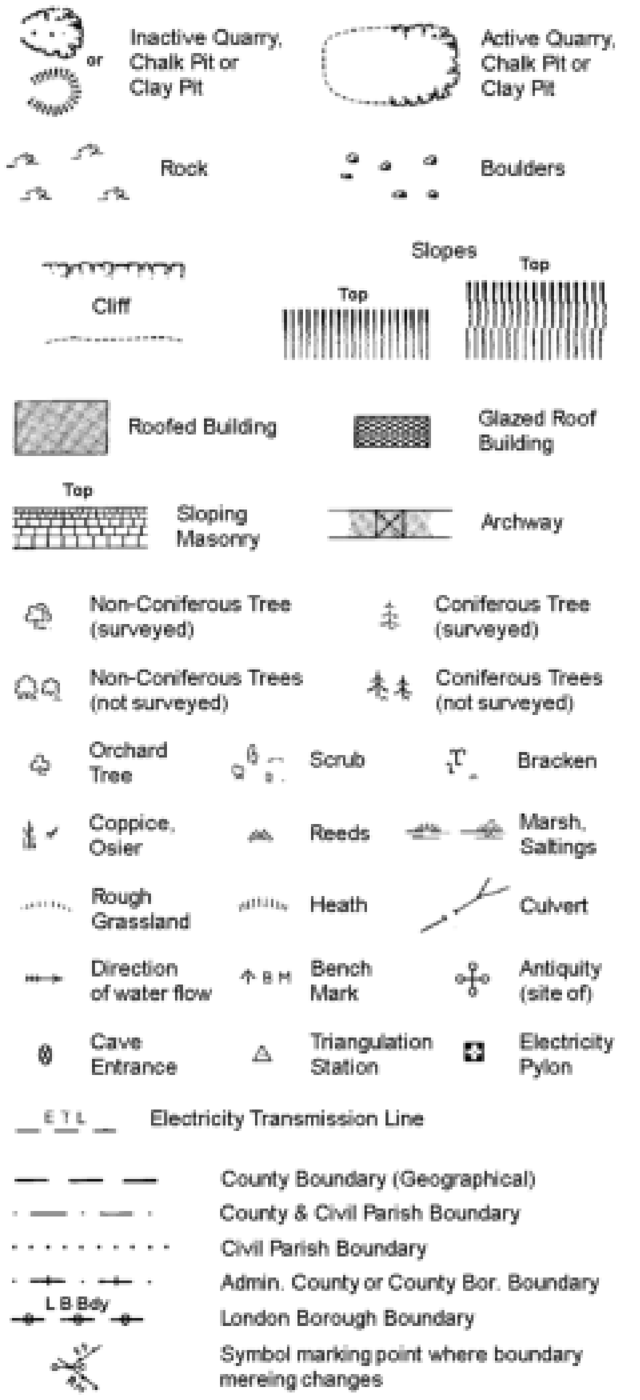
Historical Mapping Legends

Ordnance Survey County Series and Ordnance Survey Plan 1:2,500


Quarry
Gravel Pit
Sand Pit
Clay Pit
Shingle
Refuse Heap
Sloping Masonry
Flat Rock
Marsh
Reeds
Osiers
Rough Pasture
Furze
Wood
Mixed Wood
Brushwood
Orchard
Fir
Ford
Stepping Stones
Ferry
Waterfall
Lock
Trig. Station
507 Altitude at Trig. Station
B.M 325·9 Bench Mark
342 Surface Level
Arrow denotes flow of water
Antiquities (site of)
Cutting
Embankment
Railway crossing Road
Level Crossing
Road crossing Railway
Railway crossing River or Canal
Road over single stream
Road over River or Canal
County Boundary (Geographical)
County & Civil Parish Boundary
Administrative County & Civil Parish Boundary
Co. Boro. Bdy. County Borough Boundary (England)
Co. Burgh Bdy. County Burgh Boundary (Scotland)

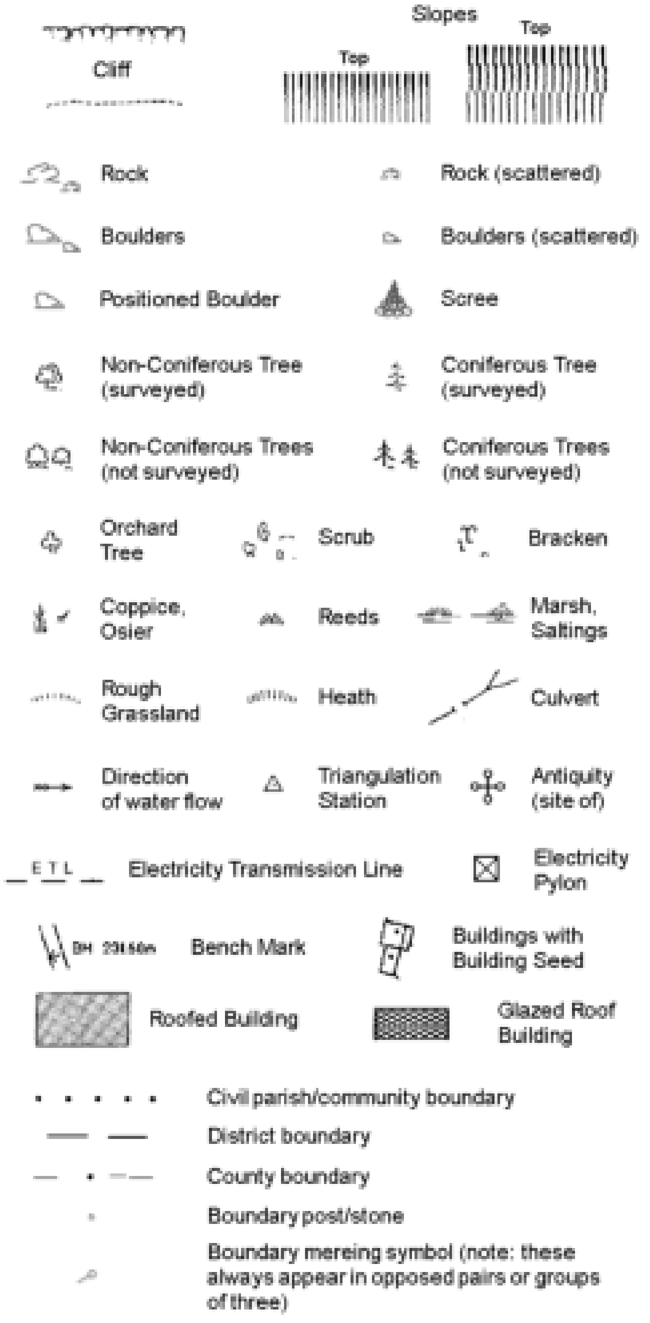
B.P. B.S.	Boundary Post or Stone	*P.C.B*	Police Call Box
B.R.	Bridle Road	*P*	Pump
E.P	Electricity Pylon	*S.P*	Signal Post
F.B.	Foot Bridge	*Sl.*	Sluice
F.P.	Foot Path	*Sp.*	Spring
G.P	Guide Post or Board	*T.C.B*	Telephone Call Box
M.S	Mile Stone	*Tr.*	Trough
M.P. M.R.	Mooring Post or Ring	*W*	Well

Ordnance Survey Plan, Additional SIMs and Supply of Unpublished Survey Information 1:2,500 and 1:1,250


or
Inactive Quarry, Chalk Pit or Clay Pit
Active Quarry, Chalk Pit or Clay Pit
Rock
Boulders
Slopes
Top
Top
Cliff
Roofed Building
Glazed Roof Building
Top
Sloping Masonry
Archway
Non-Coniferous Tree (surveyed)
Coniferous Tree (surveyed)
Non-Coniferous Trees (not surveyed)
Coniferous Trees (not surveyed)
Orchard Tree
Scrub
Bracken
Coppice, Osier
Reeds
Marsh, Saltings
Rough Grassland
Heath
Culvert
Direction of water flow
B M Bench Mark
Antiquity (site of)
Cave Entrance
Triangulation Station
Electricity Pylon
E T L Electricity Transmission Line
County Boundary (Geographical)
County & Civil Parish Boundary
Civil Parish Boundary
Admin. County or County Bor. Boundary
L B Bdy London Borough Boundary
Symbol marking point where boundary mereing changes

BH	Beer House	P	Pillar, Pole or Post
BP, BS	Boundary Post or Stone	PO	Post Office
Cn, C	Capstan, Crane	PC	Public Convenience
Chy	Chimney	PH	Public House
D Fn	Drinking Fountain	Pp	Pump
El P	Electricity Pillar or Post	SB, S Br	Signal Box or Bridge
FAP	Fire Alarm Pillar	SP, SL	Signal Post or Light
FB	Foot Bridge	Spr	Spring
GP	Guide Post	Tk	Tank or Track
H	Hydrant or Hydraulic	TCB	Telephone Call Box
LC	Level Crossing	TCP	Telephone Call Post
MH	Manhole	Tr	Trough
MP	Mile Post or Mooring Post	Wr Pt, Wr T	Water Point, Water Tap
MS	Mile Stone	W	Well
NTL	Normal Tidal Limit	Wd Pp	Wind Pump

Large-Scale National Grid Data 1:2,500 and 1:1,250

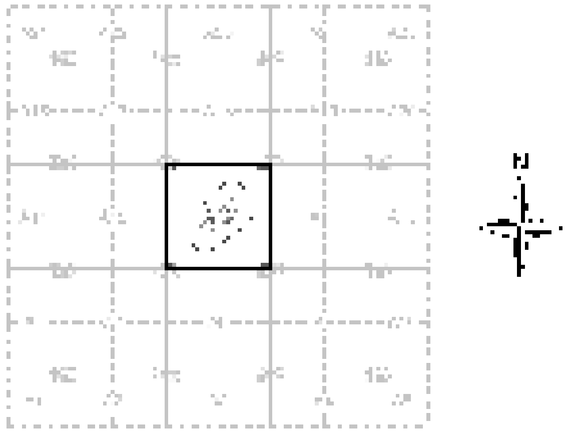

Slopes
Top
Top
Cliff
Rock
Rock (scattered)
Boulders
Boulders (scattered)
Positioned Boulder
Scree
Non-Coniferous Tree (surveyed)
Coniferous Tree (surveyed)
Non-Coniferous Trees (not surveyed)
Coniferous Trees (not surveyed)
Orchard Tree
Scrub
Bracken
Coppice, Osier
Reeds
Marsh, Saltings
Rough Grassland
Heath
Culvert
Direction of water flow
Triangulation Station
Antiquity (site of)
E T L Electricity Transmission Line
Electricity Pylon
BH 23.50m Bench Mark
Buildings with Building Seed
Roofed Building
Glazed Roof Building
Civil parish/community boundary
District boundary
County boundary
Boundary post/stone
Boundary mereing symbol (note: these always appear in opposed pairs or groups of three)

Bks	Barracks	P	Pillar, Pole or Post
Bty	Battery	PO	Post Office
Cemy	Cemetery	PC	Public Convenience
Chy	Chimney	Pp	Pump
Cis	Cistern	Ppg Sta	Pumping Station
Dismtd Rly	Dismantled Railway	PW	Place of Worship
El Gen Sta	Electricity Generating Station	Sewage Ppg Sta	Sewage Pumping Station
El P	Electricity Pole, Pillar	SB, S Br	Signal Box or Bridge
El Sub Sta	Electricity Sub Station	SP, SL	Signal Post or Light
FB	Filter Bed	Spr	Spring
Fn / D Fn	Fountain / Drinking Ftn.	Tk	Tank or Track
Gas Gov	Gas Valve Compound	Tr	Trough
GVC	Gas Governer	Wd Pp	Wind Pump
GP	Guide Post	Wr Pt, Wr T	Water Point, Water Tap
MH	Manhole	Wks	Works (building or area)
MP, MS	Mile Post or Mile Stone	W	Well

Historical Mapping & Photography included:

Mapping Type	Scale	Date	Pg
Lancashire And Furness	**1:2,500**	**1893**	**2**
Lancashire And Furness	**1:2,500**	**1908**	**3**
Lancashire And Furness	**1:2,500**	**1922 - 1931**	**4**
Ordnance Survey Plan	**1:1,250**	**1948 - 1949**	**5**
Ordnance Survey Plan	**1:2,500**	**1951**	**6**
Ordnance Survey Plan	**1:1,250**	**1952 - 1955**	**7**
Ordnance Survey Plan	**1:2,500**	**1954 - 1970**	**8**
Ordnance Survey Plan	**1:1,250**	**1965 - 1971**	**9**
Ordnance Survey Plan	**1:2,500**	**1966**	**10**
Ordnance Survey Plan	**1:1,250**	**1970 - 1981**	**11**
Additional SIMs	**1:1,250**	**1978 - 1984**	**12**
Additional SIMs	**1:1,250**	**1981 - 1991**	**13**
Additional SIMs	**1:1,250**	**1986 - 1991**	**14**
Ordnance Survey Plan	**1:1,250**	**1988 - 1990**	**15**
Additional SIMs	**1:1,250**	**1991**	**16**
Large-Scale National Grid Data	**1:1,250**	**1992**	**17**
Large-Scale National Grid Data	**1:1,250**	**1994 - 1995**	**18**
Large-Scale National Grid Data	**1:1,250**	**1995**	**19**

Historical Map - Segment A13



Order Details

Order Number: 291982299_1_1
Customer Ref: ES020322
National Grid Reference: 386120, 399600
Slice: A
Site Area (Ha): 1.83
Search Buffer (m): 100

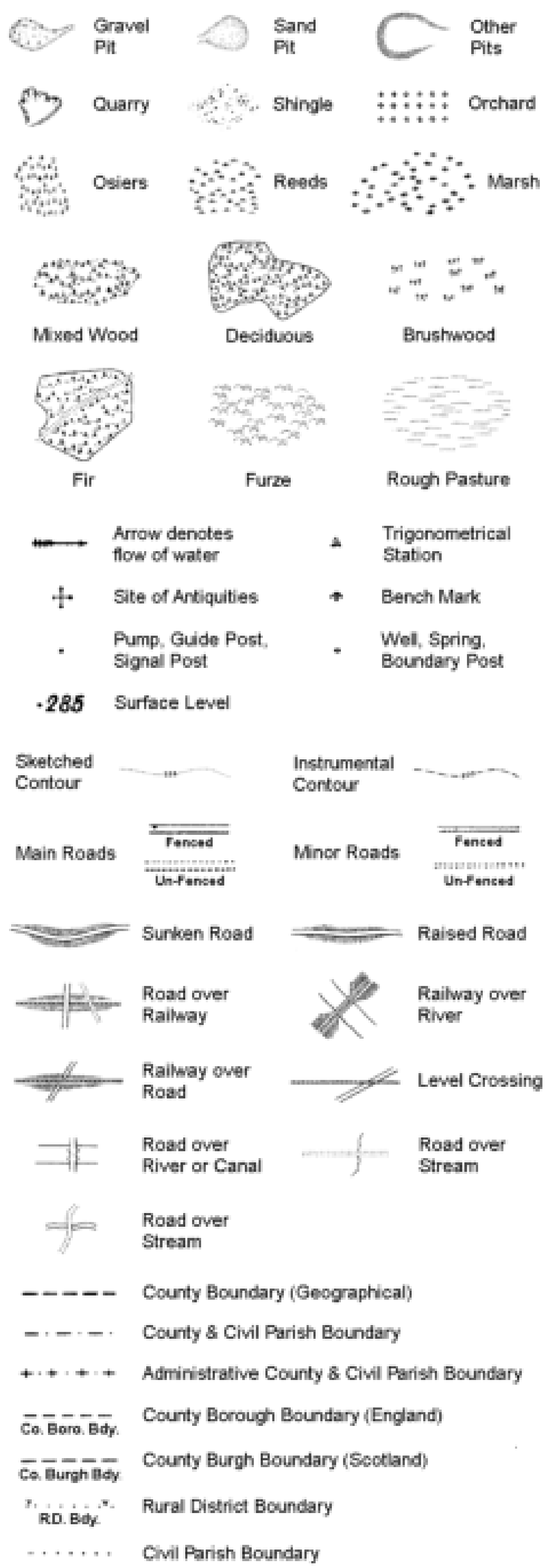
Site Details

Saville Whittle, Vickers Street, MANCHESTER, M40 8EF

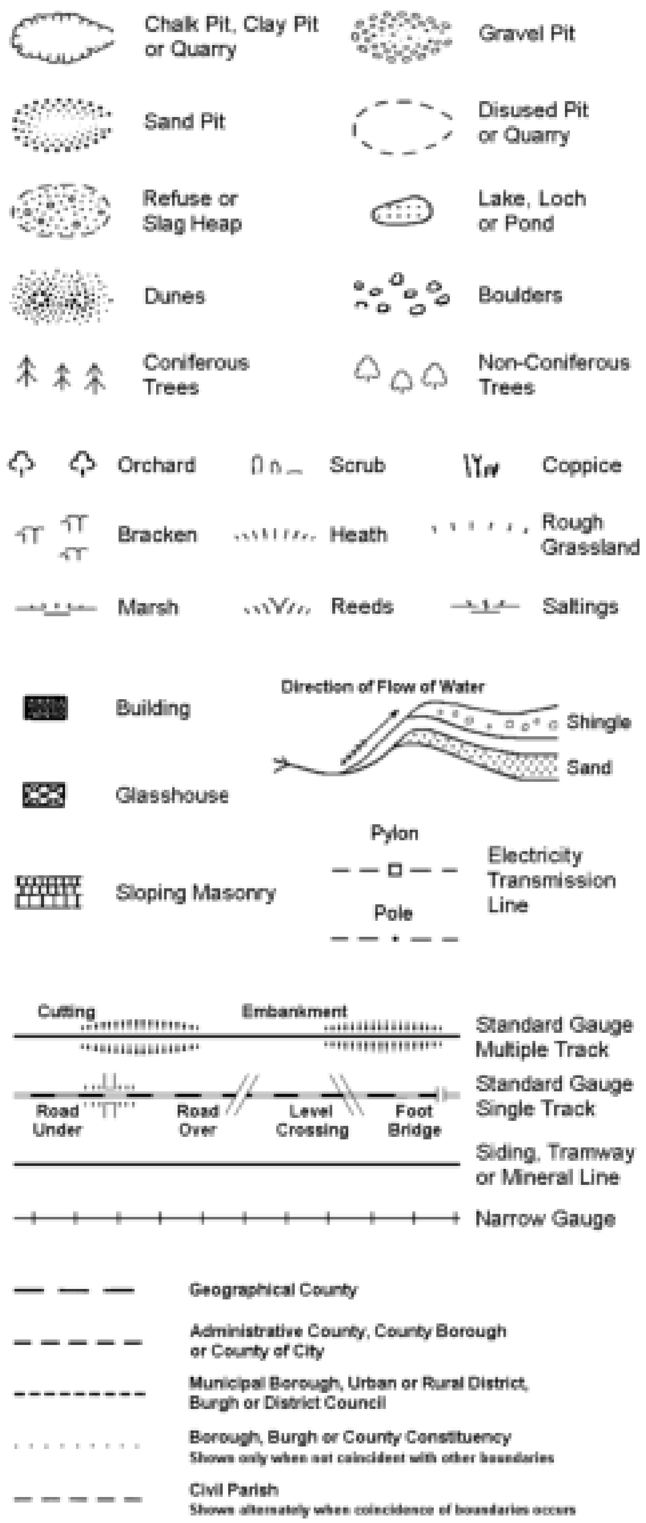
Tel: 0844 844 9952
Fax: 0844 844 9951
Web: www.envirocheck.co.uk

Historical Mapping Legends

Ordnance Survey County Series 1:10,560

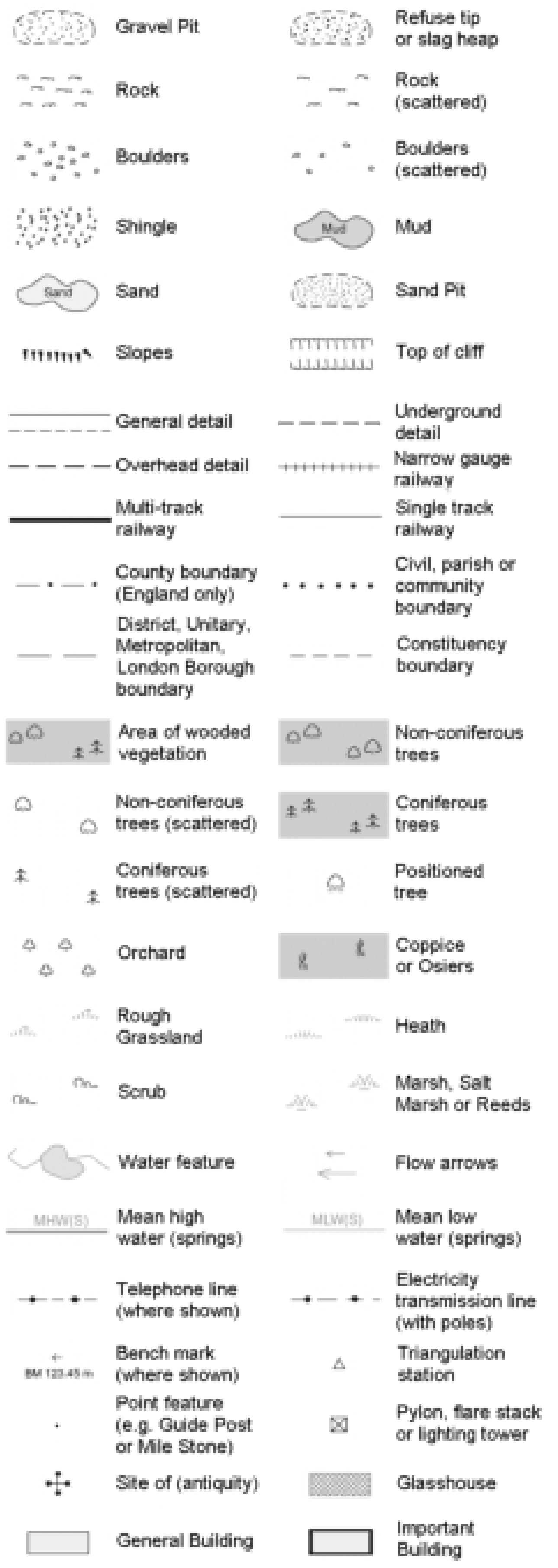

Gravel Pit
Sand Pit
Other Pits
Quarry
Shingle
Orchard
Osiers
Reeds
Marsh
Mixed Wood
Deciduous
Brushwood
Fir
Furze
Rough Pasture
Arrow denotes flow of water
Trigonometrical Station
Site of Antiquities
Bench Mark
Pump, Guide Post, Signal Post
Well, Spring, Boundary Post
·285
Surface Level
Sketched Contour
Instrumental Contour
Main Roads
Fenced
Un-Fenced
Minor Roads
Fenced
Un-Fenced
Sunken Road
Raised Road
Road over Railway
Railway over River
Railway over Road
Level Crossing
Road over River or Canal
Road over Stream
Road over Stream
County Boundary (Geographical)
County & Civil Parish Boundary
Administrative County & Civil Parish Boundary
Co. Boro. Bdy.
County Borough Boundary (England)
Co. Burgh Bdy.
County Burgh Boundary (Scotland)
R.D. Bdy.
Rural District Boundary
Civil Parish Boundary

Ordnance Survey Plan 1:10,000


Chalk Pit, Clay Pit or Quarry
Gravel Pit
Sand Pit
Disused Pit or Quarry
Refuse or Slag Heap
Lake, Loch or Pond
Dunes
Boulders
Coniferous Trees
Non-Coniferous Trees
Orchard
Scrub
Coppice
Bracken
Heath
Rough Grassland
Marsh
Reeds
Saltings
Building
Direction of Flow of Water
Shingle
Sand
Glasshouse
Pylon
Electricity Transmission Line
Pole
Sloping Masonry
Cutting
Embankment
Standard Gauge Multiple Track
Standard Gauge Single Track
Road Under
Road Over
Level Crossing
Foot Bridge
Siding, Tramway or Mineral Line
Narrow Gauge
Geographical County
Administrative County, County Borough or County of City
Municipal Borough, Urban or Rural District, Burgh or District Council
Borough, Burgh or County Constituency
Shown only when not coincident with other boundaries
Civil Parish
Shown alternately when coincidence of boundaries occurs

BP, BS	Boundary Post or Stone	Pol Sta	Police Station
Ch	Church	PO	Post Office
CH	Club House	PC	Public Convenience
F E Sta	Fire Engine Station	PH	Public House
FB	Foot Bridge	SB	Signal Box
Fn	Fountain	Spr	Spring
GP	Guide Post	TCB	Telephone Call Box
MP	Mile Post	TCP	Telephone Call Post
MS	Mile Stone	W	Well

1:10,000 Raster Mapping


Gravel Pit
Refuse tip or slag heap
Rock
Rock (scattered)
Boulders
Boulders (scattered)
Shingle
Mud
Mud
Sand
Sand
Sand Pit
Slopes
Top of cliff
General detail
Underground detail
Overhead detail
Narrow gauge railway
Multi-track railway
Single track railway
County boundary (England only)
Civil, parish or community boundary
District, Unitary, Metropolitan, London Borough boundary
Constituency boundary
Area of wooded vegetation
Non-coniferous trees
Non-coniferous trees (scattered)
Coniferous trees
Coniferous trees (scattered)
Positioned tree
Orchard
Coppice or Osiers
Rough Grassland
Heath
Scrub
Marsh, Salt Marsh or Reeds
Water feature
Flow arrows
MHW(S)
Mean high water (springs)
MLW(S)
Mean low water (springs)
Telephone line (where shown)
Electricity transmission line (with poles)
BM 123.45 m
Bench mark (where shown)
Triangulation station
Point feature (e.g. Guide Post or Mile Stone)
Pylon, flare stack or lighting tower
Site of (antiquity)
Glasshouse
General Building
Important Building

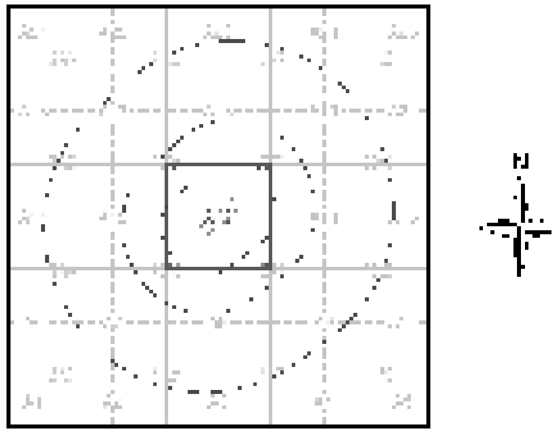
Envirocheck

LANDMARK INFORMATION GROUP

Historical Mapping & Photography included:

Mapping Type	Scale	Date	Pg
Lancashire And Furness	1:10,560	1848	2
Cheshire	1:10,560	1882	3
Lancashire And Furness	1:10,560	1894	4
Lancashire And Furness	1:10,560	1909	5
Lancashire And Furness	1:10,560	1923	6
Lancashire And Furness	1:10,560	1932 - 1933	7
Lancashire And Furness	1:10,560	1938	8
Ordnance Survey Plan	1:10,000	1956	9
Ordnance Survey Plan	1:10,000	1966 - 1968	10
Ordnance Survey Plan	1:10,000	1972 - 1979	11
Ordnance Survey Plan	1:10,000	1980 - 1986	12
Ordnance Survey Plan	1:10,000	1985 - 1987	13
Ordnance Survey Plan	1:10,000	1989	14
Ordnance Survey Plan	1:10,000	1990 - 1994	15
10K Raster Mapping	1:10,000	1999	16
Street View	Variable		17

Historical Map - Slice A



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National Grid Reference:	386120, 399600
Slice:	A
Site Area (Ha):	1.83
Search Buffer (m):	1000

Site Details

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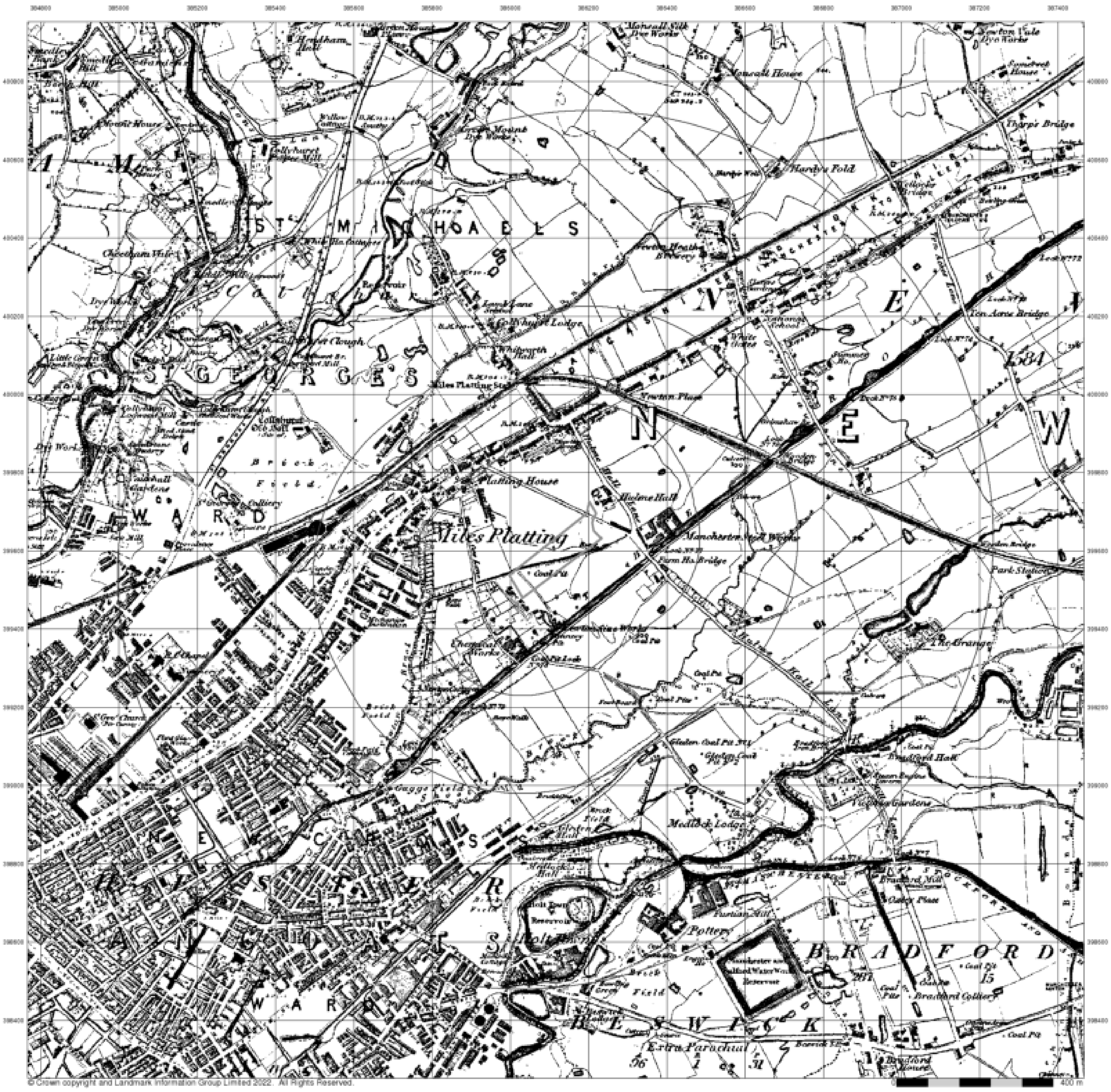
Harpurhey
St. Michaels
Cheetham Vale
St. George's
Miles Platting
Miles Platting Sta.
Platting House
Holme Hall
Newton Heath Brewery
Hardy's Fold
Ten Acre Bridge
Newton Place
Manchester Soap Works
Farm Ho. Bridge
Chemical Works
Coal Pit
New Cross
Gaggs Field
The Grange
Park Station
Bradford Hall
Medlock Lodge
Pottery
Fustian Mill
Bradford
Bradford Colliery
Beswick
Extra Parochial
Ward
Thorps Bridge
Newton Vale Dye Works
Monsall Silk Dye Works
Monsall House
Colly Hurst Lodge
Whitworth Hall
Smedley
Manchester and Salford Water Works Reservoir

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400 m

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Lancashire And Furness

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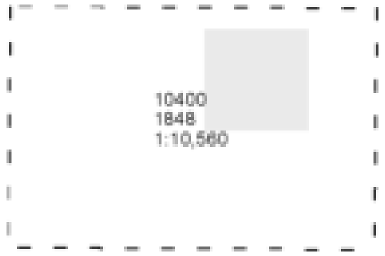
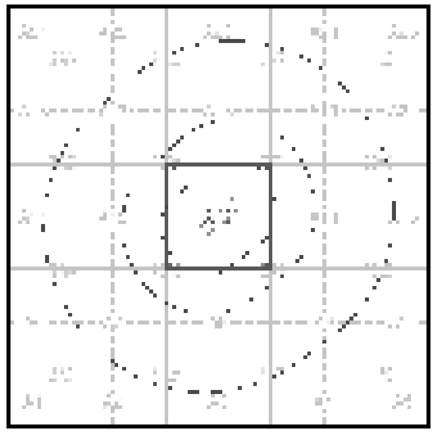
Map Name(s) and Date(s)


10400
1848
1:10,560

Historical Map - Slice A



Order Details

Order Number:	291982299_1_1
Customer Ref:	ES020322
National Grid Reference:	386120, 399600
Slice:	A
Site Area (Ha):	1.83
Search Buffer (m):	1000

Site Details

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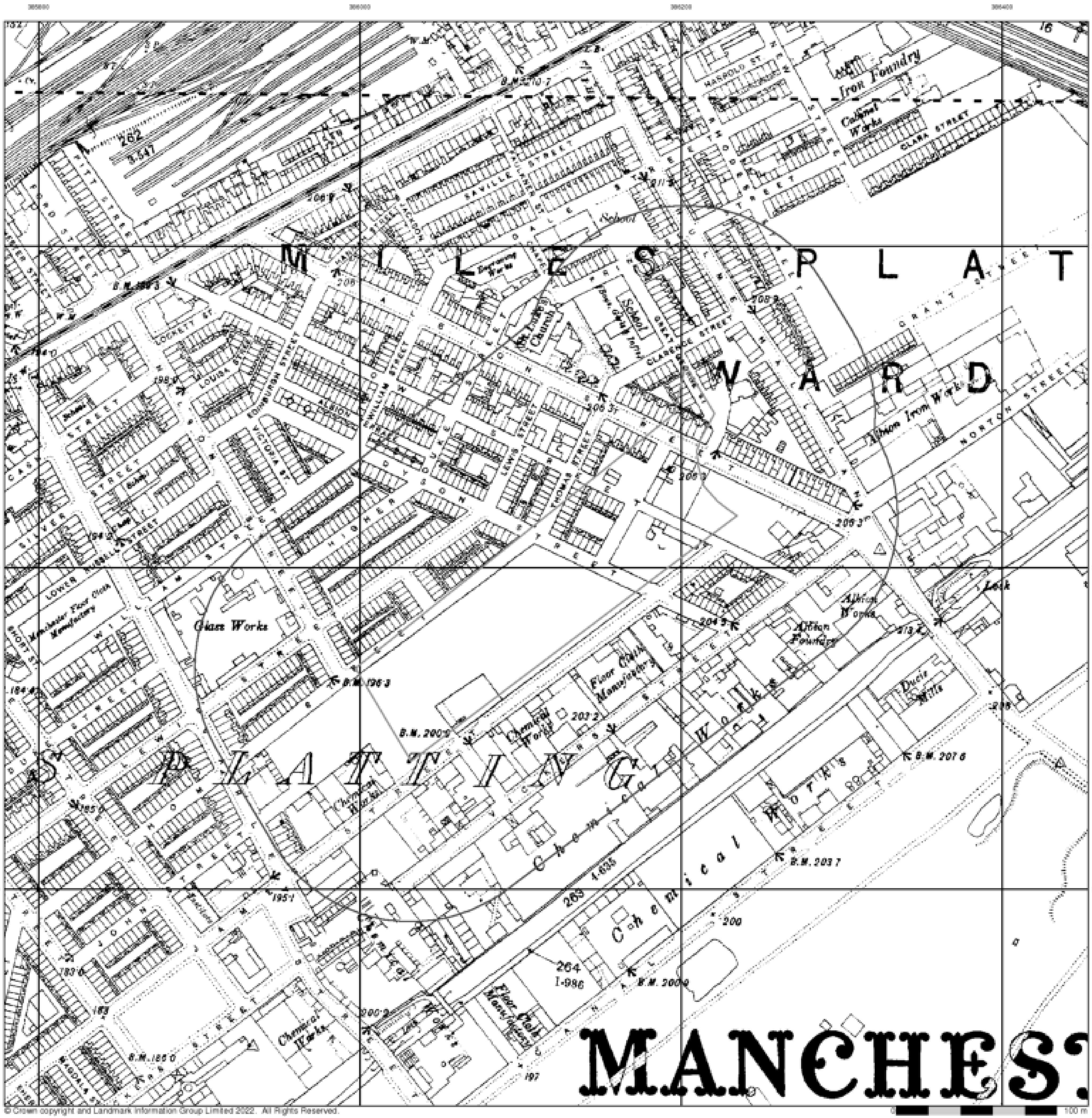
385800
386000
386200
386400
399800
399600
399400
M I L E S P L A T T I N G W A R D
MANCHES
Iron Foundry
Harrold St
Clara Street
Saville Street
School
Engineering Works
Clarence Street
Great
Grant Street
Norton Street
Albion Iron Works
Lockett Street
Louisa Street
Victoria St
Lewis Street
Thomas Street
Glass Works
Albion Works
Albion Foundry
Ducie Mills
Lock
Floor Cloth Manufactory
Chemical Works
Chemical Works
Chemical Works
Manchester Floor Cloth Manufactory
Lower
B.M. 196·3
B.M. 200·0
B.M. 207·6
B.M. 203·7
B.M. 200·9
B.M. 186·0
262
3·547
263
4·635
264
1·986
0
100 m

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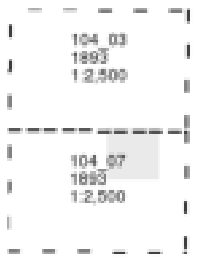
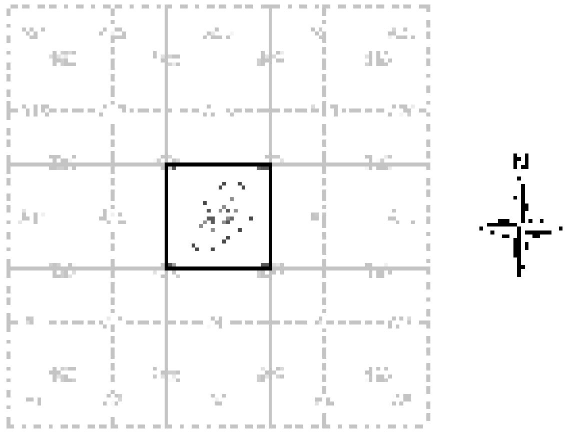
Map Name(s) and Date(s)


104_03
1893
1:2,500
104_07
1893
1:2,500

Historical Map - Segment A13



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Order Number:	291982299_1_1
Customer Ref:	ES020322
National Grid Reference:	386120, 399600
Slice:	A
Site Area (Ha):	1.83
Search Buffer (m):	100

Site Details

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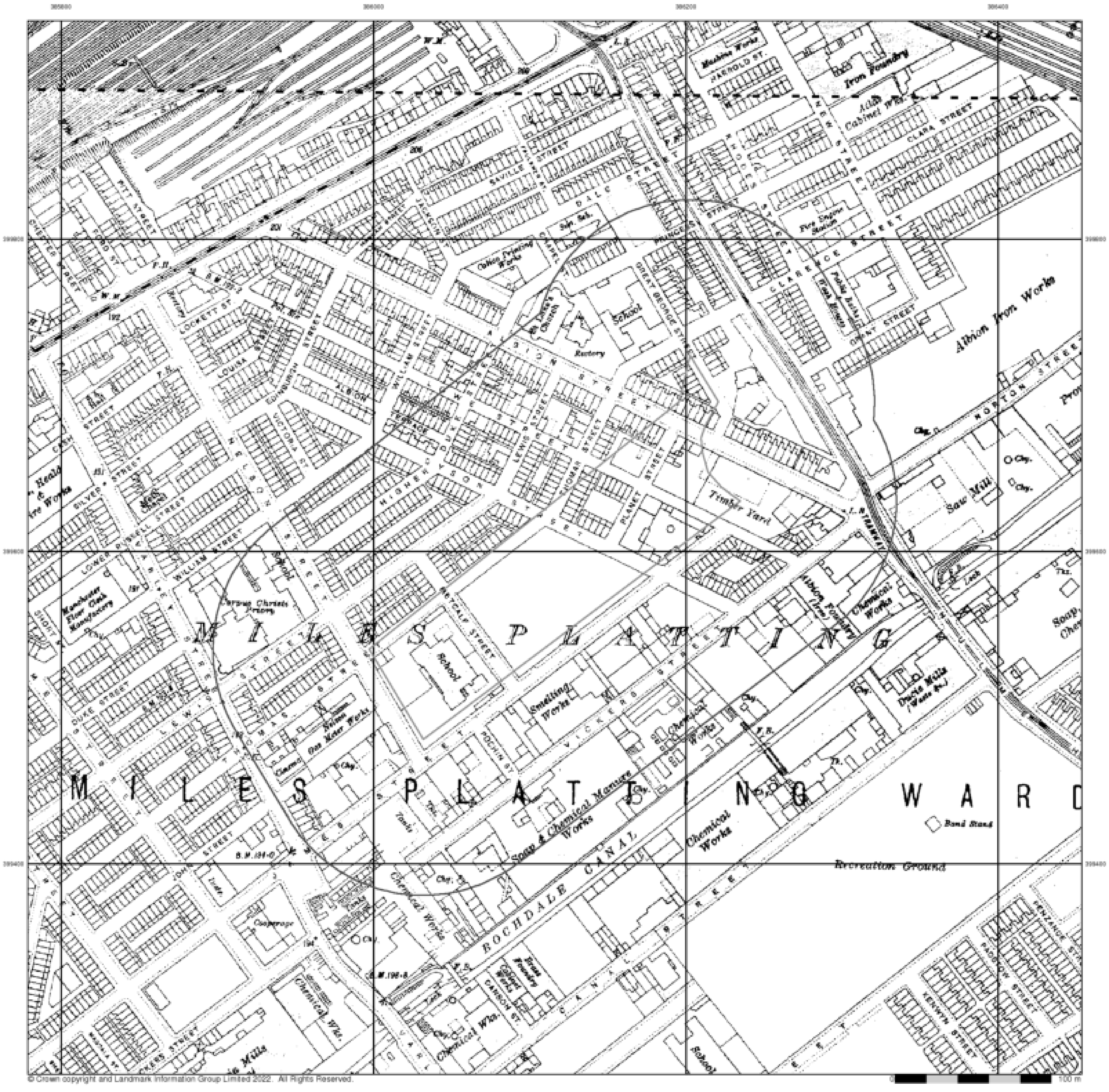
385800
386000
386200
386400
399800
399600
399400
MILES PLATTING
MILES PLATTING WARD
Albion Iron Works
Iron Foundry
Cotton Printing Works
Rectory
School
Timber Yard
Saw Mill
Smelting Works
Soap & Chemical Manure Works
Chemical Works
Albion Foundry
Ducie Mills
Gas Meter Works
Cooperage
Band Stand
Recreation Ground
ROCHDALE CANAL
SAVILLE STREET
DALE STREET
CLARA STREET
NORTON STREET
VICKERS STREET
LOCKETT ST.
SILVER STREET
WILLIAM STREET
METCALF STREET
0
100 m

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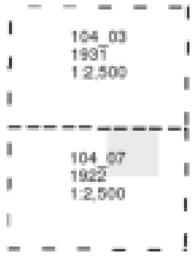
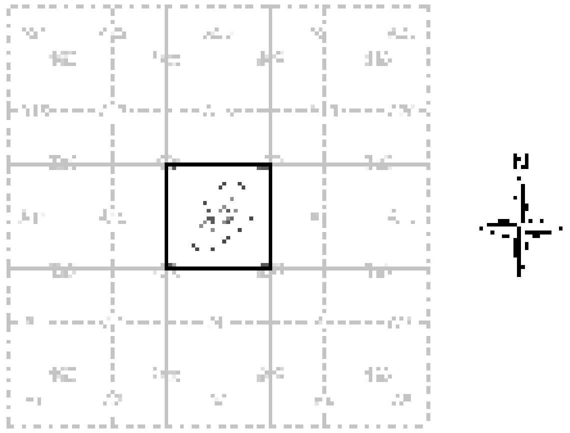
Map Name(s) and Date(s)


104_03
1931
1:2,500
104_07
1922
1:2,500

Historical Map - Segment A13



Order Details

Order Number:	291982299_1_1
Customer Ref:	ES020322
National Grid Reference:	386120, 399600
Slice:	A
Site Area (Ha):	1.83
Search Buffer (m):	100

Site Details

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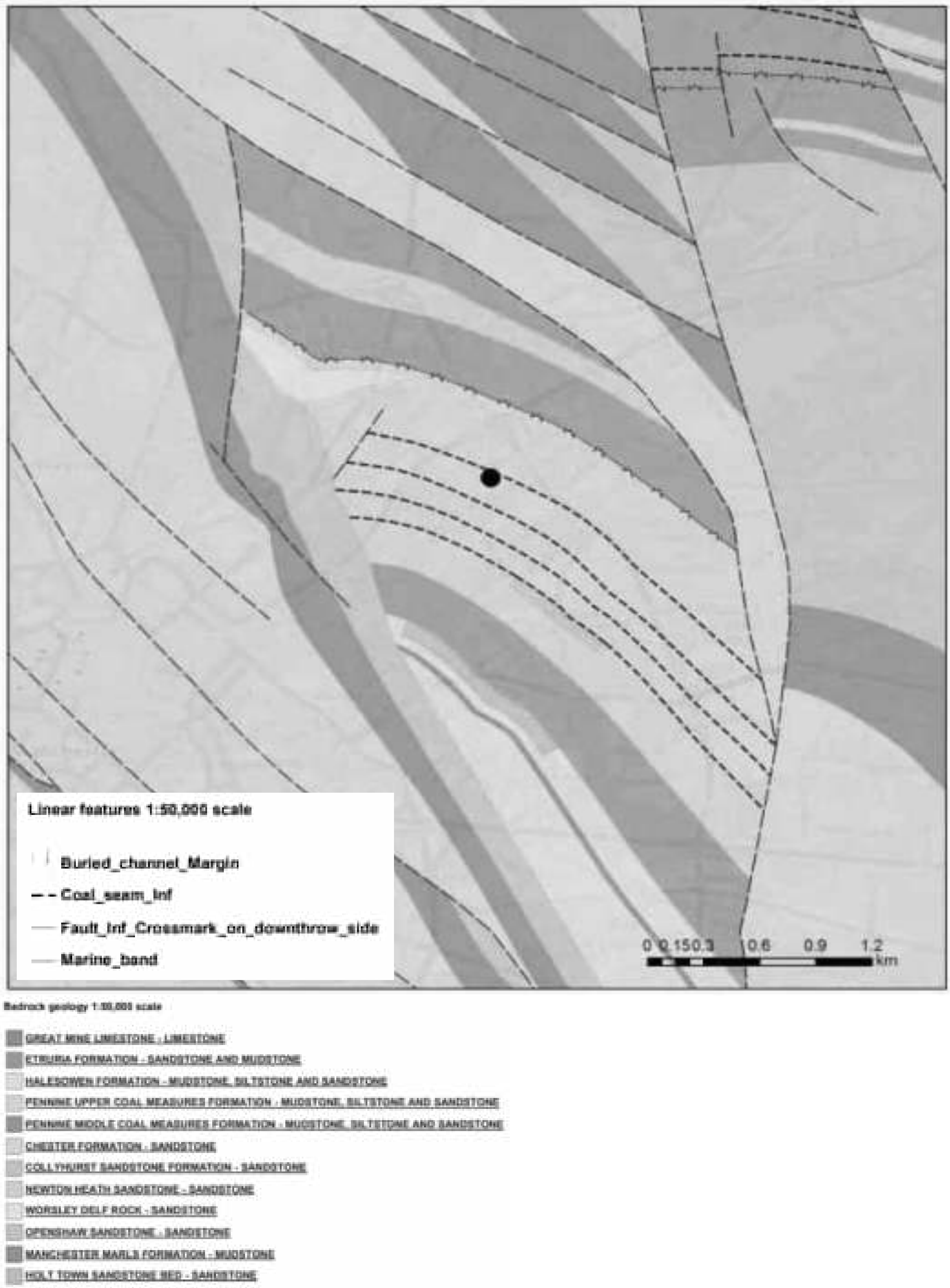
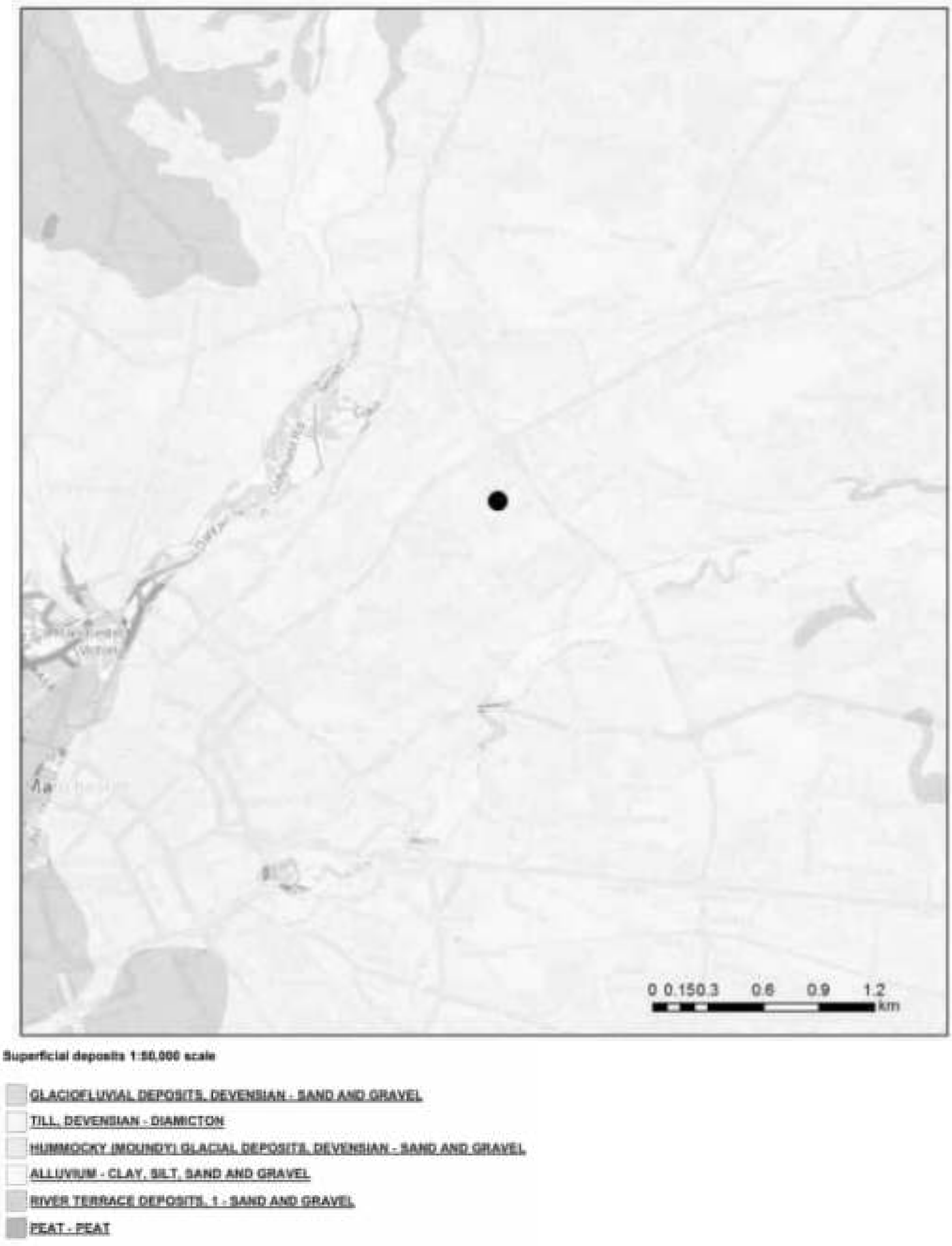
Appendix D – Geological Maps

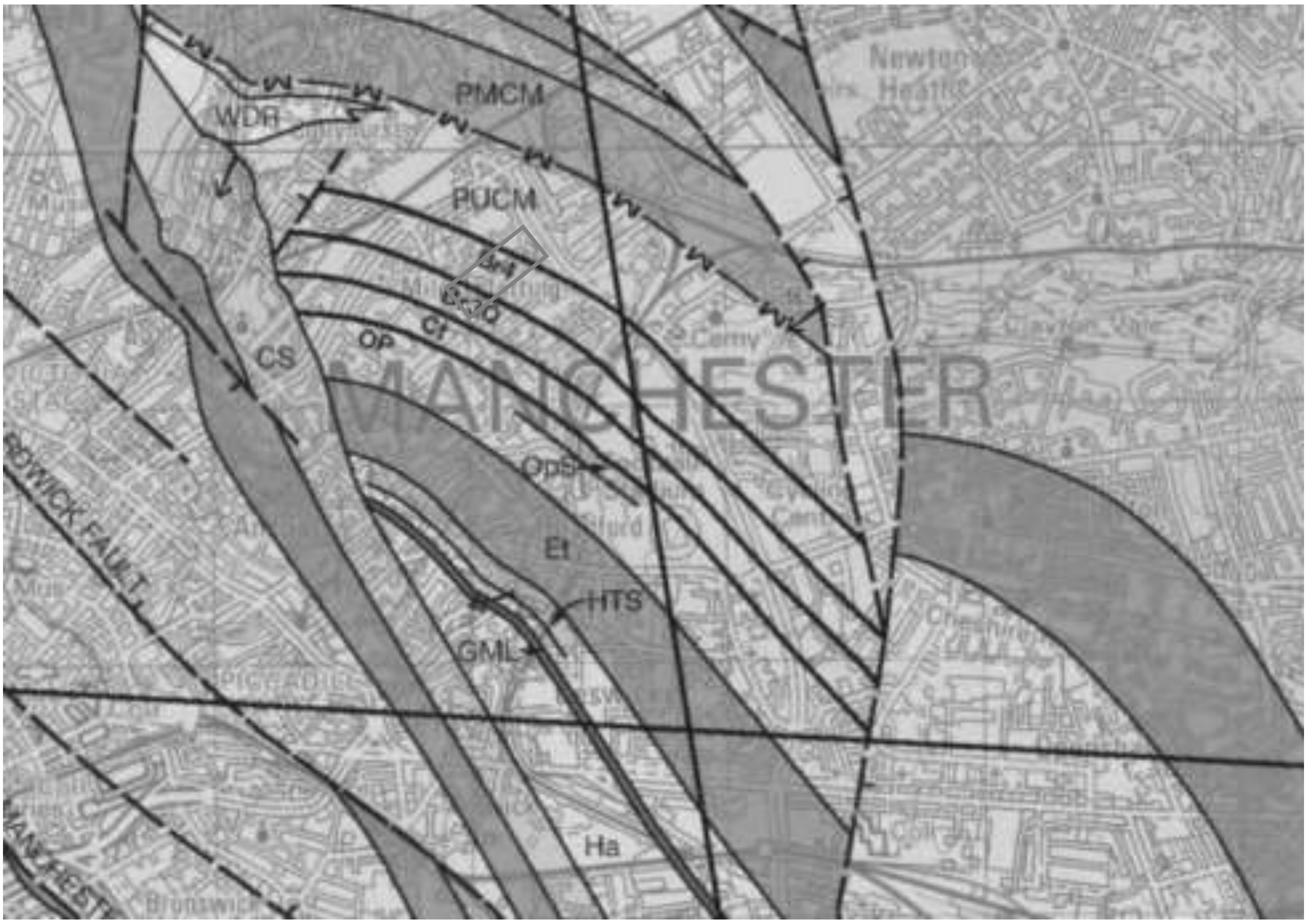
Bedrock Geology

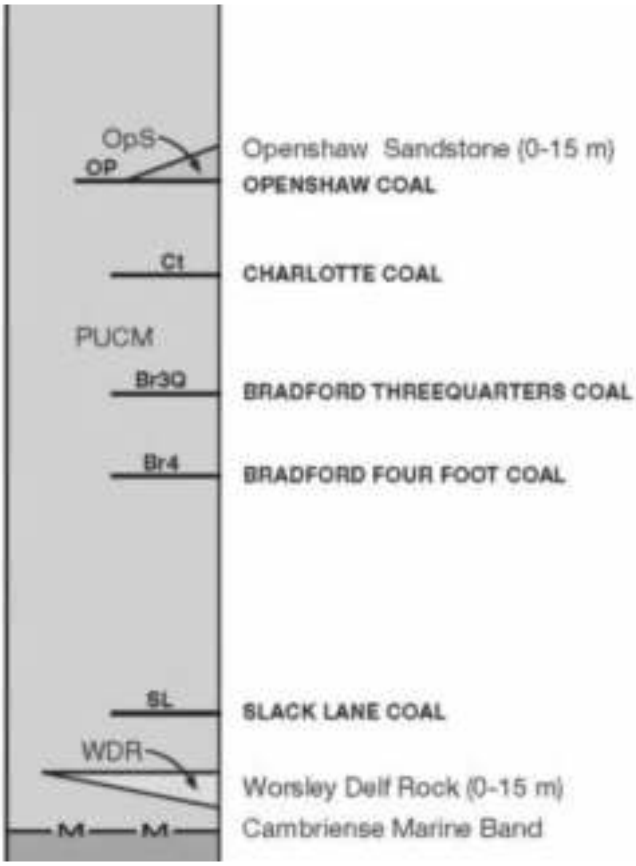

Linear features 1:50,000 scale
Buried_channel_Margin
Coal_seam_Inf
Fault_Inf_Crossmark_on_downthrow_side
Marine_band
0 0.15 0.3 0.6 0.9 1.2 km
Bedrock geology 1:50,000 scale
GREAT MINE LIMESTONE - LIMESTONE
ETRURIA FORMATION - SANDSTONE AND MUDSTONE
HALESOWEN FORMATION - MUDSTONE, SILTSTONE AND SANDSTONE
PENNINE UPPER COAL MEASURES FORMATION - MUDSTONE, SILTSTONE AND SANDSTONE
PENNINE MIDDLE COAL MEASURES FORMATION - MUDSTONE, SILTSTONE AND SANDSTONE
CHESTER FORMATION - SANDSTONE
COLLYHURST SANDSTONE FORMATION - SANDSTONE
NEWTON HEATH SANDSTONE - SANDSTONE
WORSLEY DELF ROCK - SANDSTONE
OPENSHAW SANDSTONE - SANDSTONE
MANCHESTER MARLS FORMATION - MUDSTONE
HOLT TOWN SANDSTONE BED - SANDSTONE

Superficial Geology


0 0.15 0.3 0.6 0.9 1.2
km
Superficial deposits 1:50,000 scale
GLACIOFLUVIAL DEPOSITS, DEVENSIAN - SAND AND GRAVEL
TILL, DEVENSIAN - DIAMICTON
HUMMOCKY (MOUNDY) GLACIAL DEPOSITS, DEVENSIAN - SAND AND GRAVEL
ALLUVIUM - CLAY, SILT, SAND AND GRAVEL
RIVER TERRACE DEPOSITS, 1 - SAND AND GRAVEL
PEAT - PEAT

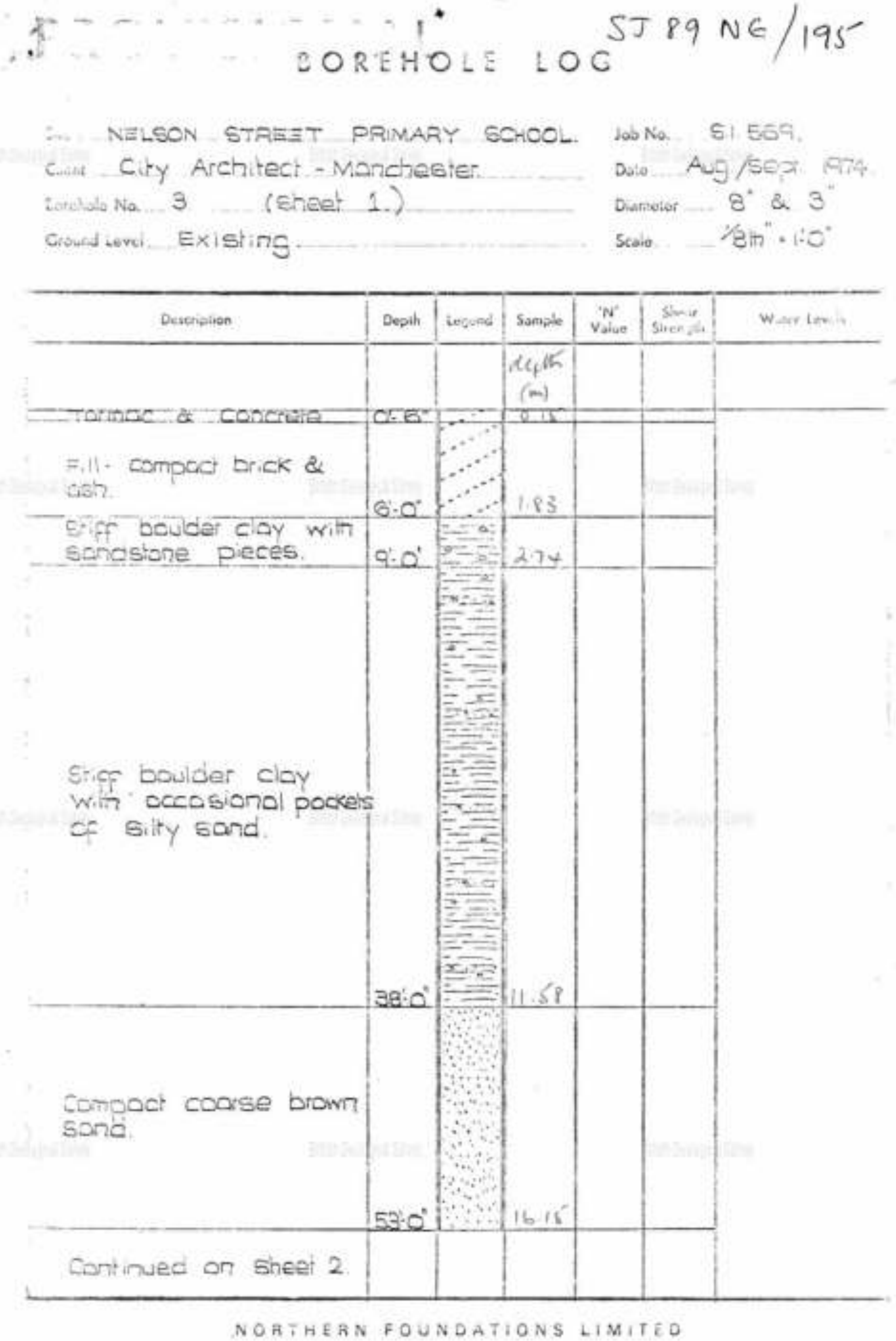
BGS Geological Survey 1:50,000 Series England and Wales Sheet 85, Manchester


WDR
PMCM
PUCM
Br4
Br3Q
Ct
OP
CS
MANCHESTER
OpS
Et
HTS
GML
Ha
ARDWICK FAULT
Newton Heath
Clayton
PICCADILLY
Brunswick


OpS
OP
Openshaw Sandstone (0-15 m)
OPENSHAW COAL
Ct
CHARLOTTE COAL
PUCM
Br3Q
BRADFORD THREEQUARTERS COAL
Br4
BRADFORD FOUR FOOT COAL
SL
SLACK LANE COAL
WDR
Worsley Delf Rock (0-15 m)
M M
Cambriense Marine Band

Appendix E – BGS Borehole Logs

SJ89NE195



SJ 89 NE/195

BOREHOLE LOG

Site NELSON STREET PRIMARY SCHOOL. Job No. 51 569.
Client City Architect - Manchester Date Aug/Sept 1974
Borehole No. 3 (Sheet 1.) Diameter 8" & 3"
Ground Level Existing. Scale 1/8th" = 1'0"

Description	Depth	Legend	Sample	'N' Value	Shear Strength	Water Levels
			depth (m)			
Tarmac & Concrete	0'-6"		0.15			
Fill - compact brick & ash.	6'-0"		1.83			
Stiff boulder clay with sandstone pieces.	9'-0"		2.74			
Stiff boulder clay with occasional pockets of silty sand.	38'-0"		11.58			
Compact coarse brown sand.	53'-0"		16.15			
Continued on Sheet 2						

NORTHERN FOUNDATIONS LIMITED

SJ 89 NE/195

BOREHOLE LOG

Site NELSON STREET PRIMARY SCHOOL
Client City Architect - Manchester
Borehole No. 3 (Sheet 2)
Ground Level

Job No. S.I. 569
Date
Diameter
Scale 1/8th" = 1'0"

Description	Depth	Legend	Sample	'N' Value	Shear Strength	Water Levels
	53'0"		depth (m) 16.15			
Compact dry clayey silt.	58'0"		17.68			
Stiff brown boulder clay.	65'0"		19.81			
Compact clayey silt with stiff silty clay lenses.	72'0"		21.95			
Very stiff boulder clay.	77'0"		23.47			
Hard dry sandy clay	82'0"		24.99			
Very compact broken shattered coal. (no cavities)	87'0"		26.52			
Hard clay shale with compact sand seams.	90'0"		27.43			
Hard clay shale with occasional bands of gritstone	100'0"		30.48			
Continued on sheet 3						

BOREHOLE LOG

SJ 89 NE/195

Site NELSON STREET PRIMARY SCHOOL Job No.
Client Date
Borehole No. 3 (Sheet 3) Diameter
Ground Level Scale

Description	Depth	Legend	Sample	'N' Value	Shear Strength	Water Levels
	100'-0"		depth (m) 30.48			
Very compact dry silt	108'-0"	▨	32.92			
Hard gritstone with coal traces.	112'-0"	▨	34.14			
Coal seam	113'-6"	▨	34.59			
Hard gritstone	119'-0"	▨	36.27			
Hard Sandstone	120'-0"	▨	36.58			

SJ 89 NE/194

BOREHOLE LOG

Site NELSON STREET PRIMARY SCHOOL. Job No. S1. 569.
Client City Architect - Manchester. Date Aug. 1974.
Borehole No. 1. (sheet 1) Diameter 6"
Ground Level Existing Scale 1/8th" = 1'-0"

Site plan - see 12.8/74/225 enquiry

Description	Depth	Legend	Sample	'N' Value	Shear Strength	Water Levels
			depth (m)			
Fill: tarmac overlying ash & brick rubble	8'-0"		2.44			
Firm plastic boulder clay	9'-0"		2.74			
Boulder clay varying stiff to very stiff.	38'-0"		11.58			
Compact dry sand.	52'-6"		16.00			
Boulder clay varying stiff to very stiff.	56'-0"		17.07			Continued on sheet 2.

NORTHERN FOUNDATIONS LIMITED

SJ 89 NE/194

BOREHOLE LOG

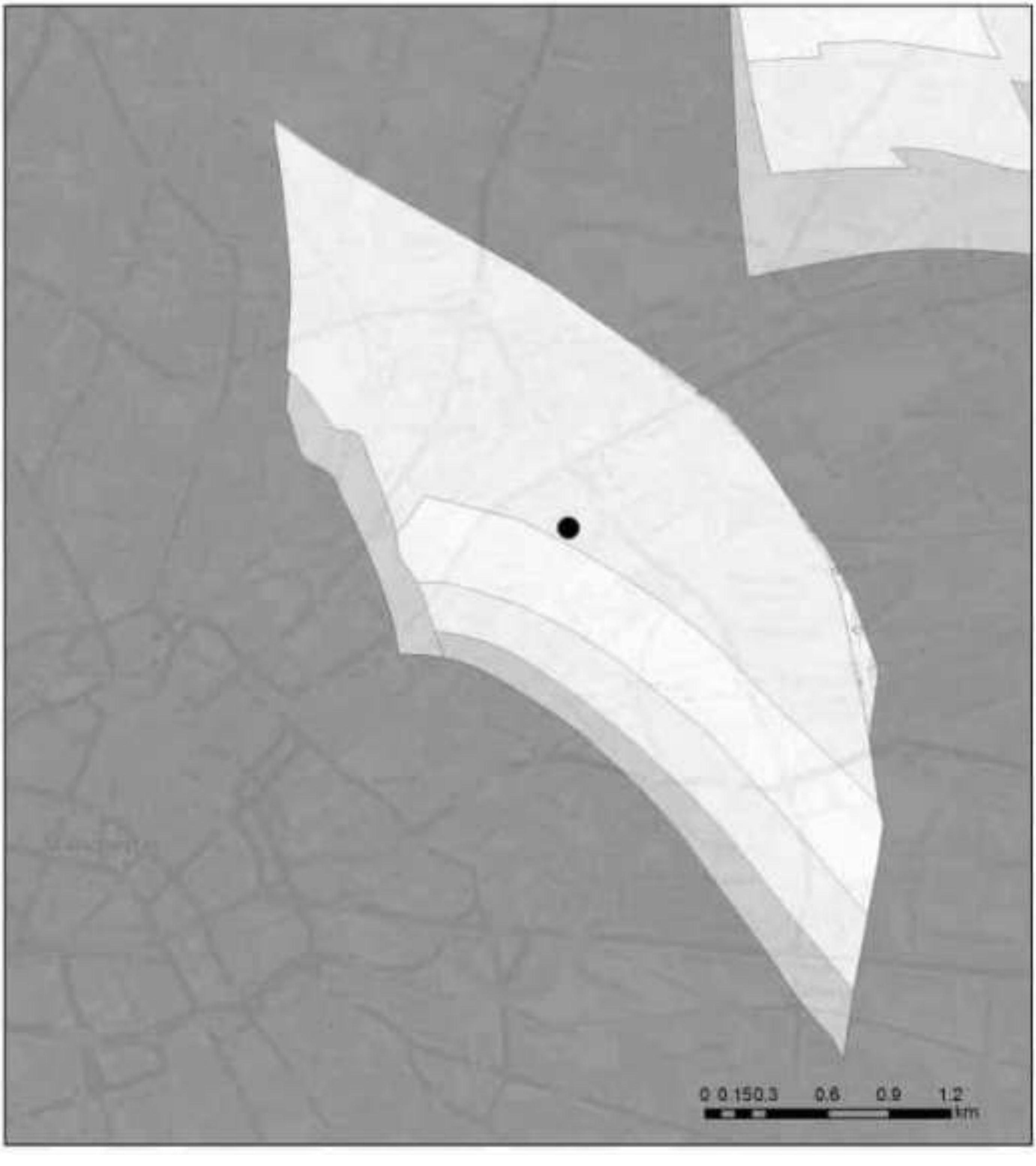
Site NELSON STREET PRIMARY SCHOOL.
Client
Borehole No. 1. (Sheet 2.)
Ground Level

Job No.
Date
Diameter
Scale

Description	Depth	Legend	Sample	'N' Value	Shear Strength	Water Levels
	56'-0"		depth (m) 17.07			
Very stiff boulder clay.	58'-0"		17.68			No ground water.
Compact dry clayey sand.	62'-0"		18.90			
Very stiff sandy boulder clay.	71'-0"		21.64			
Very compact dry clayey sand.	90'-0"		27.43			
Hard blue shale.	94'-0"		28.65			
Hard blue shale with coal traces.	97'-0"		29.57			
Coal	100'-0"		30.48			

NORTHERN FOUNDATIONS LIMITED

Appendix F – Coal Resource Map



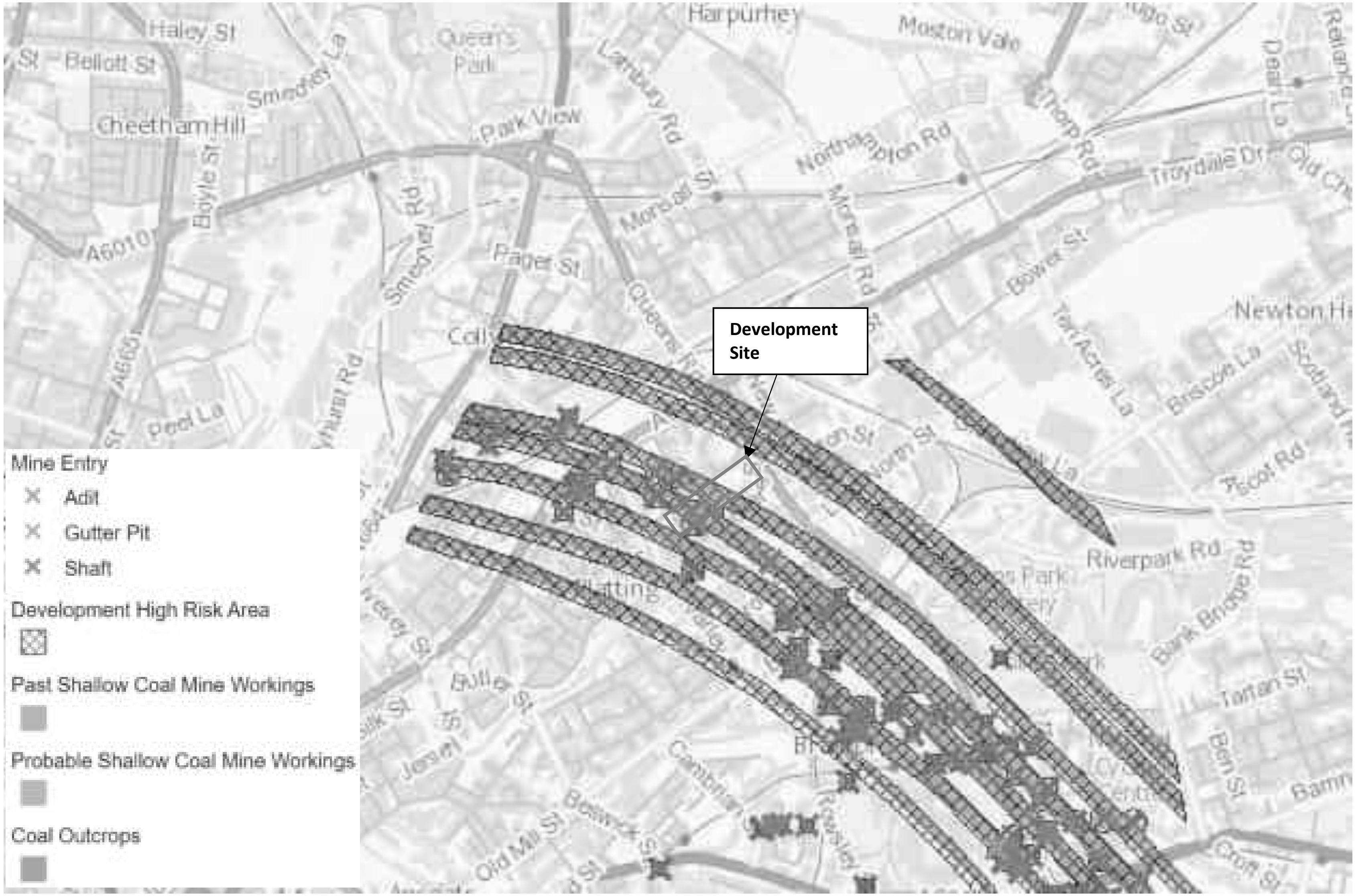
Shallow Coal

- ▨ Buried coal resource overlain by up to 50m overburden
- ☐ Primary opencast coal resource area
- ☐ Secondary opencast coal resource area
- ▨ Tertiary opencast coal resource area

Deep Coal

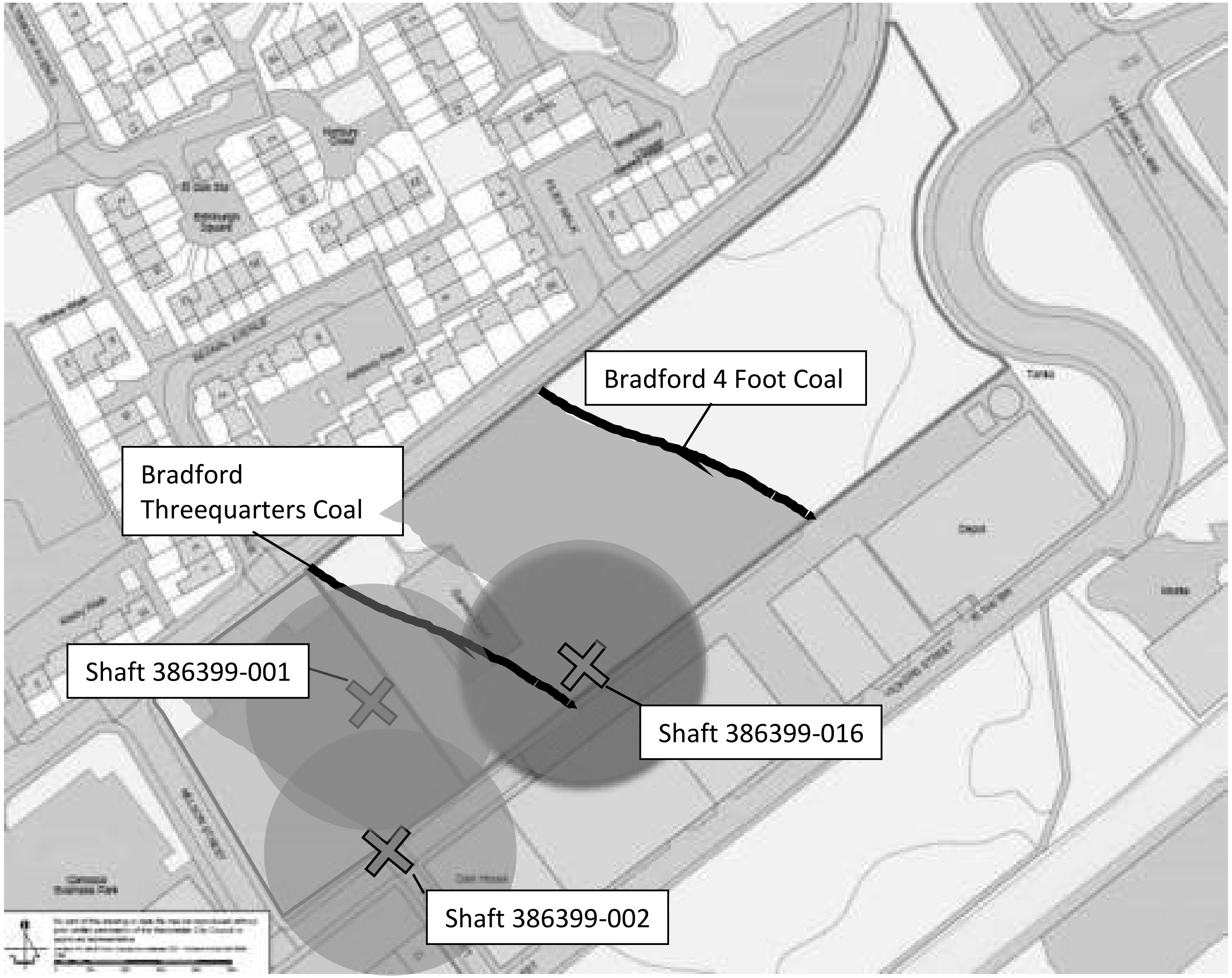
- ■ Deep coal at more than 1200m
- ■ Deep coal between 50m and 1200m

Appendix G – Coal Mining Summary Map


Development Site
Mine Entry
Adit
Gutter Pit
Shaft
Development High Risk Area
Past Shallow Coal Mine Workings
Probable Shallow Coal Mine Workings
Coal Outcrops
Haley St
Bellott St
Cheetham Hill
Smedley La
Queen's Park
Harpurhey
Moston Vale
Lambury Rd
Park View
Northampton Rd
Thorp Rd
Troydale Dr
Dean La
Boyle St
A6010
Smedley Rd
Pager St
Monsall St
Monsall Rd
Bower St
Queens Rd
Newton Heath
Ten Acres La
Briscoe La
Scotland
Peel La
Riverpark Rd
Bank Bridge Rd
Tartan St
Ben St
Butler St
Jersey St
Old Mill St
Berwick St
Cambrian St
Croft St

enviro | solution	**Coal Mining Summary Map**

Appendix H – Hazard Zonation Plan


Bradford 4 Foot Coal
Bradford Threequarters Coal
Shaft 386399-001
Shaft 386399-016
Shaft 386399-002

enviro|solution

Hazard Zonation Plan

Red zones indicate further investigation or mitigation is required

Appendix E Phase 1 Geo-Environmental Desk Study (March 2022)

PHASE 1 ENVIRONMENTAL SITE ASSESSMENT REPORT

VARLEY STREET
MANCHESTER
M40 8EF

Prepared for:

Mace Group

By:

ENVIROSOLUTION LTD

Suite 53

3a Bridgewater St

Liverpool

L1 0AB

Date: 2nd March 2022

EnviroSolution Ltd
Document Verification

Site Address	Varley Street, Manchester, M40 8EF		
Report Title	Phase 1 Environmental Site Assessment Report		
Job Number	CL101	**Document Ref.**	CL101
Date Issued	2nd March 2022	**Report Version**	1
Prepared by	Tom Craig	**Signature**	[redacted]
Checked by	Gemma Lucas	**Signature**	[redacted]

Executive Summary

The preliminary environmental site assessment indicates that the site can be classified as moderate risk in terms of contamination and the risks to the identified receptors (e.g. human health, controlled waters, buildings) following redevelopment is considered to be moderate.

This classification is due to the potential for Made Ground to be present within the shallow soils at the site associated with the historical land use as a timber yard and the demolition of former buildings on site. Contaminants such as heavy metals, PAHs, hydrocarbons and asbestos could be present within the Made Ground. There is also the potential for ground gases (i.e. carbon dioxide and methane to be present) in the ground beneath the site associated with any organic/putrescible material that may be present within the Made Ground deposits.

Furthermore, there may also be the potential for ground gases to be present associated with the mine shafts located within the site boundary which will act as a preferential pathway for mine gases at depth to reach the surface.

It is recommended a Phase 2 intrusive ground investigation is undertaken prior to site redevelopment to obtain additional information on the ground conditions and the contamination status. The investigation should be carried out by qualified and competent persons. The scope of works for the investigation will need to be submitted and approved by the local authority prior to the commencement of the Phase 2 intrusive works.

Disclaimer

This report has been prepared by EnviroSolution Ltd who has exercised such professional skill, care and diligence as may reasonably be expected of a properly qualified and competent consultant experienced in preparing reports of a similar scope.

However, to the extent that the report is based on or relies upon information contained in records, reports or other materials provided to EnviroSolution Ltd, which have not been independently produced or verified, EnviroSolution Ltd, gives no warranty, representation or assurance as to the accuracy or completeness of such information.

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Appendix B – Site Photographs
Appendix C – Historical OS Maps
Appendix D – Geological Maps
Appendix E – BGS Borehole Logs
Appendix F – Coal Mining Summary Map
Appendix G – Hydrogeology Maps
Appendix H – Historic Landfill Map
Appendix I – Environmental Designations

1 Introduction

1.1 Background

EnviroSolution Ltd was commissioned to undertake a Phase 1 Environmental Site Assessment at a site located at Varley Street in Manchester. This report was commissioned to provide information on the likely contamination status at the site. It is understood that this work is to investigate the feasibility of an educational development at the site including up to two schools including playing fields and car parking.

1.2 Objectives

The objective of the preliminary environmental site assessment was:

1. To provide a summary of the environmental setting and historical land use of the site and immediate surrounding area.
2. To obtain information on the ground conditions present beneath the site.
3. To develop an updated conceptual site model and complete a generic quantitative risk assessment to identify any environmental risks and liabilities associated with ground conditions at the site.

1.3 Scope of Work

To achieve the objectives, the following scope of work was completed:

1. A desk-based study of the site comprising a review of available environmental information for the site such as geological and hydrogeological data and historical land use information.
2. A site walkover survey to assess on site ground conditions.
3. Assessment of potential hazards and constraints during construction and longer term.

This work has been devised to generally comply with the relevant principles and requirements of the following legalisation and guidance:

- Part IIA of the Environmental Protection Act, 1990 and Section 57 of the Environmental Act 1995;
- Contaminated Land (England) (Amendment) Regulations 2012 and Contaminated Land Statutory Guidance (DEFRA, April 2012);
- National Planning Policy Framework (Ministry of Housing, Communities and Local Government, February 2019);
- BS10175: 2011 +A2:2017 “Investigation of Potentially Contaminated Sites- Code of Practice”; and
- Environment Agency (2020) Land Contamination Risk Management Report LCRM “How to assess and manage the risks from land contamination”.

1.4 Information Sources

Historical Ordnance Survey maps have been obtained from historical records, ranging from 1848 to 2021. These maps provide high quality information on historical site use.

The British Geological Survey Geoindex database has been used to provide information on geo-environmental aspects of the site and the immediate surrounding area such as geological, hydrogeological and hydrological data.

The Environment Agency website (www.gov.uk/government/organisations/environment-agency) and Magic website (www.magic.gov.uk) was also used to obtain environmental information.

Industry Profiles produced by the Department of the Environment were utilised to obtain information on processes, materials and wastes associated potential contaminative land uses near the site.

Readily available information sources have been used to produce this desk-based study. Additional information may be requested by the Local Planning Authority (e.g. local authority environmental information request).

2 The Site

2.1 Site Location

The site is located at Varley Street, Manchester, M40 8EF. The British National Grid Reference for the approximate site centre is GR: 386125 399605.

The site location is shown on **Figure 1** in **Appendix A**.

2.2 Site Description

The site description is aided by the completion of a site walkover survey conducted by EnviroSolution on the 21st of January 2022. The site photographs are included in **Appendix B**.

The site is irregular in shape and covers an approximate area of 22,200 square metres. The site is currently a vacant plot of waste land formerly used as a school playing field. A tarmac games court is located in the central area of the site. The land to the northeast of this is rough grassland. The land to the southwest of this is tarmacadam hardstanding.

Sporadic trees are present along the permitter of the site but are more clustered along the eastern and southern boundaries.

The proposed development area is generally flat with little change in topographic level. Vehicle access is gained from Sawley Street via a break in the fence or along Nelson Street via a double gate. A metal fence separates the western quarter of the site from the former playing field.

The site boundaries consist of metal fencing and chain link fencing on all sides.

The site is bounded by residential properties to the north and commercial properties to the west, south and east.

There are no active petrol filling stations within a 250m radius of the site.

The existing site plan is shown on **Figure 2** which is included in **Appendix A**.

2.3 Development Proposals

It is understood that the development plans could include the construction of up to two schools with associated vehicle parking, play areas and playing fields.

Currently, no formal development plans have been provided.

2.4 Site History

The development site and surrounding area has been reviewed with reference to historical Ordnance Survey (OS) maps. The history of the site and immediate surrounding area is summarised in Table 1. Copies of the historical OS maps are included in **Appendix C**. A search buffer of 250m has been used.

Table 1 - Historic Mapping Review

Date	Scale	On Site	Off Site
1848	1:10,560	The site is undeveloped and lies within an open field. Coal pit located in western portion of the site.	Chemical works 130m south and 160m southwest of the site.
1893	1:2,500	Eastern half of the site is developed with residential terraced housing.	Large residential development directly north of the site. Chemical works 10m south of the site. Floor cloth works 10m south of the site. Chemical works 60m south and 130m south of the site. Glass works 60m west of the site. Iron foundry 90m east of the site. Engineering works 105m north of the site. Tannery 200m north of the site. Railway line 250m north of the site.
1908	1:2,500	Timber yard built in eastern extent of the site. School built along western boundary.	Iron foundry 60m south. Brass foundry 200m south of the site. Soap and colour works 150m east of the site.
1922	1:2,500	No significant change.	Smelting works 10m south of the site.
1948	1:2,500	Travelling crane on site along northern boundary. Timber yar extending southwest within the boundary. Day nursery built along south-western boundary.	Iron foundry 20m north of the site. Soap works converted to asbestos works 150m east of the site. Rubber works 10m south of the site. Tar distillery 60m southwest of the site. Cabinet works 165m north of the site. Cotton mills 190m southwest of the site.
1965	1:2,500	Buildings demolished and site used as a playing field.	Chemical and rubber works converted to warehouses and depot 10m south of the site.
1978	1:2,500	No significant change.	Engineering works adjacent to the eastern boundary. Chemical works and iron foundries labelled as works. Tar distilleries demolished.
1986	1:2,500	No significant change.	No significant change.
2021	1:2,500	Site disused as a school playing field. School demolished.	Works demolished 130m south of the site.

3 Environmental Setting

3.1 Geology

The BGS geological mapping (Geoindex and BGS Sheet 85 Manchester) show that the site is directly underlain by diamicton which is of Quaternary age. Diamicton generally consists of unsorted clays, silts, sands and gravels.

The underlying bedrock consists of the Pennine Upper Coal Measures Formation which is of Carboniferous age. The Pennine Upper Coal Measures Formation generally consists of interbedded grey mudstones and siltstones with pale grey sandstones and numerous coal seams but no mudstones containing marine fossils. According to the BGS geological sheet, the bedrock has a regional dip of about 18° towards the southwest – **See Appendix D**.

The nearest geological fault is located 670m northwest of the site.

Two BGS borehole records (ref: SJ89NE195 and SJ89NE194) have been obtained from BGS online records, relating to locations within the southwest of the site. The boreholes show about 2m of Made Ground overlying thick deposits of diamicton consisting of generally stiff clays with occasional lenses of sand. A 4m thick layer of sand is recorded at a depth of 12m bgl. Bedrock was recoded at depths of between 25.0m and 27.5m bgl.

A copy of the geological maps is included in **Appendix D**. A copy of the BGS borehole logs is included in **Appendix E**.

3.2 Radon

The site lies within the lowest band of radon potential where it is estimated that less than 1% of the properties are above the action level (low probability). Radon protective measures are not deemed necessary for the development.

3.3 Coal Mining Activity

The site falls within a coal mining area described as having minable coal deposits and partially intersects a 'Development High Risk Area' for coal mining as defined by the Coal Authority. As such, it is considered that any future development at the site could be at risk from coal mining related hazards.

The Coal Authority Interactive Viewer map shows that the site is intersected by two seams of coal, of which one has been known to have been worked. Additionally, two mine shafts are located in the south-western corner of the site.

It is recommended that a detailed Coal Mining Risk Assessment is completed for the site.

A copy of the coal mining summary map is included in **Appendix F**.

3.4 Hydrogeology

The superficial diamicton deposits are designated as a Secondary (Undifferentiated) Aquifer. This is defined as: cases where it has not been possible to assign A or B to a soil unit due to the inherent heterogeneity.

The Pennine Upper Coal Measures Formation is designated as a Secondary A Aquifer. This is defined as: permeable layers capable of supporting water supplies at a local rather than strategic scale, and in some cases forming an important source of base flow to rivers.

There is a single record of a groundwater abstraction licence held within a 1km radius of the site. The license is held 360m east of the site for construction purposes.

The site is not located within Source Protection Zone.

A copy of the hydrogeological maps is included in **Appendix G**.

3.5 Hydrology

There are no significant surface water features (rivers, lakes, reservoirs) located within a 1km radius of the site.

Rochdale Canal is located 110m south of the site.

3.6 Flood Risk

The site lies within a Flood Zone 1, land assessed as having less than a 1 in 1,000 annual probability of river flooding in any year (low probability).

3.7 Waste Management Facilities

There are 5 no. records of historic landfill sites located within a 1km radius of the site. The landfill site information is summarised below.

Table 2 - Historic Landfill Summary

Landfill Sites	Operation Dates	Waste Type	Distance From Site
Bradford Road Works	1979 – 1983	Inert, Industrial, Special	595m SE
New Viaduct Street	No Information	No Information	620m S
Cambrian Street Depot	1985 – 1990	Inert	670m S
Fitzgeorge Street	No Information	No Information	780m NW
Sand Street	No Information	No Information	950m W

There are no records of currently authorised landfill sites located within a 1km radius of the site.

There are 6 no. records of sites operating under an environmental permit for waste operations located within a 1km radius of the site. The waste operations permits are summarised in Table 3 below:

Table 3 – Waste Operations Summary

License Holder	Site Type	Distance from Site
Biffa Waste Services Limited	Transfer station taking no-biodegradable waste	250m N
P R Junior Limited	Inert & Excavation WTS with treatment	340m NE
European Metal Recycling Ltd	Metal recycling site	440m NE
Bensons For Skips	Household, commercial and industrial waste transfer station	450m NE
Recon Packaging Ltd	Material recycling treatment facility	790m E
Mauser	Material recycling treatment facility	790m E

A copy of the historic landfill map is included in **Appendix H**.

3.8 Environmental Permits, Incidents and Registers

There are several records of site operating under an environmental permit for discharges to water and groundwater located within a 1kmr radius if the site. The nearest is held by United Utilities Water Ltd 280m east of the site.

There is a single record of a site operating under an environmental installation permit located within a 1km radius of the site. The permit is held by Princes Ltd 600m east of the site for animal vegetable and food.

There is a single record of a historic environmental pollution events within 1km of the site. The event occurred 420m northeast of the site in 2004. The event was caused by fly tipping of organic chemical wastes.

3.9 Designated Environmentally Sensitive Sites

There is a single record of a designated environmentally sensitive site located within a 1km radius of the site. A Nitrate Vulnerable Zone is located 400m north of the site.

A copy of the environmental designations map is included in **Appendix I**.

4 Preliminary Conceptual Site Model

4.1 Introduction

In order to assess the environmental risks present, a preliminary conceptual model has been developed for the site. This model has been developed using best practice guidelines in conjunction with the current assessment framework taking into account the development proposals. This preliminary conceptual model is based on the gathered desk based information (e.g. historical OS data and data sourced from the EA, Geoindex and Magic databases).

The conceptual site model is a representation of the hypothesised relationships between sources, pathways and receptors which allows the identification of potential pollutant linkages and whether these linkages have the potential to comprise significant harm and/or pollution of controlled waters in relation to the site. This model comprises three elements:

Source – the key pollutant hazards associated with the site

Receptor – the key targets at risk from the sources

Pathway – the means by which the contaminant can cause harm to the receptor

If all three elements are present, then a potential pollutant linkage exists, and this may require further assessment.

4.2 Potential Contamination Sources

Historically, the site has been developed with residential housing, a school and a timber yard since as far back as the 1890s. The majority of the site was cleared by the 1950s and then used as a playing field for an adjacent school and this was then disused following the demolition of the school in the 2000s. Given the former on site development, there is the potential for Made Ground to be present within the shallow soils at the site. The Made Ground could contain contaminants such as heavy metals, polyaromatic hydrocarbons (PAHs), hydrocarbons, solvents and asbestos. Additionally, if the Made Ground contains significant putrescible material, there is the potential for ground gases (i.e. carbon dioxide and methane) to be present, however, nearby boreholes do not indicate a high putrescible content within the Made Ground.

Additionally, a number of off-site land uses have been identified in the surrounding area. The land uses and their associated contaminants are summarised in Table 4 below:

Table 4 – Off-Site Land Use Summary

Land Use	**Potential Contaminants**
Rubber Works	Solvents, PAHs
Iron Foundry	Heavy metals, PAHs, solvents, sulphates, phenols
Chemical Works	Heavy metals, PAHs, solvents

Land Use	Potential Contaminants
Railway Line	Heavy metals, PAHs, solvents
Tar Distillery	Hydrocarbons, phenols
Soap and Colour Works	Heavy metals, PAHs, solvents, acids, sulphates
Engineering Works	Heavy metals, PAHs, solvents
Furniture Works	Heavy metals, PAHs, solvents, paints
Warehouse/ Depot	Heavy metals, PAHs, solvents
Glass Works	Heavy metals, PAHs
Tannery	Anthrax, solvents, heavy metals
Cotton Mill	Heavy metals, PAHs, solvents, pesticides
Asbestos Works	Asbestos, solvents

The majority of the above land uses can be discounted as credible sources of contamination due to the presence of low permeability superficial deposits underlying the area which will limit the migration of contaminants to the site. However, the depositing of waste materials at the site from these processes cannot be ruled out.

It is considered that the substantial thickness of superficial deposits which are present underlying the sit and surrounding area will act as an impermeable barrier, preventing the migration of mine gases from recorded mine workings beneath the site to the surface. However, a recorded mine shaft is located within the south-western corner of the site which will provide a preferential pathway.

Several historic landfill sites have been identified in the surrounding area. The landfill sites can be discounted as potential sources of ground gas due to the distance from site (>595m). Additionally, the presence of low permeability diamicton will limit the migration of any ground gas to the site from off-site sources.

4.3 Receptors

The potential receptors considered to be at risk from soil and groundwater contamination associated with the site are summarised in Table 5 below:

Table 5 - Receptor Description

Receptor	Details
Human (On Site)	- Construction workers - Future site users - Site visitors
Human (Off Site)	- Adjacent site users
Controlled Waters	- Secondary undifferentiated Aquifer - Secondary A Aquifer - Rochdale Canal - Groundwater Abstraction
Building/ construction materials	- Foundations and buried services

4.4 Pathways

The potential exposure pathways linking contamination with the receptors identified above are summarised in Table 6 below:

Table 6 - Exposure Pathways Summary

Receptor	Details of Exposure Pathway
Human (on-site)	- Direct ingestion of contaminated soil/groundwater - Dermal contact with soil/groundwater
Human (off-site)	- Inhalation of fibres and particulates
Controlled waters	- Vertical and lateral migration of dissolved phase contaminants via preferential pathways to groundwater aquifers - Lateral migration and surface water run-off to water courses
Building/construction	- Buried materials/services - Contact with contaminated soil and/or groundwater

4.5 Potential Pollution Linkages

4.5.1 Human Health

It is understood that the development plans could include the construction of up to two new schools. Plans include areas for vehicle parking and soft landscaping.

The presence of buildings and hardstanding would eliminate the risk of exposure, via the dermal contact and ingestion pathways to future site users to any ground contamination that may remain in these areas following development.

There could be a potential risk of exposure to any ground contamination that remains following redevelopment in the proposed areas of soft landscaping, to future site users, via all possible exposure pathways.

Any ground gases (i.e. methane and carbon dioxide) and vapours that are present within the soils beneath the site could potentially ingress into the buildings through preferential pathways (e.g. service entry points). Therefore, there would be a risk of exposure via inhalation to future site users.

There is the potential for construction workers and adjacent land users to be exposed to soil and groundwater contamination during site redevelopment. However, the use of appropriate

PPE and the adoption of suitable Health and Safety methods will help to reduce the risks posed to human health during this work.

4.5.2 Controlled Waters

Geological maps indicate that the site is underlain by superficial diamicton deposits which are designated as a Secondary Undifferentiated Aquifer. Nearby borehole records show that the diamicton generally comprises stiff clay which will act as a barrier, limiting the migration of contaminants to the underlying aquifer or off-site receptors.

The site does not lie within a Source Protection Zone and there is a single record of a groundwater abstraction license held within a 1km radius of the site. The license is not for potable water.

The Rochdale Canal is located 110m from the site boundary. It is considered that this can be discounted as a feasible receptor due to the distance and presence of low permeability clay soils and clay lining of the canal.

Overall, the risk to controlled waters is deemed to be negligible.

4.5.3 Building/Construction Materials/Buried Services

The presence of any soil and groundwater contaminants beneath the site could potentially impact on construction materials for the new development, such as below ground structures and services. Concrete foundations are particularly sensitive to aggressive ground conditions, i.e. sulphate attack.

If ground gases and vapour are present in the soil beneath the site, then there would be the potential risk of ingress into the new property which could present a risk of explosion.

4.6 Preliminary Hazard Assessment

A preliminary hazard assessment is presented in Table 7. The preliminary hazard assessment is a qualitative assessment of the risks posed by each potential pollutant linkage described above and is used to identify the requirement for additional work (e.g. intrusive ground investigation).

Table 7 – Preliminary Hazard Assessment

Source 1	Pathway	Receptor	Likelihood	Effect	Risk	Assessment
Contaminated soil	Ingestion (via soil dust), inhalation (via soil dust and vapours), ingestion through dirty hands, dermal contact with soil/water.	Future site users Adjacent site users Construction workers	3	3	Moderate	On-site contamination identified.
Contaminated soil groundwater	Direct contact	Buildings/services	3	3	Moderate	On-site source potential identified. Foundations and services in contact with potentially contaminated soils.
Contaminated groundwater	Downward or lateral migration	Secondary Undifferentiated Aquifer Secondary A Aquifer Rochdale Canal Groundwater Abstraction	1	3	Low	Source potential identified. Superficial deposits act as an impermeable barrier. The site is not located within a Source Protection Zone.
Ground gas / vapours	Inhalation, ingress into buildings	Buildings / services Future site users Adjacent site users Construction workers	3	3	Moderate	Made Ground not thought to contain significant putrescible material. Superficial deposits act as an impermeable barrier to off-site sources. Mine shaft identified within the site boundary could provide a preferential pathway to gas migration. Site located within a low probability area for radon.

Using Risk Matrix (Table 8) Degree of Risk (R) = Likelihood (L) x Effect (E)

Table 8 - Risk Matrix, Degree of Risk (R) = Likelihood (L) x Effect (E)

Likelihood	Description	Probability	Effect (E)	Description
5	Almost certain	>70%		
4	Probable	50-70%	4	Severe
3	Likely	30-50%	3	Medium
2	Unlikely	10-30%	2	Mild
1	Negligible	<10%	1	Minor
Risk (R)	**Risk Level**	**Action**		
1-5	Low	None required		
6-10	Moderate	Further assessment via Phase 2 intrusive ground investigation.		
>10	High	Further assessment via Phase 2 intrusive ground investigation.		

5 Conclusions and Recommendations

The preliminary environmental site assessment indicates that the site can be classified as moderate risk in terms of contamination and the risks to the identified receptors (e.g. human health, controlled waters, buildings) following redevelopment is considered to be moderate.

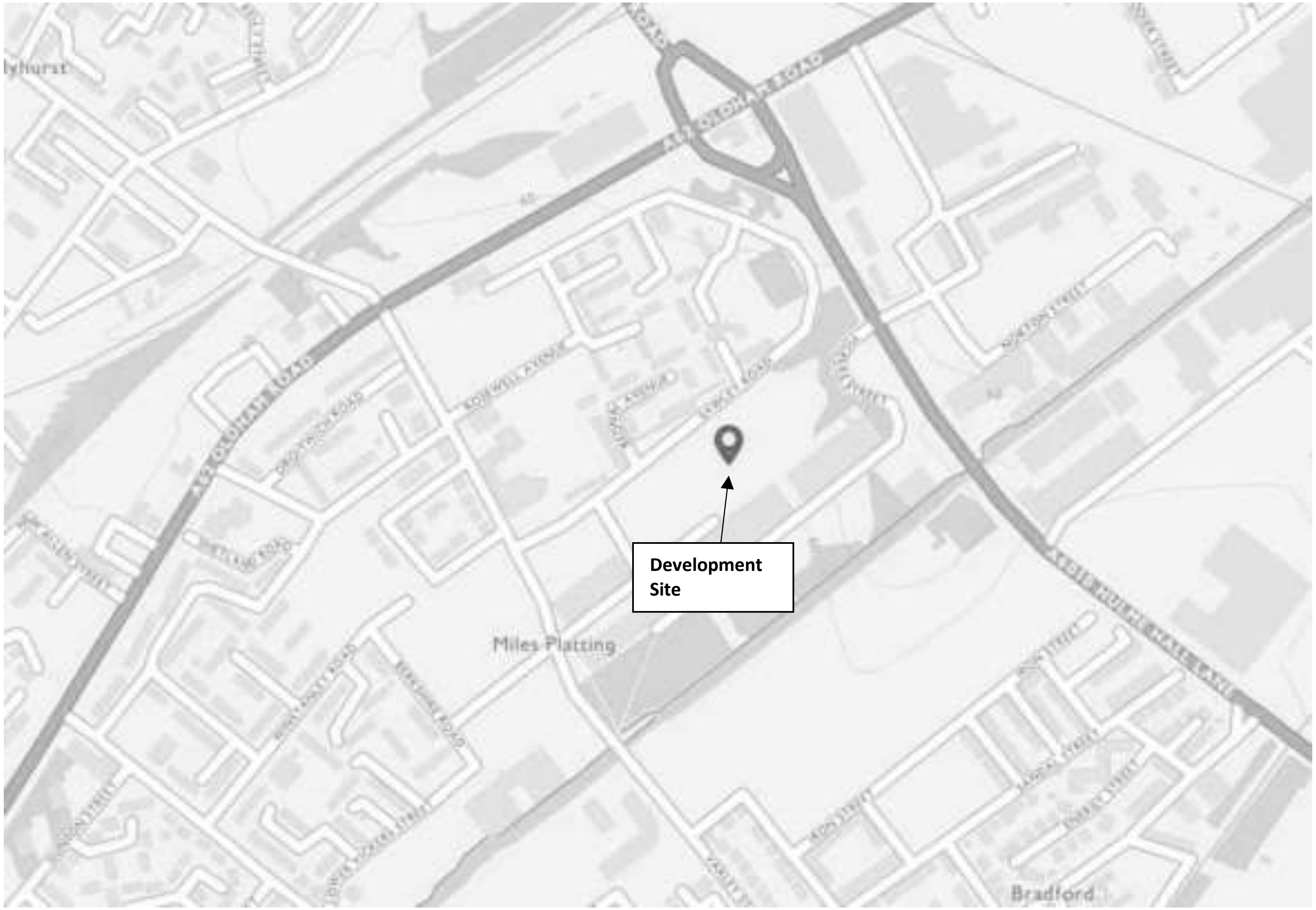
This classification is due to the potential for Made Ground to be present within the shallow soils at the site associated with the historical land use as a timber yard and the demolition of former buildings on site. Contaminants such as heavy metals, PAHs, hydrocarbons and asbestos could be present within the Made Ground. There is also the potential for ground gases (i.e. carbon dioxide and methane to be present) in the ground beneath the site associated with any organic/putrescible material that may be present within the Made Ground deposits.

Furthermore, there may also be the potential for ground gases to be present associated with the mine shafts located within the site boundary which will act as a preferential pathway for mine gases at depth to reach the surface.

It is recommended a Phase 2 intrusive ground investigation is undertaken prior to site redevelopment to obtain additional information on the ground conditions and the contamination status. The investigation should be carried out by qualified and competent persons. The scope of works for the investigation will need to be submitted and approved by the local authority prior to the commencement of the Phase 2 intrusive works.

APPENDICES

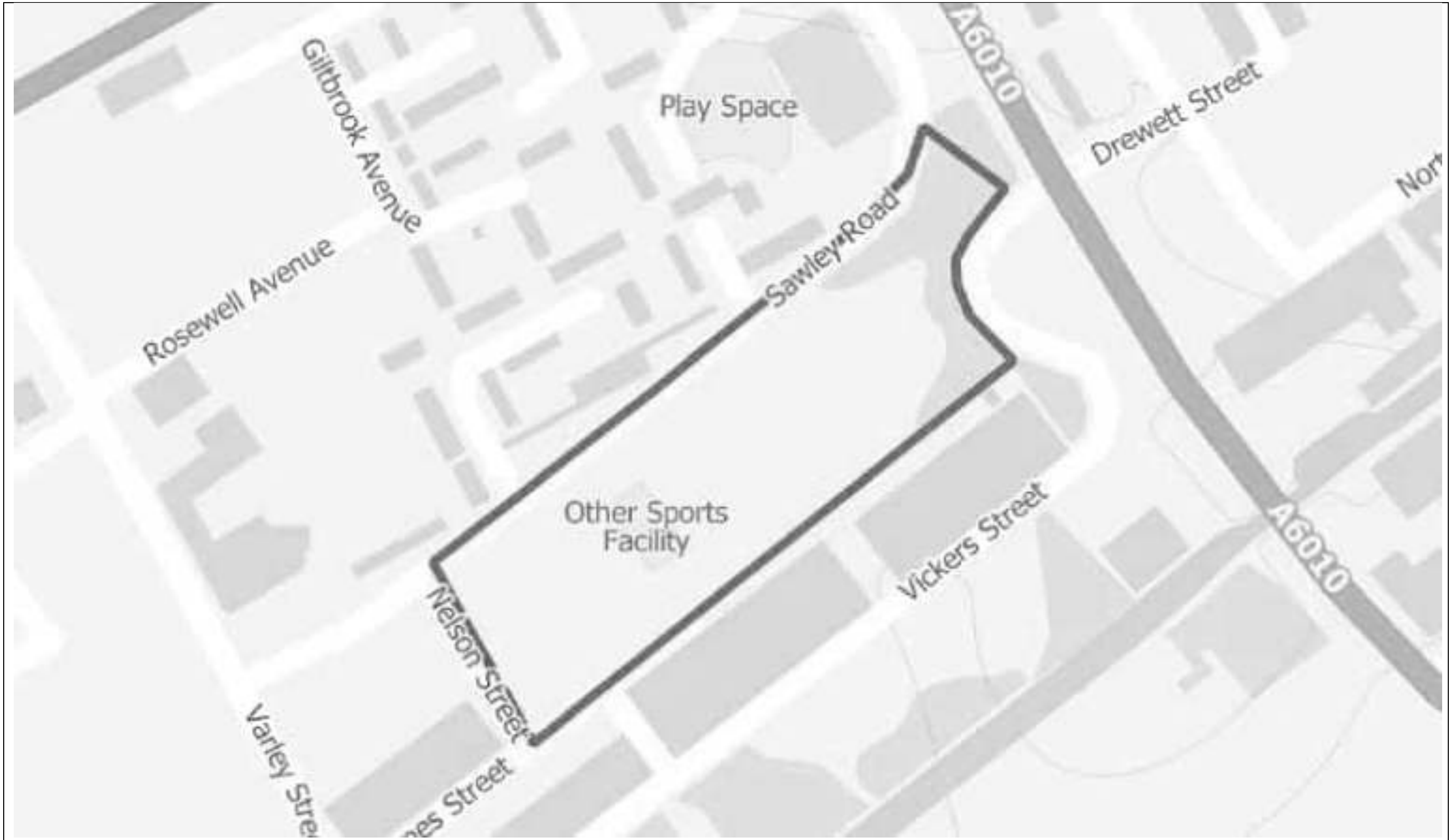
Appendix A – Site Location and Site Plan



Development Site
Miles Platting
Bradford
A62 Oldham Road
A6010 Hulme Hall Lane

enviro | solution

Site Location Map


Play Space
Giltbrook Avenue
Drewett Street
A6010
Rosewell Avenue
Sawley Road
Other Sports Facility
Vickers Street
A6010
Nelson Street
Varley Stre
nes Street
Nort

enviro | solution

Existing Site Plan

Appendix B – Site Photographs

enviro | solution

View of site looking north

enviro | solution

View of site looking south

enviro | solution

North-western corner of the site

enviro | solution

View of site looking west showing games court

enviro | solution

Current site entrance along Sawley Street

enviro | solution

Chain link fence boundary along Sawley Street

View of site looking north

View of northern site boundary and entrance

Site entrance along Nelson Street

View of westerns site boundary looking north

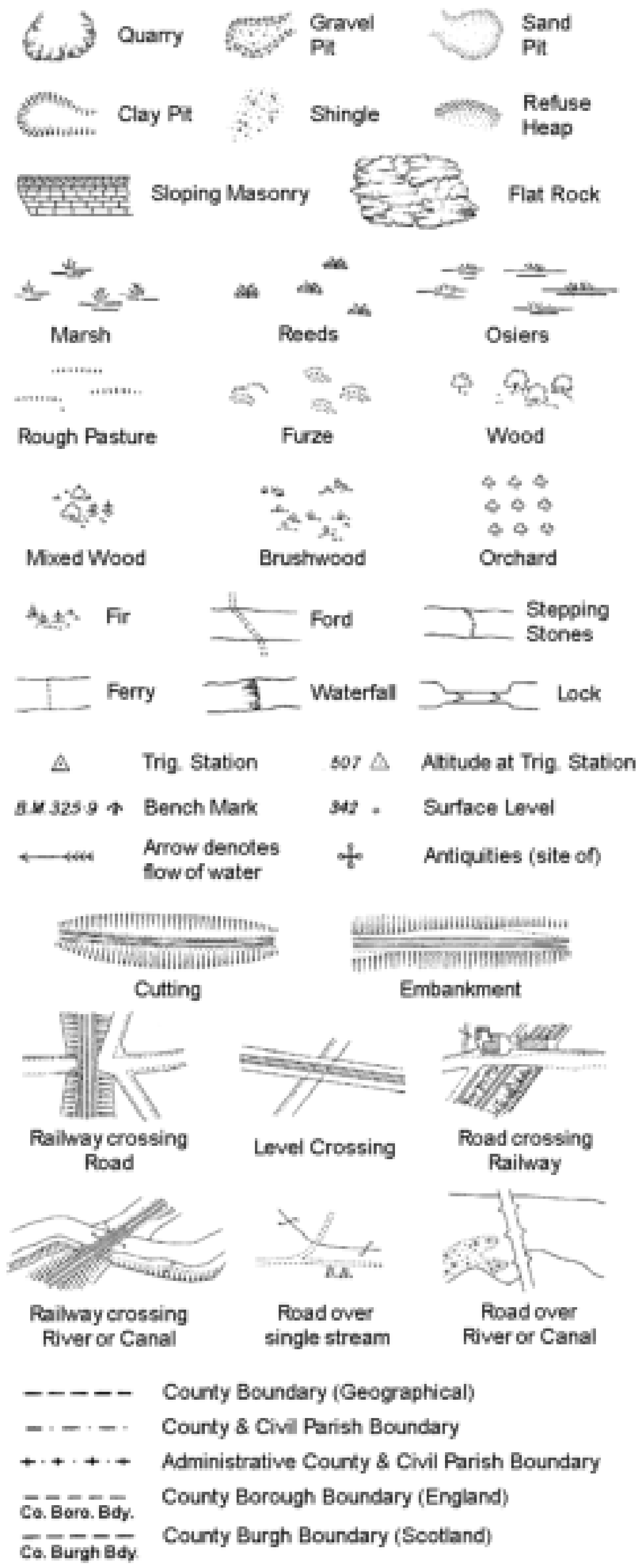
Northern site boundary

Southern site boundary looking northeast

Appendix C - Historical Maps

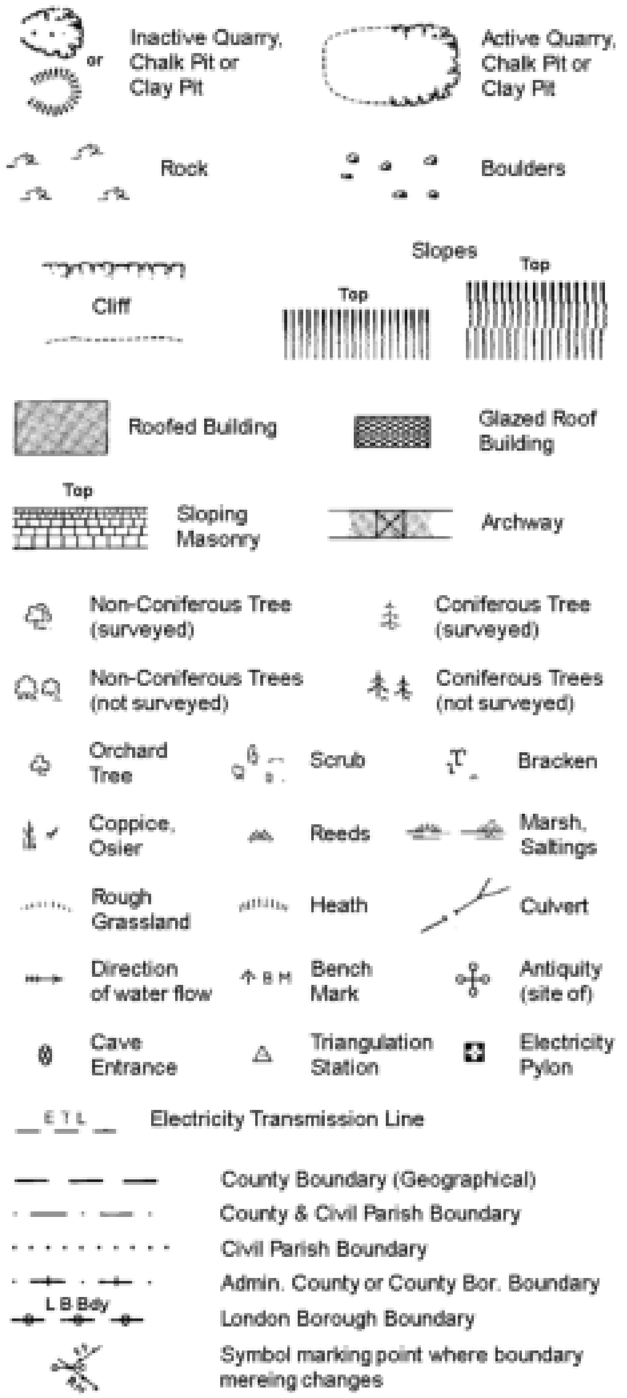
Historical Mapping Legends

Ordnance Survey County Series and Ordnance Survey Plan 1:2,500


Quarry
Gravel Pit
Sand Pit
Clay Pit
Shingle
Refuse Heap
Sloping Masonry
Flat Rock
Marsh
Reeds
Osiers
Rough Pasture
Furze
Wood
Mixed Wood
Brushwood
Orchard
Fir
Ford
Stepping Stones
Ferry
Waterfall
Lock
Trig. Station
507
Altitude at Trig. Station
B.M 325·9
Bench Mark
342
Surface Level
Arrow denotes flow of water
Antiquities (site of)
Cutting
Embankment
Railway crossing Road
Level Crossing
Road crossing Railway
Railway crossing River or Canal
Road over single stream
Road over River or Canal
County Boundary (Geographical)
County & Civil Parish Boundary
Administrative County & Civil Parish Boundary
Co. Boro. Bdy.
County Borough Boundary (England)
Co. Burgh Bdy.
County Burgh Boundary (Scotland)

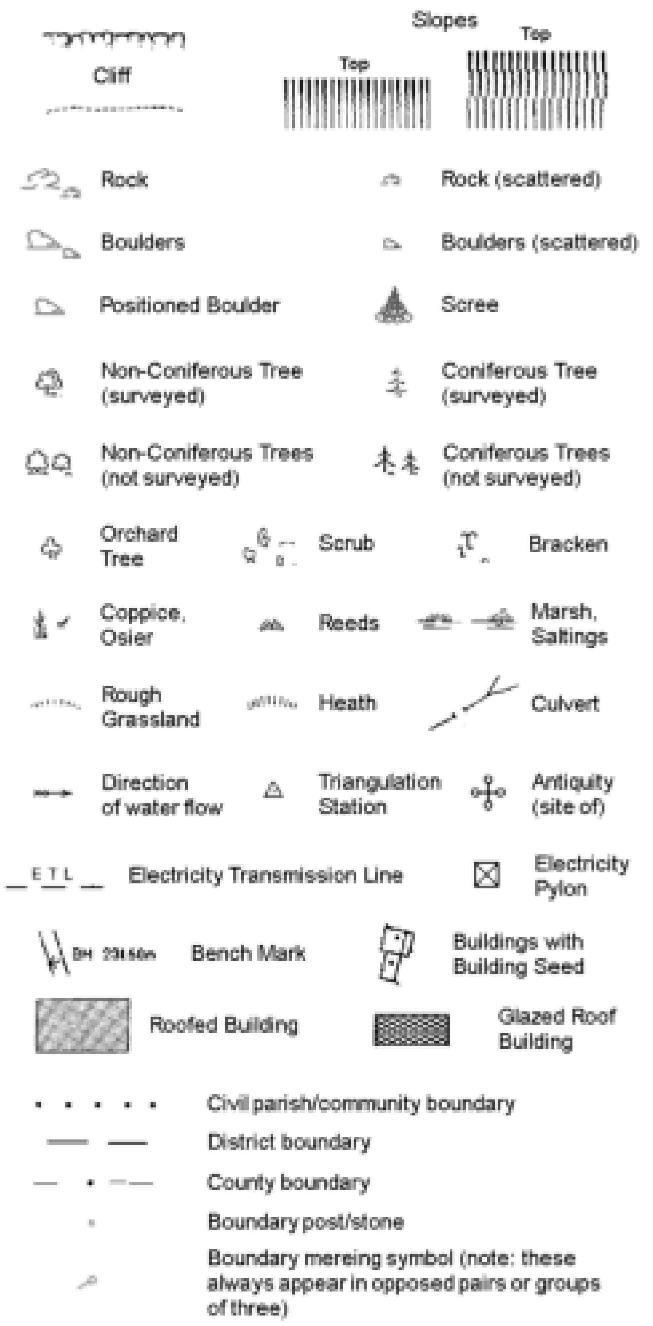
B.P. B.S.	Boundary Post or Stone	*P.C.B*	Police Call Box
B.R.	Bridle Road	*P*	Pump
E.P	Electricity Pylon	*S.P*	Signal Post
F.B.	Foot Bridge	*Sl.*	Sluice
F.P.	Foot Path	*Sp.*	Spring
G.P	Guide Post or Board	*T.C.B*	Telephone Call Box
M.S	Mile Stone	*Tr.*	Trough
M.P. M.R.	Mooring Post or Ring	*W*	Well

Ordnance Survey Plan, Additional SIMs and Supply of Unpublished Survey Information 1:2,500 and 1:1,250


Inactive Quarry, Chalk Pit or Clay Pit
or
Active Quarry, Chalk Pit or Clay Pit
Rock
Boulders
Slopes
Top
Top
Cliff
Roofed Building
Glazed Roof Building
Top
Sloping Masonry
Archway
Non-Coniferous Tree (surveyed)
Coniferous Tree (surveyed)
Non-Coniferous Trees (not surveyed)
Coniferous Trees (not surveyed)
Orchard Tree
Scrub
Bracken
Coppice, Osier
Reeds
Marsh, Saltings
Rough Grassland
Heath
Culvert
Direction of water flow
B M
Bench Mark
Antiquity (site of)
Cave Entrance
Triangulation Station
Electricity Pylon
E T L
Electricity Transmission Line
County Boundary (Geographical)
County & Civil Parish Boundary
Civil Parish Boundary
Admin. County or County Bor. Boundary
L B Bdy
London Borough Boundary
Symbol marking point where boundary mereing changes

BH	Beer House	P	Pillar, Pole or Post
BP, BS	Boundary Post or Stone	PO	Post Office
Cn, C	Capstan, Crane	PC	Public Convenience
Chy	Chimney	PH	Public House
D Fn	Drinking Fountain	Pp	Pump
El P	Electricity Pillar or Post	SB, S Br	Signal Box or Bridge
FAP	Fire Alarm Pillar	SP, SL	Signal Post or Light
FB	Foot Bridge	Spr	Spring
GP	Guide Post	Tk	Tank or Track
H	Hydrant or Hydraulic	TCB	Telephone Call Box
LC	Level Crossing	TCP	Telephone Call Post
MH	Manhole	Tr	Trough
MP	Mile Post or Mooring Post	Wr Pt, Wr T	Water Point, Water Tap
MS	Mile Stone	W	Well
NTL	Normal Tidal Limit	Wd Pp	Wind Pump

Large-Scale National Grid Data 1:2,500 and 1:1,250


Slopes
Top
Top
Cliff
Rock
Rock (scattered)
Boulders
Boulders (scattered)
Positioned Boulder
Scree
Non-Coniferous Tree (surveyed)
Coniferous Tree (surveyed)
Non-Coniferous Trees (not surveyed)
Coniferous Trees (not surveyed)
Orchard Tree
Scrub
Bracken
Coppice, Osier
Reeds
Marsh, Saltings
Rough Grassland
Heath
Culvert
Direction of water flow
Triangulation Station
Antiquity (site of)
E T L
Electricity Transmission Line
Electricity Pylon
BH 23.50m
Bench Mark
Buildings with Building Seed
Roofed Building
Glazed Roof Building
Civil parish/community boundary
District boundary
County boundary
Boundary post/stone
Boundary mereing symbol (note: these always appear in opposed pairs or groups of three)

Bks	Barracks	P	Pillar, Pole or Post
Bty	Battery	PO	Post Office
Cemy	Cemetery	PC	Public Convenience
Chy	Chimney	Pp	Pump
Cis	Cistern	Ppg Sta	Pumping Station
Dismtd Rly	Dismantled Railway	PW	Place of Worship
El Gen Sta	Electricity Generating Station	Sewage Ppg Sta	Sewage Pumping Station
El P	Electricity Pole, Pillar	SB, S Br	Signal Box or Bridge
El Sub Sta	Electricity Sub Station	SP, SL	Signal Post or Light
FB	Filter Bed	Spr	Spring
Fn / D Fn	Fountain / Drinking Ftn.	Tk	Tank or Track
Gas Gov	Gas Valve Compound	Tr	Trough
GVC	Gas Governer	Wd Pp	Wind Pump
GP	Guide Post	Wr Pt, Wr T	Water Point, Water Tap
MH	Manhole	Wks	Works (building or area)
MP, MS	Mile Post or Mile Stone	W	Well

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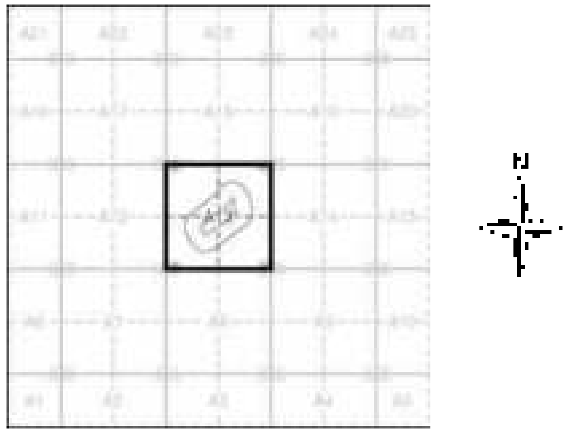
Historical Mapping & Photography included:

Mapping Type	Scale	Date	Pg
Lancashire And Furness	1:2,500	1893	2
Lancashire And Furness	1:2,500	1908	3
Lancashire And Furness	1:2,500	1922 - 1931	4
Ordnance Survey Plan	1:1,250	1948 - 1949	5
Ordnance Survey Plan	1:2,500	1951	6
Ordnance Survey Plan	1:1,250	1952 - 1955	7
Ordnance Survey Plan	1:2,500	1954 - 1970	8
Ordnance Survey Plan	1:1,250	1965 - 1971	9
Ordnance Survey Plan	1:2,500	1966	10
Ordnance Survey Plan	1:1,250	1970 - 1981	11
Additional SIMs	1:1,250	1978 - 1984	12
Additional SIMs	1:1,250	1981 - 1991	13
Additional SIMs	1:1,250	1986 - 1991	14
Ordnance Survey Plan	1:1,250	1988 - 1990	15
Additional SIMs	1:1,250	1991	16
Large-Scale National Grid Data	1:1,250	1992	17
Large-Scale National Grid Data	1:1,250	1994 - 1995	18
Large-Scale National Grid Data	1:1,250	1995	19

Historical Map - Segment A13



Order Details

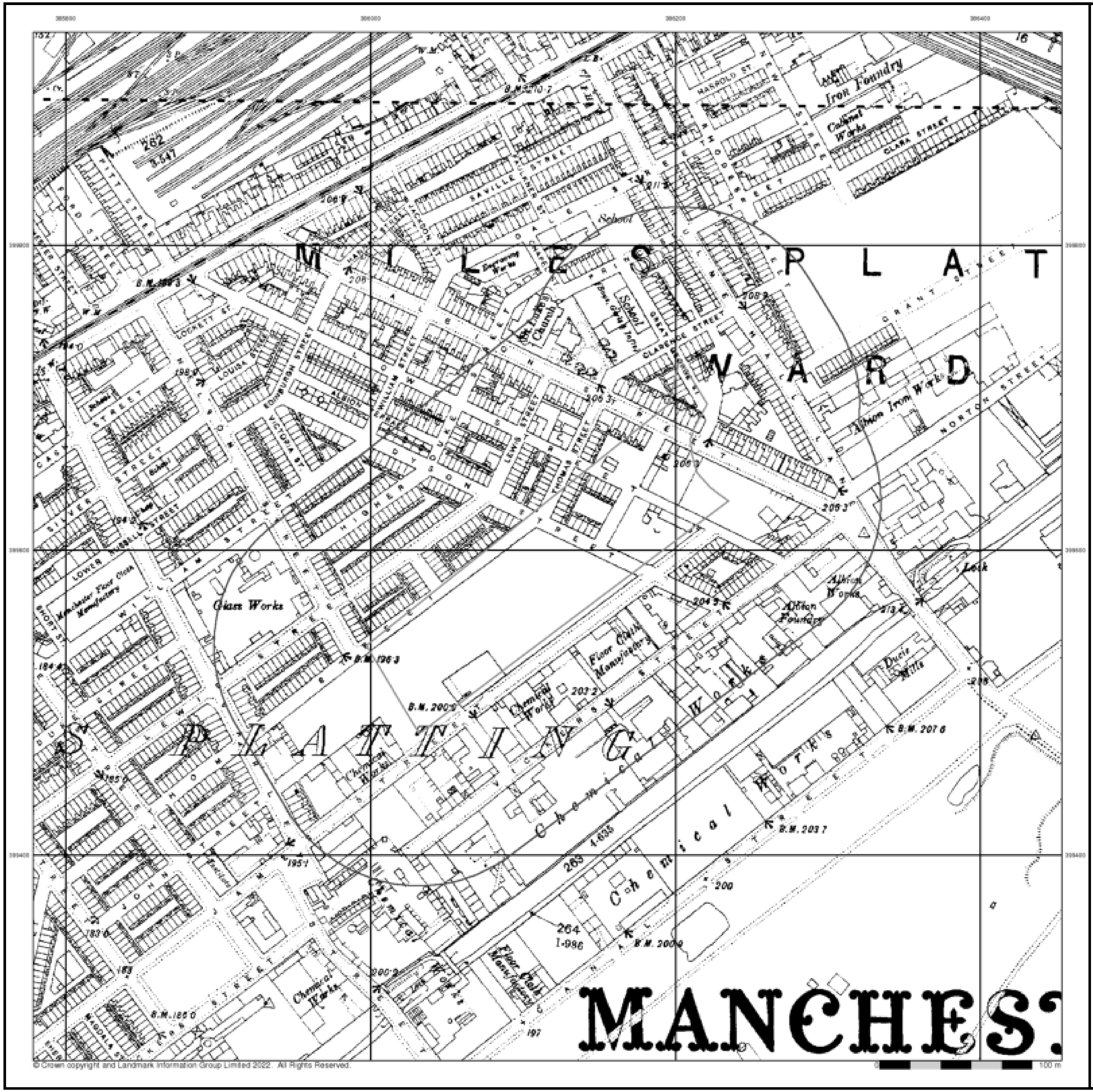
Order Number: 291982299_1_1
Customer Ref: ES020322
National Grid Reference: 386120, 399600
Slice: A
Site Area (Ha): 1.83
Search Buffer (m): 100

Site Details

Saville Whittle, Vickers Street, MANCHESTER, M40 8EF

Landmark INFORMATION GROUP

Tel: 0844 844 9952
Fax: 0844 844 9951
Web: www.envirocheck.co.uk


385800
386000
386200
386400
399800
399600
399400
MILES PLATT
WARD
PLATTING
MANCHEST
Iron Foundry
Calamel Works
Glass Works
Floor Cloth Manufactory
Chemical Works
Albion Works
Albion Foundry
Albion Iron Works
Ducie Mills
Manchester Floor Cloth Manufactory
School
Engineering Works
Lock
HAROLD ST
CLARA STREET
GRANT STREET
NORTON STREET
SAVILLE STREET
CLARENCE STREET
LOUISA ST
ALBION
VICTORIA ST
LEWIS STREET
THOMAS STREET
LOWER
B.M. 206·3
B.M. 196·3
B.M. 200·9
B.M. 207·6
B.M. 203·7
B.M. 185·0
B.M. 210·7
262
3·547
263
4·635
264
1·986
100 m

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Lancashire And Furness

Published 1893

Source map scale - 1:2,500

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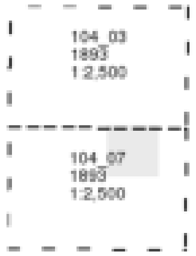
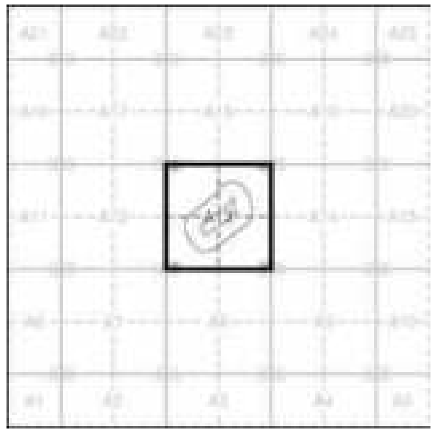
Map Name(s) and Date(s)


104_03
1893
1:2,500
104_07
1893
1:2,500

Historical Map - Segment A13



Order Details

Order Number:	291982299_1_1
Customer Ref:	ES020322
National Grid Reference:	386120, 399600
Slice:	A
Site Area (Ha):	1.83
Search Buffer (m):	100

Site Details

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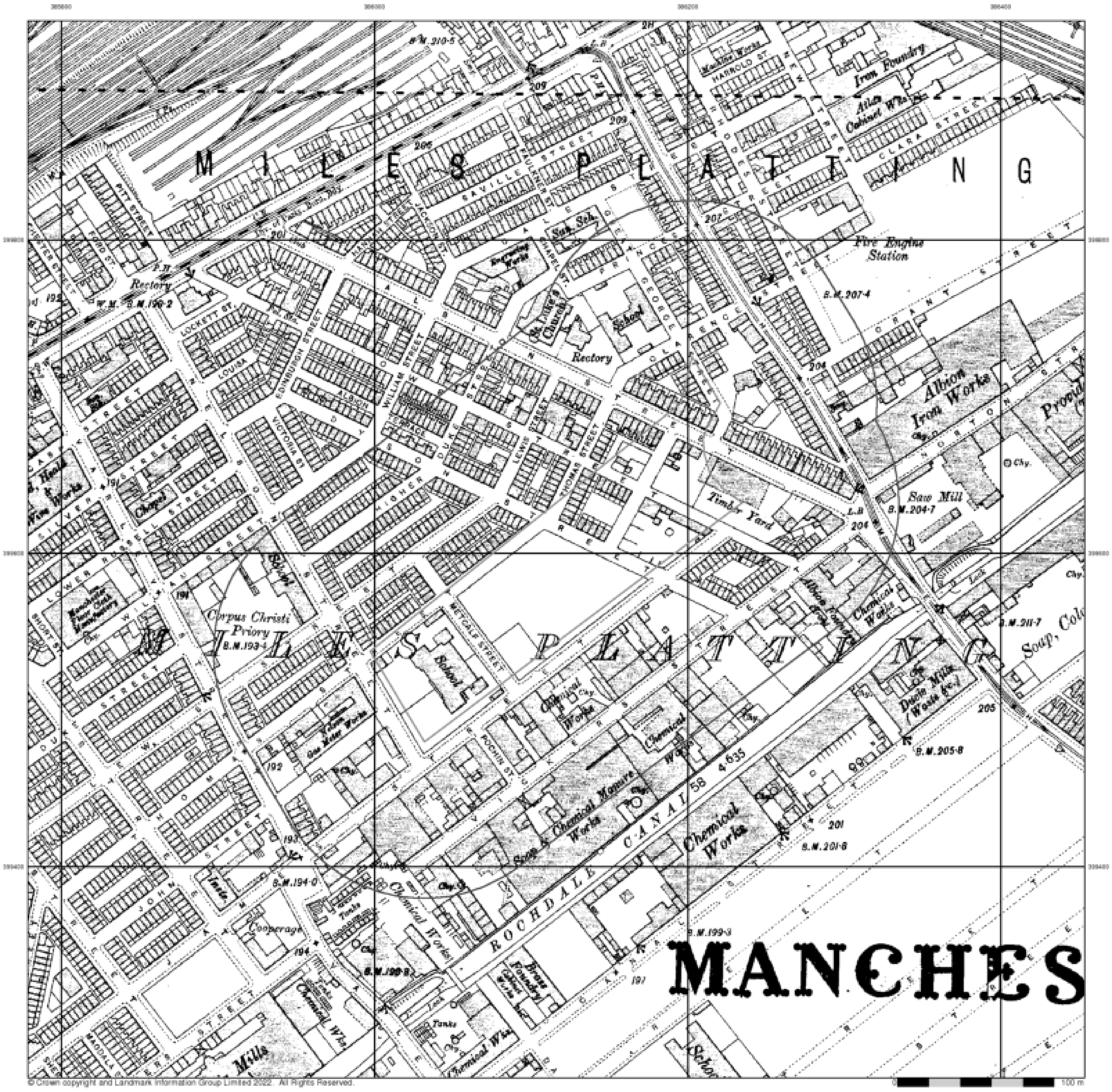

MILES PLATTING
MILES PLATTING
MANCHES
Iron Foundry
Fire Engine Station
Albion Iron Works
Saw Mill
Timber Yard
Rectory
School
Corpus Christi Priory
Chemical Works
Chemical Manure Works
Rochdale Canal
Cooperage
Brass Foundry
Soap, Col
Dacia Mills (Waste &c.)
Albion Works
Chemical Wks
Tanks
Mills
0
100 m

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Lancashire And Furness

Published 1908

Source map scale - 1:2,500

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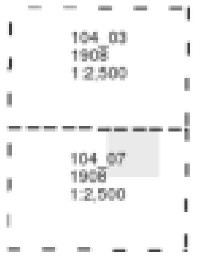
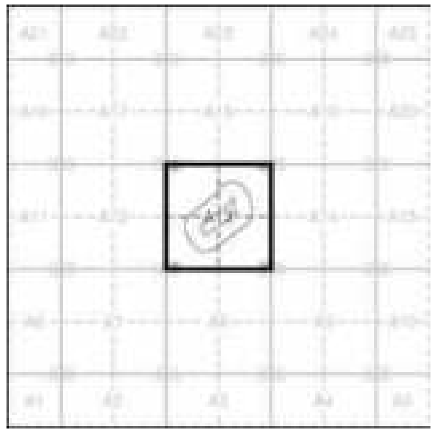
Map Name(s) and Date(s)



104_03
1908
1:2,500
104_07
1908
1:2,500

Historical Map - Segment A13



Order Details

Order Number:	291982299_1_1
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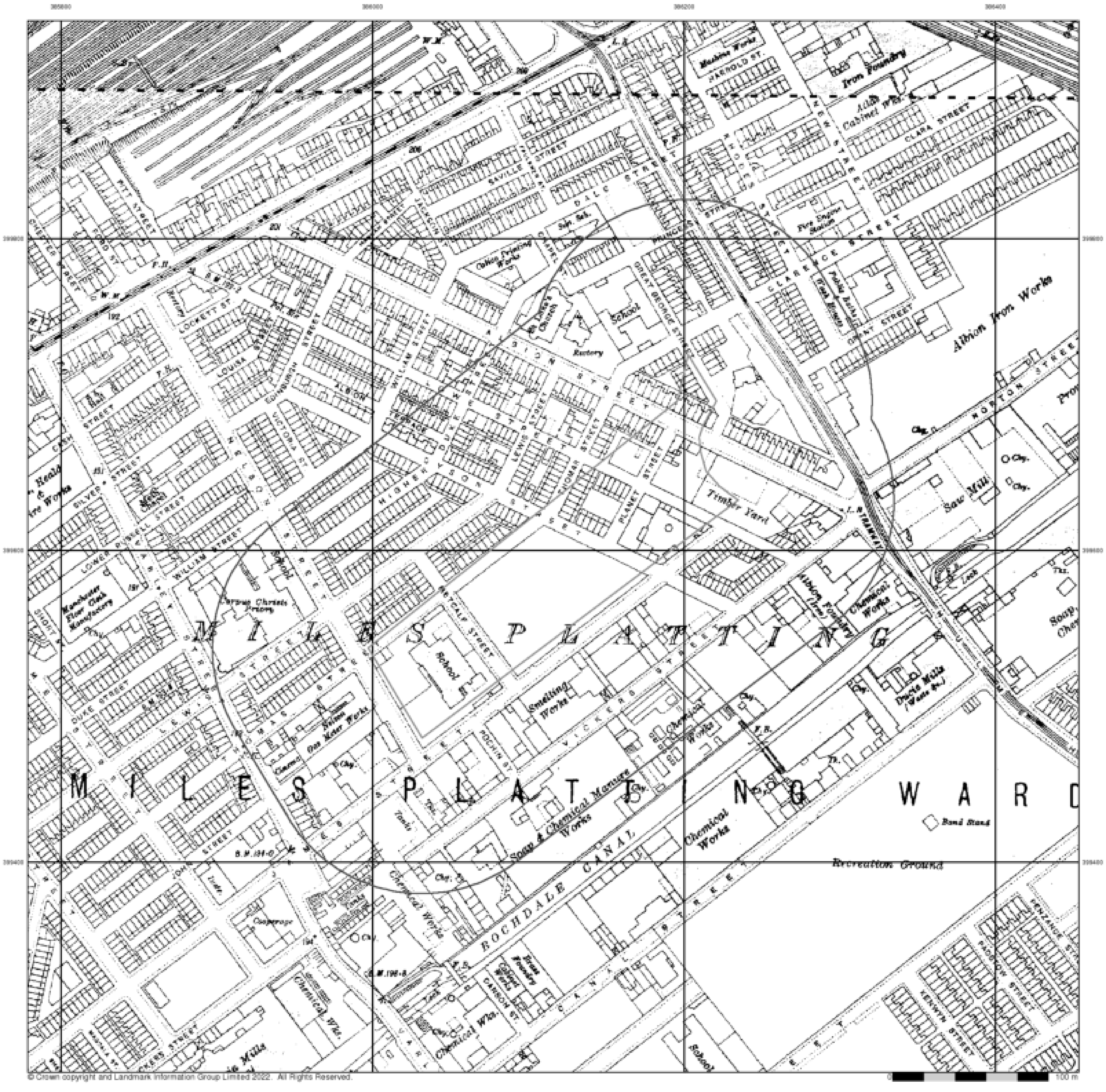
385800
386000
386200
386400
399800
399600
399400
MILES PLATTING
MILES PLATTING WARD
Albion Iron Works
Iron Foundry
Machine Works
Cabinet Wks.
Fire Engine Station
Cotton Spinning Works
School
Rectory
Timber Yard
Saw Mill
Smelting Works
Gas Meter Works
Soap & Chemical Manure Works
Chemical Works
Ducks Mills
Band Stand
Recreation Ground
Cooperage
Tanks
ROCHDALE CANAL
Manchester Flour Cake Manufactory
Lock
Soap Chem
CLARA STREET
NORTON STREET
CLARENCE STREET
METCALF STREET
VICKERS STREET
SAVILLE STREET
PLANET STREET
LEWIS STREET
LOCKETT ST.
LOUISA ST.
SILVER STREET
PITT STREET
HAROLD ST.
GRANT STREET
WILLIAM STREET
DUKE STREET
KERSHAW STREET
CARSON ST.
B.M. 191·0
B.M. 198·8
Chy.
F.P.
W.M.
Chemical Wks.

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0
100 m

Lancashire And Furness

Published 1922 - 1931

Source map scale - 1:2,500

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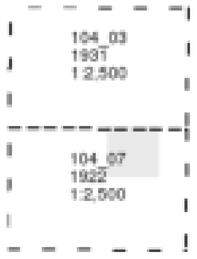
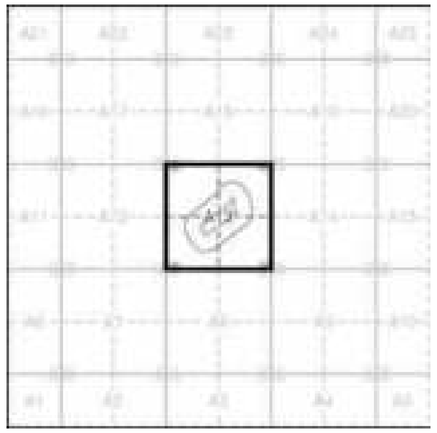
Map Name(s) and Date(s)


104_03
1931
1:2,500
104_07
1922
1:2,500

Historical Map - Segment A13



Order Details

Order Number:	291982299_1_1
Customer Ref:	ES020322
National Grid Reference:	386120, 399600
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Site Area (Ha):	1.83
Search Buffer (m):	100

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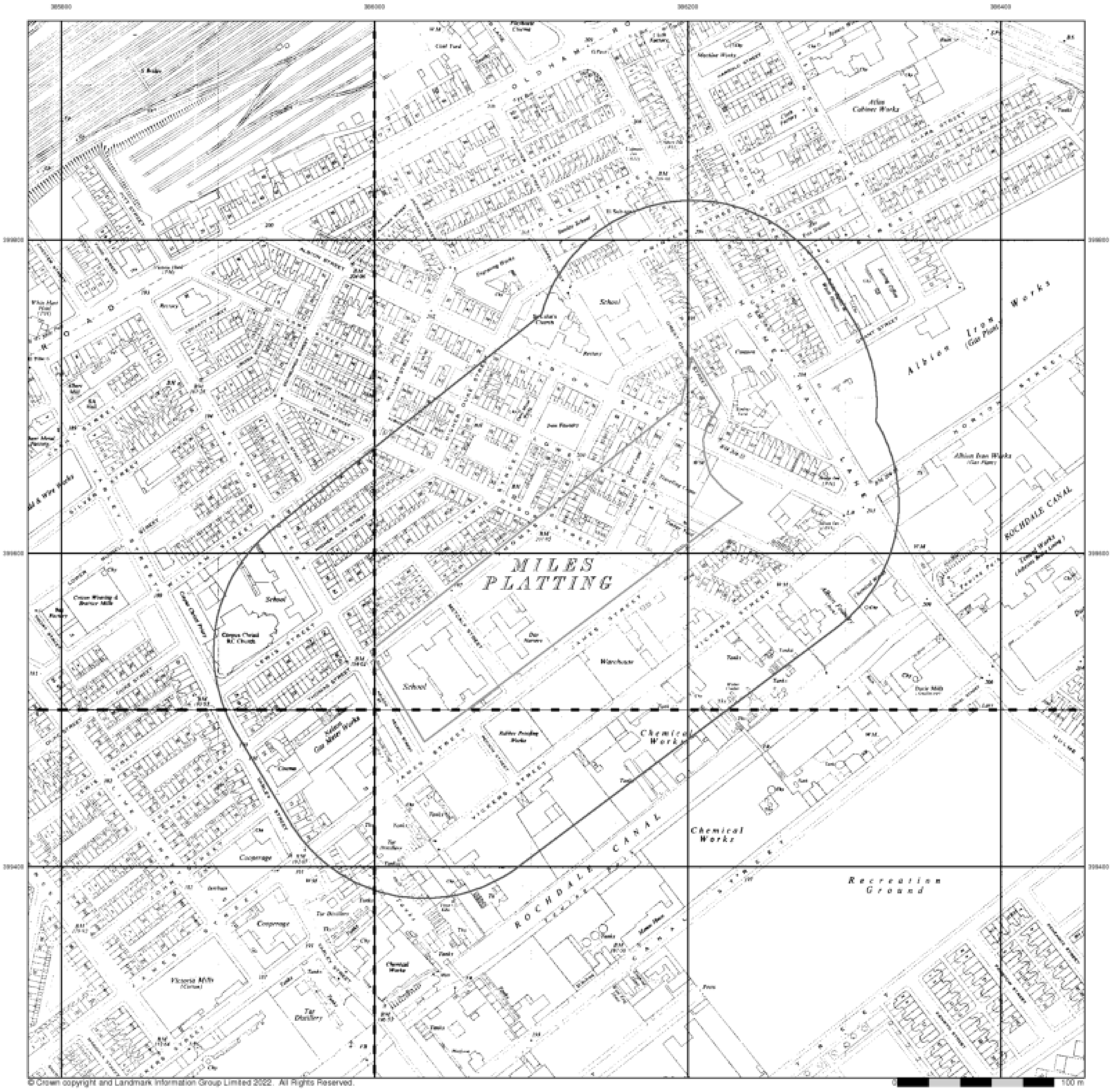

385800
386000
386200
386400
399800
399600
399400
MILES PLATTING
Albion Iron Works (Gas Plant)
Albion Iron Works (Gas Plant)
ROCHDALE CANAL
ROCHDALE CANAL
OLDHAM ROAD
School
School
School
Corpus Christi R.C. Church
Warehouse
Chemical Works
Chemical Works
Recreation Ground
Victoria Mills (Cotton)
Tar Distillery
Cooperage
Cooperage
Cinema
Dye Works
Rubber Proofing Works
VICKERS STREET
JAMES STREET
LEWIS STREET
Atlas Cabinet Works
Crown Weaving & Bleaching Mills
0
100 m

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Ordnance Survey Plan

Published 1948 - 1949

Source map scale - 1:1,250

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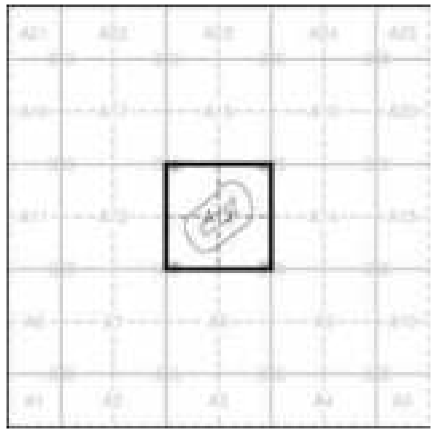
Map Name(s) and Date(s)

SJ8599NE
1949
1:1,250
SJ8699NW
1949
1:1,250
SJ8599SE
1949
1:1,250
SJ8699SW
1948
1:1,250

Historical Map - Segment A13



Order Details

Order Number:	291982299_1_1
Customer Ref:	ES020322
National Grid Reference:	386120, 399600
Slice:	A
Site Area (Ha):	1.83
Search Buffer (m):	100

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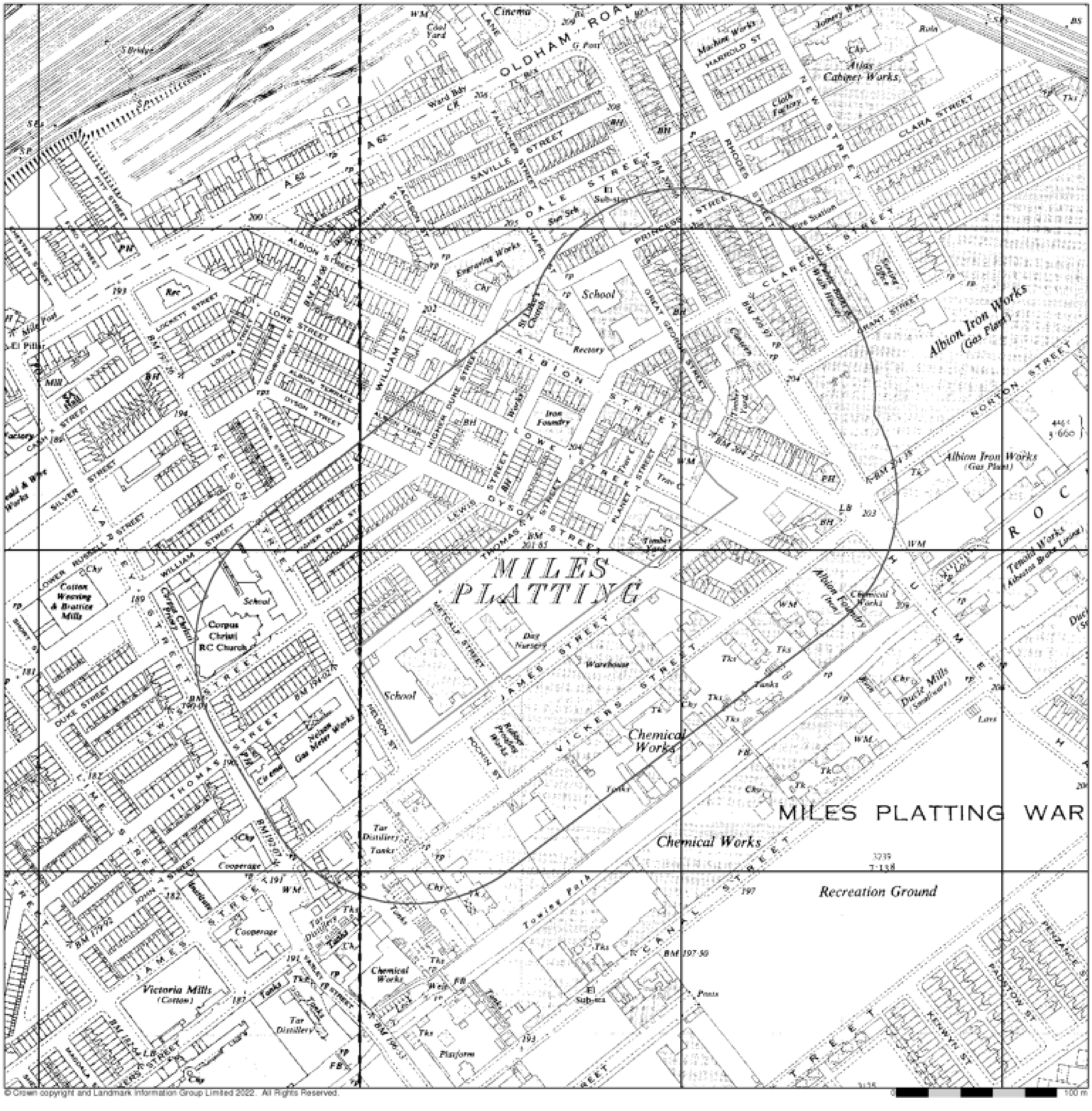
OLDHAM ROAD
A 62
MILES PLATTING
MILES PLATTING WAR
Albion Iron Works (Gas Plant)
Chemical Works
Recreation Ground
Victoria Mills (Cotton)
Corpus Christi RC Church
School
Iron Foundry
Warehouse
Tar Distillery
Cooperage
ALBION STREET
VICKERS STREET
JAMES STREET
CLARA STREET
NORTON STREET
PRINCESS STREET
SAVILLE STREET
DALE STREET
WILLIAM ST
NELSON ST
Cotton Weaving & Braiding Mills
Nelson Gas Meter Works
Engraving Works
Atlas Cabinet Works
Dulcie Mills (Smallware)
Day Nursery
Rectory
Timber Yard
Platform
El Sub-sta
100 m

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Ordnance Survey Plan

Published 1951

Source map scale - 1:2,500

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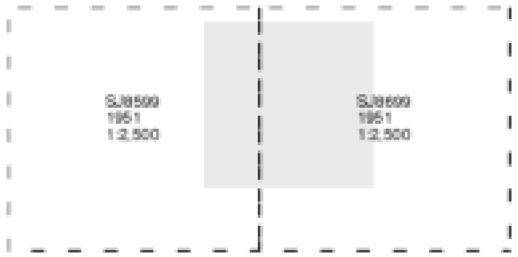
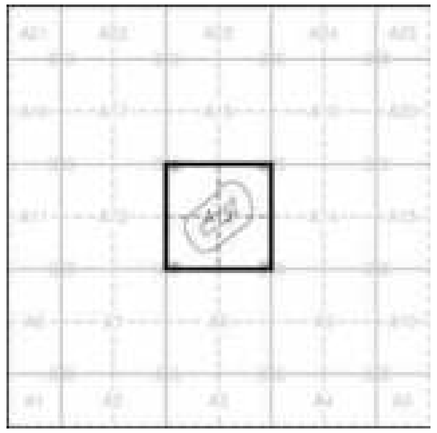
Map Name(s) and Date(s)


SJ8599
1951
1:2,500
SJ8599
1951
1:2,500

Historical Map - Segment A13



Order Details

Order Number:	291982299_1_1
Customer Ref:	ES020322
National Grid Reference:	386120, 399600
Slice:	A
Site Area (Ha):	1.83
Search Buffer (m):	100

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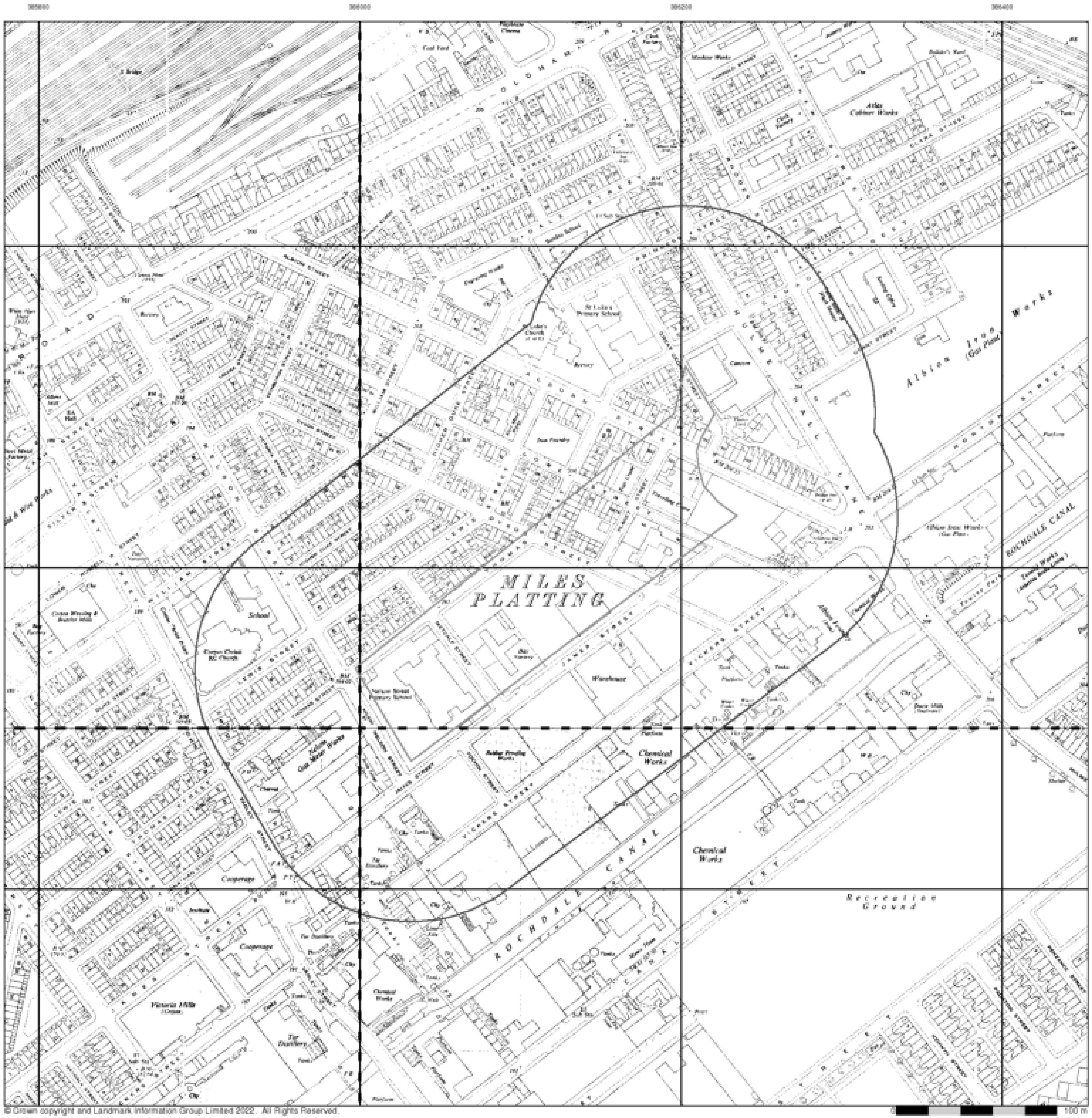
385800
386000
386200
386400
399800
399600
399400
MILES PLATTING
ROCHDALE CANAL
OLDHAM ROAD
Albion Iron Works (Gas Plant)
Atlas Cabinet Works
St Luke's Primary School
Corpus Christi RC Church
School
Warehouse
Chemical Works
Recreation Ground
Cooperage
Victoria Mills
Vickers Street
James Street
0
100 m

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Ordnance Survey Plan

Published 1952 - 1955

Source map scale - 1:1,250

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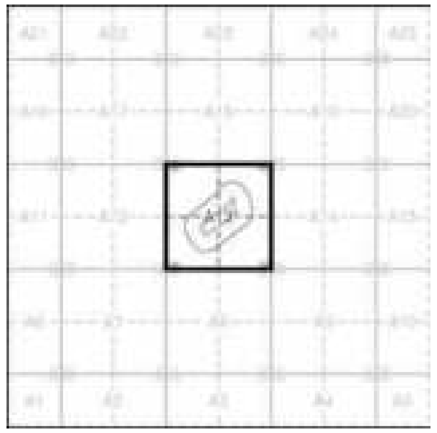
Map Name(s) and Date(s)

SJ8599NE 1952 1:1,250	SJ8699NW 1955 1:1,250
SJ8599SE 1953 1:1,250	SJ8699SW 1953 1:1,250

Historical Map - Segment A13


A21
A22
A23
A24
A25
A16
A17
A18
A19
A20
A11
A12
A13
A14
A15
A6
A7
A8
A9
A10
A1
A2
A3
A4
A5
N

Order Details

Order Number: 291982299_1_1
Customer Ref: ES020322
National Grid Reference: 386120, 399600
Slice: A
Site Area (Ha): 1.83
Search Buffer (m): 100

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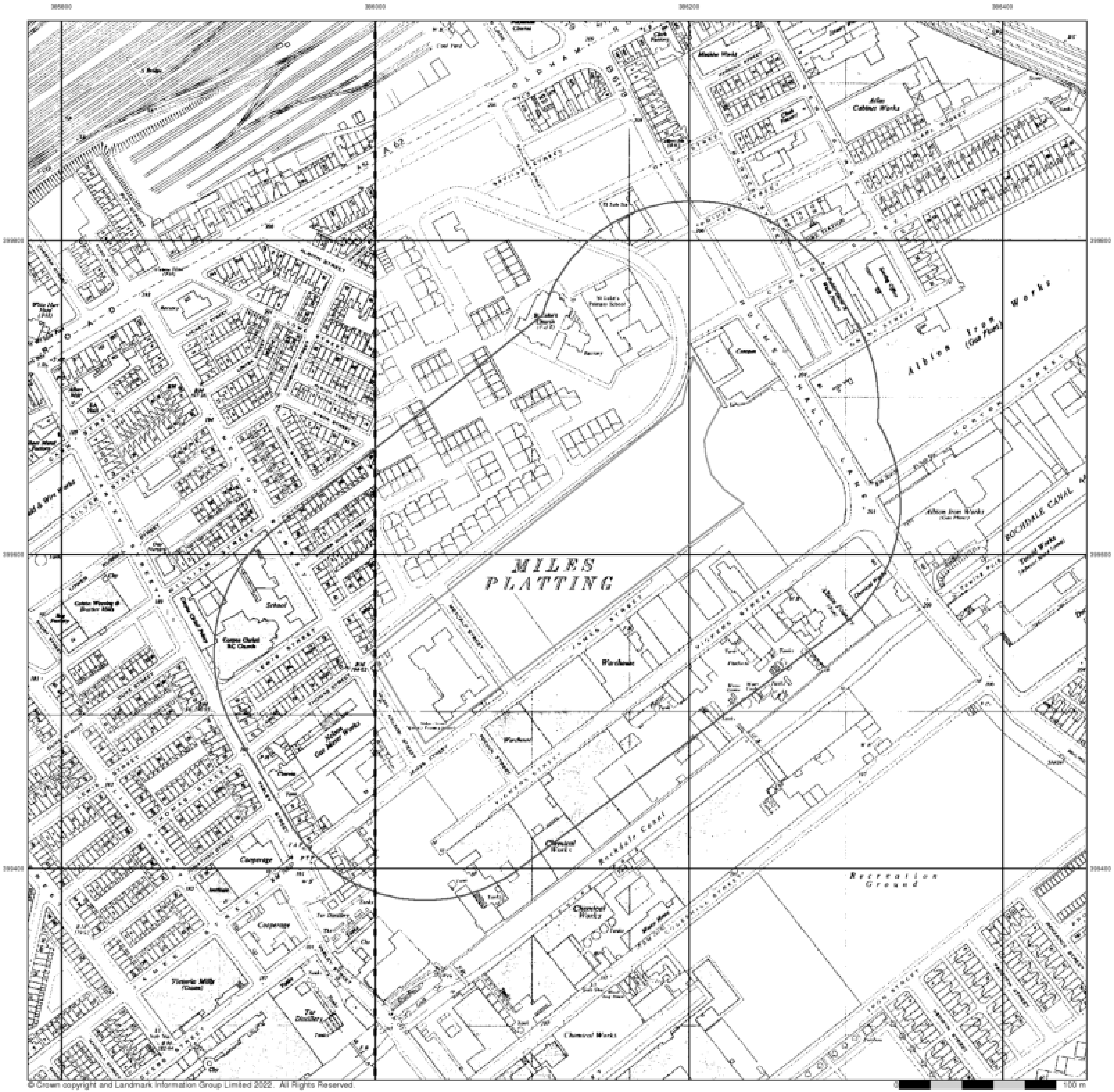
385800
386000
386200
386400
399800
399600
399400
MILES PLATTING
OLDHAM ROAD
A 62
Rochdale Canal
ROCHDALE CANAL
Albion Iron Works (Gas Plant)
Albion Iron Works (Gas Plant)
Recreation Ground
Chemical Works
Chemical Works
Warehouse
Warehouse
School
Corpus Christi RC Church
Cooperage
Cooperage
Tar Distillery
Victoria Mills (Disused)
Cotton Weaving & Doubler Mills
Albion Cabinet Works
Cinema
Cinema
Nelson Gas Meter Works
Cooperage
Institute

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0 100 m

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Ordnance Survey Plan

Published 1954 - 1970

Source map scale - 1:2,500

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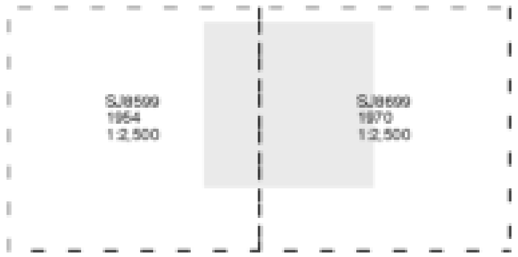
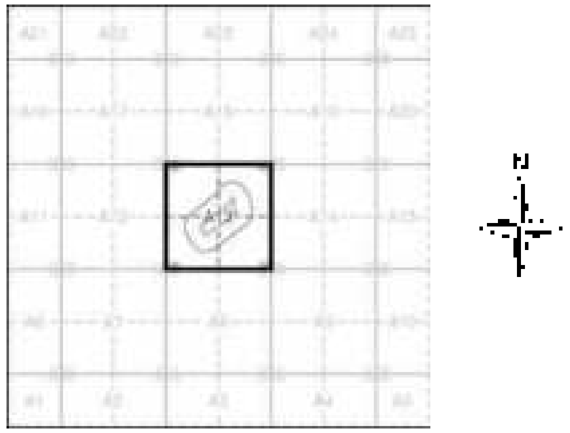
Map Name(s) and Date(s)


SJ8599
1954
1:2,500
SJ8699
1970
1:2,500

Historical Map - Segment A13



Order Details

Order Number:	291982299_1_1
Customer Ref:	ES020322
National Grid Reference:	386120, 399600
Slice:	A
Site Area (Ha):	1.83
Search Buffer (m):	100

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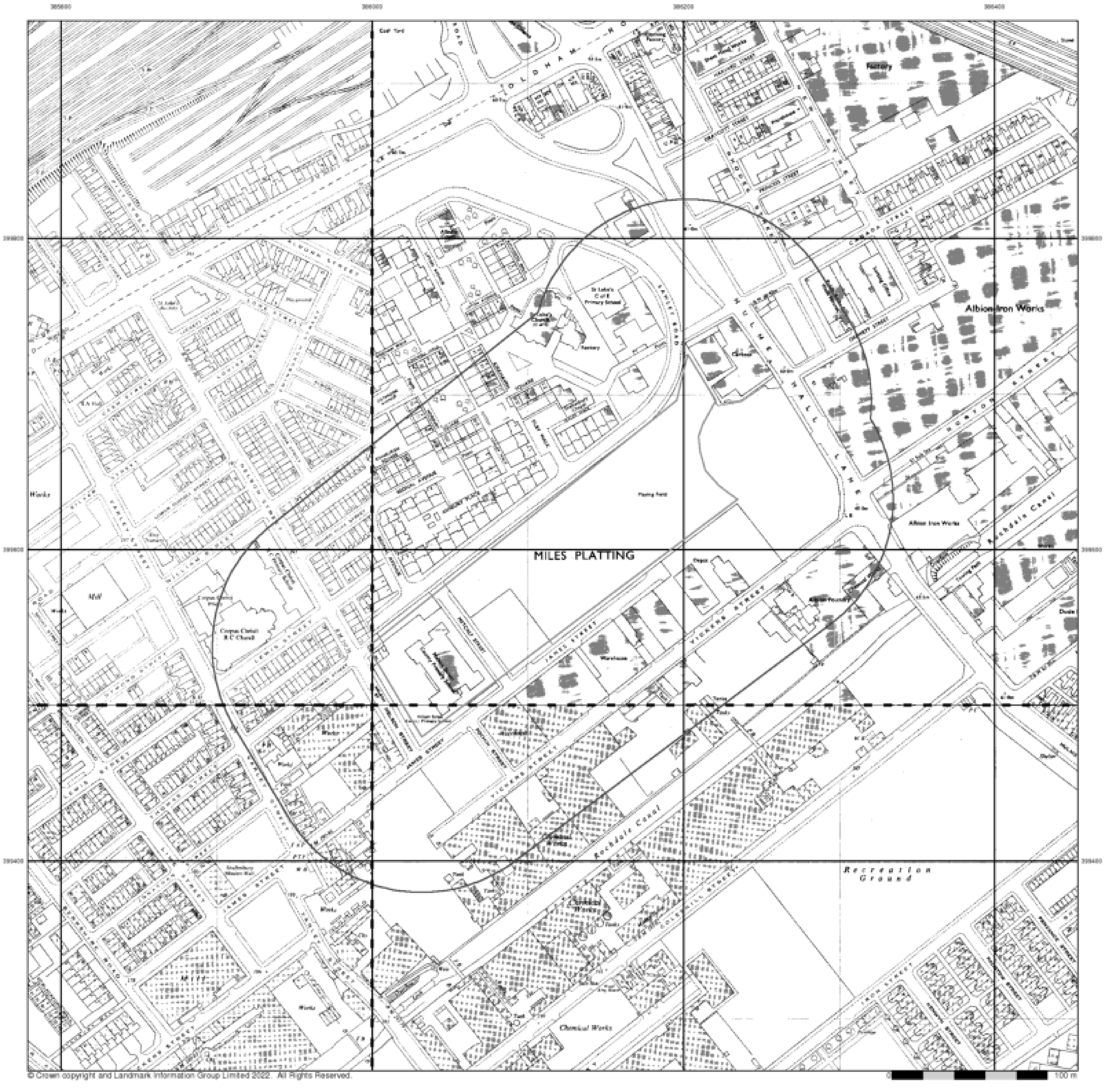
385800
386000
386200
386400
399800
399600
399400
OLDHAM ROAD
Factory
Albion Iron Works
St Luke's C of E Primary School
HULME HALL LANE
Playing Field
MILES PLATTING
Corpus Christi RC Church
Mill
Works
Depot
Albion Foundry
Warehouse
JAMES STREET
VICKERS STREET
Rochdale Canal
Recreation Ground
Chemical Works
0
100 m

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Ordnance Survey Plan

Published 1965 - 1971

Source map scale - 1:1,250

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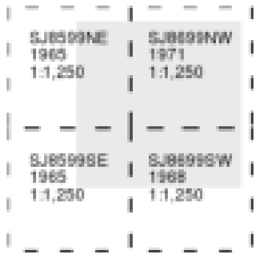
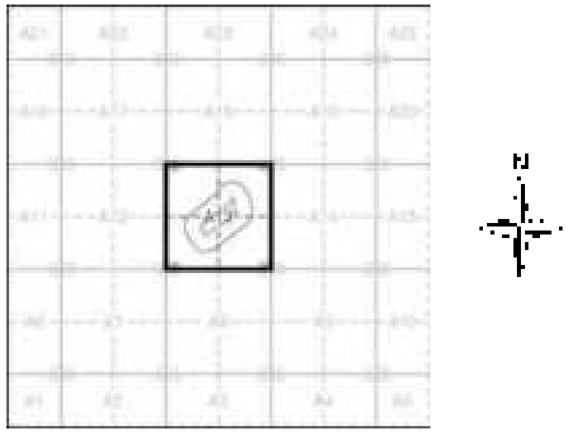
Map Name(s) and Date(s)



SJ8599NE 1965 1:1,250	SJ8699NW 1971 1:1,250
SJ8599SE 1965 1:1,250	SJ8699SW 1968 1:1,250

Historical Map - Segment A13



Order Details

Order Number:	291982299_1_1
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National Grid Reference:	386120, 399600
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Site Area (Ha):	1.83
Search Buffer (m):	100

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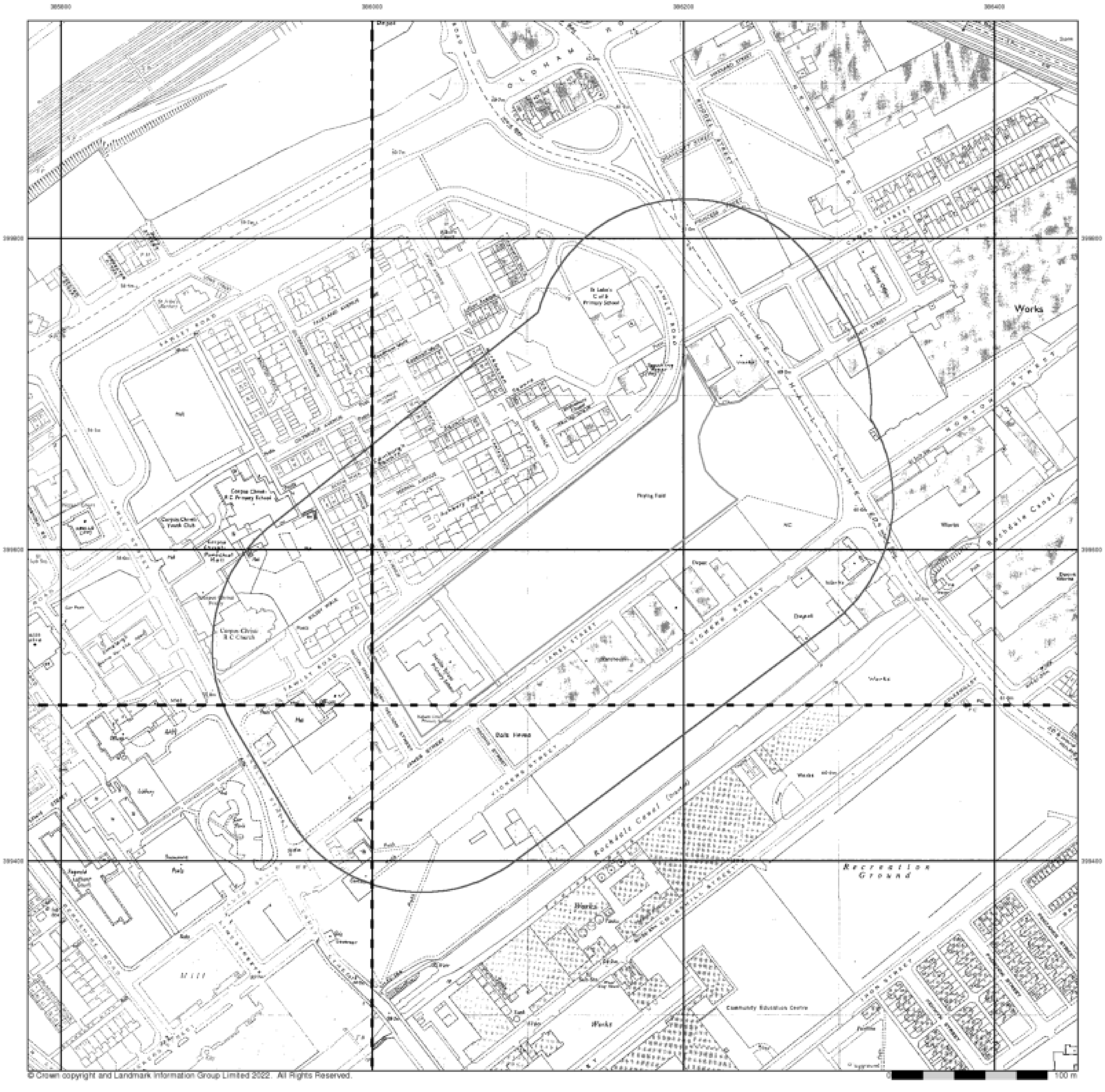
385800
386000
386200
386400
399800
399600
399400
Oldham Road
St Luke's C of E Primary School
Corpus Christi R C Primary School
Corpus Christi Youth Club
Corpus Christi R C Church
Playing Field
Works
Depot
Vickers Street
James Street
Jarvis Road
Rochdale Canal
Recreation Ground
Mill
Community Education Centre
0
100 m

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Additional SIMs

Published 1978 - 1984

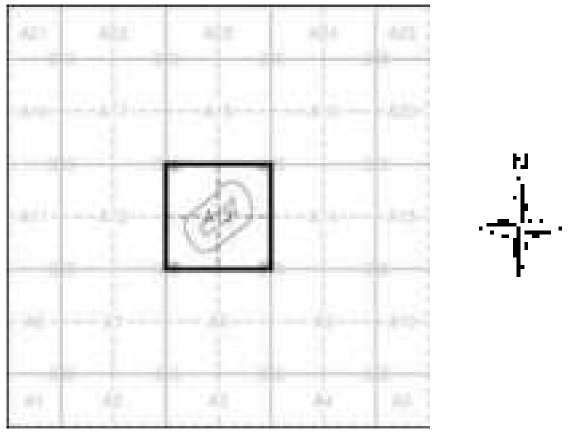
Source map scale - 1:1,250

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

Map Name(s) and Date(s)

SJ8599NE 1979 1:1,250	SJ8699NW 1984 1:1,250
SJ8599SE 1978 1:1,250	SJ8699SW 1984 1:1,250

Historical Map - Segment A13



Order Details

Order Number:	291982299_1_1
Customer Ref:	ES020322
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Slice:	A
Site Area (Ha):	1.83
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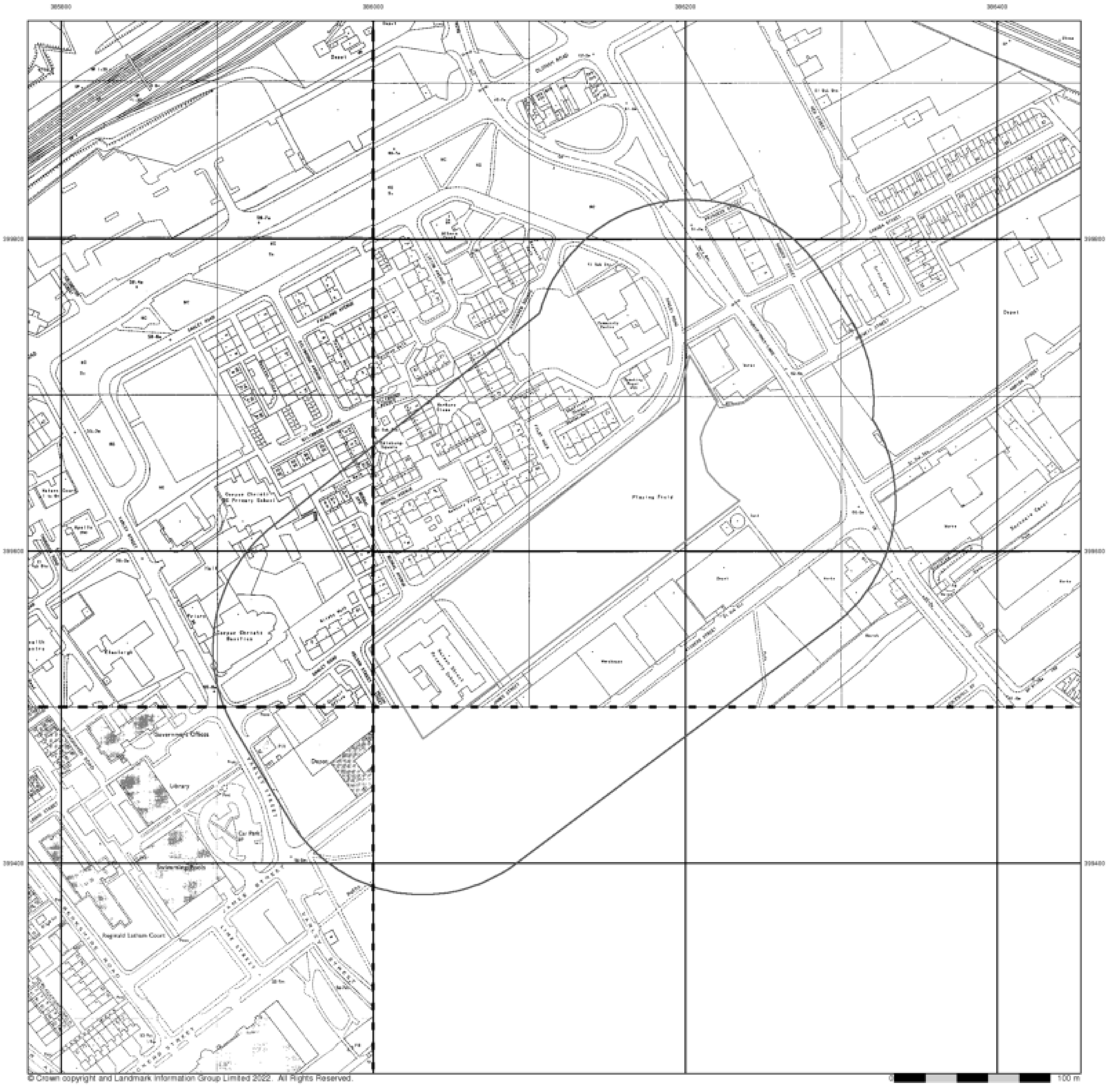
385800
386000
386200
386400
399800
399600
399400
Playing Field
Library
Car Park
100 m

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Additional SIMs

Published 1986 - 1991

Source map scale - 1:1,250

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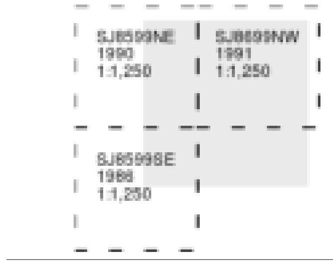
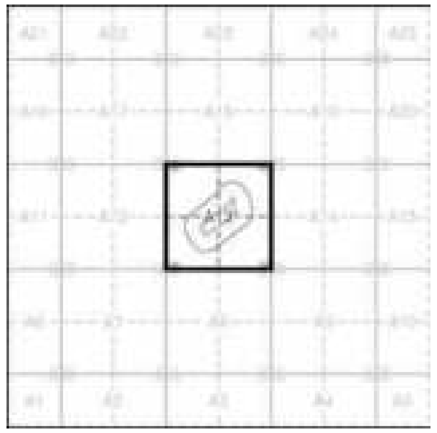
Map Name(s) and Date(s)


SJ8599NE
1990
1:1,250
SJ8699NW
1991
1:1,250
SJ8599SE
1986
1:1,250

Historical Map - Segment A13



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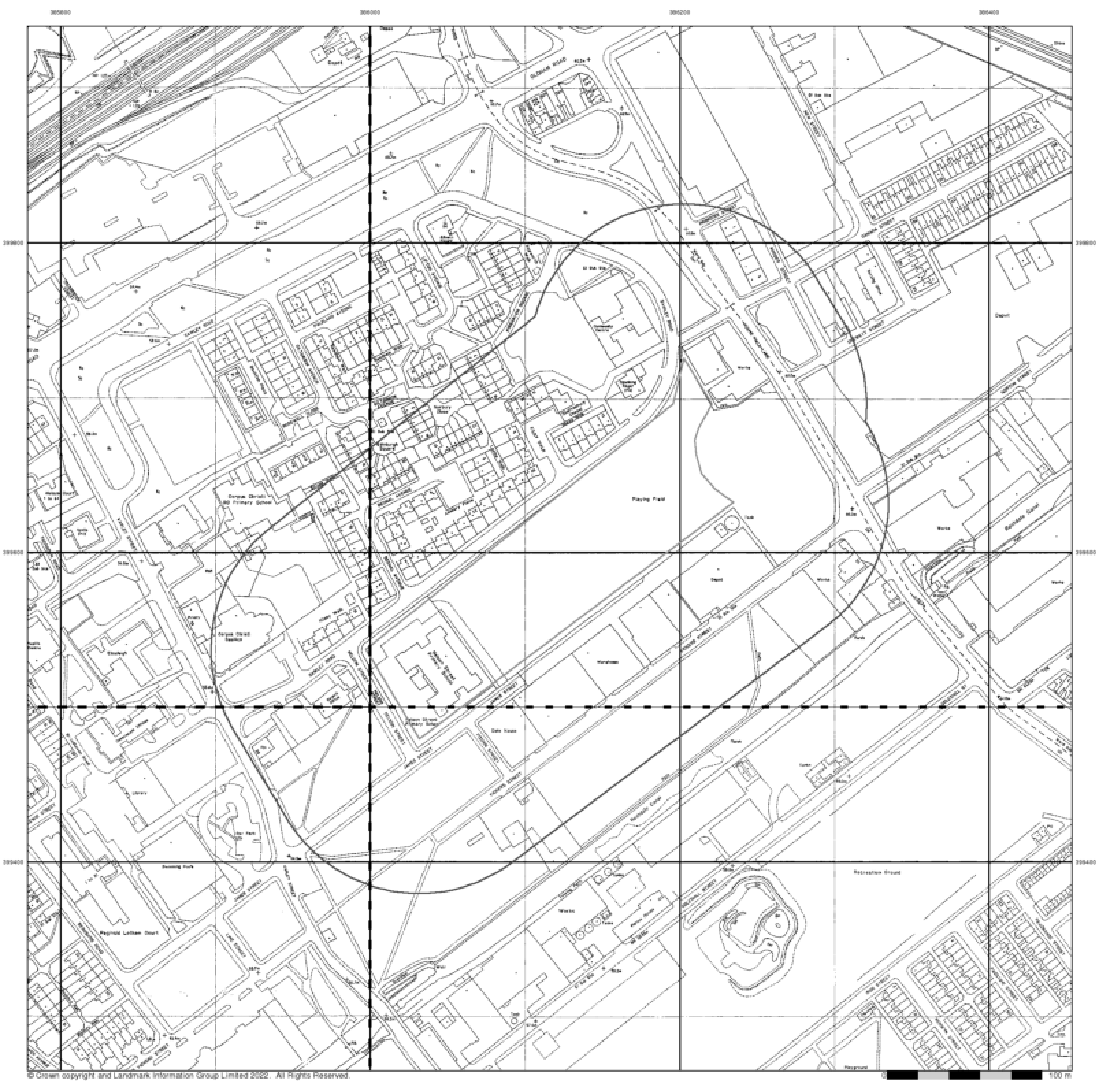
385800
386000
386200
386400
399800
399600
399400
Playing Field
Depot
Works
Warehouse
Library
Corpus Christi RC Primary School
Recreation Ground
Tank
0
100 m

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Large-Scale National Grid Data

Published 1992

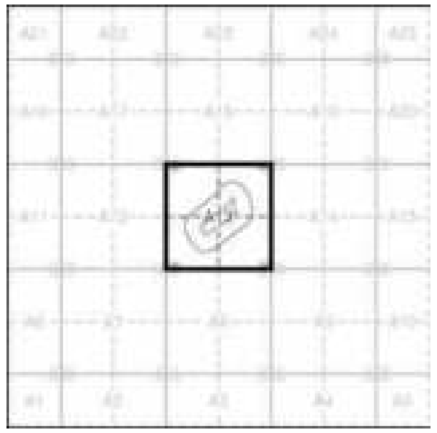
Source map scale - 1:1,250

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

Map Name(s) and Date(s)

SJ8599NE 1992 1:1,250	SJ8699NW 1992 1:1,250
SJ8599SE 1992 1:1,250	SJ8699SW 1992 1:1,250

Historical Map - Segment A13


A21
A22
A23
A24
A25
A16
A17
A18
A19
A20
A11
A12
A13
A14
A15
A6
A7
A8
A9
A10
A1
A2
A3
A4
A5

Order Details

Order Number:	291982299_1_1
Customer Ref:	ES020322
National Grid Reference:	386120, 399600
Slice:	A
Site Area (Ha):	1.83
Search Buffer (m):	100

Site Details

Saville Whittle, Vickers Street, MANCHESTER, M40 8EF

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INFORMATION GROUP

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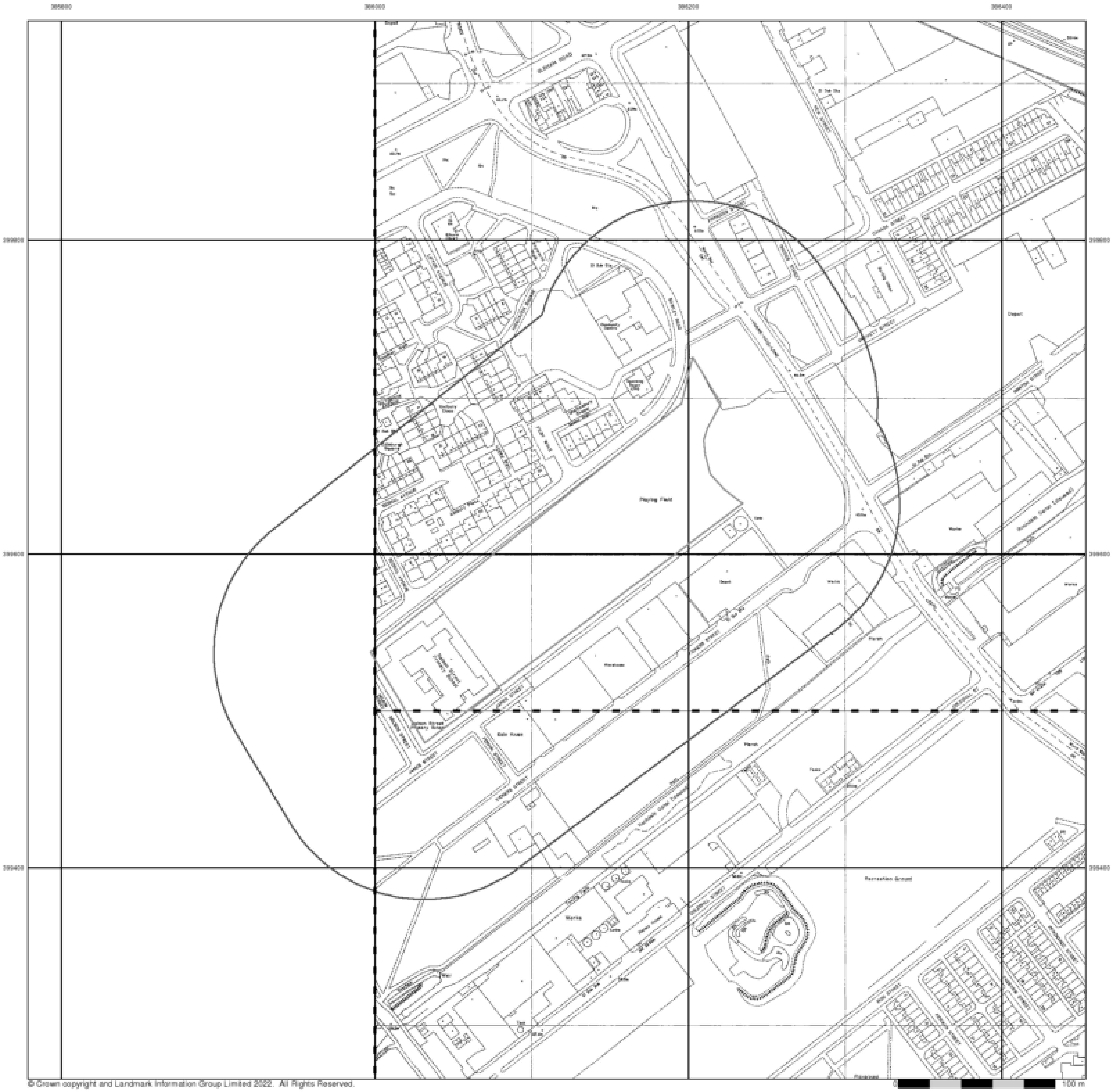
Web: www.envirocheck.co.uk


385800
386000
386200
386400
399800
399600
399400
Playing Field
Depot
Works
Marsh
Recreation Ground
Vickers Street
0
100 m

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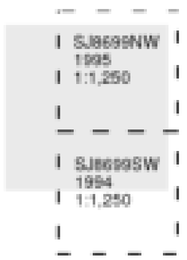
Large-Scale National Grid Data

Published 1994 - 1995

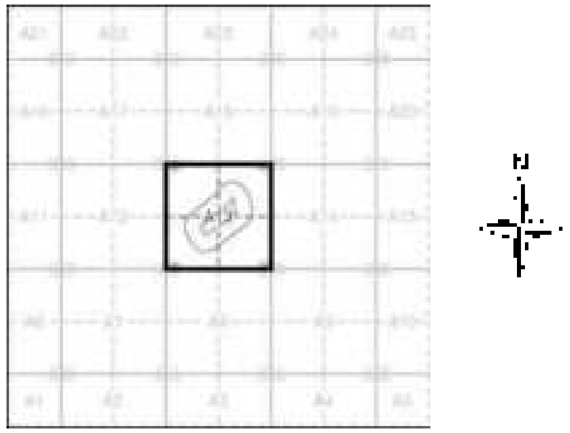
Source map scale - 1:1,250

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

Map Name(s) and Date(s)


SJ8699NW
1995
1:1,250
SJ8699SW
1994
1:1,250

Historical Map - Segment A13


A21
A22
A23
A24
A25
A16
A17
A18
A19
A20
A11
A12
A13
A14
A15
A6
A7
A8
A9
A10
A1
A2
A3
A4
A5
N

Order Details

Order Number:	291982299_1_1
Customer Ref:	ES020322
National Grid Reference:	386120, 399600
Slice:	A
Site Area (Ha):	1.83
Search Buffer (m):	100

Site Details

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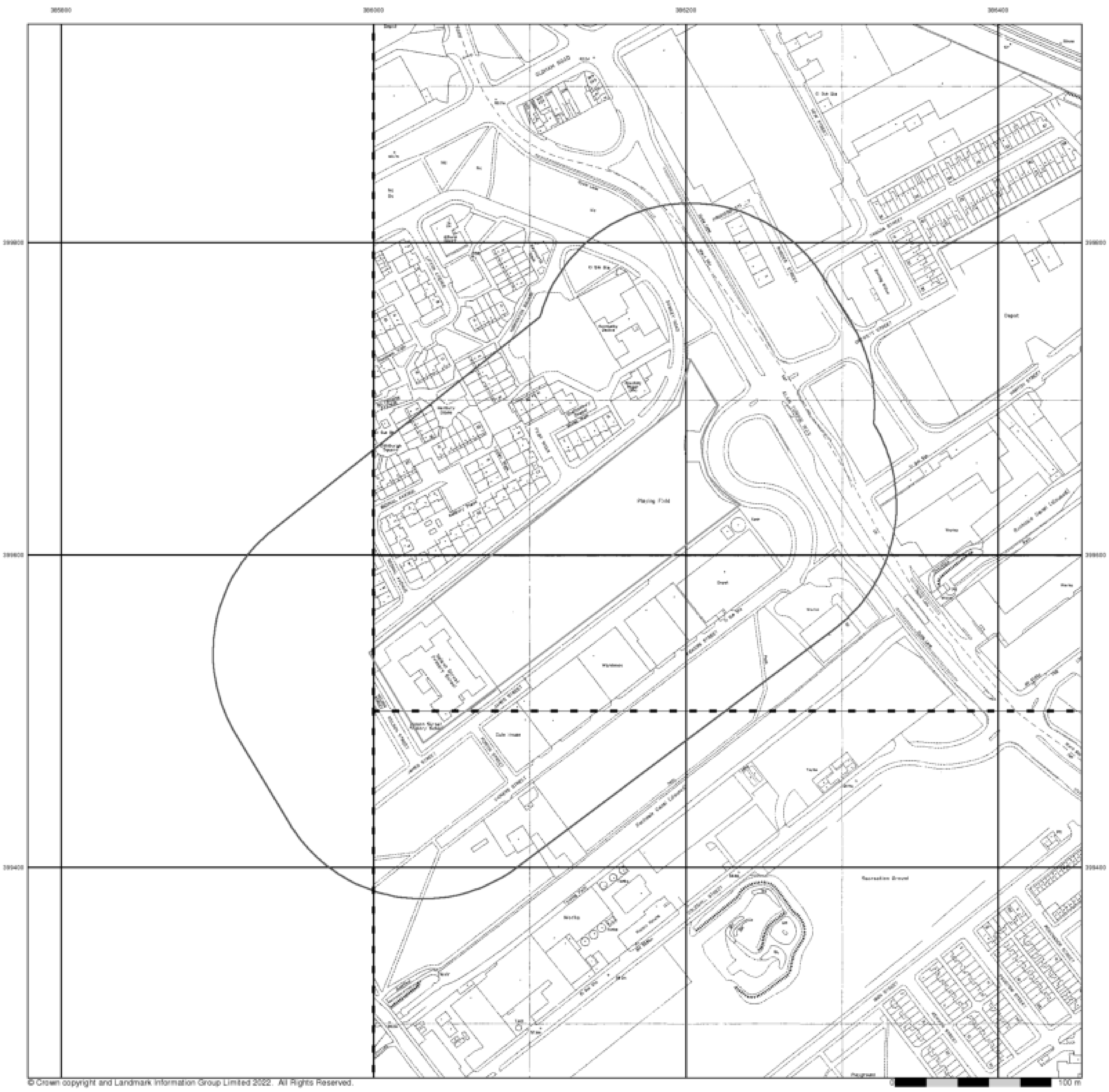
385800
386000
386200
386400
399800
399600
399400
Playing Field
Recreation Ground
Depot
Works
Warehouse
0
100 m

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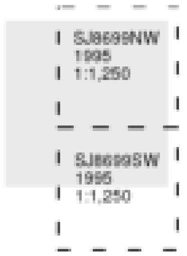
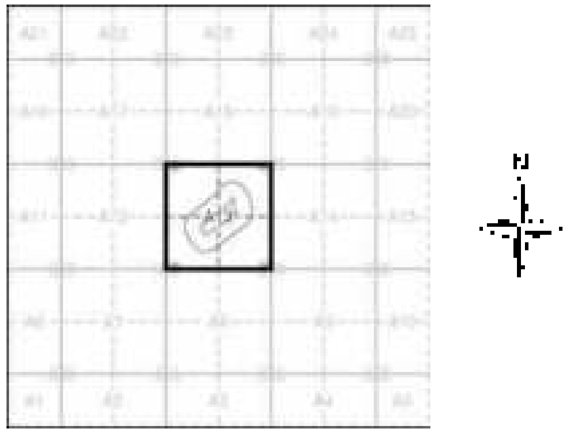
Large-Scale National Grid Data
Published 1995
Source map scale - 1:1,250

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

Map Name(s) and Date(s)


SJ8699NW
1995
1:1,250
SJ8699SW
1995
1:1,250

Historical Map - Segment A13



Order Details

Order Number:	291982299_1_1
Customer Ref:	ES020322
National Grid Reference:	386120, 399600
Slice:	A
Site Area (Ha):	1.83
Search Buffer (m):	100

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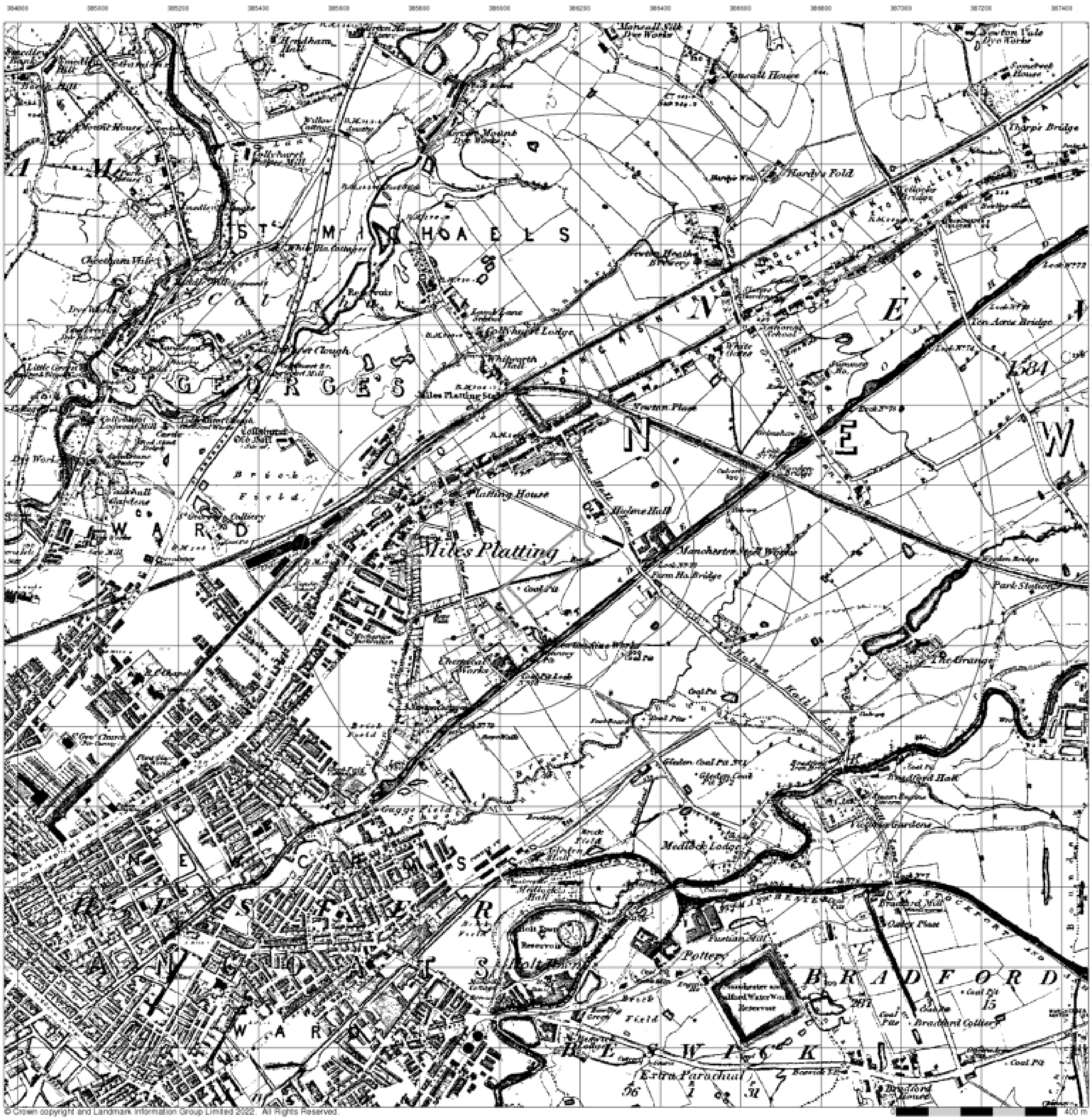

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Lancashire And Furness
Published 1848
Source map scale - 1:10,560

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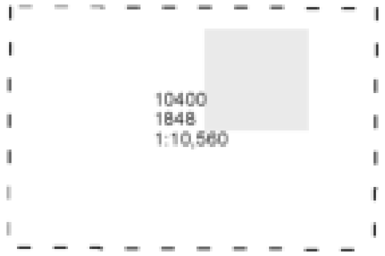
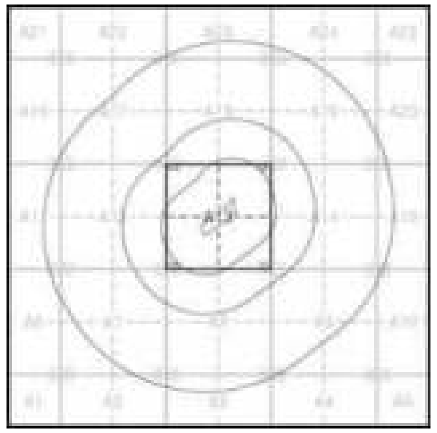
Map Name(s) and Date(s)



Historical Map - Slice A



Order Details

Order Number:	291982299_1_1
Customer Ref:	ES020322
National Grid Reference:	386120, 399600
Slice:	A
Site Area (Ha):	1.83
Search Buffer (m):	1000

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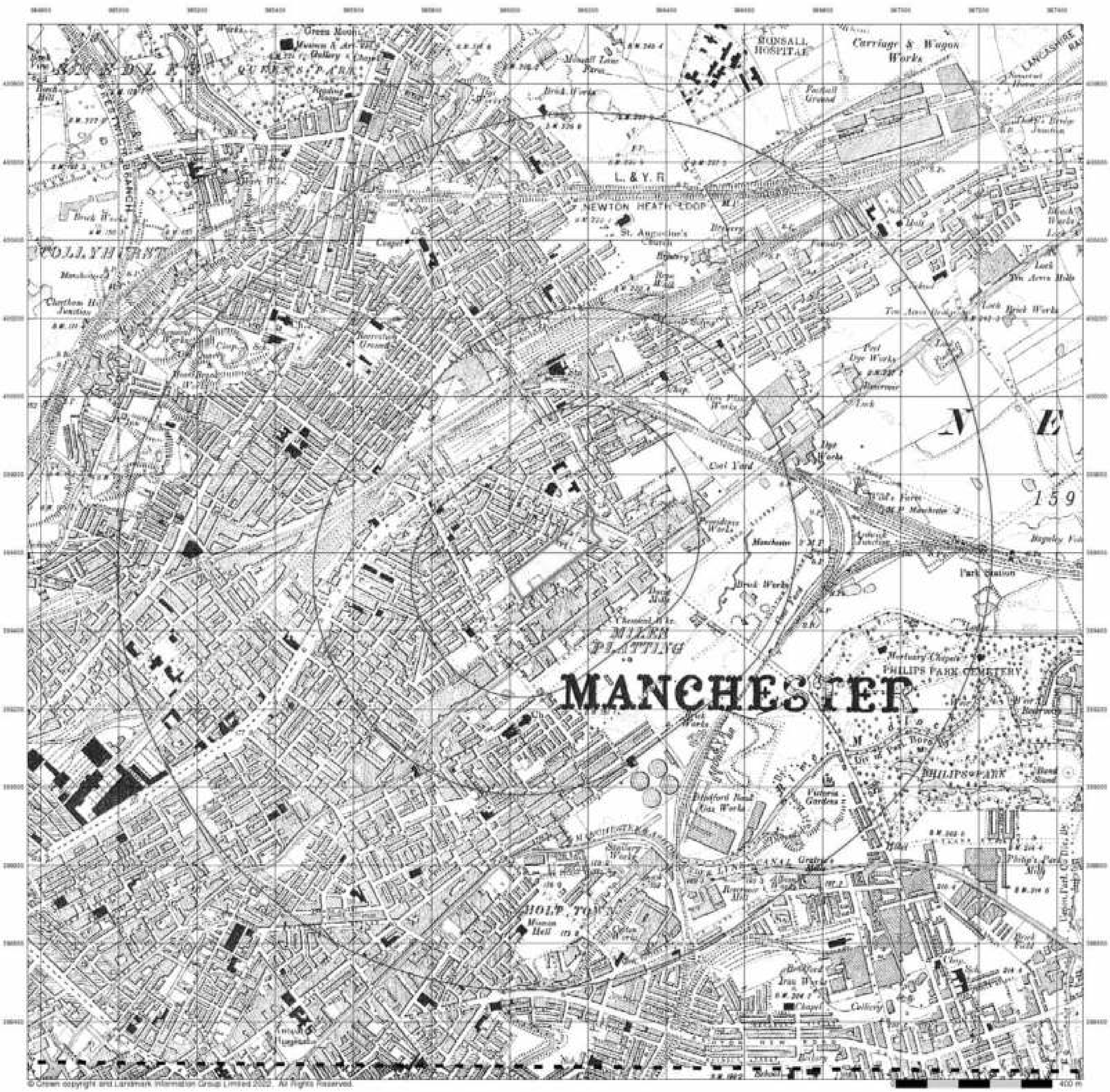
MONSALL HOSPITAL
Carriage & Wagon Works
L. & Y. R.
NEWTON HEATH LOOP
St. Augustine's Church
COLLYHURST
Brick Works
Coal Yard
Dye Works
Park Station
N
E
159
MILES PLATTING
MANCHESTER
PHILIPS PARK CEMETERY
Mortuary Chapels
PHILIPS PARK
Bradford Road Gas Works
Victoria Gardens
HOLT TOWN
Iron Works
Colliery
400 m

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Lancashire And Furness

Published 1894

Source map scale - 1:10,560

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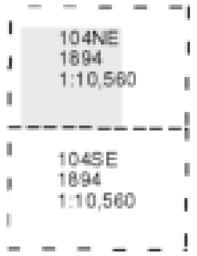
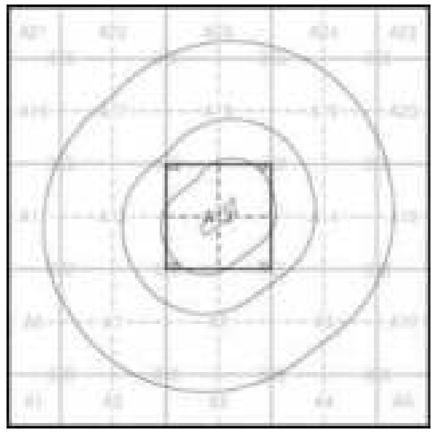
Map Name(s) and Date(s)


104NE
1894
1:10,560
104SE
1894
1:10,560

Historical Map - Slice A



Order Details

Order Number:	291982299_1_1
Customer Ref:	ES020322
National Grid Reference:	386120, 399600
Slice:	A
Site Area (Ha):	1.83
Search Buffer (m):	1000

Site Details

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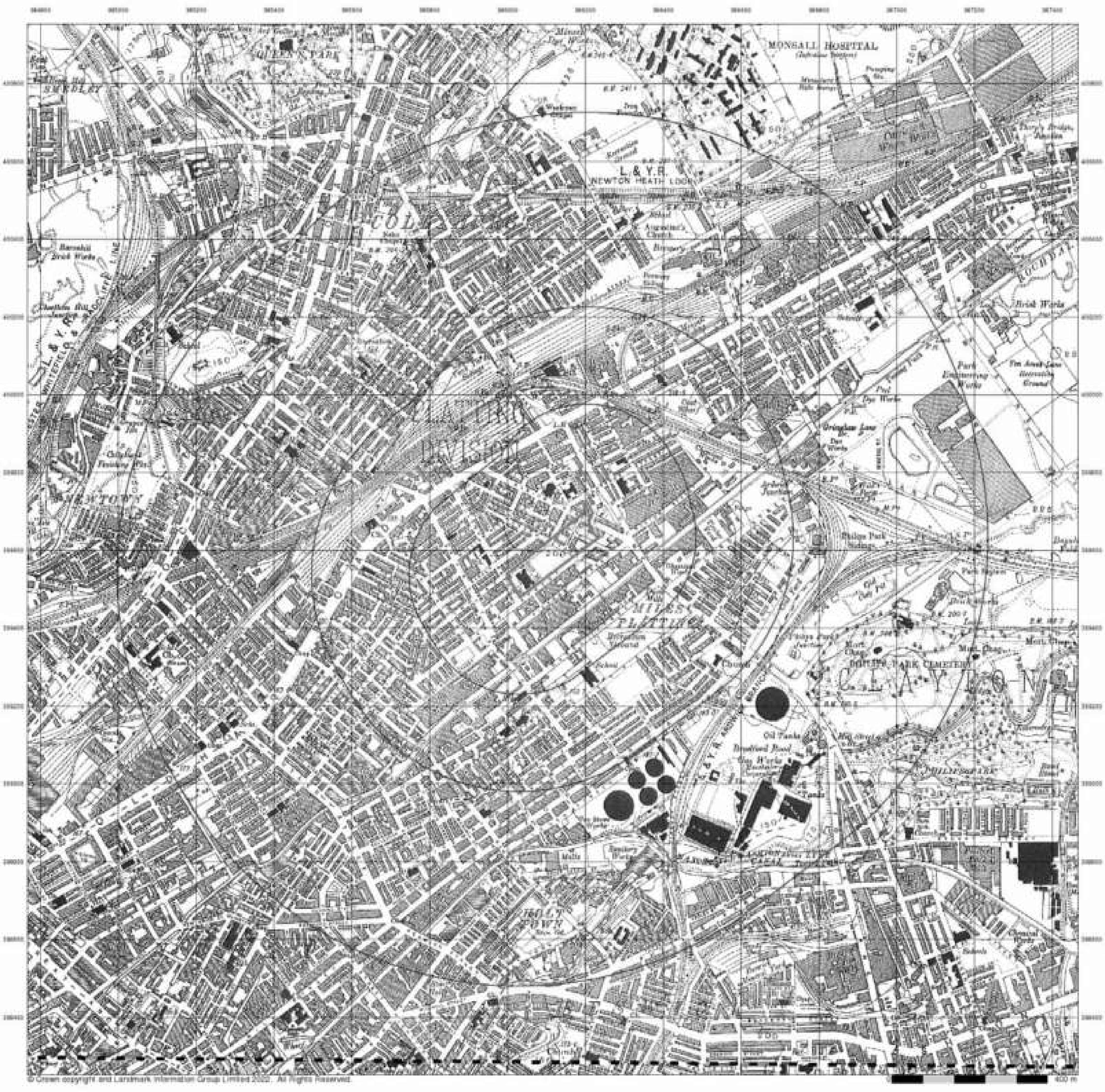
MONSALL HOSPITAL
L. & Y.R.
NEWTON HEATH LOCO
SMEDLEY
COLLYHURST
NEWTOWN
CLAYTON DIVISION
MILES PLATTING
PHILIPS PARK CEMETERY
CLAYTON
Oil Tanks
Gas Works
Brick Works
400 m

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Lancashire And Furness

Published 1923

Source map scale - 1:10,560

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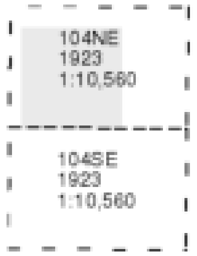
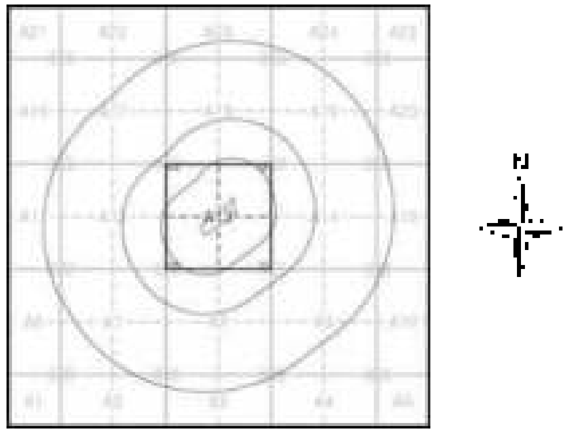
Map Name(s) and Date(s)


104NE
1923
1:10,560
104SE
1923
1:10,560

Historical Map - Slice A



Order Details

Order Number:	291982299_1_1
Customer Ref:	ES020322
National Grid Reference:	386120, 399600
Slice:	A
Site Area (Ha):	1.83
Search Buffer (m):	1000

Site Details

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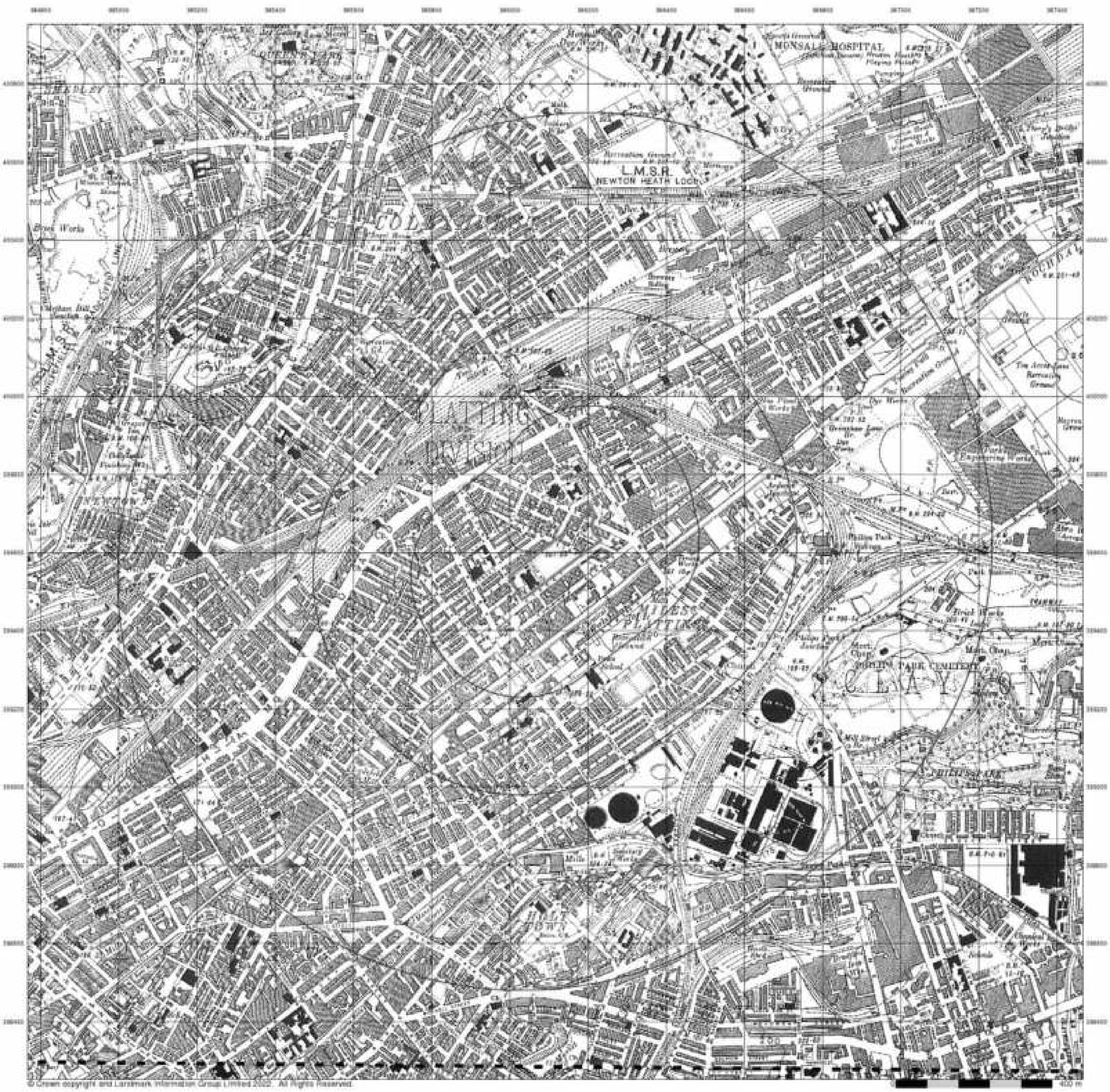

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Lancashire And Furness

Published 1932 - 1933

Source map scale - 1:10,560

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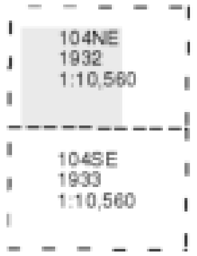
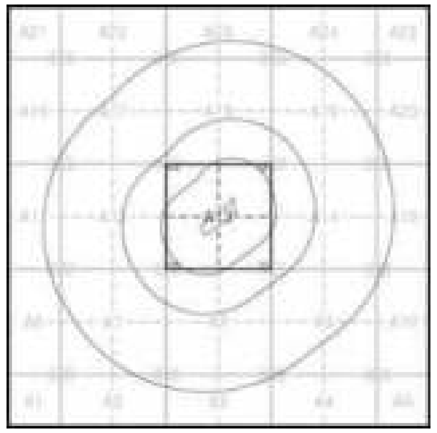
Map Name(s) and Date(s)



Historical Map - Slice A

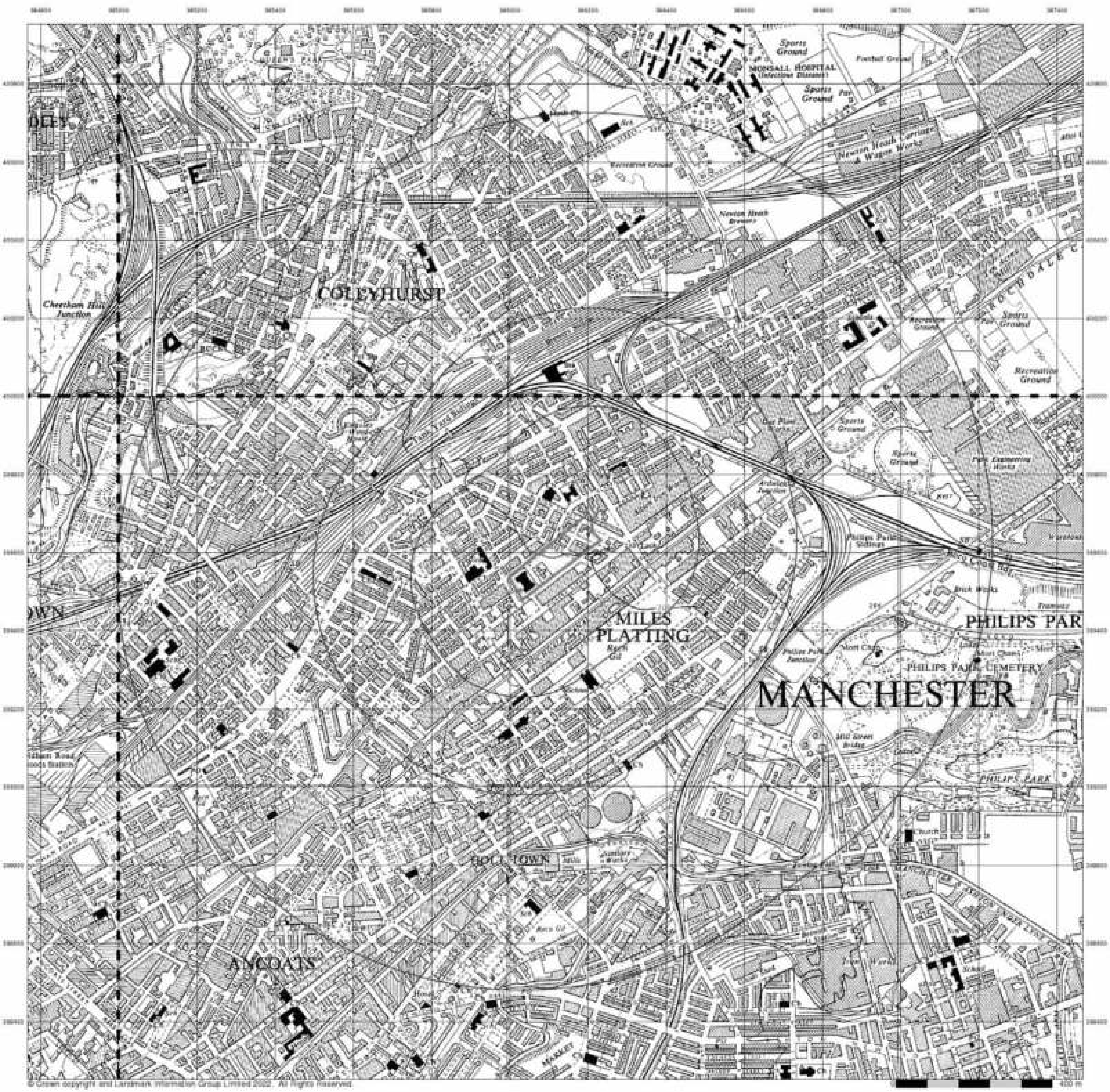


Order Details

Order Number:	291982299_1_1
Customer Ref:	ES020322
National Grid Reference:	386120, 399600
Slice:	A
Site Area (Ha):	1.83
Search Buffer (m):	1000

Site Details

Saville Whittle, Vickers Street, MANCHESTER, M40 8EF


Sports Ground
MONSALL HOSPITAL (Infectious Diseases)
Football Ground
Newton Heath Carriage & Wagon Works
Recreation Ground
Newton Heath Brewery
COLLYHURST
Cheetham Hill Junction
ROCHDALE
Sports Ground
Recreation Ground
Sports Ground
Brick Works
MILES PLATTING
PHILIPS PARK
PHILIPS PARK CEMETERY
MANCHESTER
PHILIPS PARK
ANCOATS
400 m

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Ordnance Survey Plan

Published 1956

Source map scale - 1:10,000

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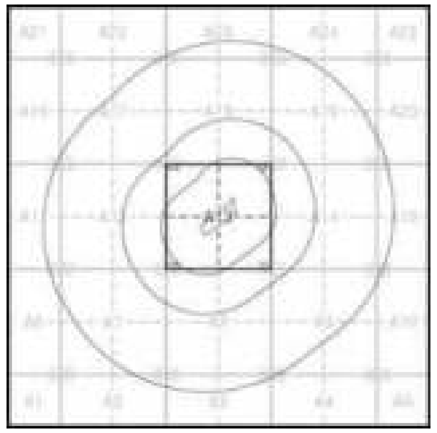
Map Name(s) and Date(s)

SD80SW 1956 1:10,560	SD80SE 1956 1:10,560
SJ89NW 1956 1:10,560	SJ89NE 1956 1:10,560

Historical Map - Slice A



Order Details

Order Number:	291982299_1_1
Customer Ref:	ES020322
National Grid Reference:	386120, 399600
Slice:	A
Site Area (Ha):	1.83
Search Buffer (m):	1000

Site Details

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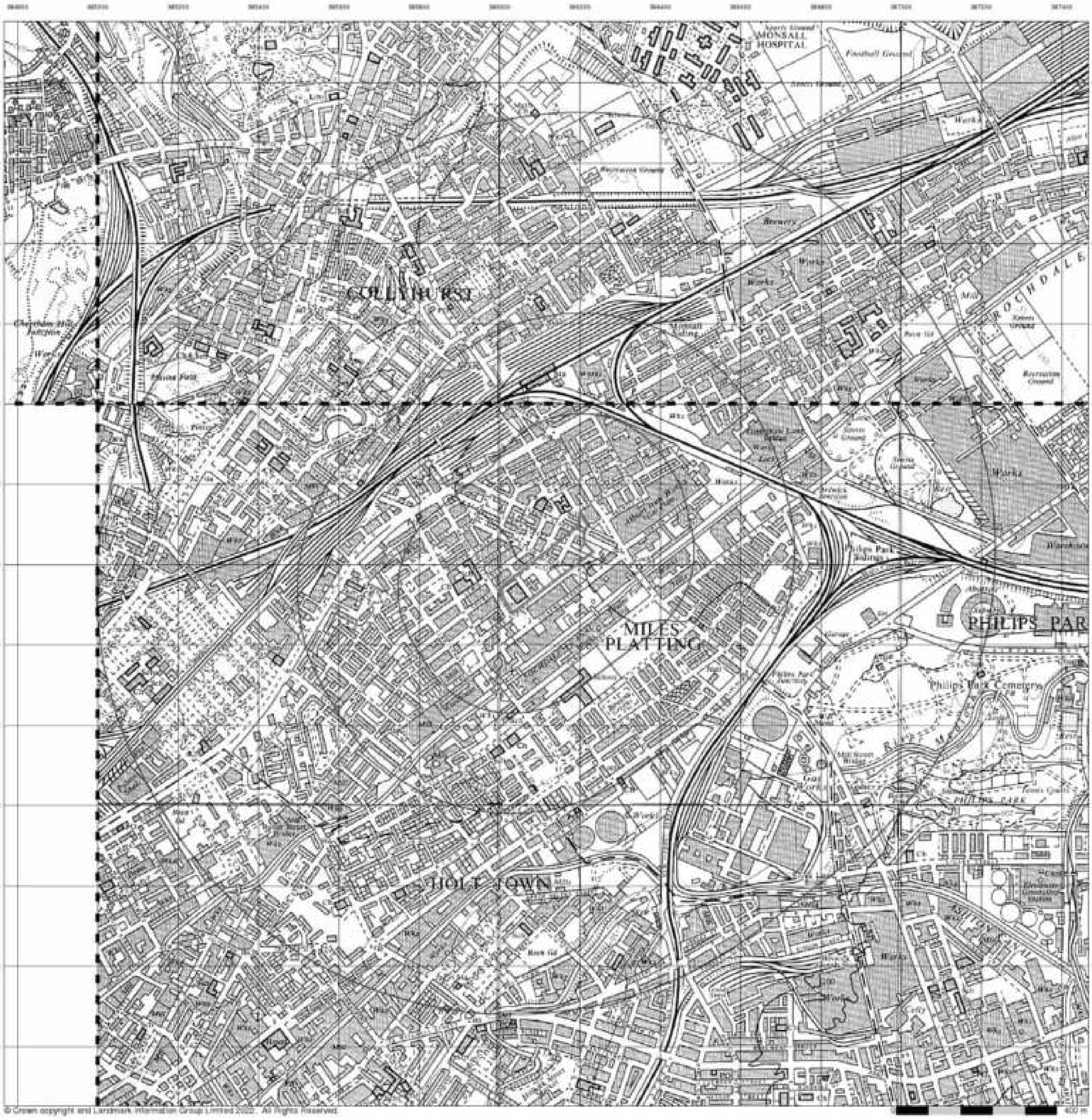
MONSALL HOSPITAL
Football Ground
Recreation Ground
Brewery
Works
COLLYHURST
ROCHDALE
Recreation Ground
MILES PLATTING
Philips Park Sidings
PHILIPS PAR
Philips Park Cemetery
HOLT TOWN
400 m

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Ordnance Survey Plan

Published 1966 - 1968

Source map scale - 1:10,000

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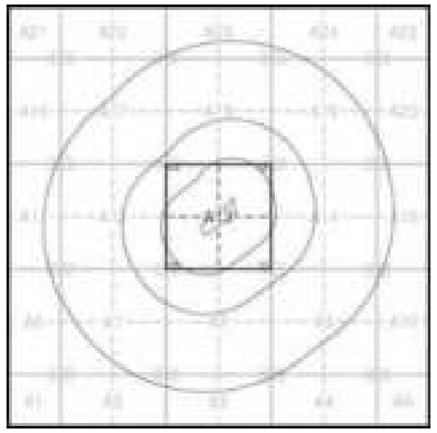
Map Name(s) and Date(s)

SD80SW
1968
1:10,560

SD80SE
1966
1:10,560

SJ89NE
1968
1:10,560

Historical Map - Slice A



Order Details

Order Number: 291982299_1_1
Customer Ref: ES020322
National Grid Reference: 386120, 399600
Slice: A
Site Area (Ha): 1.83
Search Buffer (m): 1000

Site Details

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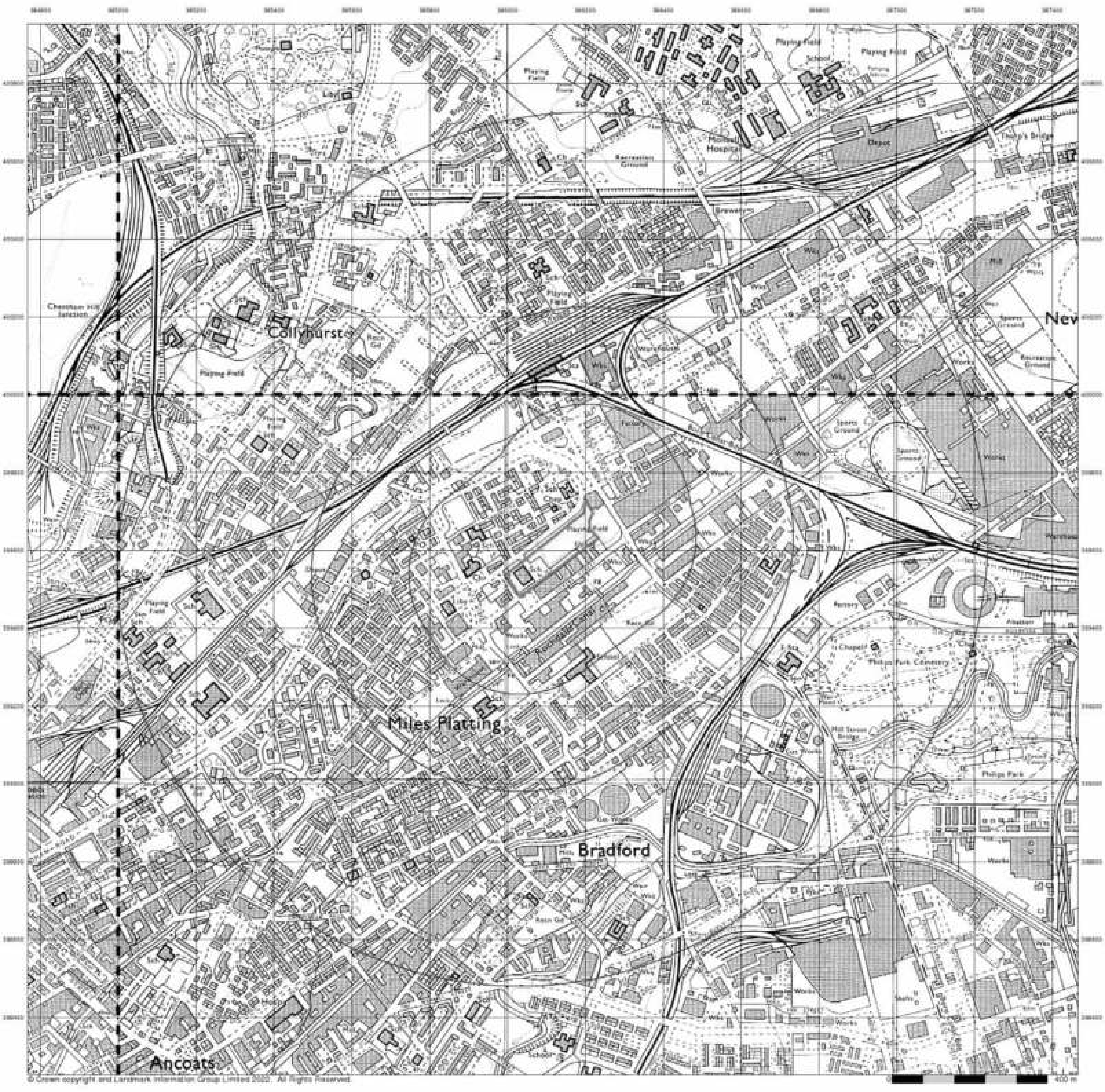
Cheetham Hill Junction
Collyhurst
Playing Field
Hospital
Depot
Brewery
Recreation Ground
Sports Ground
New
Miles Platting
Philips Park Cemetery
Philips Park
Bradford
Ancoats
400 m

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Ordnance Survey Plan

Published 1980 - 1986

Source map scale - 1:10,000

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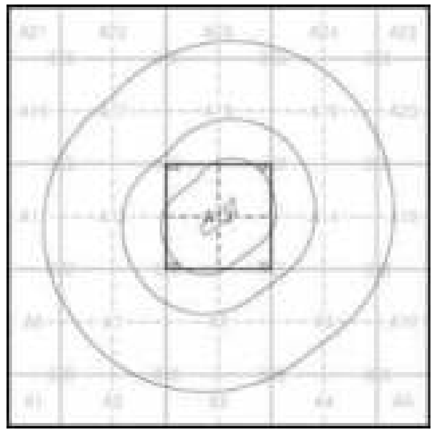
Map Name(s) and Date(s)

SD80SW 1986 1:10,000	SD80SE 1982 1:10,000
SJ89NW 1980 1:10,000	SJ89NE 1981 1:10,000

Historical Map - Slice A



Order Details

Order Number:	291982299_1_1
Customer Ref:	ES020322
National Grid Reference:	386120, 399600
Slice:	A
Site Area (Ha):	1.83
Search Buffer (m):	1000

Site Details

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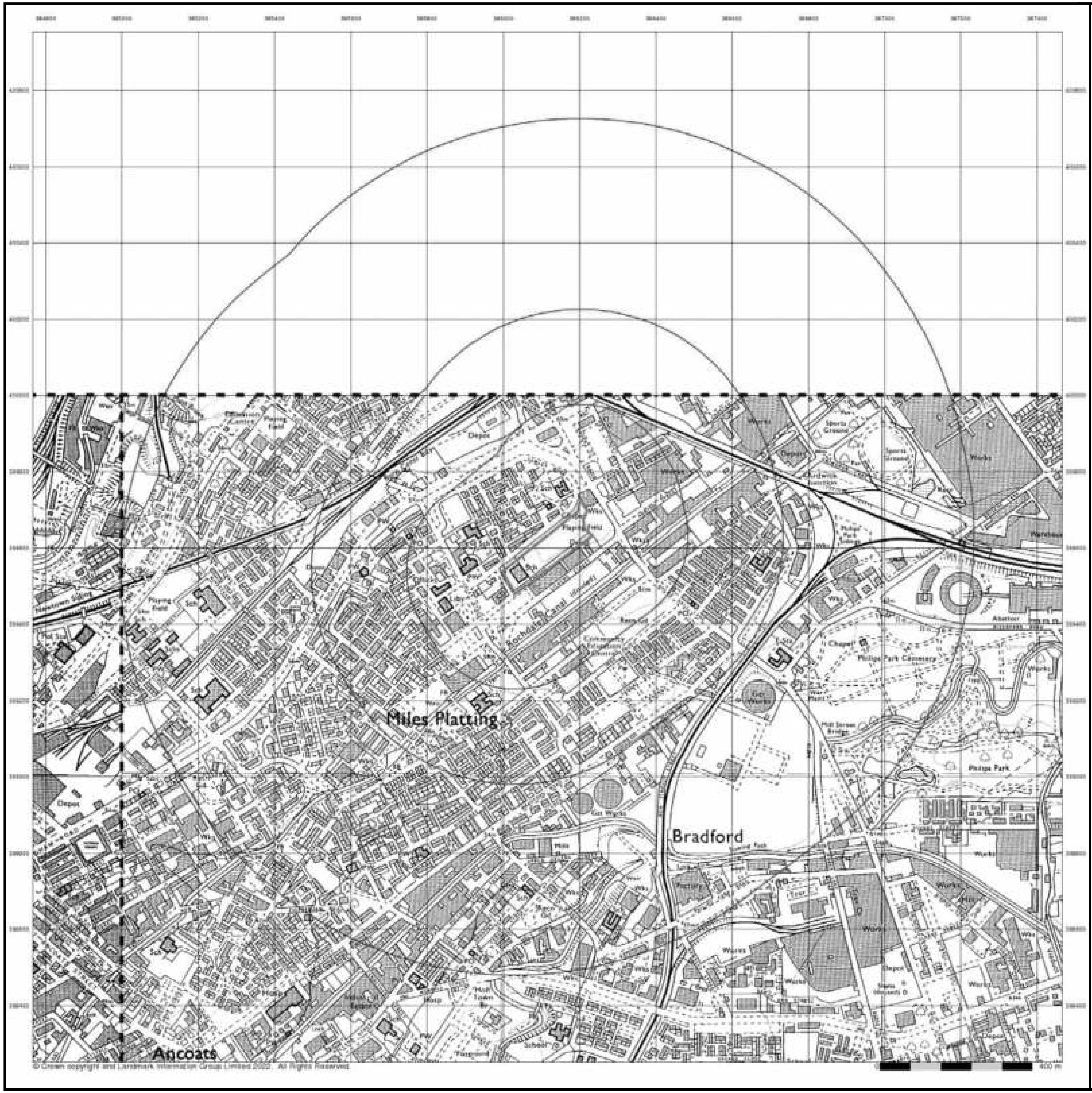

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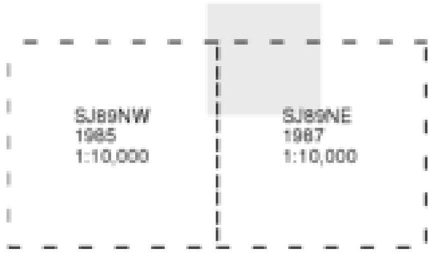
Ordnance Survey Plan

Published 1985 - 1987

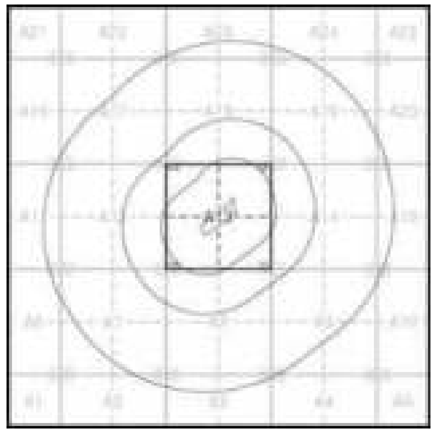
Source map scale - 1:10,000

The historical maps shown were reproduced from maps predominantly held at the scale adopted for England, Wales and Scotland in the 1840`s. In 1854 the 1:2,500 scale was adopted for mapping urban areas; these maps were used to update the 1:10,560 maps. The published date given therefore is often some years later than the surveyed date. Before 1938, all OS maps were based on the Cassini Projection, with independent surveys of a single county or group of counties, giving rise to significant inaccuracies in outlying areas. In the late 1940`s, a Provisional Edition was produced, which updated the 1:10,560 mapping from a number of sources. The maps appear unfinished - with all military camps and other strategic sites removed. These maps were initially overprinted with the National Grid. In 1970, the first 1:10,000 maps were produced using the Transverse Mercator Projection. The revision process continued until recently, with new editions appearing every 10 years or so for urban areas.

Map Name(s) and Date(s)



Historical Map - Slice A

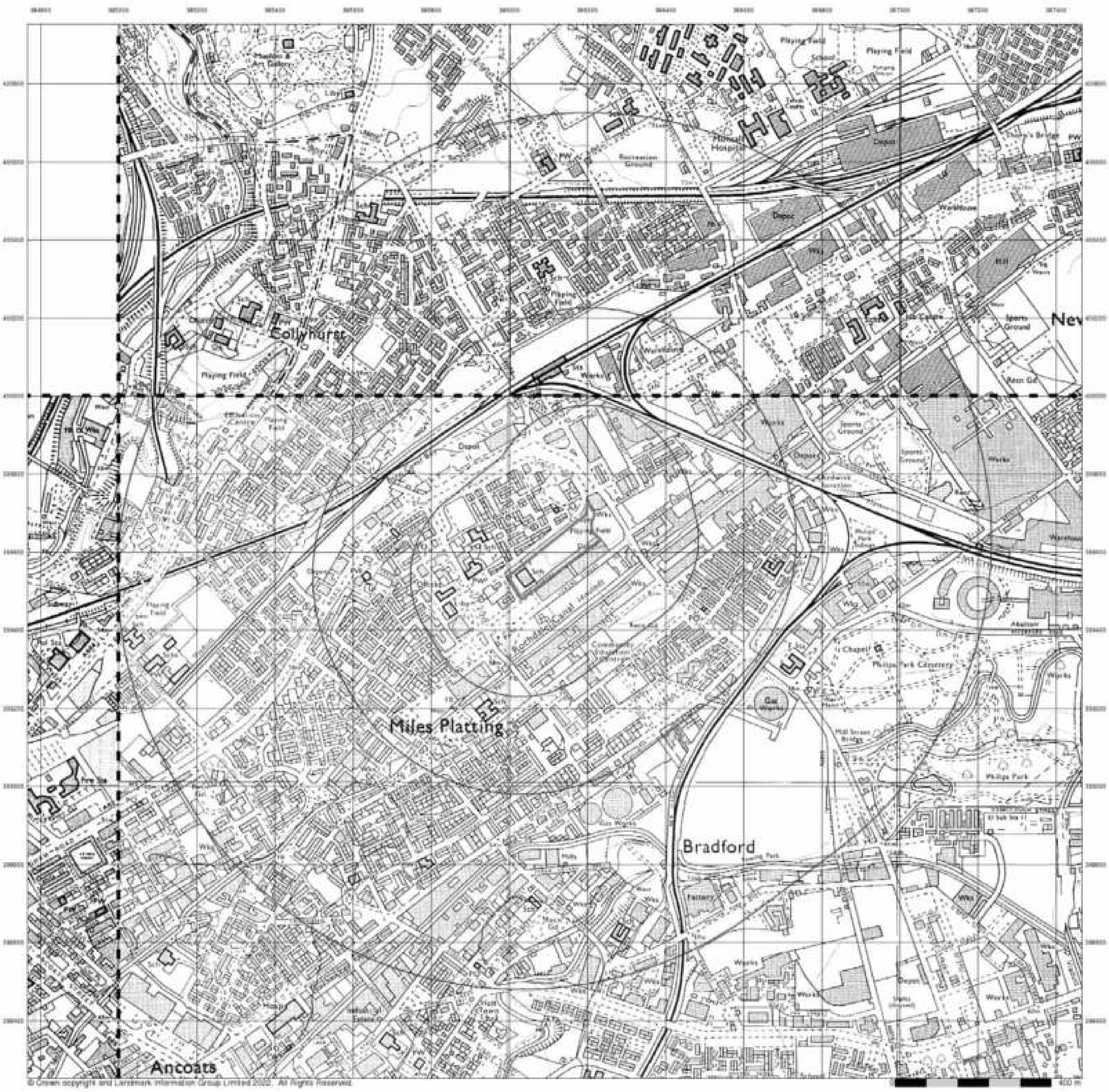


Order Details

Order Number:	291982299_1_1
Customer Ref:	ES020322
National Grid Reference:	386120, 399600
Slice:	A
Site Area (Ha):	1.83
Search Buffer (m):	1000

Site Details

Saville Whittle, Vickers Street, MANCHESTER, M40 8EF


Collyhurst
Miles Platting
Bradford
Ancoats
New
Philips Park Cemetery
Philips Park
Depot
Playing Field
Recreation Ground
Sports Ground
Gas Works
Works
400 m

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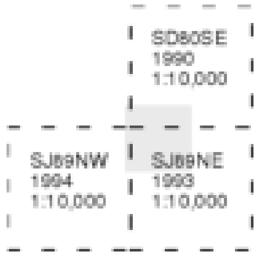
Ordnance Survey Plan

Published 1990 - 1994

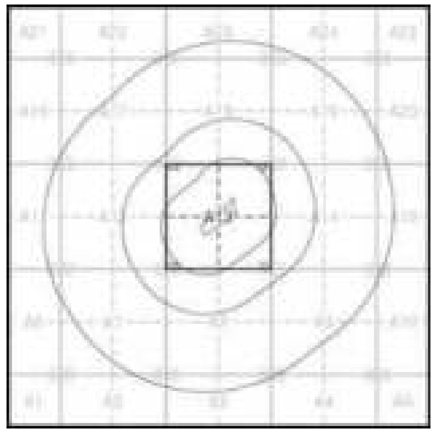
Source map scale - 1:10,000

The historical maps shown were reproduced from maps predominantly held at the scale adopted for England, Wales and Scotland in the 1840`s. In 1854 the 1:2,500 scale was adopted for mapping urban areas; these maps were used to update the 1:10,560 maps. The published date given therefore is often some years later than the surveyed date. Before 1938, all OS maps were based on the Cassini Projection, with independent surveys of a single county or group of counties, giving rise to significant inaccuracies in outlying areas. In the late 1940`s, a Provisional Edition was produced, which updated the 1:10,560 mapping from a number of sources. The maps appear unfinished - with all military camps and other strategic sites removed. These maps were initially overprinted with the National Grid. In 1970, the first 1:10,000 maps were produced using the Transverse Mercator Projection. The revision process continued until recently, with new editions appearing every 10 years or so for urban areas.

Map Name(s) and Date(s)


SD80SE
1990
1:10,000
SJ89NW
1994
1:10,000
SJ89NE
1993
1:10,000

Historical Map - Slice A



Order Details

Order Number:	291982299_1_1
Customer Ref:	ES020322
National Grid Reference:	386120, 399600
Slice:	A
Site Area (Ha):	1.83
Search Buffer (m):	1000

Site Details

Saville Whittle, Vickers Street, MANCHESTER, M40 8EF

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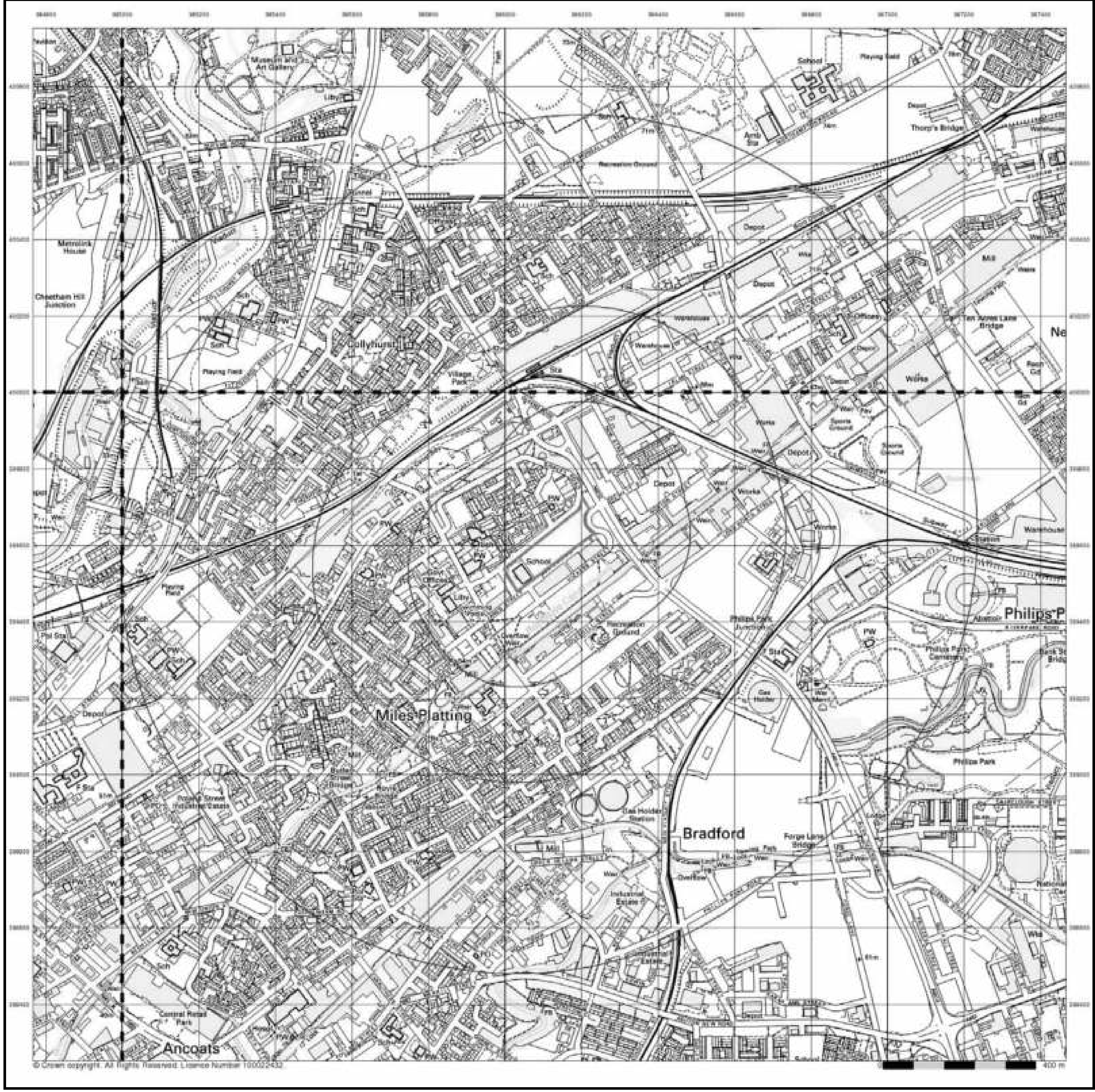
Web:	www.envirocheck.co.uk


Museum and Art Gallery
Library
School
Playing Field
Depot
Thorp's Bridge
Metrolink House
Cheetham Hill Junction
Collyhurst
Playing Field
Village Park
Recreation Ground
Warehouse
Mill
Works
Ten Acres Lane Bridge
Sports Ground
Philips Park Junction
Philips Park Cemetery
Philips Park
Miles Platting
Gas Holder
Gas Holder Station
Bradford
Forge Lane Bridge
Industrial Estate
Central Retail Park
Ancoats
400 m

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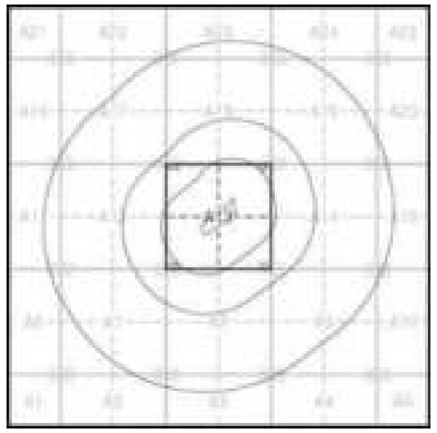
10k Raster Mapping
Published 1999
Source map scale - 1:10,000

The historical maps shown were produced from the Ordnance Survey`s 1:10,000 colour raster mapping. These maps are derived from Landplan which replaced the old 1:10,000 maps originally published in 1970. The data is highly detailed showing buildings, fences and field boundaries as well as all roads, tracks and paths. Road names are also included together with the relevant road number and classification. Boundary information depiction includes county, unitary authority, district, civil parish and constituency.

Map Name(s) and Date(s)

SD80SW 1999 1:10,000	SD80SE 1999 1:10,000
SJ89NW 1999 1:10,000	SJ89NE 1999 1:10,000

Historical Map - Slice A

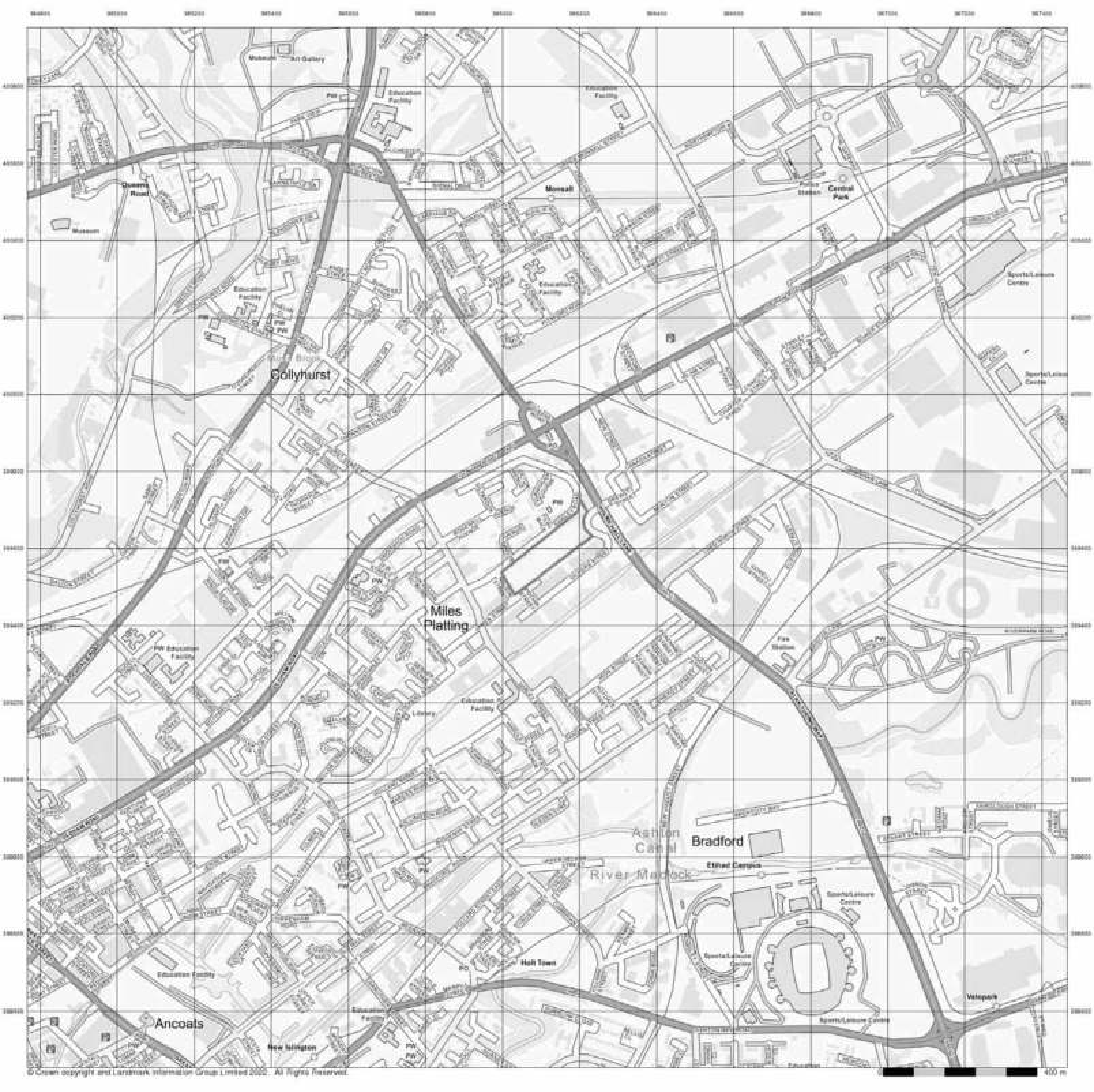


Order Details

Order Number:	291982299_1_1
Customer Ref:	ES020322
National Grid Reference:	386120, 399600
Slice:	A
Site Area (Ha):	1.83
Search Buffer (m):	1000

Site Details

Saville Whittle, Vickers Street, MANCHESTER, M40 8EF


Museum
Art Gallery
Education Facility
PW
Queens Road
Monsall
Police Station
Central Park
Sports/Leisure Centre
Collyhurst
Miles Platting
Library
Fire Station
Ashton Canal
Bradford
Etihad Campus
River Medlock
Holt Town
Ancoats
New Islington
Velopark
400 m

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Street View

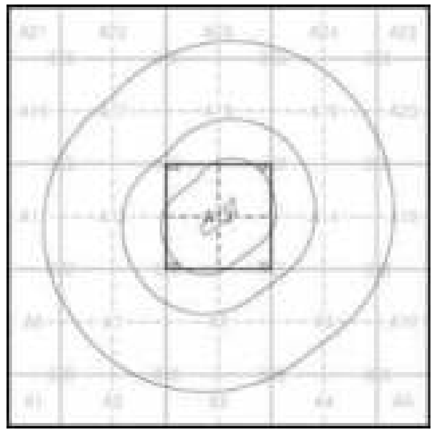
Published 2022

Source map scale - 1:10,000

Street View is a street-level map for the whole of Great Britain produced by the Ordnance Survey. These maps are provided at a nominal scale of 1:10,000

Map Name(s) and Date(s)

Street View Map - Slice A



Order Details

Order Number:	291982299_1_1
Customer Ref:	ES020322
National Grid Reference:	386120, 399600
Slice:	A
Site Area (Ha):	1.83
Search Buffer (m):	1000

Site Details

Saville Whittle, Vickers Street, MANCHESTER, M40 8EF

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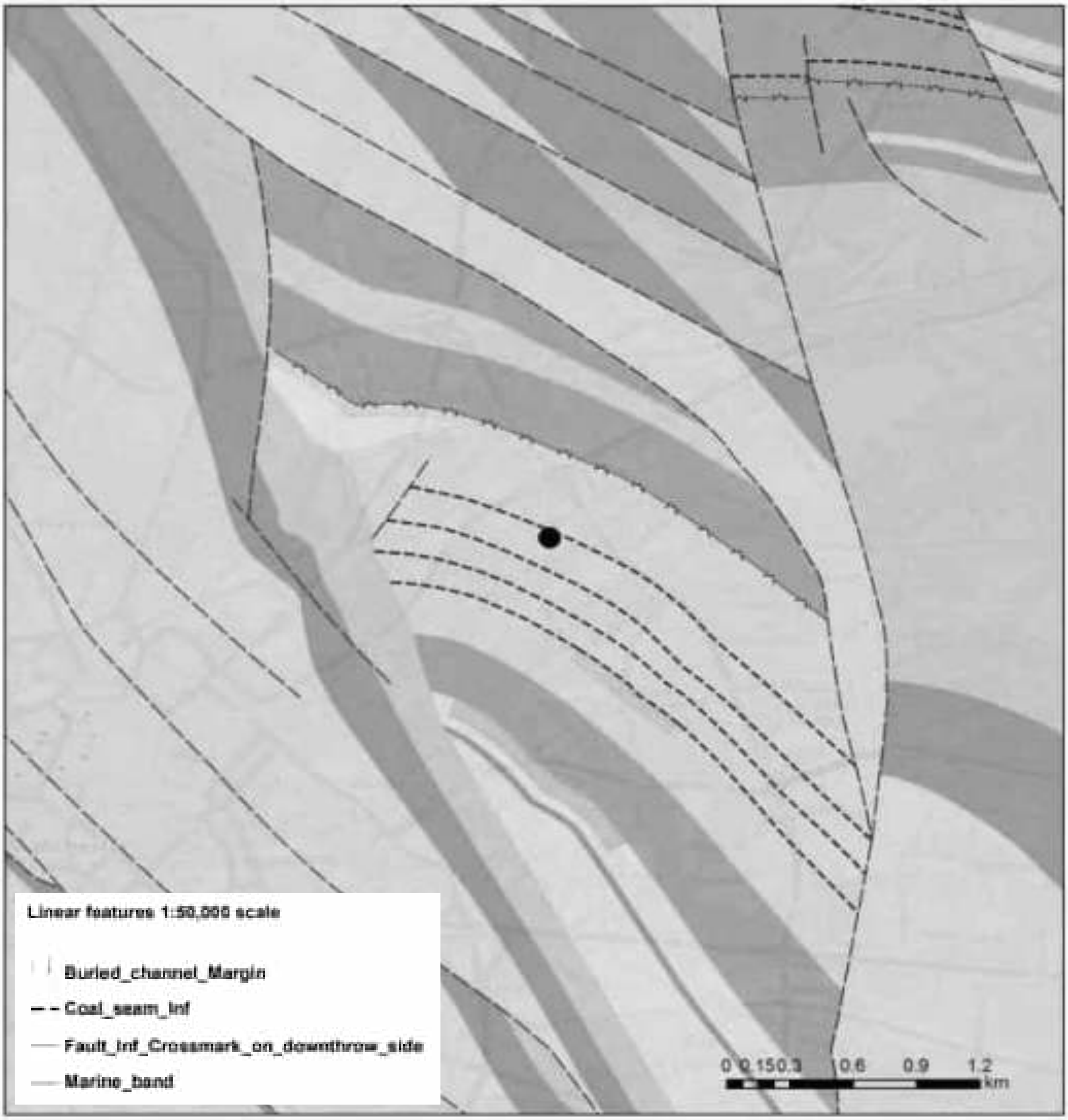
Fax: 0844 844 9951
Web: www.envirocheck.co.uk

Appendix D – Geological Maps

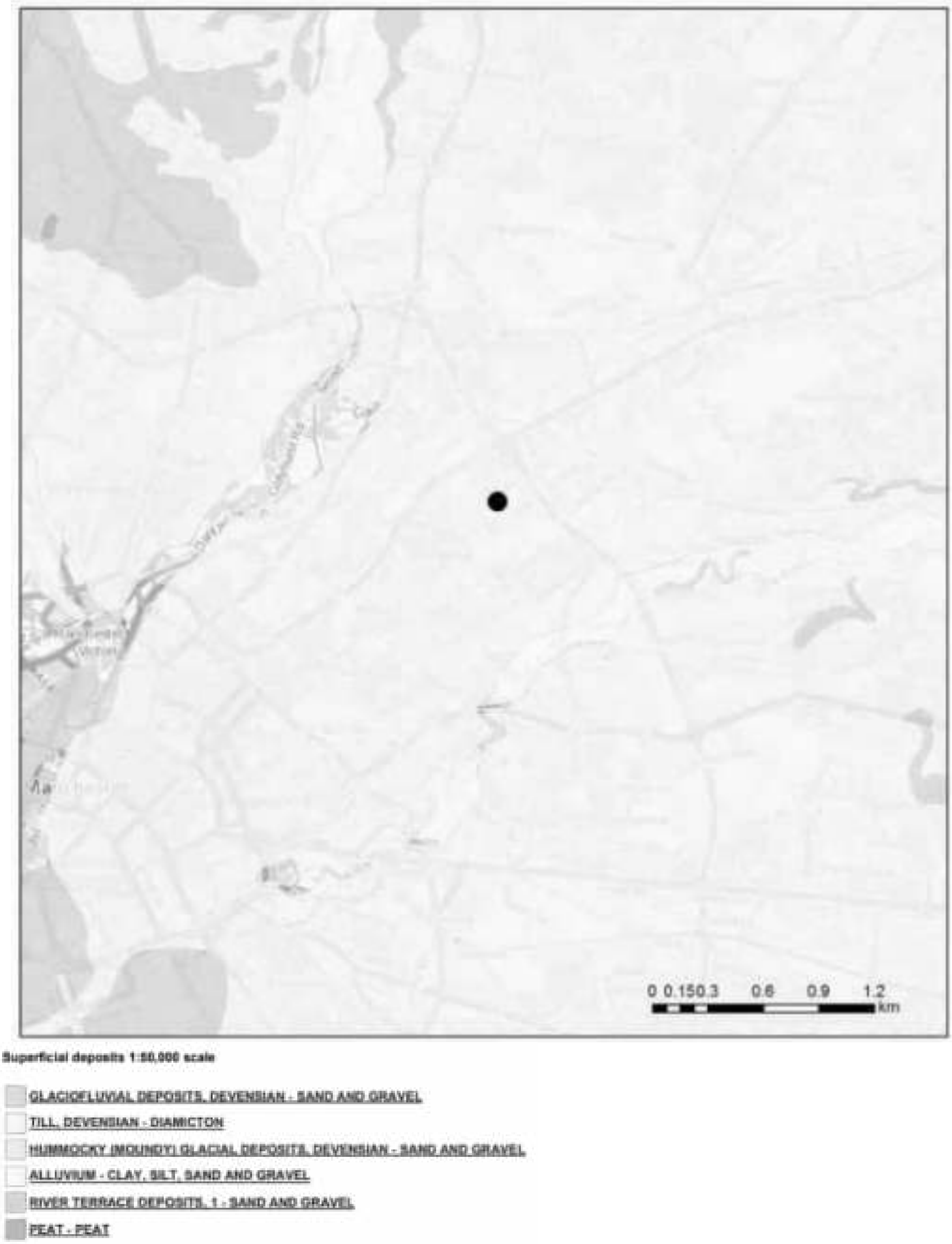
Bedrock Geology


Linear features 1:50,000 scale
Buried_channel_Margin
Coal_seam_Inf
Fault_Inf_Crossmark_on_downthrow_side
Marine_band
0 0.15 0.3 0.6 0.9 1.2
km

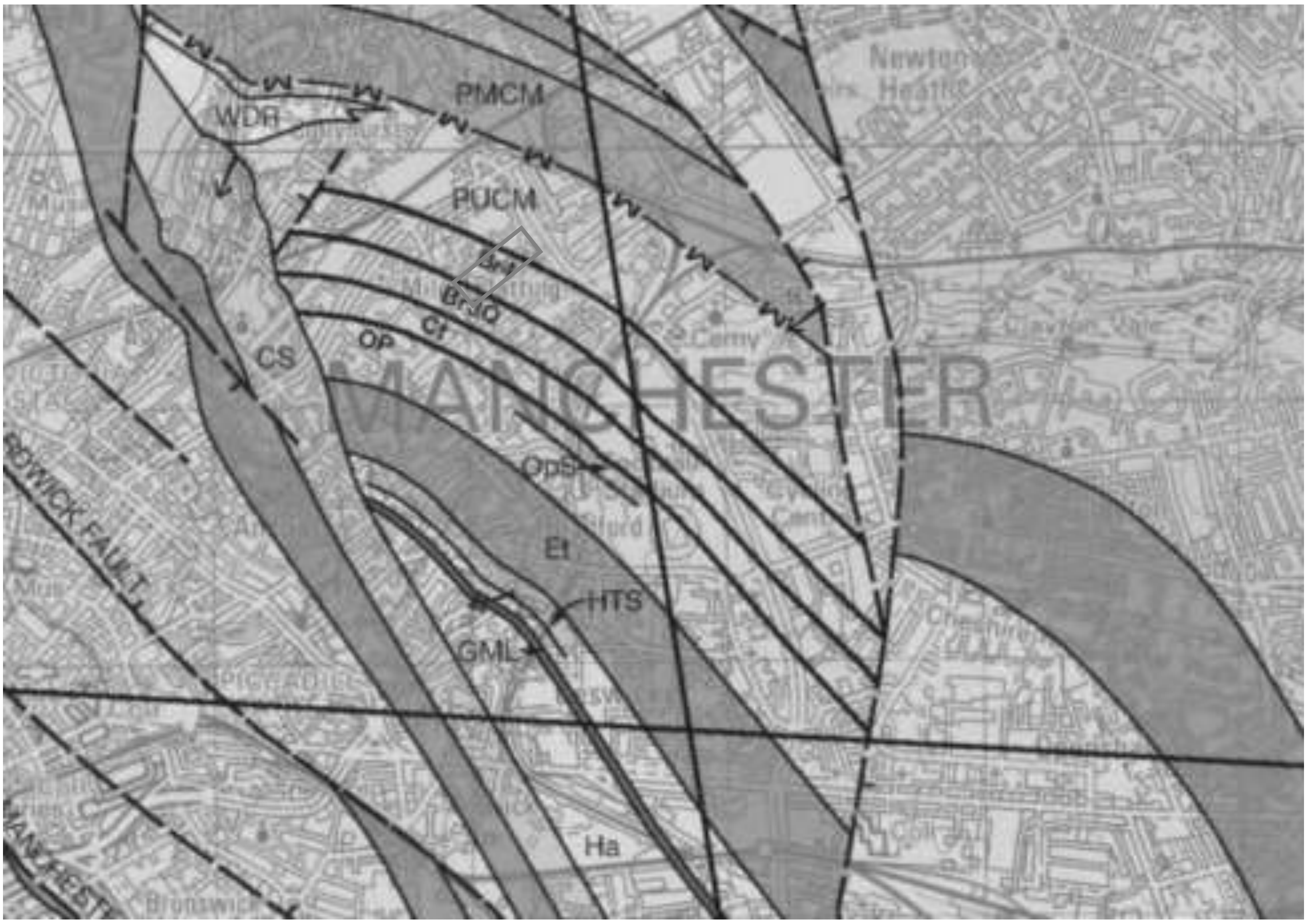
Bedrock geology 1:50,000 scale

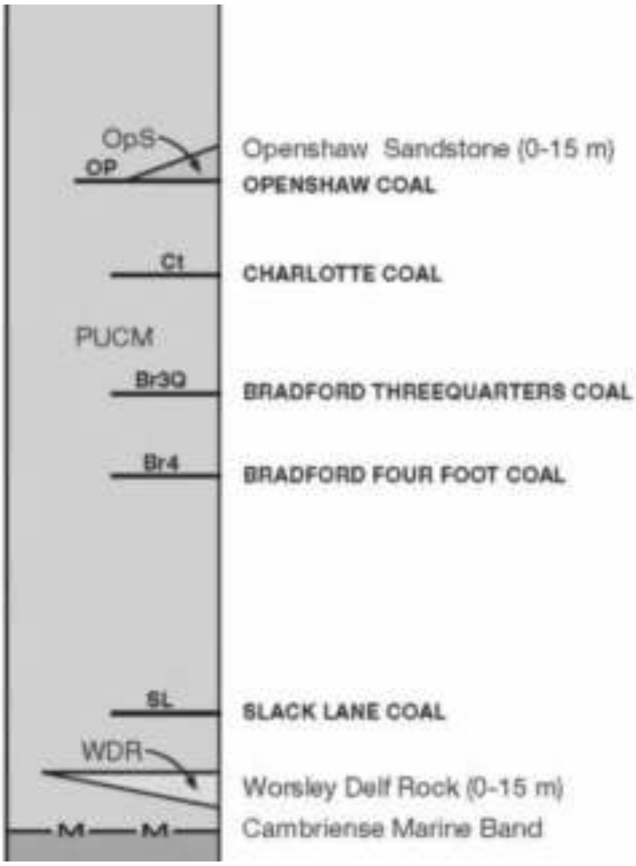
- ▨ GREAT MINE LIMESTONE - LIMESTONE
- ▨ ETRURIA FORMATION - SANDSTONE AND MUDSTONE
- ▨ HALESOWEN FORMATION - MUDSTONE, SILTSTONE AND SANDSTONE
- ▨ PENNINE UPPER COAL MEASURES FORMATION - MUDSTONE, SILTSTONE AND SANDSTONE
- ▨ PENNINE MIDDLE COAL MEASURES FORMATION - MUDSTONE, SILTSTONE AND SANDSTONE
- ▨ CHESTER FORMATION - SANDSTONE
- ▨ COLLYHURST SANDSTONE FORMATION - SANDSTONE
- ▨ NEWTON HEATH SANDSTONE - SANDSTONE
- ▨ WORSLEY DELF ROCK - SANDSTONE
- ▨ OPENSHAW SANDSTONE - SANDSTONE
- ▨ MANCHESTER MARLS FORMATION - MUDSTONE
- ▨ HOLT TOWN SANDSTONE BED - SANDSTONE

Superficial Geology


Manchester Victoria
Manchester
0 0.15 0.3 0.6 0.9 1.2
km
Superficial deposits 1:50,000 scale
GLACIOFLUVIAL DEPOSITS, DEVENSIAN - SAND AND GRAVEL
TILL, DEVENSIAN - DIAMICTON
HUMMOCKY (MOUNDY) GLACIAL DEPOSITS, DEVENSIAN - SAND AND GRAVEL
ALLUVIUM - CLAY, SILT, SAND AND GRAVEL
RIVER TERRACE DEPOSITS, 1 - SAND AND GRAVEL
PEAT - PEAT

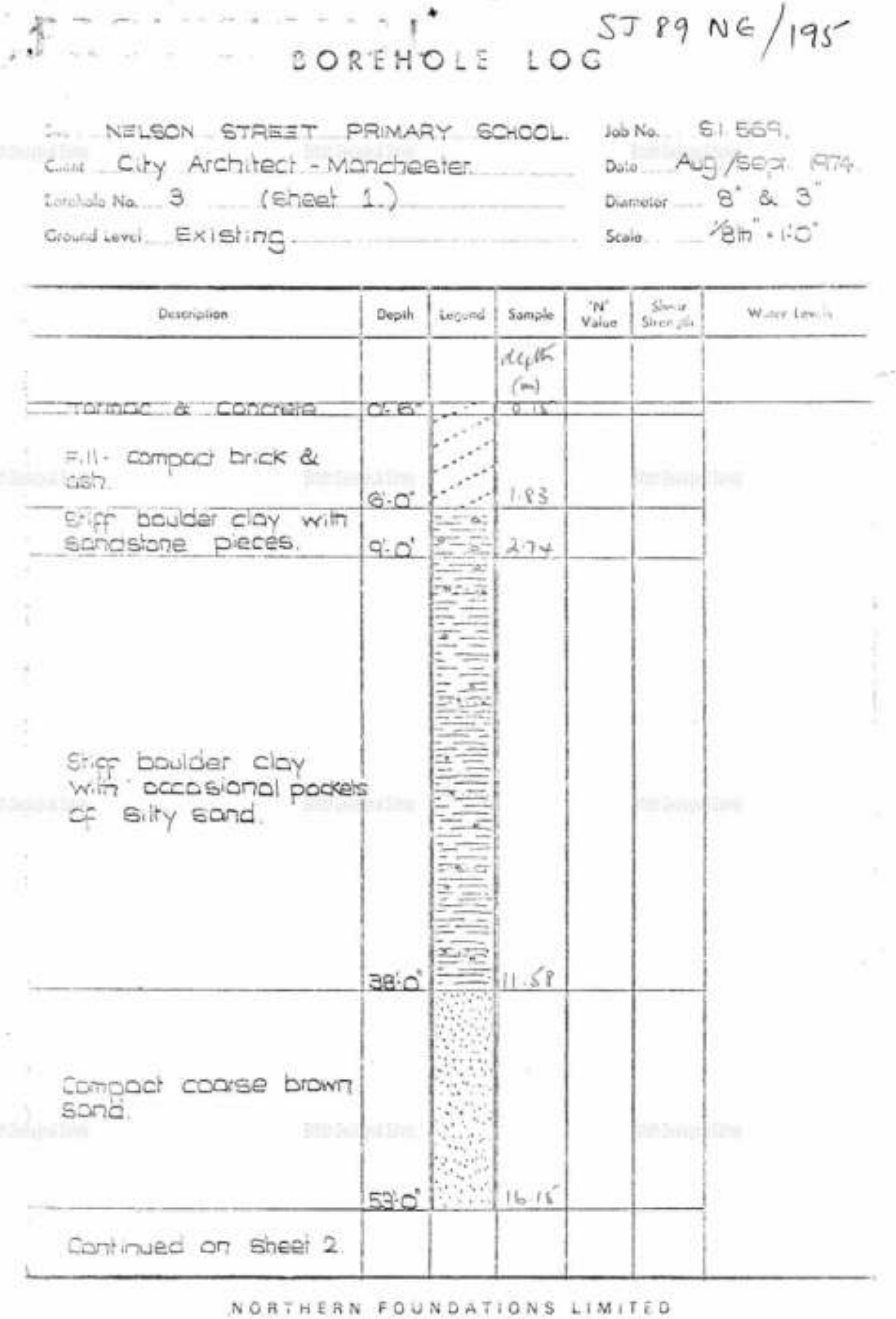
BGS Geological Survey 1:50,000 Series England and Wales Sheet 85, Manchester


Newton Heath
PMCM
WDR
PUCM
Br4
Br3Q
Ct
OP
CS
MANCHESTER
OpS
Et
HTS
GML
Ha
Brunswick


OpS
OP
Openshaw Sandstone (0-15 m)
OPENSHAW COAL
Ct
CHARLOTTE COAL
PUCM
Br3Q
BRADFORD THREEQUARTERS COAL
Br4
BRADFORD FOUR FOOT COAL
SL
SLACK LANE COAL
WDR
Worsley Delf Rock (0-15 m)
M M
Cambriense Marine Band

Appendix E – BGS Borehole Logs

SJ89NE195



SJ 89 NE/195

BOREHOLE LOG

Site NELSON STREET PRIMARY SCHOOL.
Job No. S1 569.
Client City Architect - Manchester
Date Aug/Sept 1974
Borehole No. 3 (Sheet 1.)
Diameter 8" & 3"
Ground Level Existing.
Scale 1/8th" = 1·0'

Description	Depth	Legend	Sample	'N' Value	Shear Strength	Water Levels
			depth (m)			
Tarmac & Concrete	0·6"		0.15			
Fill - compact brick & ash.	6·0'		1.83			
Stiff boulder clay with sandstone pieces.	9·0'		2.74			
Stiff boulder clay with occasional pockets of silty sand.	38·0'		11.58			
Compact coarse brown sand.	53·0'		16.15			
Continued on Sheet 2.						

NORTHERN FOUNDATIONS LIMITED

BOREHOLE LOG

SJ 89 NE/195

Site NELSON STREET PRIMARY SCHOOL
Client City Architect - Manchester
Borehole No. 3 (Sheet 2.)
Ground Level

Job No. S.I. 569
Date
Diameter
Scale 1/8th" = 1'-0"

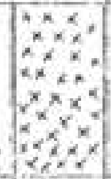
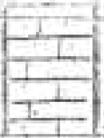
Description	Depth	Legend	Sample	'N' Value	Shear Strength	Water Levels
	53'-0"		depth (m) 16.15			
Compact dry clayey silt.	58'-0"		17.68			
Stiff brown boulder clay.	65'-0"		19.81			
Compact clayey silt with stiff silty clay lenses.	72'-0"		21.95			
Very stiff boulder clay.	77'-0"		23.47			
Hard dry sandy clay	82'-0"		24.99			
Very compact broken shattered coal. (no cavities)	87'-0"		26.52			
Hard clay shale with compact sand seams.	90'-0"		27.43			
Hard clay shale with occasional bands of gritstone	100'-0"		30.48			
Continued on sheet 3.						

NORTHERN FOUNDATIONS LIMITED

SJ 89 NE/195

BOREHOLE LOG

Site NELSON STREET PRIMARY SCHOOL Job No.
Client Date
Borehole No. 3 (Sheet 3) Diameter
Ground Level Scale

Description	Depth	Legend	Sample	'N' Value	Shear Strength	Water Levels
			depth (m)			
	100'-0"		30·48			
Very compact dry silt	108'-0"		32·92			
Hard gritstone with coal traces.	112'-0"		34·14			
Coal seam	113'-6"		34·59			
Hard gritstone	119'-0"		36·27			
Hard - Sandstone.	120'-0"		36·58			

NORTHERN FOUNDATIONS LIMITED

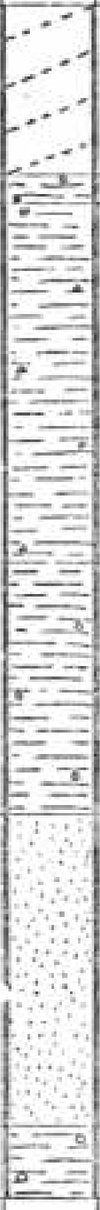
SJ89NE194

SJ 89 NE/194

BOREHOLE LOG

Site NELSON STREET PRIMARY SCHOOL. Job No. S1. 569.
Client City Architect - Manchester. Date Aug. 1974.
Borehole No. 1. (sheet 1) Diameter 6"
Ground Level Existing Scale 1/8th" = 1'-0"

Site plan - see 12/8/74/225 enquiry

Description	Depth	Legend	Sample	'N' Value	Shear Strength	Water Levels
			depth (m)			
Fill: tarmac overlying ash & brick rubble	8'-0"		2.44			
Firm plastic boulder clay	9'-0"		2.74			
Boulder clay varying stiff to very stiff.	38'-0"		11.58			
Compact dry sand.	52'-6"		16.00			
Boulder clay varying stiff to very stiff.	56'-0"		17.07			Continued on sheet 2.

NORTHERN FOUNDATIONS LIMITED

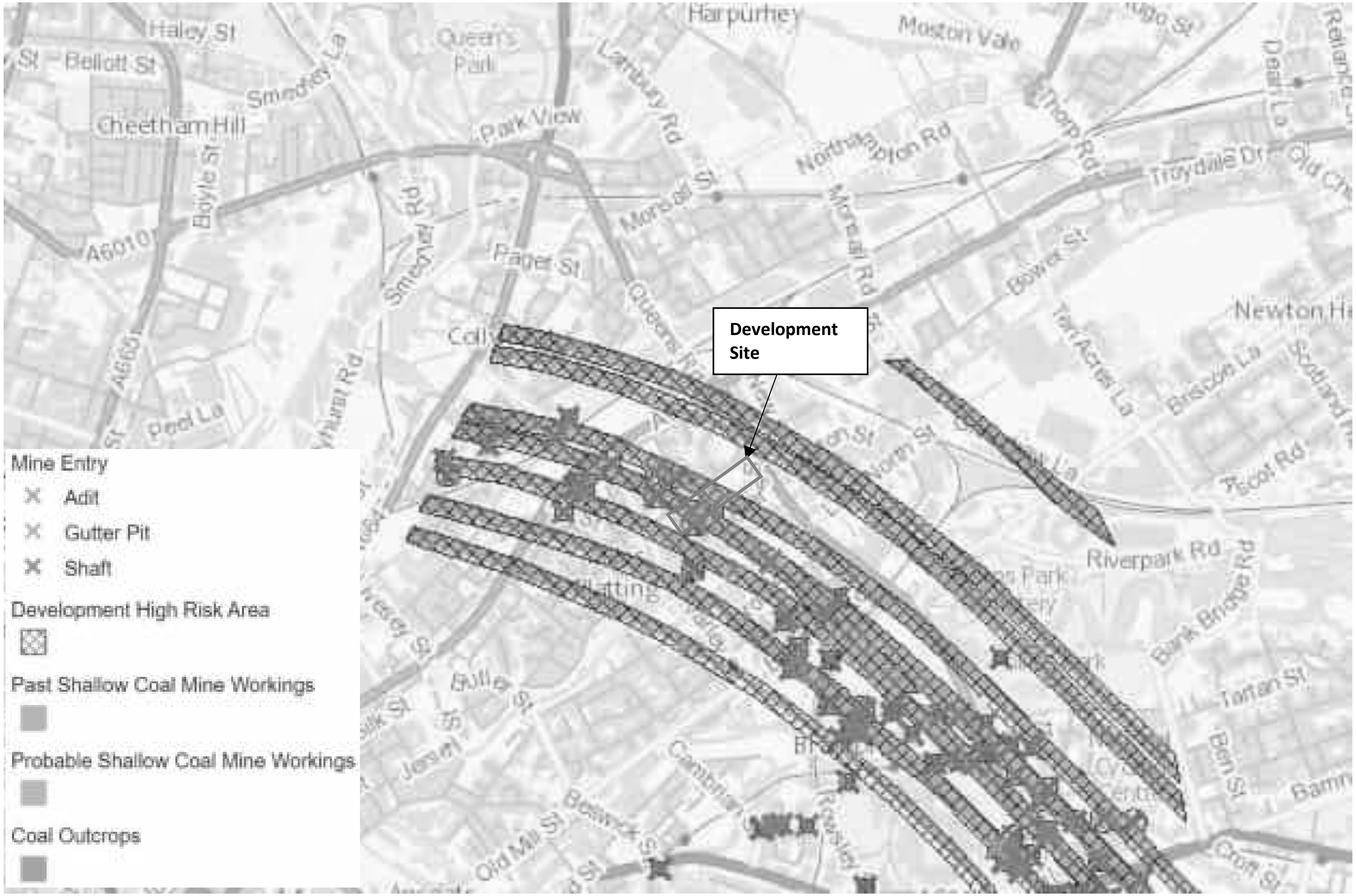
5J 84 NE/194

BOREHOLE LOG

Site NELSON STREET PRIMARY SCHOOL.
Client
Borehole No. 1. (Sheet 2.)
Ground Level
Job No.
Date
Diameter
Scale

Description	Depth	Legend	Sample	'N' Value	Shear Strength	Water Levels
	56'-0"		depth (m) 17.07			
Very stiff boulder clay.	58'-0"		17.68			No ground water.
Compact dry clayey sand.	62'-0"		18.90			
Very stiff sandy boulder clay.	71'-0"		21.64			
Very compact dry clayey sand.	90'-0"		27.43			
Hard blue shale.	94'-0"		28.65			
Hard blue shale with coal traces.	97'-0"		29.57			
Coal	100'-0"		30.48			

Appendix F – Coal Mining Summary Map


Development Site
Mine Entry
Adit
Gutter Pit
Shaft
Development High Risk Area
Past Shallow Coal Mine Workings
Probable Shallow Coal Mine Workings
Coal Outcrops
Haley St
Bellott St
Cheetham Hill
Queen's Park
Harpurhey
Moston Vale
Smedley La
Park View
Lambury Rd
Northampton Rd
Thorp Rd
Troydale Dr
Dean La
Boyle St
A6010
Smedley Rd
Monsall St
Monsall Rd
Pager St
Queens Rd
Bower St
Newton Heath
Ten Acres La
Briscoe La
Scotland
Peel La
Riverpark Rd
Bank Bridge Rd
Tartan St
Ben St
Butler St
Jersey St
Bothwick St
Old Mill St
Cambrian St
Croft St

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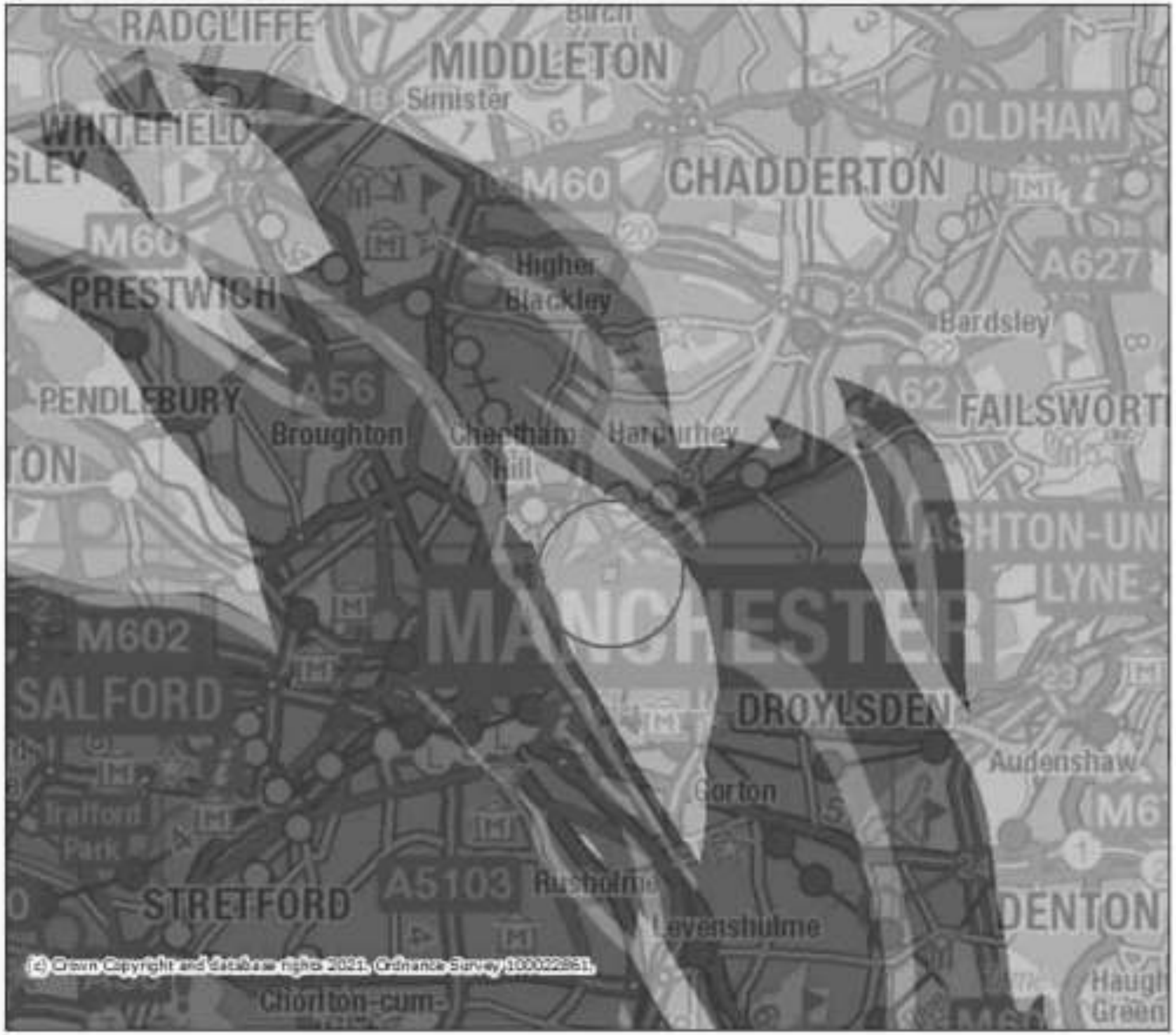
Coal Mining Summary Map

Appendix G - Hydrogeological Maps

MAGIC

Bedrock Aquifer


RADCLIFFE
Birch
MIDDLETON
Simister
WHITEFIELD
M60
CHADDERTON
OLDHAM
PRESTWICH
Higher Blackley
A627
Bardsley
PENDLEBURY
A56
A62
FAILSWORTH
Broughton
Cheetham Hill
Harpurhey
ASHTON-UNDER-LYNE
M602
MANCHESTER
SALFORD
DROYLSDEN
Audenshaw
Trafford Park
Gorton
M60
STRETFORD
A5103
Rusholme
Levenshulme
DENTON
Haughton Green
Chorlton-cum-

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Legend

Aquifer Designation Map (Bedrock) (England)

- ■ Principal
- ■ Secondary A
- ■ Secondary B
- □ Secondary (undifferentiated)
- Unproductive

Projection = OSGB36
xmin = 370200
ymin = 392800
xmax = 401500
ymax = 408000

0 1.5 3
km

Map produced by MAGIC on 1 February, 2022.

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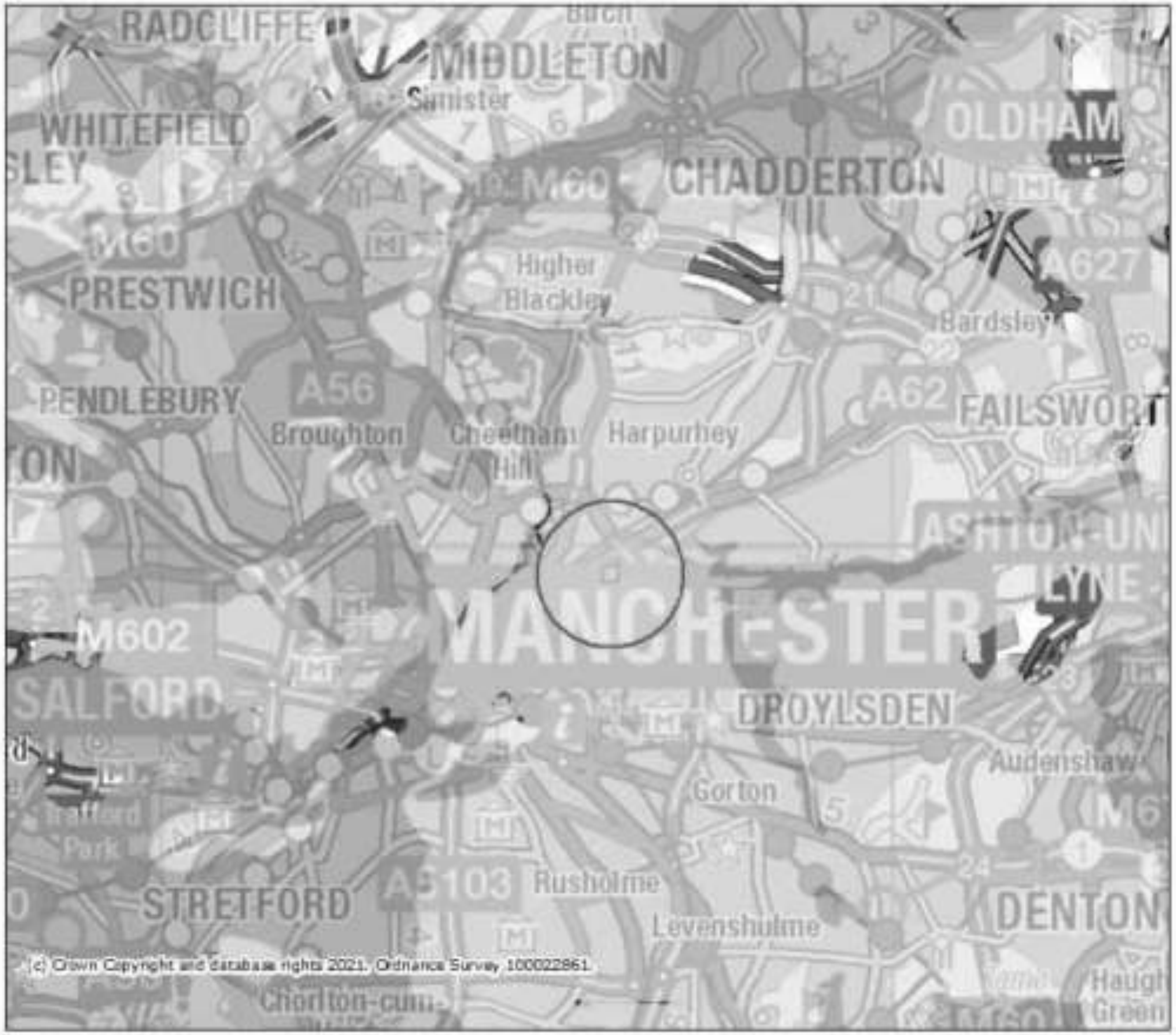
MAGIC

Superficial Aquifer


RADCLIFFE
MIDDLETON
Simister
WHITEFIELD
CHADDERTON
OLDHAM
M60
PRESTWICH
Higher Blackley
A627
Bardsley
PENDLEBURY
A56
A62
Broughton
Cheetham Hill
Harpurhey
FAILSWORTH
ASHTON-UNDER-LYNE
M602
MANCHESTER
SALFORD
DROYLSDEN
Audenshaw
Trafford Park
Gorton
STRETFORD
A6103
Rusholme
Levenshulme
DENTON
Chorlton-cum-
Haughton Green

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Legend

Aquifer Designation Map (Superficial Drift) (England)

- ■ Principal
- ■ Secondary A
- ■ Secondary B
- ■ Secondary (undifferentiated)
- ■ Unknown (lakes+landslip)
- Unproductive

Projection = OSGB36
xmin = 370200
ymin = 392800
xmax = 401500
ymax = 408000

0 1.5 3
km

Map produced by MAGIC on 1 February 2022.

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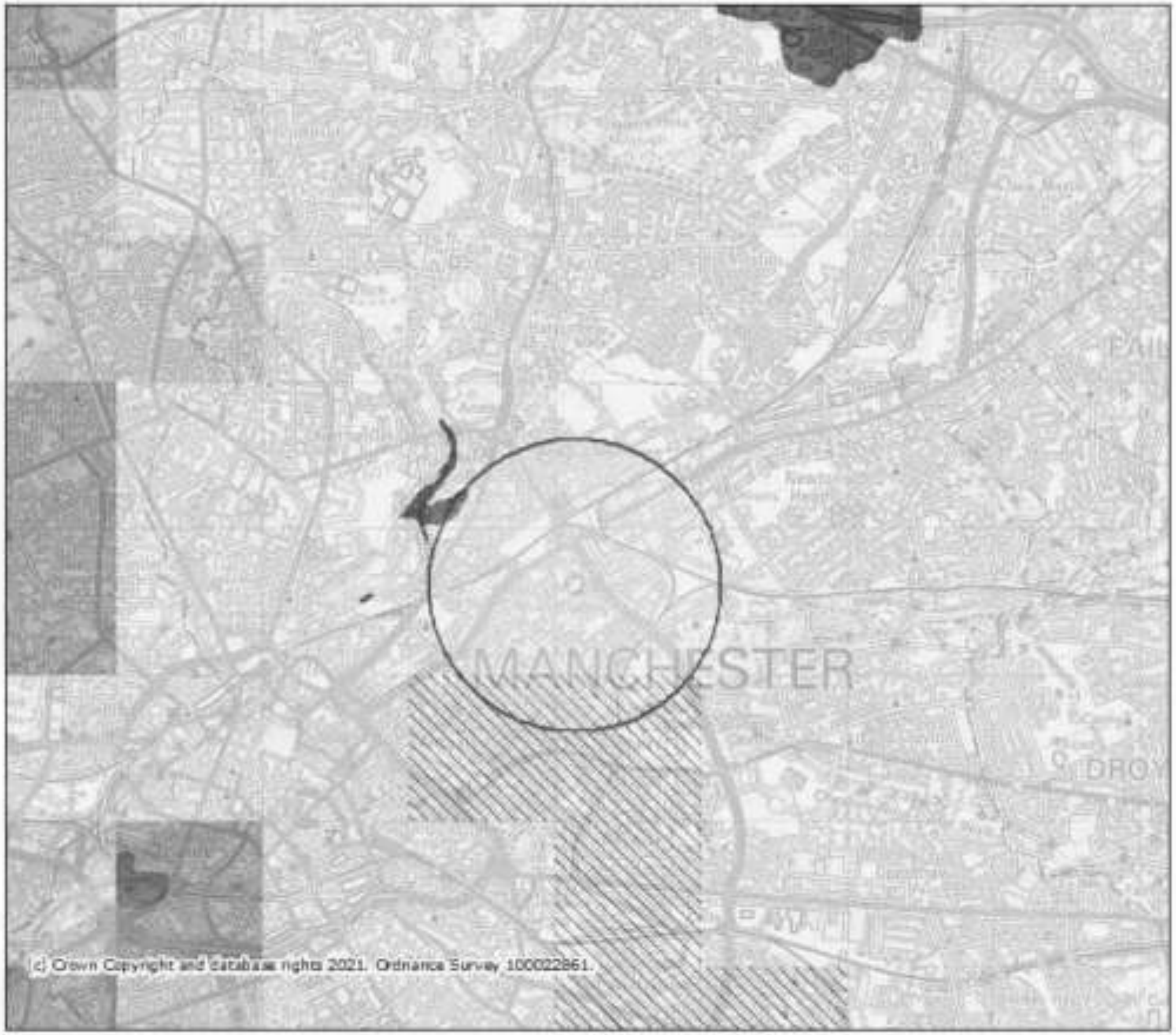
MAGIC

Groundwater Vulnerability



(c) Crown Copyright and database rights 2021. Ordnance Survey 100022861.

Legend

Groundwater Vulnerability Map (England)

- ▨ Local Information
- ▨ Soluble Rock Risk
- ■ High
- ■ Medium - High
- ■ Medium
- ■ Medium - Low
- ■ Low
- ■ Unproductive

Projection = OSGB36
xmin = 378400
ymin = 396300
xmax = 394000
ymax = 403900

Map produced by MAGIC on 1 February, 2022.

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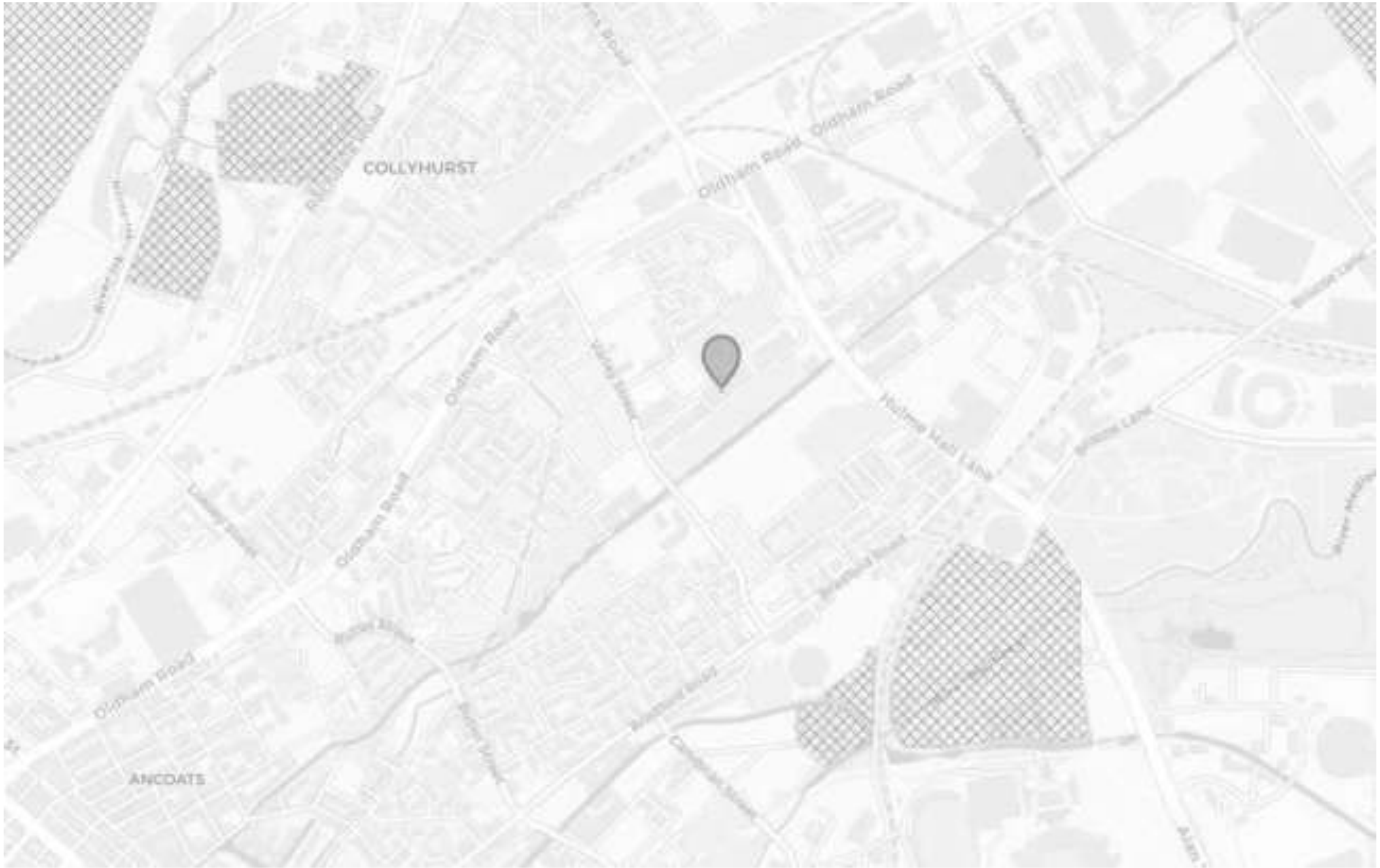
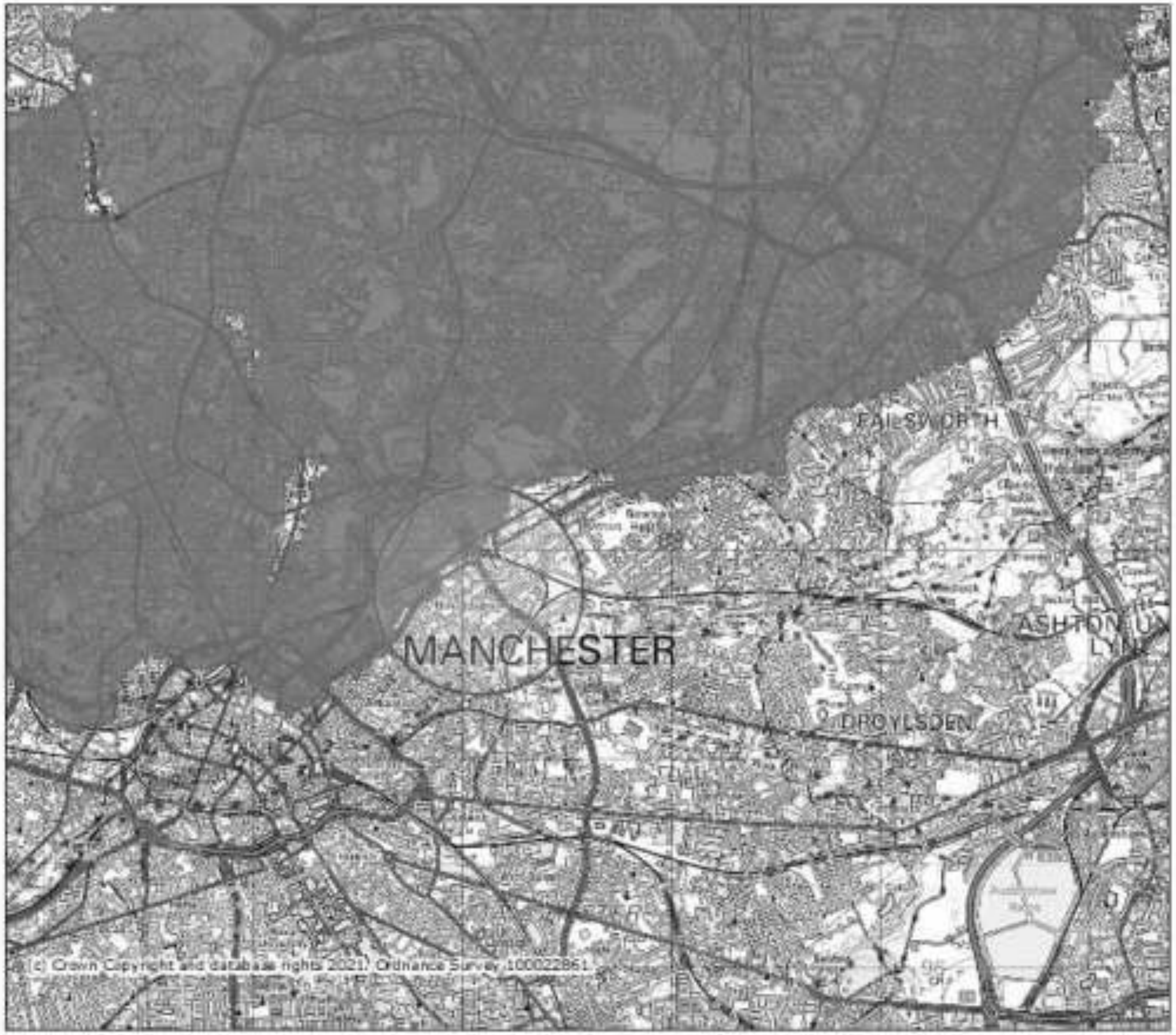
Appendix H – Historic Landfill Map


COLLYHURST
Oldham Road
Oldham Road
Oldham Road
Oldham Road
Oldham Road
Holme Hall Lane
Bradford Road
Bradford Road
ANCOATS

enviro solution	**Groundsure Historic Landfill Map**

MAGIC

Nitrate Vulnerable Zone


FAILSWORTH
MANCHESTER
ASHTON U
LYN
DROYLSDEN
(c) Crown Copyright and database rights 2021. Ordnance Survey 100022861.

Legend

▨ Nitrate Vulnerable Zones 2017 Designations (England)

Projection = OSGB36
xmin = 376200
ymin = 395500
xmax = 398100
ymax = 405100

Map produced by MAGIC on 1 February, 2022.

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Appendix F Phase 2 Geo-Environmental Assessment Report (CL102-V1 ¦ March 2022)

PHASE 2 GEO-ENVIRONMENTAL SITE ASSESSMENT REPORT

VARLEY STREET
MANCHESTER
M40 8EF

Prepared for:

Mace Group

By:

ENVIROSOLUTION LTD

Suite 53

3a Bridgewater St

Liverpool

L1 0AB

Date: 2nd March 2022

enviro | solution

EnviroSolution Ltd
Document Verification

Site Address	Varley Street, Manchester, M40 8EF		
Report Title	Phase 2 Geo-Environmental Site Assessment Report		
Job Number	CL102	**Document Ref.**	CL102
Date Issued	2nd March 2022	**Report Version**	V1
Prepared by	Tom Craig	**Signature**	[redacted]
Checked by	Gemma Lucas	**Signature**	[redacted]

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Executive Summary

The recent intrusive ground investigation has proven that Made Ground is present beneath the site with a variable thickness of between 0.50m and 3.30m.

A total of 29 no. soil samples were taken and tested for a range of chemical parameters. Several substances have been detected in the Made Ground beneath the site at concentrations in excess of the residential GAC and commercial GAC. These include heavy metals, total petroleum hydrocarbons and semi volatile organic compounds. Chrysotile asbestos was identified in a single sample (TP19 at 0.30m) at the site. If the location of the positive asbestos identification is located beneath the proposed areas of soft landscaping, it could present a long-term risk of exposure to future site users.

Qualitative risk assessment has shown that these substances could present a long-term exposure risk to human health of future site users if they remain present in the shallow soils within the areas of soft landscaping following redevelopment. Therefore, remedial measures will be required in areas of proposed soft landscaping in order to eliminate exposure risks (e.g. clean topsoil cover system).

Risks to controlled waters (i.e. groundwater aquifer) have been assessed to be low. However, the risk from the contaminants of concern to the identified receptors is considered to be negligible due to the presence of impermeable diamicton deposits which underlie the site.

The site can be classified as Characteristic Situation 2 (CS2; low risk) in terms of ground gases and therefore, ground gas protection measures need to be installed.

A remediation strategy should be prepared prior to redevelopment to detail the remediation and validation requirements. This document should be submitted to planning for approval prior to commencing any groundworks on the site.

If new water supply pipes are to be installed for the proposed development, then it is recommended that discussions are undertaken with the local water supply company to confirm their requirements.

The Made Ground material would not be suitable for the construction of traditional shallow spread foundations due to the risk of unacceptable total and differential settlement occurring. Given the variable thickness of Made Ground at the site, it is deemed appropriate to zone the site with foundation solution options. These include piles in the south-western portion of the site, and trench fill foundations in the north-eastern portion.

Area 1 (southwest) – Piles

Given the variable thickness of Made Ground encountered beneath this area (up to 3.30m), it is recommended that a piled foundation solution is used. The ground would be suitable for driven or bored cast in-situ piled foundations. It is recommended that initial designs should incorporate the use of a suspended floor slab with a ring beam spanning the pile layout. Appropriate test pile and works pile testing procedures will need to be established.

Area 2 – (northeast) Trench Fill

The underlying diamicton deposits would be suitable for the construction of trench fill foundations with an allowable bearing pressure of 150kN/m^2. This is based on a characteristic undrained shear strength of 100kN/m^2 and a maximum foundation width of 1m for strip footings. Foundations should be set at a minimum of 1.50m bgl, allowing for limited tree planting.

Foundation excavations should be checked by an experienced ground worker prior to placing concrete. Any soft spots or unsuitable founding materials should be removed if encountered and replaced with compacted granular fill or lean mix concrete.

A variable thickness of Made Ground was noted in the boreholes. It is therefore considered that initial designs consider the use of suspended (block and beam) floor slabs.

Heave precautions should be incorporated into the foundation solution in accordance with NHBC Chapter 4.2.10.

The results from the chemical laboratory sulphate and pH analysis for the site indicate a Design Sulphate Class of DS-1 and an Aggressive Chemical Environment for Concrete (ACEC) class of AC-1.

It is recommended that further study is undertaken into the risk that historic coal mining poses to the development, relating to the recorded mine shaft and unrecorded and recorded workings.

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1 Introduction

1.1 Background

EnviroSolution Ltd was commissioned to undertake a Phase 2 Geo-Environmental Site Assessment at a site located at Varley Street in Manchester. This work was required to investigate the feasibility of an educational development at the site which will include the construction of two schools.

A Phase 1 Environmental Site Assessment has previously been completed for this site:

- EnviroSolution Ltd, Varley Street Phase 1 Environmental Site Assessment Report, Ref: CL101, 12th February 2022.

The Phase 1 report should be read in conjunction with this report as this will form the basis for the conceptual understanding of the site.

1.2 Objectives

The objectives of the ground investigation were:

1. To obtain information on the ground conditions beneath the site.
2. To obtain information to inform foundation design.
3. To confirm the contamination status of the ground beneath the site.
4. To identify any environmental risks and liabilities associated with ground conditions at the site.
5. To identify the requirements for any additional works prior to site development (e.g. further ground investigation or remedial works).

1.3 Scope of Work

- An intrusive ground investigation.
- Generic quantitative risk assessments utilising the ground investigation data in line with industry approved guidelines.
- A Ground Gas Risk Assessment
- A geotechnical appraisal of the ground conditions to inform foundation design.

The scope of work was developed in accordance with the Environment Agency of England and Wales and Department for Environment Food and Rural Affairs (DEFRA) document Environment Agency (2020) Land Contamination Risk Management Report LCRM "How to assess and manage the risks from land contamination" and BS10175:2011+A2:2017 '*Investigation of Potentially Contaminated Sites – Code of Practice'.*

1.4 Site Location

The site is located at Varley Street, Manchester, M40 8EF. The British National Grid Reference for the approximate site centre is GR: 386125 399605.

The site location is shown on **Figure 1** in **Appendix A**.

1.5 Site Description

The site is irregular in shape and covers an approximate area of 16,000 square metres. The site is currently a vacant plot of waste land formerly used as a school playing field. A tarmac games court is located in the western extent of the site. The rest of the site is rough grassland.

Sporadic trees are present along the permitter of the site but are more clustered along the eastern and southern boundaries.

The proposed development area is generally flat with little change in topographic level. Vehicle access is gained from Sawley Street.

The site boundaries consist of metal fencing and chain link fencing on all sides.

The site is rectangular in shape and has an approximate area of 450 square meters. The site is currently a vacant plot of wasteland.

The site is bounded by residential properties to the north and commercial properties to the west, south and east.

There are no active petrol filling stations within a 250m radius of the site.

The existing site plan is shown on **Figure 2** which is included in **Appendix A**.

1.6 Development Proposals

It is understood that the development plans could include the construction of up to two schools with associated vehicle parking, play areas and playing fields.

Currently, no formal development plans have been provided.

2 Ground Investigation Methodology

2.1 Intrusive Field Works

The intrusive investigation works were undertaken by EnviroSolution Ltd on the of 17th and 18th of January and the 24th to 25th of February 2022. The work comprised the following:

- The drilling of 10 no. window sample boreholes (designated as WS1 – WS10) to depths of up to 5.0m below ground level (bgl).
- The drilling of 2 no. rotary boreholes (designated as RT1 – RT2) to depths of up to 35m bgl.
- The excavation of 19 no. trial pits (designated as TP1 – TP19) to depths of up to 2.10m bgl.
- The installation of 6 no. gas and groundwater monitoring wells.
- Geotechnical logging of ground conditions at each location.
- In-situ geotechnical testing within boreholes.
- Collection of representative soil samples from boreholes for subsequent chemical and geotechnical laboratory analysis.

The deep rotary borehole works were undertaken following the receipt of a permit to drill from the CA and were supervised by a qualified EnviroSolution Engineer. Gas returns from the boreholes were monitored and water flush was used.

The exploratory hole locations are shown on **Figure 4** in **Appendix A**. The boreholes were located on an evenly spaced grid (where access allowed) to ensure full site coverage. Areas along the northern boundary were inaccessible due to vegetation.

2.2 Soil Sampling Methodology

The exploratory holes were logged in accordance with the requirements of BS 5930: 2015 and BS EN 14688 Pts 1&2. Visual and olfactory evidence of contamination was noted if encountered. These observations were used to aid scheduling of samples for chemical laboratory analysis. Soil samples were collected at distinct changes in lithology, or on the basis of field observations.

Samples were collected with a clean trowel or by hand (using dedicated nitrile gloves for each sampling location). Samples were placed immediately into laboratory supplied sampling containers, specific to the type of analyses required. All sample containers were sealed and labelled with a unique location identity, depth and date of sampling.

2.3 Gas and Groundwater Monitoring

A total of 6 no. combined gas and groundwater monitoring standpipes (WS1, WS2, WS3, WS6, WS7, WS10) were installed during the intrusive ground investigation. Three rounds of gas and groundwater monitoring were completed between the 24th of January and the 7th of February.

The following parameters were measured during each visit:

- Methane % (v/v)
- Carbon dioxide % (v/v)
- Oxygen % (v/v),
- Hydrogen sulphide (ppm)
- Flow rate (l/hr).
- Atmospheric pressure (mbar)
- Groundwater level and borehole depth (m bgl)

During the second monitoring visit, a representative groundwater sample was collected from each borehole.

2.4 Laboratory Analysis

2.4.1 Chemical Analysis

All soil samples were transported in cool boxes at the end of the day under a chain of custody regime to Chemtest, who are a UKAS accredited laboratory. Analysis was conducted to MCerts standards where applicable.

Chemical analysis was scheduled on a total of 29 no. soil samples (23 no. Made Ground and 6 no. natural ground) for a range of chemical parameters including: Toxic 9 metals, pH, asbestos ID, asbestos quantification, volatile and semi-volatile organic compounds (VOCs and SVOCs) and TPH criteria working group. Chemical analysis was scheduled on a total of 3 no. groundwater samples for a range of chemical parameters including: Toxic 9 metals, VOCs, SVOCs, TPH CWG, sulphates, hardness and pH.

2.4.2 QA/QC

Field methods and procedures complied with accepted industry standards (BS10175:2011). These standards include the use of specified sample container types and agreed sampling decontamination procedures.

All samples were transported from the site to the analytical laboratory under a chain of custody regime within cool boxes containing ice packs. All analytical results were subjected to a QA/QC validation check to ensure they met the Laboratory's target criteria.

2.4.3 Geotechnical Analysis

A programme of laboratory testing was undertaken in accordance with BS:1377 (1990) 'Methods of Test for Soils for Civil Engineering Purposes'. The following tests being carried out:

Table 1: BS:1377 Testing

BS Test No.	Description
Part 2: 3.2.3.3	Moisture Content
Part 3: 5.2	Sulphate Content, pH Value
Part 2: 5.4	Plasticity

The following in-situ and laboratory testing outside the scope of BS:1377 was also undertaken:

Table 2: Non-BS:1377 Testing

Standard or Methodology	Test Description
BRE Special Digest 1	Total Sulphate, Aqueous Extract Sulphate, Total Sulphur, pH

3 Ground Conditions

3.1 Made Ground

Made Ground was encountered in all of the exploratory boreholes typically beneath a 0.30m layer of topsoil. The Made Ground ranged in thickness between 0.50m and 3.30m and was generally thickest in the south-western half of the site thinning to the northeast.

The Made Ground can be described as reworked fill. It generally consists of a brown/ grey gravelly sandy reworked clays and grey/brown/black clayey sandy gravel with variable amounts of brick, tile, glass, concrete, sandstone fragments, slag and timber.

Evidence of hydrocarbon contamination was noted in TP1, WS7, TP7, TP13, TP14 and TP16.

A buried obstruction was encountered in TP19 at 0.70m bgl.

3.2 Diamicton

Diamicton deposits were encountered in 26 no. exploratory holes at the site. The diamicton generally consists of soft to stiff brown/ orange/ grey mottled clay. A thick (4.5m to 5.5m) band of fine sand was recorded in RT2 and RT1 respectively at depth of 10.0m and 11.0m bgl.

Uncorrected SPT N values recorded in the diamicton ranged between 8 and 32 which indicates a medium, becoming very high strength clay with an approximate undrained shear strength range of between 40kN/m^2 and 160kN/m^2 using the general approximation of:

Undrained shear strength = N x 5 (after Stroud, 1974).

The diamicton shows an increasing strength with depth. Based on these results, then it is considered that a Characteristic Shear Strength of 100kN/m^2 can be adopted for foundation design.

3.3 Bedrock

Bedrock of the Pennine Upper Coal Measures was encountered in 2 no. of the exploratory boreholes at depths of between 23.5m and 26.5m bgl. The depth to bedrock is shown to increase towards the north.

The Coal Measures consist of grey mudstone with minor sandstone bands. Minimal flakes of coal were noted in RT1 at 32.0m bgl.

The recorded borehole logs are shown in **Appendix C**. The recorded trial pit logs are included in **Appendix D**.

3.4 Groundwater

Groundwater inflows were recorded during the investigation in TP3 at 2.0m, TP7 at 1.70m, TP8 at 1.20m, TP16 at 1.50m, TP17 at 1.40m. In all cases, seepage into the trial pits was slow.

Groundwater was recorded in the monitoring wells (WS2, WS3, WS6 and WS7) at depths of between 0.85 and 4.95m bgl. It is considered that these strikes represent a perched water table.

Evidence of hydrocarbon contamination was noted in WS7 and TP14.

3.5 Ground Gas

Ground gases such as methane and carbon dioxide have been detected in both the Made Ground and natural ground deposits beneath the site. Monitoring records are included in **Appendix G** and the data is summarised in Table 3 below.

Table 3: Monitoring Summary

Borehole ID	Response Zone	Highest Detected Flow Rate (l/hr)	CH4 Range (%v/v)	CO2 Range (%v/v)	O2 Range (%v/v)
WS1	Made Ground	0.3	0	0.2 – 6.1	10.7 – 19.8
WS2	Made Ground	0.2	0	1.3 – 3.0	14.5 – 17.4
WS3	Made Ground and Natural Ground	0.2	0	0.2 – 0.4	17.1 – 19.5
WS6	Natural Ground	0.2	0	6.0 – 8.3	8.0 – 15.6
WS7	Made Ground and Natural Ground	0.2	0	2.4 – 4.2	2.6 – 16.1
WS10	Natural Ground	0	0	2.0 – 2.2	17.2 – 19.4

An assessment of the ground gases monitoring results is provided in Section 6.

3.6 Chemical Analysis

The results of the chemical analysis are assessed in Section 6. A copy of the laboratory test certificates is included in **Appendix E**.

3.7 Geotechnical Model

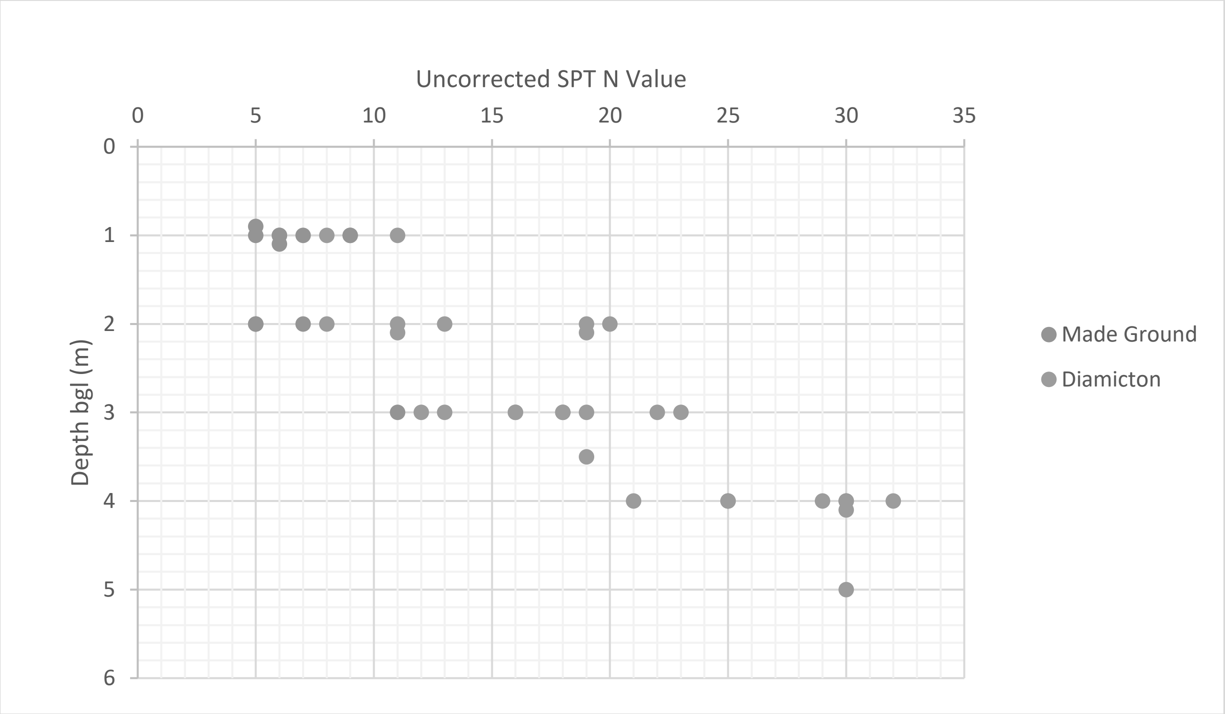
Table 4: Geotechnical Model

Stratum	Depth to Base (m bgl)	Parameters/ Comments	
		Strength Parameters	Other Parameters/ Notes
Made Ground	0.40m – 2.5m	SPT N values 5 – 11	Brown/ grey gravelly sandy reworked clays and grey/ brown/ black clayey sandy gravel with variable amounts of brick, tile, glass, concrete, sandstone fragments, slag and timber. Hydrocarbons noted in 6 no. locations
Diamicton/ Glaciofluvial Deposits	23.5 – 26.5m	SPT N values 8 – 32	Soft to stiff brown/ orange/ grey mottled clay, becoming stiff with depth. 4.5m to 5.5m thick sand layer at 10m to 11m bgl.

Stratum	Depth to Base (m bgl)	Parameters/ Comments	
		Strength Parameters	**Other Parameters/ Notes**
Pennine Upper Coal Measures	Not Proven	None recorded	Grey mudstones with subordinate sandstone bands. Occasional fragments of coal at 32m depth.

A total of 39 no. Standard Penetration Tests (SPTs) were performed during the drilling works. The results are recorded on the borehole logs at the appropriate depths and are displayed on the graph below.

SPT – Depth Plot



3.8 Geotechnical Laboratory Results

3.8.1 Sulphate Testing

The results of chemical testing carried out in accordance with BRE Special Digest 1:2005 Concrete in Aggressive Ground are summarised as follows (See **Appendix E**):

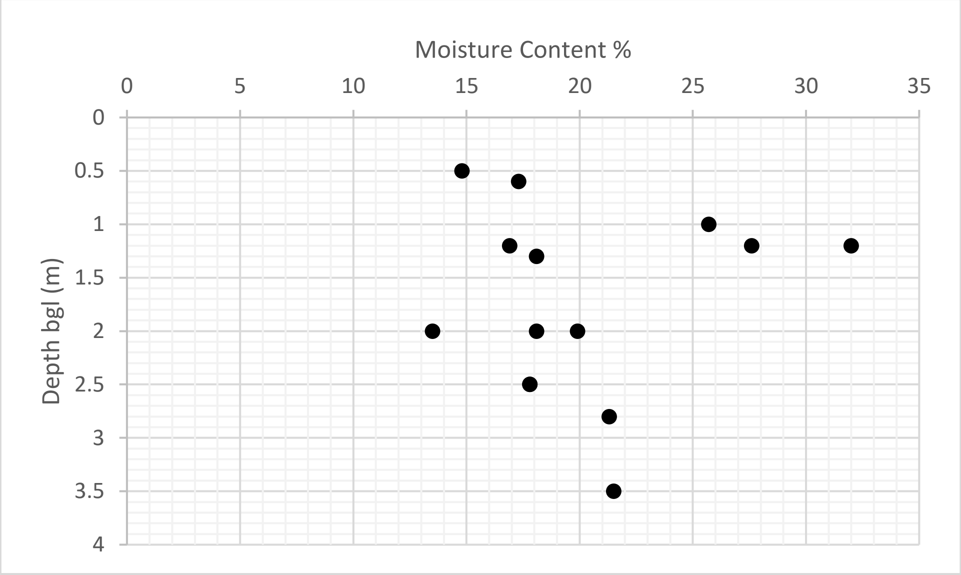
Table 5: BRE Special Digest 1:2005 Test Results

Material	Property	No. of Tests	Range of Results	Characteristic Values (BRE Special Digest 1)	Design Sulphate Class and ACEC Class
Made Ground	Sulphate (SO4) by 2:1 water soil extract (mg/l)	6	13 – 325	325	**DS-1** **AC-1**
	pH	6	6.8 – 8.0	6.8	
	Total Sulphur %	6	0.0 – 0.76	0.76	
	Chloride by 2:1 water soil extract (mg/l)	6	2.5 – 6.9	N/a	N/a
	Nitrate by 2:1 water soil extract (mg/l)	6	<1.5	N/a	N/a
Natural Ground	Sulphate (SO4) by 2:1 water soil extract (mg/l)	1	54 – 261	261	**DS-1** **AC-1**
	pH	1	7.2 – 7.9	7.2	
	Total Sulphur %	1	<0.02 – 0.03	0.03	
	Chloride by 2:1 water soil extract (mg/l)	1	13.1 – 14	N/a	N/a
	Nitrate by 2:1 water soil extract (mg/l)	1	<1.5	N/a	N/a

3.8.2 Natural Moisture Content

Natural moisture content testing was carried out on a total of 14 no. soil samples. The results of the natural moisture content testing are shown in **Appendix E**.

The results show a range in natural moisture content of between 13.5% and 32.0%.



3.8.3 Plasticity Testing

The results of the plasticity testing are summarised below. A copy of the laboratory testing results is included in **Appendix H**.

Table 6: Plasticity Results

Sample	Plasticity Index	Modified Plasticity Index	Volume Change Potential
TP4 at 1.20m	34	34	High
TP13 at 1.2m	34	34	High
WS1 at 3.50m	28	28	Medium
WS3 at 2.80m	26	25	Medium
WS7 at 2.50m	27	26	Medium
WS10 at 2.50m	28	28	Medium

* Modified Plasticity Index for % passing 425μm sieve in accordance with NHBC Standards Chapter 4.2

The results show a medium to high plasticity clay soil with a high volume change potential.

4 Geotechnical Appraisal

Desk-based studies have indicated that the site lies within a Development High Risk Area for coal mining. This assessment relates solely to foundation design and does not take into account the influence of shallow mine workings. It is recommended that further study is undertaken into the risk that historic coal mining poses to the development.

4.1 Foundations

The Made Ground material would not be suitable for the construction of traditional shallow spread foundations due to the risk of unacceptable total and differential settlement occurring. This is due to the variable nature of the material and the lack of controlled compaction when the material was placed. The underlying glacial diamicton deposits are considered to be suitable bearing strata.

Given the variable thickness of Made Ground at the site, it is deemed appropriate to zone the site with foundation solution options. The foundations zones are shown in **Figure 4** in **Appendix A**.

Area 1 (southwest) – Piles

Given the variable thickness of Made Ground encountered beneath this area (up to 3.30m), it is recommended that a piled foundation solution is used. The ground would be suitable for driven or bored cast in-situ piled foundations. It is recommended that initial designs should incorporate the use of a suspended floor slab with a ring beam spanning the pile layout. Appropriate test pile and works pile testing procedures will need to be established.

Specialist structural engineers will be required to prepare schedules for column loads. This information, together with these geotechnical design data, should then be sent to a specialist ground improvement and/or piling contractor to enable them to derive suitable proprietary designs.

Area 2 – (northeast) Trench Fill

The underlying diamicton deposits would be suitable for the construction of trench fill foundations with an allowable bearing pressure of 150kN/m^2. This is based on a characteristic undrained shear strength of 100kN/m^2 and a maximum foundation width of 1m for strip footings. Further assessment would be required for larger foundations. Foundations should be set at a minimum of 1.50m bgl, allowing for limited tree planting.

Foundation excavations should be checked by an experienced ground worker prior to placing concrete. Any soft spots or unsuitable founding materials should be removed if encountered and replaced with compacted granular fill or lean mix concrete.

A variable thickness of Made Ground was noted in the boreholes. It is therefore considered that initial designs consider the use of suspended (block and beam) floor slabs.

Heave precautions should be incorporated into the foundation solution in accordance with NHBC Chapter 4.2.10.

4.2 Excavations and Groundwater

Groundwater inflows were recorded during the investigation in TP3 at 2.0m, TP7 at 1.70m, TP8 at 1.20m, TP16 at 1.50m, TP17 at 1.40m. In all cases, seepage into the trial pits was slow.

Groundwater was recorded in the monitoring wells (WS2, WS3, WS6 and WS7) at depths of between 0.85 and 4.95m bgl.

It is considered that these strikes represent a perched water table.

Sump pumps should be adequate for dewatering shallow service excavations if required. Advice on groundwater control in construction is given in CIRIA Report C515: Groundwater Control Design and Practice.

Shallow excavations within the Made Ground could be relied upon to stand unsupported in the short term only. Larger excavations should be supported or battered back to a safe angle of repose. Further advice on excavation support is given in CIRIA Document 97: Trenching Practice. It is recommended that an adequate drainage system for surface water be installed by a competent contractor in order to prevent surface water ponding or collecting during and post construction which may lead to a deterioration of the founding strata. Where trench bottoms become excessively dried or softened due to rain or ground water, the excavation should be re-bottomed prior to concreting.

Provision should be made for the breaking out of relic structures encountered in the location of TP19.

4.3 Concrete Design

The results from the chemical laboratory sulphate and pH analysis for the site indicate a Design Sulphate Class of DS-1 and an Aggressive Chemical Environment for Concrete (ACEC) class of AC-1.

4.4 Mine Workings

The two deep rotary boreholes encountered intact Coal Measures at depths of between 23.5m and 26.5m bgl. No voids or loss of flush was recorded. There was no evidence of shallow unrecorded mine workings. Further investigation should be carried out across the site.

5 Generic Quantitative Risk Assessment

5.1 Introduction

The quantitative risk assessment has been undertaken in general accordance with guidance issued by the Environment Agency and comprises a Generic Quantitative Risk Assessment (GQRA) which screens site concentrations against Generic Assessment Criteria (GAC) based on the Preliminary Risk Assessment (PRA) and associated Preliminary Conceptual Site Model. Where a concentration exceeds the GAC, the substance is confirmed as a Contaminant of Concern (CoC).

5.2 Human Health

5.2.1 Long Term Risks to Human Health

Taking into account the proposed land use at the site (i.e. academic school) GAC for residential land use without plant uptake has been adopted as the GAC for this assessment as it is considered feasible that the dermal contact exposure pathway may be feasible in the areas of soft landscaping (i.e. playing fields). This, however, is expected to be an extremely conservative approach as the actual exposure durations will be limited in an academic setting as opposed to residential. To provide a further assessment, GAC for commercial land use has also been adopted for comparative purposes.

The source of the GAC utilised for this assessment comprise the CLEA Soil Guideline Values (SGVs) and LQM ‘Suitable 4 Use Levels’ and Category 4 Screening Levels’.

A number of substances have been detected in the Made Ground beneath the site at concentrations in excess of the residential GAC (see **Appendix F**). Such substances include:

Contaminant of Concern	Samples
Arsenic	• TP1, TP7, TP9, TP10, TP14, TP15. TP16, TP17, TP18 at 0.30m • TP8 at 1.50m • TP13 at 0.80m • TP14 at 1.0m • TP18 at 1.30m • WS6 at 0.60m
Lead	• TP1, TP7, TP9, TP10, TP15, TP16TP17, TP18, TP19 at 0.30m • TP8 at 1.50m • TP14 at 1.0m
Aromatic TPH C10-C12	• TP14 at 1.0m
Aromatic TPH C12-C16	• TP14 at 1.0m
Aromatic TPH C16-C21	• TP4, TP7 at 0.30m • TP14 at 1.0m
Aromatic TPH C21-C35	• TP4, TP7, TP8, TP14 at 0.30m • TP14 at 1.0m
Benzo(a)anthracene	• TP1, TP5, TP13, TP14, TP15, TP16 TP17, TP18 at 0.30m • TP14 at 1.0m
Benzo(b)fluoranthene	• TP1, TP2, TP3, TP4, TP5, TP7, TP8, TP9, TP10, TP13, TP14, TP15, TP16 TP17, TP18 TP19 at 0.30m

Contaminant of Concern	Samples
	• TP12 at 0.50m • TP14 at 1.0m
Benzo(a)pyrene	• TP1, TP2, TP3, TP4, TP5, TP7, TP8, TP9, TP10, TP13, TP14, TP15, TP16 TP17, TP18 TP19 at 0.30m • TP12 at 0.50m • TP14 at 1.0m
Dibenzo(a,h)anthracene	• TP1, TP2, TP3, TP4, TP5, TP7, TP8, TP9, TP10, TP13, TP14, TP15, TP16 TP17, TP18 TP19 at 0.30m • TP12 at 0.50m • TP14 at 1.0m
Chrysene	• TP14, TP17, TP18 at 0.30m
Benzene	• TP14 at 1.0m
m & p-Xylene	• TP14 at 1.0m
1,2,4-Trimethylbenzene	• TP12, TP13, TP17 at 0.30m • TP14 at 1.0m
1,2,3-Trichlorobenzene	• TP11 at 0.30m
Naphthalene	• TP14, TP15, TP16, TP17, TP18 at 0.30m • TP14 at 1.0m

In addition to the above exceedances to the residential GAC, the following substances have also been detected in the Made Ground beneath the site at concentrations in excess of the commercial GAC (see **Appendix F**). Such substances include:

Contaminant of Concern	Samples
Lead	• TP8 at 0.30m
Arsenic	• TP14 at 1.0m
Dibenzo(a,h)anthracene	• TP5, TP7, TP14, TP17 at 0.30m
Benzene	• TP14 at 1.0m
1,2,4-Trimethylbenzene	• TP14 at 1.0m
Naphthalene	• TP14 at 1.0m

The identified contaminants of concern could potentially present a long-term exposure risk to human health of future site users if they remain present in the shallow soils following redevelopment. Therefore, remedial measures will potentially be required, particularly in areas of soft landscaping in order to eliminate exposure risks.

Asbestos was detected in a single sample of the Made Ground soil samples that were analysed. It was detected in TP19 at 0.3m. It was identified to be chrysotile in the form of fibres/clumps. Quantification testing identified that the samples contained 0.015% asbestos. UK guidance (ICRCL 64/85 ver2) notes that 0.001% asbestos in soil can exceed occupational exposure limits (0.1 f/ml air). Therefore, there is the potential for human health impacts to occur if the impacted soil remains present in the shallow soils beneath the site if the soil is exposed at the surface and so remedial measures may be required if the location falls within and area of soft landscaping.

5.2.2 Short Term Risks

During the redevelopment of the site, it will be necessary to implement measures to protect construction workers, and adjacent site users from the soil contaminants identified at the site. In addition, to ensure that they do not come into contact with contaminated soils and / or groundwater, construction workers and site visitors should wear appropriate personal protective equipment (PPE). Health and safety procedures would ensure that ingestion of contaminated soils and / or groundwater is avoided (e.g. by washing hands prior to eating, drinking and smoking).

5.3 Controlled Waters

The Phase 1 preliminary assessment concluded that the risks to controlled water receptors to be low. This is because the site is immediately underlain by superficial diamicton deposits which are designated as a Secondary Undifferentiated Aquifer and are of low permeability. The site does not lie within a Source Protection Zone and there is a single record of a groundwater abstraction license held within a 1km radius of the site. The license is not for potable water. The underlying bedrock is designated a Secondary A Aquifer.

The Rochdale Canal is located 110m from the site boundary. It is considered that this can be discounted as a feasible receptor due to the distance and presence of low permeability clay soils and clay lining of the canal.

Groundwater analysis was completed as part of the recent Phase 2 investigation and a copy of the laboratory test certificates are included in **Appendix E**. In order to provide some significance on the groundwater laboratory test results, the data has been compared with GAC comprising the UK Drinking Water Standards as the groundwater abstractions and Secondary A Aquifer are the only identified receptors.

Only 3 no. of the boreholes (WS2, WS3 and WS7) yielded groundwater during the sampling visit. Arsenic was detected in the groundwater samples at concentrations in excess of the UK Drinking Water Standards in WS2 and WS3. A copy of the assessment table is included in **Appendix G**.

Although exceedances of arsenic have been detected, it is considered that the underlying diamicton will act as an impermeable barrier, preventing the migration of any contaminants of concern to the identified receptors. Therefore, the risk from the contaminants of concern to the identified receptors is considered to be negligible.

5.4 Buildings and Buried Services

It is considered that the foundations for the proposed development could be at risk of attack from any aggressive chemicals contained within the ground. In line with the recommendations with BRE Special Digest 1 (2005) “Concrete in Aggressive Ground”, the Design Sulphate Class for the site is DS-1 and AC-1 as previously detailed in Section 3.8.1.

Plastic pipe materials are potentially vulnerable to attack from elevated levels of hydrocarbons, which can potentially lead to contamination of potable water supplies, At the time of writing this report, we are aware that the client has contacted the water supply company and has confirmed the use of MDPE barrier pipe which should mitigate the risk of low-level soil and groundwater contaminants.

6 Ground Gas Risk Assessment

6.1 Introduction

Any material having an organic or biodegradable content e.g. organic clays, peat, coal mine workings and domestic refuse, will have a potential for the generation of the gases methane, carbon dioxide and hydrogen sulphide (H2S) and for the depletion of oxygen, with associated hazards of explosion or asphyxiation.

The principal hazardous gas associated with the degradation of organic materials is methane. As methane is biochemically reactive it is readily oxidised to carbon dioxide under aerobic conditions, the presence of carbon dioxide is therefore often associated with elevated methane.

The conceptual site model has identified both Made Ground on site, and the potential presence of mine workings at depth beneath the site as the potential for gas generation. The conceptual site model recognises the natural clay deposits will act to mitigate the migration of any ground gases through the site.

6.2 Assessment Guidelines

The gas risk assessment presented below has been undertaken in general accordance with accordance with the British Standard BS8485:2015, "*Code of Practice for the Characterisation and Remediation from Ground Gas in Affected Developments".* The guidance is written specifically for use by designers of gas protection measures relating to the development of a site. Reference has also been made to the CIRIA document C665:2007: "*Assessing Risks Posed by Hazardous Ground Gases to Buildings*".

A semi-quantitative assessment method is proposed to include general classifications of risk obtained from a qualitative assessment undertaken for the site in question.

Gas concentrations and borehole flow rates are used to define a characteristic situation for a site based on the Gas Screening Value. The Gas Screening Value (in litres of gas per hour) for both methane and carbon dioxide is calculated as:

$$\text{Gas Screening Value (l/hr)} = \frac{\text{Gas Concentration (\%) x Borehole Flow Rate (l/hr)}}{100}$$

These calculations are carried out on the worst-case gas concentrations and flow rates encountered on the site.

The characteristic situation is then determined from Table 8.5 of the CIRIA C665 report. This Characteristic Situation is then used to define the general scope of gas protection measures required. Guidance is given on the number of protective measures required and the scope of the measures for each situation.

6.3 Semi-Quantitative Risk Assessment

The gas screening value has been calculated for the site using the highest detected carbon dioxide concentration for the site of 8.3% in WS6 and highest gas flow reading of 0.3 l/hr in WS1. The gas screening value for the site has been calculated as 0.06 l/hr. This classifies the site as Characteristic Situation 1 (very low risk). However, as stated in CIRIA C665, it would be prudent to increase to Situation 2 (low risk) where carbon dioxide concentrations exceed 5%.

Therefore, CS2 gas protection measures are required for the new development. A typical scope of gas protective measures is listed in Table 8.6 in CIRIA C665.

7 Conclusions and Recommendations

7.1 Contaminated Land

The recent intrusive ground investigation has proven that Made Ground is present beneath the site with a variable thickness of between 0.50m and 3.30m.

A total of 29 no. soil samples were taken and tested for a range of chemical parameters. Several substances have been detected in the Made Ground beneath the site at concentrations in excess of the residential GAC and commercial GAC. These include heavy metals, total petroleum hydrocarbons and semi volatile organic compounds. Risk assessment has shown that these substances could present a long-term exposure risk to human health of future site users if they remain present in the shallow soils within the areas of soft landscaping following redevelopment. Therefore, remedial measures will be required in areas of proposed soft landscaping in order to eliminate exposure risks (e.g. clean topsoil cover system).

In addition, Chrysotile asbestos was identified in a single sample (TP19 at 0.30m) at the site. If the location of the positive asbestos identification is located beneath the proposed areas of soft landscaping, it could present a long-term risk of exposure to future site users.

Risks to controlled waters (i.e. groundwater aquifer) have been assessed to be low. However, the risk from the contaminants of concern to the identified receptors is considered to be negligible due to the presence of impermeable diamicton deposits which underlie the site.

The site can be classified as Characteristic Situation 2 (CS2; low risk) in terms of ground gases and therefore, ground gas protection measures need to be installed.

A remediation strategy should be prepared prior to redevelopment to detail the remediation and validation requirements. This document should be submitted to planning for approval prior to commencing any groundworks on the site.

If new water supply pipes are to be installed for the proposed development, then it is recommended that discussions are undertaken with the local water supply company to confirm their requirements.

7.2 Geotechnical

The Made Ground material would not be suitable for the construction of traditional shallow spread foundations due to the risk of unacceptable total and differential settlement occurring. Given the variable thickness of Made Ground at the site, it is deemed appropriate to zone the site with foundation solution options. These include piles in the south-western portion of the site, and trench fill foundations in the north-eastern portion.

Area 1 (southwest) – Piles

Given the variable thickness of Made Ground encountered beneath this area (up to 3.30m), it is recommended that a piled foundation solution is used. The ground would be suitable for driven or bored cast in-situ piled foundations. It is recommended that initial designs should incorporate the use of a suspended floor slab with a ring beam spanning the pile layout. Appropriate test pile and works pile testing procedures will need to be established.

Area 2 – (northeast) Trench Fill

The underlying diamicton deposits would be suitable for the construction of trench fill foundations with an allowable bearing pressure of 150kN/m^2. This is based on a characteristic undrained shear strength of 100kN/m^2 and a maximum foundation width of 1m for strip footings. Foundations should be set at a minimum of 1.50m bgl, allowing for limited tree planting.

Foundation excavations should be checked by an experienced ground worker prior to placing concrete. Any soft spots or unsuitable founding materials should be removed if encountered and replaced with compacted granular fill or lean mix concrete.

A variable thickness of Made Ground was noted in the boreholes. It is therefore considered that initial designs consider the use of suspended (block and beam) floor slabs.

Heave precautions should be incorporated into the foundation solution in accordance with NHBC Chapter 4.2.10.

The results from the chemical laboratory sulphate and pH analysis for the site indicate a Design Sulphate Class of DS-1 and an Aggressive Chemical Environment for Concrete (ACEC) class of AC-1.

It is recommended that further study is undertaken into the risk that historic coal mining poses to the development, relating to the recorded mine shaft and unrecorded and recorded workings.

REFERENCES

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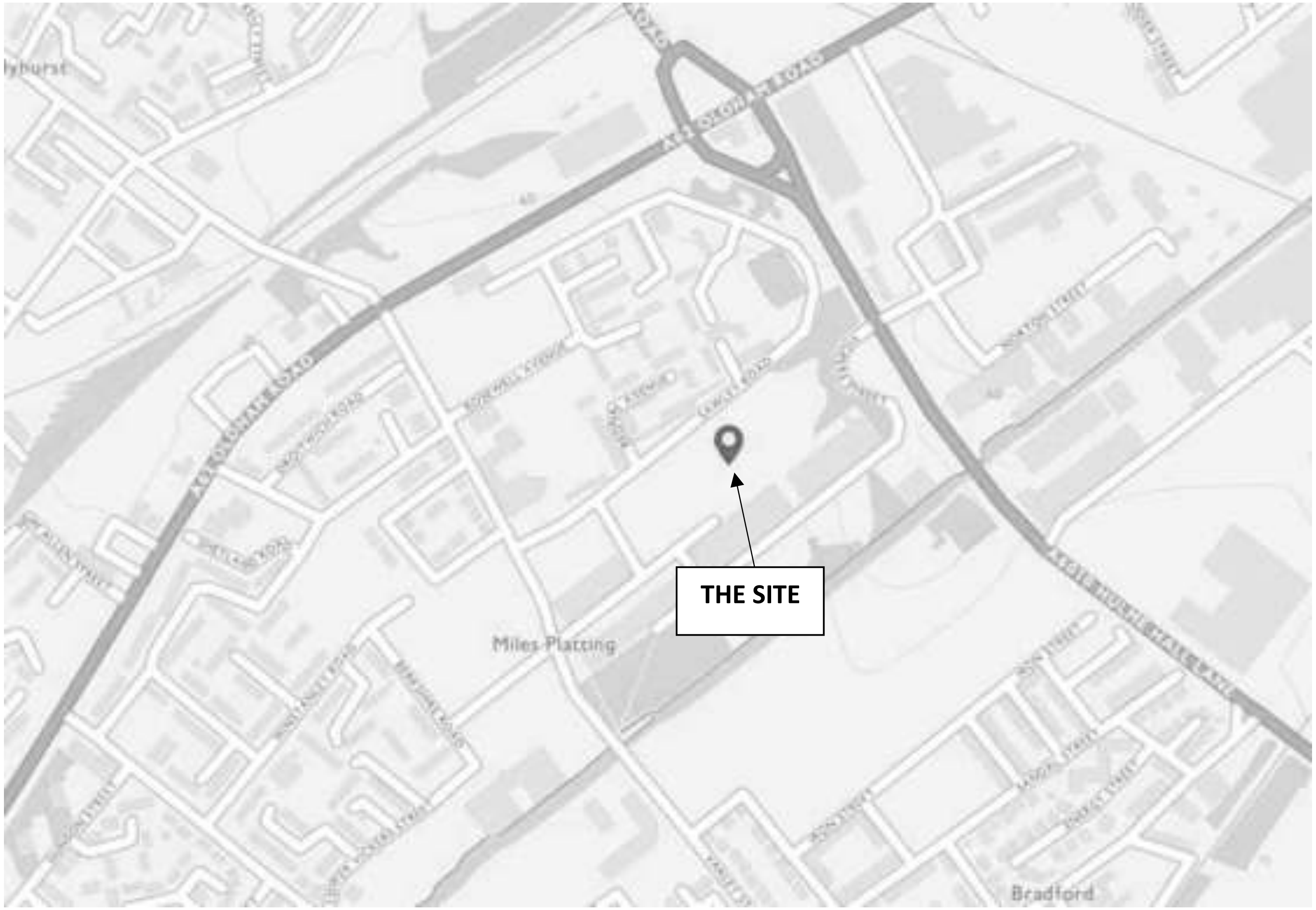
11. Environment Agency: Contaminated Land Exposure Assessment - Soil Guideline Values for Human Health Risk Assessment.
12. LQM/CIEH: S4ULS for Human Health Risk Assessment. Land Quality Press (2015). (Copyright Land Quality Management Limited reproduced with permission, publication number S4UL3505. All rights reserved).
13. SP1010: Category 4 Screening Levels for Assessment of Land Affected by Contamination. DEFRA (2014).
14. CIRIA Report C665:2007: Assessing Risks Posed by Hazardous Ground Gases to Buildings.

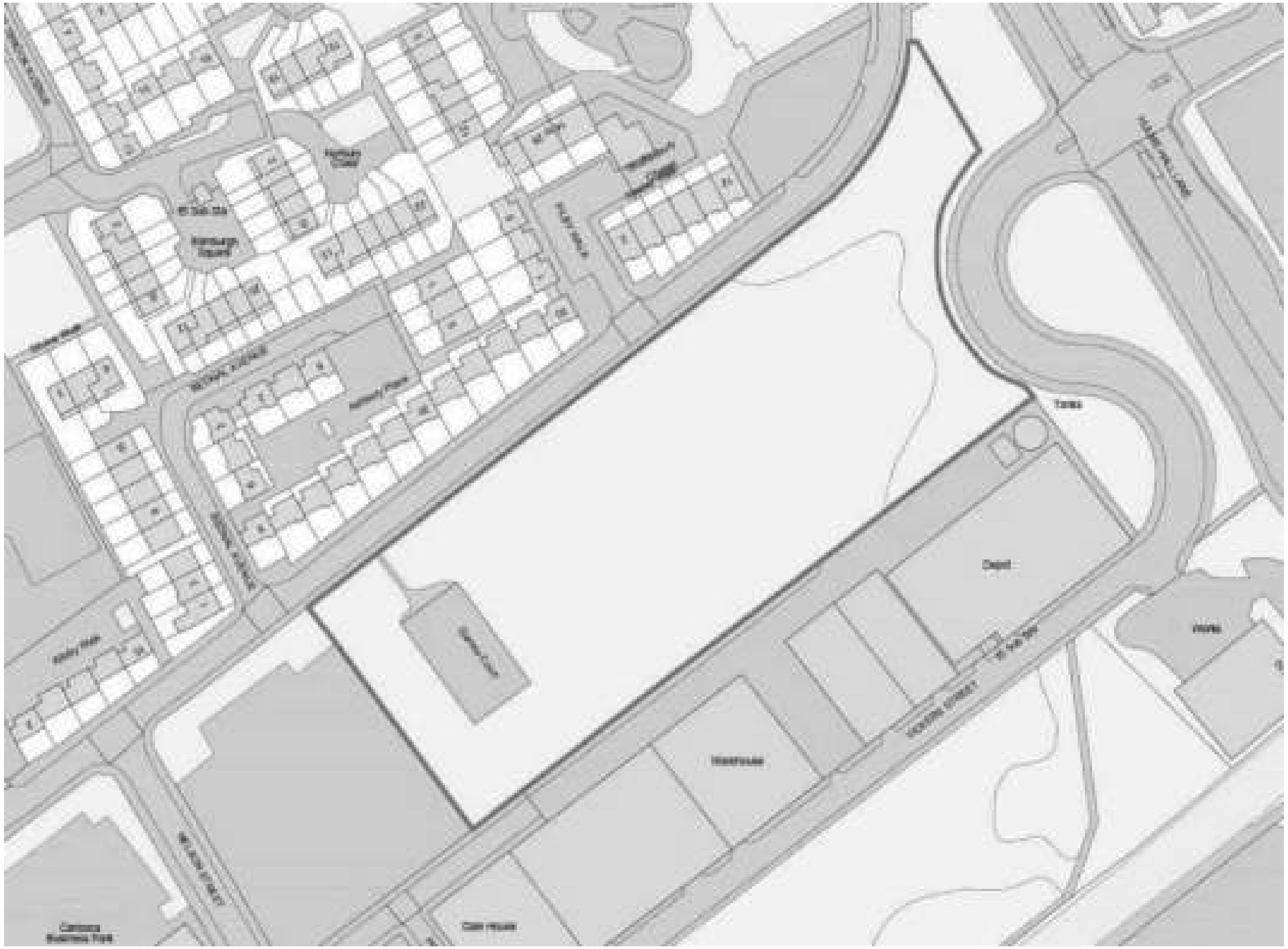
APPENDICES

Appendix A – Site Location and Site Plan


lyhurst
Miles Platting
Bradford
THE SITE

Site Location Map

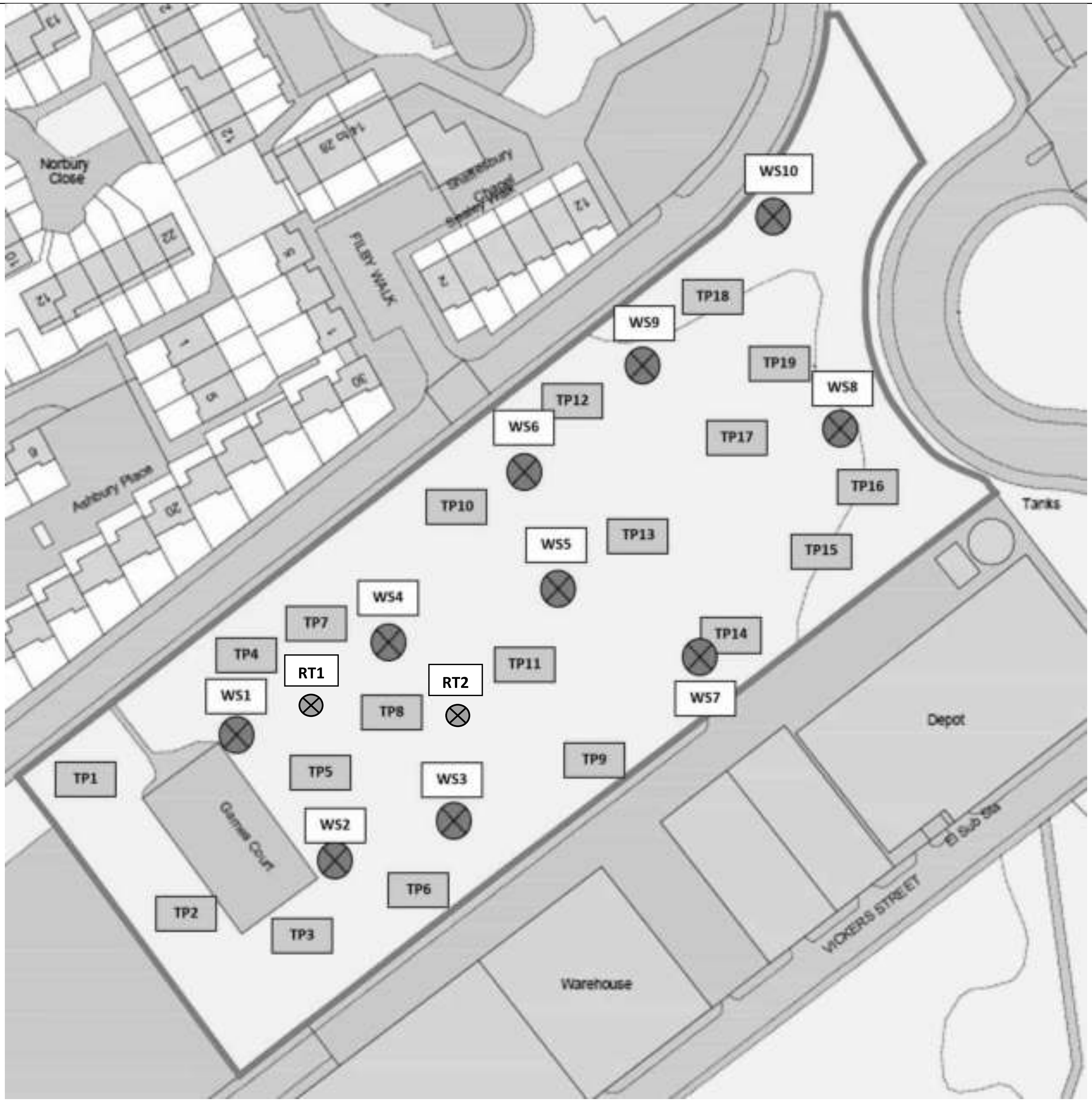
Figure 1


Tanks
Depot
Works
Warehouse

enviro solution

Existing Site Plan

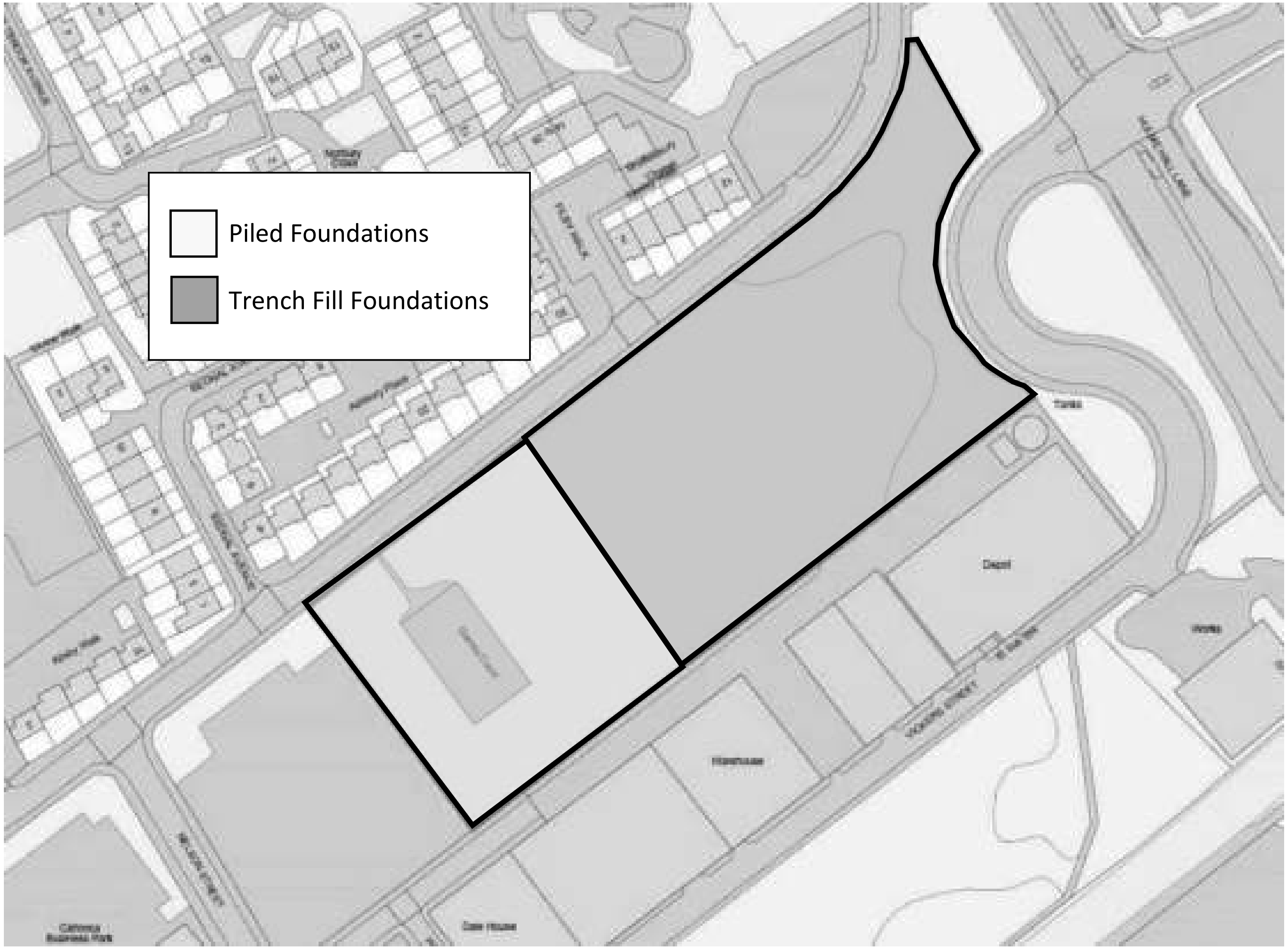
Figure 2


WS10
TP18
WS9
TP19
WS8
TP12
WS6
TP17
TP16
TP10
WS5
TP13
TP15
WS4
TP7
TP14
TP4
RT1
RT2
TP11
WS1
TP8
WS7
TP9
TP1
TP5
WS3
WS2
TP6
TP2
TP3
Norbury Close
Shrewsbury Chapel
Sentry Walk
FILBY WALK
14 to 28
Ashbury Place
Games Court
Tanks
Depot
El Sub Sta
VICKERS STREET
Warehouse
12
22
20
30

enviro | solution

Exploratory Hole Location Plan

Figure 3


Piled Foundations
Trench Fill Foundations
Tanks
Depot

enviro | solution

Foundation Zone Plan

Figure 4

Appendix B – Site Photographs

enviro solution	**View of site looking north**

enviro solution	**View of northern site boundary and entrance**

Appendix C – Borehole Logs

Job Title: Varley Street	Client: Mace Group	**Borehole No: WS1**
Location: Varley Street, Manchester		**Page 1 of 10**

Drilling Dates: 17.01.22	Drilling Method: Window Sampler
Drilling Contractor: EnviroSolution Ltd	Borehole Diameter: 87mm
Logged by: Tom Craig	Screen Type & Diameter: n/a
Checked by: Gemma Lucas	Screen Slot Size: n/a

Borehole Construction	Sample Number	Sample Type	Soil Vapour (ppm)	Groundwater	Depth (m)	SPT	Description	Comments	
					0		Description	Comments	0
■							Made Ground: Grass on black sandy CLAY with brick fragments and slate FILL		
▨							Made Ground: Firm brown reworked gravelly CLAY		
▨					1	9			1
▨							Made Ground: Black sandy medium GRAVEL FILL		
▨	2.0m	♦			2	5			2
▨					3	11			3
▨							Stiff brown/ grey CLAY		
▨	3.5m	♦							
■									
					4	32			4
					5				5

Non-slotted Install	■	Surrounded by bentonite seal, capped with flush cover and gas valve
Slotted Install	▨	Surrounded by 10mm gravel and installed with end cap

Legend:

♦ Disturbed Sample	† Down Borehole Analysis
◡ Undisturbed Sample	∇ Groundwater Table
∅ Headspace Analysis	∆ Perched Water Table

Job Title: Varley Street	Client: Mace Group	**Borehole No: WS2**
Location: Varley Street, Manchester		**Page 2 of 10**

Drilling Dates: 17.01.22	Drilling Method: Window Sampler
Drilling Contractor: EnviroSolution Ltd	Borehole Diameter: 87mm
Logged by: Tom Craig	Screen Type & Diameter: n/a
Checked by: Gemma Lucas	Screen Slot Size: n/a

Borehole Construction	Sample Number	Sample Type	Soil Vapour (ppm)	Groundwater	Depth (m)	SPT	Description	Comments	
					0		Description	Comments	0
■							Grass on brown clayey TOPSOIL with brick fragments		
■							Made Ground: Brown/ grey reworked gravelly CLAY with coal and brick fragments		
▦					1	6			1
▦	2.0m	♦			2	7			2
▦					3	13	Firm brown CLAY		3
■					4	30			4
					5				5

Non-slotted Install	■	Surrounded by bentonite seal, capped with flush cover and gas valve
Slotted Install	▦	Surrounded by 10mm gravel and installed with end cap

Legend:

♦ Disturbed Sample † Down Borehole Analysis

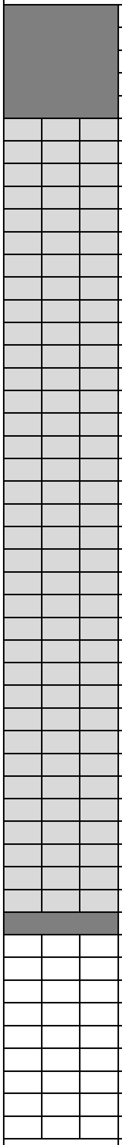
◡ Undisturbed Sample ∇ Groundwater Table

∅ Headspace Analysis ∆ Perched Water Table

Job Title: Varley Street	Client: Mace Group	**Borehole No: WS3**
Location: Varley Street, Manchester		**Page 3 of 10**

Drilling Dates: 17.01.22	Drilling Method: Window Sampler
Drilling Contractor: EnviroSolution Ltd	Borehole Diameter: 87mm
Logged by: Tom Craig	Screen Type & Diameter: n/a
Checked by: Gemma Lucas	Screen Slot Size: n/a

Borehole Construction



Sample Number	Sample Type	Soil Vapour (ppm)	Groundwater	Depth (m)	SPT	Description	Comments	
				0				0
						Grass on brown TOPSOIL		
						Made Ground: Firm brown/ grey reworked gravelly CLAY with brick fragments		
				1	6			1
						Soft grey CLAY		
				2	5			2
						No recovery		
						Stiff brown/ grey CLAY		
2.8m	♦							
				3	12			3
				4	30			4
				5				5

Non-slotted Install	■	Surrounded by bentonite seal, capped with flush cover and gas valve
Slotted Install	▨	Surrounded by 10mm gravel and installed with end cap

Legend:

♦ Disturbed Sample † Down Borehole Analysis

∪ Undisturbed Sample ∇ Groundwater Table

∅ Headspace Analysis ∆ Perched Water Table

Job Title: Varley Street	Client: Mace Group	**Borehole No: WS4**
Location: Varley Street, Manchester		**Page 4 of 10**

Drilling Dates: 17.01.22	Drilling Method: Window Sampler
Drilling Contractor: EnviroSolution Ltd	Borehole Diameter: 87mm
Logged by: Tom Craig	Screen Type & Diameter: n/a
Checked by: Gemma Lucas	Screen Slot Size: n/a

Borehole Construction	Sample Number	Sample Type	Soil Vapour (ppm)	Groundwater	Depth (m)	SPT	Description	Comments	
					0				0
							Grass on brown clayey TOPSOIL		
							Made Ground: Brown/ grey reworked sandy gravelly CLAY		
					1	5			1
							Soft grey/ brown slightly gravelly CLAY		
					2	11			2
							Black sandy GRAVEL		
							Dark grey gravelly CLAY		
							Stiff brown CLAY		
					3	18			3
	3.8m	♦							
					4	29			4
					5				5

Non-slotted Install	■	Surrounded by bentonite seal, capped with flush cover and gas valve
Slotted Install	▦	Surrounded by 10mm gravel and installed with end cap

Legend:

♦ Disturbed Sample † Down Borehole Analysis

◡ Undisturbed Sample ∇ Groundwater Table

∅ Headspace Analysis ∆ Perched Water Table

Job Title: Varley Street	Client: Mace Group	**Borehole No: WS5**
Location: Varley Street, Manchester		**Page 5 of 10**

Drilling Dates: 17.01.22	Drilling Method: Window Sampler
Drilling Contractor: EnviroSolution Ltd	Borehole Diameter: 87mm
Logged by: Tom Craig	Screen Type & Diameter: n/a
Checked by: Gemma Lucas	Screen Slot Size: n/a

Borehole Construction	Sample Number	Sample Type	Soil Vapour (ppm)	Groundwater	Depth (m)	SPT	Description	Comments	
					0				0
							Grass on clayey TOPSOIL		
							Made Ground: Brown reworked gravelly CLAY with concrete fragments		
					1	7			1
							Firm grey/ brown mottled slightly gravelly CLAY		
							Stiff brown/ grey mottled CLAY with occasional coal fragments		
					2	11			2
					3	16			3
					4	25			4
					5				5

Non-slotted Install	■	Surrounded by bentonite seal, capped with flush cover and gas valve
Slotted Install	▦	Surrounded by 10mm gravel and installed with end cap

Legend:

♦ Disturbed Sample	† Down Borehole Analysis
◡ Undisturbed Sample	∇ Groundwater Table
∅ Headspace Analysis	∆ Perched Water Table

Job Title: Varley Street	Client: Mace Group	**Borehole No: WS6**
Location: Varley Street, Manchester		**Page 6 of 10**

Drilling Dates: 17.01.22	Drilling Method: Window Sampler
Drilling Contractor: EnviroSolution Ltd	Borehole Diameter: 87mm
Logged by: Tom Craig	Screen Type & Diameter: n/a
Checked by: Gemma Lucas	Screen Slot Size: n/a

Borehole Construction	Sample Number	Sample Type	Soil Vapour (ppm)	Groundwater	Depth (m)	SPT	Description	Comments	
					0		Description	Comments	0
■							Made Ground: Grass on brown sandy TOPSOIL with brick fragments and glass		
■	0.3m	♦							
■							Made Ground: Firm grey/ brown mottled reworked slightly gravelly CLAY with occasional coal fragments and glass		
■					1	9			1
■							Stiff grey/ brown mottled slightly gravelly CLAY		
■	2.0m	♦			2	19			2
▦					3	22			3
▦							Stiff brown sandy CLAY		
▦					4	21			4
▦						30			
■					5				5

Non-slotted Install	■	Surrounded by bentonite seal, capped with flush cover and gas valve
Slotted Install	▦	Surrounded by 10mm gravel and installed with end cap

Legend:

♦ Disturbed Sample	† Down Borehole Analysis
◡ Undisturbed Sample	∇ Groundwater Table
∅ Headspace Analysis	∆ Perched Water Table

Job Title: Varley Street	Client: Mace Group	**Borehole No: WS7**
Location: Varley Street, Manchester		**Page 7 of 10**

Drilling Dates: 17.01.22	Drilling Method: Window Sampler
Drilling Contractor: EnviroSolution Ltd	Borehole Diameter: 87mm
Logged by: Tom Craig	Screen Type & Diameter: n/a
Checked by: Gemma Lucas	Screen Slot Size: n/a

Borehole Construction	Sample: Number	Sample: Type	Soil Vapour (ppm)	Groundwater	Depth (m)	SPT	Description	Comments	Depth
					0				0
■							Grass on brown clayey TOPSOIL		
■ / ▦							Made Ground: Black clayey GRAVEL heavily stained black with oily sheen	Strong hydrocarbon odour	
▦	1.0m	♦			1	6			1
▦							Soft to firm dark grey reworked sandy gravelly CLAY		
▦							Firm to stiff brown/ grey mottled CLAY		
▦					2	19	Soft grey CLAY		2
▦							Stiff brown CLAY		
▦	2.5m	♦							
▦					3	16			3
▦						19			
■									
					4				4
					5				5

Non-slotted Install	■	Surrounded by bentonite seal, capped with flush cover and gas valve
Slotted Install	▦	Surrounded by 10mm gravel and installed with end cap

Legend:

♦ Disturbed Sample † Down Borehole Analysis

◡ Undisturbed Sample ∇ Groundwater Table

∅ Headspace Analysis ∆ Perched Water Table

Job Title: Varley Street	Client: Mace Group	**Borehole No: WS8**
Location: Varley Street, Manchester		**Page 8 of 10**

Drilling Dates: 17.01.22	Drilling Method: Window Sampler
Drilling Contractor: EnviroSolution Ltd	Borehole Diameter: 87mm
Logged by: Tom Craig	Screen Type & Diameter: n/a
Checked by: Gemma Lucas	Screen Slot Size: n/a

Borehole Construction	Sample Number	Sample Type	Soil Vapour (ppm)	Groundwater	Depth (m)	SPT	Description	Comments	
					0				0
							Made Ground: Black/ brown sandy GRAVEL FILL with brick fragments		
	0.6m	♦							
							Concrete cobbles at 1.0m		
					1	5	Made Ground: Black GRAVEL		1
							Firm brown/ grey mottled CLAY		
					2	13			2
					3	19	Stiff brown CLAY		3
					4	30			4
					5				5

Non-slotted Install	■	Surrounded by bentonite seal, capped with flush cover and gas valve
Slotted Install	▨	Surrounded by 10mm gravel and installed with end cap

Legend:

♦ Disturbed Sample	† Down Borehole Analysis
◡ Undisturbed Sample	∇ Groundwater Table
∅ Headspace Analysis	∆ Perched Water Table

Job Title: Varley Street	Client: Mace Group	**Borehole No: WS9**
Location: Varley Street, Manchester		**Page 9 of 10**

Drilling Dates: 17.01.22	Drilling Method: Window Sampler
Drilling Contractor: EnviroSolution Ltd	Borehole Diameter: 87mm
Logged by: Tom Craig	Screen Type & Diameter: n/a
Checked by: Gemma Lucas	Screen Slot Size: n/a

Borehole Construction	Sample Number	Sample Type	Soil Vapour (ppm)	Groundwater	Depth (m)	SPT	Description	Comments	
					0				0
							Made Ground: Brown gravelly clayey FILL with bricks		
						8	Firm grey/ brown mottled CLAY		
					1				1
							Stiff grey/ brown mottled CLAY		
					2	8			2
					3	23			3
					4				4
					5				5

Non-slotted Install	■	Surrounded by bentonite seal, capped with flush cover and gas valve
Slotted Install	▨	Surrounded by 10mm gravel and installed with end cap

Legend:

♦ Disturbed Sample	† Down Borehole Analysis
◡ Undisturbed Sample	∇ Groundwater Table
∅ Headspace Analysis	∆ Perched Water Table

Job Title: Varley Street	Client: Mace Group	**Borehole No: WS10**
Location: Varley Street, Manchester		**Page 10 of 10**

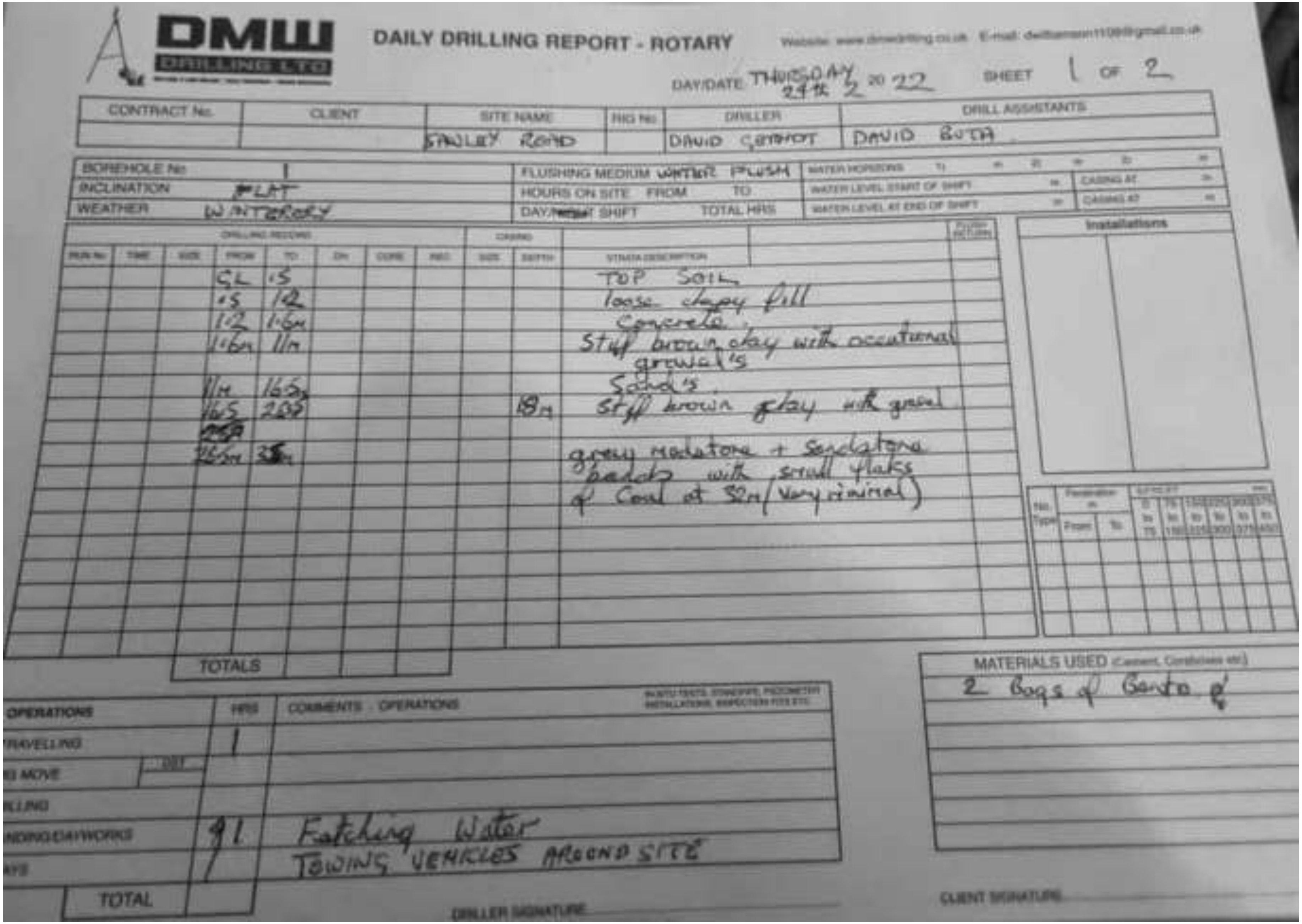
Drilling Dates: 17.01.22	Drilling Method: Window Sampler
Drilling Contractor: EnviroSolution Ltd	Borehole Diameter: 87mm
Logged by: Tom Craig	Screen Type & Diameter: n/a
Checked by: Gemma Lucas	Screen Slot Size: n/a

Borehole Construction	Sample Number	Sample Type	Soil Vapour (ppm)	Groundwater	Depth (m)	SPT	Description	Comments	
					0				0
▓							Made Ground: Brown/ grey clayey gravelly FILL with brick fragments		
▒							Firm brown/ grey mottled CLAY		
▒					1	11	Very stiff brown CLAY		1
▒	2.0m	♦			2	20			2
▒	2.5m	♦							
▒					3	18			3
▓					4	25			4
					5				5

Non-slotted Install	▓	Surrounded by bentonite seal, capped with flush cover and gas valve
Slotted Install	▒	Surrounded by 10mm gravel and installed with end cap

Legend:

♦ Disturbed Sample	† Down Borehole Analysis
◡ Undisturbed Sample	∇ Groundwater Table
∅ Headspace Analysis	∆ Perched Water Table



DMW
DRILLING LTD

DAILY DRILLING REPORT - ROTARY

Website: www.dmwdrilling.co.uk E-mail: [illegible]

DAY/DATE THURSDAY 24th 2 20 22 SHEET 1 OF 2

CONTRACT No.	CLIENT	SITE NAME	RIG No.	DRILLER	DRILL ASSISTANTS
		SANLEY ROAD		DAVID [illegible]	DAVID BUTA

BOREHOLE No 1

INCLINATION FLAT

WEATHER WINTERY

FLUSHING MEDIUM WATER FLUSH

HOURS ON SITE FROM TO

DAY/~~NIGHT~~ SHIFT TOTAL HRS

WATER HORIZONS

WATER LEVEL START OF SHIFT m CASING AT m

WATER LEVEL AT END OF SHIFT m CASING AT m

DRILLING RECORD								CASING			
RUN No	TIME	SIZE	FROM	TO	DH	CORE	REC	SIZE	DEPTH	STRATA DESCRIPTION	FLUSH RETURN
			GL	.5						TOP SOIL	
			.5	1.2						loose clayey fill	
			1.2	1.6m						Concrete.	
			1.6m	11m						Stiff brown clay with occational grawel's	
			11m	16.5m						Sand's.	
			16.5	23.5					18m	Stiff brown clay with gravel	
			[illegible]								
			23.5m	35m						grey mudstone + sandstone bands with small flakes of Coal at 32m (very minimal)	
		TOTALS									

Installations

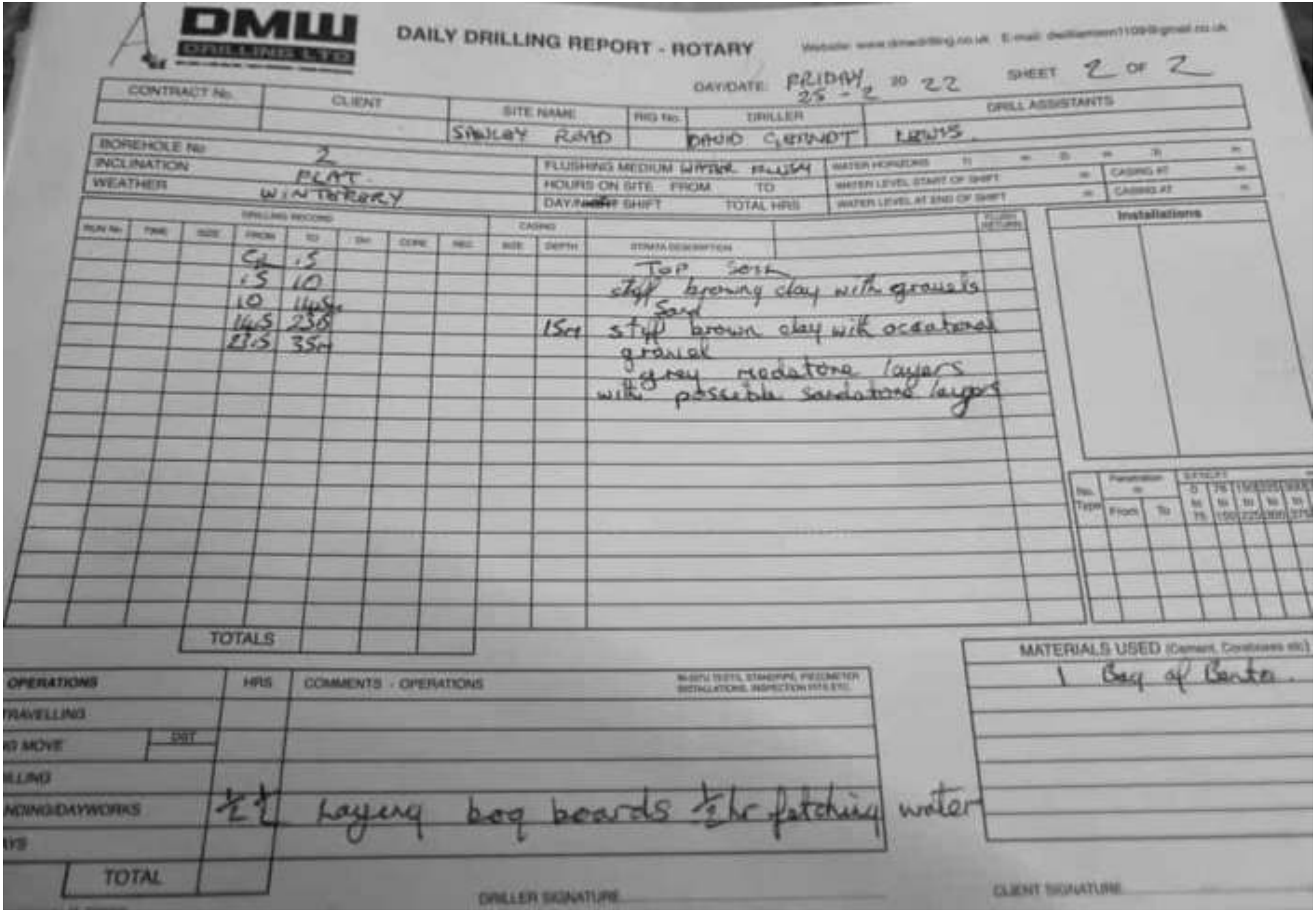
MATERIALS USED (Cement, Containers etc)

2 Bags of Bento [illegible]

OPERATIONS	HRS	COMMENTS - OPERATIONS
RAVELLING	1	
G MOVE		
LLING		
NDING/DAYWORKS	91	Fetching Water TOWING VEHICLES AROUND SITE
AYS		
TOTAL		

DRILLER SIGNATURE

CLIENT SIGNATURE



DMW DRILLING LTD

DAILY DRILLING REPORT - ROTARY

Website: www.dmwdrilling.co.uk E-mail: [illegible]

DAY/DATE: FRIDAY 25 - 2 20 22

SHEET 2 OF 2

CONTRACT No.	CLIENT	SITE NAME	RIG No.	DRILLER	DRILL ASSISTANTS
		SPAWLEY ROAD		DAVID GERNOT	LEWIS.

BOREHOLE No: 2

INCLINATION: FLAT.

WEATHER: WINTERRY

FLUSHING MEDIUM: WATER FLUSH

HOURS ON SITE FROM TO

DAY/~~NIGHT~~ SHIFT TOTAL HRS

WATER HORIZONS

WATER LEVEL START OF SHIFT m CASING AT m

WATER LEVEL AT END OF SHIFT m CASING AT m

RUN No.	TIME	SIZE	FROM	TO	DH	CORE	REC	CASING SIZE	CASING DEPTH	STRATA DESCRIPTION	FLUSH RETURN
			GL	.5						Top Soil	
			.5	10						stiff browning clay with gravels Sand	
			10	14.5m					15m	stiff brown clay with occasional gravel	
			14.5	23.5						grey mudstone layers with possible sandstone layers	
			23.5	35m							
		TOTALS									

Installations

No. Type	Penetration m From	To	SPT/CPT 0 to 75	75 to 150	150 to 225	225 to 300	300 to 375

OPERATIONS	HRS	COMMENTS - OPERATIONS
TRAVELLING		
SET MOVE DIST		
DRILLING		
STANDING/DAYWORKS	½ hr	laying bog boards ½ hr fetching water
DAYS		
TOTAL		

IN-SITU TESTS, STANDPIPE, PIEZOMETER INSTALLATIONS, INSPECTION PITS ETC.

MATERIALS USED (Cement, Bentonite etc)

1 Bag of Bento.

DRILLER SIGNATURE

CLIENT SIGNATURE

Appendix D – Trial Pit Logs

Job Title: Varley Street	Client: Mace Group	**Borehole No: TP1**
Location: Varley Street, Manchester		**Page 1 of 20**

Drilling Dates: 17.01.22	Drilling Method: Machine Excavator
Drilling Contractor: EnviroSolution Ltd	Borehole Diameter: n/a
Logged by: Tom Craig	Screen Type & Diameter: n/a
Checked by: Gemma Lucas	Screen Slot Size: n/a

Borehole Construction	Sample: Number	Sample: Type	Soil Vapour (ppm)	Groundwater	Depth (m)	SPT	Description	Comments	
					0		Description	Comments	0
							Made Ground: Grass on black loamy gravelly SAND with fragments of brick, glass and tile		
	0.3m	♦							
					0.5		Made Ground: Light brown ashy SAND with fragments of slate		1
					1		Made Ground: Orange gravelly SAND with fragments of slag		2
							Soft brown/ orange slightly gravelly CLAY with occasional fragments of coal	Slight hydrocarbon odour noted in the clay	
	1.3m	♦							
					1.5				3
					2				4
					2.5				5

Non-slotted Install	■	Surrounded by bentonite seal, capped with flush cover and gas valve
Slotted Install	▨	Surrounded by 10mm gravel and installed with end cap

Legend:

♦ Disturbed Sample	† Down Borehole Analysis
◡ Undisturbed Sample	∇ Groundwater Table
∅ Headspace Analysis	∆ Perched Water Table

Job Title: Varley Street	Client: Mace Group	**Borehole No: TP2**
Location: Varley Street, Manchester		**Page 2 of 20**

Drilling Dates: 17.01.22	Drilling Method: Machine Excavator
Drilling Contractor: EnviroSolution Ltd	Borehole Diameter: n/a
Logged by: Tom Craig	Screen Type & Diameter: n/a
Checked by: Gemma Lucas	Screen Slot Size: n/a

Borehole Construction	Sample Number	Sample Type	Soil Vapour (ppm)	Groundwater	Depth (m)	SPT	Description	Comments	
					0				0
							Made Ground: Grass on brown clayey gravelly TOPSOIL with occasional fragments of brick		
	0.3m	♦					Made Ground: Large cobbles of concrete		
							Made Ground: Firm brown slightly gravelly CLAY		
					0.5		Made Ground: Black sandy ashy GRAVEL with fragments of slate and tile		1
					1		Made Ground: Black sandy GRAVEL with fragments of brick	Drain encountered at 1.50m	2
					1.5				3
					2				4
					2.5				5

Non-slotted Install	■	Surrounded by bentonite seal, capped with flush cover and gas valve
Slotted Install	▦	Surrounded by 10mm gravel and installed with end cap

Legend:

♦ Disturbed Sample	† Down Borehole Analysis
∪ Undisturbed Sample	∇ Groundwater Table
∅ Headspace Analysis	∆ Perched Water Table

Job Title: Varley Street	Client: Mace Group	**Borehole No: TP3**
Location: Varley Street, Manchester		**Page 3 of 20**

Drilling Dates: 17.01.22	Drilling Method: Machine Excavator
Drilling Contractor: EnviroSolution Ltd	Borehole Diameter: n/a
Logged by: Tom Craig	Screen Type & Diameter: n/a
Checked by: Gemma Lucas	Screen Slot Size: n/a

Borehole Construction	Sample Number	Sample Type	Soil Vapour (ppm)	Groundwater	Depth (m)	SPT	Description	Comments	
					0		Description	Comments	0
							Made Ground: Grass on black/ brown gravelly SAND with cobbles, brick, coal, tile, pottery, slate and clay inclusions		
	0.3m	♦							
					0.5				1
	1.0m	♦							
					1		Made Ground: Firm grey/ brown mottled reworked CLAY		2
	1.2m	♦							
							Made Ground: Black sandy GRAVEL FILL with clay inclusions		
					1.5				3
							Firm light grey slightly clayey gravelly SAND	Slight seepage at 2.0m	
					2				4
							Dark grey slightly organic CLAY		
					2.5				5

Non-slotted Install	■	Surrounded by bentonite seal, capped with flush cover and gas valve
Slotted Install	▨	Surrounded by 10mm gravel and installed with end cap

Legend:

♦ Disturbed Sample † Down Borehole Analysis

◡ Undisturbed Sample ∇ Groundwater Table

∅ Headspace Analysis ∆ Perched Water Table

Job Title: Varley Street	Client: Mace Group	**Borehole No: TP4**
Location: Varley Street, Manchester		**Page 4 of 20**

Drilling Dates: 17.01.22	Drilling Method: Machine Excavator
Drilling Contractor: EnviroSolution Ltd	Borehole Diameter: n/a
Logged by: Tom Craig	Screen Type & Diameter: n/a
Checked by: Gemma Lucas	Screen Slot Size: n/a

Borehole Construction	Sample Number	Sample Type	Soil Vapour (ppm)	Groundwater	Depth (m)	SPT	Description	Comments	
					0		Description	Comments	0
							Grass on brown clayey TOPSOIL		
	0.3m	♦					Made Ground: Black sandy GRAVEL FILL with bricks, slag, glass and slate		
					0.5				1
					1		Firm brown/ orange/ grey mottled CLAY		2
					1.5				3
					2				4
					2.5				5

Non-slotted Install	▨	Surrounded by bentonite seal, capped with flush cover and gas valve
Slotted Install	▨	Surrounded by 10mm gravel and installed with end cap

Legend:

♦ Disturbed Sample † Down Borehole Analysis

◡ Undisturbed Sample ∇ Groundwater Table

∅ Headspace Analysis ∆ Perched Water Table

Job Title: Varley Street	Client: Mace Group	**Borehole No: TP5**
Location: Varley Street, Manchester		**Page 5 of 20**

Drilling Dates: 17.01.22	Drilling Method: Machine Excavator
Drilling Contractor: EnviroSolution Ltd	Borehole Diameter: n/a
Logged by: Tom Craig	Screen Type & Diameter: n/a
Checked by: Gemma Lucas	Screen Slot Size: n/a

Borehole Construction	Sample Number	Sample Type	Soil Vapour (ppm)	Groundwater	Depth (m)	SPT	Description	Comments	
					0				0
							Grass on brown TOPSOIL		
	0.3m	♦					Black sandy GRAVEL with bricks and slag		
					0.5		Made Ground: Grey/ brown gravelly reworked CLAY with bricks, tile and concrete		1
					1				2
							Made Ground: Firm brown/ grey reworked CLAY		
	1.5m	♦			1.5				3
							Black ashy GRAVEL		
					2				4
					2.5				5

Non-slotted Install	■	Surrounded by bentonite seal, capped with flush cover and gas valve
Slotted Install	▦	Surrounded by 10mm gravel and installed with end cap

Legend:

♦ Disturbed Sample † Down Borehole Analysis

◡ Undisturbed Sample ∇ Groundwater Table

∅ Headspace Analysis ∆ Perched Water Table

Job Title: Varley Street	Client: Mace Group	**Borehole No: TP6**
Location: Varley Street, Manchester		**Page 6 of 20**

Drilling Dates: 17.01.22	Drilling Method: Machine Excavator
Drilling Contractor: EnviroSolution Ltd	Borehole Diameter: n/a
Logged by: Tom Craig	Screen Type & Diameter: n/a
Checked by: Gemma Lucas	Screen Slot Size: n/a

Borehole Construction	Sample Number	Sample Type	Soil Vapour (ppm)	Groundwater	Depth (m)	SPT	Description	Comments	
					0				0
							Made Ground: Grass on dark brown gravelly SAND		
	0.3m	♦							
							Made Ground: Firm slightly gravelly reworked CLAY		
					0.5				1
							Made Ground: Black clayey SAND with brick		
					1				2
							Firm brown sandy CLAY		
					1.5				3
					2				4
					2.5				5

Non-slotted Install	■	Surrounded by bentonite seal, capped with flush cover and gas valve
Slotted Install	▦	Surrounded by 10mm gravel and installed with end cap

Legend:

♦ Disturbed Sample † Down Borehole Analysis

◡ Undisturbed Sample ∇ Groundwater Table

∅ Headspace Analysis ∆ Perched Water Table

Job Title: Varley Street	Client: Mace Group	**Borehole No: TP7**
Location: Varley Street, Manchester		**Page 7 of 20**

Drilling Dates: 17.01.22	Drilling Method: Machine Excavator
Drilling Contractor: EnviroSolution Ltd	Borehole Diameter: n/a
Logged by: Tom Craig	Screen Type & Diameter: n/a
Checked by: Gemma Lucas	Screen Slot Size: n/a

Borehole Construction	Sample Number	Sample Type	Soil Vapour (ppm)	Groundwater	Depth (m)	SPT	Description	Comments	
					0				0
							Made Ground: Grass on brown clayey TOPSOIL		
	0.3m	♦					Made Ground: Grey gravelly CLAY with brick		
					0.5		Made Ground: Brown gravelly CLAY		1
					1		Made Ground: Black slightly clayey ashy GRAVEL FILL	Hydrocarbon odour noted	2
					1.5			Groundwater inflow at 1.70m	3
					2				4
					2.5				5

Non-slotted Install	■	Surrounded by bentonite seal, capped with flush cover and gas valve
Slotted Install	▦	Surrounded by 10mm gravel and installed with end cap

Legend:

♦ Disturbed Sample	† Down Borehole Analysis
◡ Undisturbed Sample	∇ Groundwater Table
∅ Headspace Analysis	∆ Perched Water Table

Job Title: Varley Street	Client: Mace Group	**Borehole No: TP8**
Location: Varley Street, Manchester		**Page 8 of 20**

Drilling Dates: 17.01.22	Drilling Method: Machine Excavator
Drilling Contractor: EnviroSolution Ltd	Borehole Diameter: n/a
Logged by: Tom Craig	Screen Type & Diameter: n/a
Checked by: Gemma Lucas	Screen Slot Size: n/a

Borehole Construction	Sample Number	Sample Type	Soil Vapour (ppm)	Groundwater	Depth (m)	SPT	Description	Comments	
					0				0
							Made Ground: Grass on brown loamy TOPSOIL		
	0.3m	♦							
							Made Ground: Brown/ black ashy gravelly SAND FILL with brick, tile and glass		
	0.5m	♦			0.5				1
							Made Ground: Soft grey/ black ashy CLAY with metallic ash		
					1				2
							Made Ground: Black/ grey reworked CLAY with slag fragments	Slight seepage at 1.20m	
	1.5m	♦			1.5				3
					2				4
					2.5				5

Non-slotted Install	▨	Surrounded by bentonite seal, capped with flush cover and gas valve
Slotted Install	☐	Surrounded by 10mm gravel and installed with end cap

Legend:

♦ Disturbed Sample † Down Borehole Analysis

◡ Undisturbed Sample ∇ Groundwater Table

∅ Headspace Analysis ∆ Perched Water Table

Job Title: Varley Street	Client: Mace Group	**Borehole No: TP9**
Location: Varley Street, Manchester		**Page 9 of 20**

Drilling Dates: 17.01.22	Drilling Method: Machine Excavator
Drilling Contractor: EnviroSolution Ltd	Borehole Diameter: n/a
Logged by: Tom Craig	Screen Type & Diameter: n/a
Checked by: Gemma Lucas	Screen Slot Size: n/a

Borehole Construction	Sample Number	Sample Type	Soil Vapour (ppm)	Groundwater	Depth (m)	SPT	Description	Comments	
					0		Made Ground: Grass on black sandy GRAVEL FILL with tile, slag and brick		0
	0.3m	♦							
					0.5				1
					1		Made Ground: Reworked grey CLAY with ash and slag		2
					1.5				3
					2				4
					2.5				5

Non-slotted Install	■	Surrounded by bentonite seal, capped with flush cover and gas valve
Slotted Install	▨	Surrounded by 10mm gravel and installed with end cap

Legend:

♦ Disturbed Sample † Down Borehole Analysis

◡ Undisturbed Sample ∇ Groundwater Table

∅ Headspace Analysis ∆ Perched Water Table

Job Title: Varley Street	Client: Mace Group	**Borehole No: TP10**
Location: Varley Street, Manchester		**Page 10 of 20**

Drilling Dates: 17.01.22	Drilling Method: Machine Excavator
Drilling Contractor: EnviroSolution Ltd	Borehole Diameter: n/a
Logged by: Tom Craig	Screen Type & Diameter: n/a
Checked by: Gemma Lucas	Screen Slot Size: n/a

Borehole Construction	Sample Number	Sample Type	Soil Vapour (ppm)	Groundwater	Depth (m)	SPT	Description	Comments	
					0				0
							Grass on brown sandy TOPSOIL		
	0.3m	♦					Made Ground: Black sandy GRAVEL FILL with brick, slag and tile		
					0.5				1
	0.7m	♦					Firm to stiff light grey/ orange slightly gravelly CLAY with rounded gravels		
					1				2
					1.5				3
					2				4
					2.5				5

Non-slotted Install	▨	Surrounded by bentonite seal, capped with flush cover and gas valve
Slotted Install	☐	Surrounded by 10mm gravel and installed with end cap

Legend:

♦ Disturbed Sample † Down Borehole Analysis

◡ Undisturbed Sample ∇ Groundwater Table

∅ Headspace Analysis ∆ Perched Water Table

Job Title: Varley Street	Client: Mace Group	**Borehole No: TP11**
Location: Varley Street, Manchester		**Page 11 of 20**

Drilling Dates: 17.01.22	Drilling Method: Machine Excavator
Drilling Contractor: EnviroSolution Ltd	Borehole Diameter: n/a
Logged by: Tom Craig	Screen Type & Diameter: n/a
Checked by: Gemma Lucas	Screen Slot Size: n/a

Borehole Construction	Sample Number	Sample Type	Soil Vapour (ppm)	Groundwater	Depth (m)	SPT	Description	Comments	
					0				0
							Grass on brown sandy TOPSOIL		
	0.6m	♦							
					0.5		Dark brown loamy TOPSOIL with brick and tile fragments	Buried drain encountered	1
					1				2
					1.5				3
					2				4
					2.5				5

Non-slotted Install	■	Surrounded by bentonite seal, capped with flush cover and gas valve
Slotted Install	▨	Surrounded by 10mm gravel and installed with end cap

Legend:

♦ Disturbed Sample † Down Borehole Analysis

◡ Undisturbed Sample ∇ Groundwater Table

∅ Headspace Analysis ∆ Perched Water Table

Job Title: Varley Street	Client: Mace Group	**Borehole No: TP12**
Location: Varley Street, Manchester		**Page 12 of 20**

Drilling Dates: 17.01.22	Drilling Method: Machine Excavator
Drilling Contractor: EnviroSolution Ltd	Borehole Diameter: n/a
Logged by: Tom Craig	Screen Type & Diameter: n/a
Checked by: Gemma Lucas	Screen Slot Size: n/a

Borehole Construction	Sample Number	Sample Type	Soil Vapour (ppm)	Groundwater	Depth (m)	SPT	Description	Comments	
					0				0
							Made Ground: Black/ grey sandy GRAVEL FILL with brick, tile, coal and roots		
	0.5m	♦			0.5				1
							Made Ground: Dark grey gravelly reworked clay with brick		
					1				2
							Brown/ orange clayey SAND		
					1.5				3
							Stiff brown/ grey mottled slightly gravelly CLAY		
					2				4
					2.5				5

Non-slotted Install	■	Surrounded by bentonite seal, capped with flush cover and gas valve
Slotted Install	▨	Surrounded by 10mm gravel and installed with end cap

Legend:

♦ Disturbed Sample	† Down Borehole Analysis
◡ Undisturbed Sample	∇ Groundwater Table
∅ Headspace Analysis	∆ Perched Water Table

Job Title: Varley Street	Client: Mace Group	**Borehole No: TP13**
Location: Varley Street, Manchester		**Page 13 of 20**

Drilling Dates: 17.01.22	Drilling Method: Machine Excavator
Drilling Contractor: EnviroSolution Ltd	Borehole Diameter: n/a
Logged by: Tom Craig	Screen Type & Diameter: n/a
Checked by: Gemma Lucas	Screen Slot Size: n/a

Borehole Construction	Sample Number	Sample Type	Soil Vapour (ppm)	Groundwater	Depth (m)	SPT	Description	Comments	
					0		Description	Comments	0
							Made Ground: rass on dark brown sandy TOPSOIL with bricks, sandstone fragments and roots		
	0.3m	♦							
							Made Ground: Black gravelly SAND with coal fragments and sandstone cobbles		
					0.5				1
							Made Ground: Firm dark grey CLAY with coal	Slight hydrocarbon odour noted	
	0.8m	♦							
					1				2
							Firm brown/ grey CLAY		
	1.2m	♦							
					1.5				3
					2				4
					2.5				5

Non-slotted Install	▩	Surrounded by bentonite seal, capped with flush cover and gas valve
Slotted Install	▦	Surrounded by 10mm gravel and installed with end cap

Legend:

♦ Disturbed Sample	† Down Borehole Analysis
◡ Undisturbed Sample	∇ Groundwater Table
∅ Headspace Analysis	∆ Perched Water Table

Job Title: Varley Street	Client: Mace Group	**Borehole No: TP14**
Location: Varley Street, Manchester		**Page 14 of 20**

Drilling Dates: 17.01.22	Drilling Method: Machine Excavator
Drilling Contractor: EnviroSolution Ltd	Borehole Diameter: n/a
Logged by: Tom Craig	Screen Type & Diameter: n/a
Checked by: Gemma Lucas	Screen Slot Size: n/a

Borehole Construction	Sample Number	Sample Type	Soil Vapour (ppm)	Groundwater	Depth (m)	SPT	Description	Comments	
					0		Made Ground: Grass on brown clayey sandy TOPSOIL with brick and roots		0
	0.3m	♦					Made Ground: Compact brick and concrete with black heavily stained sandy GRAVEL with tile, wood and slate with an oily sheen	Strong hydrocarbon odour noted	
					0.5				1
	1.0m	♦			1				2
							Firm grey/ light brown CLAY		
					1.5				3
					2				4
					2.5				5

Non-slotted Install	■	Surrounded by bentonite seal, capped with flush cover and gas valve
Slotted Install	□	Surrounded by 10mm gravel and installed with end cap

Legend:

♦ Disturbed Sample † Down Borehole Analysis

∪ Undisturbed Sample ∇ Groundwater Table

∅ Headspace Analysis ∆ Perched Water Table

Job Title: Varley Street	Client: Mace Group	**Borehole No: TP15**
Location: Varley Street, Manchester		**Page 15 of 20**

Drilling Dates: 17.01.22	Drilling Method: Machine Excavator
Drilling Contractor: EnviroSolution Ltd	Borehole Diameter: n/a
Logged by: Tom Craig	Screen Type & Diameter: n/a
Checked by: Gemma Lucas	Screen Slot Size: n/a

Borehole Construction	Sample Number	Sample Type	Soil Vapour (ppm)	Groundwater	Depth (m)	SPT	Description	Comments	
					0				0
							Made Ground: Black/ brown sandy GRAVEL with bricks		
	0.3m	♦							
					0.5				1
					1		Made Ground: Black/ grey gravelly reworked CLAY		2
							Firm grey/ brown mottled CLAY		
					1.5				3
					2				4
					2.5				5

Non-slotted Install	▨	Surrounded by bentonite seal, capped with flush cover and gas valve
Slotted Install	▥	Surrounded by 10mm gravel and installed with end cap

Legend:

♦ Disturbed Sample	† Down Borehole Analysis
◡ Undisturbed Sample	∇ Groundwater Table
∅ Headspace Analysis	∆ Perched Water Table

Job Title: Varley Street	Client: Mace Group	**Borehole No: TP16**
Location: Varley Street, Manchester		**Page 16 of 20**

Drilling Dates: 17.01.22	Drilling Method: Machine Excavator
Drilling Contractor: EnviroSolution Ltd	Borehole Diameter: n/a
Logged by: Tom Craig	Screen Type & Diameter: n/a
Checked by: Gemma Lucas	Screen Slot Size: n/a

Borehole Construction	Sample Number	Sample Type	Soil Vapour (ppm)	Groundwater	Depth (m)	SPT	Description	Comments	0
					0		Grass on brown sandy TOPSOIL		
							Made Ground: Black/ brown sandy GRAVEL with glass, brick, sandstone and slag		
	0.3m	◆							
					0.5				
					1				
							Made Ground: Black sandy GRAVEL with timber and cobbles of sandstone	Hydrocarbon odour noted	
					1.5			Groundwater inflow at 1.5m	
					2		Firm grey/ brown mottled CLAY		
					2.5				

Non-slotted Install	■	Surrounded by bentonite seal, capped with flush cover and gas valve
Slotted Install	▨	Surrounded by 10mm gravel and installed with end cap

Legend:

♦ Disturbed Sample	† Down Borehole Analysis
◡ Undisturbed Sample	∇ Groundwater Table
∅ Headspace Analysis	∆ Perched Water Table

Job Title: Varley Street	Client: Mace Group	**Borehole No: TP17**
Location: Varley Street, Manchester		**Page 17 of 20**

Drilling Dates: 17.01.22	Drilling Method: Machine Excavator
Drilling Contractor: EnviroSolution Ltd	Borehole Diameter: n/a
Logged by: Tom Craig	Screen Type & Diameter: n/a
Checked by: Gemma Lucas	Screen Slot Size: n/a

Borehole Construction	Sample Number	Sample Type	Soil Vapour (ppm)	Groundwater	Depth (m)	SPT	Description	Comments	
					0		Description	Comments	0
							Grass on brown loamy TOPSOIL with rootlets		
	0.3m	◆							
							Made Ground: Black/ grey sandy GRAVEL FILL with brick, clay, timber and slag		
					0.5				1
					1				2
							Concrete slab		
							Natural grey/ brown CLAY	Groundwater inflow at 1.40m	
					1.5				3
					2				4
					2.5				5

Non-slotted Install	■	Surrounded by bentonite seal, capped with flush cover and gas valve
Slotted Install	▨	Surrounded by 10mm gravel and installed with end cap

Legend:

♦ Disturbed Sample	† Down Borehole Analysis
◡ Undisturbed Sample	∇ Groundwater Table
∅ Headspace Analysis	∆ Perched Water Table

Job Title: Varley Street	Client: Mace Group	**Borehole No: TP18**
Location: Varley Street, Manchester		**Page 18 of 20**

Drilling Dates: 17.01.22	Drilling Method: Machine Excavator
Drilling Contractor: EnviroSolution Ltd	Borehole Diameter: n/a
Logged by: Tom Craig	Screen Type & Diameter: n/a
Checked by: Gemma Lucas	Screen Slot Size: n/a

Borehole Construction	Sample Number	Sample Type	Soil Vapour (ppm)	Groundwater	Depth (m)	SPT	Description	Comments	
					0				0
							Made Ground: Brown sandy loamy TOPSOIL with brick fragments		
	0.3m	♦							
							Made Ground: Brown loamy gravelly SAND with bricks, cobbles, slag, glass and slate		
					0.5				1
					1		Firm brown/ orange/ grey CLAY		2
	1.2m	♦							
	1.3m	♦							
					1.5				3
					2				4
					2.5				5

Non-slotted Install	■	Surrounded by bentonite seal, capped with flush cover and gas valve
Slotted Install	▨	Surrounded by 10mm gravel and installed with end cap

Legend:

♦ Disturbed Sample † Down Borehole Analysis

◡ Undisturbed Sample ∇ Groundwater Table

∅ Headspace Analysis ∆ Perched Water Table

Job Title: Varley Street	Client: Mace Group	**Borehole No: TP19**
Location: Varley Street, Manchester		**Page 19 of 20**

Drilling Dates: 17.01.22	Drilling Method: Machine Excavator
Drilling Contractor: EnviroSolution Ltd	Borehole Diameter: n/a
Logged by: Tom Craig	Screen Type & Diameter: n/a
Checked by: Gemma Lucas	Screen Slot Size: n/a

Borehole Construction	Sample Number	Sample Type	Soil Vapour (ppm)	Groundwater	Depth (m)	SPT	Description	Comments	
					0		Description	Comments	0
							Grass on loamy SAND		
	0.3m	♦					Made Ground: Grey/ brown gravelly SAND FILL with brick and timber	Refusal at 0.70m on brick slab. Buried wall?	
					0.5				1
					1				2
					1.5				3
					2				4
					2.5				5

Non-slotted Install	■	Surrounded by bentonite seal, capped with flush cover and gas valve
Slotted Install	▨	Surrounded by 10mm gravel and installed with end cap

Legend:

♦ Disturbed Sample	† Down Borehole Analysis
◡ Undisturbed Sample	∇ Groundwater Table
∅ Headspace Analysis	∆ Perched Water Table

Appendix D – Monitoring Results

Project:	Varley Street			**Weather:**	Dry, overcast
Project Number:	D0108	**Date:**	24/01/2022	**Engineer:**	IP

Monitoring Point Reference	**Date / Time**	**Atmos. Pressure (mbar)**	**Temp. (°C)**	**Flow Rate (l/h)**	**Time (sec)**	**CH_4 (% v/v)**	**LEL (%)**	**CO_2 (% v/v)**	**O_2 (% v/v)**	**H_2S (ppm)**	**CO (ppm)**	**VOC (ppm)**	**Depth to Water (m bgl)**	**Depth to base (m bgl)**	**Comments**
WS1	24/01/2022 14:00:00	1005	5	Peak: 0.3 Steady: 0.1	Initial	0	0.0	0.2	18.9	0	0		Dry	2.50	
					30	0	0.0	6.0	0.9	0	0				
					60	0	0.0	6.0	0.4	0	0				
					90	0	0.0	6.1	0.3	0	0				
					120	0	0.0	6.1	0.2	0	0				
					150	0	0.0	6.1	0.2	0	0				
					180	0	0.0	6.1	0.2	0	0				
WS2	24/01/2022 14:10:00	1005	5	Peak: 0.2 Steady: 0.1	Initial	0	0.0	1.3	17.4	0	0		1.18	3.00	
					30	0	0.0	3.0	14.6	0	0				
					60	0	0.0	3.0	14.5	0	0				
					90	0	0.0	3.0	14.5	0	0				
					120	0	0.0	3.0	14.5	0	0				
					150	0	0.0	3.0	14.5	0	0				
					180	0	0.0	3.0	14.5	0	0				
WS3	24/01/2022 14:20:00	1005	5	Peak: 0.2 Steady: 0.1	Initial	0	0.0	2.0	14.8	0	0		1.45	2.80	
					30	0	0.0	0.3	19.5	0	0				
					60	0	0.0	0.2	20.0	0	0				
					90	0	0.0	0.2	20.0	0	0				
					120	0	0.0	0.2	20.0	0	0				
					150	0	0.0	0.2	20.0	0	0				
					180	0	0.0	0.2	20.0	0	0				
WS6	24/01/2022 14:30:00	1005	5	Peak: 0.2 Steady: -0.1	Initial	0	0.0	2.4	15.6	0	0		4.95	5.00	
					30	0	0.0	7.4	11.1	0	0				
					60	0	0.0	7.4	10.4	0	0				
					90	0	0.0	7.5	10.2	0	0				
					120	0	0.0	7.6	10.2	0	0				
					150	0	0.0	7.6	10.1	0	0				
					180	0	0.0	7.6	10.1	0	0				
WS7	24/01/2022 14:40:00	1005	5		Initial								0.95	3.00	No gas bung in place, gas bung added during visit. Strong hydrocarbon odour noted from well.
					30										
					60										
					90										
					120										
					150										
					180										
WS10	24/01/2022 14:50:00	1005	5	Peak: -0.2 Steady: -0.1	Initial	0	0.0	0.0	19.4	0	0		Dry	4.00	
					30	0	0.0	2.0	17.5	0	0				
					60	0	0.0	2.0	17.3	0	0				
					90	0	0.0	2.0	17.3	0	0				
					120	0	0.0	2.0	17.3	0	0				
					150	0	0.0	2.0	17.3	0	0				
					180	0	0.0	2.0	17.3	0	0				

Notes:

Ambient Concentration	
CH_4	0
CO_2	0.1
O_2	20.6
H_2S	0
CO	0

Wessex and West
Ground Investigation

QA Checklist:

QA Checklist:		**Instrument Details:**	Serial No.
Gas monitor calibrated	Y	Landfill Gas Analyser	G507192
All filters in place	Y	PID	
Flow reading stable and zeroed	Y	Dip meter/ interface probe	

Project:	Varley Street	**Weather:**	Dry, overcast
Project Number:	D0108	**Date:** 31/01/2022	**Engineer:** IP

Monitoring Point Reference	Date / Time	Atmos. Pressure (mbar)	Temp. (°C)	Flow Rate (l/h)	Time (sec)	CH_4 (% v/v)	LEL (%)	CO_2 (% v/v)	O_2 (% v/v)	H_2S (ppm)	CO (ppm)	VOC (ppm)	Depth to Water (m bgl)	Depth to base (m bgl)	Comments
WS1	31/01/2022 11:00:00	1008	6	Peak:	Initial	0	0.0	4.1	19.8	0	0		Dry	2.50	
				0.1	30	0	0.0	3.2	15.0	0	0				
					60	0	0.0	3.5	13.1	0	0				
					90	0	0.0	3.4	11.1	0	0				
				Steady:	120	0	0.0	3.4	10.7	0	0				
				0.1	150	0	0.0	3.4	11.1	0	0				
					180	0	0.0	3.4	11.1	0	0				
WS2	31/01/2022 11:10:00	1008	6	Peak:	Initial	0	0.0	3.0	14.6	0	0		1.30	3.00	
				0.2	30	0	0.0	2.3	15.5	0	0				
					60	0	0.0	2.2	16.8	0	0				
					90	0	0.0	2.3	16.9	0	0				
				Steady:	120	0	0.0	2.2	16.9	0	0				
				0.1	150	0	0.0	2.2	16.9	0	0				
					180	0	0.0	2.2	16.9	0	0				
WS3	31/01/2022 11:20:00	1008	6	Peak:	Initial	0	0.0	0.4	17.0	0	10		1.55	2.80	
				0.2	30	0	0.0	0.4	16.1	0	13				
					60	0	0.0	0.4	15.7	0	43				
					90	0	0.0	0.4	15.6	0	45				
				Steady:	120	0	0.0	0.4	15.6	0	51				
				0.1	150	0	0.0	0.4	15.6	0	51				
					180	0	0.0	0.4	15.6	0	51				
WS6	31/01/2022 11:30:00	1008	6	Peak:	Initial	0	0.0	6.0	8.0	0	0		Dry	4.70	
				0.2	30	0	0.0	8.3	8.8	0	0				
					60	0	0.0	8.3	9.1	0	0				
					90	0	0.0	8.3	9.1	0	0				
				Steady:	120	0	0.0	8.3	9.1	0	0				
				0.1	150	0	0.0	8.3	9.1	0	0				
					180	0	0.0	8.3	9.1	0	0				
WS7	31/01/2022 11:40:00	1008	6	Peak:	Initial	0	0.0	2.4	16.1	0	10		0.85	2.90	Hydrocarbon odour noted from well. Slight sheen to water sample.
				0.2	30	0	0.0	2.4	4.2	0	11				
					60	0	0.0	2.4	3.2	0	10				
					90	0	0.0	2.4	3.0	0	10				
				Steady:	120	0	0.0	2.4	2.8	0	11				
				0.1	150	0	0.0	2.4	2.6	0	10				
					180	0	0.0	2.4	2.6	0	10				
WS10	31/01/2022 11:50:00	1008	6	Peak:	Initial	0	0.0	0.0	19.4	0	0		Dry	4.00	
				-0.2	30	0	0.0	2.2	17.2	0	0				
					60	0	0.0	2.2	17.3	0	0				
					90	0	0.0	2.2	17.2	0	0				
				Steady:	120	0	0.0	2.2	17.2	0	0				
				-0.1	150	0	0.0	2.2	17.2	0	0				
					180	0	0.0	2.2	17.2	0	0				

Notes:

QA Checklist:

QA Checklist:		**Instrument Details:**	Serial No.
Gas monitor calibrated	Y	Landfill Gas Analyser	G507192
All filters in place	Y	PID	
Flow reading stable and zeroed	Y	Dip meter/ interface probe	

Ambient Concentration	
CH_4	**0**
CO_2	**0.1**
O_2	**20.6**
H_2S	**0**
CO	**0**

Wessex and West
Ground Investigation

Project:	Varley Street			**Weather:**	Dry, overcast
Project Number:	D0108	**Date:**	07/02/2022	**Engineer:**	IP

Monitoring Point Reference	Date / Time	Atmos. Pressure (mbar)	Temp. (^{o}C)	Flow Rate (l/h)	Time (sec)	CH_4 (% v/v)	LEL (%)	CO_2 (% v/v)	O_2 (% v/v)	H_2S (ppm)	CO (ppm)	VOC (ppm)	Depth to Water (m bgl)	Depth to base (m bgl)	Comments
WS1	07/02/2022 10:00:00	1012	8	Peak:	Initial	0	0.0	3.9	19.8	0	0		Dry	2.50	
				0.1	30	0	0.0	3.8	16.2	0	0				
					60	0	0.0	3.1	14.5	0	0				
					90	0	0.0	3.1	12.2	0	0				
				Steady:	120	0	0.0	3.1	11.6	0	0				
				0.1	150	0	0.0	3.1	11.6	0	0				
					180	0	0.0	3.1	11.6	0	0				
WS2	07/02/2022 10:10:00	1012	8	Peak:	Initial	0	0.0	2.8	16.1	0	0		1.30	3.00	
				0.2	30	0	0.0	2.2	16.5	0	0				
					60	0	0.0	2.2	16.8	0	0				
					90	0	0.0	2.2	17.0	0	0				
				Steady:	120	0	0.0	2.2	17.0	0	0				
				0.1	150	0	0.0	2.2	17.0	0	0				
					180	0	0.0	2.2	17.0	0	0				
WS3	07/02/2022 10:20:00	1012	8	Peak:	Initial	0	0.0	0.4	17.2	0	10		1.55	2.80	
				0.2	30	0	0.0	0.4	16.3	0	11				
					60	0	0.0	0.4	15.8	0	35				
					90	0	0.0	0.4	15.8	0	35				
				Steady:	120	0	0.0	0.4	15.8	0	35				
				0.1	150	0	0.0	0.4	15.8	0	35				
					180	0	0.0	0.4	15.8	0	35				
WS6	07/02/2022 10:30:00	1012	8	Peak:	Initial	0	0.0	6.0	10.5	0	0		Dry	4.70	
				0.2	30	0	0.0	8.3	9.8	0	0				
					60	0	0.0	8.3	9.8	0	0				
					90	0	0.0	8.3	9.8	0	0				
				Steady:	120	0	0.0	8.3	9.8	0	0				
				0.1	150	0	0.0	8.3	9.8.	0	0				
					180	0	0.0	8.3	9.8	0	0				
WS7	07/02/2022 10:40:00	1012	8	Peak:	Initial	0	0.0	2.4	9.7	0	10		0.85	2.90	Hydrocarbon odour noted from well. Slight sheen to water sample.
				0.2	30	0	0.0	2.4	6.2	0	11				
					60	0	0.0	2.4	4.5	0	11				
					90	0	0.0	2.4	4.2	0	11				
				Steady:	120	0	0.0	2.4	3.9	0	11				
				0.1	150	0	0.0	2.4	3.9	0	11				
					180	0	0.0	2.4	3.6	0	11				
WS10	07/02/2022 10:50:00	1012	8	Peak:	Initial	0	0.0	2.2	19.2	0	0		Dry	4.00	
				-0.2	30	0	0.0	2.0	17.4	0	0				
					60	0	0.0	2.0	17.4	0	0				
					90	0	0.0	2.0	17.4	0	0				
				Steady:	120	0	0.0	2.0	17.4	0	0				
				-0.1	150	0	0.0	2.0	17.4	0	0				
					180	0	0.0	2.0	17.4	0	0				

Notes:

QA Checklist:

QA Checklist:		**Instrument Details:**	Serial No.
Gas monitor calibrated	Y	Landfill Gas Analyser	G507192
All filters in place	Y	PID	
Flow reading stable and zeroed	Y	Dip meter/ interface probe	

Ambient Concentration	
CH_4	**0**
CO_2	**0.1**
O_2	**20.6**
H_2S	**0**
CO	**0**

Appendix E – Laboratory Data

UKAS TESTING 2183

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

Final Report

Report No.:	22-04178-1		
Initial Date of Issue:	10-Feb-2022		
Client	EnviroSolution		
Client Address:	Suite 53 3a Bridgewater Street Liverpool L1 0AB		
Contact(s):	Tom Craig		
Project	Varley Street, Manchester		
Quotation No.:		**Date Received:**	04-Feb-2022
Order No.:	ES040222	**Date Instructed:**	07-Feb-2022
No. of Samples:	3		
Turnaround (Wkdays):	5	**Results Due:**	11-Feb-2022
Date Approved:	10-Feb-2022		
Approved By:	[redacted]		
Details:	Stuart Henderson, Technical Manager		

Results - Water

Project: Varley Street, Manchester

Client: EnviroSolution	**Chemtest Job No.:**				22-04178	22-04178	22-04178
Quotation No.:	**Chemtest Sample ID.:**				1366059	1366060	1366061
Order No.: ES040222	Client Sample Ref.:				1	1	1
	Sample Location:				WS02	WS03	WS07
	Sample Type:				WATER	WATER	WATER
	Top Depth (m):				1.30	1.55	0.85
	Date Sampled:				01-Feb-2022	01-Feb-2022	01-Feb-2022
Determinand	**Accred.**	**SOP**	**Units**	**LOD**			
pH	U	1010		N/A	8.4	7.9	7.4
Sulphate	U	1220	mg/l	1.0	53	310	65
Total Hardness as CaCO3	U	1270	mg/l	15	380	590	420
Arsenic (Dissolved)	U	1455	µg/l	0.20	40	97	5.6
Cadmium (Dissolved)	U	1455	µg/l	0.11	< 0.11	< 0.11	< 0.11
Chromium (Dissolved)	U	1455	µg/l	0.50	2.3	5.5	2.0
Copper (Dissolved)	U	1455	µg/l	0.50	0.82	1.1	1.1
Mercury (Dissolved)	U	1455	µg/l	0.05	< 0.05	< 0.05	< 0.05
Nickel (Dissolved)	U	1455	µg/l	0.50	3.8	5.5	3.6
Lead (Dissolved)	U	1455	µg/l	0.50	0.69	< 0.50	< 0.50
Selenium (Dissolved)	U	1455	µg/l	0.50	0.54	0.74	< 0.50
Zinc (Dissolved)	U	1455	µg/l	2.5	23	4.6	2.6
Aliphatic TPH >C5-C6	N	1675	µg/l	0.10	< 0.10	< 0.10	< 0.10
Aliphatic TPH >C6-C8	N	1675	µg/l	0.10	< 0.10	< 0.10	< 0.10
Aliphatic TPH >C8-C10	N	1675	µg/l	0.10	< 0.10	< 0.10	< 0.10
Aliphatic TPH >C10-C12	N	1675	µg/l	0.10	< 0.10	< 0.10	< 0.10
Aliphatic TPH >C12-C16	N	1675	µg/l	0.10	< 0.10	< 0.10	< 0.10
Aliphatic TPH >C16-C21	N	1675	µg/l	0.10	< 0.10	< 0.10	< 0.10
Aliphatic TPH >C21-C35	N	1675	µg/l	0.10	< 0.10	< 0.10	< 0.10
Aliphatic TPH >C35-C44	N	1675	µg/l	0.10	< 0.10	< 0.10	< 0.10
Total Aliphatic Hydrocarbons	N	1675	µg/l	5.0	< 5.0	< 5.0	< 5.0
Aromatic TPH >C5-C7	N	1675	µg/l	0.10	< 0.10	< 0.10	< 0.10
Aromatic TPH >C7-C8	N	1675	µg/l	0.10	< 0.10	< 0.10	< 0.10
Aromatic TPH >C8-C10	N	1675	µg/l	0.10	< 0.10	< 0.10	< 0.10
Aromatic TPH >C10-C12	N	1675	µg/l	0.10	< 0.10	< 0.10	< 0.10
Aromatic TPH >C12-C16	N	1675	µg/l	0.10	< 0.10	< 0.10	< 0.10
Aromatic TPH >C16-C21	N	1675	µg/l	0.10	< 0.10	< 0.10	< 0.10
Aromatic TPH >C21-C35	N	1675	µg/l	0.10	< 0.10	< 0.10	< 0.10
Aromatic TPH >C35-C44	N	1675	µg/l	0.10	< 0.10	< 0.10	< 0.10
Total Aromatic Hydrocarbons	N	1675	µg/l	5.0	< 5.0	< 5.0	< 5.0
Total Petroleum Hydrocarbons	N	1675	µg/l	10	< 10	< 10	< 10
Dichlorodifluoromethane	U	1760	µg/l	1.0	< 1.0	< 1.0	< 1.0
Chloromethane	U	1760	µg/l	1.0	< 1.0	< 1.0	< 1.0
Vinyl Chloride	N	1760	µg/l	1.0	< 1.0	< 1.0	< 1.0
Bromomethane	U	1760	µg/l	5	< 5	< 5	< 5
Chloroethane	U	1760	µg/l	2.0	< 2.0	< 2.0	< 2.0
Trichlorofluoromethane	U	1760	µg/l	1.0	< 1.0	< 1.0	< 1.0
1,1-Dichloroethene	U	1760	µg/l	1.0	< 1.0	< 1.0	< 1.0
Trans 1,2-Dichloroethene	U	1760	µg/l	1.0	< 1.0	< 1.0	< 1.0

Results - Water

Project: Varley Street, Manchester

Client: EnviroSolution	**Chemtest Job No.:**				22-04178	22-04178	22-04178
Quotation No.:	**Chemtest Sample ID.:**				1366059	1366060	1366061
Order No.: ES040222	Client Sample Ref.:				1	1	1
	Sample Location:				WS02	WS03	WS07
	Sample Type:				WATER	WATER	WATER
	Top Depth (m):				1.30	1.55	0.85
	Date Sampled:				01-Feb-2022	01-Feb-2022	01-Feb-2022
Determinand	**Accred.**	**SOP**	**Units**	**LOD**			
1,1-Dichloroethane	U	1760	µg/l	1.0	< 1.0	< 1.0	< 1.0
cis 1,2-Dichloroethene	U	1760	µg/l	1.0	< 1.0	< 1.0	< 1.0
Bromochloromethane	U	1760	µg/l	5	< 5	< 5	< 5
Trichloromethane	U	1760	µg/l	1.0	< 1.0	< 1.0	< 1.0
1,1,1-Trichloroethane	U	1760	µg/l	1.0	< 1.0	< 1.0	< 1.0
Tetrachloromethane	U	1760	µg/l	1.0	< 1.0	< 1.0	< 1.0
1,1-Dichloropropene	U	1760	µg/l	1.0	< 1.0	< 1.0	< 1.0
Benzene	U	1760	µg/l	1.0	< 1.0	6.5	< 1.0
1,2-Dichloroethane	U	1760	µg/l	2.0	< 2.0	< 2.0	< 2.0
Trichloroethene	N	1760	µg/l	1.0	< 1.0	< 1.0	< 1.0
1,2-Dichloropropane	U	1760	µg/l	1.0	< 1.0	< 1.0	< 1.0
Dibromomethane	U	1760	µg/l	10	< 10	< 10	< 10
Bromodichloromethane	U	1760	µg/l	5	< 5	< 5	< 5
cis-1,3-Dichloropropene	N	1760	µg/l	10	< 10	< 10	< 10
Toluene	U	1760	µg/l	1.0	< 1.0	< 1.0	< 1.0
Trans-1,3-Dichloropropene	N	1760	µg/l	10	< 10	< 10	< 10
1,1,2-Trichloroethane	U	1760	µg/l	10	< 10	< 10	< 10
Tetrachloroethene	U	1760	µg/l	1.0	< 1.0	< 1.0	< 1.0
1,3-Dichloropropane	U	1760	µg/l	2.0	< 2.0	< 2.0	< 2.0
Dibromochloromethane	U	1760	µg/l	10	< 10	< 10	< 10
1,2-Dibromoethane	U	1760	µg/l	5	< 5	< 5	< 5
Chlorobenzene	N	1760	µg/l	1.0	< 1.0	< 1.0	< 1.0
1,1,1,2-Tetrachloroethane	U	1760	µg/l	2.0	< 2.0	< 2.0	< 2.0
Ethylbenzene	U	1760	µg/l	1.0	< 1.0	< 1.0	< 1.0
m & p-Xylene	U	1760	µg/l	1.0	< 1.0	< 1.0	< 1.0
o-Xylene	U	1760	µg/l	1.0	< 1.0	< 1.0	< 1.0
Styrene	U	1760	µg/l	1.0	< 1.0	< 1.0	< 1.0
Tribromomethane	U	1760	µg/l	1.0	< 1.0	< 1.0	< 1.0
Isopropylbenzene	U	1760	µg/l	1.0	< 1.0	< 1.0	< 1.0
Bromobenzene	U	1760	µg/l	1.0	< 1.0	< 1.0	< 1.0
1,2,3-Trichloropropane	N	1760	µg/l	50	< 50	< 50	< 50
N-Propylbenzene	U	1760	µg/l	1.0	< 1.0	< 1.0	< 1.0
2-Chlorotoluene	U	1760	µg/l	1.0	< 1.0	< 1.0	< 1.0
1,3,5-Trimethylbenzene	U	1760	µg/l	1.0	< 1.0	< 1.0	< 1.0
4-Chlorotoluene	U	1760	µg/l	1.0	< 1.0	< 1.0	< 1.0
Tert-Butylbenzene	U	1760	µg/l	1.0	< 1.0	< 1.0	< 1.0
1,2,4-Trimethylbenzene	U	1760	µg/l	1.0	< 1.0	< 1.0	< 1.0
Sec-Butylbenzene	U	1760	µg/l	1.0	< 1.0	< 1.0	< 1.0
1,3-Dichlorobenzene	N	1760	µg/l	1.0	< 1.0	< 1.0	< 1.0

Results - Water

Project: Varley Street, Manchester

Client: EnviroSolution	**Chemtest Job No.:**				22-04178	22-04178	22-04178
Quotation No.:	**Chemtest Sample ID.:**				1366059	1366060	1366061
Order No.: ES040222	Client Sample Ref.:				1	1	1
	Sample Location:				WS02	WS03	WS07
	Sample Type:				WATER	WATER	WATER
	Top Depth (m):				1.30	1.55	0.85
	Date Sampled:				01-Feb-2022	01-Feb-2022	01-Feb-2022
Determinand	**Accred.**	**SOP**	**Units**	**LOD**			
4-Isopropyltoluene	U	1760	µg/l	1.0	< 1.0	< 1.0	< 1.0
1,4-Dichlorobenzene	U	1760	µg/l	1.0	< 1.0	< 1.0	< 1.0
N-Butylbenzene	U	1760	µg/l	1.0	< 1.0	< 1.0	< 1.0
1,2-Dichlorobenzene	U	1760	µg/l	1.0	< 1.0	< 1.0	< 1.0
1,2-Dibromo-3-Chloropropane	U	1760	µg/l	50	< 50	< 50	< 50
1,2,4-Trichlorobenzene	U	1760	µg/l	1.0	< 1.0	< 1.0	< 1.0
Hexachlorobutadiene	U	1760	µg/l	1.0	< 1.0	< 1.0	< 1.0
1,2,3-Trichlorobenzene	U	1760	µg/l	2.0	< 2.0	< 2.0	< 2.0
Methyl Tert-Butyl Ether	N	1760	µg/l	1.0	< 1.0	< 1.0	< 1.0
N-Nitrosodimethylamine	N	1790	µg/l	0.50	< 0.50	< 0.50	< 0.50
Phenol	N	1790	µg/l	0.50	< 0.50	< 0.50	< 0.50
2-Chlorophenol	N	1790	µg/l	0.50	< 0.50	< 0.50	< 0.50
Bis-(2-Chloroethyl)Ether	N	1790	µg/l	0.50	< 0.50	< 0.50	< 0.50
1,3-Dichlorobenzene	N	1790	µg/l	0.50	< 0.50	< 0.50	< 0.50
1,4-Dichlorobenzene	N	1790	µg/l	0.50	< 0.50	< 0.50	< 0.50
1,2-Dichlorobenzene	N	1790	µg/l	0.50	< 0.50	< 0.50	< 0.50
2-Methylphenol (o-Cresol)	N	1790	µg/l	0.50	< 0.50	< 0.50	< 0.50
Bis(2-Chloroisopropyl)Ether	N	1790	µg/l	0.50	< 0.50	< 0.50	< 0.50
Hexachloroethane	N	1790	µg/l	0.50	< 0.50	< 0.50	< 0.50
N-Nitrosodi-n-propylamine	N	1790	µg/l	0.50	< 0.50	< 0.50	< 0.50
4-Methylphenol	N	1790	µg/l	0.50	< 0.50	< 0.50	< 0.50
Nitrobenzene	N	1790	µg/l	0.50	< 0.50	< 0.50	< 0.50
Isophorone	N	1790	µg/l	0.50	< 0.50	< 0.50	< 0.50
2-Nitrophenol	N	1790	µg/l	0.50	< 0.50	< 0.50	< 0.50
2,4-Dimethylphenol	N	1790	µg/l	0.50	< 0.50	< 0.50	< 0.50
Bis(2-Chloroethoxy)Methane	N	1790	µg/l	0.50	< 0.50	< 0.50	< 0.50
2,4-Dichlorophenol	N	1790	µg/l	0.50	< 0.50	< 0.50	< 0.50
1,2,4-Trichlorobenzene	N	1790	µg/l	0.50	< 0.50	< 0.50	< 0.50
Naphthalene	N	1790	µg/l	0.50	< 0.50	< 0.50	< 0.50
4-Chloroaniline	N	1790	µg/l	0.50	< 0.50	< 0.50	< 0.50
Hexachlorobutadiene	N	1790	µg/l	0.50	< 0.50	< 0.50	< 0.50
4-Chloro-3-Methylphenol	N	1790	µg/l	0.50	< 0.50	< 0.50	< 0.50
2-Methylnaphthalene	N	1790	µg/l	0.50	< 0.50	< 0.50	< 0.50
Hexachlorocyclopentadiene	N	1790	µg/l	0.50	< 0.50	< 0.50	< 0.50
2,4,6-Trichlorophenol	N	1790	µg/l	0.50	< 0.50	< 0.50	< 0.50
2,4,5-Trichlorophenol	N	1790	µg/l	0.50	< 0.50	< 0.50	< 0.50
2-Chloronaphthalene	N	1790	µg/l	0.50	< 0.50	< 0.50	< 0.50
2-Nitroaniline	N	1790	µg/l	0.50	< 0.50	< 0.50	< 0.50
Acenaphthylene	N	1790	µg/l	0.50	< 0.50	< 0.50	< 0.50

Results - Water

Project: Varley Street, Manchester

Client: EnviroSolution				**Chemtest Job No.:**	22-04178	22-04178	22-04178
Quotation No.:				**Chemtest Sample ID.:**	1366059	1366060	1366061
Order No.: ES040222				Client Sample Ref.:	1	1	1
				Sample Location:	WS02	WS03	WS07
				Sample Type:	WATER	WATER	WATER
				Top Depth (m):	1.30	1.55	0.85
				Date Sampled:	01-Feb-2022	01-Feb-2022	01-Feb-2022
Determinand	**Accred.**	**SOP**	**Units**	**LOD**			
Dimethylphthalate	N	1790	µg/l	0.50	< 0.50	< 0.50	< 0.50
2,6-Dinitrotoluene	N	1790	µg/l	0.50	< 0.50	< 0.50	< 0.50
Acenaphthene	N	1790	µg/l	0.50	< 0.50	11	14
3-Nitroaniline	N	1790	µg/l	0.50	< 0.50	< 0.50	< 0.50
Dibenzofuran	N	1790	µg/l	0.50	< 0.50	2.6	3.6
4-Chlorophenylphenylether	N	1790	µg/l	0.50	< 0.50	< 0.50	< 0.50
2,4-Dinitrotoluene	N	1790	µg/l	0.50	< 0.50	< 0.50	< 0.50
Fluorene	N	1790	µg/l	0.50	< 0.50	2.1	3.0
Diethyl Phthalate	N	1790	µg/l	0.50	< 0.50	< 0.50	< 0.50
4-Nitroaniline	N	1790	µg/l	0.50	< 0.50	< 0.50	< 0.50
2-Methyl-4,6-Dinitrophenol	N	1790	µg/l	0.50	< 0.50	< 0.50	< 0.50
Azobenzene	N	1790	µg/l	0.50	< 0.50	< 0.50	< 0.50
4-Bromophenylphenyl Ether	N	1790	µg/l	0.50	< 0.50	< 0.50	< 0.50
Hexachlorobenzene	N	1790	µg/l	0.50	< 0.50	< 0.50	< 0.50
Pentachlorophenol	N	1790	µg/l	0.50	< 0.50	< 0.50	< 0.50
Phenanthrene	N	1790	µg/l	0.50	< 0.50	< 0.50	< 0.50
Anthracene	N	1790	µg/l	0.50	< 0.50	< 0.50	0.69
Carbazole	N	1790	µg/l	0.50	< 0.50	< 0.50	< 0.50
Di-N-Butyl Phthalate	N	1790	µg/l	0.50	< 0.50	< 0.50	< 0.50
Fluoranthene	N	1790	µg/l	0.50	< 0.50	0.74	0.99
Pyrene	N	1790	µg/l	0.50	< 0.50	< 0.50	< 0.50
Butylbenzyl Phthalate	N	1790	µg/l	0.50	< 0.50	< 0.50	< 0.50
Benzo[a]anthracene	N	1790	µg/l	0.50	< 0.50	< 0.50	< 0.50
Chrysene	N	1790	µg/l	0.50	< 0.50	< 0.50	< 0.50
Bis(2-Ethylhexyl)Phthalate	N	1790	µg/l	0.50	< 0.50	< 0.50	< 0.50
Di-N-Octyl Phthalate	N	1790	µg/l	0.50	< 0.50	< 0.50	< 0.50
Benzo[b]fluoranthene	N	1790	µg/l	0.50	< 0.50	< 0.50	< 0.50
Benzo[k]fluoranthene	N	1790	µg/l	0.50	< 0.50	< 0.50	< 0.50
Benzo[a]pyrene	N	1790	µg/l	0.50	< 0.50	< 0.50	< 0.50
Indeno(1,2,3-c,d)Pyrene	N	1790	µg/l	0.50	< 0.50	< 0.50	< 0.50
Dibenz(a,h)Anthracene	N	1790	µg/l	0.50	< 0.50	< 0.50	< 0.50
Benzo[g,h,i]perylene	N	1790	µg/l	0.50	< 0.50	< 0.50	< 0.50
4-Nitrophenol	N	1790	µg/l	0.50	< 0.50	< 0.50	< 0.50

Test Methods

SOP	Title	Parameters included	Method summary
1010	pH Value of Waters	pH	pH Meter
1220	Anions, Alkalinity & Ammonium in Waters	Fluoride; Chloride; Nitrite; Nitrate; Total; Oxidisable Nitrogen (TON); Sulfate; Phosphate; Alkalinity; Ammonium	Automated colorimetric analysis using ‘Aquakem 600’ Discrete Analyser.
1270	Total Hardness of Waters	Total hardness	Calculation applied to calcium and magnesium results, expressed as mg l-1 CaCO3 equivalent.
1455	Metals in Waters by ICP-MS	Metals, including: Antimony; Arsenic; Barium; Beryllium; Boron; Cadmium; Chromium; Cobalt; Copper; Lead; Manganese; Mercury; Molybdenum; Nickel; Selenium; Tin; Vanadium; Zinc	Filtration of samples followed by direct determination by inductively coupled plasma mass spectrometry (ICP-MS).
1675	TPH Aliphatic/Aromatic split in Waters by GC-FID(cf. Texas Method 1006 / TPH CWG)	Aliphatics: >C5–C6, >C6–C8, >C8– C10, >C10–C12, >C12–C16, >C16–C21, >C21–C35, >C35– C44Aromatics: >C5–C7, >C7–C8, >C8– C10, >C10–C12, >C12–C16, >C16– C21, >C21– C35, >C35– C44	Pentane extraction / GCxGC FID detection
1760	Volatile Organic Compounds (VOCs) in Waters by Headspace GC-MS	Volatile organic compounds, including BTEX and halogenated Aliphatic/Aromatics. (cf. USEPA Method 8260)	Automated headspace gas chromatographic (GC) analysis of water samples with mass spectrometric (MS) detection of volatile organic compounds.
1790	Semi-Volatile Organic Compounds (SVOCs) in Waters by GC-MS	Semi-volatile organic compounds	Solvent extraction / GCMS detection

Report Information

Key	
U	UKAS accredited
M	MCERTS and UKAS accredited
N	Unaccredited
S	This analysis has been subcontracted to a UKAS accredited laboratory that is accredited for this analysis
SN	This analysis has been subcontracted to a UKAS accredited laboratory that is not accredited for this analysis
T	This analysis has been subcontracted to an unaccredited laboratory
I/S	Insufficient Sample
U/S	Unsuitable Sample
N/E	not evaluated
<	"less than"
>	"greater than"
SOP	Standard operating procedure
LOD	Limit of detection

Comments or interpretations are beyond the scope of UKAS accreditation
The results relate only to the items tested
Uncertainty of measurement for the determinands tested are available upon request
None of the results in this report have been recovery corrected
All results are expressed on a dry weight basis

The following tests were analysed on samples as received and the results subsequently corrected to a dry weight basis TPH, BTEX, VOCs, SVOCs, PCBs, Phenols

For all other tests the samples were dried at < 37°C prior to analysis
All Asbestos testing is performed at the indicated laboratory
Issue numbers are sequential starting with 1 all subsequent reports are incremented by 1

Sample Deviation Codes

A - Date of sampling not supplied
B - Sample age exceeds stability time (sampling to extraction)
C - Sample not received in appropriate containers
D - Broken Container
E - Insufficient Sample (Applies to LOI in Trommel Fines Only)

Sample Retention and Disposal

All soil samples will be retained for a period of 30 days from the date of receipt
All water samples will be retained for 14 days from the date of receipt
Charges may apply to extended sample storage

If you require extended retention of samples, please email your requirements to:
customerservices@chemtest.com

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

Final Report

Report No.:	22-02360-1		
Initial Date of Issue:	28-Jan-2022		
Client	EnviroSolution		
Client Address:	Suite 5, The Quay No 12 Princes Dock Liverpool Waters Liverpool L3 1DL		
Contact(s):	Gemma Lucas Tom Craig		
Project	Varley Street		
Quotation No.:		**Date Received:**	24-Jan-2022
Order No.:	ES210122	**Date Instructed:**	24-Jan-2022
No. of Samples:	29		
Turnaround (Wkdays):	5	**Results Due:**	28-Jan-2022
Date Approved:	28-Jan-2022		
[redacted] **Details:**	Stuart Henderson, Technical Manager		

Results - Soil

Project: Varley Street

Client: EnviroSolution	**Chemtest Job No.:**				22-02360	22-02360	22-02360	22-02360	22-02360	22-02360	22-02360	22-02360	22-02360
Quotation No.:	**Chemtest Sample ID.:**				1357375	1357376	1357377	1357378	1357379	1357380	1357381	1357382	1357383
	Sample Location:				TP1	TP1	TP2	TP3	TP3	TP4	TP5	TP5	TP6
	Sample Type:				SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL
	Top Depth (m):				0.3	1.3	0.3	0.3	1.0	0.3	0.3	1.5	0.3
	Date Sampled:				17-Jan-2022	17-Jan-2022	17-Jan-2022	17-Jan-2022	17-Jan-2022	17-Jan-2022	17-Jan-2022	17-Jan-2022	17-Jan-2022
	Asbestos Lab:				COVENTRY		COVENTRY	COVENTRY		COVENTRY	COVENTRY		COVENTRY
Determinand	**Accred.**	**SOP**	**Units**	**LOD**									
ACM Type	U	2192		N/A	-		-	-		-	-		-
Asbestos Identification	U	2192		N/A	No Asbestos Detected		No Asbestos Detected	No Asbestos Detected		No Asbestos Detected	No Asbestos Detected		No Asbestos Detected
Asbestos by Gravimetry	U	2192	%	0.001									
Total Asbestos	U	2192	%	0.001									
Moisture	N	2030	%	0.020	14	19	19	14	18	15	14	22	18
pH	U	2010		4.0	8.7	8.2	8.5	8.6	8.4	8.5	8.4	8.3	8.3
Arsenic	U	2450	mg/kg	1.0	47	31	20	24	22	32	31	30	11
Cadmium	U	2450	mg/kg	0.10	0.78	0.16	0.28	0.47	0.15	0.32	0.20	0.65	0.52
Chromium	U	2450	mg/kg	1.0	23	23	14	26	22	20	23	20	22
Copper	U	2450	mg/kg	0.50	180	39	66	730	30	100	310	140	34
Mercury	U	2450	mg/kg	0.10	0.79	0.20	0.25	0.86	< 0.10	0.34	0.65	0.35	< 0.10
Nickel	U	2450	mg/kg	0.50	31	34	20	29	33	24	34	31	27
Lead	U	2450	mg/kg	0.50	460	72	160	220	29	290	280	220	76
Selenium	U	2450	mg/kg	0.20	0.58	0.28	0.37	0.73	0.30	0.46	0.43	0.83	0.34
Zinc	U	2450	mg/kg	0.50	270	57	130	160	50	140	240	160	80
Aliphatic TPH >C5-C6	N	2680	mg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Aliphatic TPH >C6-C8	N	2680	mg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Aliphatic TPH >C8-C10	U	2680	mg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Aliphatic TPH >C10-C12	U	2680	mg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Aliphatic TPH >C12-C16	U	2680	mg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	20	22	< 1.0	< 1.0
Aliphatic TPH >C16-C21	U	2680	mg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	43	32	< 1.0	6.6
Aliphatic TPH >C21-C35	U	2680	mg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	27	35	< 1.0	53
Aliphatic TPH >C35-C44	N	2680	mg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Total Aliphatic Hydrocarbons	N	2680	mg/kg	5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	90	88	< 5.0	59
Aromatic TPH >C5-C7	N	2680	mg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Aromatic TPH >C7-C8	N	2680	mg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Aromatic TPH >C8-C10	U	2680	mg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Aromatic TPH >C10-C12	U	2680	mg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	75	6.9	< 1.0	< 1.0
Aromatic TPH >C12-C16	U	2680	mg/kg	1.0	< 1.0	< 1.0	140	52	< 1.0	740	160	< 1.0	< 1.0
Aromatic TPH >C16-C21	U	2680	mg/kg	1.0	110	< 1.0	740	270	< 1.0	2300	860	15	< 1.0
Aromatic TPH >C21-C35	U	2680	mg/kg	1.0	460	< 1.0	1600	560	< 1.0	4400	2900	7.4	45
Aromatic TPH >C35-C44	N	2680	mg/kg	1.0	< 1.0	< 1.0	200	24	< 1.0	360	340	< 1.0	< 1.0
Total Aromatic Hydrocarbons	N	2680	mg/kg	5.0	580	< 5.0	2700	910	< 5.0	7800	4300	22	45
Total Petroleum Hydrocarbons	N	2680	mg/kg	10.0	580	< 10	2700	910	< 10	7900	4400	22	100
Dichlorodifluoromethane	U	2760	µg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Chloromethane	U	2760	µg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Vinyl Chloride	U	2760	µg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Bromomethane	U	2760	µg/kg	20	< 20	< 20	< 20	< 20	< 20	< 20	< 20	< 20	< 20

Results - Soil

Project: Varley Street

Client: EnviroSolution	**Chemtest Job No.:**				22-02360	22-02360	22-02360	22-02360	22-02360	22-02360	22-02360	22-02360	22-02360
Quotation No.:	**Chemtest Sample ID.:**				1357375	1357376	1357377	1357378	1357379	1357380	1357381	1357382	1357383
	Sample Location:				TP1	TP1	TP2	TP3	TP3	TP4	TP5	TP5	TP6
	Sample Type:				SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL
	Top Depth (m):				0.3	1.3	0.3	0.3	1.0	0.3	0.3	1.5	0.3
	Date Sampled:				17-Jan-2022	17-Jan-2022	17-Jan-2022	17-Jan-2022	17-Jan-2022	17-Jan-2022	17-Jan-2022	17-Jan-2022	17-Jan-2022
	Asbestos Lab:				COVENTRY		COVENTRY	COVENTRY		COVENTRY	COVENTRY		COVENTRY
Determinand	**Accred.**	**SOP**	**Units**	**LOD**									
Chloroethane	U	2760	µg/kg	2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0
Trichlorofluoromethane	U	2760	µg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
1,1-Dichloroethene	U	2760	µg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Trans 1,2-Dichloroethene	U	2760	µg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
1,1-Dichloroethane	U	2760	µg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
cis 1,2-Dichloroethene	U	2760	µg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Bromochloromethane	U	2760	µg/kg	5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0
Trichloromethane	U	2760	µg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
1,1,1-Trichloroethane	U	2760	µg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Tetrachloromethane	U	2760	µg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
1,1-Dichloropropene	U	2760	µg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Benzene	U	2760	µg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
1,2-Dichloroethane	U	2760	µg/kg	2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0
Trichloroethene	N	2760	µg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
1,2-Dichloropropane	U	2760	µg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Dibromomethane	U	2760	µg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Bromodichloromethane	U	2760	µg/kg	5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0
cis-1,3-Dichloropropene	N	2760	µg/kg	10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10
Toluene	U	2760	µg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Trans-1,3-Dichloropropene	N	2760	µg/kg	10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10
1,1,2-Trichloroethane	U	2760	µg/kg	10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10
Tetrachloroethene	U	2760	µg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
1,3-Dichloropropane	U	2760	µg/kg	2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0
Dibromochloromethane	U	2760	µg/kg	10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10
1,2-Dibromoethane	U	2760	µg/kg	5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0
Chlorobenzene	U	2760	µg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
1,1,1,2-Tetrachloroethane	U	2760	µg/kg	2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0
Ethylbenzene	U	2760	µg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
m & p-Xylene	U	2760	µg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
o-Xylene	U	2760	µg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Styrene	U	2760	µg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Tribromomethane	U	2760	µg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Isopropylbenzene	U	2760	µg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Bromobenzene	U	2760	µg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
1,2,3-Trichloropropane	N	2760	µg/kg	50	< 50	< 50	< 50	< 50	< 50	< 50	< 50	< 50	< 50
N-Propylbenzene	U	2760	µg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
2-Chlorotoluene	U	2760	µg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
1,3,5-Trimethylbenzene	U	2760	µg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
4-Chlorotoluene	U	2760	µg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0

Results - Soil

Project: Varley Street

Client: EnviroSolution	**Chemtest Job No.:**				22-02360	22-02360	22-02360	22-02360	22-02360	22-02360	22-02360	22-02360	22-02360
Quotation No.:	**Chemtest Sample ID.:**				1357375	1357376	1357377	1357378	1357379	1357380	1357381	1357382	1357383
	Sample Location:				TP1	TP1	TP2	TP3	TP3	TP4	TP5	TP5	TP6
	Sample Type:				SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL
	Top Depth (m):				0.3	1.3	0.3	0.3	1.0	0.3	0.3	1.5	0.3
	Date Sampled:				17-Jan-2022	17-Jan-2022	17-Jan-2022	17-Jan-2022	17-Jan-2022	17-Jan-2022	17-Jan-2022	17-Jan-2022	17-Jan-2022
	Asbestos Lab:				COVENTRY		COVENTRY	COVENTRY		COVENTRY	COVENTRY		COVENTRY
Determinand	**Accred.**	**SOP**	**Units**	**LOD**									
Tert-Butylbenzene	U	2760	µg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
1,2,4-Trimethylbenzene	U	2760	µg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Sec-Butylbenzene	U	2760	µg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
1,3-Dichlorobenzene	U	2760	µg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
4-Isopropyltoluene	U	2760	µg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
1,4-Dichlorobenzene	U	2760	µg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
N-Butylbenzene	U	2760	µg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
1,2-Dichlorobenzene	U	2760	µg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
1,2-Dibromo-3-Chloropropane	U	2760	µg/kg	50	< 50	< 50	< 50	< 50	< 50	< 50	< 50	< 50	< 50
1,2,4-Trichlorobenzene	U	2760	µg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Hexachlorobutadiene	U	2760	µg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
1,2,3-Trichlorobenzene	U	2760	µg/kg	2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0
Methyl Tert-Butyl Ether	U	2760	µg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
N-Nitrosodimethylamine	U	2790	mg/kg	0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
Phenol	U	2790	mg/kg	0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
2-Chlorophenol	U	2790	mg/kg	0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
Bis-(2-Chloroethyl)Ether	U	2790	mg/kg	0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
1,3-Dichlorobenzene	U	2790	mg/kg	0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
1,4-Dichlorobenzene	N	2790	mg/kg	0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
1,2-Dichlorobenzene	U	2790	mg/kg	0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
2-Methylphenol	U	2790	mg/kg	0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
Bis(2-Chloroisopropyl)Ether	U	2790	mg/kg	0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
Hexachloroethane	N	2790	mg/kg	0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
N-Nitrosodi-n-propylamine	U	2790	mg/kg	0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
4-Methylphenol	U	2790	mg/kg	0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
Nitrobenzene	U	2790	mg/kg	0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
Isophorone	U	2790	mg/kg	0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
2-Nitrophenol	N	2790	mg/kg	0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
2,4-Dimethylphenol	N	2790	mg/kg	0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
Bis(2-Chloroethoxy)Methane	U	2790	mg/kg	0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
2,4-Dichlorophenol	U	2790	mg/kg	0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
1,2,4-Trichlorobenzene	U	2790	mg/kg	0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
Naphthalene	U	2790	mg/kg	0.50	1.6	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	2.4	< 0.50	< 0.50
4-Chloroaniline	N	2790	mg/kg	0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
Hexachlorobutadiene	U	2790	mg/kg	0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
4-Chloro-3-Methylphenol	U	2790	mg/kg	0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
2-Methylnaphthalene	U	2790	mg/kg	0.50	1.9	< 0.50	0.82	< 0.50	< 0.50	0.60	2.9	< 0.50	< 0.50
4-Nitrophenol	N	2790	mg/kg	0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
Hexachlorocyclopentadiene	N	2790	mg/kg	0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50

Results - Soil

Project: Varley Street

Client: EnviroSolution	**Chemtest Job No.:**				22-02360	22-02360	22-02360	22-02360	22-02360	22-02360	22-02360	22-02360	22-02360
Quotation No.:	**Chemtest Sample ID.:**				1357375	1357376	1357377	1357378	1357379	1357380	1357381	1357382	1357383
	Sample Location:				TP1	TP1	TP2	TP3	TP3	TP4	TP5	TP5	TP6
	Sample Type:				SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL
	Top Depth (m):				0.3	1.3	0.3	0.3	1.0	0.3	0.3	1.5	0.3
	Date Sampled:				17-Jan-2022	17-Jan-2022	17-Jan-2022	17-Jan-2022	17-Jan-2022	17-Jan-2022	17-Jan-2022	17-Jan-2022	17-Jan-2022
	Asbestos Lab:				COVENTRY		COVENTRY	COVENTRY		COVENTRY	COVENTRY		COVENTRY
Determinand	**Accred.**	**SOP**	**Units**	**LOD**									
2,4,6-Trichlorophenol	U	2790	mg/kg	0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
2,4,5-Trichlorophenol	U	2790	mg/kg	0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
2-Chloronaphthalene	U	2790	mg/kg	0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
2-Nitroaniline	U	2790	mg/kg	0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
Acenaphthylene	U	2790	mg/kg	0.50	0.61	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	1.3	< 0.50	< 0.50
Dimethylphthalate	U	2790	mg/kg	0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
2,6-Dinitrotoluene	U	2790	mg/kg	0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
Acenaphthene	U	2790	mg/kg	0.50	6.0	2.6	2.2	1.1	< 0.50	2.1	9.0	< 0.50	< 0.50
3-Nitroaniline	N	2790	mg/kg	0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
Dibenzofuran	U	2790	mg/kg	0.50	2.9	2.5	0.94	0.71	< 0.50	1.0	4.8	< 0.50	< 0.50
4-Chlorophenylphenylether	U	2790	mg/kg	0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
2,4-Dinitrotoluene	U	2790	mg/kg	0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
Fluorene	U	2790	mg/kg	0.50	4.0	1.7	1.5	1.0	< 0.50	1.6	8.3	< 0.50	< 0.50
Diethyl Phthalate	U	2790	mg/kg	0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
4-Nitroaniline	U	2790	mg/kg	0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
2-Methyl-4,6-Dinitrophenol	N	2790	mg/kg	0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
Azobenzene	U	2790	mg/kg	0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
4-Bromophenylphenyl Ether	U	2790	mg/kg	0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
Hexachlorobenzene	U	2790	mg/kg	0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
Pentachlorophenol	N	2790	mg/kg	0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
Phenanthrene	U	2790	mg/kg	0.50	42	9.1	13	8.2	< 0.50	14	66	2.6	< 0.50
Anthracene	U	2790	mg/kg	0.50	11	1.7	2.5	2.1	< 0.50	3.9	16	< 0.50	< 0.50
Carbazole	U	2790	mg/kg	0.50	2.4	< 0.50	0.62	< 0.50	< 0.50	0.78	3.0	< 0.50	< 0.50
Di-N-Butyl Phthalate	U	2790	mg/kg	0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
Fluoranthene	U	2790	mg/kg	0.50	60	3.4	19	14	< 0.50	25	88	3.9	< 0.50
Pyrene	U	2790	mg/kg	0.50	54	2.5	16	13	< 0.50	22	87	4.2	< 0.50
Butylbenzyl Phthalate	U	2790	mg/kg	0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
Benzo[a]anthracene	U	2790	mg/kg	0.50	22	< 0.50	5.8	4.9	< 0.50	9.0	33	2.0	< 0.50
Chrysene	U	2790	mg/kg	0.50	27	< 0.50	7.0	6.6	< 0.50	11	38	1.9	< 0.50
Bis(2-Ethylhexyl)Phthalate	N	2790	mg/kg	0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
Di-N-Octyl Phthalate	U	2790	mg/kg	0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
Benzo[b]fluoranthene	U	2790	mg/kg	0.50	30	< 0.50	8.0	7.5	< 0.50	13	43	1.9	< 0.50
Benzo[k]fluoranthene	U	2790	mg/kg	0.50	10	< 0.50	2.6	2.4	< 0.50	5.1	14	< 0.50	< 0.50
Benzo[a]pyrene	U	2790	mg/kg	0.50	24	< 0.50	5.9	5.7	< 0.50	10	35	1.4	< 0.50
Indeno(1,2,3-c,d)Pyrene	U	2790	mg/kg	0.50	12	< 0.50	2.8	3.2	< 0.50	5.0	16	< 0.50	< 0.50
Dibenz(a,h)Anthracene	U	2790	mg/kg	0.50	3.1	< 0.50	0.80	0.62	< 0.50	1.4	4.3	< 0.50	< 0.50
Benzo[g,h,i]perylene	U	2790	mg/kg	0.50	13	< 0.50	3.0	3.3	< 0.50	5.9	17	0.71	< 0.50

Results - Soil

Project: Varley Street

Client: EnviroSolution				**Chemtest Job No.:**	22-02360	22-02360	22-02360	22-02360	22-02360	22-02360	22-02360	22-02360	22-02360
Quotation No.:				**Chemtest Sample ID.:**	1357384	1357385	1357386	1357387	1357388	1357389	1357390	1357391	1357392
				Sample Location:	TP7	TP8	TP8	TP9	TP10	TP10	TP11	TP12	TP13
				Sample Type:	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL
				Top Depth (m):	0.3	0.3	1.5	0.3	0.3	0.7	0.3	0.5	0.3
				Date Sampled:	17-Jan-2022	17-Jan-2022	17-Jan-2022	17-Jan-2022	17-Jan-2022	17-Jan-2022	17-Jan-2022	17-Jan-2022	17-Jan-2022
				Asbestos Lab:	COVENTRY	COVENTRY		COVENTRY	COVENTRY		COVENTRY	COVENTRY	COVENTRY
Determinand	**Accred.**	**SOP**	**Units**	**LOD**									
ACM Type	U	2192		N/A	-	-		-	-		-	-	-
Asbestos Identification	U	2192		N/A	No Asbestos Detected	No Asbestos Detected		No Asbestos Detected	No Asbestos Detected		No Asbestos Detected	No Asbestos Detected	No Asbestos Detected
Asbestos by Gravimetry	U	2192	%	0.001									
Total Asbestos	U	2192	%	0.001									
Moisture	N	2030	%	0.020	17	18	28	17	18	23	21	15	21
pH	U	2010		4.0	8.6	8.3	7.8	8.0	8.3	7.3	8.0	8.4	8.4
Arsenic	U	2450	mg/kg	1.0	62	39	89	42	73	11	40	33	14
Cadmium	U	2450	mg/kg	0.10	0.38	0.31	12	0.60	0.48	< 0.10	1.4	1.0	0.22
Chromium	U	2450	mg/kg	1.0	18	17	14	24	29	17	16	14	16
Copper	U	2450	mg/kg	0.50	120	140	2100	110	170	11	140	75	28
Mercury	U	2450	mg/kg	0.10	0.29	0.54	0.51	1.7	0.92	< 0.10	0.51	0.43	0.18
Nickel	U	2450	mg/kg	0.50	29	30	26	30	35	12	22	18	20
Lead	U	2450	mg/kg	0.50	350	230	5300	380	480	17	190	180	85
Selenium	U	2450	mg/kg	0.20	0.55	0.59	1.3	1.2	0.62	< 0.20	0.41	0.37	0.27
Zinc	U	2450	mg/kg	0.50	130	110	520	200	180	27	270	210	58
Aliphatic TPH >C5-C6	N	2680	mg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Aliphatic TPH >C6-C8	N	2680	mg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Aliphatic TPH >C8-C10	U	2680	mg/kg	1.0	7.2	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Aliphatic TPH >C10-C12	U	2680	mg/kg	1.0	34	12	< 1.0	< 1.0	13	< 1.0	10	< 1.0	10
Aliphatic TPH >C12-C16	U	2680	mg/kg	1.0	59	46	< 1.0	< 1.0	17	< 1.0	14	< 1.0	18
Aliphatic TPH >C16-C21	U	2680	mg/kg	1.0	44	51	< 1.0	< 1.0	25	< 1.0	< 1.0	< 1.0	15
Aliphatic TPH >C21-C35	U	2680	mg/kg	1.0	160	170	20	48	110	< 1.0	79	33	120
Aliphatic TPH >C35-C44	N	2680	mg/kg	1.0	170	120	< 1.0	< 1.0	56	< 1.0	41	< 1.0	64
Total Aliphatic Hydrocarbons	N	2680	mg/kg	5.0	470	400	20	48	220	< 5.0	140	33	230
Aromatic TPH >C5-C7	N	2680	mg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Aromatic TPH >C7-C8	N	2680	mg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Aromatic TPH >C8-C10	U	2680	mg/kg	1.0	7.4	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Aromatic TPH >C10-C12	U	2680	mg/kg	1.0	61	70	< 1.0	< 1.0	< 1.0	< 1.0	13	< 1.0	20
Aromatic TPH >C12-C16	U	2680	mg/kg	1.0	460	390	< 1.0	13	130	< 1.0	87	< 1.0	170
Aromatic TPH >C16-C21	U	2680	mg/kg	1.0	2000	1200	14	130	670	< 1.0	250	100	740
Aromatic TPH >C21-C35	U	2680	mg/kg	1.0	5700	3800	69	600	1800	< 1.0	990	470	2500
Aromatic TPH >C35-C44	N	2680	mg/kg	1.0	370	190	< 1.0	< 1.0	62	< 1.0	< 1.0	< 1.0	98
Total Aromatic Hydrocarbons	N	2680	mg/kg	5.0	8600	5700	82	740	2700	< 5.0	1300	570	3600
Total Petroleum Hydrocarbons	N	2680	mg/kg	10.0	9100	6100	100	790	2900	< 10	1500	600	3800
Dichlorodifluoromethane	U	2760	µg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Chloromethane	U	2760	µg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Vinyl Chloride	U	2760	µg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Bromomethane	U	2760	µg/kg	20	< 20	< 20	< 20	< 20	< 20	< 20	< 20	< 20	< 20

Results - Soil

Project: Varley Street

Client: EnviroSolution				**Chemtest Job No.:**	22-02360	22-02360	22-02360	22-02360	22-02360	22-02360	22-02360	22-02360	22-02360
Quotation No.:				**Chemtest Sample ID.:**	1357384	1357385	1357386	1357387	1357388	1357389	1357390	1357391	1357392
				Sample Location:	TP7	TP8	TP8	TP9	TP10	TP10	TP11	TP12	TP13
				Sample Type:	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL
				Top Depth (m):	0.3	0.3	1.5	0.3	0.3	0.7	0.3	0.5	0.3
				Date Sampled:	17-Jan-2022	17-Jan-2022	17-Jan-2022	17-Jan-2022	17-Jan-2022	17-Jan-2022	17-Jan-2022	17-Jan-2022	17-Jan-2022
				Asbestos Lab:	COVENTRY	COVENTRY		COVENTRY	COVENTRY		COVENTRY	COVENTRY	COVENTRY
Determinand	**Accred.**	**SOP**	**Units**	**LOD**									
Chloroethane	U	2760	µg/kg	2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0
Trichlorofluoromethane	U	2760	µg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
1,1-Dichloroethene	U	2760	µg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Trans 1,2-Dichloroethene	U	2760	µg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
1,1-Dichloroethane	U	2760	µg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
cis 1,2-Dichloroethene	U	2760	µg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Bromochloromethane	U	2760	µg/kg	5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0
Trichloromethane	U	2760	µg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	5.9	8.2
1,1,1-Trichloroethane	U	2760	µg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Tetrachloromethane	U	2760	µg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
1,1-Dichloropropene	U	2760	µg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Benzene	U	2760	µg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
1,2-Dichloroethane	U	2760	µg/kg	2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	27	< 2.0	26	28
Trichloroethene	N	2760	µg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
1,2-Dichloropropane	U	2760	µg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Dibromomethane	U	2760	µg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Bromodichloromethane	U	2760	µg/kg	5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0
cis-1,3-Dichloropropene	N	2760	µg/kg	10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10
Toluene	U	2760	µg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Trans-1,3-Dichloropropene	N	2760	µg/kg	10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10
1,1,2-Trichloroethane	U	2760	µg/kg	10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10
Tetrachloroethene	U	2760	µg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
1,3-Dichloropropane	U	2760	µg/kg	2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0
Dibromochloromethane	U	2760	µg/kg	10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10
1,2-Dibromoethane	U	2760	µg/kg	5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0
Chlorobenzene	U	2760	µg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
1,1,1,2-Tetrachloroethane	U	2760	µg/kg	2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0
Ethylbenzene	U	2760	µg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	3.9	< 1.0
m & p-Xylene	U	2760	µg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	13	< 1.0
o-Xylene	U	2760	µg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	9.3	7.0
Styrene	U	2760	µg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	2.7
Tribromomethane	U	2760	µg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	13
Isopropylbenzene	U	2760	µg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	1.5	2.7
Bromobenzene	U	2760	µg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
1,2,3-Trichloropropane	N	2760	µg/kg	50	< 50	< 50	< 50	< 50	< 50	< 50	< 50	< 50	< 50
N-Propylbenzene	U	2760	µg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	15	13
2-Chlorotoluene	U	2760	µg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
1,3,5-Trimethylbenzene	U	2760	µg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	8.6	12
4-Chlorotoluene	U	2760	µg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0

Results - Soil

Project: Varley Street

Client: EnviroSolution	**Chemtest Job No.:**				22-02360	22-02360	22-02360	22-02360	22-02360	22-02360	22-02360	22-02360	22-02360
Quotation No.:	**Chemtest Sample ID.:**				1357384	1357385	1357386	1357387	1357388	1357389	1357390	1357391	1357392
	Sample Location:				TP7	TP8	TP8	TP9	TP10	TP10	TP11	TP12	TP13
	Sample Type:				SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL
	Top Depth (m):				0.3	0.3	1.5	0.3	0.3	0.7	0.3	0.5	0.3
	Date Sampled:				17-Jan-2022	17-Jan-2022	17-Jan-2022	17-Jan-2022	17-Jan-2022	17-Jan-2022	17-Jan-2022	17-Jan-2022	17-Jan-2022
	Asbestos Lab:				COVENTRY	COVENTRY		COVENTRY	COVENTRY		COVENTRY	COVENTRY	COVENTRY
Determinand	**Accred.**	**SOP**	**Units**	**LOD**									
Tert-Butylbenzene	U	2760	µg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
1,2,4-Trimethylbenzene	U	2760	µg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	18	17
Sec-Butylbenzene	U	2760	µg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
1,3-Dichlorobenzene	U	2760	µg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
4-Isopropyltoluene	U	2760	µg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
1,4-Dichlorobenzene	U	2760	µg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
N-Butylbenzene	U	2760	µg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
1,2-Dichlorobenzene	U	2760	µg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
1,2-Dibromo-3-Chloropropane	U	2760	µg/kg	50	< 50	< 50	< 50	< 50	< 50	< 50	< 50	< 50	< 50
1,2,4-Trichlorobenzene	U	2760	µg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Hexachlorobutadiene	U	2760	µg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
1,2,3-Trichlorobenzene	U	2760	µg/kg	2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	9.9	< 2.0	< 2.0
Methyl Tert-Butyl Ether	U	2760	µg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
N-Nitrosodimethylamine	U	2790	mg/kg	0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
Phenol	U	2790	mg/kg	0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
2-Chlorophenol	U	2790	mg/kg	0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
Bis-(2-Chloroethyl)Ether	U	2790	mg/kg	0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
1,3-Dichlorobenzene	U	2790	mg/kg	0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
1,4-Dichlorobenzene	N	2790	mg/kg	0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
1,2-Dichlorobenzene	U	2790	mg/kg	0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
2-Methylphenol	U	2790	mg/kg	0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
Bis(2-Chloroisopropyl)Ether	U	2790	mg/kg	0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
Hexachloroethane	N	2790	mg/kg	0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
N-Nitrosodi-n-propylamine	U	2790	mg/kg	0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
4-Methylphenol	U	2790	mg/kg	0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
Nitrobenzene	U	2790	mg/kg	0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
Isophorone	U	2790	mg/kg	0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
2-Nitrophenol	N	2790	mg/kg	0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
2,4-Dimethylphenol	N	2790	mg/kg	0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
Bis(2-Chloroethoxy)Methane	U	2790	mg/kg	0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
2,4-Dichlorophenol	U	2790	mg/kg	0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
1,2,4-Trichlorobenzene	U	2790	mg/kg	0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
Naphthalene	U	2790	mg/kg	0.50	1.3	< 0.50	< 0.50	0.94	0.67	< 0.50	< 0.50	1.5	< 0.50
4-Chloroaniline	N	2790	mg/kg	0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	3.0
Hexachlorobutadiene	U	2790	mg/kg	0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
4-Chloro-3-Methylphenol	U	2790	mg/kg	0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
2-Methylnaphthalene	U	2790	mg/kg	0.50	1.6	< 0.50	< 0.50	1.2	< 0.50	< 0.50	< 0.50	< 0.50	2.0
4-Nitrophenol	N	2790	mg/kg	0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
Hexachlorocyclopentadiene	N	2790	mg/kg	0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50

Results - Soil

Project: Varley Street

Client: EnviroSolution	**Chemtest Job No.:**				22-02360	22-02360	22-02360	22-02360	22-02360	22-02360	22-02360	22-02360	22-02360
Quotation No.:	**Chemtest Sample ID.:**				1357384	1357385	1357386	1357387	1357388	1357389	1357390	1357391	1357392
	Sample Location:				TP7	TP8	TP8	TP9	TP10	TP10	TP11	TP12	TP13
	Sample Type:				SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL
	Top Depth (m):				0.3	0.3	1.5	0.3	0.3	0.7	0.3	0.5	0.3
	Date Sampled:				17-Jan-2022	17-Jan-2022	17-Jan-2022	17-Jan-2022	17-Jan-2022	17-Jan-2022	17-Jan-2022	17-Jan-2022	17-Jan-2022
	Asbestos Lab:				COVENTRY	COVENTRY		COVENTRY	COVENTRY		COVENTRY	COVENTRY	COVENTRY
Determinand	**Accred.**	**SOP**	**Units**	**LOD**									
2,4,6-Trichlorophenol	U	2790	mg/kg	0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
2,4,5-Trichlorophenol	U	2790	mg/kg	0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
2-Chloronaphthalene	U	2790	mg/kg	0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
2-Nitroaniline	U	2790	mg/kg	0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
Acenaphthylene	U	2790	mg/kg	0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
Dimethylphthalate	U	2790	mg/kg	0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
2,6-Dinitrotoluene	U	2790	mg/kg	0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
Acenaphthene	U	2790	mg/kg	0.50	5.4	1.3	< 0.50	3.1	1.8	< 0.50	< 0.50	2.0	6.4
3-Nitroaniline	N	2790	mg/kg	0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
Dibenzofuran	U	2790	mg/kg	0.50	2.4	< 0.50	< 0.50	1.6	0.75	< 0.50	< 0.50	0.92	3.0
4-Chlorophenylphenylether	U	2790	mg/kg	0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
2,4-Dinitrotoluene	U	2790	mg/kg	0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
Fluorene	U	2790	mg/kg	0.50	3.8	0.92	< 0.50	2.3	1.3	< 0.50	< 0.50	1.3	4.7
Diethyl Phthalate	U	2790	mg/kg	0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
4-Nitroaniline	U	2790	mg/kg	0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
2-Methyl-4,6-Dinitrophenol	N	2790	mg/kg	0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
Azobenzene	U	2790	mg/kg	0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
4-Bromophenylphenyl Ether	U	2790	mg/kg	0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
Hexachlorobenzene	U	2790	mg/kg	0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
Pentachlorophenol	N	2790	mg/kg	0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
Phenanthrene	U	2790	mg/kg	0.50	30	8.0	2.0	21	15	< 0.50	4.1	41	44
Anthracene	U	2790	mg/kg	0.50	6.0	1.9	< 0.50	4.8	3.4	< 0.50	1.0	3.4	10
Carbazole	U	2790	mg/kg	0.50	< 0.50	< 0.50	< 0.50	1.4	0.99	< 0.50	< 0.50	1.3	3.4
Di-N-Butyl Phthalate	U	2790	mg/kg	0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
Fluoranthene	U	2790	mg/kg	0.50	38	12	2.4	26	24	< 0.50	6.5	26	61
Pyrene	U	2790	mg/kg	0.50	33	12	2.5	24	21	< 0.50	6.1	24	56
Butylbenzyl Phthalate	U	2790	mg/kg	0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
Benzo[a]anthracene	U	2790	mg/kg	0.50	11	4.5	1.4	9.0	12	< 0.50	2.3	11	21
Chrysene	U	2790	mg/kg	0.50	13	6.1	1.3	12	11	< 0.50	3.0	12	25
Bis(2-Ethylhexyl)Phthalate	N	2790	mg/kg	0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
Di-N-Octyl Phthalate	U	2790	mg/kg	0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
Benzo[b]fluoranthene	U	2790	mg/kg	0.50	14	7.0	1.3	13	12	< 0.50	3.3	13	27
Benzo[k]fluoranthene	U	2790	mg/kg	0.50	1.7	2.2	< 0.50	4.3	4.1	< 0.50	1.1	4.2	9.1
Benzo[a]pyrene	U	2790	mg/kg	0.50	4.6	5.5	1.1	11	10	< 0.50	2.5	9.8	20
Indeno(1,2,3-c,d)Pyrene	U	2790	mg/kg	0.50	1.3	3.0	< 0.50	5.6	5.0	< 0.50	1.4	4.8	8.8
Dibenz(a,h)Anthracene	U	2790	mg/kg	0.50	4.7	0.62	< 0.50	1.2	1.4	< 0.50	< 0.50	1.3	1.9
Benzo[g,h,i]perylene	U	2790	mg/kg	0.50	4.7	3.4	< 0.50	6.2	5.6	< 0.50	1.1	5.5	9.3

Results - Soil

Project: Varley Street

Client: EnviroSolution	**Chemtest Job No.:**				22-02360	22-02360	22-02360	22-02360	22-02360	22-02360	22-02360	22-02360	22-02360
Quotation No.:	**Chemtest Sample ID.:**				1357393	1357394	1357395	1357396	1357397	1357398	1357399	1357400	1357401
	Sample Location:				TP13	TP14	TP14	TP15	TP16	TP17	TP18	TP18	TP19
	Sample Type:				SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL
	Top Depth (m):				0.8	0.3	1.0	0.3	0.3	0.3	0.3	1.2	0.3
	Date Sampled:				17-Jan-2022	17-Jan-2022	17-Jan-2022	17-Jan-2022	17-Jan-2022	17-Jan-2022	17-Jan-2022	17-Jan-2022	17-Jan-2022
	Asbestos Lab:					COVENTRY		COVENTRY	NEW-ASB	COVENTRY	COVENTRY		COVENTRY
Determinand	**Accred.**	**SOP**	**Units**	**LOD**									
ACM Type	U	2192		N/A		-		-	-	-	-		Fibres/Clumps
Asbestos Identification	U	2192		N/A		No Asbestos Detected		No Asbestos Detected	No Asbestos Detected	No Asbestos Detected	No Asbestos Detected		Chrysotile
Asbestos by Gravimetry	U	2192	%	0.001									0.015
Total Asbestos	U	2192	%	0.001									0.015
Moisture	N	2030	%	0.020	28	16	23	17	17	16	18	22	16
pH	U	2010		4.0	8.0	8.3	8.1	8.2	8.2	8.3	8.4	8.0	8.5
Arsenic	U	2450	mg/kg	1.0	90	120	940	83	77	61	93	8.7	87
Cadmium	U	2450	mg/kg	0.10	3.1	0.51	0.29	0.74	0.86	1.0	0.67	< 0.10	0.26
Chromium	U	2450	mg/kg	1.0	60	20	13	16	32	23	22	26	72
Copper	U	2450	mg/kg	0.50	23	120	160	93	210	140	160	26	210
Mercury	U	2450	mg/kg	0.10	3.8	0.62	8.5	0.50	0.76	0.80	0.86	< 0.10	1.9
Nickel	U	2450	mg/kg	0.50	29	27	25	24	42	35	37	30	82
Lead	U	2450	mg/kg	0.50	67	330	650	400	650	430	410	30	1800
Selenium	U	2450	mg/kg	0.20	< 0.20	0.61	1.7	0.36	0.73	0.57	0.79	< 0.20	0.56
Zinc	U	2450	mg/kg	0.50	61	190	140	210	270	370	260	50	350
Aliphatic TPH >C5-C6	N	2680	mg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Aliphatic TPH >C6-C8	N	2680	mg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Aliphatic TPH >C8-C10	U	2680	mg/kg	1.0	< 1.0	< 1.0	7.1	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Aliphatic TPH >C10-C12	U	2680	mg/kg	1.0	< 1.0	14	72	9.2	14	10	11	< 1.0	< 1.0
Aliphatic TPH >C12-C16	U	2680	mg/kg	1.0	< 1.0	39	130	13	17	19	17	< 1.0	< 1.0
Aliphatic TPH >C16-C21	U	2680	mg/kg	1.0	< 1.0	42	84	< 1.0	40	13	< 1.0	< 1.0	< 1.0
Aliphatic TPH >C21-C35	U	2680	mg/kg	1.0	< 1.0	160	210	110	190	190	98	< 1.0	< 1.0
Aliphatic TPH >C35-C44	N	2680	mg/kg	1.0	< 1.0	66	37	47	56	54	< 1.0	< 1.0	< 1.0
Total Aliphatic Hydrocarbons	N	2680	mg/kg	5.0	< 5.0	320	540	180	320	290	130	< 5.0	< 5.0
Aromatic TPH >C5-C7	N	2680	mg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Aromatic TPH >C7-C8	N	2680	mg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Aromatic TPH >C8-C10	U	2680	mg/kg	1.0	< 1.0	< 1.0	24	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Aromatic TPH >C10-C12	U	2680	mg/kg	1.0	< 1.0	27	7400	14	12	11	8.1	< 1.0	< 1.0
Aromatic TPH >C12-C16	U	2680	mg/kg	1.0	< 1.0	200	2500	63	86	130	47	< 1.0	< 1.0
Aromatic TPH >C16-C21	U	2680	mg/kg	1.0	< 1.0	720	5900	320	510	440	220	< 1.0	150
Aromatic TPH >C21-C35	U	2680	mg/kg	1.0	< 1.0	2200	3900	1200	1900	1700	990	< 1.0	790
Aromatic TPH >C35-C44	N	2680	mg/kg	1.0	< 1.0	71	49	< 1.0	73	80	< 1.0	< 1.0	< 1.0
Total Aromatic Hydrocarbons	N	2680	mg/kg	5.0	< 5.0	3200	20000	1600	2600	2400	1300	< 5.0	940
Total Petroleum Hydrocarbons	N	2680	mg/kg	10.0	< 10	3600	20000	1800	2900	2700	1400	< 10	940
Dichlorodifluoromethane	U	2760	µg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Chloromethane	U	2760	µg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Vinyl Chloride	U	2760	µg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Bromomethane	U	2760	µg/kg	20	< 20	< 20	< 20	< 20	< 20	< 20	< 20	< 20	< 20

Results - Soil

Project: Varley Street

Client: EnviroSolution	**Chemtest Job No.:**				22-02360	22-02360	22-02360	22-02360	22-02360	22-02360	22-02360	22-02360	22-02360
Quotation No.:	**Chemtest Sample ID.:**				1357393	1357394	1357395	1357396	1357397	1357398	1357399	1357400	1357401
	Sample Location:				TP13	TP14	TP14	TP15	TP16	TP17	TP18	TP18	TP19
	Sample Type:				SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL
	Top Depth (m):				0.8	0.3	1.0	0.3	0.3	0.3	0.3	1.2	0.3
	Date Sampled:				17-Jan-2022	17-Jan-2022	17-Jan-2022	17-Jan-2022	17-Jan-2022	17-Jan-2022	17-Jan-2022	17-Jan-2022	17-Jan-2022
	Asbestos Lab:					COVENTRY		COVENTRY	NEW-ASB	COVENTRY	COVENTRY		COVENTRY
Determinand	**Accred.**	**SOP**	**Units**	**LOD**									
Chloroethane	U	2760	µg/kg	2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0
Trichlorofluoromethane	U	2760	µg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
1,1-Dichloroethene	U	2760	µg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Trans 1,2-Dichloroethene	U	2760	µg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
1,1-Dichloroethane	U	2760	µg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
cis 1,2-Dichloroethene	U	2760	µg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Bromochloromethane	U	2760	µg/kg	5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0
Trichloromethane	U	2760	µg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	7.2	< 1.0	< 1.0	6.3
1,1,1-Trichloroethane	U	2760	µg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Tetrachloromethane	U	2760	µg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
1,1-Dichloropropene	U	2760	µg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Benzene	U	2760	µg/kg	1.0	< 1.0	< 1.0	95	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
1,2-Dichloroethane	U	2760	µg/kg	2.0	< 2.0	< 2.0	25	< 2.0	< 2.0	2.5	< 2.0	< 2.0	< 2.0
Trichloroethene	N	2760	µg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
1,2-Dichloropropane	U	2760	µg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Dibromomethane	U	2760	µg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Bromodichloromethane	U	2760	µg/kg	5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0
cis-1,3-Dichloropropene	N	2760	µg/kg	10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10
Toluene	U	2760	µg/kg	1.0	< 1.0	< 1.0	110	< 1.0	< 1.0	3.7	< 1.0	< 1.0	< 1.0
Trans-1,3-Dichloropropene	N	2760	µg/kg	10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10
1,1,2-Trichloroethane	U	2760	µg/kg	10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10
Tetrachloroethene	U	2760	µg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
1,3-Dichloropropane	U	2760	µg/kg	2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0
Dibromochloromethane	U	2760	µg/kg	10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10
1,2-Dibromoethane	U	2760	µg/kg	5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0
Chlorobenzene	U	2760	µg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
1,1,1,2-Tetrachloroethane	U	2760	µg/kg	2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0
Ethylbenzene	U	2760	µg/kg	1.0	< 1.0	< 1.0	80	< 1.0	< 1.0	7.1	< 1.0	< 1.0	< 1.0
m & p-Xylene	U	2760	µg/kg	1.0	< 1.0	< 1.0	100	< 1.0	< 1.0	9.8	< 1.0	< 1.0	< 1.0
o-Xylene	U	2760	µg/kg	1.0	< 1.0	< 1.0	120	< 1.0	< 1.0	7.2	< 1.0	< 1.0	< 1.0
Styrene	U	2760	µg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Tribromomethane	U	2760	µg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Isopropylbenzene	U	2760	µg/kg	1.0	< 1.0	< 1.0	70	< 1.0	< 1.0	2.0	< 1.0	< 1.0	< 1.0
Bromobenzene	U	2760	µg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
1,2,3-Trichloropropane	N	2760	µg/kg	50	< 50	< 50	< 50	< 50	< 50	< 50	< 50	< 50	< 50
N-Propylbenzene	U	2760	µg/kg	1.0	< 1.0	< 1.0	180	< 1.0	< 1.0	12	< 1.0	< 1.0	< 1.0
2-Chlorotoluene	U	2760	µg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
1,3,5-Trimethylbenzene	U	2760	µg/kg	1.0	< 1.0	< 1.0	220	< 1.0	< 1.0	6.2	< 1.0	< 1.0	< 1.0
4-Chlorotoluene	U	2760	µg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0

Results - Soil

Project: Varley Street

Client: EnviroSolution	**Chemtest Job No.:**				22-02360	22-02360	22-02360	22-02360	22-02360	22-02360	22-02360	22-02360	22-02360
Quotation No.:	**Chemtest Sample ID.:**				1357393	1357394	1357395	1357396	1357397	1357398	1357399	1357400	1357401
	Sample Location:				TP13	TP14	TP14	TP15	TP16	TP17	TP18	TP18	TP19
	Sample Type:				SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL
	Top Depth (m):				0.8	0.3	1.0	0.3	0.3	0.3	0.3	1.2	0.3
	Date Sampled:				17-Jan-2022	17-Jan-2022	17-Jan-2022	17-Jan-2022	17-Jan-2022	17-Jan-2022	17-Jan-2022	17-Jan-2022	17-Jan-2022
	Asbestos Lab:					COVENTRY		COVENTRY	NEW-ASB	COVENTRY	COVENTRY		COVENTRY
Determinand	**Accred.**	**SOP**	**Units**	**LOD**									
Tert-Butylbenzene	U	2760	µg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
1,2,4-Trimethylbenzene	U	2760	µg/kg	1.0	< 1.0	< 1.0	140	< 1.0	< 1.0	12	< 1.0	< 1.0	< 1.0
Sec-Butylbenzene	U	2760	µg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
1,3-Dichlorobenzene	U	2760	µg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
4-Isopropyltoluene	U	2760	µg/kg	1.0	< 1.0	< 1.0	37	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
1,4-Dichlorobenzene	U	2760	µg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
N-Butylbenzene	U	2760	µg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
1,2-Dichlorobenzene	U	2760	µg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
1,2-Dibromo-3-Chloropropane	U	2760	µg/kg	50	< 50	< 50	< 50	< 50	< 50	< 50	< 50	< 50	< 50
1,2,4-Trichlorobenzene	U	2760	µg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Hexachlorobutadiene	U	2760	µg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
1,2,3-Trichlorobenzene	U	2760	µg/kg	2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0
Methyl Tert-Butyl Ether	U	2760	µg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
N-Nitrosodimethylamine	U	2790	mg/kg	0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
Phenol	U	2790	mg/kg	0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
2-Chlorophenol	U	2790	mg/kg	0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
Bis-(2-Chloroethyl)Ether	U	2790	mg/kg	0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
1,3-Dichlorobenzene	U	2790	mg/kg	0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
1,4-Dichlorobenzene	N	2790	mg/kg	0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
1,2-Dichlorobenzene	U	2790	mg/kg	0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
2-Methylphenol	U	2790	mg/kg	0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
Bis(2-Chloroisopropyl)Ether	U	2790	mg/kg	0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
Hexachloroethane	N	2790	mg/kg	0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
N-Nitrosodi-n-propylamine	U	2790	mg/kg	0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
4-Methylphenol	U	2790	mg/kg	0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
Nitrobenzene	U	2790	mg/kg	0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
Isophorone	U	2790	mg/kg	0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
2-Nitrophenol	N	2790	mg/kg	0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
2,4-Dimethylphenol	N	2790	mg/kg	0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
Bis(2-Chloroethoxy)Methane	U	2790	mg/kg	0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
2,4-Dichlorophenol	U	2790	mg/kg	0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
1,2,4-Trichlorobenzene	U	2790	mg/kg	0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
Naphthalene	U	2790	mg/kg	0.50	< 0.50	4.8	3000	3.6	3.1	3.6	7.3	< 0.50	1.1
4-Chloroaniline	N	2790	mg/kg	0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
Hexachlorobutadiene	U	2790	mg/kg	0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
4-Chloro-3-Methylphenol	U	2790	mg/kg	0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
2-Methylnaphthalene	U	2790	mg/kg	0.50	< 0.50	3.2	42	1.5	1.7	2.5	8.5	< 0.50	0.99
4-Nitrophenol	N	2790	mg/kg	0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
Hexachlorocyclopentadiene	N	2790	mg/kg	0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50

Results - Soil

Project: Varley Street

Client: EnviroSolution	**Chemtest Job No.:**				22-02360	22-02360	22-02360	22-02360	22-02360	22-02360	22-02360	22-02360	22-02360
Quotation No.:	**Chemtest Sample ID.:**				1357393	1357394	1357395	1357396	1357397	1357398	1357399	1357400	1357401
	Sample Location:				TP13	TP14	TP14	TP15	TP16	TP17	TP18	TP18	TP19
	Sample Type:				SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL
	Top Depth (m):				0.8	0.3	1.0	0.3	0.3	0.3	0.3	1.2	0.3
	Date Sampled:				17-Jan-2022	17-Jan-2022	17-Jan-2022	17-Jan-2022	17-Jan-2022	17-Jan-2022	17-Jan-2022	17-Jan-2022	17-Jan-2022
	Asbestos Lab:					COVENTRY		COVENTRY	NEW-ASB	COVENTRY	COVENTRY		COVENTRY
Determinand	**Accred.**	**SOP**	**Units**	**LOD**									
2,4,6-Trichlorophenol	U	2790	mg/kg	0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
2,4,5-Trichlorophenol	U	2790	mg/kg	0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
2-Chloronaphthalene	U	2790	mg/kg	0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
2-Nitroaniline	U	2790	mg/kg	0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
Acenaphthylene	U	2790	mg/kg	0.50	< 0.50	0.69	1.6	< 0.50	0.70	1.1	< 0.50	< 0.50	0.78
Dimethylphthalate	U	2790	mg/kg	0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
2,6-Dinitrotoluene	U	2790	mg/kg	0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
Acenaphthene	U	2790	mg/kg	0.50	< 0.50	10	95	4.4	5.2	7.2	< 0.50	< 0.50	< 0.50
3-Nitroaniline	N	2790	mg/kg	0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	17	< 0.50	< 0.50
Dibenzofuran	U	2790	mg/kg	0.50	< 0.50	5.0	76	2.2	2.4	3.1	11	< 0.50	1.5
4-Chlorophenylphenylether	U	2790	mg/kg	0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
2,4-Dinitrotoluene	U	2790	mg/kg	0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
Fluorene	U	2790	mg/kg	0.50	< 0.50	7.9	87	3.5	3.9	5.1	13	< 0.50	2.4
Diethyl Phthalate	U	2790	mg/kg	0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
4-Nitroaniline	U	2790	mg/kg	0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
2-Methyl-4,6-Dinitrophenol	N	2790	mg/kg	0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
Azobenzene	U	2790	mg/kg	0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
4-Bromophenylphenyl Ether	U	2790	mg/kg	0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
Hexachlorobenzene	U	2790	mg/kg	0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
Pentachlorophenol	N	2790	mg/kg	0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
Phenanthrene	U	2790	mg/kg	0.50	< 0.50	63	320	35	41	49	93	< 0.50	16
Anthracene	U	2790	mg/kg	0.50	< 0.50	16	44	8.1	10	12	25	< 0.50	5.2
Carbazole	U	2790	mg/kg	0.50	< 0.50	4.8	9.2	2.6	3.4	3.2	4.8	< 0.50	1.0
Di-N-Butyl Phthalate	U	2790	mg/kg	0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
Fluoranthene	U	2790	mg/kg	0.50	< 0.50	80	100	51	59	71	93	< 0.50	23
Pyrene	U	2790	mg/kg	0.50	< 0.50	74	78	50	56	68	80	< 0.50	21
Butylbenzyl Phthalate	U	2790	mg/kg	0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
Benzo[a]anthracene	U	2790	mg/kg	0.50	< 0.50	29	16	19	22	27	30	< 0.50	8.4
Chrysene	U	2790	mg/kg	0.50	< 0.50	35	20	25	28	34	35	< 0.50	11
Bis(2-Ethylhexyl)Phthalate	N	2790	mg/kg	0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
Di-N-Octyl Phthalate	U	2790	mg/kg	0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
Benzo[b]fluoranthene	U	2790	mg/kg	0.50	< 0.50	40	18	28	32	38	37	< 0.50	11
Benzo[k]fluoranthene	U	2790	mg/kg	0.50	< 0.50	14	5.8	8.6	11	13	13	< 0.50	4.2
Benzo[a]pyrene	U	2790	mg/kg	0.50	< 0.50	30	16	23	25	30	29	< 0.50	8.9
Indeno(1,2,3-c,d)Pyrene	U	2790	mg/kg	0.50	< 0.50	15	6.3	10	13	15	13	< 0.50	4.4
Dibenz(a,h)Anthracene	U	2790	mg/kg	0.50	< 0.50	4.4	1.8	2.7	3.4	4.2	3.4	< 0.50	1.1
Benzo[g,h,i]perylene	U	2790	mg/kg	0.50	< 0.50	16	7.5	12	14	16	5.3	< 0.50	4.6

Results - Soil

Project: Varley Street

Client: EnviroSolution				**Chemtest Job No.:**	22-02360	22-02360
Quotation No.:				**Chemtest Sample ID.:**	1357402	1357403
				Sample Location:	WS4	WS6
				Sample Type:	SOIL	SOIL
				Top Depth (m):	3.8	0.6
				Date Sampled:	17-Jan-2022	17-Jan-2022
				Asbestos Lab:		
Determinand	**Accred.**	**SOP**	**Units**	**LOD**		
ACM Type	U	2192		N/A		
Asbestos Identification	U	2192		N/A		
Asbestos by Gravimetry	U	2192	%	0.001		
Total Asbestos	U	2192	%	0.001		
Moisture	N	2030	%	0.020	17	17
pH	U	2010		4.0	8.6	8.3
Arsenic	U	2450	mg/kg	1.0	24	250
Cadmium	U	2450	mg/kg	0.10	0.13	1.0
Chromium	U	2450	mg/kg	1.0	25	15
Copper	U	2450	mg/kg	0.50	27	130
Mercury	U	2450	mg/kg	0.10	0.11	0.64
Nickel	U	2450	mg/kg	0.50	36	27
Lead	U	2450	mg/kg	0.50	52	330
Selenium	U	2450	mg/kg	0.20	0.24	0.71
Zinc	U	2450	mg/kg	0.50	59	400
Aliphatic TPH >C5-C6	N	2680	mg/kg	1.0	< 1.0	< 1.0
Aliphatic TPH >C6-C8	N	2680	mg/kg	1.0	< 1.0	< 1.0
Aliphatic TPH >C8-C10	U	2680	mg/kg	1.0	< 1.0	< 1.0
Aliphatic TPH >C10-C12	U	2680	mg/kg	1.0	< 1.0	< 1.0
Aliphatic TPH >C12-C16	U	2680	mg/kg	1.0	< 1.0	< 1.0
Aliphatic TPH >C16-C21	U	2680	mg/kg	1.0	< 1.0	< 1.0
Aliphatic TPH >C21-C35	U	2680	mg/kg	1.0	< 1.0	< 1.0
Aliphatic TPH >C35-C44	N	2680	mg/kg	1.0	< 1.0	< 1.0
Total Aliphatic Hydrocarbons	N	2680	mg/kg	5.0	< 5.0	< 5.0
Aromatic TPH >C5-C7	N	2680	mg/kg	1.0	< 1.0	< 1.0
Aromatic TPH >C7-C8	N	2680	mg/kg	1.0	< 1.0	< 1.0
Aromatic TPH >C8-C10	U	2680	mg/kg	1.0	< 1.0	< 1.0
Aromatic TPH >C10-C12	U	2680	mg/kg	1.0	< 1.0	< 1.0
Aromatic TPH >C12-C16	U	2680	mg/kg	1.0	< 1.0	< 1.0
Aromatic TPH >C16-C21	U	2680	mg/kg	1.0	< 1.0	< 1.0
Aromatic TPH >C21-C35	U	2680	mg/kg	1.0	< 1.0	< 1.0
Aromatic TPH >C35-C44	N	2680	mg/kg	1.0	< 1.0	< 1.0
Total Aromatic Hydrocarbons	N	2680	mg/kg	5.0	< 5.0	< 5.0
Total Petroleum Hydrocarbons	N	2680	mg/kg	10.0	< 10	< 10
Dichlorodifluoromethane	U	2760	µg/kg	1.0	< 1.0	< 1.0
Chloromethane	U	2760	µg/kg	1.0	< 1.0	< 1.0
Vinyl Chloride	U	2760	µg/kg	1.0	< 1.0	< 1.0
Bromomethane	U	2760	µg/kg	20	< 20	< 20

Results - Soil

Project: Varley Street

Client: EnviroSolution				**Chemtest Job No.:**	22-02360	22-02360
Quotation No.:				**Chemtest Sample ID.:**	1357402	1357403
				Sample Location:	WS4	WS6
				Sample Type:	SOIL	SOIL
				Top Depth (m):	3.8	0.6
				Date Sampled:	17-Jan-2022	17-Jan-2022
				Asbestos Lab:		
Determinand	**Accred.**	**SOP**	**Units**	**LOD**		
Chloroethane	U	2760	µg/kg	2.0	< 2.0	< 2.0
Trichlorofluoromethane	U	2760	µg/kg	1.0	< 1.0	< 1.0
1,1-Dichloroethene	U	2760	µg/kg	1.0	< 1.0	< 1.0
Trans 1,2-Dichloroethene	U	2760	µg/kg	1.0	< 1.0	< 1.0
1,1-Dichloroethane	U	2760	µg/kg	1.0	< 1.0	< 1.0
cis 1,2-Dichloroethene	U	2760	µg/kg	1.0	< 1.0	< 1.0
Bromochloromethane	U	2760	µg/kg	5.0	< 5.0	< 5.0
Trichloromethane	U	2760	µg/kg	1.0	6.3	< 1.0
1,1,1-Trichloroethane	U	2760	µg/kg	1.0	< 1.0	< 1.0
Tetrachloromethane	U	2760	µg/kg	1.0	< 1.0	< 1.0
1,1-Dichloropropene	U	2760	µg/kg	1.0	< 1.0	< 1.0
Benzene	U	2760	µg/kg	1.0	< 1.0	< 1.0
1,2-Dichloroethane	U	2760	µg/kg	2.0	< 2.0	< 2.0
Trichloroethene	N	2760	µg/kg	1.0	< 1.0	< 1.0
1,2-Dichloropropane	U	2760	µg/kg	1.0	< 1.0	< 1.0
Dibromomethane	U	2760	µg/kg	1.0	< 1.0	< 1.0
Bromodichloromethane	U	2760	µg/kg	5.0	< 5.0	< 5.0
cis-1,3-Dichloropropene	N	2760	µg/kg	10	< 10	< 10
Toluene	U	2760	µg/kg	1.0	< 1.0	< 1.0
Trans-1,3-Dichloropropene	N	2760	µg/kg	10	< 10	< 10
1,1,2-Trichloroethane	U	2760	µg/kg	10	< 10	< 10
Tetrachloroethene	U	2760	µg/kg	1.0	< 1.0	< 1.0
1,3-Dichloropropane	U	2760	µg/kg	2.0	3.6	< 2.0
Dibromochloromethane	U	2760	µg/kg	10	< 10	< 10
1,2-Dibromoethane	U	2760	µg/kg	5.0	< 5.0	< 5.0
Chlorobenzene	U	2760	µg/kg	1.0	< 1.0	< 1.0
1,1,1,2-Tetrachloroethane	U	2760	µg/kg	2.0	< 2.0	< 2.0
Ethylbenzene	U	2760	µg/kg	1.0	< 1.0	< 1.0
m & p-Xylene	U	2760	µg/kg	1.0	< 1.0	< 1.0
o-Xylene	U	2760	µg/kg	1.0	< 1.0	< 1.0
Styrene	U	2760	µg/kg	1.0	< 1.0	< 1.0
Tribromomethane	U	2760	µg/kg	1.0	< 1.0	< 1.0
Isopropylbenzene	U	2760	µg/kg	1.0	< 1.0	< 1.0
Bromobenzene	U	2760	µg/kg	1.0	< 1.0	< 1.0
1,2,3-Trichloropropane	N	2760	µg/kg	50	< 50	< 50
N-Propylbenzene	U	2760	µg/kg	1.0	< 1.0	< 1.0
2-Chlorotoluene	U	2760	µg/kg	1.0	< 1.0	< 1.0
1,3,5-Trimethylbenzene	U	2760	µg/kg	1.0	< 1.0	< 1.0
4-Chlorotoluene	U	2760	µg/kg	1.0	< 1.0	< 1.0

Results - Soil

Project: Varley Street

Client: EnviroSolution	**Chemtest Job No.:**				22-02360	22-02360
Quotation No.:	**Chemtest Sample ID.:**				1357402	1357403
	Sample Location:				WS4	WS6
	Sample Type:				SOIL	SOIL
	Top Depth (m):				3.8	0.6
	Date Sampled:				17-Jan-2022	17-Jan-2022
	Asbestos Lab:					
Determinand	**Accred.**	**SOP**	**Units**	**LOD**		
Tert-Butylbenzene	U	2760	µg/kg	1.0	< 1.0	< 1.0
1,2,4-Trimethylbenzene	U	2760	µg/kg	1.0	< 1.0	< 1.0
Sec-Butylbenzene	U	2760	µg/kg	1.0	< 1.0	< 1.0
1,3-Dichlorobenzene	U	2760	µg/kg	1.0	< 1.0	< 1.0
4-Isopropyltoluene	U	2760	µg/kg	1.0	< 1.0	< 1.0
1,4-Dichlorobenzene	U	2760	µg/kg	1.0	< 1.0	< 1.0
N-Butylbenzene	U	2760	µg/kg	1.0	< 1.0	< 1.0
1,2-Dichlorobenzene	U	2760	µg/kg	1.0	< 1.0	< 1.0
1,2-Dibromo-3-Chloropropane	U	2760	µg/kg	50	< 50	< 50
1,2,4-Trichlorobenzene	U	2760	µg/kg	1.0	< 1.0	< 1.0
Hexachlorobutadiene	U	2760	µg/kg	1.0	< 1.0	< 1.0
1,2,3-Trichlorobenzene	U	2760	µg/kg	2.0	< 2.0	< 2.0
Methyl Tert-Butyl Ether	U	2760	µg/kg	1.0	< 1.0	< 1.0
N-Nitrosodimethylamine	U	2790	mg/kg	0.50	< 0.50	< 0.50
Phenol	U	2790	mg/kg	0.50	< 0.50	< 0.50
2-Chlorophenol	U	2790	mg/kg	0.50	< 0.50	< 0.50
Bis-(2-Chloroethyl)Ether	U	2790	mg/kg	0.50	< 0.50	< 0.50
1,3-Dichlorobenzene	U	2790	mg/kg	0.50	< 0.50	< 0.50
1,4-Dichlorobenzene	N	2790	mg/kg	0.50	< 0.50	< 0.50
1,2-Dichlorobenzene	U	2790	mg/kg	0.50	< 0.50	< 0.50
2-Methylphenol	U	2790	mg/kg	0.50	< 0.50	< 0.50
Bis(2-Chloroisopropyl)Ether	U	2790	mg/kg	0.50	< 0.50	< 0.50
Hexachloroethane	N	2790	mg/kg	0.50	< 0.50	< 0.50
N-Nitrosodi-n-propylamine	U	2790	mg/kg	0.50	< 0.50	< 0.50
4-Methylphenol	U	2790	mg/kg	0.50	< 0.50	< 0.50
Nitrobenzene	U	2790	mg/kg	0.50	< 0.50	< 0.50
Isophorone	U	2790	mg/kg	0.50	< 0.50	< 0.50
2-Nitrophenol	N	2790	mg/kg	0.50	< 0.50	< 0.50
2,4-Dimethylphenol	N	2790	mg/kg	0.50	< 0.50	< 0.50
Bis(2-Chloroethoxy)Methane	U	2790	mg/kg	0.50	< 0.50	< 0.50
2,4-Dichlorophenol	U	2790	mg/kg	0.50	< 0.50	< 0.50
1,2,4-Trichlorobenzene	U	2790	mg/kg	0.50	< 0.50	< 0.50
Naphthalene	U	2790	mg/kg	0.50	< 0.50	0.62
4-Chloroaniline	N	2790	mg/kg	0.50	< 0.50	< 0.50
Hexachlorobutadiene	U	2790	mg/kg	0.50	< 0.50	< 0.50
4-Chloro-3-Methylphenol	U	2790	mg/kg	0.50	< 0.50	< 0.50
2-Methylnaphthalene	U	2790	mg/kg	0.50	< 0.50	0.63
4-Nitrophenol	N	2790	mg/kg	0.50	< 0.50	< 0.50
Hexachlorocyclopentadiene	N	2790	mg/kg	0.50	< 0.50	< 0.50

Results - Soil

Project: Varley Street

Client: EnviroSolution				**Chemtest Job No.:**	22-02360	22-02360
Quotation No.:				**Chemtest Sample ID.:**	1357402	1357403
				Sample Location:	WS4	WS6
				Sample Type:	SOIL	SOIL
				Top Depth (m):	3.8	0.6
				Date Sampled:	17-Jan-2022	17-Jan-2022
				Asbestos Lab:		
Determinand	**Accred.**	**SOP**	**Units**	**LOD**		
2,4,6-Trichlorophenol	U	2790	mg/kg	0.50	< 0.50	< 0.50
2,4,5-Trichlorophenol	U	2790	mg/kg	0.50	< 0.50	< 0.50
2-Chloronaphthalene	U	2790	mg/kg	0.50	< 0.50	< 0.50
2-Nitroaniline	U	2790	mg/kg	0.50	< 0.50	< 0.50
Acenaphthylene	U	2790	mg/kg	0.50	< 0.50	< 0.50
Dimethylphthalate	U	2790	mg/kg	0.50	< 0.50	< 0.50
2,6-Dinitrotoluene	U	2790	mg/kg	0.50	< 0.50	< 0.50
Acenaphthene	U	2790	mg/kg	0.50	< 0.50	2.3
3-Nitroaniline	N	2790	mg/kg	0.50	< 0.50	< 0.50
Dibenzofuran	U	2790	mg/kg	0.50	< 0.50	1.2
4-Chlorophenylphenylether	U	2790	mg/kg	0.50	< 0.50	< 0.50
2,4-Dinitrotoluene	U	2790	mg/kg	0.50	< 0.50	< 0.50
Fluorene	U	2790	mg/kg	0.50	< 0.50	2.0
Diethyl Phthalate	U	2790	mg/kg	0.50	< 0.50	< 0.50
4-Nitroaniline	U	2790	mg/kg	0.50	< 0.50	< 0.50
2-Methyl-4,6-Dinitrophenol	N	2790	mg/kg	0.50	< 0.50	< 0.50
Azobenzene	U	2790	mg/kg	0.50	< 0.50	< 0.50
4-Bromophenylphenyl Ether	U	2790	mg/kg	0.50	< 0.50	< 0.50
Hexachlorobenzene	U	2790	mg/kg	0.50	< 0.50	< 0.50
Pentachlorophenol	N	2790	mg/kg	0.50	< 0.50	< 0.50
Phenanthrene	U	2790	mg/kg	0.50	< 0.50	18
Anthracene	U	2790	mg/kg	0.50	< 0.50	3.3
Carbazole	U	2790	mg/kg	0.50	< 0.50	1.9
Di-N-Butyl Phthalate	U	2790	mg/kg	0.50	< 0.50	< 0.50
Fluoranthene	U	2790	mg/kg	0.50	< 0.50	9.0
Pyrene	U	2790	mg/kg	0.50	< 0.50	9.1
Butylbenzyl Phthalate	U	2790	mg/kg	0.50	< 0.50	< 0.50
Benzo[a]anthracene	U	2790	mg/kg	0.50	< 0.50	2.8
Chrysene	U	2790	mg/kg	0.50	< 0.50	2.8
Bis(2-Ethylhexyl)Phthalate	N	2790	mg/kg	0.50	< 0.50	< 0.50
Di-N-Octyl Phthalate	U	2790	mg/kg	0.50	< 0.50	< 0.50
Benzo[b]fluoranthene	U	2790	mg/kg	0.50	< 0.50	2.1
Benzo[k]fluoranthene	U	2790	mg/kg	0.50	< 0.50	0.67
Benzo[a]pyrene	U	2790	mg/kg	0.50	< 0.50	1.8
Indeno(1,2,3-c,d)Pyrene	U	2790	mg/kg	0.50	< 0.50	< 0.50
Dibenz(a,h)Anthracene	U	2790	mg/kg	0.50	< 0.50	< 0.50
Benzo[g,h,i]perylene	U	2790	mg/kg	0.50	< 0.50	< 0.50

Test Methods

SOP	Title	Parameters included	Method summary
2010	pH Value of Soils	pH	pH Meter
2030	Moisture and Stone Content of Soils(Requirement of MCERTS)	Moisture content	Determination of moisture content of soil as a percentage of its as received mass obtained at <37°C.
2040	Soil Description(Requirement of MCERTS)	Soil description	As received soil is described based upon BS5930
2192	Asbestos	Asbestos	Polarised light microscopy / Gravimetry
2450	Acid Soluble Metals in Soils	Metals, including: Arsenic; Barium; Beryllium; Cadmium; Chromium; Cobalt; Copper; Lead; Manganese; Mercury; Molybdenum; Nickel; Selenium; Vanadium; Zinc	Acid digestion followed by determination of metals in extract by ICP-MS.
2680	TPH A/A Split	Aliphatics: >C5–C6, >C6–C8,>C8–C10, >C10–C12, >C12–C16, >C16–C21, >C21– C35, >C35– C44Aromatics: >C5–C7, >C7–C8, >C8– C10, >C10–C12, >C12–C16, >C16– C21, >C21– C35, >C35– C44	Dichloromethane extraction / GCxGC FID detection
2760	Volatile Organic Compounds (VOCs) in Soils by Headspace GC-MS	Volatile organic compounds, including BTEX and halogenated Aliphatic/Aromatics.(cf. USEPA Method 8260)*please refer to UKAS schedule	Automated headspace gas chromatographic (GC) analysis of a soil sample, as received, with mass spectrometric (MS) detection of volatile organic compounds.
2790	Semi-Volatile Organic Compounds (SVOCs) in Soils by GC-MS	Semi-volatile organic compounds(cf. USEPA Method 8270)	Acetone/Hexane extraction / GC-MS

Report Information

Key

U	UKAS accredited
M	MCERTS and UKAS accredited
N	Unaccredited
S	This analysis has been subcontracted to a UKAS accredited laboratory that is accredited for this analysis
SN	This analysis has been subcontracted to a UKAS accredited laboratory that is not accredited for this analysis
T	This analysis has been subcontracted to an unaccredited laboratory
I/S	Insufficient Sample
U/S	Unsuitable Sample
N/E	not evaluated
<	"less than"
>	"greater than"
SOP	Standard operating procedure
LOD	Limit of detection

Comments or interpretations are beyond the scope of UKAS accreditation

The results relate only to the items tested

Uncertainty of measurement for the determinands tested are available upon request

None of the results in this report have been recovery corrected

All results are expressed on a dry weight basis

The following tests were analysed on samples as received and the results subsequently corrected to a dry weight basis TPH, BTEX, VOCs, SVOCs, PCBs, Phenols

For all other tests the samples were dried at < 37°C prior to analysis

All Asbestos testing is performed at the indicated laboratory

Issue numbers are sequential starting with 1 all subsequent reports are incremented by 1

Sample Deviation Codes

A - Date of sampling not supplied
B - Sample age exceeds stability time (sampling to extraction)
C - Sample not received in appropriate containers
D - Broken Container
E - Insufficient Sample (Applies to LOI in Trommel Fines Only)

Sample Retention and Disposal

All soil samples will be retained for a period of 30 days from the date of receipt

All water samples will be retained for 14 days from the date of receipt

Charges may apply to extended sample storage

If you require extended retention of samples, please email your requirements to:
customerservices@chemtest.com

Laboratory:
Unit 4
Rose Lane Industrial Estate
Lenham Heath
Kent ME17 2JN
01622 851176

4727

XtraTec Ltd
Construction Material Testing

TEST REPORT

Report No: **XTE 60792**
Page 1 of 1

TEST REPORT OF PLASTICITY INDEX

Method: BS 1377-2:1990 Method 4.4 Liquid Limit One Point
Method: BS 1377-2:1990 Method 5.3 Plastic Limit
Method: BS 1377-2:1990 Method 5.4 Plasticity Index

XTRATEC SAMPLE REF	XTE 60792
CUSTOMER/SITE SAMPLE REF	583108

CLIENT	DETS Ltd
SITE	Varley Street
SOIL DESCRIPTION	Red, orange Clay
SUPPLIER/SOURCE	Insitu
SAMPLING LOCATION	TP4 @ 1.20m
SAMPLING METHOD	Unknown
SAMPLED BY	Client
TYPE OF SAMPLE	Bulk
DATE SAMPLED	17 January 2022
DATE RECEIVED	24 January 2022
DATE TESTED	25 January 2022
PREPARATION METHOD	Tested by Wet Sieving

TEST RESULTS	
Percentage Retained 425um (%)	1
Liquid Limit	55
Plastic Limit	21
Plasticity Index	34

REMARKS:

ISSUE TO: DETS Ltd
Unit 1, Rose Lane Industrial Estate
Rose Lane, Lenham Heath
Maidstone
ME17 2JN

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XtraTec Ltd
Construction Material Testing

TEST REPORT

Report No: **XTE 60792**
Page 1 of 1

TEST REPORT OF MOISTURE CONTENT OF SOILS

Method: BS 1377-2:1990, Method 3.2.3.3. Oven Drying

XTRATEC SAMPLE REF	XTE 60792
CUSTOMER/SITE SAMPLE REF	583108

CLIENT	DETS Ltd
SITE	Varley Street
TYPE OF MATERIAL	For Classification
SOIL DESCRIPTION	Red, orange Clay
SPECIFICATION	For Classification
SUPPLIER/SOURCE	Insitu
SAMPLING LOCATION	TP4 @ 1.20m
SAMPLING METHOD	Unknown
SAMPLED BY	Client
TYPE OF SAMPLE	Bulk
DATE SAMPLED	17 January 2022
DATE RECEIVED	24 January 2022
DATE TESTED	25 January 2022
PREPARATION METHOD	BS 1377-1. 7.3.5.2 (Sub dividing)

TEST RESULTS	
Moisture Content (%)	27.6

REMARKS:

ISSUE TO: DETS Ltd
Unit 1, Rose Lane Industrial Estate
Rose Lane, Lenham Heath
Maidstone
ME17 2JN

DATE: 02 February 2022

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Construction Material Testing

TEST REPORT

Report No: **XTE 60793**
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TEST REPORT OF PLASTICITY INDEX

Method: BS 1377-2:1990 Method 4.4 Liquid Limit One Point
Method: BS 1377-2:1990 Method 5.3 Plastic Limit
Method: BS 1377-2:1990 Method 5.4 Plasticity Index

XTRATEC SAMPLE REF	XTE 60793
CUSTOMER/SITE SAMPLE REF	583109

CLIENT	DETS Ltd
SITE	Varley Street
SOIL DESCRIPTION	Brown, orange Clay
SUPPLIER/SOURCE	Insitu
SAMPLING LOCATION	TP13 @ 1.20m
SAMPLING METHOD	Unknown
SAMPLED BY	Client
TYPE OF SAMPLE	Bulk
DATE SAMPLED	18 January 2022
DATE RECEIVED	24 January 2022
DATE TESTED	25 January 2022
PREPARATION METHOD	Tested by Wet Sieving

TEST RESULTS	
Percentage Retained 425um (%)	1
Liquid Limit	57
Plastic Limit	23
Plasticity Index	34

REMARKS:

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Unit 1, Rose Lane Industrial Estate
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XtraTec Ltd
Construction Material Testing

TEST REPORT

Report No:
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XTE 60793

TEST REPORT OF MOISTURE CONTENT OF SOILS

Method: BS 1377-2:1990, Method 3.2.3.3. Oven Drying

XTRATEC SAMPLE REF	XTE 60793
CUSTOMER/SITE SAMPLE REF	583109

CLIENT	DETS Ltd
SITE	Varley Street
TYPE OF MATERIAL	For Classification
SOIL DESCRIPTION	Brown, orange Clay
SPECIFICATION	For Classification
SUPPLIER/SOURCE	Insitu
SAMPLING LOCATION	TP13 @ 1.20m
SAMPLING METHOD	Unknown
SAMPLED BY	Client
TYPE OF SAMPLE	Bulk
DATE SAMPLED	17 January 2022
DATE RECEIVED	24 January 2022
DATE TESTED	25 January 2022
PREPARATION METHOD	BS 1377-1. 7.3.5.2 (Sub dividing)

TEST RESULTS	
Moisture Content (%)	32.0

REMARKS:

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Construction Material Testing

TEST REPORT

Report No: **XTE 60794**
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TEST REPORT OF PLASTICITY INDEX

Method: BS 1377-2:1990 Method 4.4 Liquid Limit One Point
Method: BS 1377-2:1990 Method 5.3 Plastic Limit
Method: BS 1377-2:1990 Method 5.4 Plasticity Index

XTRATEC SAMPLE REF	XTE 60794
CUSTOMER/SITE SAMPLE REF	583110

CLIENT	DETS Ltd
SITE	Varley Street
SOIL DESCRIPTION	Brown Clay
SUPPLIER/SOURCE	Insitu
SAMPLING LOCATION	WS1 @ 3.50m
SAMPLING METHOD	Unknown
SAMPLED BY	Client
TYPE OF SAMPLE	Bulk
DATE SAMPLED	17 January 2022
DATE RECEIVED	24 January 2022
DATE TESTED	25 January 2022
PREPARATION METHOD	Tested by Wet Sieving

TEST RESULTS	
Percentage Retained 425um (%)	1
Liquid Limit	47
Plastic Limit	19
Plasticity Index	28

REMARKS:

ISSUE TO: DETS Ltd
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Construction Material Testing

TEST REPORT

Report No: XTE 60794
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TEST REPORT OF MOISTURE CONTENT OF SOILS

Method: BS 1377-2:1990, Method 3.2.3.3. Oven Drying

XTRATEC SAMPLE REF	XTE 60794
CUSTOMER/SITE SAMPLE REF	583110

CLIENT	DETS Ltd
SITE	Varley Street
TYPE OF MATERIAL	For Classification
SOIL DESCRIPTION	Brown Clay
SPECIFICATION	For Classification
SUPPLIER/SOURCE	Insitu
SAMPLING LOCATION	WS1 @ 3.50m
SAMPLING METHOD	Unknown
SAMPLED BY	Client
TYPE OF SAMPLE	Bulk
DATE SAMPLED	17 January 2022
DATE RECEIVED	24 January 2022
DATE TESTED	25 January 2022
PREPARATION METHOD	BS 1377-1, 7.3.5.2 (Sub dividing)

TEST RESULTS	
Moisture Content (%)	21.5

REMARKS:

ISSUE TO: DETS Ltd
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Construction Material Testing

TEST REPORT

Report No: **XTE 60795**
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TEST REPORT OF PLASTICITY INDEX

Method: BS 1377-2:1990 Method 4.4 Liquid Limit One Point
Method: BS 1377-2:1990 Method 5.3 Plastic Limit
Method: BS 1377-2:1990 Method 5.4 Plasticity Index

XTRATEC SAMPLE REF	XTE 60795
CUSTOMER/SITE SAMPLE REF	583111

CLIENT	DETS Ltd
SITE	Varley Street
SOIL DESCRIPTION	Brown Clay
SUPPLIER/SOURCE	Insitu
SAMPLING LOCATION	WS3 @ 2.80m
SAMPLING METHOD	Unknown
SAMPLED BY	Client
TYPE OF SAMPLE	Bulk
DATE SAMPLED	17 January 2022
DATE RECEIVED	24 January 2022
DATE TESTED	25 January 2022
PREPARATION METHOD	Tested by Wet Sieving

TEST RESULTS	
Percentage Retained 425um (%)	2
Liquid Limit	46
Plastic Limit	20
Plasticity Index	26

REMARKS:

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Construction Material Testing

TEST REPORT

Report No: **XTE 60795**
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TEST REPORT OF MOISTURE CONTENT OF SOILS

Method: BS 1377-2:1990, Method 3.2.3.3. Oven Drying

XTRATEC SAMPLE REF	XTE 60795
CUSTOMER/SITE SAMPLE REF	583111

CLIENT	DETS Ltd
SITE	Varley Street
TYPE OF MATERIAL	For Classification
SOIL DESCRIPTION	Brown Clay
SPECIFICATION	For Classification
SUPPLIER/SOURCE	Insitu
SAMPLING LOCATION	WS3 @ 2.80m
SAMPLING METHOD	Unknown
SAMPLED BY	Client
TYPE OF SAMPLE	Bulk
DATE SAMPLED	17 January 2022
DATE RECEIVED	24 January 2022
DATE TESTED	25 January 2022
PREPARATION METHOD	BS 1377-1. 7.3.5.2 (Sub dividing)

TEST RESULTS	
Moisture Content (%)	21.3

REMARKS:

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TEST REPORT

Report No: **XTE 60796**
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TEST REPORT OF PLASTICITY INDEX

Method: BS 1377-2:1990 Method 4.4 Liquid Limit One Point
Method: BS 1377-2:1990 Method 5.3 Plastic Limit
Method: BS 1377-2:1990 Method 5.4 Plasticity Index

XTRATEC SAMPLE REF	XTE 60796
CUSTOMER/SITE SAMPLE REF	583112

CLIENT	DETS Ltd
SITE	Varley Street
SOIL DESCRIPTION	Brown Clay
SUPPLIER/SOURCE	Insitu
SAMPLING LOCATION	WS7 @ 2.50m
SAMPLING METHOD	Unknown
SAMPLED BY	Client
TYPE OF SAMPLE	Bulk
DATE SAMPLED	18 January 2022
DATE RECEIVED	24 January 2022
DATE TESTED	25 January 2022
PREPARATION METHOD	Tested by Wet Sieving

TEST RESULTS	
Percentage Retained 425um (%)	4
Liquid Limit	47
Plastic Limit	20
Plasticity Index	27

REMARKS:

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DATE: 02 February 2022

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Construction Material Testing

TEST REPORT

Report No: **XTE 60796**
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TEST REPORT OF MOISTURE CONTENT OF SOILS

Method: BS 1377-2:1990, Method 3.2.3.3. Oven Drying

XTRATEC SAMPLE REF	XTE 60796
CUSTOMER/SITE SAMPLE REF	583112

CLIENT	DETS Ltd
SITE	Varley Street
TYPE OF MATERIAL	For Classification
SOIL DESCRIPTION	Brown Clay
SPECIFICATION	For Classification
SUPPLIER/SOURCE	Insitu
SAMPLING LOCATION	WS7 @ 2.50m
SAMPLING METHOD	Unknown
SAMPLED BY	Client
TYPE OF SAMPLE	Bulk
DATE SAMPLED	18 January 2022
DATE RECEIVED	24 January 2022
DATE TESTED	25 January 2022
PREPARATION METHOD	BS 1377-1. 7.3.5.2 (Sub dividing)

TEST RESULTS	
Moisture Content (%)	17.8

REMARKS:

ISSUE TO: DETS Ltd
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Rose Lane, Lenham Heath
Maidstone
ME17 2JN

DATE: 02 February 2022

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XtraTec Ltd
Construction Material Testing

TEST REPORT

Report No: **XTE 60797**
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TEST REPORT OF PLASTICITY INDEX

Method: BS 1377-2:1990 Method 4.4 Liquid Limit One Point
Method: BS 1377-2:1990 Method 5.3 Plastic Limit
Method: BS 1377-2:1990 Method 5.4 Plasticity Index

XTRATEC SAMPLE REF	XTE 60797
CUSTOMER/SITE SAMPLE REF	583113

CLIENT	DETS Ltd
SITE	Varley Street
SOIL DESCRIPTION	Brown Clay
SUPPLIER/SOURCE	Insitu
SAMPLING LOCATION	WS10 @ 2.50m
SAMPLING METHOD	Unknown
SAMPLED BY	Client
TYPE OF SAMPLE	Bulk
DATE SAMPLED	18 January 2022
DATE RECEIVED	24 January 2022
DATE TESTED	25 January 2022
PREPARATION METHOD	Tested by Wet Sieving

TEST RESULTS	
Percentage Retained 425um (%)	2
Liquid Limit	47
Plastic Limit	19
Plasticity Index	28

REMARKS:

ISSUE TO: DETS Ltd
Unit 1, Rose Lane Industrial Estate
Rose Lane, Lenham Heath
Maidstone
ME17 2JN

DATE: 02 February 2022

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XtraTec Ltd
Construction Material Testing

TEST REPORT

Report No: **XTE 60797**
Page 1 of 1

TEST REPORT OF MOISTURE CONTENT OF SOILS

Method: BS 1377-2:1990, Method 3.2.3.3. Oven Drying

XTRATEC SAMPLE REF	XTE 60797
CUSTOMER/SITE SAMPLE REF	583113

CLIENT	DETS Ltd
SITE	Varley Street
TYPE OF MATERIAL	For Classification
SOIL DESCRIPTION	Brown Clay
SPECIFICATION	For Classification
SUPPLIER/SOURCE	Insitu
SAMPLING LOCATION	WS10 @ 2.50m
SAMPLING METHOD	Unknown
SAMPLED BY	Client
TYPE OF SAMPLE	Bulk
DATE SAMPLED	18 January 2022
DATE RECEIVED	24 January 2022
DATE TESTED	25 January 2022
PREPARATION METHOD	BS 1377-1, 7.3.5.2 (Sub dividing)

TEST RESULTS	
Moisture Content (%)	17.8

REMARKS:

ISSUE TO: DETS Ltd
Unit 1, Rose Lane Industrial Estate
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Maidstone
ME17 2JN

DATE: 02 February 2022

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Tom Craig
Envirosolution Ltd
Suite 5
The Quay
No. 12 Princes Dock
Liverpool Waters
Liverpool
L3 1DL

Derwentside Environmental Testing Services Ltd
Unit 1
Rose Lane Industrial Estate
Rose Lane
Lenham Heath
Kent
ME17 2JN
t: 01622 850410

DETS Report No: 22-00641

Site Reference:	Varley Street
Project / Job Ref:	Varley Street
Order No:	ES210122
Sample Receipt Date:	21/01/2022
Sample Scheduled Date:	24/01/2022
Report Issue Number:	1
Reporting Date:	28/01/2022

[redacted]

Dave Ashworth
Technical Manager

Dates of laboratory activities for each tested analyte are available upon request.

Opinions and interpretations are outside the laboratory's scope of ISO 17025 accreditation. This certificate is issued in accordance with the accreditation requirements of the United Kingdom Accreditation Service. The results reported herein relate only to the material supplied to the laboratory. This certificate shall not be reproduced except in full, without the prior written approval of the laboratory.

Soil Analysis Certificate						
DETS Report No: 22-00641	**Date Sampled**	17/01/22	17/01/22	18/01/22	17/01/22	17/01/22
Envirosolution Ltd	**Time Sampled**	None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Site Reference: Varley Street	**TP / BH No**	TP3	TP8	TP18	WS1	WS2
Project / Job Ref: Varley Street	**Additional Refs**	None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Order No: ES210122	**Depth (m)**	1.20	0.50	1.30	2.00	2.00
Reporting Date: 28/01/2022	**DETS Sample No**	583100	583101	583102	583103	583104

Determinand	**Unit**	**RL**	**Accreditation**				(n)	
pH	pH Units	N/a	**MCERTS**	7.7	7.6	7.2	7.6	8.0
Total Sulphate as SO_4	mg/kg	< 200	**MCERTS**	1173	3182	778	2791	721
Total Sulphate as SO_4	%	< 0.02	**MCERTS**	0.12	0.32	0.08	0.28	0.07
W/S Sulphate as SO_4 (2:1)	mg/l	< 10	**MCERTS**	43	239	261	325	30
W/S Sulphate as SO_4 (2:1)	g/l	< 0.01	**MCERTS**	0.04	0.24	0.26	0.32	0.03
Total Sulphur	%	< 0.02	NONE	0.08	0.23	0.03	0.41	0.08
Ammonium as NH_4	mg/kg	< 0.5	**MCERTS**	1.8	1.6	1.8	1.9	20.2
Ammonium as NH_4	mg/l	< 0.05	**MCERTS**	0.18	0.16	0.18	0.19	2.02
W/S Chloride (2:1)	mg/kg	< 1	**MCERTS**	14	6	26	6	9
W/S Chloride (2:1)	mg/l	< 0.5	**MCERTS**	6.9	3.2	13.1	3	4.3
Water Soluble Nitrate (2:1) as NO_3	mg/kg	< 3	**MCERTS**	< 3	< 3	< 3	< 3	< 3
Water Soluble Nitrate (2:1) as NO_3	mg/l	< 1.5	**MCERTS**	< 1.5	< 1.5	< 1.5	< 1.5	< 1.5
W/S Magnesium	mg/l	< 0.1	NONE	3.1	3.7	9.6	5.3	4.4

Analytical results are expressed on a dry weight basis where samples are assisted-dried at less than 30°C. The Method Description page describes if the test is performed on the dried or as-received portion

Subcontracted analysis (S)

(n) Please note we are only MCERTS accredited (UK soils only) for sand, loam and clay and any other matrix is outside our scope of accreditation

Soil Analysis Certificate						
DETS Report No: 22-00641	**Date Sampled**	18/01/22	18/01/22	18/01/22		
Envirosolution Ltd	**Time Sampled**	None Supplied	None Supplied	None Supplied		
Site Reference: Varley Street	**TP / BH No**	WS7	WS8	WS10		
Project / Job Ref: Varley Street	**Additional Refs**	None Supplied	None Supplied	None Supplied		
Order No: ES210122	**Depth (m)**	1.00	0.60	2.00		
Reporting Date: 28/01/2022	**DETS Sample No**	583105	583106	583107		

Determinand	**Unit**	**RL**	**Accreditation**					
pH	pH Units	N/a	**MCERTS**	7.5	6.8	7.9		
Total Sulphate as SO_4	mg/kg	< 200	**MCERTS**	3417	426	349		
Total Sulphate as SO_4	%	< 0.02	**MCERTS**	0.34	0.04	0.03		
W/S Sulphate as SO_4 (2:1)	mg/l	< 10	**MCERTS**	179	13	54		
W/S Sulphate as SO_4 (2:1)	g/l	< 0.01	**MCERTS**	0.18	0.01	0.05		
Total Sulphur	%	< 0.02	NONE	0.76	0.03	< 0.02		
Ammonium as NH_4	mg/kg	< 0.5	**MCERTS**	20	1.9	1.7		
Ammonium as NH_4	mg/l	< 0.05	**MCERTS**	2	0.19	0.17		
W/S Chloride (2:1)	mg/kg	< 1	**MCERTS**	9	5	28		
W/S Chloride (2:1)	mg/l	< 0.5	**MCERTS**	4.6	2.5	14		
Water Soluble Nitrate (2:1) as NO_3	mg/kg	< 3	**MCERTS**	< 3	< 3	< 3		
Water Soluble Nitrate (2:1) as NO_3	mg/l	< 1.5	**MCERTS**	< 1.5	< 1.5	< 1.5		
W/S Magnesium	mg/l	< 0.1	NONE	3.1	0.8	7		

Analytical results are expressed on a dry weight basis where samples are assisted-dried at less than 30°C. The Method Description page describes if the test is performed on the dried or as-received portion

Subcontracted analysis (S)

Soil Analysis Certificate - Sample Descriptions

DETS Report No: 22-00641
Envirosolution Ltd
Site Reference: Varley Street
Project / Job Ref: Varley Street
Order No: ES210122
Reporting Date: 28/01/2022

DETS Sample No	TP / BH No	Additional Refs	Depth (m)	Moisture Content (%)	Sample Matrix Description
583100	TP3	None Supplied	1.20	16.9	Black loamy sand with stones
583101	TP8	None Supplied	0.50	14.8	Black loamy sand with stones and concrete
583102	TP18	None Supplied	1.30	18.1	Brown sandy clay with stones
583103	WS1	None Supplied	2.00	19.9	Black sandy gravel with stones and concrete
583104	WS2	None Supplied	2.00	18.1	Brown sandy clay with brick
583105	WS7	None Supplied	1.00	25.7	Black loamy sand with vegetation
583106	WS8	None Supplied	0.60	17.3	Brown sandy clay with stones
583107	WS10	None Supplied	2.00	13.5	Brown clay

Moisture content is part of procedure E003 & is not an accredited test

Insufficient Sample $^{I/S}$

Unsuitable Sample $^{U/S}$

Soil Analysis Certificate - Methodology & Miscellaneous Information
DETS Report No: 22-00641
Envirosolution Ltd
Site Reference: Varley Street
Project / Job Ref: Varley Street
Order No: ES210122
Reporting Date: 28/01/2022

Matrix	Analysed On	Determinand	Brief Method Description	Method No
Soil	D	Boron - Water Soluble	Determination of water soluble boron in soil by 2:1 hot water extract followed by ICP-OES	E012
Soil	AR	BTEX	Determination of BTEX by headspace GC-MS	E001
Soil	D	Cations	Determination of cations in soil by aqua-regia digestion followed by ICP-OES	E002
Soil	D	Chloride - Water Soluble (2:1)	Determination of chloride by extraction with water & analysed by ion chromatography	E009
Soil	AR	Chromium - Hexavalent	Determination of hexavalent chromium in soil by extraction in water then by acidification, addition of 1,5 diphenylcarbazide followed by colorimetry	E016
Soil	AR	Cyanide - Complex	Determination of complex cyanide by distillation followed by colorimetry	E015
Soil	AR	Cyanide - Free	Determination of free cyanide by distillation followed by colorimetry	E015
Soil	AR	Cyanide - Total	Determination of total cyanide by distillation followed by colorimetry	E015
Soil	D	Cyclohexane Extractable Matter (CEM)	Gravimetrically determined through extraction with cyclohexane	E011
Soil	AR	Diesel Range Organics (C10 - C24)	Determination of hexane/acetone extractable hydrocarbons by GC-FID	E004
Soil	AR	Electrical Conductivity	Determination of electrical conductivity by addition of saturated calcium sulphate followed by electrometric measurement	E022
Soil	AR	Electrical Conductivity	Determination of electrical conductivity by addition of water followed by electrometric measurement	E023
Soil	D	Elemental Sulphur	Determination of elemental sulphur by solvent extraction followed by GC-MS	E020
Soil	AR	EPH (C10 – C40)	Determination of acetone/hexane extractable hydrocarbons by GC-FID	E004
Soil	AR	EPH Product ID	Determination of acetone/hexane extractable hydrocarbons by GC-FID	E004
Soil	AR	EPH TEXAS (C6-C8, C8-C10, C10-C12, C12-C16, C16-C21, C21-C40)	Determination of acetone/hexane extractable hydrocarbons by GC-FID for C8 to C40. C6 to C8 by headspace GC-MS	E004
Soil	D	Fluoride - Water Soluble	Determination of Fluoride by extraction with water & analysed by ion chromatography	E009
Soil	D	Fraction Organic Carbon (FOC)	Determination of TOC by combustion analyser.	E027
Soil	D	Organic Matter (SOM)	Determination of TOC by combustion analyser.	E027
Soil	D	TOC (Total Organic Carbon)	Determination of TOC by combustion analyser.	E027
Soil	AR	Exchangeable Ammonium	Determination of ammonium by discrete analyser.	E029
Soil	D	FOC (Fraction Organic Carbon)	Determination of fraction of organic carbon by oxidising with potassium dichromate followed by titration with iron (II) sulphate	E010
Soil	D	Loss on Ignition @ 450oC	Determination of loss on ignition in soil by gravimetrically with the sample being ignited in a muffle furnace	E019
Soil	D	Magnesium - Water Soluble	Determination of water soluble magnesium by extraction with water followed by ICP-OES	E025
Soil	D	Metals	Determination of metals by aqua-regia digestion followed by ICP-OES	E002
Soil	AR	Mineral Oil (C10 - C40)	Determination of hexane/acetone extractable hydrocarbons by GC-FID fractionating with SPE cartridge	E004
Soil	AR	Moisture Content	Moisture content; determined gravimetrically	E003
Soil	D	Nitrate - Water Soluble (2:1)	Determination of nitrate by extraction with water & analysed by ion chromatography	E009
Soil	D	Organic Matter	Determination of organic matter by oxidising with potassium dichromate followed by titration with iron (II) sulphate	E010
Soil	AR	PAH - Speciated (EPA 16)	Determination of PAH compounds by extraction in acetone and hexane followed by GC-MS with the use of surrogate and internal standards	E005
Soil	AR	PCB - 7 Congeners	Determination of PCB by extraction with acetone and hexane followed by GC-MS	E008
Soil	D	Petroleum Ether Extract (PEE)	Gravimetrically determined through extraction with petroleum ether	E011
Soil	AR	pH	Determination of pH by addition of water followed by electrometric measurement	E007
Soil	AR	Phenols - Total (monohydric)	Determination of phenols by distillation followed by colorimetry	E021
Soil	D	Phosphate - Water Soluble (2:1)	Determination of phosphate by extraction with water & analysed by ion chromatography	E009
Soil	D	Sulphate (as SO4) - Total	Determination of total sulphate by extraction with 10% HCl followed by ICP-OES	E013
Soil	D	Sulphate (as SO4) - Water Soluble (2:1)	Determination of sulphate by extraction with water & analysed by ion chromatography	E009
Soil	D	Sulphate (as SO4) - Water Soluble (2:1)	Determination of water soluble sulphate by extraction with water followed by ICP-OES	E014
Soil	AR	Sulphide	Determination of sulphide by distillation followed by colorimetry	E018
Soil	D	Sulphur - Total	Determination of total sulphur by extraction with aqua-regia followed by ICP-OES	E024
Soil	AR	SVOC	Determination of semi-volatile organic compounds by extraction in acetone and hexane followed by GC-MS	E006
Soil	AR	Thiocyanate (as SCN)	Determination of thiocyanate by extraction in caustic soda followed by acidification followed by addition of ferric nitrate followed by colorimetry	E017
Soil	D	Toluene Extractable Matter (TEM)	Gravimetrically determined through extraction with toluene	E011
Soil	D	Total Organic Carbon (TOC)	Determination of organic matter by oxidising with potassium dichromate followed by titration with iron (II) sulphate	E010
Soil	AR	TPH CWG (ali: C5- C6, C6-C8, C8-C10, C10-C12, C12-C16, C16-C21, C21-C34, aro: C5-C7, C7-C8, C8-C10, C10-C12, C12-C16, C16-C21, C21-C35)	Determination of hexane/acetone extractable hydrocarbons by GC-FID fractionating with SPE cartridge for C8 to C35. C5 to C8 by headspace GC-MS	E004
Soil	AR	TPH LQM (ali: C5-C6, C6-C8, C8-C10, C10-C12, C12-C16, C16-C35, C35-C44, aro: C5-C7, C7-C8, C8-C10, C10-C12, C12-C16, C16-C21, C21-C35, C35-C44)	Determination of hexane/acetone extractable hydrocarbons by GC-FID fractionating with SPE cartridge for C8 to C44. C5 to C8 by headspace GC-MS	E004
Soil	AR	VOCs	Determination of volatile organic compounds by headspace GC-MS	E001
Soil	AR	VPH (C6-C8 & C8-C10)	Determination of hydrocarbons C6-C8 by headspace GC-MS & C8-C10 by GC-FID	E001

D Dried
AR As Received

Appendix F – Tier 1 Human Health Assessment

Sample Location:					TP1	TP1	TP2	TP3	TP3	TP4	TP5	TP5	TP6	TP7	TP8	TP8	TP9	TP10	TP10
Sample Type:					SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL
Top Depth (m):					0.3m	1.3m	0.3m	0.3m	1.0m	0.3m	0.3m	1.5m	0.3m	0.3m	0.3m	1.5m	0.3m	0.3m	0.7m
Date Sampled:					17-Jan-2022	17-Jan-2022	17-Jan-2022	17-Jan-2022	17-Jan-2022	17-Jan-2022	17-Jan-2022	17-Jan-2022	17-Jan-2022	17-Jan-2022	17-Jan-2022	17-Jan-2022	17-Jan-2022	17-Jan-2022	17-Jan-2022
Determinand	**Unit**	**LOD**	**Residential GAC**	**Commercial GAC**															
Moisture	%	0.020			14	19	19	14	18	15	14	22	18	17	18	28	17	18	23
pH		4.0			8.7	8.2	8.5	8.6	8.4	8.5	8.4	8.3	8.3	8.6	8.3	7.8	8.0	8.3	7.3
Heavy Metals																			
Arsenic	mg/kg	1.0	40	640	47	31	20	24	22	32	31	30	11	62	39	89	42	73	11
Cadmium	mg/kg	0.10	85	190	0.78	0.16	0.28	0.47	0.15	0.32	0.20	0.65	0.52	0.38	0.31	12	0.60	0.48	< 0.10
Chromium	mg/kg	1.0	910	8600	23	23	14	26	22	20	23	20	22	18	17	14	24	29	17
Copper	mg/kg	0.50	7100	68000	180	39	66	730	30	100	310	140	34	120	140	2100	110	170	11
Mercury	mg/kg	0.10	1.2	58	0.79	0.20	0.25	0.86	< 0.10	0.34	0.65	0.35	< 0.10	0.29	0.54	0.51	1.7	0.92	< 0.10
Nickel	mg/kg	0.50	180	980	31	34	20	29	33	24	34	31	27	29	30	26	30	35	12
Lead	mg/kg	0.50	310	2300	460	72	160	220	29	290	280	220	76	350	230	5300	380	480	17
Selenium	mg/kg	0.20	430	12000	0.58	0.28	0.37	0.73	0.30	0.46	0.43	0.83	0.34	0.55	0.59	1.3	1.2	0.62	< 0.20
Zinc	mg/kg	0.50	40000	730000	270	57	130	160	50	140	240	160	80	130	110	520	200	180	27
TPH CWG																			
Aliphatic TPH >C8-C10	mg/kg	1.0	27	2000	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	7.2	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Aliphatic TPH >C10-C12	mg/kg	1.0	130	9700	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	34	12	< 1.0	< 1.0	13	< 1.0
Aliphatic TPH >C12-C16	mg/kg	1.0	1100	59000	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	20	22	< 1.0	< 1.0	59	46	< 1.0	< 1.0	17	< 1.0
Aliphatic TPH >C16-C21	mg/kg	1.0	65000	1600000	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	43	32	< 1.0	6.6	44	51	< 1.0	< 1.0	25	< 1.0
Aliphatic TPH >C21-C35	mg/kg	1.0	65000	1600000	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	27	35	< 1.0	53	160	170	20	48	110	< 1.0
Aliphatic TPH >C35-C44	mg/kg	1.0	65000	1600000	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	170	120	< 1.0	< 1.0	56	< 1.0
Total Aliphatic Hydrocarbons	mg/kg	5.0			< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	90	88	< 5.0	59	470	400	20	48	220	< 5.0
Aromatic TPH >C8-C10	mg/kg	1.0	47	3500	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	7.4	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Aromatic TPH >C10-C12	mg/kg	1.0	250	16000	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	75	6.9	< 1.0	< 1.0	61	70	< 1.0	< 1.0	< 1.0	< 1.0
Aromatic TPH >C12-C16	mg/kg	1.0	1800	36000	< 1.0	< 1.0	140	52	< 1.0	740	160	< 1.0	< 1.0	460	390	< 1.0	13	130	< 1.0
Aromatic TPH >C16-C21	mg/kg	1.0	1900	28000	110	< 1.0	740	270	< 1.0	2300	860	15	< 1.0	2000	1200	14	130	670	< 1.0
Aromatic TPH >C21-C35	mg/kg	1.0	1900	28000	460	< 1.0	1600	560	< 1.0	4400	2900	7.4	45	5700	3800	69	600	1800	< 1.0
Aromatic TPH >C35-C44	mg/kg	1.0	1900	28000	< 1.0	< 1.0	200	24	< 1.0	360	340	< 1.0	< 1.0	370	190	< 1.0	< 1.0	62	< 1.0
Total Aromatic Hydrocarbons	mg/kg	5.0			580	< 5.0	2700	910	< 5.0	7800	4300	22	45	8600	5700	82	740	2700	< 5.0
Total Petroleum Hydrocarbons	mg/kg	10.0			580	< 10	2700	910	< 10	7900	4400	22	100	9100	6100	100	790	2900	< 10
SVOCs																			
1,2-Dichloroethane	µg/kg	2.0			< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	27
Naphthalene	mg/kg	0.50	2.3	190	1.6	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	2.4	< 0.50	< 0.50	1.3	< 0.50	< 0.50	0.94	0.67	< 0.50
2-Methylnaphthalene	mg/kg	0.50			1.9	< 0.50	0.82	< 0.50	< 0.50	0.60	2.9	< 0.50	< 0.50	1.6	< 0.50	< 0.50	1.2	< 0.50	< 0.50
Acenaphthylene	mg/kg	0.50	2900	83000	0.61	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	1.3	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
Acenaphthene	mg/kg	0.50	3000	84000	6.0	2.6	2.2	1.1	< 0.50	2.1	9.0	< 0.50	< 0.50	5.4	1.3	< 0.50	3.1	1.8	< 0.50
Dibenzofuran	mg/kg	0.50			2.9	2.5	0.94	0.71	< 0.50	1.0	4.8	< 0.50	< 0.50	2.4	< 0.50	< 0.50	1.6	0.75	< 0.50
Fluorene	mg/kg	0.50	2800	63000	4.0	1.7	1.5	1.0	< 0.50	1.6	8.3	< 0.50	< 0.50	3.8	0.92	< 0.50	2.3	1.3	< 0.50
Phenanthrene	mg/kg	0.50	1300	22000	42	9.1	13	8.2	< 0.50	14	66	2.6	< 0.50	30	8.0	2.0	21	15	< 0.50
Anthracene	mg/kg	0.50	31000	520000	11	1.7	2.5	2.1	< 0.50	3.9	16	< 0.50	< 0.50	6.0	1.9	< 0.50	4.8	3.4	< 0.50
Carbazole	mg/kg	0.50			2.4	< 0.50	0.62	< 0.50	< 0.50	0.78	3.0	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	1.4	0.99	< 0.50
Fluoranthene	mg/kg	0.50	1500	23000	60	3.4	19	14	< 0.50	25	88	3.9	< 0.50	38	12	2.4	26	24	< 0.50
Pyrene	mg/kg	0.50	3700	54000	54	2.5	16	13	< 0.50	22	87	4.2	< 0.50	33	12	2.5	24	21	< 0.50
Benzo[a]anthracene	mg/kg	0.50	11	170	22	< 0.50	5.8	4.9	< 0.50	9.0	33	2.0	< 0.50	11	4.5	1.4	9.0	12	< 0.50
Chrysene	mg/kg	0.50	30	350	27	< 0.50	7.0	6.6	< 0.50	11	38	1.9	< 0.50	13	6.1	1.3	12	11	< 0.50
Benzo[b]fluoranthene	mg/kg	0.50	3.9	44	30	< 0.50	8.0	7.5	< 0.50	13	43	1.9	< 0.50	14	7.0	1.3	13	12	< 0.50
Benzo[k]fluoranthene	mg/kg	0.50	110	1200	10	< 0.50	2.6	2.4	< 0.50	5.1	14	< 0.50	< 0.50	1.7	2.2	< 0.50	4.3	4.1	< 0.50
Benzo[a]pyrene	mg/kg	0.50	3.2	35	24	< 0.50	5.9	5.7	< 0.50	10	35	1.4	< 0.50	4.6	5.5	1.1	11	10	< 0.50
Indeno(1,2,3-c,d)Pyrene	mg/kg	0.50	45	500	12	< 0.50	2.8	3.2	< 0.50	5.0	16	< 0.50	< 0.50	1.3	3.0	< 0.50	5.6	5.0	< 0.50
Dibenz(a,h)Anthracene	mg/kg	0.50	0.31	3.5	3.1	< 0.50	0.80	0.62	< 0.50	1.4	4.3	< 0.50	< 0.50	4.7	0.62	< 0.50	1.2	1.4	< 0.50
Benzo[g,h,i]perylene	mg/kg	0.50	360	3900	13	< 0.50	3.0	3.3	< 0.50	5.9	17	0.71	< 0.50	4.7	3.4	< 0.50	6.2	5.6	< 0.50
Notes:																			
Only those determinands that have been detected at concentrations in excess of LoD have been included in the table																			
GAC = Human health generic assessment criteria for residential land use with plant uptake																			
░	GAC Exceedance of Residential GAC only																		
▓	GAC Exceedance of Residential GAC and Commercial GAC																		

Sample Location:					TP11	TP12	TP13	TP13	TP14	TP14	TP15	TP16	TP17	TP18	TP18	TP19	WS4	WS6
Sample Type:					SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL
Top Depth (m):					0.3m	0.5m	0.3m	0.8m	0.3m	1.0m	0.3m	0.3m	0.3m	0.3m	1.2m	0.3m	3.8m	0.6m
Date Sampled:					17-Jan-2022	17-Jan-2022	17-Jan-2022	17-Jan-2022	17-Jan-2022	17-Jan-2022	17-Jan-2022	17-Jan-2022	17-Jan-2022	17-Jan-2022	17-Jan-2022	17-Jan-2022	17-Jan-2022	17-Jan-2022
Determinand	**Units**	**LOD**	**Residential GAC**	**Commercial GAC**														
ACM Type		N/A			-	-	-		-		-	-	-	-		Fibres/Clumps		
Asbestos Identification		N/A			No Asbestos Detected	No Asbestos Detected	No Asbestos Detected		No Asbestos Detected		No Asbestos Detected	No Asbestos Detected	No Asbestos Detected	No Asbestos Detected		Chrysotile		
Asbestos by Gravimetry	%	0.001														0.015		
Total Asbestos	%	0.001														0.015		
Moisture	%	0.020			21	15	21	28	16	23	17	17	16	18	22	16	17	17
pH		4.0			8.0	8.4	8.4	8.0	8.3	8.1	8.2	8.2	8.3	8.4	8.0	8.5	8.6	8.3
Heavy Metals																		
Arsenic	mg/kg	1.0	40	640	40	33	14	90	120	940	83	77	61	93	8.7	87	24	250
Cadmium	mg/kg	0.10	85	190	1.4	1.0	0.22	3.1	0.51	0.29	0.74	0.86	1.0	0.67	< 0.10	0.26	0.13	1.0
Chromium	mg/kg	1.0	910	8600	16	14	16	60	20	13	16	32	23	22	26	72	25	15
Copper	mg/kg	0.50	7100	68000	140	75	28	23	120	160	93	210	140	160	26	210	27	130
Mercury	mg/kg	0.10	1.2	58	0.51	0.43	0.18	3.8	0.62	8.5	0.50	0.76	0.80	0.86	< 0.10	1.9	0.11	0.64
Nickel	mg/kg	0.50	180	980	22	18	20	29	27	25	24	42	35	37	30	82	36	27
Lead	mg/kg	0.50	310	2300	190	180	85	67	330	650	400	650	430	410	30	1800	52	330
Selenium	mg/kg	0.20	430	12000	0.41	0.37	0.27	< 0.20	0.61	1.7	0.36	0.73	0.57	0.79	< 0.20	0.56	0.24	0.71
Zinc	mg/kg	0.50	40000	730000	270	210	58	61	190	140	210	270	370	260	50	350	59	400
TPH CWG																		
Aliphatic TPH >C8-C10	mg/kg	1.0	27	2000	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	7.1	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Aliphatic TPH >C10-C12	mg/kg	1.0	130	9700	10	< 1.0	10	< 1.0	14	72	9.2	14	10	11	< 1.0	< 1.0	< 1.0	< 1.0
Aliphatic TPH >C12-C16	mg/kg	1.0	1100	59000	14	< 1.0	18	< 1.0	39	130	13	17	19	17	< 1.0	< 1.0	< 1.0	< 1.0
Aliphatic TPH >C16-C21	mg/kg	1.0	65000	1600000	< 1.0	< 1.0	15	< 1.0	42	84	< 1.0	40	13	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Aliphatic TPH >C21-C35	mg/kg	1.0	65000	1600000	79	33	120	< 1.0	160	210	110	190	190	98	< 1.0	< 1.0	< 1.0	< 1.0
Aliphatic TPH >C35-C44	mg/kg	1.0	65000	1600000	41	< 1.0	64	< 1.0	66	37	47	56	54	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Total Aliphatic Hydrocarbons	mg/kg	5.0			140	33	230	< 5.0	320	540	180	320	290	130	< 5.0	< 5.0	< 5.0	< 5.0
Aromatic TPH >C8-C10	mg/kg	1.0	47	3500	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	24	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Aromatic TPH >C10-C12	mg/kg	1.0	250	16000	13	< 1.0	20	< 1.0	27	7400	14	12	11	8.1	< 1.0	< 1.0	< 1.0	< 1.0
Aromatic TPH >C12-C16	mg/kg	1.0	1800	36000	87	< 1.0	170	< 1.0	200	2500	63	86	130	47	< 1.0	< 1.0	< 1.0	< 1.0
Aromatic TPH >C16-C21	mg/kg	1.0	1900	28000	250	100	740	< 1.0	720	5900	320	510	440	220	< 1.0	150	< 1.0	< 1.0
Aromatic TPH >C21-C35	mg/kg	1.0	1900	28000	990	470	2500	< 1.0	2200	3900	1200	1900	1700	990	< 1.0	790	< 1.0	< 1.0
Aromatic TPH >C35-C44	mg/kg	1.0	1900	28000	< 1.0	< 1.0	98	< 1.0	71	49	< 1.0	73	80	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Total Aromatic Hydrocarbons	mg/kg	5.0			1300	570	3600	< 5.0	3200	20000	1600	2600	2400	1300	< 5.0	940	< 5.0	< 5.0
Total Petroleum Hydrocarbons	mg/kg	10.0			1500	600	3800	< 10	3600	20000	1800	2900	2700	1400	< 10	940	< 10	< 10
SVOCs																		
Trichloromethane	µg/kg	1.0			< 1.0	5.9	8.2	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	7.2	< 1.0	< 1.0	6.3	6.3	< 1.0
Benzene	µg/kg	1.0	0.38	27	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	95	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
1,2-Dichloroethane	µg/kg	2.0			< 2.0	26	28	< 2.0	< 2.0	25	< 2.0	< 2.0	2.5	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0
Toluene	µg/kg	1.0	880	56000	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	110	< 1.0	< 1.0	3.7	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
1,3-Dichloropropane	µg/kg	2.0			< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	3.6	< 2.0
Ethylbenzene	µg/kg	1.0			< 1.0	3.9	< 1.0	< 1.0	< 1.0	80	< 1.0	< 1.0	7.1	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
m & p-Xylene	µg/kg	1.0	31	41000	< 1.0	13	< 1.0	< 1.0	< 1.0	100	< 1.0	< 1.0	9.8	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
o-Xylene	µg/kg	1.0	88	6600	< 1.0	9.3	7.0	< 1.0	< 1.0	120	< 1.0	< 1.0	7.2	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Styrene	µg/kg	1.0			< 1.0	< 1.0	2.7	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Tribromomethane	µg/kg	1.0			< 1.0	< 1.0	13	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Isopropylbenzene	µg/kg	1.0			< 1.0	1.5	2.7	< 1.0	< 1.0	70	< 1.0	< 1.0	2.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
N-Propylbenzene	µg/kg	1.0			< 1.0	15	13	< 1.0	< 1.0	180	< 1.0	< 1.0	12	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
1,3,5-Trimethylbenzene	µg/kg	1.0			< 1.0	8.6	12	< 1.0	< 1.0	220	< 1.0	< 1.0	6.2	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
1,2,4-Trimethylbenzene	µg/kg	1.0	0.41	42	< 1.0	18	17	< 1.0	< 1.0	140	< 1.0	< 1.0	12	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
4-Isopropyltoluene	µg/kg	1.0			< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	37	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
1,2,3-Trichlorobenzene	µg/kg	2.0	1.5	102	9.9	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0
Naphthalene	mg/kg	0.50	2.3	190	< 0.50	1.5	< 0.50	< 0.50	4.8	3000	3.6	3.1	3.6	7.3	< 0.50	1.1	< 0.50	0.62
4-Chloroaniline	mg/kg	0.50			< 0.50	< 0.50	3.0	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
2-Methylnaphthalene	mg/kg	0.50			< 0.50	< 0.50	2.0	< 0.50	3.2	42	1.5	1.7	2.5	8.5	< 0.50	0.99	< 0.50	0.63
Acenaphthylene	mg/kg	0.50	2900	83000	< 0.50	< 0.50	< 0.50	< 0.50	0.69	1.6	< 0.50	0.70	1.1	< 0.50	< 0.50	0.78	< 0.50	< 0.50
Acenaphthene	mg/kg	0.50	3000	84000	< 0.50	2.0	6.4	< 0.50	10	95	4.4	5.2	7.2	< 0.50	< 0.50	< 0.50	< 0.50	2.3
3-Nitroaniline	mg/kg	0.50			< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	17	< 0.50	< 0.50	< 0.50	< 0.50
Dibenzofuran	mg/kg	0.50			< 0.50	0.92	3.0	< 0.50	5.0	76	2.2	2.4	3.1	11	< 0.50	1.5	< 0.50	1.2
4-Chlorophenylphenylether	mg/kg	0.50			< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
2,4-Dinitrotoluene	mg/kg	0.50			< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50

Sample Location:					TP11	TP12	TP13	TP13	TP14	TP14	TP15	TP16	TP17	TP18	TP18	TP19	WS4	WS6
Sample Type:					SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL
Top Depth (m):					0.3m	0.5m	0.3m	0.8m	0.3m	1.0m	0.3m	0.3m	0.3m	0.3m	1.2m	0.3m	3.8m	0.6m
Date Sampled:					17-Jan-2022	17-Jan-2022	17-Jan-2022	17-Jan-2022	17-Jan-2022	17-Jan-2022	17-Jan-2022	17-Jan-2022	17-Jan-2022	17-Jan-2022	17-Jan-2022	17-Jan-2022	17-Jan-2022	17-Jan-2022
Fluorene	mg/kg	0.50	2800	63000	< 0.50	1.3	4.7	< 0.50	7.9	87	3.5	3.9	5.1	13	< 0.50	2.4	< 0.50	2.0
Phenanthrene	mg/kg	0.50	1300	22000	4.1	41	44	< 0.50	63	320	35	41	49	93	< 0.50	16	< 0.50	18
Anthracene	mg/kg	0.50	31000	520000	1.0	3.4	10	< 0.50	16	44	8.1	10	12	25	< 0.50	5.2	< 0.50	3.3
Carbazole	mg/kg	0.50			< 0.50	1.3	3.4	< 0.50	4.8	9.2	2.6	3.4	3.2	4.8	< 0.50	1.0	< 0.50	1.9
Fluoranthene	mg/kg	0.50	1500	23000	6.5	26	61	< 0.50	80	100	51	59	71	93	< 0.50	23	< 0.50	9.0
Pyrene	mg/kg	0.50	3700	54000	6.1	24	56	< 0.50	74	78	50	56	68	80	< 0.50	21	< 0.50	9.1
Benzo[a]anthracene	mg/kg	0.50	11	170	2.3	11	21	< 0.50	29	16	19	22	27	30	< 0.50	8.4	< 0.50	2.8
Chrysene	mg/kg	0.50	30	350	3.0	12	25	< 0.50	35	20	25	28	34	35	< 0.50	11	< 0.50	2.8
Benzo[b]fluoranthene	mg/kg	0.50	3.9	44	3.3	13	27	< 0.50	40	18	28	32	38	37	< 0.50	11	< 0.50	2.1
Benzo[k]fluoranthene	mg/kg	0.50	110	1200	1.1	4.2	9.1	< 0.50	14	5.8	8.6	11	13	13	< 0.50	4.2	< 0.50	0.67
Benzo[a]pyrene	mg/kg	0.50	3.2	35	2.5	9.8	20	< 0.50	30	16	23	25	30	29	< 0.50	8.9	< 0.50	1.8
Indeno(1,2,3-c,d)Pyrene	mg/kg	0.50	45	500	1.4	4.8	8.8	< 0.50	15	6.3	10	13	15	13	< 0.50	4.4	< 0.50	< 0.50
Dibenz(a,h)Anthracene	mg/kg	0.50	0.31	3.5	< 0.50	1.3	1.9	< 0.50	4.4	1.8	2.7	3.4	4.2	3.4	< 0.50	1.1	< 0.50	< 0.50
Benzo[g,h,i]perylene	mg/kg	0.50	360	3900	1.1	5.5	9.3	< 0.50	16	7.5	12	14	16	5.3	< 0.50	4.6	< 0.50	< 0.50

Notes:

Only those determinands that have been detected at concentrations in excess of LoD have been included in the table

GAC = Human health generic assessment criteria for residential land use without plant uptake and commercial

░	GAC Exceedance of Residential GAC only
▓	GAC Exceedance of Residential GAC and Commercial GAC

Appendix G – Controlled Waters Risk Assessment

			Sample Location:	WS2	WS3	WS7
			Sample Type:	WATER	WATER	WATER
			Top Depth (m):	1.30m	1.55m	0.85m
			Date Sampled:	01-Feb-2022	01-Feb-2022	01-Feb-2022
Determinand	**Units**	**LOD**	**GAC**			
pH		N/A		8.4	7.9	7.4
Sulphate	mg/l	1.0		53	310	65
Total Hardness as CaCO3	mg/l	15		380	590	420
Heavy Metals						
Arsenic (Dissolved)	µg/l	0.20	10	40	97	5.6
Chromium (Dissolved)	µg/l	0.50		2.3	5.5	2.0
Copper (Dissolved)	µg/l	0.50	2000	0.82	1.1	1.1
Nickel (Dissolved)	µg/l	0.50	20	3.8	5.5	3.6
Lead (Dissolved)	µg/l	0.50	10	0.69	< 0.50	< 0.50
Selenium (Dissolved)	µg/l	0.50	10	0.54	0.74	< 0.50
Zinc (Dissolved)	µg/l	2.5	5000	23	4.6	2.6
SVOCs						
Acenaphthene	µg/l	0.50		< 0.50	11	14
Dibenzofuran	µg/l	0.50		< 0.50	2.6	3.6
Fluorene	µg/l	0.50		< 0.50	2.1	3.0
Anthracene	µg/l	0.50		< 0.50	< 0.50	0.69
Fluoranthene	µg/l	0.50		< 0.50	0.74	0.99
Notes:						
Only those determinands that have been detected at concentrations in excess of LoD have been included in the table						
▨	GAC Exceedance (UK Drinking Water Standards)					

Appendix G Remediation Strategy (LKC 22 1670-B1-GI ¦ September 2023)

VARLEY STREET
MANCHESTER

FINAL ADDITIONAL SITE INVESTIGATION AND UPDATED REMEDIATION STRATEGY

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

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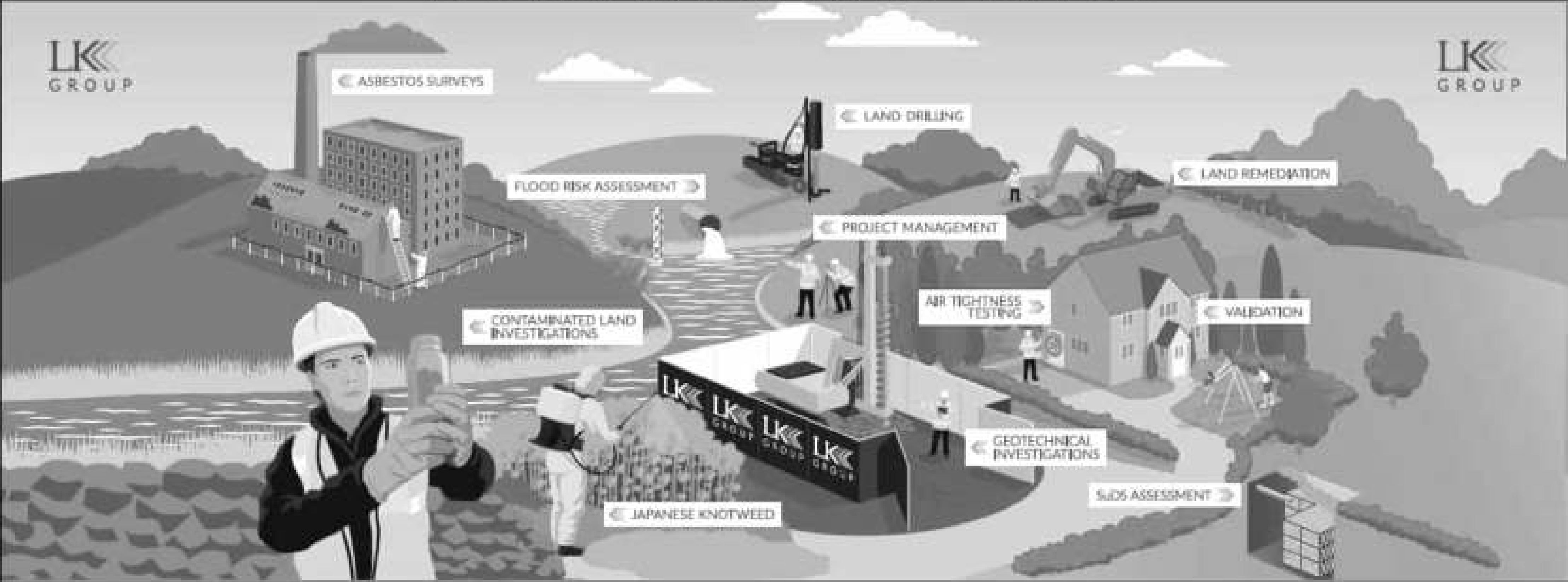
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SuDS ASSESSMENT
JAPANESE KNOTWEED
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LK Consult

Document Verification

Site Address	Sawley Road, Miles Platting, Manchester, M40 8EF		
Report Title	Final Additional Site Investigation and Updated Remediation Strategy		
Job Number	LKC 22 1670	**Document Ref.**	LKC 22 1670-B1-GI-Varley Street
Date Issued	September 2023	**Report Version**	R0
Prepared By	Ella Mcleod	**Reviewed By**	Peter Dunn

Revision Record

Revision No.	Date	Nature of Revision	Approved By

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EXECUTIVE SUMMARY

Site Details

Site Location:	Site is bound by Sawley Road to the north, Vickers Street to the east and James Street to the south. Centred at approximate National Grid Reference 386140E 399618N.
Site Area:	Approximately 15,300m^2.
Current Land Use:	Vacant land.
Proposed Development:	Planning ref. 136645/VO/2023. Erection of a part single, part two storey detached school building (Class F1) with associated sports facilities, access, car parking arrangements, landscaping and boundary treatment.
Purpose of Report:	Contamination Assessment.

Preliminary Risk Assessment

PRA Details:	Undertaken by EnviroSolution Ltd (ref. CL101_V1, dated 1st February 2023).
History:	Terraced housing, infant school, 2no. timber yards. Surrounding area: several works.
Geology / Hydrogeology:	Glacial Till (Secondary Undifferentiated Aquifer) over Pennie Middle Coal Measures (Secondary A Aquifer).
Mining:	1no. mine shaft is mapped to be located on site. of the site is classified as a 'Development High Risk Area' due to the presence of mine shafts, past shallow coal mine workings and probable shallow coal mine workings.
Relevant Environmental Setting:	Rochdale Canal 110m south. No groundwater abstraction licenses or discharge permits within 300m. No recorded landfills / historic landfill sites. Not within Source Protection Zone.
Recommendations:	The site was classified as moderate risk in terms of contamination and the risk to identified receptors (e.g. human health, controlled waters, buildings). Site investigation was recommended.

Additional Ground Investigation Work Undertaken

Date of Investigation:	10th and 23rd May 2023.
Intrusive Investigation Work Undertaken:	7no. window sample boreholes (WS101-WS106 & WS104A). 2no. trial pits, soakaway test undertaken in 1no. pit (TP101, SA101) – reported under separate cover.
Monitoring Wells:	Installed in all boreholes.
Monitoring:	6no. gas monitoring visits.
Insitu Geotechnical Testing:	SPTs, pocket penetrometer tests.

Contamination Risk Assessment

The table below shows a summary of the risk assessments undertaken for each pollutant linkage, the revised conceptual model and recommendation for either remediation and / or further investigation.

Pollutant Linkage		Risk	Assessment
1	Contaminants posing a risk to future site users and offsite receptors via dermal contact, ingestion and inhalation (of soil, dust, fibres and home-grown produce).	**Moderate** (metals, PAHs, TPH, asbestos)	- Elevated contaminants identified. - **Recommendations:** Remediation required in soft landscaping areas. Watching brief during earthworks.
2	Volatile contaminants posing a risk to future site users and offsite receptors via the inhalation of vapours.	**Moderate**	- Volatile contamination identified. - **Recommendations:** Remediation to include installing a vapour resistant membrane in proposed buildings, Watching brief during earthworks.
3	Gas posing a risk to buildings and future site users, buildings and offsite land users via the migration of gas into building causing explosion and asphyxiation.	**Moderate**	- Elevated carbon dioxide identified in all monitoring wells and mine shaft located on site. - **Recommendations:** Gas protection measures in line with CS2. Should hazardous ground gases be encountered as part of routine monitoring undertaken as part of coal mining remediation, then further gas monitoring and/ or upgrading of gas protection rating may be required
4	Mobile contamination posing a risk to controlled waters via the migration through permeable strata.	**Low**	- No significant risk to groundwater given the environmental settings and ground conditions encountered. - **Recommendations:** No remediation required. Watching brief during earthworks, particularly for petroleum hydrocarbons.
5	Organic contaminants posing a risk to water pipes.	**Moderate**	- Elevated organic contaminants identified. - **Recommendations:** UU risk assessment to be completed. The site will likely require barrier piping.

Recommendations and Remedial Strategy

The table below shows the remediation and validation requirements for the site. This information should be documented in a Site Completion Report for submission to the local authority.

Phase	Remediation Requirements	Validation Requirements
Pre-Construction (enabling)	Excavation, processing and stockpiling This will include the grubbing out and processing of hardstanding and unsuitable material. Any oversize material, if encountered will be processed and re-used as appropriate. Appropriate site won material will be stockpiled for potential reuse. Additionally, suspect material will be quarantined for characterisation prior to possible offsite disposal.	Log of work undertaken including photographs. Re-use of material will be under U1 and T5. Testing of site won/ imported soil as per Table 6-2.

Phase	Remediation Requirements	Validation Requirements
Pre-Construction (enabling)	Earthworks Site Inspections & Unexpected Contamination A watching brief should be maintained by a suitably qualified and experienced person during enabling works to identify any unusual ground conditions. If any visual or olfactory evidence of contamination be encountered at the site, further assessment of the material may be required. Particular attention should be paid to hydrocarbons, as visual and olfactory evidence of contamination identified during site investigations. Should hazardous ground gases be encountered as part of routine monitoring undertaken as part of coal mining remediation, then further gas monitoring and/ or upgrading of gas protection rating may be required	Log of work undertaken including photographs. Details of any sampling undertaken and validation of any potential additional remedial work. Further assessment of gas risk if hazardous ground gas encountered.
	Segregation and removal of unsuitable materials As part of the watching brief during earthworks, areas of unexpected contamination (including hazardous waste) and geotechnically unsuitable material will be delineated, excavated and removed following suitable testing and verification.	Log of work undertaken including photographs. Consignment notes confirming removal of unsuitable material.
Build-Phase	Vapour Membrane Elevated petroleum hydrocarbon (aromatic C10-12) and VOCs were identified on site. Given the ground conditions encountered, further contamination may be present across the site. It is recommended that buildings are to include a vapour resistant membrane.	Plan including foundation design. Photographic evidence showing installation of membrane.
	Gas Protection Measures In line with CS2 as per UK guidance[1,2]. This is likely to / should include: • Passive subfloor or active subfloor ventilation system. • Methane and carbon dioxide resistant membrane installed as per manufacturer's instructions. • Ventilation of confined spaces within the building. • Well-constructed reinforced suspended, raft or cast in situ ground slab. • Minimum penetration of ground slab by services. • All joints and penetrations to be sealed. Depending on the type of building and foundation design the protection measures can vary. The gas protection measures will be detailed and approved with the Local Authority once the foundation design has been confirmed.	Supply and review of foundation designs. Photographic evidence of sub-floor void, ventilation and suitably sealed gas membrane. Validation of gas protection measures should be in line with CIRIA 735[3]

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[1] CIRIA (2007). "Assessing Risks Posed by Hazardous Ground Gases to Buildings." CIRIA C665

[2] BSI (2015). "Code of Practice for the Design of Protective Measures for Methane and Carbon Dioxide Ground Gases for new buildings." BS8485:2015.

[3] CIRIA (2014). "Good Practice on the Testing and Verification of Protection Systems for Building Against Hazardous Ground Gas". CIRIA C735.

Phase	Remediation Requirements	Validation Requirements
Build-Phase	Environmental Cover System Shared Landscaping: 450mm thick environmental cover system comprising: geotextile membrane and at least 450mm comprising clean inert fill and sufficient topsoil for a growing medium.	Measured thickness of environmental cover system via hand dug pits and staff and/or as-built survey at each layer. Photographic evidence throughout each stage, showing geotextile membrane, subsoil and topsoil installation process and completion. Chemical validation of imported/ site-won soils.: See Table 6-2.
	United Utilities (UU) Risk Assessment UU Potable Water Risk Assessment to be undertaken once the location and depth of potable water pipes are known and following completion of the earthworks. Barrier pipe likely to be required.	To be completed following completion of the remediation earthworks.

The remediation recommended in the table above should be validated to ensure it has been carried out appropriately. This should be documented in a Completion/Validation Report and submitted to the local authority for completion.

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FIGURES

Figure 1: Site Location and Boundary Plan
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APPENDICES

Appendix A: Risk Matrix
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1 Introduction

1.1 Background

LK Consult Ltd (LKC) has been commissioned by ISG Ltd to carry out an additional site investigation and provide an updated Remediation Strategy for Varley Street, Manchester. The investigation was undertaken in support of a planning application for the construction of a school with associated sports facilities and infrastructure.

The additional site investigation was undertaken in order to undertake an updated hazardous / ground gas risk assessment for the site. Additional site investigation works at Nelson Street (parcel of land adjacent to the west of site) were undertaken by LKC at the same time at this investigation and is reported under separate cover.

The Remediation Strategy is required to determine the work necessary in order to ensure the site is "suitable for use" for the proposed development with regards to potential contaminated land pollutant linkages.

A summary of the site details is presented in Table 1-1. Figures 1 indicates the site location and boundary.

Site Location	Site is bound by Sawley Road to the north, Vickers Street to the east and James Street to the south. Centred at approximate National Grid Reference 386140E 399618N.
Approximate Area	Approximately 15,300m^2.
Topography	Approximately 59m Above Ordnance Datum (AOD). Site is approximately level.
Current Site Use	Vacant land.
Purpose of Report	Planning.
Proposed Development	Planning ref. 136645/VO/2023. Erection of a part single, part two storey detached school building (Class F1) with associated sports facilities, access, car parking arrangements, landscaping and boundary treatment.

Table 1-1. Summary of site details.

2 Summary of Previous Work

The following reports have previously been provided for the site and should be read in conjunction with this report:

- ‘Phase 1 Environmental Site Assessment Report’ for Varley Street Manchester, undertaken by EnviroSolution Ltd (ref. CL101_V1, dated 1st February 2023).
- ‘Phase 2 Geo-Environmental Site Assessment Report’ for Varley Street Manchester, undertaken by EnviroSolution Ltd (ref. CL102_V1, dated 2nd March 2022).
- Shallow Mining and Mine Shaft Investigation Works report undertaken by LKC (ref. CL-602-LKC 22 1670-CMSI R1, dated 20th June 2023).

2.1 Summary of Phase 1 Environmental Site Assessment Report

The site history, site description and environmental settings are described in the Phase 1 Site Assessment Report (desk study), with pertinent information summarised below:

- The site is vacant with rough vegetation across the majority of the site and a tarmac games court in the west.
- Historical mapping indicates that terraced housing was present in the eastern part of the site from 1893 mapping onwards. The area to the north of the site was also developed for terraced housing from 1893 mapping.
- A timber yard is shown in the eastern part of the site from 1908 mapping, which was extended by 1948 mapping.
- A day nursery is present in the south west of site from 1948 mapping, a second timber yard is present in the east.
- By 1965 mapping, all buildings are demolished and the site is used as a playing field.
- Surrounding historical land uses include several works within 50m to the north, south and south west (chemical works, cloth works, iron foundry, rubber works and smelting works). By 1965 mapping, the chemical and rubber works 10m south of site were converted to warehouses and a depot.
- By 1978 mapping, the chemical works and iron foundries are labelled as works and an engineering works is located adjacent to the eastern boundary. The works adjacent to the eastern site boundary is no longer present.
- A works is still present to the south of site (understood to be a packaging company).
- BGS records indicate the site is underlain by superficial Till (Diamicton) and Pennine Upper Coal Measures Formation. 2no. BGS borehole records 10m and 25m west of the site indicate made ground to approximately 2m below ground level (bgl) overlying stiff clay with lenses of sand (4m thick band of sand recorded at 12mbgl). Bedrock was recorded at depths of between 25-27.5mbgl.
- The site is intersected by two seams of coal, one of which is recorded as being worked.
- 1no. mine shaft is mapped to be located on site.
- Part of the site is classified as a ‘Development High Risk Area’ due to the presence of mine shaft, past shallow coal mine workings and probable shallow coal mine workings.
- Superficial deposits are considered a Secondary Undifferentiated Aquifer and bedrock a Secondary A Aquifer.

- Rochdale Canal is located 110m south of the site. No groundwater abstraction licenses or discharge permits were identified within 300m from the site and the site is not located within a Source Protection Zone.
- No recorded landfills / historic landfill sites were identified within 250m from the site.

The desk study report concludes that "*the site can be classified as moderate risk in terms of contamination and the risk to the identified receptors (e.g. human health, controlled waters, buildings)".* The report recommended site investigation to assess potential pollutant linkages.

2.2 Summary of Phase 2 Geo-Environmental Site Assessment Report

An intrusive investigation was undertaken on 17th to 18th January 2022 and 24th to 25th February 2022. 10no. window sample boreholes were drilled to depths of 3.50-5.00m below ground level (bgl). 19no. trial pits were excavated to depths of 1.50-2.50mbgl and 2no rotary boreholes were drilled to a depth of 35.00mbgl.

The site investigation included in-situ geotechnical testing as well as geotechnical laboratory analysis. Chemical laboratory analysis was undertaken on soil samples collected from investigation locations.

6no. boreholes were installed with monitoring wells to undertake groundwater level monitoring and gas monitoring.

Made ground was recorded to depths of between 0.50-3.30mbgl and was generally thickest in the south western half of the site. The made ground generally comprised sandy clayey gavel / gravelly sandy clay with anthropogenic material including brick, glass, concrete, ceramic fragments, slag, ash and timber.

Visual / olfactory evidence of hydrocarbons was noted as follows:

- A strong hydrocarbon odour and an oily sheen was recorded in WS7 between 0.30-1.10mbgl;
- A slight hydrocarbon odour noted within the superficial clay in TP1 (1.00-1.50mbgl);
- A hydrocarbon odour was noted at 1.00mbgl in TP7, and a slight hydrocarbon odour noted at 1.10mbgl in TP13;
- Made ground with an oily sheen and strong hydrocarbon odour was recorded in TP14 between 0.30-1.20mbgl;
- A hydrocarbon odour was noted in TP16 at 1.20mbgl.

The made ground is underlain by soft to stiff brown / orange / grey mottled slightly gravelly clay.

A band of sand was encountered in the two rotary boreholes at depths of 10.00-11.00mbgl (thickness of 4.50-5.50m). Bedrock was encountered in the rotary boreholes at depth of between 23.50-26.50mbgl, consisting of grey mudstone with sandstone bands. No voids or loss of flush were recorded and no evidence of unrecorded shallow workings. Further investigation was recommended across the site.

Groundwater seepages were noted in 5no. trial pits at depths of between 1.20-2.00mbgl. Groundwater was not encountered during thrilling of the window sample boreholes.

Groundwater level monitoring was undertaken on 3no. occasions. Groundwater levels in 4no. monitoring well were recorded between 0.85-4.95mbgl. No groundwater was recorded in the remaining 2no. wells installed. It was concluded that the groundwater strikes and subsequent monitored levels represent perched water.

Soil laboratory analysis results were compared against Generic Assessment Criteria (GAC) for a residential without homegrown produce land-use scenario and against commercial land-use scenario for comparative purposes. When compared against residential without homegrown produce land-use scenario as a conservative approach, elevated contaminants were recorded for heavy metals (arsenic, lead), petroleum hydrocarbons (aromatic C10-12, C12-16, C16-21 and C21-35), PAHs, SVOCs and naphthalene. Asbestos (chrysotile) was identified in one sample of made ground analysed (TP9 at 0.30mbgl). Quantification testing stated the sample contained 0.015% asbestos. Remediation was recommended in areas of soft landscaping.

Three groundwater samples were collected and compared to UK Drinking Water Standards. Exceedances of arsenic were detected in two of the samples. During the monitoring and sampling of WS7, a strong hydrocarbon odour and a sheen to the water was identified however the groundwater results recorded all TPH fractions are less than limits of detection. The risk to receptors was considered to be negligible due to impermeable Diamicton (till) which underlies the site.

Gas monitoring was undertaken on 3no. occasions between 24th January 2022 to 7th February 2022. The worst-case gas screening value (GSV) calculated classified the site as Characteristic Situation 1 (CS1). However the report recommended the site be considered Characteristic Situation 2 based on carbon dioxide concentrations recorded as greater than 5%v/v and that gas protection measures are required in all new buildings on site.

2.3 Summary of Shallow Mining and Mine Shaft Investigation Works Report

The investigation works were 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 coal mining report covers both the Varley Street site and the adjacent ‘Nelson Street’ site. The summary herein, pertains to the Varley Street site only.

The investigation works were carried out by LKC in May 2023 and comprised drilling 5no. open hole rotary boreholes to 40mbgl and trial trenching to locate 1no. mine shaft (refer to Figure 2).

Rotary drilling was undertaken to determine the depth of coal seams beneath the site and obtain evidence of unrecorded and recorded mine workings.

Trial trenching was undertaken to locate the mine shaft shown to be located in the southern area of the site (ref. 386399-016).

Superficial strata comprising sandy clay was recorded in all locations. Depth to rockhead was recorded as between 23.00-27.80mbgl and the depth to intact coal was recorded as between 34.00-34.50mbgl. The thickness of the coal ranged between 0.50-1.00mbgl.

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 sand and clay, with ash, clinker, ceramic, brick, rootlets and coal fragments. The made ground was underlain by variably gravelly and sandy clay.

A circular area of deeper made ground was recorded between 2.30-2.60mbgl in Trench 4 which is likely the untreated mine shaft.

Treatment and stabilisation work was recommended based on the findings of the coal mining investigation.

LKC has been commissioned by ISG Ltd to carry out an additional site investigation and provide an updated Remediation Strategy for the site. The objectives of the additional site investigation are to allow installation of replacement gas monitoring wells to undertake 6no. gas monitoring visits to the site over a period of three months.

3 Further Ground Investigation

3.1 Site Investigation Design and Methodology

An intrusive investigation was undertaken by LKC to install monitoring wells for gas and monitoring. Soakaway tests were undertaken to assess the potential for the incorporation of soakaways in the future drainage design. It should be noted that the soakaway test results have previously been reported under separate cover.

The investigation was carried out on 10th and 23rd May 2023 and comprised the following:

- 2no. machine excavated trial pits to depths of 2.20-2.40mbgl, and a BRE soakaway test undertaken in 1no. pit (ref. TP101, SA101).
- 6no. window sample boreholes drilled to 2.03-5.45mbgl (ref. WS101 to WS106 & WS104A).

All site investigation locations are shown in Figure 2.

WS104 refused at 2.03mbgl on a probable sandstone cobble. The borehole was repositioned approximately 1m to the southwest (ref. WS104A).

The window sample boreholes were drilled to confirm the ground conditions beneath the site and to install monitoring wells for a series of gas monitoring visits.

Table 3-1 details the targeted and general coverage (non-targeted) site investigation locations.

Site Investigation Locations	Rationale
WS102, WS103, WS104, WS104A & WS105	To install monitoring wells within the footprint of the proposed school building, and general site coverage.
WS101, WS106	General site coverage.
TP101, SA101	Within proposed hardstood area / car park area where soakaways could be incorporated.

Table 3-1: Summary of sampling locations.

All profile logs are provided in Appendix B and are in line with BS14688-1[4] and BS5930[5].

The number of monitoring wells installed corresponds to approximately one per 50m square centres. This is in line with guidance in CIRIA C665[6] for a 'moderate' gas hazard and a moderate / high sensitivity of end use.

3.2 Well Installations

All of the boreholes were installed with monitoring wells for gas and groundwater monitoring.

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[4] British Standards (2002) Geotechnical investigation and testing – Identification and Classification of Soil. Part 1: Identification and description. BS EN ISO 14688-1:2002.

[5] British Standard (2015). "Code of Practice for Ground Investigations". BS5930:2015.

[6] CIRIA (2007). "Assessing Risks Posed by Hazardous Ground Gases to Buildings." CIRIA C665.

Monitoring wells were installed in accordance with BS10175 and CIRIA C665[7] and generally comprised approximately 1m plain pipe over a length of slotted pipe surrounded by pea gravel and sealed at the top with bentonite and concrete.

Well installation details are provided in Profile Logs in Appendix B.

3.3 Onsite Testing

Soil was collected for onsite testing. A plastic zip bag was half filled with soil allowing a suitably sized headspace. The bag was sealed and stored for at least 20 minutes before being tested for total volatile organic compounds (TVOCs) using a PhoCheck Tiger photoionisation detector (PID). Results of the PID readings are presented on the profile logs (Appendix B). The on-site monitoring was carried out in line CIRIA C665[8] to aid in screening samples for volatile analysis.

3.4 Laboratory Testing

3.4.1 Soil Sampling (Contamination)

Soil sampling was not carried out as part of this additional investigation. A summary of the soil sampling carried out by EnviroSolution is provided in Section 2.2 and is further discussed in Section 5.1.1.

3.4.2 Water Sampling / Leaching Testing

Groundwater sampling / leaching testing was not carried out as part of this additional investigation. A summary of the groundwater sampling carried out by EnviroSolution is provided in Section 2.2 and is further discussed in Section 5.4.

3.5 Gas Monitoring

Six gas monitoring visits have been undertaken over a 12-week period in all installed boreholes.

Monitoring was undertaken using a Geotechnical Instruments GA5000 in accordance with the monitoring protocol outlined in CIRIA C665 (flow rate measured first).

The gas monitoring results are reproduced in full in Appendix C. It should be noted that the gas monitoring results are reported together with the Nelson Street site adjacent to the west. Data from WS101, WS102, WS103, WS104A, WS105 and WS106 apply to this report.

3.6 Geotechnical Testing

3.6.1 In-situ Onsite Geotechnical Testing

In-situ geotechnical tests were performed in the boreholes to further characterise the sub-soil conditions. The following tests were undertaken:

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[7] CIRIA (2007). “Assessing Risks Posed by Hazardous Ground Gases to Buildings.” CIRIA C665.
[8] CIRIA (2007). “Assessing Risks Posed by Hazardous Ground Gases to Buildings.” CIRIA C665.

- Standard Penetration Tests (SPTs) were performed in the window sample boreholes at approximately 1m intervals.
- Pocket -penetrometer tests (giving undrained shear strength) were performed in the window sample boreholes.

Laboratory geotechnical testing was not undertaken as part of this investigation.

The SPT and shear vane readings are provided within the profile logs (Appendix B).

4 Ground Conditions

4.1 Geology – Generalised Sequence

The ground conditions beneath the site comprised made ground underlain by variably gravelly sandy clay. A summary section of the logs is provided in Plate 4-1, with additional comments below.

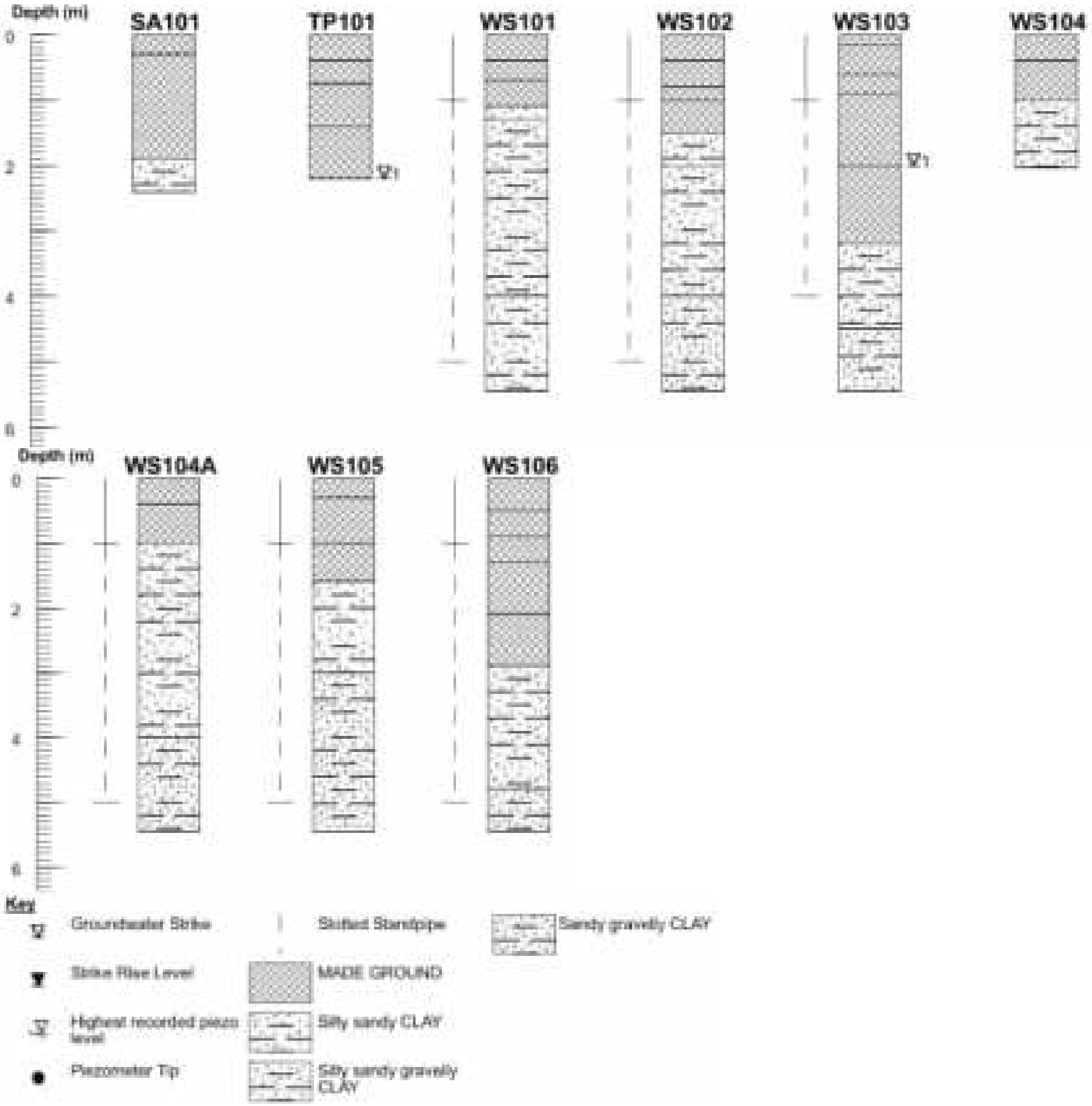
Depth (m)
0
2
4
6
SA101
TP101
WS101
WS102
WS103
WS104
Depth (m)
0
2
4
6
WS104A
WS105
WS106
Key
Groundwater Strike
Slotted Standpipe
Sandy gravelly CLAY
Strike Rise Level
MADE GROUND
Highest recorded piezo level
Silty sandy CLAY
Piezometer Tip
Silty sandy gravelly CLAY

Plate 4-1: Summary of ground conditions.

Additional information on ground conditions:

Made Ground

Made ground was recorded in all investigation locations to depths of 1.00-3.20mbgl, which is consistent with the depths recorded by EnviroSolution (0.50-3.30mbgl).

The made ground comprised horizons of sand / sand and gravel / clay / silt with anthropogenic material including ash, brick, coal, concrete, slate, glass and clinker. Exceptions to this include:

- Predominantly ash and clinker in: TP101 (0.40-0.75mbgl, 1.40-2.20mbgl), SA101 (0.30-1.90mbgl), WS102 (1.50-1.50mbgl), WS103 (0.90-3.20mbgl), WS105 (1.00-1.60mbgl) and WS106 (1.30-2.10mbgl).
- Slightly organic sandy silty clay with coal, ash and brick fragments in WS106 (2.10-2.90mbgl) and WS109 (0.90-1.30mbgl).

Natural Strata

Natural strata comprised stiff to very stiff consistency variably gravelly sandy clay, with occasional bands of sand with depth.

Contamination

The following evidence of hydrocarbon contamination was observed:

- Slight hydrocarbon odour between 0.80-1.50mbgl in WS102;
- Very slight hydrocarbon odour between 1.50-2.00mbgl in WS102;
- Slight hydrocarbon odour between 2.00-3.20mbgl in WS103.

The PID recorded a maximum of 1.1ppm TVOC in the samples.

No visible fragments of asbestos containing material (ACM) were identified.

As summarised in Section 2.2, visual and olfactory evidence of hydrocarbon contamination was encountered in 5no. investigation locations during the EnviroSolution investigation. The following evidence was observed:

- A strong hydrocarbon odour and an oily sheen was recorded in WS7 between 0.30-1.10mbgl;
- A slight hydrocarbon odour noted within the superficial clay in TP1 (1.00-1.50mbgl);
- A hydrocarbon odour was noted at 1.00mbgl in TP7, and a slight hydrocarbon odour noted at 1.10mbgl in TP13;
- Made ground with an oily sheen and strong hydrocarbon odour was recorded in TP14 between 0.30-1.20mbgl;
- A hydrocarbon odour was noted in TP16 at 1.20mbgl.

4.2 Groundwater

4.2.1 Groundwater Levels

A slow seepage of water was recorded in TP101 at 2.20mbgl and a water strike recorded in WS103 at 2.00mbgl. No groundwater strikes were recorded in the remainder of the investigation locations. Groundwater monitoring within the monitoring wells has been undertaken on six occasions.

Results are summarised in Table 4-2.

BH/TP	Water Strike Depths (mbgl)	Well Response Zone (mbgl)	No. of Monitoring Visits	Monitoring Depths (mbgl)		
				Min	Max	Base
SA101	Dry	-	-	-	-	-
TP101	2.2	-	-	-	-	-
WS101	Dry	1.0-5.0 (MG/C)	6	4.17	4.91	4.90-4.91
WS102	Dry	1.0-5.0-(MG/C)	5	0.72	3.02	4.85-4.87
WS103	2.0	1.0-4.0 (MG/C)	6	1.55	2.01	3.90-3.92
WS104A	Dry	1.0-5.0 (MG/C)	6	0.66	4.57	4.86-4.89
WS105	Dry	1.0-5.0 (MG/C)	6	1.34	3.88	3.91-3.95
WS106	Dry	1.0-5.0 (MG/C)	6	1.68	2.01	4.83-4.88

Table 4-2: Summary of water strike depths within boreholes and trial pits.

Response Zones:
MG=Made Ground; C=Clay.

4.3 In-Situ Geotechnical Testing

4.3.1 Standard Penetration Tests

In-situ standard penetration tests (SPTs) were undertaken, predominantly in the natural ground. The results are provided within the profile logs in Appendix B.

4.3.2 Pocket Penetrometer Tests

Pocket penetrometer tests, recording undrained shear strength (s_u), were taken within the clay strata. The results are provided within the profile logs in Appendix B.

5 Further Assessment of Pollutant Linkages

5.1 Introduction

Current good practice requires that the findings from a site investigation should be evaluated on a site-specific basis, using a risk-based approach. Risk assessment involves identification and evaluation of the hazards presented by the concentrations of contaminants measured followed by an evaluation of the risks which are associated with these hazards (LCRM[9]). Information gathered from the risk assessment has been collated in the contamination conceptual model in Section 5.6.

Where LKC identify a low to very low risk, limited intrusive investigation work, a watching brief (during enabling work) or no investigation work will be recommended. This is decided on a site-specific basis, dependent on the nature of the site and the proposed development.

Where the risk falls into the moderate / low risk, LKC will undertake an assessment to establish what category the pollutant linkage will fall into (i.e. moderate or low risk will be chosen). Where LKC identifies a moderate or higher risk, further works or precautionary remedial measures will be recommended.

5.1.1 Direct Contact Risk – Pollutant Linkage 1

In the EnviroSolution site investigation report soil laboratory analysis results were compared against Generic Assessment Criteria (GAC) for a residential without homegrown produce land-use scenario and against commercial land-use scenario for comparative purposes.

The EnviroSolution site investigation report lists individual PAHs elevated above the GAC separately. LKC consider the main risk drivers for PAHs are benzo(a)pyrene (B(a)P) and naphthalene. This is due to B(a)P possibly being a carcinogen and most toxic of the PAHs[10,11] and naphthalene the most volatile and soluble[12].

Category 4 Screening Levels (C4SLs) advocate using the B(a)P as a surrogate marker for carcinogenic PAHs, if it falls within appropriate limits and in the absence of coal tar.[13]. In LKC's experience the vast majority of samples pass the assessment to confirm B(a)P is a suitable surrogate marker. This approach will therefore be used for Pollutant Linkage 1. Naphthalene will be treated separately using the LQM S4ULs.

Elevated PAHs (B(a)P used as a surrogate marker) were identified in seventeen samples analysed as part of the EnviroSolution site investigation.

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[9] Land Contamination Risk Management (LCRM) https://www.gov.uk/government/publications/land-contamination-risk-management-lcrm

[10] EA (2002). "Contaminants in Soils: Collation of Toxicological Data and Intake Values for Humans. Benzo[a]pyrene." R&D Publication TOX2.

[11] USEPA (1984). "Health Effects Assessment of Polycyclic Aromatic Hydrocarbons (PAHs). EPA 540/1-86-013."

[12] EA (2003). "Review of the Fate and Transport of Selected Contaminants in the Soil Environment." Draft technical report P5- 079/TR1.

[13] CL:AIRE (2013). "SP1010: Development of Category 4 Screening Levels and Assessment of Land Affected by Contamination – Final project Report."

Elevated heavy metals (arsenic and lead) were identified in fourteen analysed. The source of the elevated PAHs and heavy metals is anticipated to be the ash, clinker and coal noted in the made ground.

Elevated aromatic C16-21 and C21-35 were identified in four samples analysed, and elevated C35-44 was identified in one sample analysed. As detailed in Section 4.1, visual and olfactory evidence of hydrocarbon contamination was recorded during the site investigations undertaken by EnviroSolution and by LKC. It is therefore possible that further small pockets of hydrocarbon contamination may be present across the site.

No discrete fragments of asbestos containing material (ACM) were identified during the site investigations undertaken by EnviroSolution and LKC. Asbestos fibres (chrysotile) were identified in one sample of made ground analysed (TP9 at 0.30mbgl). Quantification testing stated the sample contained 0.015% asbestos.

LKC have used the Joint Industry Working Group (JIWG) assessment tool for the site. The model was run assuming an environmental cover system where material will be buried at depth and the receptor classified as infant (<5 years old) as a conservative approach. This identified a very low risk when Made Ground is placed beneath clean cover soils. The output sheets are presented in Appendix D.

At the concentrations identified, heavy metals, PAHs, petroleum hydrocarbons and asbestos are considered to pose a potential risk to future site users in soft landscaped areas. The principal pathways are inhalation of fibres (asbestos), ingestion pathways (soil and dust) and dermal contact.

The probability of heavy metals, PAHs, petroleum hydrocarbon and asbestos contamination affecting site users is likely. With a medium consequence, the risk is considered to be moderate and remediation is recommended, as per the recommendation in the EnviroSolution site investigation report. This is to include an environmental cover system in areas of proposed soft landscaping.

Notwithstanding the above recommendation, a watching brief should also be maintained during earthworks. If any unusual ground conditions / unexpected contamination encountered, further assessment may be required.

Additional consideration should also be given to the risk from asbestos to workers and offsite receptors during groundworks and construction. This is discussed further in Section 6.

5.1.2 Risk from Inhalation of Vapours – Pollutant Linkage 2

An assessment of the risk from inhalation of vapours was not included as part of the EnviroSolution site investigation report.

LKC has compared the laboratory results in the EnviroSolution report against the GAC for residential without plant uptake criteria.

Elevated results have been identified for VOCs (naphthalene, 2-methylnaphthalene) in seven locations, SVOCs (dibenzofuran, carbazole) in two locations, and aromatic C10-12 in one location when compared to 1% soil organic matter (SOM). The GAC for naphthalene can be modified based on a linear relation between naphthalene and SOM concentration, however LKC have not been provided with the SOM of the samples analysed therefore this cannot be undertaken.

Visual and olfactory evidence of hydrocarbon contamination was identified in several locations during the site investigations undertaken by LKC and by EnviroSolution. The PID recorded maximum TVOCs of 1.1ppm,

The elevated VOCs and SVOCs are mainly located in the investigation locations in the northern / north eastern part of the site. However given the bands of ash and clinker encountered during the additional site investigation, and evidence of hydrocarbon contamination recorded during the site investigations undertaken by LKC and EnviroSolution (including in the western part of site), LKC consider that further contamination may be present across the site.

The probability of vapours posing a risk to site users is considered to be likely. With a medium consequence, the risk is moderate and remediation is recommended. This is to include installing a vapour resistant membrane in proposed buildings.

In addition, a watching brief for the presence of any significant hydrocarbon contamination should also be maintained during earthworks. Further assessment may be required.

5.2 Gas Risk Assessment

Six gas monitoring visits have been undertaken at the site. Gas monitoring results in full are presented in Appendix C. It should be noted that the gas monitoring results are reported together with the Nelson Street site adjacent to the west. Data from WS101, WS102, WS103, WS104A, WS105 and WS106 apply to this report.

Following guidance set out in CIRIA C665[14] and BS8485[15] peak methane and carbon dioxide concentrations have been used in the gas risk assessment. In addition, and as per guidance, flow rates were measured first.

All gas concentrations, flow, pressure and groundwater levels are shown on Table 5-1.

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[14] CIRIA (2007). “Assessing Risks Posed by Hazardous Ground Gases to Buildings.” CIRIA C665.

[15] BSI (2019). “Code of Practice for the Design of Protective Measures for Methane and Carbon Dioxide Ground Gases for New Buildings.” BS8485:2015+A1 2019.

Boreholes	Visit	CH_4 (%v/v)	CO_2 (%v/v)	O_2 (%v/v)	H_2S (ppm)	CO (ppm)	Flow (l/h)	Groundwater (mbgl)	Pressure (mb)
WS101	1	<0.1	**15.7**	4.4	<1	26	<0.1	4.85	1014 (s)
	2	<0.1	**17.2**	0.1	1	30	<0.1	4.91	1008 (r)
	3	<0.1	**16.8**	0.1	5	9	<0.1	4.89	1003 (s)
	4	0.1	**16.0**	0.1	7	3	<0.1	4.86	1007 (s)
	5	0.7	**14.8**	<0.1	6	4	<0.1	4.17	1009 (f)
	6	**1.2**	**15.3**	<0.1	6	4	<0.1	4.60	1004 (fs)
WS102	1	<0.1	1.8	18.9	<1	5	<0.1	1.71	1015 (s)
	2	<0.1	4.3	6.1	<1	4	8.6	0.95	1008 (r)
	3	<0.1	0.6	20.0	<1	<1	<0.1	3.02	1005 (s)
	4	<0.1	**5.2**	6.4	<1	2	14.2 (<0.1)*	0.79	1007 (s)
	5	UR							
	6	<0.1	3.1	14.1	<1	3	6.3 (2.0)*	0.72	1005 (fs)
WS103	1	<0.1	**13.2**	0.4	<1	12	<0.1	1.94	1015 (s)
	2	<0.1	**15.4**	0.1	<1	6	<0.1	1.97	1009 (r)
	3	<0.1	**15.8**	0.5	<1	2	<0.1	3.02	1004 (s)
	4	<0.1	**16.0**	0.5	<1	4	<0.1	1.96	1007 (s)
	5	0.1	**21.8 (13.6)**	5.2	<1	4	<0.1	1.55	1010 (f)
	6	<0.1	**15.2**	2.6	<1	3	<0.1	1.67	1005 (fs)
WS104 A	1	<0.1	**14.4**	4.9	<1	12	<0.1	4.57	1015 (s)
	2	<0.1	**6.5**	8.6	<1	6	<0.1	3.77	1009 (r)
	3	<0.1	**8.1**	3.7	<1	3	<0.1	2.92	1004 (s)
	4	<0.1	**11.0**	1.3	<1	1	13.9 (<0.1)*	0.66	1007 (s)
	5	<0.1	**9.3**	1.5	8	7	<0.1	0.68	1010 (f)
	6	<0.1	2.6	17.2	2	8	1.8 (0.2)*	0.69	1005 (fs)
WS105	1	<0.1	**9.2**	5.7	<1	3	<0.1	3.88	1015 (s)
	2	<0.1	**11.1**	2.4	<1	2	<0.1	3.44	1009 (r)
	3	<0.1	**12.5**	0.4	<1	2	<0.1	3.07	1004 (s)
	4	<0.1	**12.6**	0.2	<1	2	<0.1	2.63	1007 (s)
	5	<0.1	**11.3**	0.2	<1	2	<0.1	1.34	1009 (f)
	6	<0.1	**12.1**	0.1	<1	2	<0.1	1.49	1006 (fs)
WS106	1	<0.1	**7.6**	2.8	<1	9	<0.1	2.01	1015 (s)
	2	<0.1	**8.8**	0.2	<1	16	<0.1	1.79	1008 (r)
	3	<0.1	**11.4**	0.1	<1	2	<0.1	1.89	1004 (s)
	4	<0.1	**13.3**	0.1	<1	4	<0.1	2.01	1007 (s)
	5	<0.1	**11.3**	0.1	<1	4	<0.1	1.68	1010 (f)
	6	<0.1	**12.0**	0.1	<1	4	<0.1	1.75	1006 (fs)

Table 5-1: Summary of gas monitoring.

Notes:

If concentrations / flow is zero, then equipment detection limits are assumed.

Table shows peak concentrations of CH_4, CO_2, O_2, H_2S and CO. Where peak and steady vary significantly, steady concentration shown in brackets.

Bold where CO_2 exceeds 5%v/v and CH_4 exceeds 1%v/v.

Atmospheric pressure (over past 24hrs): r=rising, s=steady, f=falling, fs=falling then steady.

Blue shading where borehole flooded (groundwater level above the response zone).

UR=unable to record as unable to locate well.

*Steady flow provided in brackets.

Six monitoring visits have been undertaken at the site during high atmospheric pressure conditions (1003mB-1015mB). Carbon dioxide concentrations were recorded at 0.6-21.8%v/v. Methane concentrations were recorded at <0.1-1.2%v/v in WS101 and <0.1-0.1%v/v in WS103. Methane concentrations were recorded at <0.1%v/v during all visits in the remainder of the boreholes.

Flow rates were all recorded as less than limits of detection in WS101, WS103, WS105 and WS106. Peak flow rates were recorded at 6.3-14.2l/h in WS102 and at 1.8-13.9l/h in WS104A. The groundwater levels in WS102 and WS104A during the visits with high flow rates were above the height of the slotted pipe (i.e. above the response zone, borehole flooded). The flow rates recorded are therefore most likely due to pressurisation of the well, rather than an accurate representation of flow rates. This data has not been used in the risk assessment or to calculate gas screening values.

Reduced oxygen concentrations were recorded in all of the wells with the lowest concentrations recorded at <0.1%v/v (WS101). Depleted oxygen levels may be potentially associated with localised biological respiration and quickly equilibrate with ambient air concentrations near the surface. We do not consider the low oxygen levels to be a significant risk to the site and no further action is considered necessary.

Carbon monoxide was >1ppm in all boreholes. The maximum concentration was recorded as 30ppm (WS101). Most carbon monoxide peak readings decreased during the gas monitoring to steady concentrations of <5ppm. Only workplace exposure limits defined by the HSE are available for carbon monoxide and are not fully applicable to a residential setting. A Short-Term Exposure Limit of 200ppm (15-minute period) and Long-Term Exposure Limit of 30ppm have been defined (8-hour period).

Based on the above exposure limits, carbon monoxide is not expected to pose a significant risk to the proposed site receptors.

Gas Screening Value

In accordance with CIRIA C665[16], a Gas Screening Value (GSV) may be calculated. Assuming worst-case scenario maximum gas concentrations and flow for each borehole have been used to calculate the GSV. The GSV can be used to determine the characteristic situation (CS).

Table 5-2 shows the maximum GSV for each borehole and the appropriate characteristic situation (based on GSV only). An overall site assessment (WS101-WS106) has also been included (worst case values across the site). It should be noted that GSVs have been calculated using data from boreholes where the response zone was not flooded by groundwater.

Boreholes	Max GSV (l/hr)	CS
WS101	0.0172	CS1
WS102	0.0018	CS1
WS103	0.0218	CS1
WS104A	0.0144	CS1
WS105	0.0126	CS1
WS106	0.0133	CS1
WS101-WS106	0.0012 (CH_4) 0.0218 (CO_2)	CS1

Table 5-2: Summary of worst-case Gas Screening Values (GSV).

Notes:

CS – Characteristic Situation.

GSVs calculated using data from boreholes where response zone not flooded by groundwater.

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[16] CIRIA (2007). “Assessing Risks Posed by Hazardous Ground Gases to Buildings.” CIRIA C665.

In addition, in accordance with CIRIA C665[17], if carbon dioxide and methane are recorded above 5%v/v and 1%v/v respectively, you should consider upgrading the characteristic situation from CS1 to CS2.

The assessment for ground / hazardous gas also needs to take into account the release of CL:AIRE guidance on Coal Mine Gas[18].CLAIRE guidance states that the gas screening value is not considered appropriate in isolation for assessing mine gas risk on sites where there are complex conceptual site models.

As part of the shallow coal mining site investigation a shaft (ref. 386399-016) was identified in the southern part of the site.

Depth to rockhead was recorded as between 23.00-27.80mbgl and the depth to intact coal was recorded as between 34.00-34.50mbgl. The thickness of the coal ranged between 0.50-1.00mbgl.

Viable sources of mine gas have been identified on site associated with shallow worked coal seams.

Despite thick low permeability superficial deposits having been recorded across the site (depth to rockhead between 23.00-27.80mbgl) potential preferential pathways are present associated with the mineshaft located in the south of the site, the shaft mapped 5m south east of the site and rotary investigation boreholes.

No significant flow has been identified during gas monitoring (except for boreholes that are flooded, whereby the data has been discounted), indicating that mine gas is not impacting the surface of the site. However, should hazardous ground gases be encountered as part of routine monitoring undertaken as part of coal mining remediation (including the shaft and shallow coal mining), then further gas monitoring and/ or upgrading of gas protection rating may be required.

Taking the risks associated with coal mine gas, and the elevated carbon dioxide concentrations recorded, it is recommended that the site is upgraded from CS1 to CS2.

Gas can potentially migrate into buildings, accumulate in confined spaces and cause explosions (methane) and asphyxiation. LKC consider the probability of carbon dioxide and methane gas affecting site users and buildings as a low likelihood. Assuming a severe consequence, there is a moderate risk associated with Pollutant Linkage 3 and remediation is required in line with CS2 in proposed buildings.

Should hazardous ground gases be encountered as part of routine monitoring undertaken as part of coal mining remediation (including the shaft and shallow coal mining), then further gas monitoring and/ or upgrading of gas protection rating may be required.

5.3 Controlled Water Assessment

A Secondary Undifferentiated Aquifer is present in the superficial strata below the site. A Secondary A Aquifer is present in the bedrock below the site. No groundwater abstractions have been identified within 400m of the site and the site is not within a Source Protection Zone.

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[17] CIRIA (2007). “Assessing Risks Posed by Hazardous Ground Gases to Buildings.” CIRIA C665.

[18] CL:AIRE. “Good Practice for Risk Assessment for Coal Mine Gas Emissions”. October 2021.

Rochdale Canal is located 110m south of the site. Given the low permeability clay deposits beneath the site, assumed clay lining of the canal and likely head of water above groundwater on site it is not considered to be a feasible receptor.

During the monitoring undertaken by EnviroSolution, the groundwater levels in four of the wells were recorded between 0.85-4.95mbgl. No groundwater was recorded in the remaining two wells installed. Groundwater levels have been recorded between 0.66-4.91mbgl during the six monitoring visits undertaken by LKC. Given that cohesive superficial deposits were recorded during the site investigations (gravelly sandy clay with occasional sand lenses), it is considered that the water strikes recorded are representative of perched water. LKC therefore consider that the main controlled waters receptor is the Secondary A bedrock aquifer.

Visual / olfactory evidence of hydrocarbons were identified during the site investigation undertaken by EnviroSolution, and during the investigation undertaken by LKC.

Three groundwater samples were collected as part of the EnviroSolution site investigation report and compared to UK Drinking Water Standards. Exceedances of arsenic were detected in two of the samples analysed. All other contaminants tested (TPH, PAHs, VOCs, SVOCs, BTEX) were recorded as less than limits of detection.

LKC consider use of UK DWS as overly conservative given the environmental setting of the site. Moreover, most likely ‘elevated’ concentrations noted in the EnviroSolution report are associated with colloidal components within the sample associated with perched and sporadic made ground and results are not considered representative of groundwater quality beneath the site.

LKC therefore considers the probability of onsite contamination affecting the Secondary A Aquifer is a unlikely likelihood. With a medium consequence the risk is anticipated to be low and no remediation is required.

Notwithstanding the above, a watching brief should be maintained during earthworks. If any unusual ground conditions / unexpected contamination encountered (particularly hydrocarbon contamination), further assessment may be required.

5.4 Additional Risk Assessments

5.4.1 Potable Water Supply (Pollutant Linkage 5)

A United Utilities water pipeline risk assessment is recommended and will be required for a new connection. Numerous elevated contaminants have been identified on site. With a likely probability and medium consequence, the risk is considered moderate and it is likely that barrier pipe will be required. Once details of the pipeline location and depths are known a UU Risk Assessment should be undertaken.

5.5 Contamination Conceptual Model

A preliminary contamination conceptual model has been produced following the risk assessments undertaken in Sections 5.1-5.4 and is presented in Table 5-3. The risk matrix is provided in Appendix A.

Where a very low risk is identified, no specific remediation is required.

Where a low risk is identified, some form of remediation may be required depending on the pollutant linkage, the type and concentration of contaminants present and the proposed development.

Where a moderate/low risk is identified, an assessment will be undertaken to establish what category the pollutant linkage will fall into.

Where a moderate or higher risk is identified, remediation or further investigation work is recommended.

Further details of the remedial proposals and a remedial option appraisal are given in Section 6.

Pollutant Linkage	Pathway	Receptor	Contaminant	Probability	Consequence	Risk	Assessment
PL1	- Dermal contact. - Inhalation of soil, fibres and dust. - Ingestion of soils, dust. - Windblown dust.	- Future site users. - Offsite receptors.	Heavy metals: - Arsenic, lead. PAHs: - B(a)P. Petroleum hydrocarbons: -Aro C16-21, C21-35, C35-44. ACM: -Chrysotile.	Likely	Medium	**Moderate**	- Likely probability as elevated contaminants identified in the made ground which could come into contact with site users in soft landscaping areas. - **Recommendation:** Remediation required, to include an environmental cover system in soft landscaping areas. A watching brief should also be maintained during earthworks.
PL2	- Inhalation of vapours. - Migration through permeable strata and preferential pathways.	- Future site users. - Offsite receptors.	Volatile Contaminants: - Aro C10-12. -Naphthalene. -2-methylnaphthalene. SVOCs: - Dibenzofuran, carbazole.	Likely	Medium	**Moderate**	- Likely probability as elevated VOCs and SVOCs contaminants identified and further contamination may be present. - **Recommendation**: Remediation required, to include installing a vapour resistant membrane in proposed buildings. A watching brief should also be maintained during earthworks.
PL3	- Inhalation of gas. - Migration through permeable strata and preferential pathways. - Explosion in confined spaces (methane only).	- Future site users. - Buildings. - Offsite land users.	- Carbon dioxide, methane.	Low Likelihood	Severe	**Moderate**	- Elevated carbon dioxide identified in all monitoring wells and mine shaft located on site. - **Recommendation:** Gas protection measures in line with CS2 recommended. Should hazardous ground gases be encountered as part of routine monitoring undertaken as part of coal mining remediation, then further gas monitoring and/ or upgrading of gas protection rating may be required
PL4	- Surface Run-off. - Migration through permeable strata and preferential pathways - Perched waters migration.	- Groundwater (Secondary A Aquifer).	Mobile contaminants: - Metals.	Unlikely	Medium	**Low**	- Although elevated metals identified in one groundwater sample tested, given the environmental settings and ground conditions encountered not considered to pose a significant risk to groundwater. - **Recommendation**: No remediation required. However a watching brief should be maintained during earthworks, particularly for petroleum hydrocarbons.
PL5	- Ingestion of tainted water supply.	- Future site users (via potable water).	Organic Contaminants: - VOCs. - SVOCs - Petroleum hydrocarbons.	Likely	Medium	**Moderate**	- Likely probability as elevated organic contaminants identified which could permeate water pipes and contaminate water supply. - **Recommendation:** UU risk assessment undertaken. Barrier piping likely to be required.

Table 5-4: Revised Contamination Conceptual Model.

6 Remediation Strategy

6.1 Introduction

Remediation works may be spilt in to the ‘pre-construction’ (or enabling works) phase and the ‘build phase’ (i.e. during the residential development works) phase. The recommended remedial works and validation works are outlined in the following Sections.

6.2 Summary of Recommended Remediation & Validation Works

The remediation works may be split into ‘pre-construction’ (or enabling works) phase and the ‘build phase’ (i.e. during the redevelopment works) phase. The following earthworks, remediation and validation required for this site are summarised in Table 6-1. More detail of proposed works will be provided in the following Sections.

No specific remediation is required for Pollutant Linkage 4 (Controlled Waters).

Due to the minor consequence associated with the phytotoxic effect to flora (i.e. loss of plants in a landscaping scheme), the overall risk for the majority of sites will be very low to low. Where soils contain significant concentrations of heavy metals, in general there will other pollutant linkages (i.e. the risk to human health) that will trigger the requirement for remediation (e.g. a clean environmental cover system). As such the risk to flora associated with phytotoxic contaminants will not be considered further.

The risk to buildings associated with elevated sulphate should be considered by a structural engineer as part of the geotechnical assessment and will not be included in the contamination risk assessment.

It should be noted that there may be risk from short term exposure from contaminated soil to site workers. The Contamination Conceptual Model deals with long term exposure to key receptors. Acute risks can be easily mitigated by good environmental management of the site during site works. Standard health and safety precautions (as per HSE guidance[19]) should be adopted by all workers involved with site enabling and construction works. Therefore, this receptor is not considered in the contamination conceptual model.

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[19] HSE (1991). “Protection of Workers and the General Public During Development of Contaminated Land”. London HMSO.

Phase	Remediation Requirements	Validation Requirements
Pre-Construction (enabling)	Excavation, processing and stockpiling This will include the grubbing out and processing of hardstanding and unsuitable material. Any oversize material, if encountered will be processed and re-used as appropriate. Appropriate site won material will be stockpiled for potential reuse. Additionally, suspect material will be quarantined for characterisation prior to possible offsite disposal.	Log of work undertaken including photographs. Re-use of material will be under suitable exemption or MMP. Testing of site won/ imported soil as per Table 6-2.
	Earthworks Site Inspections & Unexpected Contamination A watching brief should be maintained by a suitably qualified and experienced person during enabling works to identify any unusual ground conditions. If any visual or olfactory evidence of contamination be encountered at the site, further assessment of the material may be required. Particular attention should be paid to hydrocarbons, as visual and olfactory evidence of contamination identified during site investigations. Should hazardous ground gases be encountered as part of routine monitoring undertaken as part of coal mining remediation, then further gas monitoring and/ or upgrading of gas protection rating may be required	Log of work undertaken including photographs. Details of any sampling undertaken and validation of any potential additional remedial work. Further assessment of gas risk if hazardous ground gas encountered.
	Segregation and removal of unsuitable materials As part of the watching brief during earthworks, areas of unexpected contamination (including hazardous waste) and geotechnically unsuitable material will be delineated, excavated and removed following suitable testing and verification.	Log of work undertaken including photographs. Consignment notes confirming removal of unsuitable material.
Build Phase	Vapour Membrane Elevated petroleum hydrocarbon (aromatic C10-12) and VOCs were identified on site. Given the ground conditions encountered, further contamination may be present across the site. It is therefore recommended that buildings are to include a vapour resistant membrane.	Plan including foundation design. Photographic evidence showing installation of membrane.

Table 6-1: Summary of Remediation Requirements

Phase	Remediation Requirements	Validation Requirements
Build Phase	Gas Protection Measures In line with CS2 as per UK guidance[20,21]. This is likely to / should include: - Passive subfloor or active subfloor ventilation system. - Methane and carbon dioxide resistant membrane installed as per manufacturer's instructions. - Ventilation of confined spaces within the building. - Well-constructed reinforced suspended, raft or cast in situ ground slab. - Minimum penetration of ground slab by services. - All joints and penetrations to be sealed. Depending on the type of building and foundation design the protection measures can vary. The gas protection measures will be detailed and approved with the Local Authority once the foundation design has been confirmed.	Supply and review of foundation designs. Photographic evidence of sub-floor void, ventilation and suitably sealed gas membrane. Validation of gas protection measures should be in line with CIRIA 735[22]
	Environmental Cover System Shared Landscaping: 450mm thick environmental cover system comprising: geotextile membrane and at least 450mm comprising clean inert fill and sufficient topsoil for a growing medium.	Measured thickness of environmental cover system via hand dug pits and staff and/or as-built survey at each layer. Photographic evidence throughout each stage, showing geotextile membrane, subsoil and topsoil installation process and completion. Chemical validation of imported/ site-won soils.: See Table 6-2.
	United Utilities (UU) Risk Assessment UU Potable Water Risk Assessment to be undertaken once the location and depth of potable water pipes are known and following completion of the earthworks. Barrier pipe likely to be required.	To be completed following completion of the remediation earthworks.

Table 6-1 (continued): Summary of Remediation Requirements.

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[20] CIRIA (2007). "Assessing Risks Posed by Hazardous Ground Gases to Buildings." CIRIA C665

[21] BSI (2015). "Code of Practice for the Design of Protective Measures for Methane and Carbon Dioxide Ground Gases for new buildings." BS8485:2015.

[22] CIRIA (2014). "Good Practice on the Testing and Verification of Protection Systems for Building Against Hazardous Ground Gas". CIRIA C735.

6.3 General Remediation & Enabling Works Requirements

6.3.1 Construction Management Plan and Health and Safety

A Construction Management Plan and Method Statement should be produced which details appropriate Health and Safety measures to be employed during the site works.

Risks to site workers and adjacent receptors from contamination present in the site soils can be easily mitigated by good environmental management of the site during site works. Standard health and safety precautions (as per HSE guidance) should be adopted by all workers involved with site enabling and construction works.

6.3.2 Asbestos in Soils Management Plan

Due to the presence of asbestos containing material, it is recommended that additional precautions are taken during site clearance, earthworks and construction in the areas of concern. The presence of asbestos in the made ground at the site presents a potential risk of generation of airborne fibres if this material is disturbed, such as for excavations to construct new foundations.

This risk can be managed by careful procedures and site monitoring to reduce the risk of airborne fibres, and it is recommended that an appropriate ‘Asbestos in soils Management Strategy’ is developed and adopted for all intrusive ground works which disturb the made ground in the area of concern. This should be carried out in line with CIRIA C733.

This may include asbestos awareness training for all site staff, provision of suitable personal and respiratory protective equipment and air monitoring.

With regards to cement bound asbestos, this can be handpicked, doubled bagged and disposed of appropriately to a licenced landfill. Guidance on removing asbestos cement is described in HSE (2012) .

If ACM is identified in soil arisings, then soil should be placed directly into covered skips and disposed of at a suitable licenced landfill, after further testing to quantify the extent of asbestos contamination of the soils. It should be considered that blue asbestos is notifiable and must be removed by a licenced contractor.

6.3.3 Segregation & Removal of Unsuitable Material

There is potential for some unidentified geotechnically or chemically unsuitable material to be encountered during enabling works.

Such materials will undergo appropriate investigation and testing to ascertain their suitability for re-use, if feasible. Should material be considered either chemically or geotechnically unsuitable then this material will be removed from site (including hazardous waste) under the protocols described in the following sections.

6.3.4 Materials Management

To ensure material is compliant with appropriate waste regulations, any site won material re-used onsite should be in recourse to appropriate exemptions. A U1 and T5 exemption should be registered.

This will allow the following to be used onsite or brought in for use onsite (refer to guidance for types of waste that can be used [23]):

- -5,000 tonnes (*c.* 2,500m^3) treatment of crushed concrete / stone.
- -1,000 tonnes (*c.* 500^3) use of non-hazardous soil
- -5,000 tonnes (*c.* 2,500m^3) use of clays, sand, gravel, brick, concrete, stone etc.
- -50,000 tonnes (*c.* 25,000m^3) use of bituminous material to be used in roadways.

A Materials Management Plan (MMP) with recourse to the CL:AIRE Code of Practice may be required if volumes exceed exemption limits. This must be registered **before** material movement starts onsite.

If an MMP is required, this needs to be registered by a Qualified Person (QP) and there must be 'certainty of use' for any material re-used onsite or exported to site to ensure there is no 'sham recovery'.

For all the above material will need to be tested at the rate and analytical suites presented in Table 6-2.

6.3.5 Removal of Below Ground Obstructions & Crushing

It is envisaged that grubbing out of in-ground structures is undertaken as part of enabling works.

Site turn over to remove relict structures including relict drainage, brick walls, concrete / stone slabs, etc should be included. Note that it may not be possible to include full turnover in areas of deep made ground due to limits of plant and constraints from adjacent properties.

Suitable materials derived from grubbing-up should be stored in a location on site, to be agreed with the Engineer, prior to crushing. Any unsuitable materials should be removed to a suitably licensed landfill site.

There is potential that some of the grubbed-up concrete and brick arisings may be coated with, and possibly impregnated by, hydrocarbon contaminants. Consideration could be given to steam-cleaning of these arisings in order to generate material suitable for crushing and re-use.

6.3.6 Control of Water

It is considered that significant de-watering is unlikely to be required across the majority of the site. Perched groundwater was encountered during the site investigation, therefore some localised ingress of small volumes of perched groundwater should be anticipated.

Arrangements should be made to prevent ponding in shallow excavations; the Contractor should ensure that ground levels are of sufficient gradient to enable the collection of surface water run-off in sumps or grips. Pumping from over-excavated sumps may be required to maintain satisfactory working conditions.

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[23] https://www.gov.uk/guidance/waste-exemptions-using-waste

Contingency arrangements to remove groundwater (including contamination groundwater if encountered) from excavations/ relict structures should be allowed. Small volumes of pumped fluids / groundwater should be stored in appropriate, sealed tanks / containers and analysed for a range of determinants prior to disposal to suitable facility. Alternatively, a temporary discharge licence, including their requirements for treatment / testing, should be agreed with local utility providers prior to start on site.

6.3.7 Disposal

Material required to be removed from site should be undertaken under an appropriate duty of care and the results of chemical analysis should be provided to a licensed landfill for confirmation of waste classification.

Waste records such as disposal tickets and waste carrier licences should be provided in the Site Completion Report. Photographic evidence of removal and waste removal tickets should be retained and included in the validation report.

6.4 Pre-Construction (Enabling Works)

6.4.1 Watching Brief for Unexpected Contamination

A watching brief will be maintained for evidence of previously unidentified contamination (including asbestos containing material and areas of hydrocarbon contamination) during the remediation earthworks and development works.

If evidence of contamination is identified, then works in the area will stop pending further sampling and assessment, and the Local Authority will be informed.

Delineation works will be undertaken, and this may include collection of appropriate samples for laboratory analysis to further characterise the material and allow a risk assessment to be undertaken or removal of the impacted material to quarantine.

Soil samples will be taken and analysed for a suite of contaminants, including *inter alia* heavy metals, Soil Organic Matter, VOCs, SVOCs, BTEX, TPHCWG and asbestos (depending on ground conditions). Soil samples should represent the impacted material. In order to determine that significantly impacted soils have been removed, verification samples will be collected from the base and sides of the excavation.

Quarantined material may be removed offsite to a licensed treatment facility or an assessment made of its potential for treatment and / or retention on site.

6.5 Build Phase Remediation Works

The scope of the build phase remediation works will comprise the following:

- Gas protection measures installed in line with CS2.
- Vapour membrane installed in proposed buildings.
- Environmental cover system in areas of soft landscaping.
- Risk assessment for potable water pipes and installation of barrier pipes, as required.

Further details are given in the following Sections. LKC recommend that the proposed works are prior approved by the regulators prior to the commencement of construction works.

6.5.1 Environmental Cover System

In soft landscaping areas, remediation will be required and comprise and environmental cover system which should be constructed as follows:

- **450mm thick environmental cover system comprising:** geotextile membrane and at least 450mm comprising clean inert fill and sufficient topsoil for a growing medium.

A diagram of a typical environmental cover system is shown in Plate 6-1 below.

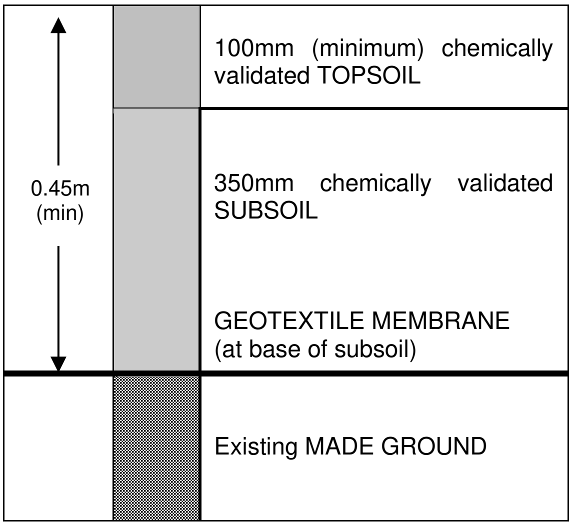
0.45m (min)
100mm (minimum) chemically validated TOPSOIL
350mm chemically validated SUBSOIL
GEOTEXTILE MEMBRANE (at base of subsoil)
Existing MADE GROUND

Plate 6-1: Typical Environmental Cover System Construction.
Notes: Subsoil can be replaced with additional topsoil.
Hardstood areas– No Remediation Required.

Validation of the provision of environmental cover soils should be provided in the completion report and should include evidence of thickness of clean cover soils construction, including geotextile membrane, subsoil and topsoil.

Suitable evidence includes a measured thickness of environmental cover system via hand dug pits and staff and / or as-built surveys at each layer. Photographic evidence throughout each stage, showing geotextile membrane, subsoil and topsoil installation process and completion should also be provided.

6.5.2 Vapour Membrane

Elevated potentially volatile contaminants were identified on site. Given the ground conditions encountered, further contamination may be present across the site. It is therefore recommended that buildings are to include a vapour resistant membrane.

The vapour membrane will be detailed and approved with the Local Authority once the foundation design has been confirmed. Photographic evidence showing installation of membrane will be required as part of the site completion report.

6.5.3 Gas Protection Measures

Gas protection measures are required in proposed buildings in line with CS2 as per UK guidance[24,25]. This is likely to / should include:

- Passive subfloor or active subfloor ventilation system…
- Methane and carbon dioxide resistant membrane installed as per manufacturer's instructions.
- Ventilation of confined spaces within the building.
- Well-constructed reinforced suspended, raft or cast in situ ground slab.
- Minimum penetration of ground slab by services.
- All joints and penetrations to be sealed.

Depending on the type of building and foundation design the protection measures can vary.

The gas protection measures will be detailed and approved with the Local Authority once the foundation design has been confirmed. Photographic evidence of sub-floor void, ventilation and suitably sealed gas membranes will be required as part of the site completion report. Validation of gas protection measures should be in line with CIRIA 735[26].

6.5.4 Potable Water Pipelines

It is recommended that a Water Pipeline Assessment is undertaken once the location and depth of potable water pipes are known and once enabling works have been completed. Additional sampling may be required following reduced levels and confirmation of pipeline routes. Barrier pipe is likely to be required.

In the event that barrier pipe is required then the risk assessment should be approved by water supply company prior to any installation works. Pipework should be installed in trenches back filled with first generation materials (if installed within made ground).

For the purposes of the build phase validation report (if barrier pipe is required), a works notice, delivery notes indicating the source of the first generation backfill material and photographic evidence of this material in the trenches should be collated along with photographs illustrating the installation of barrier pipe.

6.5.5 Validation of Subsoil / Topsoil

Chemical validation of all imported soils to be used on site soft landscaping areas should be undertaken. Imported soils should be accompanied by a certificate of analysis and source details.

A summary of the required imported material sampling requirements is presented in Table 6-2, based on MCC 'Guidelines to Developer' (2021)[27]. However, LKC consider no testing, but proof of provenance is sufficient for natural, virgin, quarried material.
Ideally, the material should be sampled at source to prevent double handling if soil fails, with confirmatory sampling undertaken on importation to site.

---

[24] CIRIA (2007). "Assessing Risks Posed by Hazardous Ground Gases to Buildings." CIRIA C665
[25] BSI (2015). "Code of Practice for the Design of Protective Measures for Methane and Carbon Dioxide Ground Gases for new buildings." BS8485:2015.
[26] CIRIA (2014). "Good Practice on the Testing and Verification of Protection Systems for Building Against Hazardous Ground Gas". CIRIA C735.
[27] MCC (2021). "Planning & Contaminated Land Technical Guidance." February 2021.

However, where this is not possible then material imported should be segregated based on source and soil type. Validation samples should be taken prior to placement in gardens / soft landscaping to ensure suitability for use.

Material Type	**Source**	**Suite of Analysis**	**Sampling Rate (min. 3 per source) ***		
			Garden	**Landscape**	**Other ****
Topsoil / subsoil / Fill material	Greenfield	Suite A	200m^3	200m^3	200m^3
	Remediated	Suite A / B dependent upon original SI	100m^3	150m^3	200m^3
	Brownfield / Unknown	Suite B	50m^3	150m^3	200m^3
Quarried Fill	First Generation i.e. quarried sand (subsoil) or stone (break layer)	No testing is required. Certification of material provenance is required.			

Table 6-2: Sampling requirements for imported and site won soils.

Notes:

Suite A - Heavy metals, pH, water soluble sulphate, speciated PAH, soil organic matter and asbestos screen.

Suite B - Heavy metals, pH, water soluble sulphate, speciated PAH, phenol, total and free cyanide, soil organic matter, asbestos screen, banded petroleum hydrocarbons (TPH CWG), BTEX, MTBE.

** Other assumed to be stone / 6F2 / mass fill etc.

Any soil with visual or olfactory evidence of hydrocarbons should be rejected.

In addition, it should be ensured that the matrix of the topsoil is suitable as a growing medium and no undesirable material is present (in line with BS3882[28]). LKC advise this information is provided by the supplier before material is imported onto site.

Imported material to be used in gardens will be compared against residential without plant uptake criteria (as used in the contamination risk assessment (Section 5)). Appropriate remedial target criteria are presented in Appendix E.

6.6 Site Completion Report

It is recommended that any remediation carried out on the site is validated by a third party and suitable documentary evidence provided in a Site Completion Report, such as photographs, consignment documents and analytical results. This should include as a minimum:

- Validation of gas protection measures installed.
- Validation of vapour membrane installed.
- Provision of waste transfer documents.
- Validation of environmental cover system.
- Verification testing of all imported soil for soft landscaping areas.
- Information on the installation of protective pipes and / or sterile trenches.
- Details of any unexpected contamination identified onsite, suitably risk assessed and / or validated.

The Site Completion Report will assist the Local Authority in the discharge of any future relevant planning condition and will also be of use to solicitors acting on behalf of any prospective conveyancer who may have concerns over the former use of the site.

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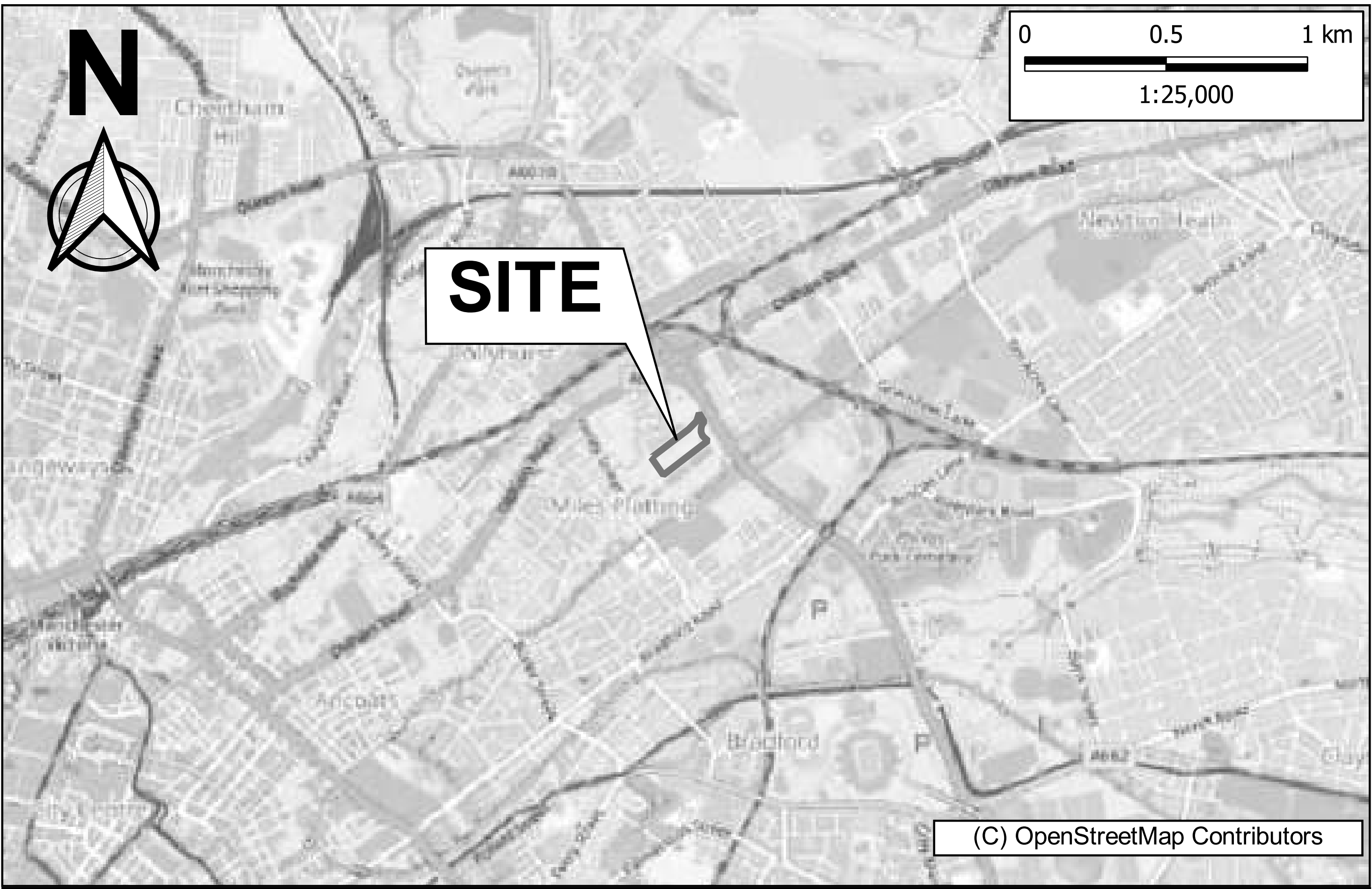
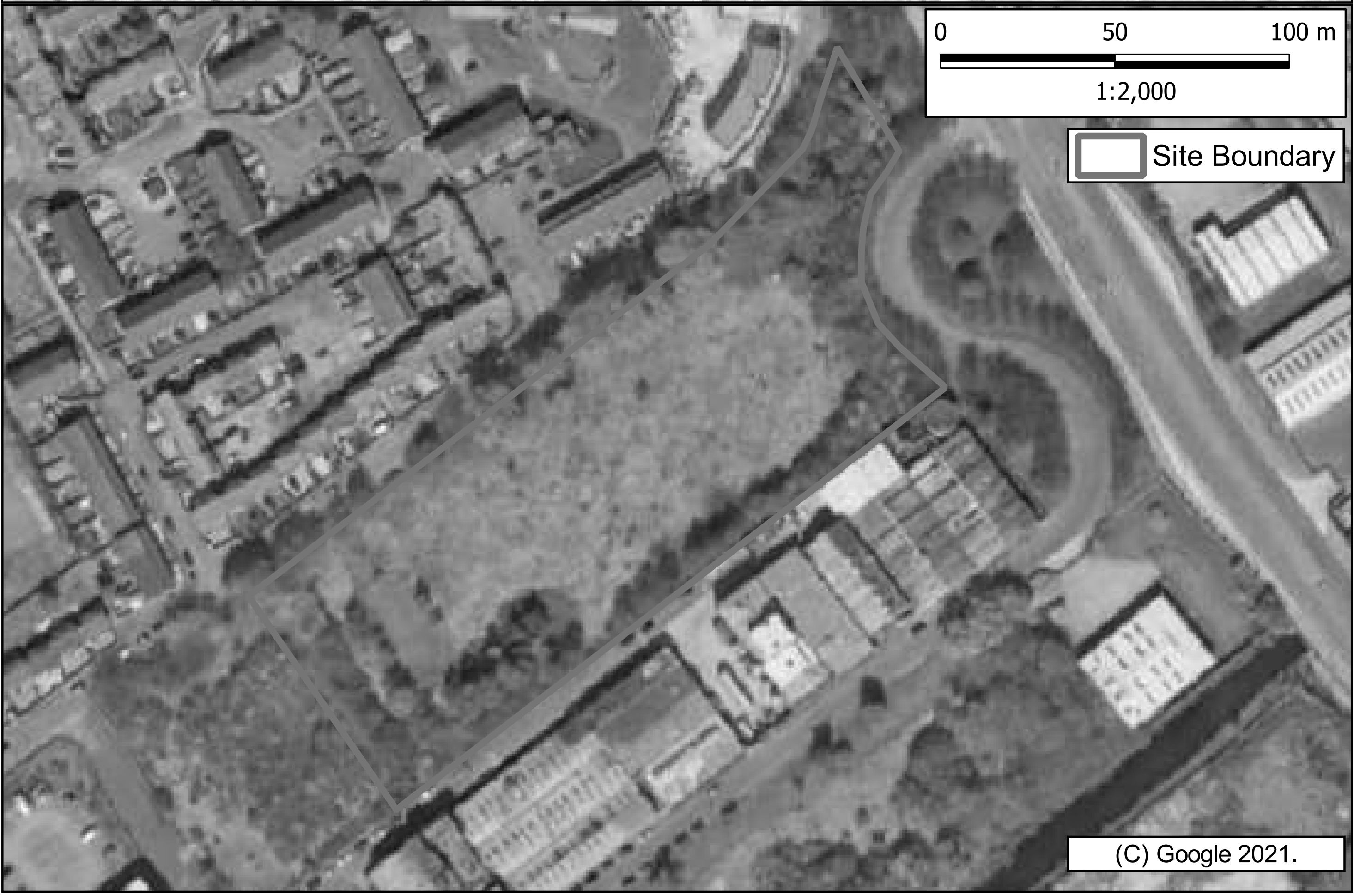
[28] BS (2015). “Specifications for Topsoil and Requirements for use.” BS3882:2015.

Figures


N
SITE
0
0.5
1 km
1:25,000
Cheetham Hill
Newton Heath
Miles Platting
Ancoats
Bradford

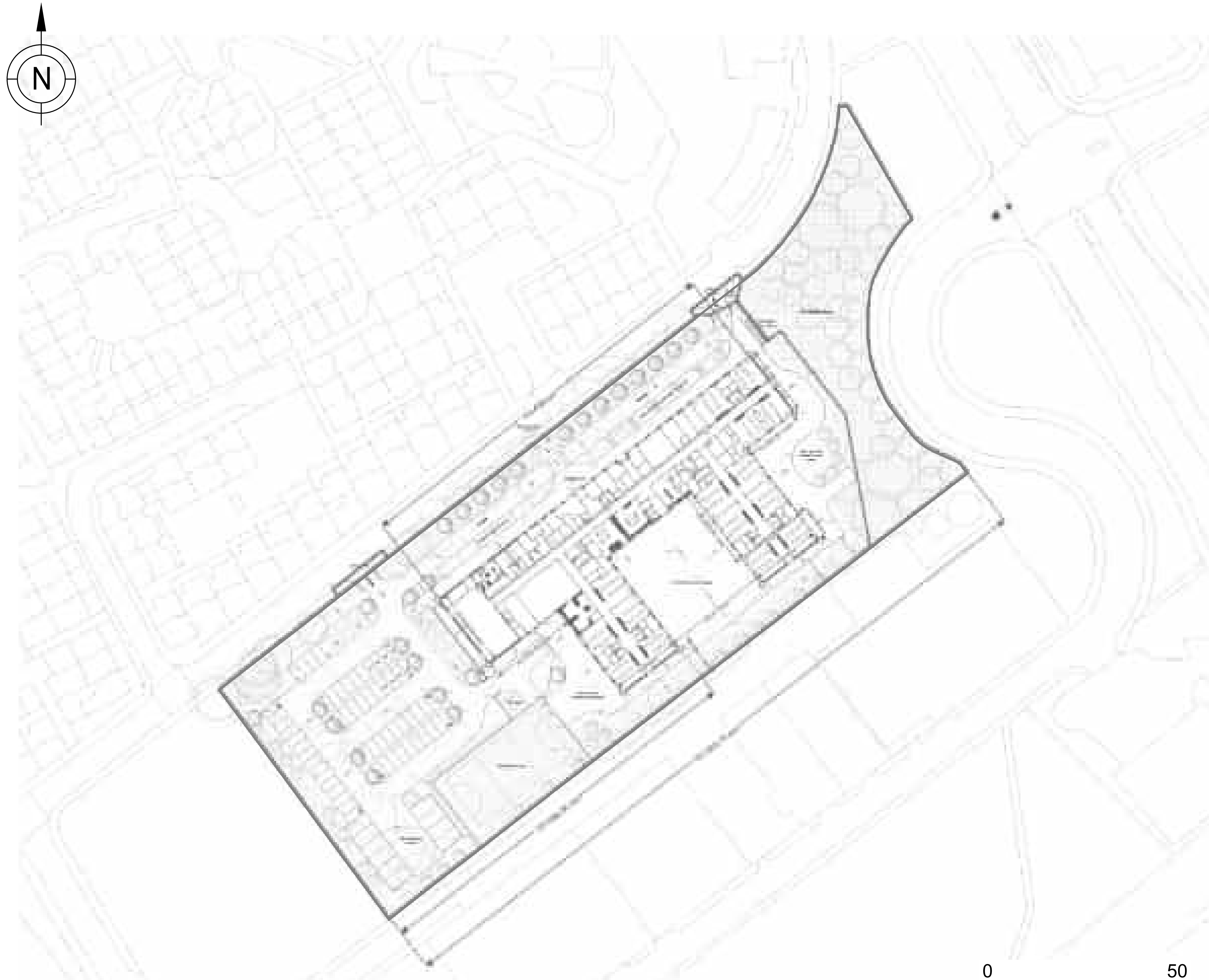
(C) OpenStreetMap Contributors


0
50
100 m
1:2,000
Site Boundary

(C) Google 2021.

Client:	ISG Ltd
Site:	Varley Street, Manchester
Job No.:	LKC 22 1670
Drawn By:	EM
Checked By:	PD
Drawn:	July 2023
Title:	Site Location & Boundary Plan
Scale (see scale bar):	1:25,000 & 1:2000 @ A4
Figure:	1
Revision:	

LK CONSULT



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)

KEY

▭	Site Boundary

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

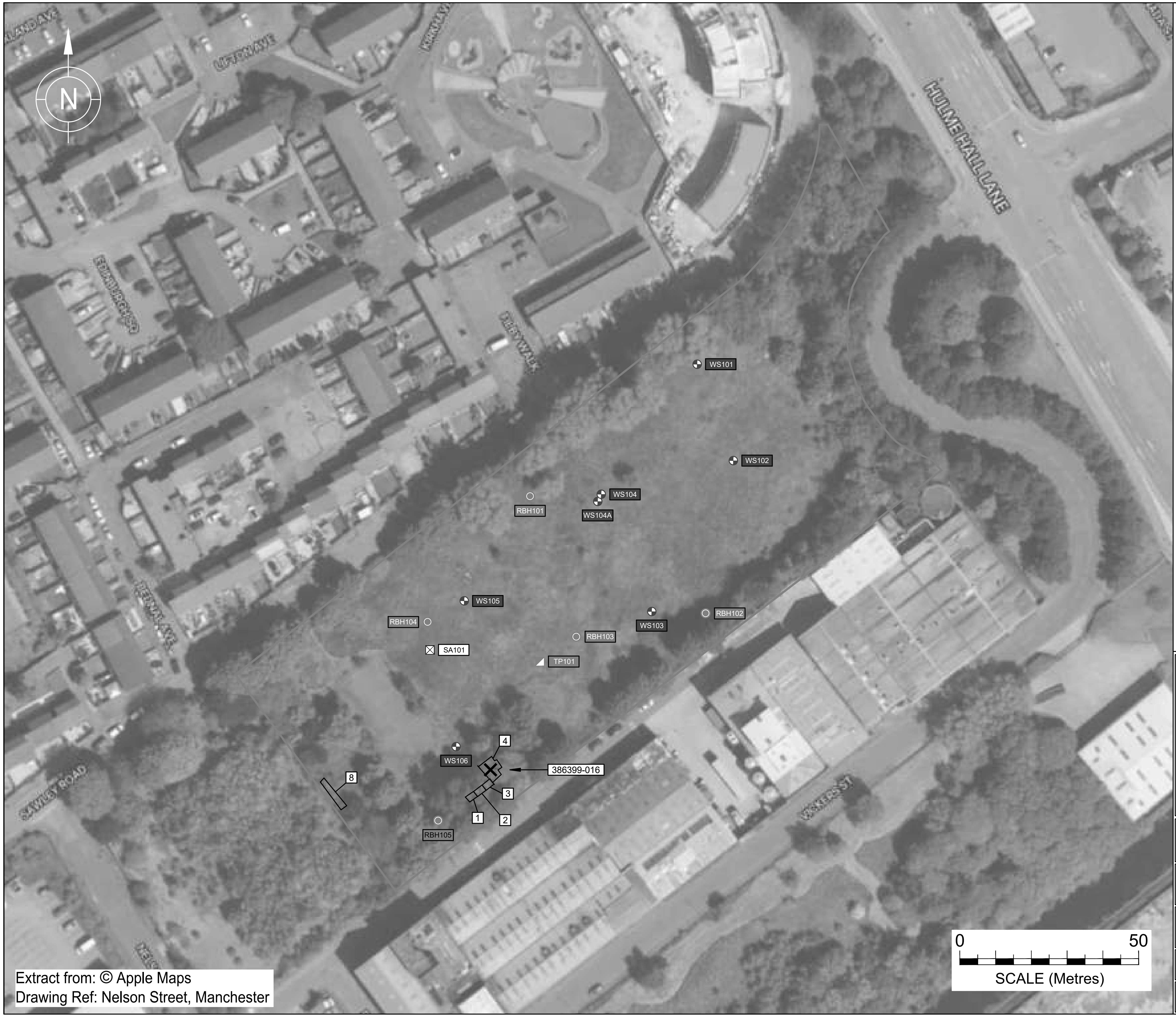
Client:
ISG Ltd

Site:
Varley Street, Manchester

Title:
Proposed Development Plan

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

Drawn By:	Checked By:	Drawn:
AC	EM	Jul 2023


N
HULME HALL LANE
WS101
WS102
WS104
WS104A
RBH101
WS105
RBH104
SA101
RBH103
WS103
RBH102
TP101
WS106
4
386399-016
3
8
1
2
RBH105
0
50
SCALE (Metres)

Extract from: © Apple Maps
Drawing Ref: Nelson Street, Manchester

KEY

═	Site Boundary
◑	Window Sample Borehole (WS)
◩	Trial Pit (TP)
☒	Soakaway Test (SA)

COAL MINING SITE INVESTIGATION:

✕	Mine Entry
◉	Rotary Borehole (RBH)
▱	Excavation
9	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: Nelson Street, Manchester

Title: Site Investigation Location Plan (East Land Parcel)

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

Drawn By:	Checked By:	Drawn:
AC	EM	Jul 2023

Appendix A

Risk Matrix

Risk Evaluation

The method for risk evaluation is a qualitative method of interpreting the output from the risk estimation stage of the assessment, based on CIRIA 552[29]. It involves the classification of the:

- Magnitude of the potential consequence (severity) of the risk occurring (Table A).
- Magnitude if the probability (likelihood) of the risk occurring (Table B).

Consequence (Severity)		
Classification	**Definition**	**Example**
Severe	6.6.1.1.1 Short term (acute) risk to human health likely to results in 'significant harm' as defined by the Environment Protection Act 1990, Part IIA. 6.6.1.1.2 Short term risk of pollution (note: water Resources Act contains no scope for considering significance of pollution) of sensitive water resource. 6.6.1.1.3 Catastrophic damage to buildings/properties. 6.6.1.1.4 A short-term risk to a particular ecosystem, or organism forming part of such ecosystem (note: the definition of ecological systems within the Draft Circular on Contaminated Land, DETR, 2000).	6.6.1.1.5 High Concentrations of cyanide on the surface of an informal recreation area. 6.6.1.1.6 Major spillage of contaminants from site into controlled waters. 6.6.1.1.7 Explosion, causing building collapse (can also equate to short term human health risk if buildings are occupied).
Medium	6.6.1.1.8 Chronic damage to Human Health ('significant harm' as defined in DETR, 2000). 6.6.1.1.9 Pollution of sensitive water resources (note Water Resources Act contains no scope for considering significance of pollution). 6.6.1.1.10 A significant change in a particular ecosystem, or organism forming part of such ecosystem.	6.6.1.1.11 Concentrations of a contaminant from site exceed generic, or site-specific assessment criteria. 6.6.1.1.12 Leaching of contaminants from a site to a major or minor aquifer (Principal and Secondary). 6.6.1.1.13 Death of a species within a designated nature reserve.
Mild	6.6.1.1.14 Pollution of non-sensitive water resources. 6.6.1.1.15 Significant damage to crops, buildings, structures and services ('significant harm' as defined in DETR, 2000). 6.6.1.1.16 Damage to sensitive buildings/structures/services or the environment.	6.6.1.1.17 Pollution of non-classified groundwater. 6.6.1.1.18 Damage to building rendering it unsafe to occupy (e.g. foundation damage resulting in instability).
Minor	6.6.1.1.19 Harm, although not necessarily significant harm, which may result in a financial loss, or expenditure to resolve. 6.6.1.1.20 Non-permanent health effects to human health (easily prevented by means such as personal protective clothing etc). 6.6.1.1.21 Easily repairable damage to buildings, structures and services.	6.6.1.1.22 The presence of contaminants at such concentrations that protective equipment is required during site works. 6.6.1.1.23 The loss of plants in a landscaping scheme. 6.6.1.1.24 Discoloration of concrete.

Table A. Classification of Consequence

Probability (Likelihood)	
Classification	**Definition**
High Likelihood	6.6.1.1.25 There is a pollutant linkage and an event that either appears very likely in the short term and almost inevitable over the long term, or there is evidence at the receptor of harm or pollution.
Likely	6.6.1.1.26 There is a pollutant linkage and all the elements are present and in the right place, which means that it is probable that an event will occur. 6.6.1.1.27 Circumstances are such that an event is not inevitable, but possible in the short term and likely over the long term.

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[29] CIRIA C552 (2001) Contaminated Land Risk Assessment - A Guide to Good Practice.

Low Likelihood	6.6.1.1.28 There is a pollutant linkage and circumstances are possible under which an event could occur. 6.6.1.1.29 However, it is by no means certain that even over a longer period such event would take place and is less likely in the shorter term.
Unlikely	6.6.1.1.30 There is a pollutant linkage, but circumstances are such that it is improbable that an event would occur in the very long term.

Table B. Classification of Probability.

These classifications are then compared to indicate the risk presented by each pollutant linkage (Table C). It is important that this classification is only applied where there is a possibility (which can range from high likelihood to unlikely) of a pollutant linkage existing.

		Consequence			
		Severe	**Medium**	**Mild**	**Minor**
Probability	**High Likelihood**	Very High Risk	High Risk	Moderate Risk	Moderate / Low Risk
	Likely	High Risk	Moderate Risk	Moderate / Low Risk	Low Risk
	Low Likelihood	Moderate Risk	Moderate / Low Risk	Low Risk	Very Low Risk
	Unlikely	Moderate / Low Risk	Low Risk	Very Low Risk	Very Low Risk

Table C. Comparison of Consequence against Probability

Once the risk has been determined the corresponding action can be assessed (Table D).

Risk	Action Required
Very High Risk	6.6.1.1.31 There is a high probability that severe harm could arise to a designated receptor from an identified hazard, OR, there is evidence that sever harm to a designated receptor is currently happening. 6.6.1.1.32 This risk, if realised, is likely to results in a substantial liability. 6.6.1.1.33 Urgent investigation (if not already undertaken) and remediation are likely to be required.
High Risk	6.6.1.1.34 Harm is likely to arise to a designated receptor from an identified hazard. 6.6.1.1.35 Realisation of the risk is likely to present a substantial liability. 6.6.1.1.36 Urgent investigation (if not undertaken already) is required and remedial works may be necessary in the short term and are likely over the longer term.
Moderate Risk	6.6.1.1.37 It is possible that harm could arise to a designated receptor from an identified hazard. However, it is either relatively unlikely that any such harm would be severe, or if any harm were to occur it is more likely that the harm would be relatively mild. 6.6.1.1.38 Investigation (if not already undertaken) is normally required to clarify the risk and to determine the potential liability. Some remedial works may be required in the longer term.
Low Risk	6.6.1.1.39 It is possible that harm could arise to a designated receptor from an identified hazard, but it is likely that this harm, if realised, would at worst normally be mild.
Very Low Risk	6.6.1.1.40 There is a low possibility that harm could arise to a receptor. In the event of such harm being realised it is not likely to be severe.

Table D. Description of the Classification and Likely Action Required.

Where a very low risk is identified no specific remediation is required. Where a low risk is identified, some form of remediation may be required depending on the pollutant linkage, the type and concentration of contaminants present and the proposed development.

Where there is a moderate/low risk is identified, an assessment will be undertaken to establish what category the pollutant linkage will fall into. Where LKC identifies a moderate or higher risk, remediation or further investigation work is recommended.

Appendix B

Profile Logs

LK CONSULT LTD

Eton Business Park, Eton Hill Road, Radcliffe, M26 2ZS
Tel: 0161 763 7200 web: www.thelkgroup.com

Site	Varley and Nelson Street, Manchester			**Number** WS101
Excavation Method Drive-in Windowless Sampler driven to 5.45mbgl.	**Dimensions**	**Ground Level (mOD)** 60.44	**Client** ISG Ltd	**Job Number** LKC 22 1670
	Location (Handheld GPS) 386166 E 399659 N	**Dates** 23/05/2023	**Engineer** LKC	**Sheet** 1/1

Depth (m)	Sample / Tests	Water Depth (m)	Field Records
0.00-0.40	ES PID<0.1ppm		
0.40-0.70	ES PID<0.1ppm		
0.70-1.00	ES		
1.10-1.30	PP 85.8kPa		
1.20-1.65	SPT N=13		2,2/3,3,3,4
1.20-1.65	D		
1.30-2.00	PP 196.2kPa		
1.60-1.80	D		
2.00-2.45	SPT N=22		3,3/4,5,6,7
2.00-2.45	D		
2.00-3.00	PP 213.4kPa		
2.50-2.70	D		
3.00-3.45	SPT N=18		3,3/4,4,4,6
3.00-4.00	PP 171.7kPa		
4.00-4.45	SPT N=18		2,3/3,4,5,6
4.00-4.45	D		
4.00-5.00	PP 112.1kPa		
5.00-5.45	SPT N=16		3,3/3,4,4,5

Level (mOD)	Depth (m) (Thickness)	Description
60.04	0.40 (0.40)	MADE GROUND: Dark brown slightly gravelly very sandy SILT with occasional rootlets, rare coal and ash, becoming increasingly gravelly with depth. Sand is fine to coarse. Gravel is fine to coarse, sub-angular to sub-rounded comprising sandstone.
59.74	0.70 (0.30)	MADE GROUND: Dark grey slightly gravelly silty SAND with frequent ash, occasional coal, slate, brick fragments and glass. Sand is fine to coarse. Gravel is fine to coarse, sub-angular to sub-rounded comprising sandstone.
59.34	1.10 (0.40)	MADE GROUND: Brown very clayey SAND with occasional brick fragments and rare coal. Sand is fine to medium.
59.14	1.30 (0.20)	Stiff consistency high strength orangish brown and light grey mottled sandy silty CLAY with occasional rootlets. Sand is fine to medium.
56.44	4.00 (2.70)	Very stiff consistency very high strength brown and light grey mottled slightly gravelly sandy silty CLAY with occasional rootlets. Sand is fine to coarse. Gravel is fine to coarse, sub-angular to sub-rounded comprising sandstone and mudstone. Rare rootlets and coal gravel from 2.30mbgl.
54.99	5.45 (1.45)	Very stiff consistency high strength sandy silty CLAY with occasional bands of sand. Sand is fine to medium.
		Complete at 5.45m

Remarks
Borehole dry and stable.

Scale (approx) 1:40	**Logged By** EM
Figure No. LKC 22 1670.WS101	

LK CONSULT LTD

Eton Business Park, Eton Hill Road, Radcliffe, M26 2ZS
Tel: 0161 763 7200 web: www.thelkgroup.com

Site	Varley and Nelson Street, Manchester	**Number**	WS102
Excavation Method	Drive-in Windowless Sampler driven to 5.45mbgl.	**Dimensions**	
Ground Level (mOD)	60.41	**Client**	ISG Ltd
Job Number	LKC 22 1670	**Location** (Handheld GPS)	386176.1 E 399632.5 N
Dates	23/05/2023	**Engineer**	LKC
Sheet	1/1		

Depth (m)	Sample / Tests	Water Depth (m)	Field Records
0.00-0.40	ES PID=0.3ppm		
0.40-0.80	ES PID=0.1ppm		
0.80-1.00	ES PID=0.2ppm		
1.00-1.50	ES PID=1.1ppm		
1.20-1.65	SPT N=7		1,0/1,1,2,3
1.50-2.00	ES PID=0.1ppm		
1.50-2.00	ES PID=0.1ppm		
1.50-2.00	PP 118.5kPa		
1.80-2.00	D		
2.00-2.45	SPT N=15		2,2/3,3,4,5
2.00-3.00	PP 161.5kPa		
3.00-3.45	SPT N=23		3,3/4,6,6,7
3.00-3.45	D		
3.00-4.00	PP 194.2kPa		
4.00-4.45	SPT N=26		3,4/5,6,7,8
4.00-5.00	PP 194.7kPa		
5.00-5.45	SPT N=30		4,4/6,6,8,10

Level (mOD)	Depth (m)	(Thickness)	Description
60.01	0.40	(0.40)	MADE GROUND: Dark brown slightly gravelly very sandy SILT with occasional rootlets, rare coal and glass fragments, becoming increasingly gravelly with depth. Sand is fine to coarse. Gravel is fine to coarse, sub-angular to sub-rounded comprising sandstone.
59.61	0.80	(0.40)	MADE GROUND: Brown very sandy silty CLAY with frequent brick fragments, occasional ash, coal and concrete fragments. Sand is fine to coarse.
59.41	1.00	(0.20)	MADE GROUND: Black with slight hydrocarbon odour gravelly slightly silty SAND predominantly comprising ash with frequent clinker. Sand is fine to coarse. Gravel is fine to coarse, sub-angular to sub-rounded.
58.91	1.50	(0.50)	MADE GROUND: Black with slight hydrocarbon odour sandy silty CLAY with occasional ash and rare brick fragments, becoming grey in colour with depth. Sand is fine to coarse.
58.41	2.00	(0.50)	Stiff consistency high strength light orangish brown and light grey mottled with very slight hydrocarbon odour slightly gravelly slightly sandy silty CLAY. Sand is fine to coarse. Gravel is fine to coarse, sub-angular to sub-rounded comprising sandstone and mudstone.
56.41	4.00	(2.00)	Very stiff consistency very high strength brown with occasional light grey mottling slightly gravelly slightly sandy silty CLAY with rare bands of sand. Sand is fine to coarse. Gravel is fine to coarse, sub-angular to sub-rounded comprising sandstone and mudstone. Band of brown silty SAND at approximately 3.50-3.70mbgl. Strata is damp.
54.96	5.45	(1.45)	Very stiff consistency very high strength brown gravelly slightly sandy CLAY. Sand is fine to coarse. Gravel is fine to coarse, sub-angular to sub-rounded comprising sandstone, mudstone and coal.

Complete at 5.45m

Remarks
Borehole stable and dry.

Scale (approx)	1:40
Logged By	EM
Figure No.	LKC 22 1670.WS102

LK CONSULT LTD
Eton Business Park, Eton Hill Road, Radcliffe, M26 2ZS
Tel: 0161 763 7200 web: www.thelkgroup.com

Site	Varley and Nelson Street, Manchester			**Number** WS103
Excavation Method Drive-in Windowless Sampler driven to 5.45mbgl.	**Dimensions**	**Ground Level (mOD)** 59.90	**Client** ISG Ltd	**Job Number** LKC 22 1670
	Location (Handheld GPS) 386153.3 E 399590.3 N	**Dates** 23/05/2023	**Engineer** LKC	**Sheet** 1/1

Depth (m)	Sample / Tests	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water	Instr
0.00-0.15	ES PID=0.1ppm			59.75	(0.15) 0.15	MADE GROUND: Brown very silty SAND with frequent rootlets and rare brick fragments. Sand is fine to medium.			
0.15-0.60	ES PID=0.5ppm			59.30	(0.45) 0.60	MADE GROUND: Dark greyish brown slightly gravelly clayey SAND with frequent ash, occasional brick fragments, clinker, ceramic fragments and slate. Sand is fine to coarse. Gravel is fine to coarse, sub-angular to sub-rounded comprising sandstone and mudstone.			
0.60-0.90	ES PID=0.1ppm			59.00	(0.30) 0.90	MADE GROUND: Firm consistency light brown sandy CLAY with occasional brick fragments and bands of ash. Sand is fine to medium.			
0.90-1.30 1.20-1.65	ES PID=0.3ppm SPT N=0		 0,0/0,0,0,0	57.90	(1.10) 2.00	MADE GROUND: Black SAND and GRAVEL predominantly comprising ash and clinker with occasional brick fragments. Sand is fine to coarse. Gravel is fine to coarse, sub-angular to sub-rounded. Approximately 20% recovery between 1.00-2.00mbgl.			
2.00-3.00 2.00-2.45 3.00-3.45 3.00-4.00	ES PID=0.3ppm SPT N=0 SPT N=7 PP 137.4kPa		Water strike(1) at 2.00m. 0,0/0,0,0,0 0,0/0,2,2,3	56.70	(1.20) 3.20	MADE GROUND: Brownish grey with slight hydrocarbon odour silty SAND and GRAVEL predominantly comprising ash and clinker with occasional bands of clay. Sand is fine to coarse. Gravel is fine to coarse, sub-angular to sub-rounded. Strata is wet. Very slight sheen to water. Approximately 70% recovery between 2.00-3.00mbgl.		∇1	
3.20-3.50 3.80-4.00 4.00-4.45 4.00-5.00	ES D SPT N=16 PP 125.7kPa		 2,2/3,4,4,5	55.40	(1.30) 4.50	Stiff to very stiff consistency high strength brown with occasional light grey mottling slightly gravelly slightly sandy silty CLAY with rare rootlets. Sand is fine to coarse. Gravel is fine to medium, sub-angular to sub-rounded comprising sandstone and mudstone. Very stiff consistency from 4.00mbgl.			
5.00-5.45	SPT N=18		6,5/3,4,5,6	54.45	(0.95) 5.45	Very stiff consistency high strength brown slightly gravelly slightly sandy CLAY with rare bands of sand. Sand is fine to coarse. Gravel is fine to medium, sub-angular to sub-rounded comprising sandstone and mudstone. Orange fine to medium SAND between 5.30-5.45mbgl.			
						Complete at 5.45m			

Remarks
Strata is wet between 2.00-3.20mbgl. Perched water.
Borehole unstable between 1.00-3.00mbgl due to wet made ground.

Scale (approx) 1:40	**Logged By** EM
Figure No. LKC 22 1670.WS103	

LK CONSULT LTD
Eton Business Park, Eton Hill Road, Radcliffe, M26 2ZS
Tel: 0161 763 7200 web: www.thelkgroup.com

Site
Varley and Nelson Street, Manchester

Number
WS104

Excavation Method Drive-in Windowless Sampler driven to 2.03mbgl.	**Dimensions**	**Ground Level (mOD)**	**Client** ISG Ltd	**Job Number** LKC 22 1670
	Location	**Dates** 23/05/2023	**Engineer** LKC	**Sheet** 1/1

Depth (m)	Sample / Tests	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water
0.00-0.40	ES PID=0.8ppm				(0.40) 0.40	MADE GROUND: Dark brown slightly gravelly very sandy SILT with occasional coal fragments, ash, rootlets and rare ceramic fragments. Gravel content increases with depth. Sand is fine to coarse. Gravel is fine to coarse, sub-angular to sub-rounded comprising sandstone.	▨	
0.40-1.00	ES PID<0.1ppm				(0.60) 1.00	MADE GROUND: Stiff consistency dark greyish brown slightly gravelly sandy CLAY with frequent brick fragments, ash, occasional coal, clinker, ceramic fragments and glass fragments. Decreasing brick and ash content with depth. Sand is fine to coarse. Gravel is fine to coarse, sub-angular to sub-rounded comprising sandstone and mudstone.	▨	
1.20-1.65 1.20-1.65	SPT N=10 D		2,2/2,2,3,3		(1.03) 2.03	Stiff becoming very stiff consistency very high strength brown and light grey mottled slightly gravelly slightly sandy silty CLAY with rare rootlets. Sand is fine to coarse. Gravel is fine to coarse, sub-angular to sub-rounded comprising sandstone and mudstone. Very stiff consistency from 1.40mbgl.	▤	
1.60-2.00	PP 179kPa							
1.80-2.00	D							
2.00-2.03	SPT 25*/10 50/20		25/50			Terminated at 2.03m		

Remarks
SPT refusal at 2.03mbgl on possible sandstone cobble.
Borehole dry and stable.
Borehole repositioned approximately 1.00m to the south west (Ref. WS104A).

Scale (approx) 1:40	**Logged By** EM
Figure No. LKC 22 1670.WS104	

LK CONSULT LTD Eton Business Park, Eton Hill Road, Radcliffe, M26 2ZS Tel: 0161 763 7200 web: www.thelkgroup.com		**Site** Varley and Nelson Street, Manchester	**Number** **WS104A**
Excavation Method Drive-in Windowless Sampler driven to 5.45mbgl.	**Dimensions**	**Ground Level (mOD)** 60.23	**Client** ISG Ltd
	Location (Handheld GPS) 386138.2 E 399621.1 N	**Dates** 23/05/2023	**Engineer** LKC

Job Number	LKC 22 1670
Sheet	1/1

Depth (m)	Sample / Tests	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water	Instr
					(0.40)	MADE GROUND: Dark brown slightly gravelly very sandy SILT with occasional rootlets, coal and brick fragments. Gravel content increases with depth. Sand is fine to coarse. Gravel is fine to coarse, sub-angular to sub-rounded comprising sandstone.			
				59.83	0.40				
					(0.60)	MADE GROUND: Stiff consistency dark greyish brown slightly gravelly sandy CLAY with frequent brick fragments, ash, occasional coal, clinker, ceramic fragments and glass fragments. Decreasing brick and ash content with depth. Sand is fine to coarse. Gravel is fine to coarse, sub-angular to sub-rounded comprising sandstone and mudstone.			
				59.23	1.00				
1.00-1.40	PP 71.1kPa								
1.20-1.65	SPT N=9		2,2/2,2,2,3						
1.40-2.00	PP 153.3kPa								
						Stiff becoming very stiff consistency medium to very high strength brown and light grey mottled slightly gravelly slightly sandy silty CLAY with rare rootlets. Sand is fine to coarse. Gravel is fine to coarse, sub-angular to sub-rounded comprising sandstone, mudstone and rare coal. Very stiff consistency and very high strength from 1.50mbgl. Occasional grey mottling from 2.00mbgl.			
2.00-2.45	SPT N=14		3,2/3,3,4,4						
2.00-3.00	PP 179.9kPa								
					(3.00)				
2.50-2.70	D								
3.00-3.45	SPT N=23		3,4/5,6,6,6						
3.00-3.45	D								
3.00-4.00	PP 152.4kPa								
				56.23	4.00	Very stiff consistency very high strength brown gravelly slightly sandy CLAY. Sand is fine to coarse. Gravel is fine to medium, sub-angular to sub-rounded comprising sandstone, mudstone and occasional coal.			
4.00-4.45	SPT N=23		3,3/5,5,6,7						
4.00-5.00	PP 205kPa								
					(1.45)				
5.00-5.45	SPT N=27		4,4/5,6,7,9						
				54.78	5.45	Complete at 5.45m			

Remarks
Borehole dry and stable.

Scale (approx)	**Logged By**
1:40	EM

Figure No.
LKC 22 1670.WS104A

LK CONSULT LTD
Eton Business Park, Eton Hill Road, Radcliffe, M26 2ZS
Tel: 0161 763 7200 web: www.thelkgroup.com

Site	Varley and Nelson Street, Manchester			**Number** WS105
Excavation Method Drive-in Windowless Sampler driven to 5.45mbgl.	**Dimensions**	**Ground Level (mOD)** 59.83	**Client** ISG Ltd	**Job Number** LKC 22 1670
	Location (Handheld GPS) 386101.5 E 399594.9 N	**Dates** 23/05/2023	**Engineer** LKC	**Sheet** 1/1

Depth (m)	Sample / Tests	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water	Instr
0.00-0.30	ES PID=0.3ppm				(0.30)	MADE GROUND: Dark brown slightly gravelly very silty SAND with occasional coal, brick fragments, rootlets and rare ash. Sand is fine to coarse. Gravel is fine to coarse, sub-angular to sub-rounded comprising sandstone.			
0.30-1.00	ES			59.53	0.30				
					(0.70)	MADE GROUND: Firm consistency brown very sandy CLAY with frequent brick fragments, occasional coal, ash, glass and ceramic fragments. Sand is fine to coarse.			
1.00-1.60	ES			58.83	1.00	MADE GROUND: Black slightly silty SAND and GRAVEL predominantly comprising ash and clinker. Sand is fine to coarse. Gravel is fine to coarse, sub-angular to sub-rounded.			
1.20-1.65	SPT N=6		3,3/3,1,1,1		(0.60)				
1.60-2.00 1.60-2.00	ES PP 154.5kPa			58.23	1.60	Stiff consistency very high strength brown with light grey mottling slightly sandy silty CLAY with rare rootlets and coal fragments. Sand is fine to coarse.			
2.00-2.45 2.00-2.45 2.00-3.00	SPT N=11 D PP 165.5kPa		2,2/2,3,3,3		(1.40)				
3.00-3.45 3.00-4.00	SPT N=19 PP 165kPa		3,3/3,5,7,4	56.83	3.00	Very stiff consistency very high strength brown gravelly slightly sandy CLAY. Sand is fine to coarse. Gravel is fine to coarse, sub-angular to sub-rounded comprising mudstone and sandstone.			
4.00-4.45 4.00-5.00	SPT N=20 PP 193.1kPa		3,3/4,5,5,6		(2.45)				
5.00-5.45	SPT N=22		3,4/4,5,6,7						
				54.38	5.45	Complete at 5.45m			

Remarks
Borehole dry and stable.

Scale (approx) 1:40	**Logged By** EM
Figure No. LKC 22 1670.WS105	

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Site Varley and Nelson Street, Manchester				**Number** **WS106**
Excavation Method Drive-in Windowless Sampler driven to 5.45mbgl.	**Dimensions**	**Ground Level (mOD)** 59.34	**Client** ISG Ltd	**Job Number** LKC 22 1670
	Location (Handheld GPS) 386098.6 E 399552.5 N	**Dates** 25/05/2023	**Engineer** LKC	**Sheet** 1/1

Depth (m)	Sample / Tests	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water	Instr
0.00-0.50	D PID=0.2ppm				(0.50)	MADE GROUND: Dark brown slightly gravelly very sandy silty CLAY with occasional brick fragments, coal, rootlets and glass fragments. Sand is fine to coarse. Gravel is fine to coarse, sub-angular to sub-rounded comprising sandstone.			
				58.84	0.50				
0.50-0.90	D PID=0.3ppm				(0.40)	MADE GROUND: Blackish brown slightly gravelly slightly silty SAND with frequent ash, occasional brick fragments and rare coal. Sand is fine to coarse. Gravel is fine to coarse, sub-angular to sub-rounded comprising sandstone.			
				58.44	0.90				
0.90-1.30	D PID=0.3ppm				(0.40)	MADE GROUND: Firm consistency brown with occasional grey mottling sandy CLAY with occasional brick fragments and ash. Sand is fine to medium.			
1.20-1.65 1.30-2.00	SPT N=20 D PID=0.4ppm		1,0/4,7,5,4	58.04	1.30				
					(0.80)	MADE GROUND: Black slightly silty SAND and GRAVEL predominantly comprising ash and clinker with occasional brick fragments, coal and bands of slightly organic very sandy clay. Sand is fine to coarse. Gravel is fine to coarse, sub-angular to sub-rounded.			
2.00-2.45	SPT N=4		1,2/0,1,1,2	57.24	2.10				
					(0.80)	MADE GROUND: Soft becoming firm consistency light greyish brown slightly organic sandy silty CLAY with occasional bands of coal and ash and rare brick fragments. Sand is fine to coarse. Bands of coal and ash are wet. Firm consistency from 2.30mbgl.			
				56.44	2.90				
3.00-3.45	SPT N=17		2,2/3,3,5,6			Stiff becoming very stiff consistency very high strength brown with occasional light grey mottling slightly gravelly slightly sandy silty CLAY. Sand is fine to coarse. Gravel is fine to coarse, sub-angular to sub-rounded comprising sandstone and mudstone. Stiff consistency sandy silty CLAY between 2.90-3.20mbgl. Very stiff consistency from 3.20mbgl.			
3.20-4.00	PP 177.8kPa				(1.90)				
4.00-4.45 4.00-5.00	SPT N=26 PP 192.1kPa		4,4/5,6,7,8			Rare grey mottling from 4.00mbgl.			
				54.54	4.80				
5.00-5.45	SPT N=28		3,4/5,7,7,9		(0.65)	Very stiff consistency very high strength brown gravelly slightly sandy CLAY. Sand is fine to coarse. Gravel is fine to coarse, sub-angular to sub-rounded comprising sandstone and mudstone. Occasional bands of brown silty SAND between 4.80-5.00mbgl. Sand is fine to medium.			
				53.89	5.45				
						Complete at 5.45m			

Remarks
Borehole stable.

Scale (approx) 1:40	**Logged By** EM
Figure No. LKC 22 1670.WS106	

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LK CONSULT LTD Eton Business Park, Eton Hill Road, Radcliffe, M26 2ZS Tel: 0161 763 7200 web: www.thelkgroup.com		**Site** Varley and Nelson Street, Manchester	**Trial Pit Number** **SA101**
Excavation Method Machine excavated pit to 2.40mbgl to undertake soakaway test.	**Dimensions** 0.60m x 2.00m x 2.40m	**Ground Level (mOD)** 59.61	**Client** ISG Ltd	**Job Number** LKC 22 1670
	Location (Handheld GPS) 386091.3 E 399579.6 N	**Dates** 10/05/2023	**Engineer** LKC	**Sheet** 1/1

Depth (m)	Sample / Tests	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water
					(0.30)	MADE GROUND: Brown slightly gravelly very silty SAND with occasional rootlets and brick fragments. Sand is fine to coarse. Gravel is fine to coarse, sub-angular to sub-rounded comprising sandstone and mudstone.	▨	
				59.31	0.30	MADE GROUND: Brownish grey slightly clayey SAND and GRAVEL predominantly comprising ash and clinker with occasional coal, brick fragments, bands of firm consistency slightly gravelly slightly sandy clay and rare whole bricks. Sand is fine to coarse. Gravel is fine to coarse, sub-angular to sub-rounded comprising sandstone and mudstone.	▨	
					(1.60)			
				57.71	1.90	Stiff consistency light brown and light grey mottled slightly gravelly slightly sandy silty CLAY. Sand is fine to coarse. Gravel is fine to coarse, sub-angular to sub-rounded comprising mudstone, sandstone and coal.	▨	
					(0.50)			
				57.21	2.40	Complete at 2.40m		

Remarks

Pit dry and stable.
Soakaway test undertaken in pit, refer to separate output sheet (ref. SA101).

Scale (approx)	Logged By	Figure No.
1:20	EM	LKC 22 1670.SA101

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Tel: 0161 763 7200 web: www.thelkgroup.com

			Site Varley and Nelson Street, Manchester	**Trial Pit Number** TP101
Excavation Method Machine excavated pit to 2.20mbgl.	**Dimensions** 0.60m x 2.00m x 2.20m	**Ground Level (mOD)** 59.67	**Client** ISG Ltd	**Job Number** LKC 22 1670
	Location (Handheld GPS) 386122 E 399576.4 N	**Dates** 10/05/2023	**Engineer** LKC	**Sheet** 1/1

Depth (m)	Sample / Tests	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water
					(0.40)	MADE GROUND: Brown slightly gravelly very silty SAND with occasional rootlets and brick fragments. Sand is fine to coarse. Gravel is fine to coarse, sub-angular to sub-rounded comprising sandstone and mudstone.	▨	
				59.27	0.40 (0.35)	MADE GROUND: Black slightly silty SAND and GRAVEL predominantly comprising ash and clinker with occasional brick fragments. Sand is fine to coarse. Gravel is fine to coarse, sub-angular to sub-rounded.	▨	
				58.92	0.75 (0.65)	MADE GROUND: Stiff consistency brown and light grey mottled slightly gravelly slightly sandy CLAY with occasional coal and brick fragments. Sand is fine to coarse. Gravel is fine to coarse, sub-angular to sub-rounded comprising sandstone and mudstone.	▨	
				58.27	1.40 (0.80)	MADE GROUND: Black slightly silty SAND and GRAVEL predominantly comprising ash and clinker with occasional brick fragments. Sand is fine to coarse. Gravel is fine to coarse, sub-angular to sub-rounded. Strata is damp.	▨	
			Slow seepage(1) at 2.20m.	57.47	2.20	Complete at 2.20m		∇1

Remarks

Soakaway pit not undertaken due to depth of made ground encountered, and due to refusal on dense made ground at 2.20mbgl.
Pit relocated (ref. SA101).
Perched water slowly seeping into base of pit at 2.20mbgl. Strata between 1.40-2.20mbgl is damp.

Scale (approx)	Logged By	Figure No.
1:20	EM	LKC 22 1670.TP101

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Appendix C

Gas Monitoring Results

LK CONSULT LTD

GAS MONITORING RECORD

Site	Varley and Nelson Street
Job Number	LKC 22 1670
Date	08/06/2023
Engineer	CD
Visit	1 of 6

Equipment[1]		
Instrument	**Serial Number**	**Comments**
Gas Analyser GA5000	G507783	Serviced, calibrated, gas checked.
HydroTechnik	HT-03	Operating normally.
Pho-Check Tiger	T-106802	Serviced, calibrated.

Atmospheric / Ground Conditions	
Atmospheric pressure trend onsite	Rising then steady
Atmospheric pressure (prev 24hrs)	Steady
Weather Conditions	Clear, Hot, No wind.
Ground Conditions	Dry

Borehole ID	Date & Time	CH_4 (%v/v)	CO_2 (%v/v)	O_2 (%v/v)	Peak CH_4 (%v/v)	Peak CO_2 (%v/v)	Min O_2 (%v/v)	% LEL[2]	Peak CO (ppm)	Peak H_2S (ppm)	Balance (%)	Barometric Pressure (mb)	Internal Flow[3] (l/hr)	PID (ppm)	Standing water level (mbgl)	Installation base depth (mbgl)	Notes
WS101	08/06/2023 11:57	0	15.7	4.4	0	15.7	4.4	0	26	0	79.9	1014	0	2.1	4.85	4.90	Steady CO=3ppm.
WS102	08/06/2023 14:03	0	1.8	18.9	0	1.8	18.9	0	5	0	79.3	1015	0	0.6	1.71	4.85	Steady CO=1ppm.
WS103	08/06/2023 12:22	0	13.2	0.4	0	13.2	0.4	0	12	0	86.4	1015	0	0.9	1.94	3.95	Steady CO=2ppm, Slightly Silty.
WS104A	08/06/2023 12:33	0	4.9	14.4	0	4.9	14.4	0	12	0	80.7	1015	0	0.8	4.57	4.89	Steady CO=1ppm.
WS105	08/06/2023 12:44	0	9.2	5.7	0	9.2	5.7	0	3	0	85.1	1015	0	1.1	3.88	3.95	Steady CO=2ppm.
WS106	08/06/2023 13:00	0	7.6	2.8	0	7.6	2.8	0	9	0	89.6	1015	0	0.8	2.01	4.83	Steady CO=4ppm.
WS107	08/06/2023 13:16	0	8.8	4.4	0	8.8	4.4	0	28	0	86.8	1015	0	1.3	2.57	4.86	Steady CO=2ppm.
WS108	08/06/2023 13:27	0	7.3	11.9	0	7.4	11.9	0	7	0	80.8	1015	0	0.7	4.13	4.85	Steady CO=1ppm.
WS109	08/06/2023 13:37	0	6.2	15.5	0	6.2	15.5	0	29	0	78.3	1015	0	1.4	4.19	4.44	Steady CO=1ppm, Peak PID=2.0
WS110	08/06/2023 13:47	0	3.9	17.4	0	3.9	17.2	0	9	0	78.7	1015	0	0.7	4.40	4.91	Steady CO=1ppm.

ABBREVIATIONS	
ND	Not detected
NR	Not recorded
UR	Unable to record
OS	Off recordable scale
N/A	Not applicable
ppm	Parts per million
mb	Millibars
l/hr	Litres per hour
mbgl	Metres below ground level
LEL	Lower explosive limit in air

NOTES

All monitoring is carried out in line with LK Consult Ltd procedures, with reference to CIRIA C665.

[1] Equipment is serviced and checked as recommended by the manufacturer. Refer to calibration records and service certificates.

[2] CH4 is explosive between the range of 5-15%v/v. 100% lower explosive limit is equal to 5%v/v CH4.

[3] Flow readings are based on a 1 minute average value where flow is detected (equipment range of +/- 12 ltr/hr).

LK CONSULT LTD

GAS MONITORING RECORD

Site	Varley and Nelson Street, Manchester
Job Number	LKC 22 1670
Date	21/06/2023
Engineer	CD
Visit	2 of 6

Equipment[1]		
Instrument	**Serial Number**	**Comments**
Gas Analyser GA5000	G507783	Serviced, calibrated, gas checked.
HydroTechnik	HT-04	Operating normally.
Mini Rae Lite	PGM7300	Serviced, calibrated.

Atmospheric / Ground Conditions	
Atmospheric pressure trend onsite	Rising
Atmospheric pressure (prev 24hrs)	Rising
Weather Conditions	Slight Breeze, Warm, Sudden Showers
Ground Conditions	Initially Dry, Damp after Rain.

Borehole ID	Date & Time	CH_4 (%v/v)	CO_2 (%v/v)	O_2 (%v/v)	Peak CH_4 (%v/v)	Peak CO_2 (%v/v)	Min O_2 (%v/v)	% LEL[2]	Peak CO (ppm)	Peak H_2S (ppm)	Balance (%)	Barometric Pressure (mb)	Internal Flow[3] (l/hr)	PID (ppm)	Standing water level (mbgl)	Installation base depth (mbgl)	Notes
WS101	21/06/2023 10:58	0	17.1	0.1	0	17.2	0.1	0	30	1	0	1008	0	5	4.91	4.91	Steady CO=30ppm.
WS102	21/06/2023 11:14	0	4.3	6.1	0	4.3	6.1	0	4	0	0	1008	8.6	1.9	0.95	4.87	Steady CO=3ppm.
WS103	21/06/2023 11:29	0	15.4	0.1	0	15.4	0.1	0	6	0	0	1009	0	1.2	1.97	3.91	Steady CO=3ppm, Very Silty.
WS104A	21/06/2023 11:40	0	6.5	8.6	0	6.5	8.6	0	6	0	0	1009	0	1.1	3.77	4.87	Steady CO=1ppm.
WS105	21/06/2023 11:57	0	11.1	2.4	0	11.1	2.4	0	2	0	0	1009	0	1.6	3.44	3.95	Steady CO=2ppm.
WS106	21/06/2023 12:27	0	8.7	0.2	0	8.8	0.2	0	16	0	0	1008	0	1.4	1.79	4.87	Steady CO=16ppm.
WS107	21/06/2023 12:34	0	10.9	3.1	0	10.9	3.1	0	13	0	0	1009	0	1.1	2.23	4.72	Steady CO=2ppm.
WS108	21/06/2023 12:54	0	9.4	6.4	0	9.4	4.5	0	17	0	0	1009	0	0.6	3.26	4.85	Steady CO=0ppm.
WS109	21/06/2023 13:08	0	8.1	10.4	0	8.1	10.4	0	14	0	0	1009	0	0.9	2.18	4.46	Steady CO=0ppm.
WS110	21/06/2023 13:20	0	6	3.7	0	6	3.7	0	2	0	0	1009	0	1	2.18	4.90	Steady CO=2ppm.

ABBREVIATIONS	
ND	Not detected
NR	Not recorded
UR	Unable to record
OS	Off recordable scale
N/A	Not applicable
ppm	Parts per million
mb	Millibars
l/hr	Litres per hour
mbgl	Metres below ground level
LEL	Lower explosive limit in air

NOTES

All monitoring is carried out in line with LK Consult Ltd procedures, with reference to CIRIA C665.

[1] Equipment is serviced and checked as recommended by the manufacturer. Refer to calibration records and service certificates.

[2] CH4 is explosive between the range of 5-15%v/v. 100% lower explosive limit is equal to 5%v/v CH4.

[3] Flow readings are based on a 1 minute average value where flow is detected (equipment range of +/- 12 ltr/hr).

LK CONSULT LTD

GAS MONITORING RECORD

Site	Varley and Nelson Street
Job Number	LKC 22 1670
Date	05/07/2023
Engineer	CD
Visit	3 of 6

Equipment[1]		
Instrument	**Serial Number**	**Comments**
Gas Analyser GA5000	G507783	Serviced, calibrated, gas checked.
HydroTechnik	HT-01	Operating normally.
Mini Rae Lite	PGM7300	Serviced, calibrated.

Atmospheric / Ground Conditions	
Atmospheric pressure trend onsite	Rising
Atmospheric pressure (prev 24hrs)	Steady
Weather Conditions	Partial Cloud Cover, Slight Wind, Dry
Ground Conditions	Dry

Borehole ID	**Date & Time**	**CH_4 (%v/v)**	**CO_2 (%v/v)**	**O_2 (%v/v)**	**Peak CH_4 (%v/v)**	**Peak CO_2 (%v/v)**	**Min O_2 (%v/v)**	**% LEL[2]**	**Peak CO (ppm)**	**Peak H_2S (ppm)**	**Balance (%)**	**Barometric Pressure (mb)**	**Internal Flow[3] (l/hr)**	**PID (ppm)**	**Standing water level (mbgl)**	**Installation base depth (mbgl)**	**Notes**
WS101	05/07/2023 10:38	0	16.8	0.1	0	16.8	0.1	0	9	5	83.1	1003	0	4.3	4.89	4.90	Steady CO=8ppm.
WS102	05/07/2023 12:25	0	0.6	20	0	1.4	19.7	0	0	0	79.4	1005	0	1.3	3.02	4.86	Steady CO=0ppm, Bung removed, measured 1hr 30 later.
WS103	05/07/2023 11:10	0	15.8	0.5	0	15.8	0.5	0	2	0	83.7	1004	0	1.3	2.01	3.90	Steady CO=1ppm.
WS104	05/07/2023 11:39	0	8.1	3.7	0	8.1	3.7	0	3	0	88.2	1004	-0.1	1.1	2.92	4.86	Steady CO=1ppm
WS105	05/07/2023 12:03	0	12.5	0.4	0	12.5	0.4	0	2	0	87.1	1004	0	1.2	3.07	3.91	Steady CO=1ppm
WS106	05/07/2023 12:14	0	11.4	0.1	0	11.4	0.1	0	2	0	88.5	1005	0	1.3	1.89	4.86	Steady CO=1ppm
WS107	05/07/2023 12:40	0	11.9	6.4	0	11.9	6.4	0	6	0	81.7	1005	0	1.5	2.23	4.83	Steady CO=1ppm
WS108	05/07/2023 12:51	0	11	6.4	0	11	6.4	0	9	0	82.6	1005	-0.1	1.5	2.60	4.85	Steady CO=1ppm
WS109	05/07/2023 13:03	0	8	13.1	0	8	13.1	0	5	0	78.9	1005	-0.1	0.4	1.97	4.45	Steady CO=0ppm
WS110	05/07/2023 13:12	0	9	3.2	0	9	3.2	0	2	0	87.8	1005	0	1	2.31	4.90	Steady CO=1ppm

ABBREVIATIONS	
ND	Not detected
NR	Not recorded
UR	Unable to record
OS	Off recordable scale
N/A	Not applicable
ppm	Parts per million
mb	Millibars
l/hr	Litres per hour
mbgl	Metres below ground level
LEL	Lower explosive limit in air

NOTES

All monitoring is carried out in line with LK Consult Ltd procedures, with reference to CIRIA C665.

[1] Equipment is serviced and checked as recommended by the manufacturer. Refer to calibration records and service certificates.

[2] CH4 is explosive between the range of 5-15%v/v. 100% lower explosive limit is equal to 5%v/v CH4.

[3] Flow readings are based on a 1 minute average value where flow is detected (equipment range of +/- 12 ltr/hr).

LK CONSULT LTD

GAS MONITORING RECORD

Site	Varley and Nelson Street
Job Number	LKC 22 1760
Date	21/07/2023
Engineer	CD
Visit	4 of 6

Equipment[1]

Instrument	Serial Number	Comments
Gas Analyser GA5000	G502417	Serviced, calibrated, gas checked.
HydroTechnik	HT-02	Operating normally.

Atmospheric / Ground Conditions

Atmospheric pressure trend onsite	Rising then steady
Atmospheric pressure (prev 24hrs)	Steady
Weather Conditions	Heavy Showers and Sun
Ground Conditions	Damp

Borehole ID	Date & Time	CH_4 (%v/v)	CO_2 (%v/v)	O_2 (%v/v)	Peak CH_4 (%v/v)	Peak CO_2 (%v/v)	Min O_2 (%v/v)	% LEL[2]	Peak CO (ppm)	Peak H_2S (ppm)	Balance (%)	Barometric Pressure (mb)	Internal Flow[3] (l/hr)	PID (ppm)	Standing water level (mbgl)	Installation base depth (mbgl)	Notes
WS101	21/07/2023 10:10	0.1	16	0.1	0.1	16	0.1	2	3	7	83.8	1007	0	NR	4.86	4.91	Steady CO=2ppm.
WS102	21/07/2023 10:29	0	5.2	6.4	0	5.2	6.4	0	2	0	88.4	1007	14.2	NR	0.79	4.85	Steady CO=2ppm, Peak flow=14.21 l/hr. Decreased to 0 l/h over 3 minutes.
WS103	21/07/2023 10:47	0	15.9	0.5	0	16	0.5	0	4	0	83.6	1007	0	NR	1.96	3.92	Steady CO=0ppm, Silty.
WS104A	21/07/2023 11:00	0	9.1	1.3	0	11	1.3	0	1	0	89.6	1007	13.9	NR	0.66	4.88	Steady CO=1ppm, Peak flow=13.9 l/hr. Decreased to 0 l/h over 3 minutes.
WS105	21/07/2023 11:12	0	12.6	0.2	0	12.6	0.2	0	2	0	87.2	1007	0	NR	2.63	3.93	Steady CO=0ppm
WS106	21/07/2023 11:26	0	11.3	0.1	0	13.3	0.1	0	4	0	88.6	1007	0	NR	2.01	4.88	Steady CO=1ppm
WS107	21/07/2023 11:49	0	11.8	6.7	0	15.6	6.7	0	3	0	81.5	1007	0	NR	2.20	4.85	Steady CO=0ppm
WS108	21/07/2023 11:39	0	10.6	7.2	0	11.2	7.2	0	5	0	82.2	1007	0	NR	2.16	4.85	Steady CO=0ppm
WS109	21/07/2023 12:03	0	8.4	13.2	0	8.4	13.2	0	4	0	78.4	1007	0	NR	1.78	4.45	Steady CO=0ppm
WS110	21/07/2023 12:13	0	8.6	6.9	0	8.6	6.9	0	1	0	84.5	1007	0	NR	2.35	4.91	Steady CO=1ppm

ABBREVIATIONS	
ND	Not detected
NR	Not recorded
UR	Unable to record
OS	Off recordable scale
N/A	Not applicable
ppm	Parts per million
mb	Millibars
l/hr	Litres per hour
mbgl	Metres below ground level
LEL	Lower explosive limit in air

NOTES

All monitoring is carried out in line with LK Consult Ltd procedures, with reference to CIRIA C665.

[1] Equipment is serviced and checked as recommended by the manufacturer. Refer to calibration records and service certificates.

[2] CH4 is explosive between the range of 5-15%v/v. 100% lower explosive limit is equal to 5%v/v CH4.

[3] Flow readings are based on a 1 minute average value where flow is detected (equipment range of +/- 12 ltr/hr).

LK CONSULT LTD

GAS MONITORING RECORD

Site	Varley and Nelson Street
Job Number	LKC 22 1670
Date	11/08/2023
Engineer	CD
Visit	5 of 6

Equipment[1]

Instrument	Serial Number	Comments
Gas Analyser GA5000	G507783	Serviced, calibrated, gas checked.
HydroTechnik	HT-04	Operating normally.
Mini Rae Lite	PGM7300	Serviced, calibrated.

Atmospheric / Ground Conditions

Atmospheric pressure trend onsite	Rising then steady
Atmospheric pressure (prev 24hrs)	Falling
Weather Conditions	Dry, Sunny, Slight Wind, Warm
Ground Conditions	Dry

Borehole ID	Date & Time	CH_4 (%v/v)	CO_2 (%v/v)	O_2 (%v/v)	Peak CH_4 (%v/v)	Peak CO_2 (%v/v)	Min O_2 (%v/v)	% LEL[2]	Peak CO (ppm)	Peak H_2S (ppm)	Balance (%)	Barometric Pressure (mb)	Internal Flow[3] (l/hr)	PID (ppm)	Standing water level (mbgl)	Installation base depth (mbgl)	Notes
WS101	11/08/2023 10:13	0.7	14.8	0	0.7	14.8	0	14	4	6	84.5	1009	0	6.5	4.17	4.91	Steady CO=3ppm.
WS102	UR	UR	UR	UR	UR	UR	UR	UR	UR	UR	UR	UR	UR	UR	UR	UR	Unable to locate well.
WS103	11/08/2023 10:31	0	13.6	5.2	0.1	21.8	5.2	0	4	0	81.2	1010	0	1.4	1.55	3.90	Steady CO=1ppm, Silty.
WS104A	11/08/2023 10:46	0	9.3	2	0	9.3	1.5	0	7	8	88.7	1010	-0.1	5.1	0.68	4.89	Steady CO=2ppm. H2S= 0ppm for first 175 seconds, followed by sharp rise to 8ppm.
WS105	11/08/2023 11:10	0	11.3	0.2	0	11.3	0.2	0	2	0	88.5	1009	0	2.9	1.34	3.93	Steady CO=1ppm.
WS106	11/08/2023 11:28	0	11.3	0.1	0	11.3	0.1	0	4	0	88.6	1010	0	2.1	1.68	4.86	Steady CO=2ppm.
WS107	11/08/2023 11:39	0	11.2	5.2	0	15.7	5.2	0	4	0	83.6	1010	0	2.4	2.21	4.86	Steady CO=1ppm.
WS108	11/08/2023 11:50	0	9.8	8.1	0	11.3	8	0	5	0	82.1	1010	0	2	1.42	4.86	Steady CO=1ppm.
WS109	11/08/2023 12:01	0	8	14.2	0	9.5	14.2	0	6	0	77.8	1010	-0.1	1.6	1.18	4.46	Steady CO=1ppm.
WS110	11/08/2023 12:12	0	8.9	4.2	0	8.9	4.2	0	5	0	86.9	1010	-0.1	2.2	2.38	4.93	Steady CO=2ppm.

ABBREVIATIONS

ND	Not detected
NR	Not recorded
UR	Unable to record
OS	Off recordable scale
N/A	Not applicable
ppm	Parts per million
mb	Millibars
l/hr	Litres per hour
mbgl	Metres below ground level
LEL	Lower explosive limit in air

NOTES

All monitoring is carried out in line with LK Consult Ltd procedures, with reference to CIRIA C665.

[1] Equipment is serviced and checked as recommended by the manufacturer. Refer to calibration records and service certificates.

[2] CH4 is explosive between the range of 5-15%v/v. 100% lower explosive limit is equal to 5%v/v CH4.

[3] Flow readings are based on a 1 minute average value where flow is detected (equipment range of +/- 12 ltr/hr).

LK CONSULT LTD

GAS MONITORING RECORD

Site	Varley and Nelson Street
Job Number	LKC 22 1670
Date	01/09/2023
Engineer	CD
Visit	6 of 6

Equipment[1]		
Instrument	**Serial Number**	**Comments**
Gas Analyser GA5000	G507783	Serviced, calibrated, gas checked.
HydroTechnik	HT-03	Operating normally.
Mini Rae Lite	PGM7300	Serviced, calibrated.

Atmospheric / Ground Conditions	
Atmospheric pressure trend onsite	Rising
Atmospheric pressure (prev 24hrs)	Falling then steady
Weather Conditions	Sunny, clear to overcast. No wind.
Ground Conditions	Damp.

Borehole ID	Date & Time	CH$_4$ (%v/v)	CO$_2$ (%v/v)	O$_2$ (%v/v)	Peak CH$_4$ (%v/v)	Peak CO$_2$ (%v/v)	Min O$_2$ (%v/v)	% LEL[2]	Peak CO (ppm)	Peak H$_2$S (ppm)	Balance (%)	Barometric Pressure (mb)	Internal Flow[3] (l/hr)	PID (ppm)	Standing water level (mbgl)	Installation base depth (mbgl)	Notes
WS101	01/09/2023 10:02	1.2	15.3	0	1.2	15.3	0	0	4	6	83.5	1004	0	4.5	4.60	4.91	Steady CO=2ppm
WS102	01/09/2023 10:29	0	3.1	14.1	0	3.1	14.3	0	3	0	82.8	1005	6.2	2.1	0.72	4,86	Steady CO=3ppm. Peak flow=6.2l/h, decreased to 2.0l/h over 3 minutes. Water taken up tubing at 40 seconds.
WS103	01/09/2023 10:02	0	15.2	2.6	0	15.2	2.6	0	3	0	82.2	1005	-0.1	1.1	1.67	3.90	Steady CO=1ppm, Silty
WS104A	01/09/2023 10:58	0	2.6	17.2	0	2.6	17.2	0	8	2	80.2	1005	0.2	3	0.69	4.88	Steady CO=6ppm. Peak flow=1.8l/h, decreased to 0.2l/h over 3 minutes.
WS105	01/09/2023 11:29	0	12	0.1	0	12.1	0.1	0	2	0	87.9	1006	-0.1	1.5	1.49	3.93	Steady CO=1ppm
WS106	01/09/2023 11:57	0	12	0.1	0	12	0.1	0	4	0	87.9	1006	0	1.2	1.75	4.86	Steady CO=2ppm
WS107	01/09/2023 12:13	0	11.5	4.7	0	11.6	4.7	0	4	0	83.8	1006	-0.1	1.9	2.23	4.85	Steady CO=1ppm
WS108	01/09/2023 12:25	0	9.5	8.8	0	9.5	8.7	0	4	0	81.7	1007	0	1.1	1.55	4.86	Steady CO=1ppm
WS109	01/09/2023 12:39	0	7.8	13.5	0	7.8	13.5	0	4	0	78.7	1007	0	0.6	1.26	4.47	Steady CO=1ppm
WS110	01/09/2023 12:45	0	9.1	6.2	0	9.1	6.2	0	4	0	84.7	1007	0	0.7	2.34	4.91	Steady CO=1ppm

ABBREVIATIONS	
ND	Not detected
NR	Not recorded
UR	Unable to record
OS	Off recordable scale
N/A	Not applicable
ppm	Parts per million
mb	Millibars
l/hr	Litres per hour
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NOTES

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[1] Equipment is serviced and checked as recommended by the manufacturer. Refer to calibration records and service certificates.

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[3] Flow readings are based on a 1 minute average value where flow is detected (equipment range of +/- 12 ltr/hr).

Appendix D

JIWG Output Sheet

JIWG

Decision Support Tool for Receptor Risk Ranking

Stage 1 **Hazard Identification**		Score
Select ACM type (run model for each type to generate 'Worst Case' output)	Free dispersed fibres/fibre bundles	2
Extent of degradation of ACMs	Degraded (Significant degradation in ACM; material has lost its basic integrity)	3
Friability and degree of bonding by matrix (ACM matrix, not ground materials)	Friable ACM or ACM with fibres not linked in any matrix (free dispersed fibres/fibre bundles)	4
Distribution of Visible Asbestos Across Affected Area	No visible ACMs/fibre bundles	0
Asbestos fibre type	Chrysotile alone	0
Sub-total		**9**
Hazard ranking		**Low**

No warranty, expressed or implied, or reliance, is provided in relation to the use of this tool.
It is contingent on users to satisfy themselves that the output from the tool is relevant and appropriate to the assessment being made.

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Stage 2

Emission Factors

		Score
Amount of asbestos fibre in selected ACM/fibre type as % of host material	Low quantities - >0.01 to <0.05 %wt/wt	2
Respirable fibre index for ACM - RIVM report 711701034 (2003)	Low	2
Activity type and effect on deterioration of ACMs	Minimal disturbance, no deterioration expected	1
Best description of primary host material matrix	Made Ground - Recycled Aggregate, Track Ballast	4
Sub-total		**9**

Exposure ranking **Low**

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Stage 3

Pathway and Receptor Sensitivity		Score	
Receptor category	Public open space or building	No score required	
Age of Receptor	Infant (under 5)	4	
Duration of exposure/site occupancy	> 1hr <10 hr daily exposure (e.g. part-time to full time occupational exposure or extended daily recreational exposure)	3	
Receptor ranking		**7**	**High**
Combined hazard, exposure and receptor ranking			**Medium**
Pathway: Distance of Receptor from Source	In or within 10m of area of disturbance	4	
Pathway: Depth to impacted material	Material buried at depth, unlikely to be disturbed except for deeper construction related excavation	B	
Pathway ranking		4B	**Very Low**
Overall ranking			**Very Low**

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Project Reference	LKC 22 1670
Site Name	Varley Street, Manchester
Client	ISG Ltd
Run by	EM
Date	14th July 2023
Reviewed by	PD
Characterisation of scenario being evaluated	Assessment based on a cover system in areas of soft landscaping (material buried at depth). Age of receptor classified as infant (<5 years old) as a conservative approach.
Interpretation of scenario ranking by DST	Very low risk assuming environmental cover system.

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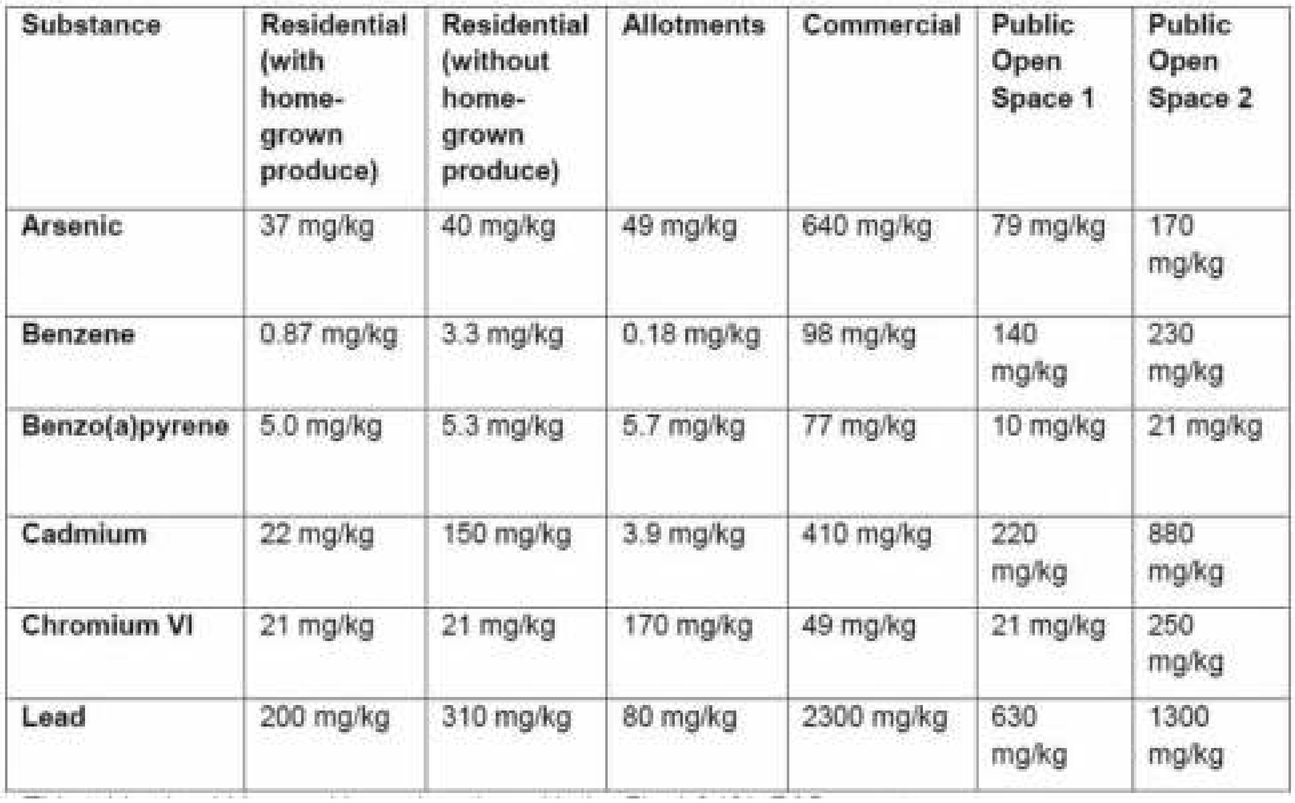
Appendix D

Generic Assessment Criteria Values

CATEGORY 4 SCREENING LEVELS



Substance	Residential (with home-grown produce)	Residential (without home-grown produce)	Allotments	Commercial	Public Open Space 1	Public Open Space 2
Arsenic	37 mg/kg	40 mg/kg	49 mg/kg	640 mg/kg	79 mg/kg	170 mg/kg
Benzene	0.87 mg/kg	3.3 mg/kg	0.18 mg/kg	98 mg/kg	140 mg/kg	230 mg/kg
Benzo(a)pyrene	5.0 mg/kg	5.3 mg/kg	5.7 mg/kg	77 mg/kg	10 mg/kg	21 mg/kg
Cadmium	22 mg/kg	150 mg/kg	3.9 mg/kg	410 mg/kg	220 mg/kg	880 mg/kg
Chromium VI	21 mg/kg	21 mg/kg	170 mg/kg	49 mg/kg	21 mg/kg	250 mg/kg
Lead	200 mg/kg	310 mg/kg	80 mg/kg	2300 mg/kg	630 mg/kg	1300 mg/kg

Tetrachlorethene (PCE) – 1% SOM	0.31 mg/kg	0.32 mg/kg	2.0 mg/kg	24 mg/kg	3,200 mg/kg	1,400 mg/kg
Tetrachlorethene (PCE) – 2.5% SOM	0.70 mg/kg	0.71 mg/kg	4.8 mg/kg	55 mg/kg	3,300 mg/kg	1,900 mg/kg
Tetrachlorethene (PCE) – 6% SOM	1.6 mg/kg	1.6 mg/kg	11 mg/kg	130 mg/kg	3,400 mg/kg	2,500 mg/kg
Trichlorethene (TCE) – 1% SOM	0.0093 mg/kg	0.0097 mg/kg	0.032 mg/kg	0.73 mg/kg	76 mg/kg	41 mg/kg
Trichlorethene (TCE) – 2.5% SOM	0.020 mg/kg	0.020 mg/kg	0.072 mg/kg	1.5 mg/kg	78 mg/kg	54 mg/kg
Trichlorethene (TCE) – 6% SOM	0.043 mg/kg	0.045 mg/kg	0.16 mg/kg	3.4 mg/kg	79 mg/kg	69 mg/kg
Vinyl Chloride (VC) – 1%SOM	0.0064 mg/kg	0.015 mg/kg	0.0017 mg/kg	1.1 mg/kg	7.8 mg/kg	18 mg/kg
Vinyl Chloride (VC) – 2.5%SOM	0.010 mg/kg	0.019 mg/kg	0.0031 mg/kg	1.4 mg/kg	7.8 mg/kg	19 mg/kg
Vinyl Chloride (VC) – 6%SOM	0.017 mg/kg	0.029 mg/kg	0.0058 mg/kg	2.2 mg/kg	7.8 mg/kg	19 mg/kg

Summary Table for the Generic Assessment Criteria for Human Health Risk Assessment Land Quality Management (LQM) S4ULs.

All GAC are based on sandy loam soils with a pH 7.

			LQM Generic Assessment Criteria (mg/kg) Dry weight soil					
	Contaminant	**SOM**	**Res +**	**Res -**	**Allot.**	**Comm.**	**POS_{resi}**	**POS_{park}**
Metals	Inorganic Arsenic	6%	37	40	43	640	79	170
	Beryllium	6%	1.7	1.7	35	12	2.2	63
	Boron	6%	290	11,000	45	240,000	21,000	46,000
	Cadmium	6%	11	85	1.9	190	120	532
	Chromium (III)	6%	910	910	18,000	8,600	1,500	33,000
	Chromium (VI)	6%	6.0	6.0	1.8	33	7.7	220
	Copper	6%	2,400	7,100	520	68,000	12,000	44,000
	Elemental Mercury	6%	1.2	1.2	21	58 (25.8) ^{vap}	16	30 (25.8) ^{vap}
	Inorganic Mercury	6%	40	56	19	1,100	120	240
	Methylmercury	6%	11	15	6.0	320	40	68
	Nickel	6%	180	180	230	980	230	3,400
	Selenium	6%	250	430	88	12,000	1,100	1,800
	Vanadium	6%	410	1,200	91	9,000	2,000	5,000
	Zinc	6%	3,700	40,000	620	730,000	81,000	170,000
BTEX Compounds	Benzene	1%	0.087	0.38	0.017	27	72	90
		2.5%	0.17	0.70	0.034	47	72	100
		6%	0.37	1.4	0.075	90	73	110
	Toluene	1%	130	880 (869) ^{vap}	22	56,000 (869) ^{vap}	56,000	87,000 (869) ^{vap}
		2.5%	290	1,900	51	110,000 (1,920) ^{vap}	56,000	95,000 (1,920) ^{vap}
		6%	660	3,900	120	180,000 (4,360) ^{vap}	56,000	100,000 (4,360) ^{vap}
	Ethylbenzene	1%	47	83	16	5,700 (518) ^{vap}	24,000	17,000 (518) ^{vap}
		2.5%	110	190	39	13,000 (1,220) ^{vap}	24,000	22,000 (1,220) ^{vap}
		6%	260	440	91	27,000 (2,840) ^{vap}	25,000	27,000 (2,840) ^{vap}
	ο-xylene	1%	60	88	28	6,600 (478) ^{sol}	41,000	17,000 (478) ^{sol}
		2.5%	140	210	67	15,000 (1,120) ^{sol}	42,000	24,000 (1,120) ^{sol}
		6%	330	480	160	33,000 (2,620) ^{sol}	43,000	33,000 (2,620) ^{sol}
	m-xylene	1%	59	82	31	6,200 (625) ^{vap}	41,000	17,000 (625) ^{vap}
		2.5%	140	190	74	14,000 (1,470) ^{vap}	42,000	24,000 (1,470) ^{vap}
		6%	320	450	170	31,000 (3,460) ^{vap}	43,000	32,000 (3,460) ^{vap}
	ρ-xylene	1%	56	79	29	5,900 (576) ^{sol}	41,000	17,000 (576) ^{sol}
		2.5%	130	180	69	14,000 (1,350) ^{sol}	42,000	23,000 (1,350) ^{sol}
		6%	310	430	160	30,000 (3,170) ^{sol}	43,000	31,000 (3,170) ^{sol}

NOTES

$^{Sol / vap}$ = solubility / vapour limit (potentially use if free product identified, although highly conservative).

f = oral, dermal and inhalation exposures compared to oral HCV.

All GAC are based on sandy loam soils with a pH 7.

Contaminant		SOM	LQM Generic Assessment Criteria (mg/kg) Dry weight soil					
			Res +	**Res -**	**Allot.**	**Comm.**	**POS$_{resi}$**	**POS$_{park}$**
Polycyclic Aromatic Hydrocarbons (PAHs)	Acenaphthene	1%	210	3,000 (57.1) ^{sol}	34	84,000 (57.0) ^{sol}	15,000	29,000
		2.5%	510	4,700 (141) ^{sol}	85	97,000 (141) ^{sol}	15,000	30,000
		6%	1,100	6,000 (336) ^{sol}	200	100,000	15,000	30,000
	Acenaphthylene	1%	170	2,900 (86.1) ^{sol}	28	83,000 (86.1) ^{sol}	15,000	29,000
		2.5%	420	4,600 (212) ^{sol}	69	97,000 (212) ^{sol}	15,000	30,000
		6%	920	6,000 (506) ^{sol}	160	100,000	15,000	30,000
	Anthracene	1%	2,400	31,000 (1.17) ^{vap}	380	520,000	74,000	150,000
		2.5%	5,400	35,000	950	540,000	74,000	150,000
		6%	11,000	37,000	2,200	540,000	74,000	150,000
	Benz(a)anthracene	1%	7.2	11	2.9	170	29	49
		2.5%	11	14	6.5	170	29	56
		6%	13	15	13	180	29	62
	Benzo(a)pyrene (only)	1%	2.2	3.2	0.97	35	5.7	11
		2.5%	2.7	3.2	2.0	35	5.7	12
		6%	3.0	3.2	3.5	36	5.7	13
	Benzo(b)fluoranthene	1%	2.6	3.9	0.99	44	7.1	13
		2.5%	3.3	4.0	2.1	44	7.2	15
		6%	3.7	4.0	3.9	45	7.2	16
	Benzo(ghi)perylene	1%	320	360	290	3,900	640	1,400
		2.5%	340	360	470	4,000	640	1,500
		6%	350	360	640	4,000	640	1,600
	Benzo(k)fluoranthene	1%	77	110	37	1,200	190	370
		2.5%	93	110	75	1,200	190	410
		6%	100	110	130	1,200	190	440
	Chrysene	1%	15	30	4.1	350	57	93
		2.5%	22	31	9.4	350	57	110
		6%	27	32	19	350	57	120
	Dibenzo(ah)anthracene	1%	0.24	0.31	0.14	3.5	0.57	1.1
		2.5%	0.28	0.32	0.27	3.6	0.58	1.3
		6%	0.3	0.32	0.43	3.6	0.58	1.4
	Fluoranthene	1%	280	1,500	52	23,000	3,100	6,300
		2.5%	560	1,600	130	23,000	3,100	6,300
		6%	890	1,600	290	23,000	3,100	6,400
	Fluorene	1%	170	2,800 (36.0) ^{sol}	27	63,000 (30.9) ^{sol}	9,900	20,000
		2.5%	400	3,800 (76.5) ^{sol}	67	68,000	9,900	20,000
		6%	860	4,500 (183) ^{sol}	160	71,000	9,900	20,000
	Indeno(123-cd)pyrene	1%	27	45	9.5	500	82	150
		2.5%	36	46	21	510	82	170
		6%	41	46	39	510	82	180
	Naphthalene	1%	2.3 ^{f}	2.3 ^{f}	4.1 ^{f}	190 ^{f} (76.4) ^{sol}	4,900 ^{f}	1,200 ^{f} (76.4) ^{sol}
		2.5%	5.6 ^{f}	5.6 ^{f}	10 ^{f}	460 ^{f} (183) ^{sol}	4,900 ^{f}	1,900 ^{f} (183) ^{sol}
		6%	13 ^{f}	13 ^{f}	24 ^{f}	1,100 ^{f} (432) ^{sol}	4,900 ^{f}	3,000
	Phenanthrene	1%	95	1,300 (36.0) ^{sol}	15	22,000	3,100	6,200
		2.5%	220	1,500	38	22,000	3,100	6,200
		6%	440	1,500	90	22,000	3,100	6,300
	Pyrene	1%	620	3,700	110	54,000	7,400	15,000
		2.5%	1,200	3,800	270	54,000	7,400	15,000
		6%	2,000	3,800	620	54,000	7,400	15,000
	Coal Tar (B(a)P as surrogate marker)	1%	0.79	1.2	0.32	15	2.2	4.4
		2.5%	0.98	1.2	0.67	15	2.2	4.7
		6%	1.1	1.2	1.2	15	2.2	4.8

NOTES

$^{Sol / vap}$ = solubility / vapour limit (potentially use if free product identified, although highly conservative).

f = naphthalene is based on comparison of inhalation exposure with TDI$_{inhal}$ for localised effect.

All GAC are based on sandy loam soils with a pH 7.

LQM Generic Assessment Criteria (mg/kg) Dry weight soil

Contaminant		SOM	Res +	Res -	Allot.	Comm.	POS$_{resi}$	POS$_{park}$
Petroleum Hydrocarbons	**Aliphatic**							
	EC 5-6	1%	42	42	730	3,200 (304) ^{sol}	570,000(304)^{sol}	95,000 (304) ^{sol}
	EC>6-8	1%	100	100	2,300	7,800 (144) ^{sol}	600,000	150,000 (144) ^{sol}
	EC>8-10	1%	27	27	320	2,000 (78) ^{sol}	13,000	14,000 (78) ^{vap}
	EC>10-12	1%	130 (48) ^{vap}	130 (48) ^{vap}	2,200	9,700 (48) ^{sol}	13,000	21,000 (48) ^{vap}
	EC>12-16	1%	1,100 (24) ^{sol}	1,100 (24) ^{sol}	11,000	59,000 (24) ^{sol}	13,000	25,000 (24) ^{sol}
	EC>16-35	1%	65,000 (8.48) ^{f,sol}	65,000 (8.48) ^{f,sol}	260,000 ^{f}	160,000 ^{f}	250,000 ^{f}	450,000 ^{f}
	EC>35-44	1%	65,000 (8.48) ^{f,sol}	65,000 (8.48) ^{f,sol}	260,000 ^{f}	160,000 ^{f}	250,000 ^{f}	450,000 ^{f}
	Aliphatic							
	EC 5-6	2.5%	78	78	1,700	5,900 (558) ^{sol}	590,000	130,000 (558) ^{sol}
	EC>6-8	2.5%	230	230	5,600	17,000 (322) ^{sol}	610,000	220,000 (322) ^{sol}
	EC>8-10	2.5%	65	65	770	4,800 (190) ^{vap}	13,000	18,000 (190) ^{vap}
	EC>10-12	2.5%	330 (118) ^{vap}	330 (118) ^{vap}	4,400	23,000 (118) ^{vap}	13,000	23,000 (118) ^{vap}
	EC>12-16	2.5%	2,400 (59) ^{sol}	2,400 (59) ^{sol}	13,000	82,000 (59) ^{sol}	13,000	25,000 (59) ^{sol}
	EC>16-35	2.5%	92,000 (21) ^{f,sol}	92,000 (21) ^{f,sol}	270,000 ^{f}	1,700,000 ^{f}	250,000 ^{f}	480,000 ^{f}
	EC>35-44	2.5%	92,000 (21) ^{f,sol}	92,000 (21) ^{f,sol}	270,000 ^{f}	1,700,000 ^{f}	250,000 ^{f}	480,000 ^{f}
	Aliphatic							
	EC 5-6	6%	160	160	3,900	12,000 (1,150) ^{sol}	600,000	180,000 (1,150) ^{sol}
	EC>6-8	6%	530	530	13,000	40,000 (736) ^{sol}	620,000	320,000 (736) ^{sol}
	EC>8-10	6%	150	150	1,700	11,000 (451) ^{vap}	13,000	21,000 (451) ^{vap}
	EC>10-12	6%	760 (283) ^{vap}	760 (283) ^{vap}	7,300	47,000 (283) ^{vap}	13,000	24,000 (283) ^{vap}
	EC>12-16	6%	4,300 (142) ^{sol}	4,400 (142) ^{sol}	13,000	90,000 (142) ^{sol}	13,000	26,000 (142) ^{sol}
	EC>16-35	6%	110,000^{f}	110,000^{f}	270,000 ^{f}	1,800,000^{f}	250,000 ^{f}	490,000 ^{f}
	EC>35-44	6%	110,000^{f}	110,000^{f}	270,000 ^{f}	1,800,000^{f}	250,000 ^{f}	490,000 ^{f}
	Aromatic							
	EC5-7(benzene as non-threshold)	1%	70	370	13	26,000 (1,220$^{)\ sol}$	56,000	76,000 (1,220) ^{sol}
	EC>7-8(toluene)	1%	130	860	22	56,000 (869) ^{vap}	56,000	87,000 (869) ^{vap}
	EC>8-10	1%	34	47	8.6	3,500 (613) ^{vap}	5,000	7,200 (613) ^{vap}
	EC>10-12	1%	74	250	13	16,000 (364) ^{sol}	5,000	9,200 (364) ^{sol}
	EC>12-16	1%	140	1,800	23	36,000 (169)^{sol}	5,100	10,000
	EC>16-21	1%	260 ^{f}	1,900 ^{f}	46 ^{f}	28,000 ^{f}	3,800 ^{f}	7,600 ^{f}
	EC>21-35	1%	1,100 ^{f}	1,900 ^{f}	370 ^{f}	28,000 ^{f}	3,800 ^{f}	7,800 ^{f}
	EC>35-44	1%	1,100 ^{f}	1,900 ^{f}	370^{f}	28,000 ^{f}	3,800 ^{f}	7,800 ^{f}
	Aromatic							
	EC5-7(benzene as non-threshold)	2.5%	140	690	27	46,000 (2,260) ^{sol}	56,000	84,000 (2,260) ^{sol}
	EC>7-8(toluene)	2.5%	290	1,800	51	110,000 (1,920) ^{sol}	56,000	95,000 (1,920) ^{sol}
	EC>8-10	2.5%	83	110	21	8,100 (1,500) ^{vap}	5,000	8,500 (1,500) ^{vap}
	EC>10-12	2.5%	180	590	31	28,000 (899) ^{sol}	5,000	9,700 (899) ^{sol}
	EC>12-16	2.5%	330	2,300 (419) ^{sol}	57	37,000	5,100	10,000
	EC>16-21	2.5%	540 ^{f}	1,900 ^{f}	110 ^{f}	28,000 ^{f}	3,800 ^{f}	7,700 ^{f}
	EC>21-35	2.5%	1,500 ^{f}	1,900 ^{f}	820 ^{f}	28,000 ^{f}	3,800 ^{f}	7,800 ^{f}
	EC>35-44	2.5%	1,500 ^{f}	1,900 ^{f}	820 ^{f}	28,000 ^{f}	3,800 ^{f}	7,800 ^{f}
	Aromatic							
	EC5-7(benzene as non-threshold)	6%	300	1,400	57	86,000 (4,710) ^{sol}	56,000	92,000 (4,710) ^{sol}
	EC>7-8(toluene)	6%	660	3,900	120	180,000 (4,360) $_{vap}$	56,000	100,000 (4,360) ^{vap}
	EC>8-10	6%	190	270	51	17,000 (3,580) ^{vap}	5,000	9,300 (3,580) ^{vap}
	EC>10-12	6%	380	1,200	4	34,000 (2,150) ^{sol}	5,000	10,000
	EC>12-16	6%	660	2,500	130	38,000	5,100	10,000
	EC>16-21	6%	930^{f}	1,900 ^{f}	260 ^{f}	28,000 ^{f}	3,800 ^{f}	7,800 ^{f}
	EC>21-35	6%	1,700 ^{f}	1,900 ^{f}	1,600 ^{f}	28,000 ^{f}	3,800 ^{f}	7,900 ^{f}
	EC>35-44	6%	1,700 ^{f}	1,900 ^{f}	1,600 ^{f}	28,000 ^{f}	3,800 ^{f}	7,900 ^{f}
	Aliphatic +Aromatic >EC44	1%	1,600 ^{f}	1,900 ^{f}	1,200 ^{f}	28,000 ^{f}	3,800 ^{f}	7,800 ^{f}
		2.5%	1,800 ^{f}	1,900 ^{f}	2,100 ^{f}	28,000 ^{f}	3,800 ^{f}	7,800 ^{f}
		6%	1,900 ^{f}	1,900 ^{f}	3,000 ^{f}	28,000 ^{f}	3,800 ^{f}	7,900 ^{f}

NOTES

$^{Sol / vap}$ = solubility / vapour limit (potentially use if free product identified, although highly conservative).

f = oral, dermal and inhalation exposures compared to oral HCV.

All GAC are based on sandy loam soils with a pH 7.

			LQM Generic Assessment Criteria (mg/kg) Dry weight soil					
Contaminant		**SOM**	**Res +**	**Res -**	**Allot.**	**Comm.**	**POS_{resi}**	**POS_{park}**
Chloalkanes and Alkenes & Explosives	1,2 Dichloroethane (DCA)	1%	7.1E-03	9.2E-03	4.6E-03	0.67	29	21
		2.5%	1.1E-02	1.3E-02	8.3E-03	0.97	29	24
		6%	1.9E-02	2.3E-02	1.6E-02	1.7	29	28
	1,1,1 Trichloroethane (TCA)	1%	8.8	9.0	48	660	140,000	57,000 (1,425) ^{vap}
		2.5%	18	18	110	1,300	140,000	76,000 (2,915) ^{vap}
		6%	39	40	240	3,000	140,000	100,000 (6,392) ^{vap}
	1,1,2,2-Tetrachloroethanes (PCA)	1%	1.6	3.9	0.41	270	1,400	1,800
		2.5%	3.4	8.0	0.89	550	1,400	2,100
		6%	7.5	17	2.0	1,100	1,400	2,300
	1,1,1,2-Tetrachloroethanes (PCA)	1%	1.2	1.5	0.79	110	1,400	1,500
		2.5%	2.8	3.5	1.9	250	1,400	1,800
		6%	6.4	8.2	4.4	560	1,400	2,100
	Tetrachloroethene (PCE)	1%	0.18	0.18	0.65	19	1,400	810 (424) ^{sol}
		2.5%	0.39	0.40	1.5	42	1,400	1,100 (951) ^{sol}
		6%	0.90	0.92	3.6	95	1,400	1,500
	Tetrachloromethane (carbon tetrachloride)	1%	2.6E-02	2.6E-02	0.45	2.9	890	190
		2.5%	5.6E-02	5.6E-02	1.0	6.3	920	270
		6%	0.13	0.13	2.4	14	950	400
	Trichloroethene (TCE)	1%	1.6E-02	1.7E-02	4.1E-02	1.2	120	70
		2.5%	3.4E-02	3.6E-02	9.1E-02	2.6	120	91
		6%	7.5E-02	8.0E-02	0.21	5.7	120	120
	Trichloromethane (chloroform)	1%	0.91	1.2	0.42	99	2,500	2,600
		2.5%	1.7	2.1	0.83	170	2,500	2,800
		6%	3.4	4.2	1.7	350	2,500	3,100
	Chloroethene (vinyl chloride)	1%	6.4E-04	7.7E-04	5.5E-04	5.9E-02	3.5	4.8
		2.5%	8.7E-04	1.0E-03	1.0E-03	7.7E-02	3.5	5.0
		6%	1.4E-03	1.5E-03	1.8E-03	0.12	3.5	5.4
	2,4,6-Trinitritoluene (TNT)	1%	1.6	65	0.24	1,000	130	260
		2.5%	3.7	66	0.58	1,000	130	270
		6%	8.1	66	1.4	1,000	130	270
	RDX	1%	120	13,000	17	210,000	26,000	49,000 (18.7) ^{sol}
		2.5%	250	13,000	38	210,000	26,000	51,000
		6%	540	13,000	85	210,000	27,000	53,000
	HMX	1%	5.7	6,700	0.86	110,000	13,000	23,000 (0.35) ^{vap}
		2.5%	13	6,700	1.9	110,000	13,000	23,000 (0.39) ^{vap}
		6%	26	6,700	3.9	110,000	13,000	24,000 (0.48) ^{vap}
Pesticides	Aldrin	1%	5.7	7.3	3.2	170	18	30
		2.5%	6.6	7.4	6.1	170	18	31
		6%	7.1	7.5	9.8	170	18	31
	Dieldrin	1%	0.97	7.0	0.17	170	18	30
		2.5%	2.0	7.3	0.41	170	18	30
		6%	3.5	7.4	0.96	170	18	31
	Atrazine	1%	3.3	610	0.5	9,300	1,200	2,300
		2.5%	7.8	620	1.2	9,400	1,200	2,400
		6%	17.4	620	2.7	9,400	1,200	2,400
	Dichlorvos	1%	3.2E-02	6.4	4.9E-03	140	16	26
		2.5%	6.6E-02	6.5	1.0E-02	140	16	26
		6%	0.14	6.6	2.2E-02	140	16	27
	Endosulfanns (2 isomers)	1%	7.4	160 (3.0E-03) ^{vap}	1.2	5,600 (3.0E-03) ^{vap}	1,200	2,300
		2.5%	18	280 (7.0E-03) ^{vap}	2.9	7,400 (7.0E-03) ^{vap}	1,200	2,400
		6%	41	410 (1.6E-02) ^{vap}	6.8	8,400 (1.6E-02) ^{vap}	1,200	2,500
	Hexachlorocyclohexane (3 isomers), inc Lindane	1%	8.5E-02	3.7	1.3E-02	65	8.1	15
		2.5%	0.2	3.8	3.2E-02	65	8.1	15
		6%	0.46	3.8	7.7E-02	65	8.1	16

NOTES

$^{Sol / vap}$ = solubility / vapour limit (potentially use if free product identified, although highly conservative).

All GAC are based on sandy loam soils with a pH 7.

LQM Generic Assessment Criteria (mg/kg) Dry weight soil

	Contaminant	SOM	Res +	Res -	Allot.	Comm.	POS_{resi}	POS_{park}
Chlorobenzenes	Chlorobenzene	1%	0.46	0.46	5.9	56	11,000	1,300 (675) [sol]
		2.5%	1.0	1.0	14	130	13,000	2,000 (1,520) [sol]
		6%	2.4	2.4	32	290	14,000	2,900
	Dichlorobenzenes (3 isomers)	1%	23	24	94	2,000 (571) [sol]	90,000	24,000 (571) [sol]
		2.5%	55	57	230	4,800 (1,370) [sol]	95,000	36,000 (1,370) [sol]
		6%	130	130	540	11,000 (3,240) [sol]	98,000	51,000 (3,270) [sol]
	Trichlorobenzenes (3 isomers)	1%	2.6	2.6	55	220	15,000	1,700 (318) [vap]
		2.5%	6.4	6.4	140	530	17,000	2,600 (786) [vap]
		6%	15	15	320	1,300	19,000	4,000 (1,880) [vap]
	Tetrachlorobenzenes (3 isomers)	1%	0.66	0.75	0.38	49 (39.4) [vap]	78	110 (39) [vap]
		2.5%	1.6	1.9	0.90	120 (98.1) [vap]	79	120
		6%	3.7	4.3	2.2	240 (235) [vap]	79	130
	Pentachlorobenzene	1%	5.8	19	1.2	640 (43.0) [sol]	100	190
		2.5%	12	30	3.1	770 (107) [sol]	100	190
		6%	22	38	7.0	830	100	190
	Hexachlorobenzene	1%	1.8 (0.20) [vap]	4.1 (0.20) [vap]	0.47	110 (0.20) [vap]	16	30
		2.5%	3.3 (0.50) [vap]	5.7 (0.50) [vap]	1.1	120	16	30
		6%	4.9	6.7 (1.2) [vap]	2.5	120	16	30
Chlorophenol	Chlorophenols (4 congeners)	1%	0.87 [g]	94	0.13 [g]	3,500	620	1,100
		2.5%	2.0	150	0.30	4,000	620	1,100
		6%	4.5	210	0.70	4,300	620	1,100
	Pentachlorophenol	1%	0.22	27 (16.4) [vap]	3.0E-02	400	60	110
		2.5%	0.52	29	8.0E-02	400	60	120
		6%	1.2	31	0.19	400	60	120
Others	Carbon Disulphide	1%	0.14	0.14	4.8	11	11,000	1,300
		2.5%	0.29	0.29	10	22	11,000	1,900
		6%	0.62	0.62	23	47	11,000	2,700
	Hexachlorobutadiene	1%	0.29	0.32	0.25	31	25	48
		2.5%	0.7	0.78	0.61	66	25	50
		6%	1.6	1.8	1.4	120	25	51
	Phenol	1%	280	750	66	760 [dir] (31,000)	760 [dir] (11,000)	760 [dir] (8,600)
		2.5%	550	1,300	140	1,500 [dir] (35,000)	1,500 [dir] (11,000)	1,500 [dir] (9,700)
		6%	1,100	2,300	280	3,200 [dir] (37,000)	3,200 [dir] (11,000)	3,200 [dir] (11,000)

NOTES

[Sol / vap] = solubility / vapour limit (potentially use if free product identified, although highly conservative).

[dir] = S4uls based on threshold protective of direct skin contact with phenol (brackets long term exposure for illustration purposes).

[g] = derived based on 2,3,4,6-tetrachlorophenol.

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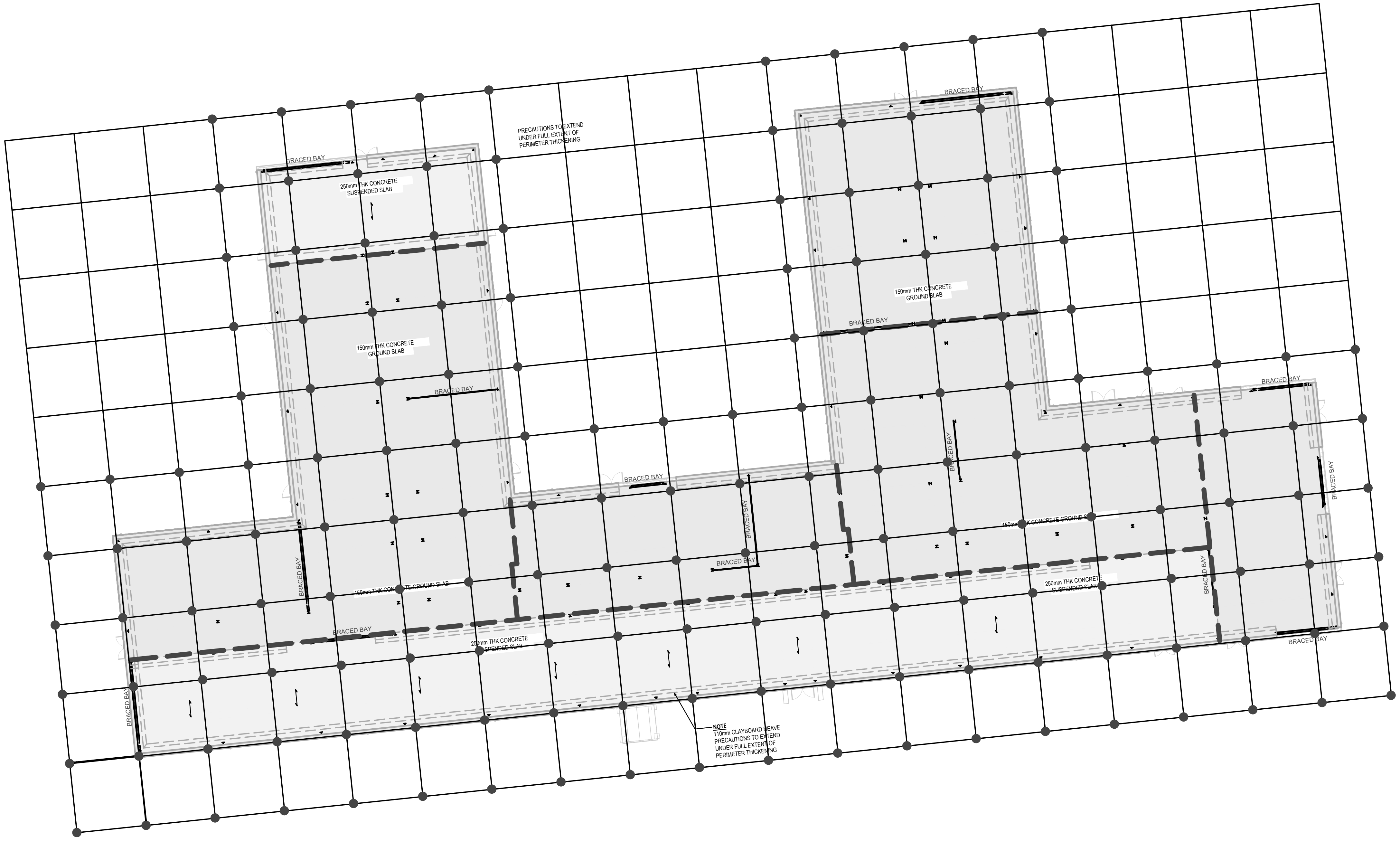
- Land Remediation
- Project Management
- Land Drilling

Appendix H Mine Shaft Grout Stabilisation


BRACED BAY
PRECAUTIONS TO EXTEND
UNDER FULL EXTENT OF
PERIMETER THICKENING
BRACED BAY
250mm THK CONCRETE
SUSPENDED SLAB
150mm THK CONCRETE
GROUND SLAB
BRACED BAY
150mm THK CONCRETE
GROUND SLAB
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150mm THK CONCRETE GROUND SLAB
BRACED BAY
250mm THK CONCRETE
SUSPENDED SLAB
BRACED BAY
150mm THK CONCRETE GROUND SLAB
BRACED BAY
250mm THK CONCRETE
SUSPENDED SLAB
BRACED BAY
BRACED BAY
NOTE
110mm CLAYBOARD HEAVE
PRECAUTIONS TO EXTEND
UNDER FULL EXTENT OF
PERIMETER THICKENING

NOTES

○ PRIMARY HOLES - No

Mine Shaft

REVISION NOTES:

-

VAN ELLE
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CLIENT:

ISG

CONTRACT:

Valey Street - Mine Consolidation

DRAWING TITLE:

Van Elle Mine Consolidation
Plan

DATE: 14/06/2023	DRAWN BY: SF
SCALE: NTS	CHECKED BY: SB

SHEET SIZE: A1	DRAWING No: 231836VE	REV: -

231836

Varley Street, Manchester

Specification for Consolidation of Mine Workings with Shaft Treatment

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Control Sheet

This report has been prepared for the sole benefit, use and information of ISG for the purposes set out in the instructions commissioning it. The liability of Van Elle Ltd in respect of the information contained in the report will not extend to any third party.

Prepared by	Sam Palmer	[redacted]	Date 13/07/2023
Approved by	Dave Bourne	[redacted]	Date 13/07/2023

1.0 Introduction

ISG, in their capacity as Principal Contractor, has instructed Van Elle (VE) to consolidate potential mine workings through a program of drilling and grouting on a 6m x 6m grid (closing to 4.25m grid if workings are encountered) to an average depth of 36m bgl or 12m of rock cover. The drilling and grouting layout is shown in Appendix 2.

The works also include treatment of 2No. mineshafts, Ref: 386399-001 (potentially partially treated) and 386399-016 (untreated), assumed 75m deep and 2.5m wide and partially backfilled. The treatment will be from the base of the shaft (plus 5m solid).

There is also a potential third mineshaft, Ref: 386399-002 which is suspected to be around 5m south west of the site boundary, which the site team will remain aware of in case it is in fact within the site boundary.

1.1 Site Location and Description

The site is located between Sawley Road (NW), Vickers Street (NE), Nelson Street (SW) and James Street (SE) in Manchester. The site is bordered by residential properties on the North West side and industrial buildings on the South West and South East sides.

1.2 Ground Conditions & Geology

The geology of the site has been summarised as superficial Devensian Till (Diamicton), underlain by the Pennine Upper Coal Measures Formation (interbedded mudstone, sandstone and siltstone), dipping 18° SW. There are two expected subcropping coal seams, both striking NW to SE: Bradford Four Foot NE and Bradford Threequarters SW. (As per Envirosolution Ltd CMRA 2022, referenced in the provided SHALLOW MINING SITE INVESTIGATION WORKS by LKC Group.)

It was therefore recommended that the seams be investigated, and if found to show evidence of workings, consolidated by drilling and grouting.

There are no known faults within the site.

1.3 Purpose of the Works

Treatment is required where less than ten times seam thickness of rock cover exists between the top of the worked seam and the base of the proposed piles/rock head.

Treatment is required to stabilise the identified mineshafts by the injection of a cementitious grout.

1.4 Permissions

1.4.1 Coal Authority

A permit to treat the workings and shafts will be obtained from the Coal Authority. A copy of the permit shall be kept on site by the foreman.

2.0 Specification

2.1 Design

A 6m grid has been superimposed on the footprint of the site. This can be reduced to a 4.25m grid if workings are encountered.

The shaft will be treated by pressure grouting from the bottom up in 2m sections. Two treatment boreholes will be drilled, with one validation borehole.

2.2 Supervision

A full time non-working foreman will be on site during the project, who will be responsible for ensuring the works comply with the specification. They will liaise with VE contract management staff on a weekly basis.

2.3 Drilling

Drilling will be carried out using hydraulic driven rotary percussive drill rig, advancing 101mm casing into the target seam to allow grouting and consolidation. 101mm diameter casing will also be advanced into the shaft to allow grouting and consolidation. Rotary percussive drilling techniques will be used with water as the flushing medium. The rigs will be fitted with a fully interlocked guard, which will be operation at all times that drilling is being carried out.

2.3.1 Treatment Grid

A treatment grid of 6m will be drilled, with boreholes extending to average 36m bgl or 12m of rock cover. This grid will be reduced to 4.25m if workings are encountered. The integrity of the boreholes within the fill/overburden shall be maintained using 101mm casing.

2.3.2 Perimeter

At the discretion of the foreman/engineer a perimeter may be installed at 3m or 1.5m centres as appropriate. This is only generally necessary if there is a significant dip within the workings.

2.3.3 Shaft treatment

The treatment boreholes will be drilled to the base of the shaft (approx. 75m deep) plus 5m into the base to ensure that the bottom is at rockhead and is not an installed staging. They will then pressure grouted under 2 bar of pressure in 2m sections from base to surface.

The validation test hole will then be drilled and grouted using the same methodology in order to ensure the shaft has been sufficiently treated.

2.3.4 Records

Full records shall be maintained during the works, showing job name and location, hole reference number, date, plant in use and crew members, inclination of borehole, daily and cumulative length drilled depth to each major change in stratum, description noting where stratum is broken, details of any voids or suspected workings and depth of completed borehole.

2.4 Grouting

2.4.1 Materials & Mix

Grout materials shall consist of Pulverised Fuel Ash and Ordinary Portland Cement, mixed at a ratio of 12:1 for the treatment grid and 10:1 for the mineshafts with a water solids ratio of no more than 40%. No thixotropic or thickening agents will be added during agitation. OPC shall comply with BS12 and PFA shall be in accordance with BS 3892: part 2. Pea gravel may be introduced if deemed necessary (where voids exceeding 500mm are encountered, as per CIRIA Guidance).

2.4.2 Equipment

Grout will be batched and pumped on site using a suitable electric mixer and pump arrangement. All plant shall be certified safe and maintained properly throughout the operation.

2.4.3 Water

A source of water will be provided to Van Elle from a hydrant with a standpipe.

2.4.4 Testing

Sets of 4 grout cubes will be taken and tested at 7-, 14- and 28-day intervals to achieve a minimum strength of 1N/mm^2 after 28 days.

The foreman shall ensure that mixes are tested regularly for flow and bleed using a Colcrete type flowmeter and graduated beaker respectively. Flows should be with the range of 300-600mm, and bleed should be no more than 2% by volume.

2.5 Testing

2.5.1 Test holes for the treatment grid

Test holes will be drilled at the site to validate the works. The position of the test holes will be chosen to correspond with the areas of the site where the highest grout takes are recorded. The position of the test holes will be indicated on the Grout borehole layout plan. All test holes will be pressurised to correspond with the amount of overburden (ie 10kN/m of overburden) for 2 minutes. The test shall be considered a pass where not more than 1t can be injected, and the pressure drops by no more than 10% for 2 minutes. Drilling and Grouting records of test holes will be kept.

2.5.2 Test holes for the mineshafts

Test holes will be drilled and will be pressurised to 2bar and held for 2 minutes. The tests shall be considered a pass where the pressure does not drop by no more than 10% for 2 minutes. Drill and Grout records of test holes will be kept.

2.5.3 Gas testing

A gas monitor shall be used throughout the consolidation program to monitor for the presence of three harmful gases, carbon monoxide (CO), hydrogen sulphide (H_2S) and Methane (CH_4). Levels of airborne Oxygen (O_2) will also be monitored. The gas alarms have visible and aural alarms should concentrations of any of these gases touch pre-determined trigger levels. Records of the gas monitoring shall be kept.

3.0 Reporting

A completion report will be compiled following completion of the works. The report will include drilling records, grouting records, testing records and a location plan showing the location of the boreholes and any test holes carried out. It will also summarise total length drilled, and quantities of grout materials.

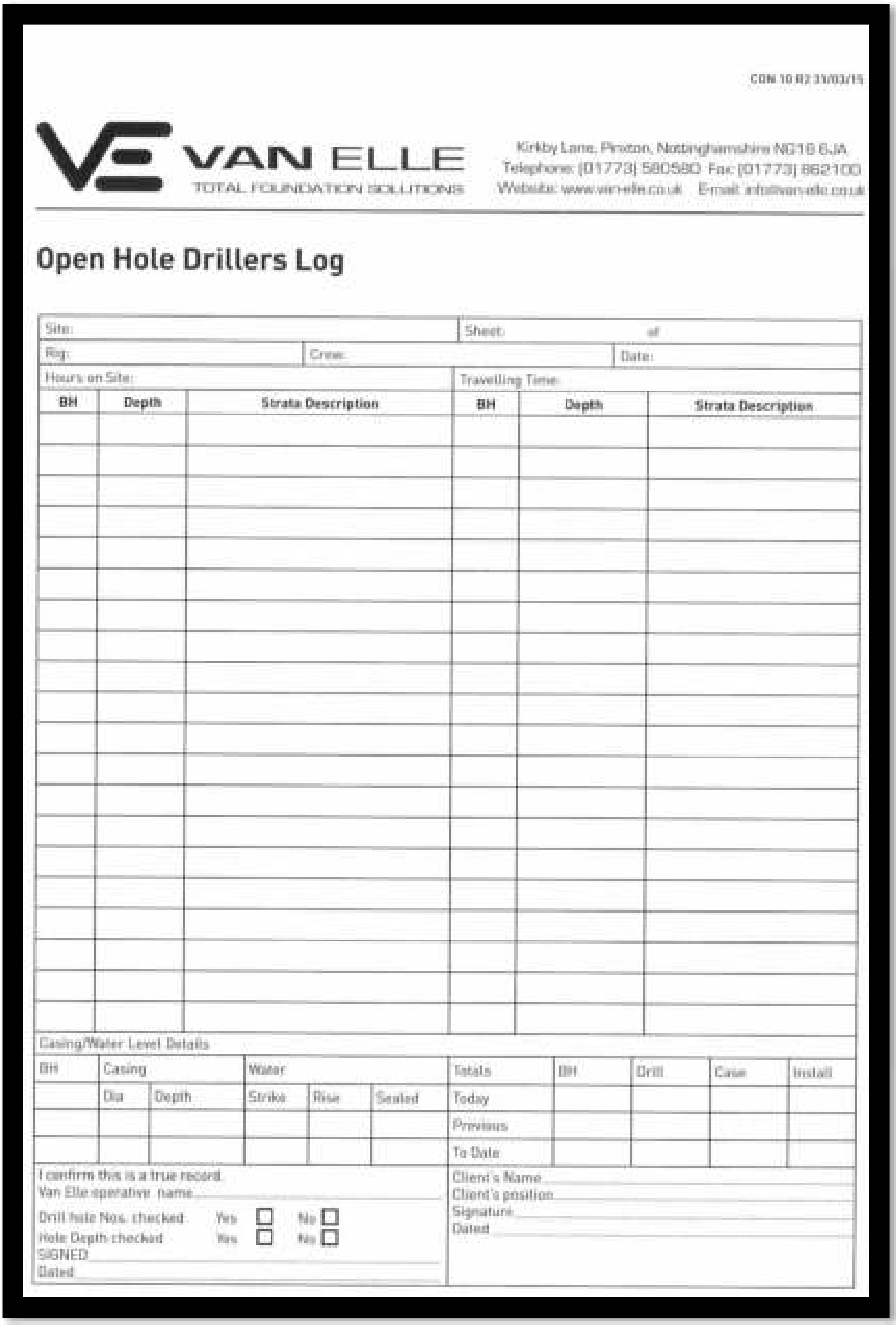
4.0 References

CIRIA Special Publication C758D – Abandoned Mineworkings

LKC Group, 2023 - VARLEY AND NELSON STREET MANCHESTER SHALLOW MINING SITE INVESTIGATION WORKS

Appendix 1

Sample Drilling & Grouting Records



CON 10 R2 31/03/15

VAN ELLE
TOTAL FOUNDATION SOLUTIONS

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Telephone: (01773) 580580 Fax: (01773) 862100
Website: www.van-elle.co.uk E-mail: info@van-elle.co.uk

Open Hole Drillers Log

Site: Sheet: of
Rig: Crew: Date:
Hours on Site: Travelling Time:

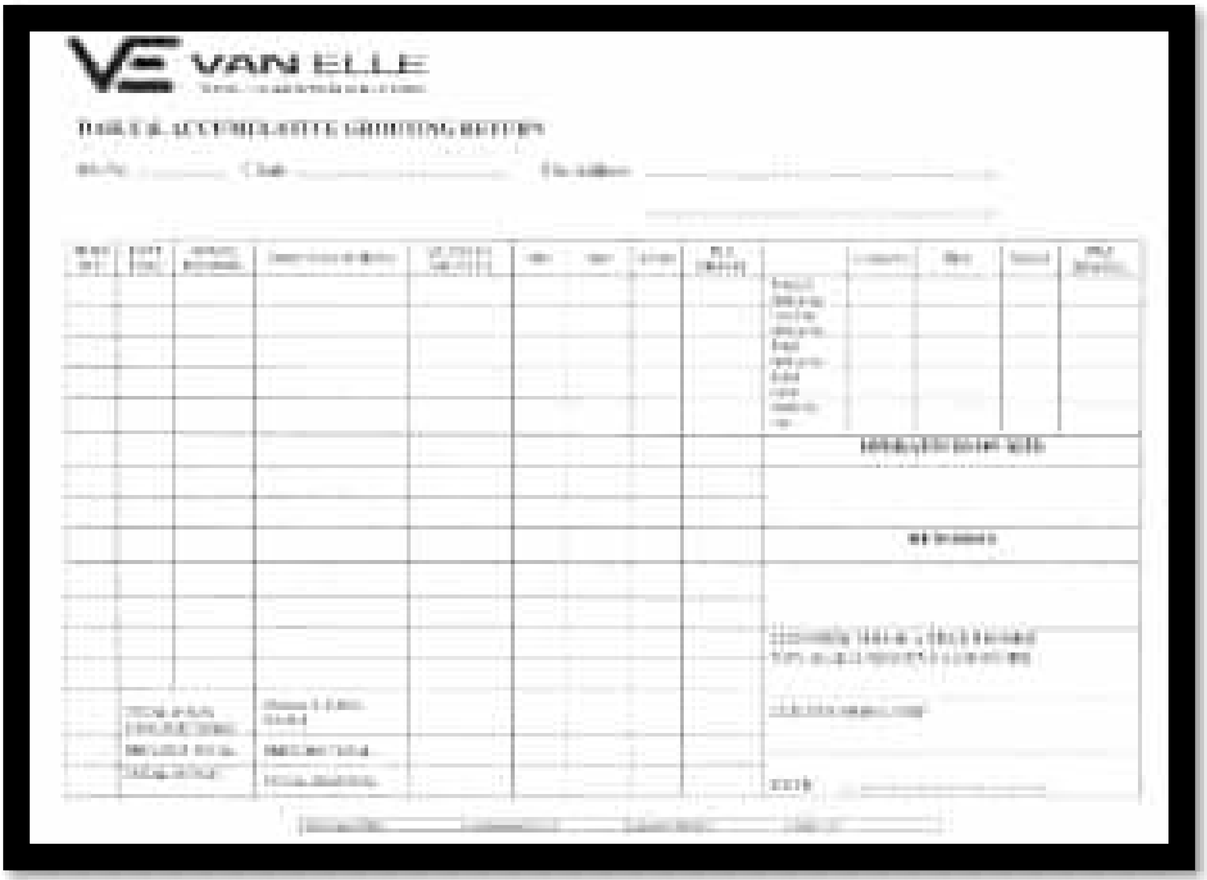
BH	Depth	Strata Description	BH	Depth	Strata Description

Casing/Water Level Details

BH	Casing		Water			Totals	BH	Drill	Case	Install
	Dia	Depth	Strike	Rise	Sealed	Today				
						Previous				
						To Date				

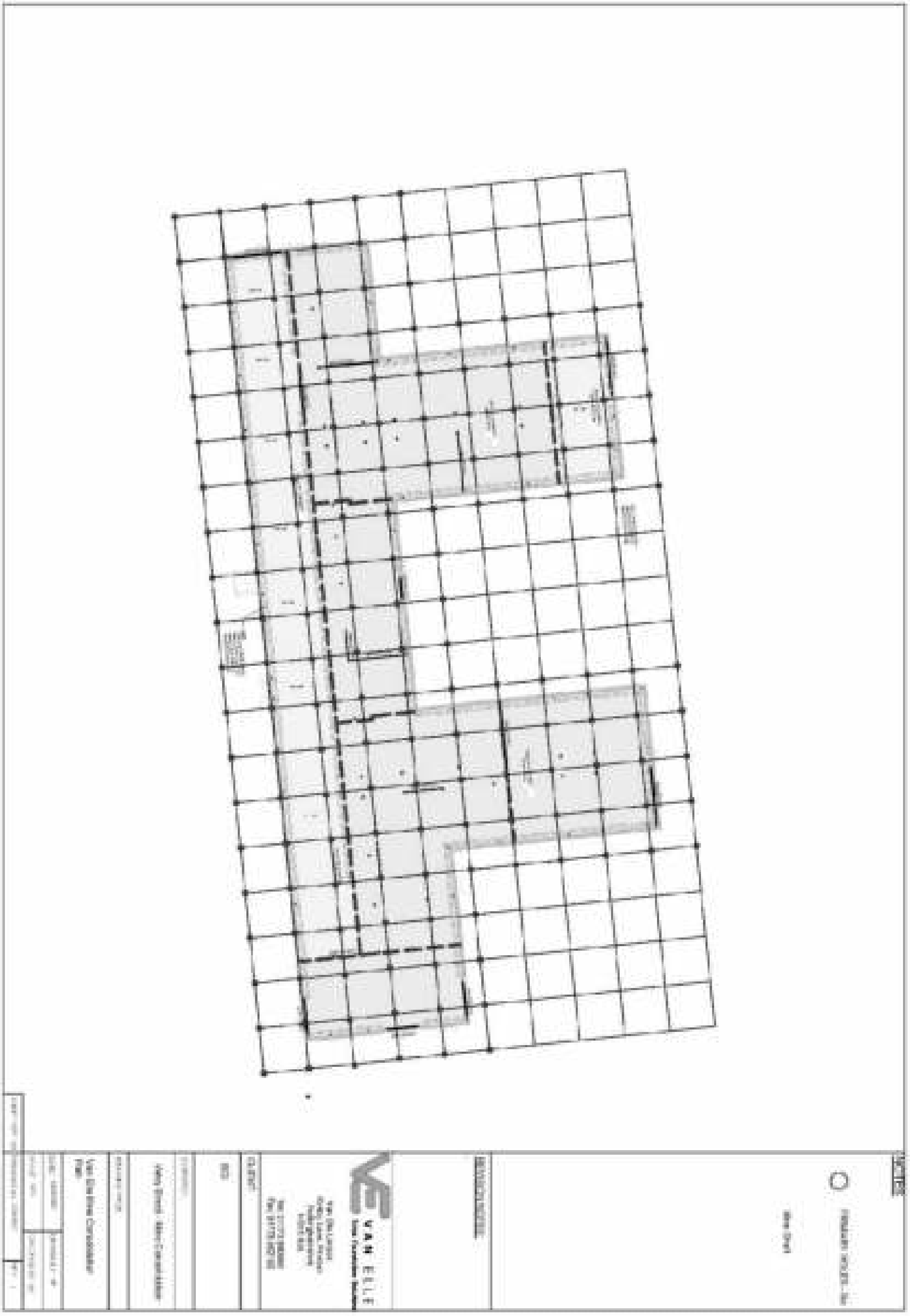
I confirm this is a true record.
Van Elle operative name
Drill hole Nos. checked Yes ☐ No ☐
Hole Depth checked Yes ☐ No ☐
SIGNED
Dated

Client's Name
Client's position
Signature
Dated



Appendix 2

Proposed Grouting Layout


NOTES
VAN ELLE

GOV.UK Permit Application Menu

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Your submitted application details

Application details

Application reference	APP-004227
Permit reference	PER-27171

Primary contact

Full name	Sam Palmer
Job role (optional)	Contracts Engineer
Company	Van Elle
Contact details	[redacted]
Primary contact role	Relevant designer or consultant

Start date

Proposed works start date	14 Aug 2023

Duration of works in days	25

Site location

Site name or description	Varley Street
Address	Manchester M40 8EF
Easting	386148
Northing	399620
Site elevation (optional)	
Site plans	Site Plan.pdf
Supporting documents	SP231836 Varley Street, Manchester Specification.pdf
Borehole plans	231836 - VE Grid.pdf

Client details

Full name	Jon Paramor
Job role (optional)	Senior Group Leader, Legal Services
Company	Manchester City Council
Contact details	[redacted]
Address	Town Hall Extension Mount Street Manchester M2 5DB

Designers and contractors

Relevant designer or consultant	Yes
Additional designers	No
Relevant contractor	Yes
Additional contractors	No

Relevant designer or consultant details

Full name	Sam Palmer
Job role (optional)	Contracts Engineer
Company	Van Elle
Contact details	[redacted]
Address	Van Elle, Summit Close Kirkby in Ashfield Nottinghamshire NG17 8GJ

Relevant contractor details

Full name	Mick Wilks
Job role (optional)	Contracts Manager
Company	ISG
Contact details	[redacted]

Address	Think Park, Mosley Road, Trafford Park Manchester M17 1FQ

Proposed works

Site investigation	No
Site remediation	Yes
Other	No

Site remediation

Treatment of mine workings	Yes
Treatment of mine entries	Yes

Treatment of mine workings

Description of works	Consolidation of potential mine workings through a program of drilling and grouting on a 6m x 6m grid (closing to 4.25m grid if workings are encountered) to an average depth of 36m bgl or 12m of rock cover. Fill with 12:1 PFA:OPC grout. Completing confirmation and testing bores to assist with validation of works.
Minimum depth of boreholes in metres below ground level	
Maximum depth of boreholes in metres below ground level	
Target seam(s)	

horizon	
Grout mix ratios	
Grid spacing	
Flushing mediums that will be used	Water: Yes Mud: No Foam: No Air mist: No Air: No Other: No

Treatment of mine entries

Description of works	Treatment of 2No. mineshafts, Ref: 386399-001 (potentially partially treated) and 386399-016 (untreated), assumed 75m deep and 2.5m wide and partially backfilled. The treatment will be from the base of the shaft (plus 5m solid) with 10:1 PFA:OPC grout. There will be 2 treatment BHs and 1 test BH.
Number of mine entries	2
Flushing mediums that will be used	Water: Yes Mud: No Foam: No Air mist: No Air: No Other: No

General risks

Acknowledged risks	Mine gas emission: Yes Spontaneous combustion: Yes

	Mine water emission: Yes Collapse of mine workings or entries: Yes
Safety and security measures	Perimeter fencing and safety barriers will be erected as required with appropriate signage in place demarking the works.

Source risks

Prone to spontaneous combustion	No
Prone to mine gases	No
Ground contamination	Yes
Ground contamination details	'Evidence of hydrocarbon contamination identified in Trenches 4, 6, 10 and 11' as per LKC SHALLOW MINING SITE INVESTIGATION WORKS

Pathway risks

Mine entries within or adjacent to site	Yes
Details of mine entries	The works also include treatment of 2No. mineshafts, Ref: 386399-001 (potentially partially treated) and 386399-016 (untreated), assumed 75m deep and 2.5m wide and partially backfilled. There is also a potential third mineshaft, Ref: 386399-002 which is suspected to be around 5m south west of the site boundary, which the site team will remain aware of in case it is in fact within the site boundary.
Ground disturbances, faults or fissures	No

Depth and type of superficial deposits	Yes

Receptor risks

Receptor risks – receptors within the site boundary

Buildings, basements or underground spaces	No
Will receptors be occupied during works	No

Receptor risks - receptors within influencing distance

Buildings, basements or underground spaces	Yes
Details of buildings, basements or underground spaces	The site is bordered by residential properties on the North West side and industrial buildings on the South West and South East sides.
Will receptors be occupied during works	Yes
Details of occupied receptors	Houses will remain occupied and businesses will run as usual.

Receptor risks - stability problems

Possible stability problems affecting property	

Mine gas monitoring

Gases that will be monitored	Carbon monoxide: Yes Methane: Yes Carbon dioxide: Yes Oxygen: Yes Hydrogen sulphide: Yes Other: No
Where gases will be monitored	Borehole and drill rig: Yes On-site receptors: No Off-site receptors: No Monitoring points: No Other: No
How gases will be monitored	Monitoring will be through the use of Gas Monitors located at the front of the drill rig. These will be monitored continuously through the drilling operations.
Additional mitigation or control measures	Perimeter fencing will be erected around the site and stand off zones will be implemented within.

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Appendix I Pile Design Calculations

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Think Safely
Act Safely

Contract Design Calculations

Project No.: 233492

Project: Varley Street Manchester

Title: Bearing Piles

Document Ref.: VE(SP)_233492_BP_C1

Revision: C1

Site Investigation
Drilling & Grouting
Ground Anchors & Soil Nails
Piling
Restricted Access Piling
Smartfoot® Precast Concrete Foundations
Ground Improvement

INVESTORS IN PEOPLE

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F: 01773 862100
info@van-elle.co.uk www.van-elle.co.uk

DESIGN STATUS & ISSUE RECORD

Revision	Status	Description	Design		Check	
			Engineer	Date	Engineer	Date
C0	FOR CONSTRUCTION	Bearing pile design	MG	05/06/24	SAS	05/06/24
C1	FOR CONSTRUCTION	Design life changed to 100 years	MG	06/06/24		Digitally signed by Simon Shaw DN: cn=Simon Shaw gn=Simon Shaw c=GB United Kingdom l=GB United Kingdom o=Van Elle e=simon.shaw@van-elle.co.uk Reason: I have reviewed this document Location: Date: 2024-06-07 10:09+01:00

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I. Designers Risk Assessment I

1.0 INTRODUCTION

Van Elle have been contracted to design & install the bearing piles at the above development. The design considers 600mm diameter CFA piles designed in accordance with Eurocode standards.

2.0 DOCUMENTATION

The following documents have been received:

(i) Enviro Solution, Phase 2 Geo-environmental Site Assessment Report, CL102, 2nd March 2022

(ii) LK Group, Final Additional Site Investigation, LKC 22 1670, September 2023

(iii) LK Consult, Borehole RBH01 & RBH02 only, LKC 22 1670, 24/04/2024

(iv) Clancy Consulting, Mineshaft Capping Slab & Pile GA, VAR-CCL-ZZ-00-DR-S-40002, Rev C01

3.0 DESIGN ASSUMPTIONS

1. The design considers 600mm diameter CFA piles.

2. Regarding Levels:

    a. Platform Level (PPL) has been considered at borehole commencement level; this should be confirmed by the client.

    b. Cut Off Level (COL) are assumed as per the scheme drawings.

    c. We have modelled groundwater at ground level, this should be confirmed by the client.

3. Regarding Buildability and Construction:

    a. Ground conditions to be monitored during installation and should the encountered ground conditions vary from the ground conditions assumed in the design, the designer is to be advised immediately.

    b. Refusal is defined as 300mm penetration in 2 minutes. Should refusal occur prior to the minimum depth required, we will withdraw from the position and review.

    c. Others should check the impact of the bearing piles on the integrity and stability of the existing mine shaft.

    d. The design has been completed on the assumption that the shafts are being grouted.

4. Regarding Design Responsibility and Methodology

    a. The design has been undertaken in accordance with the Eurocodes and relevant guidance. We have adopted partial factors as detailed in the National Annex to BS EN 1997-1:2013 appropriate for the method of installation and level of testing. The piles have been designed with a minimum condition that a factor of safety of 1.2×Fk is achieved on shaft friction alone in accordance with BS8004:2015.

    b. The design life is assumed to be 100 years.

    c. It is noted that we are missing boreholes and in situ strength testing in the soil and rock. Where piles are founded in unforeseen ground conditions, the risk associated with failure of the piles will remain with the client.

5. Regarding Structural Design

    a. Cover to pile reinforcement is to be 75mm. Spacers to be provided for the main cage to ensure minimum cover. Main reinforcement to be grade B500B.

    b. The piles will be formed in a grade C30/37 concrete. Design chemical class DC-2 in accordance with BRE SD-1.

    c. This design assumes fixed head conditions for all piles.

    d. Some or all of the piles have either tensile or lateral loads imposed on them. Please note, no calculation has been undertaken in this document for the required projection/anchorage length of reinforcement into the pile caps in order to provide sufficient restraint against tensile strain development in the reinforcement. This should be carried out by others. They should also check that there is sufficient distance between PPL and COL.

e. Pile settlement is less than or equal to 10mm.

6. We have based the design on penetration into underlying mudstone, or practical rig refusal. The SI information indicate varying depths to the bedrock. Hence for the purpose of design we have adopted a generic soils model but the piles are based on penetration into the mudstone. Final pile lengths will be established on site.
7. For the avoidance of doubt, the Subcontractor's design does not allow for global/slope instability, sloping ground, UXO risk, dissolution features, pile obstructions, contaminated soil, eccentric/free head pile loading, building damage due to excessive deflection, anchorage, ground heave, negative skin friction, or down drag from recently placed fill materials.

4.0 GROUND MODEL

Refer to Appendix A for a summary of the available, relevant site investigation and Van Elle's ground model.

5.0 SUMMARY

NUMBER OF PILES	16No.
PILE DIAMETER	Ø600mm
ROCK SOCKET LENGTH	3.75m
REINFORCEMENT	6 B20 x 6.00m, B8 @ 300mm c/c
CONCRETE GRADE	C30/37, Design Chemical Class to be DC-2
TESTING	100% integrity testing

6.0 SPECIFICATION

1. ICE Specification for Piling and Embedded Retaining Walls – 3rd Edition: 2017.

7.0 REFERENCES

BS EN 1990 Eurocode – Basis of Structural Design

BS EN 1991 Eurocode 1 – Actions on Structures

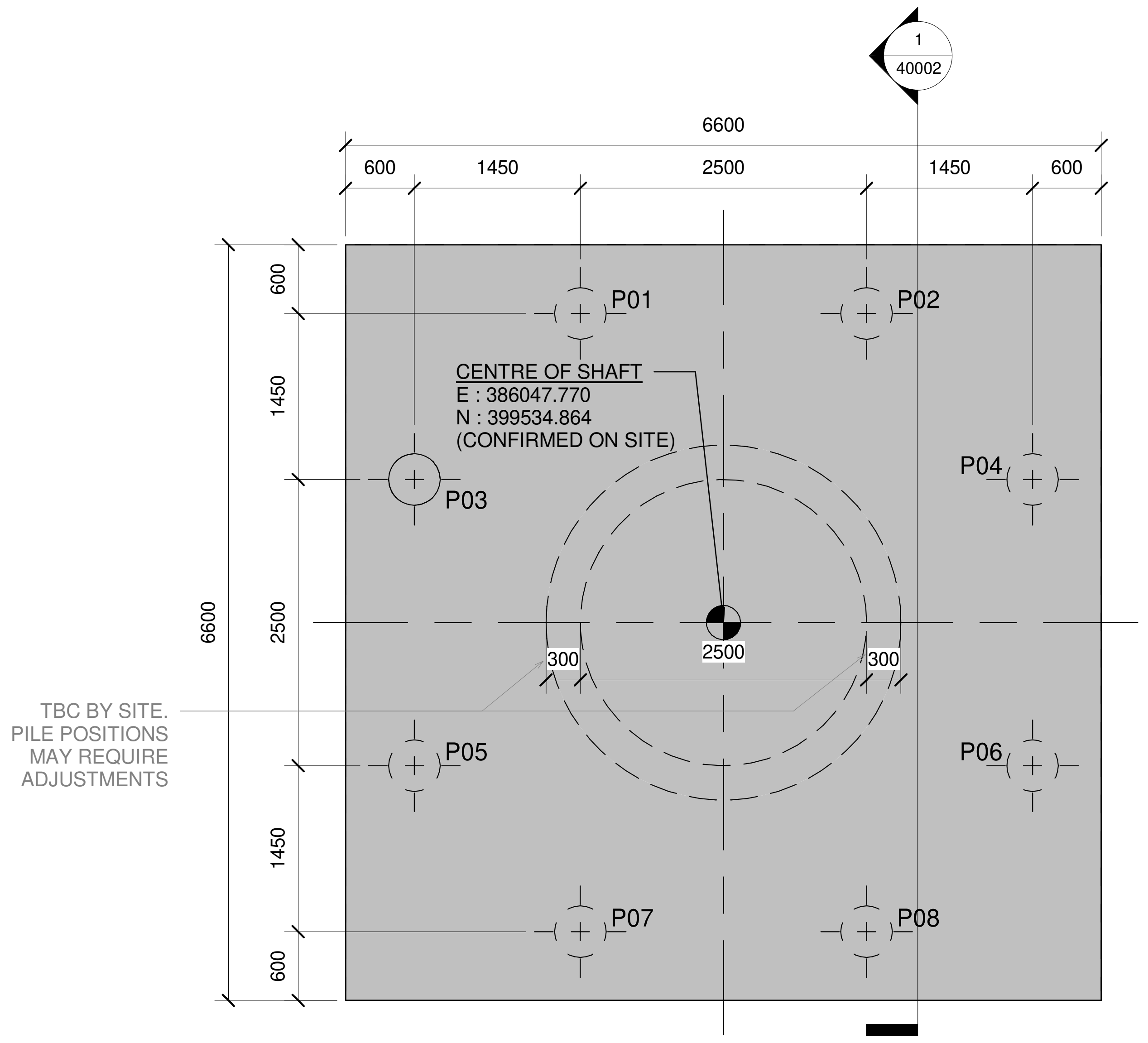
BS EN 1992 Eurocode 2 – Design of Concrete Structures; Part 1-1: General Rules and Rules for Buildings; and associated National Annex.

BS EN 1997 Eurocode 7 – Geotechnical Design; Part 1: General Rules; and associated National Annex.

BRE SD1 - Concrete in Aggressive Ground 2005

8.0 APPENDICES

A. Client Drawing


1
40002
6600
600
1450
2500
1450
600
P01
P02
P03
P04
P05
P06
P07
P08
CENTRE OF SHAFT
E : 386047.770
N : 399534.864
(CONFIRMED ON SITE)
300
2500
300
TBC BY SITE.
PILE POSITIONS
MAY REQUIRE
ADJUSTMENTS

MINE SHAFT 1 TCA REF: 386399-001

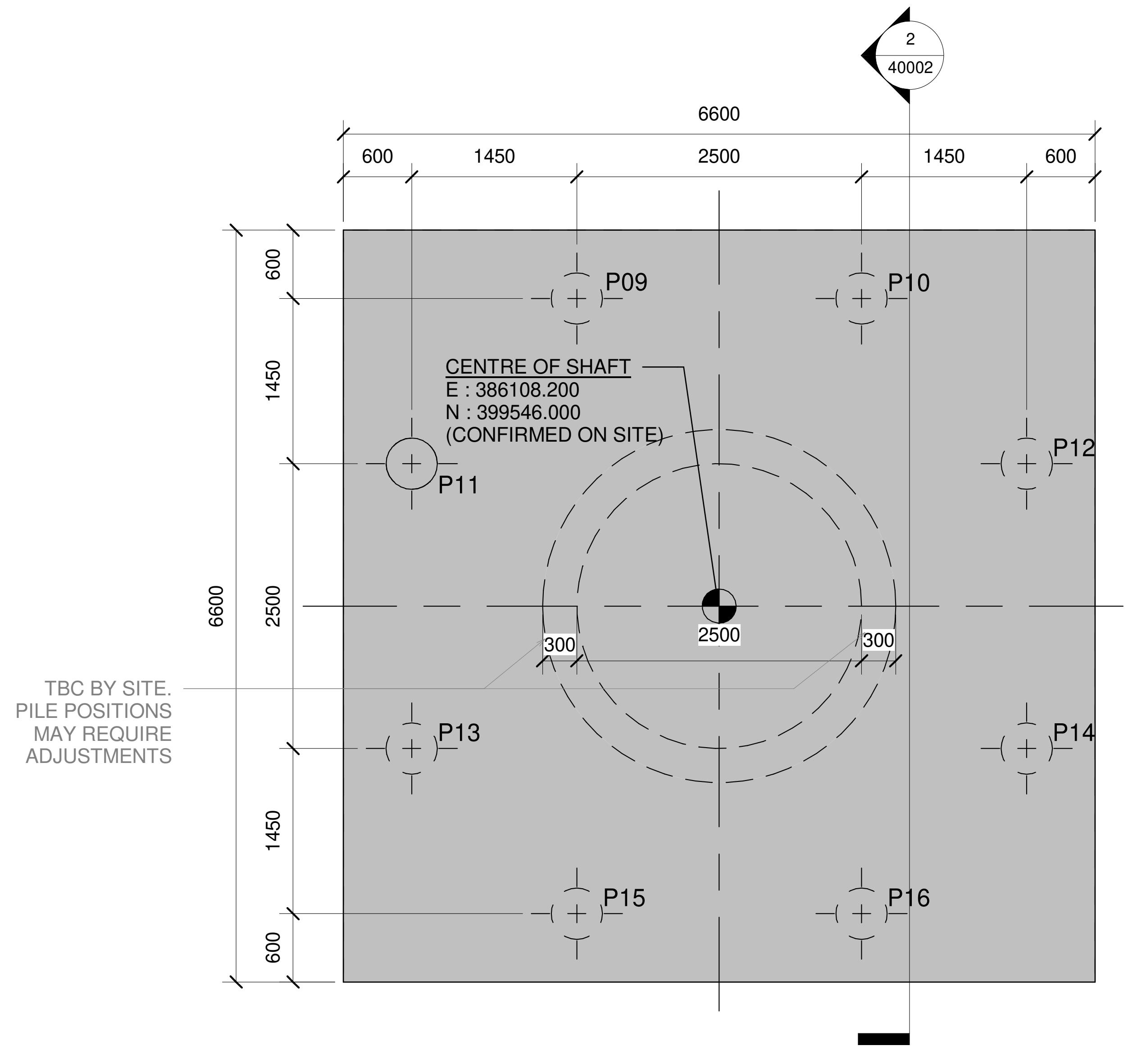
EXISTING TCA DETAILS:
GROUND LEVEL = 58.683m (CONFIRMED ON SITE)
DEPTH TO SHAFT TOP = 5.5m BGL
SHAFT DIA = 2.5m (CONFIRMED ON SITE)
SHAFT WALL THICKNESS = 300mm (ASSUMED)
COORDINATES (CENTRE) = E: 386047.770 N: 399534.864 (CONFIRMED ON SITE)
SHAFT DEPTH = 73m (CONFIRMED ON SITE)
SHAFT TREATED = NO

NEW CAPPING DETAILS:
CAPPING SIZE = 6.6x6.6m
CAPPING THICKNESS = 0.45m
CLEAR SPAN = 5.4m (2.15 Dia)
CONCRETE GRADE = C40/50
REINFORCEMENT = H40 @ 200c/c (T) BOTH WAYS
H40 @ 200c/c (B) BOTH WAYS
H25 U-BARS AT 200c/c TO PERIMETER
CONCRETE COVER = 75mm
DESIGN LIFE = 100 YEARS
SULPHATE/ACEC = DS-1 / AC-1

SHAFT TREATEMENT DETAILS:
METHOD = BORE & HIGH PRESSURE PUMPED
GROUT OR AGGREGATE CONCRETE WHERE
LARGE VOIDS ENCOUNTERED
MIXTURE = 10:1 FLY ASH/OFC OR PFA/OPC
TREATMENT DEPTH = 73m (DEPTH OF SHAFT)

SHAFT 1 PROPOSED MINESHAFT CAPPING PLAN - TCA REF - 386399-001

1 : 50


2
40002
6600
600
1450
2500
1450
600
P09
P10
P11
P12
P13
P14
P15
P16
CENTRE OF SHAFT
E : 386108.200
N : 399546.000
(CONFIRMED ON SITE)
300
2500
300
TBC BY SITE.
PILE POSITIONS
MAY REQUIRE
ADJUSTMENTS

MINE SHAFT 2 TCA REF: 386399-016

EXISTING TCA DETAILS:
GROUND LEVEL = 59.108m (CONFIRMED ON SITE)
DEPTH TO SHAFT TOP = 2.6m BGL
SHAFT DIA = 2.5m
SHAFT WALL THICKNESS = 300mm (ASSUMED)
COORDINATES = E: 386108.2 N: 399546.0 (CONFIRMED ON SITE)
SHAFT DEPTH = 58m (CONFIRMED ON SITE)
SHAFT TREATED = YES

NEW CAPPING DETAILS:
CAPPING SIZE = 6.6x6.6m
CAPPING THICKNESS = 0.45m
CLEAR SPAN = 5.4m (2.15 Dia)
CONCRETE GRADE = C40/50
REINFORCEMENT = H40 @ 200c/c (T) BOTH WAYS
H40 @ 200c/c (B) BOTH WAYS
H25 U-BARS AT 200c/c TO PERIMETER
CONCRETE COVER = 75mm
DESIGN LIFE = 100 YEARS
SULPHATE/ACEC = DS-1 / AC-1

SHAFT TREATEMENT DETAILS:
METHOD = BORE & HIGH PRESSURE PUMPED
GROUT OR AGGREGATE CONCRETE WHERE
LARGE VOIDS ENCOUNTERED
MIXTURE = 10:1 FLY ASH/OFC OR PFA/OPC
TREATMENT DEPTH = 58m (DEPTH OF SHAFT)

SHAFT 2 PROPOSED MINESHAFT CAPPING PLAN - TLA REF 386399-016

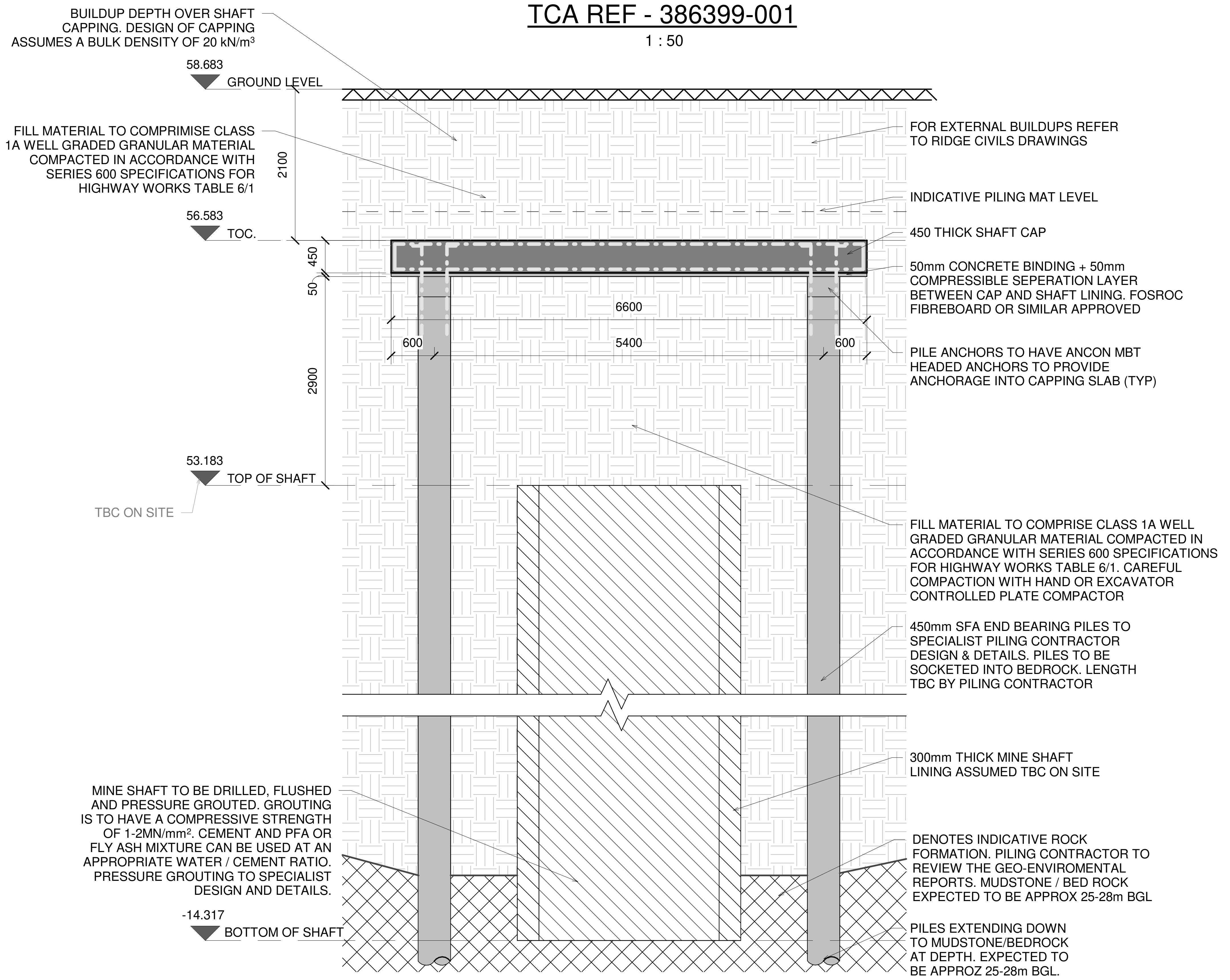
1 : 50

NOTES

1. THIS DRAWING IS TO BE READ IN CONJUNCTION WITH ALL OTHER RELEVENT ARCHITECTURAL, ENGINEERING DRAWINGS AND SPECIFICATIONS.
2. DO NOT SCALE FROM THIS DRAWING. ANY AMBIGUITIES OR ERRORS ON DRAWINGS SHALL BE BROUGHT TO THE ENGINERS ATTENTION IMMEDIATELY. ALL DIMENSIONS TO BE CHECKED/VERIFIED ON SITE.
3. ALL LEVELS IN METERS, ALL DIMENSIONS IN MILLIMIETERS UNLESS NOTED OTHERWISE.
4. THIS DRAWING IS TO BE READ IN CONJUNCTION WITH THE MINE SHAFT CAPPING PHILOSOPHY AND CALCULATIONS. CCL REF: VAR-CCL-XX-XX-RP-S-40001.
5. FOR GROUND CONDITIONS AND GEO-ENVIRONMENTAL ASSESSMENT REFER TI TGE FOLLOWING REPORTS
    a. ENVIRO SOLUTION PHASE 1 ENVIRONMENTAL SITE ASSESSMENT REPORT (REF: CL101 DATED 02.03.22).
    b. ENVIRO SOLUTION PHASE 2 GEO-ENVIRONMENTAL SITE ASSESSMENT REPORT (REF: CL102 V1 DATED 02.03.22).
6. FOR COAL MINING RISK AND MINE
    a. ENVIRO SOLUTION COAL MINING RISK ASSESSMENT REPORT (REF: CL101b DATED 15.03.22).
    b. LK GROUP SHALLOW MINING SITE INVESTIGATION WORKS REPORT (REF: LKC 22 1670 DATED JUNE 2023).

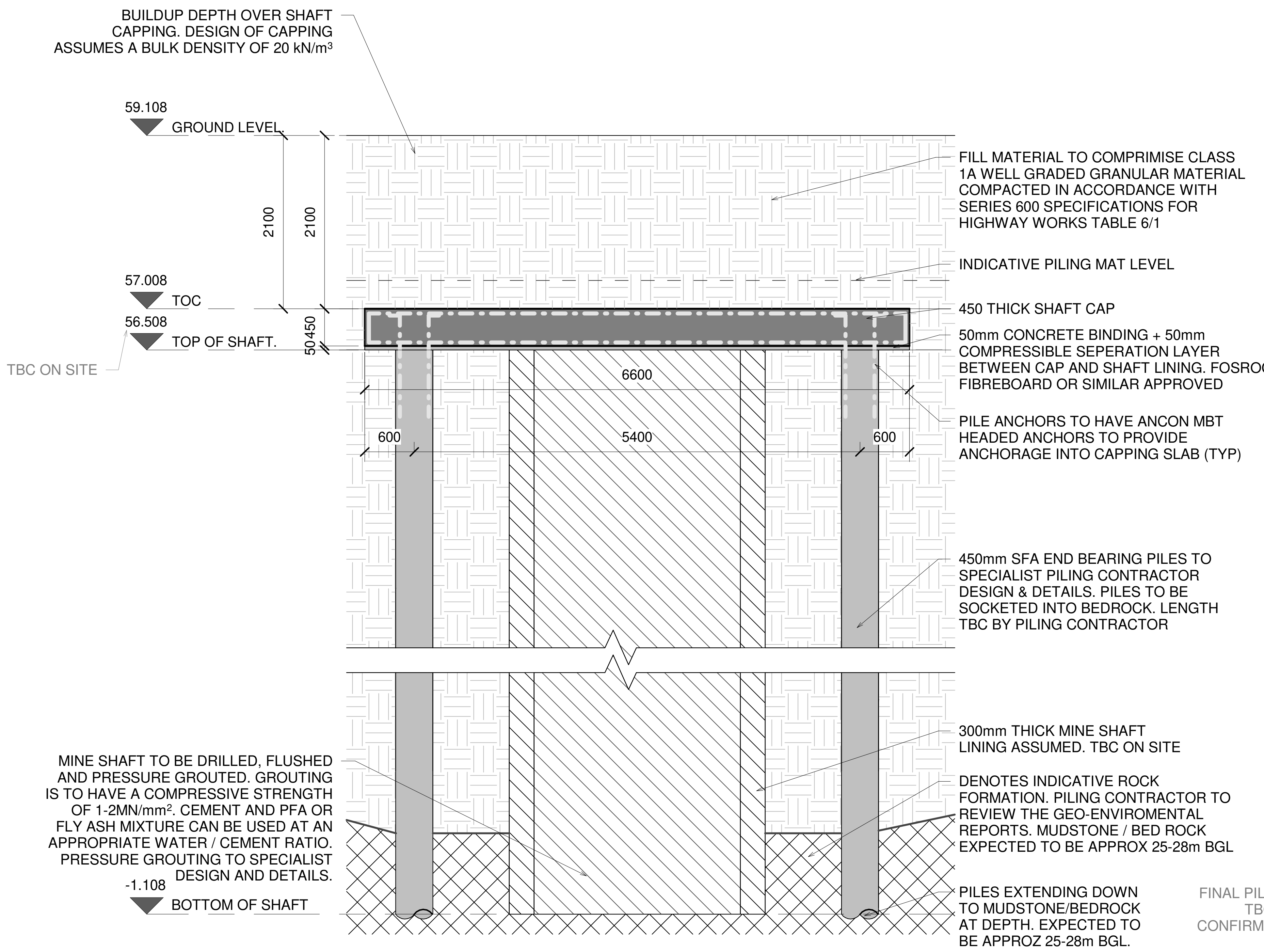
PILING NOTES

1. PILES ARE TO BE DESIGNED BY THE SPECIALIST SUBCONTRACTOR. DESIGN IS TO BE BASED ON THE UNFACTORED VERTICAL LOADS AND SHEARS SHOWN IN THE PILE SCHEDULE INCLUDED ON THIS DRAWING.
2. PILE TYPE AND DIAMETER TO BE CONFIRMED BY THE SPECIALIST PILING CONTRACTOR. THE PILE LAYOUT HAS BEEN DEVELOPED ON THE BASIS OF 450MM DIAMETER CFA SLEEVED PILES. HOWEVER, PILE SIZE, TYPE AND LENGTHS ARE SUBJECT TO DESIGN CONFIRMATION BY THE PILING CONTRACTOR TO THE PERFORMANCE SPECIFICATION/REQUIREMENT BY CLANCY.
3. PILING SHALL COMPLY WITH THE CURRENT EDITION OF 'SPECIFICATION FOR PILING AND EMBEDDED RETAINING WALLS' (SPERW).
4. THE FOLLOWING SITE INVESTIGATIONS ARE PROVIDED FOR DESIGN: PHASE 2 GEO-ENVIRONMENTAL SITE ASSESSMENT REPORT BY ENVIRO SOLUTION (REF CL02 V1 02/03/22).
5. PERMITTED PILE SETTLEMENT AT DVL = 10mm.
6. PILES SHALL BE DESIGNED IN ACCORDANCE WITH BS EN 1997-1& BS EN 1992:1.
7. DESIGN FACTOR OF SAFETY IN ACCORDANCE WITH BS EN 1997:1 AND THE U.K NATIONAL ANNEX.
8. FOR BURIED CONCRETE THE SULPHATE AND PH TESTING REQUIRE DESIGN SULPHATE CLASS OF DS-1 AND AN ACEC CLASSIFICATION OF AC-1 BASED ON SAMPLING CARRIED OUT OVER PART OF THE SITE TO DATE.
9. THE SPECIALIST CONTRACTOR SHALL BE RESPONSIBLE FOR SPECIFYING STARTER BARS. PILES TO BE DESIGNED WITH A PINNED HEAD CONNECTION USING A MINIMUM SINGLE 16mm DIAMETER BAR TO BE PROVIDED FROM THE HEAD OF EACH PILE. THE SPECIALIST CONTRACTOR SHALL ALSO SPECIFY THE TENSION BAR IN ANY PILES REQUIRING TENSILE CAPACITY.
10. SUBMISSION OF INFORMATION: AS REQUIRED BY SPERW, TABLE B1.1 AND ELSEWHERE, AS APPROPRIATE FOR THE PILE TYPE, MATERIALS AND TESTS SPECIFIED.
11. THE PILING CONTRACTOR SHALL DEMONSTRATE THE ADEQUACY OF THE PILES BY CALCULATION AND TESTING TO THE SATISFACTION OF BOTH THE ENGINEER AND BUILDING CONTROL.
12. WHERE PILE DESIGN IS TO BE JUSTIFIED BY TESTING, THE PILING CONTRACTOR SHALL SUBMIT THEIR TESTING PROPOSAL FOR ACCEPTANCE. A MINIMUM OF 1 WORKING TEST PILE TO BE UNDERTAKEN.
13. UNLESS AGREED OTHERWISE, ALL PILES SHALL BE INTEGRITY TESTED USING AN APPROVED METHOD. PILES SHALL BE PREPARED TO SUIT THE TEST METHOD. THE RESULTS OF THE INTEGRITY TESTING AND SUMMARY STATEMENT CONFIRMING ADEQUACY OF THE PILING SHALL BE PROVIDED TO THE ENGINEER WITHIN 7 DAYS OF TESTING PRIOR TO UNDERTAKING THE CAPPING WORKS.
14. CONCRETE SHALL BE IN ACCORDANCE WITH BS EN 1992 AND SPERW, SECTION B19AND IN ACCORDANCE WITH THE CONCRETE CLASSIFICATION REQUIREMENTS FROM THE SITE INVESTIGATIONS.
15. COMPRESSIVE STRENGTH TESTING OF CONCRETE REQUIRED AS SPERW, CLAUSE B19.8.
16. STEEL REINFORCEMENT TO BE IN ACCORDANCE WITH BS 4449, RIBBED BAR, GRADE B500B, SUPPLIED BY A COMPANY HOLDING A VALID CERTIFICATE OF APPROVAL ISSUED UNDER A PRODUCT CERTIFICATION SCHEME OPERATED BY A THIRD PARTY CERTIFICATION BODY WITH APPROPRIATE CATEGORY 2 ACCREDITATION FROM THE UNITED KINGDOM ACCREDITATION SERVICE (UKAS) SUCH AS CARES.
17. REINFORCEMENT THAT IS MORE THAN 50mm ABOVE CUT-OFF LEVEL SHALL BE DEBONDED AND THE DEBONDING AGENT CLEANED OFF WHEN PILE IS TRIMMED.
18. COVER SHALL MEET THE REQUIREMENTS OF BS 8500 FOR A DESIGN WORKING LIFE OF 120 YEARS AND THE GROUND CONDITIONS IN THE SI REPORT. THE CONTRACTOR SHALL ENSURE THAT THE COVER IS MAINTAINED USING A SUITABLE INSTALLATION METHOD.
19. THE CONTRACTOR IS RESPONSIBLE FOR LOCATING ALL SERVICES AND INFORMING THE MAIN CONTRACTOR OF ANY CLASHES WITH THE PILING WORKS.
20. THE CONTRACTOR IS TO ENSURE ACCESS TO THE SITE IS ADEQUATE FOR PLANT AND MATERIALS. METHOD OF PILE TESTING IS TO BE AGREED WITH THE ENGINEER. ALL PILES TO BE INTEGRITY TESTED AND AT LEAST 1 PRELIMINARY PILE TEST AND AT LEAST 1 WORKING PILE TEST TO BE UNDERTAKEN. THE PILING SHALL BE GUARANTEED FOR A MINIMUM PERIOD OF 12 YEARS FROM COMPLETION. THIS SHALL BE AN INSURANCE BACKED GUARANTEE, ADMINISTERED BY AN INDEPENDENT INSURANCE PROTECTION COMPANY. PROVIDE CERTIFICATES/ GUARANTEES AT COMPLETION OF PILING WORKS


BUILDUP DEPTH OVER SHAFT
CAPPING. DESIGN OF CAPPING
ASSUMES A BULK DENSITY OF 20 kN/m³
58.683
GROUND LEVEL
FILL MATERIAL TO COMPRIMISE CLASS
1A WELL GRADED GRANULAR MATERIAL
COMPACTED IN ACCORDANCE WITH
SERIES 600 SPECIFICATIONS FOR
HIGHWAY WORKS TABLE 6/1
2100
56.583
TOC.
450
50
2900
53.183
TOP OF SHAFT
TBC ON SITE
FOR EXTERNAL BUILDUPS REFER
TO RIDGE CIVILS DRAWINGS
INDICATIVE PILING MAT LEVEL
450 THICK SHAFT CAP
50mm CONCRETE BINDING + 50mm
COMPRESSIBLE SEPERATION LAYER
BETWEEN CAP AND SHAFT LINING. FOSROC
FIBREBOARD OR SIMILAR APPROVED
6600
600
5400
600
PILE ANCHORS TO HAVE ANCON MBT
HEADED ANCHORS TO PROVIDE
ANCHORAGE INTO CAPPING SLAB (TYP)
FILL MATERIAL TO COMPRISE CLASS 1A WELL
GRADED GRANULAR MATERIAL COMPACTED IN
ACCORDANCE WITH SERIES 600 SPECIFICATIONS
FOR HIGHWAY WORKS TABLE 6/1. CAREFUL
COMPACTION WITH HAND OR EXCAVATOR
CONTROLLED PLATE COMPACTOR
450mm SFA END BEARING PILES TO
SPECIALIST PILING CONTRACTOR
DESIGN & DETAILS. PILES TO BE
SOCKETED INTO BEDROCK. LENGTH
TBC BY PILING CONTRACTOR
300mm THICK MINE SHAFT
LINING ASSUMED TBC ON SITE
MINE SHAFT TO BE DRILLED, FLUSHED
AND PRESSURE GROUTED. GROUTING
IS TO HAVE A COMPRESSIVE STRENGTH
OF 1-2MN/mm². CEMENT AND PFA OR
FLY ASH MIXTURE CAN BE USED AT AN
APPROPRIATE WATER / CEMENT RATIO.
PRESSURE GROUTING TO SPECIALIST
DESIGN AND DETAILS.
DENOTES INDICATIVE ROCK
FORMATION. PILING CONTRACTOR TO
REVIEW THE GEO-ENVIROMENTAL
REPORTS. MUDSTONE / BED ROCK
EXPECTED TO BE APPROX 25-28m BGL
-14.317
BOTTOM OF SHAFT
PILES EXTENDING DOWN
TO MUDSTONE/BEDROCK
AT DEPTH. EXPECTED TO
BE APPROZ 25-28m BGL.

SHAFT 1 PROPOSED MINESHAFT ELEVATION (TCA REF: 386399-001)

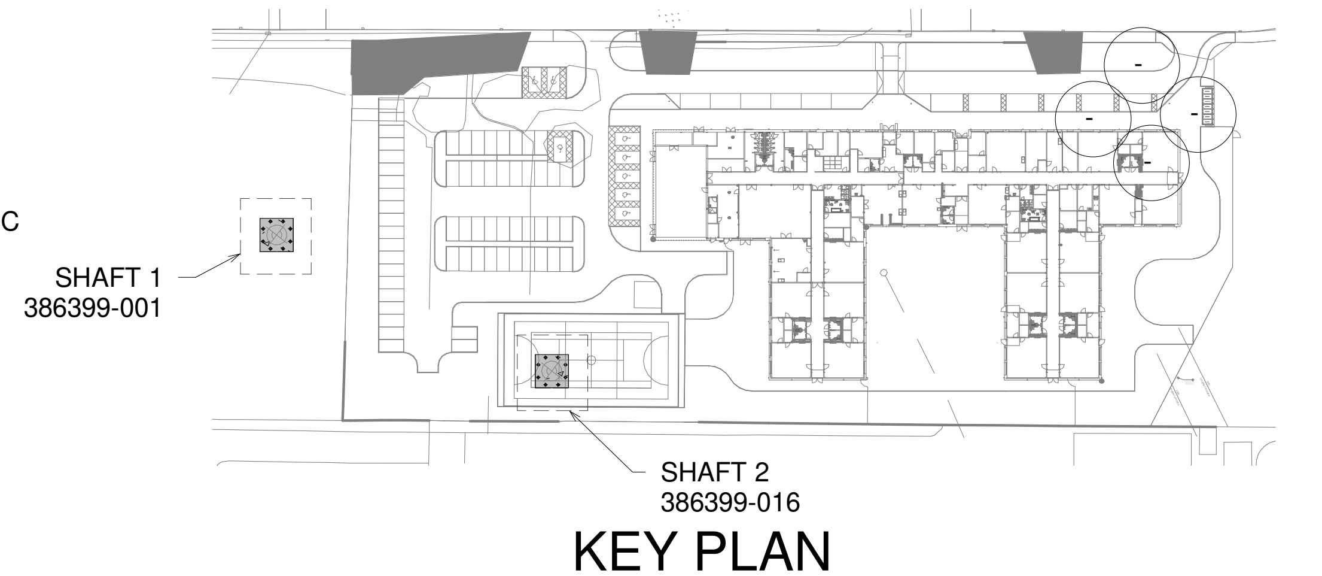
1 : 50


BUILDUP DEPTH OVER SHAFT
CAPPING. DESIGN OF CAPPING
ASSUMES A BULK DENSITY OF 20 kN/m³
59.108
GROUND LEVEL
2100
2100
57.008
TOC
56.508
TOP OF SHAFT.
TBC ON SITE
50
450
6600
600
5400
600
FILL MATERIAL TO COMPRIMISE CLASS
1A WELL GRADED GRANULAR MATERIAL
COMPACTED IN ACCORDANCE WITH
SERIES 600 SPECIFICATIONS FOR
HIGHWAY WORKS TABLE 6/1
INDICATIVE PILING MAT LEVEL
450 THICK SHAFT CAP
50mm CONCRETE BINDING + 50mm
COMPRESSIBLE SEPERATION LAYER
BETWEEN CAP AND SHAFT LINING. FOSROC
FIBREBOARD OR SIMILAR APPROVED
PILE ANCHORS TO HAVE ANCON MBT
HEADED ANCHORS TO PROVIDE
ANCHORAGE INTO CAPPING SLAB (TYP)
450mm SFA END BEARING PILES TO
SPECIALIST PILING CONTRACTOR
DESIGN & DETAILS. PILES TO BE
SOCKETED INTO BEDROCK. LENGTH
TBC BY PILING CONTRACTOR
300mm THICK MINE SHAFT
LINING ASSUMED. TBC ON SITE
MINE SHAFT TO BE DRILLED, FLUSHED
AND PRESSURE GROUTED. GROUTING
IS TO HAVE A COMPRESSIVE STRENGTH
OF 1-2MN/mm². CEMENT AND PFA OR
FLY ASH MIXTURE CAN BE USED AT AN
APPROPRIATE WATER / CEMENT RATIO.
PRESSURE GROUTING TO SPECIALIST
DESIGN AND DETAILS.
-1.108
BOTTOM OF SHAFT
DENOTES INDICATIVE ROCK
FORMATION. PILING CONTRACTOR TO
REVIEW THE GEO-ENVIROMENTAL
REPORTS. MUDSTONE / BED ROCK
EXPECTED TO BE APPROX 25-28m BGL
PILES EXTENDING DOWN
TO MUDSTONE/BEDROCK
AT DEPTH. EXPECTED TO
BE APPROX 25-28m BGL.

FINAL PILE CUT OFF LEVEL
TBC. AWAITING SITE
CONFIRMATION OF TOP OF
SHAFT LEVEL

SHAFT 2 PROPOSED MINESHAFT CAPPING ELEVATION (TCA REF: 386399-016)

1 : 50


SHAFT 1
386399-001
SHAFT 2
386399-016

KEY PLAN

1 : 1500

SAFETY HEALTH AND ENVIRONMENTAL INFORMATION BOX		
Construction Risks	Maintenance/Cleaning Risks	Demolition/Adaptation Risks
1. THE EXISTING MINE SHAFTS MAY BE IN POOR CONDITION. NO PLANT IS TO TRACK DIRECTLY OVER THE SHAFT DURING THE CONSTRUCTION WORKS. PILING RIG IS TO INSTALL PILES SO THE MAST IS THE CLOSEST TO THE SHAFT. 2. DURING THE MINE SHAFT WORKS, THE MAIN CONTRACTOR IS TO HAVE REVIEWED THE RECOMMENDATIONS OF THE COAL MINING RISK ASSESSMENT AND HAVE GROUND MONITORING METHODS IN PLACE. 3. UNCHARTERED SERVICES MAY BE PRESENT LOCAL TO THE MINE SHAFTS. FOR EXISTING SERVICES, REFER TO VAR-RDG-XX-XX-DR-C-00600.	1. CHAMBERS ARE LOCATED CENTRALLY (APPROX) TO THE MINE SHAFT AND MINE SHAFT CAPPING TO FACILITATE ACCESS FOR INEPECTION OF THE MINE SHAFT VIA A 500X500 PENETRATION THROUGH THE CAPPING SLAB. THE CHAMBER COVER LOCAL TO THE FOOTBALL PITCH IS CONCEALED BELOW THE FINISHES (APPROX -400MM). CARE TO BE TAKEN WHEN LOCATING ON SITE.	1. DEMOLITION CONTRACTOR TO NOTE THAT IN ADDITION TO THE SHAFT CAPS SELFWEIGHT, THE MINE SHAFT CAPCS HAVE BEEN DESIGNED FOR A PERMANENT LOAD OF 55kN/m2 (SOIL & BUILDUPS) AND A VARIABLE LOAD OF 70kN/m2 (SURCHARGES) AT SERVICE LIMIT STATE. ALL LOADINGS MUST SIT WITHIN THESE BOUNDS.
IN ADDITION TO THE HAZARDS / RISKS NORMALLY ASSOCIATED WITH THE TYPE OF WORK DETAILED ON THIS DRAWING - THE CONTRACTOR IS TO TAKE NOTE OF THE ABOVE & ALSO THE HAZARDS IDENTIFIED IN THE RISK ASSESSMENT DOCUMENT. IT IS ASSUMED THAT ALL WORKS DETAILED ON THIS DRAWING WILL BE PERFORMED BY A COMPETENT CONTRACTOR WORKING, WHERE APPROPRIATE, TO AN APPROVED METHOD STATEMENT.		

Structural Piling Schedule

REF	PILE DIA (mm)	Gk (kN)	Qk (kN)	Wk (+/- kN)	EHF GK (+/- kN)	EHF QK (+/- kN)	SHEAR (W)	AD (kN)	PILE CUT-OFF LEVEL (m)
P01	450	575	575	-	-	-	15	-	56.208
P02	450	575	575	-	-	-	15	-	56.208
P03	450	575	575	-	-	-	15	-	56.208
P04	450	575	575	-	-	-	15	-	56.208
P05	450	575	575	-	-	-	15	-	56.208
P06	450	575	575	-	-	-	15	-	56.208
P07	450	575	575	-	-	-	15	-	56.208
P08	450	575	575	-	-	-	15	-	56.208
P09	450	575	575	-	-	-	15	-	56.633
P10	450	575	575	-	-	-	15	-	56.633
P11	450	575	575	-	-	-	15	-	56.633
P12	450	575	575	-	-	-	15	-	56.633
P13	450	575	575	-	-	-	15	-	56.633
P14	450	575	575	-	-	-	15	-	56.633
P15	450	575	575	-	-	-	15	-	56.633
P16	450	575	575	-	-	-	15	-	56.633

REV	DATE	DESCRIPTION	BY	Chk	App
C01	23.04.24	CONSTRUCTION ISSUE	PB	CB	CB
P02	30.11.23	INCORPORATING MAIN CONTRACTOR COMMENTS	ZB	CB	CB
P01	26.10.23	PRELIMINARY ISSUE	ZB	CB	CB

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Client
ISG LTD

Project
VARLEY STREET
SEN SCHOOL

Office
MANCHESTER

Title
MINESHAFT CAPPING SLAB
& PILE GA

Scale @ A1
As indicated

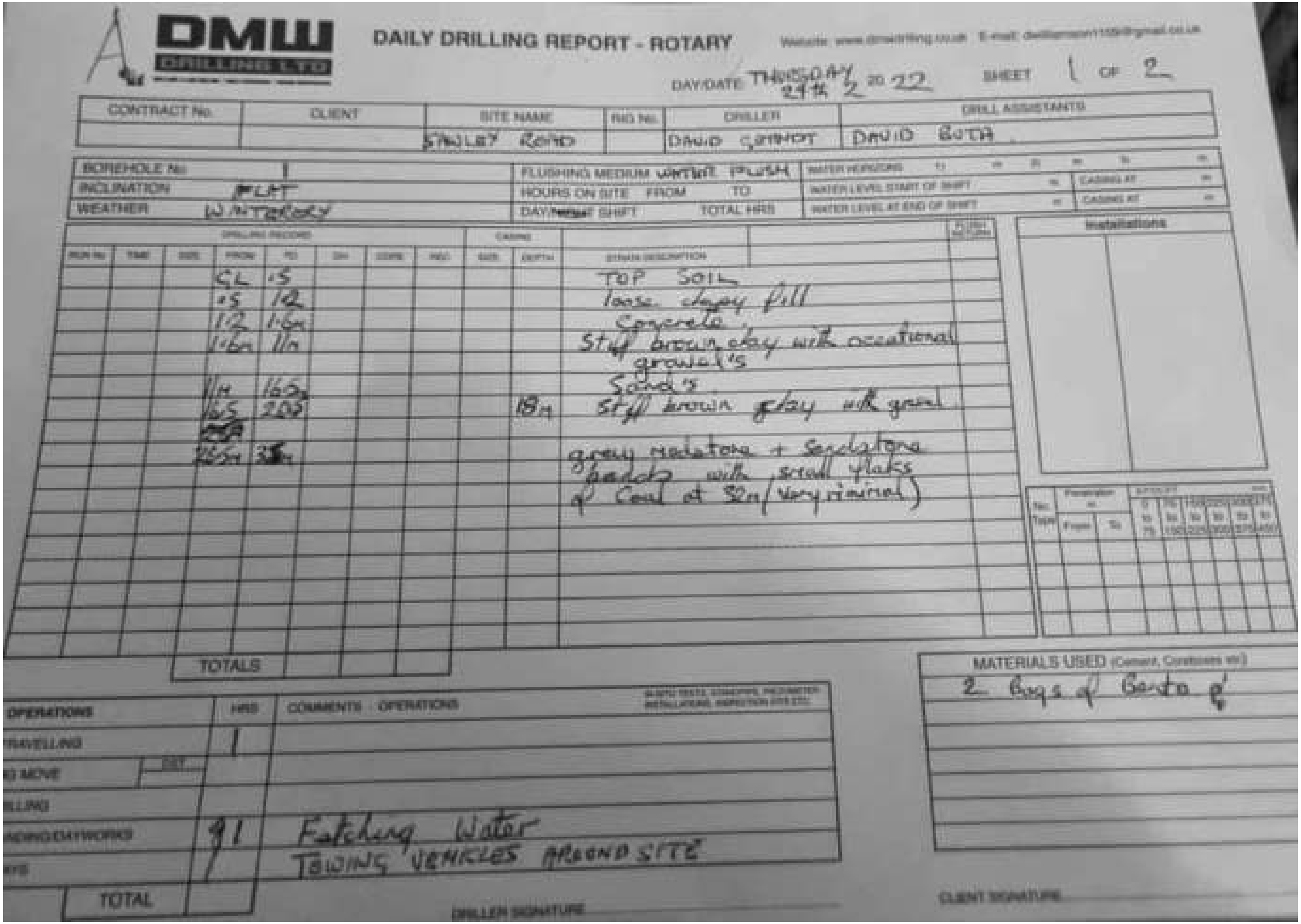
Status
CONSTRUCTION

clancy
consulting

CCL Project No. 1-21628
www.clancy.co.uk

Project Ref	Originator	Volume	Level
VAR	CCL	ZZ	00
File Type	Discipline	Drawing No.	Revision
DR	S	40002	C01

B. Ground Model



DMW DRILLING LTD

DAILY DRILLING REPORT - ROTARY

Website: www.dmwdrilling.co.uk E-mail: [illegible]

DAY/DATE THURSDAY 24th 2 20 22 SHEET 1 OF 2

CONTRACT No.	CLIENT	SITE NAME	RIG No.	DRILLER	DRILL ASSISTANTS
		STANLEY ROAD		DAVID SCHMIDT	DAVID BOTH

BOREHOLE No. 1
INCLINATION FLAT
WEATHER WINTERY
FLUSHING MEDIUM WATER FLUSH
HOURS ON SITE FROM TO
DAY/~~NIGHT~~ SHIFT TOTAL HRS
WATER HORIZONS
WATER LEVEL START OF SHIFT m CASING AT m
WATER LEVEL AT END OF SHIFT m CASING AT m

DRILLING RECORD

RUN No	TIME	SIZE	FROM	TO	DH	CORE	REC	CASING SIZE	CASING DEPTH	STRATA DESCRIPTION	FLUSH RETURN
			GL	·5						TOP SOIL	
			·5	1·2						loose clayey fill	
			1·2	1·6m						Concrete.	
			1·6m	11m						Stiff brown clay with occational gravel's	
			11m	16·5m						Sand's.	
			16·5	20·5					18m	Stiff brown clay with gravel	
			[illegible]								
			25m	35m						grey mudstone + sandstone bands with small flaks of Coal at 32m (very minimal)	
		TOTALS									

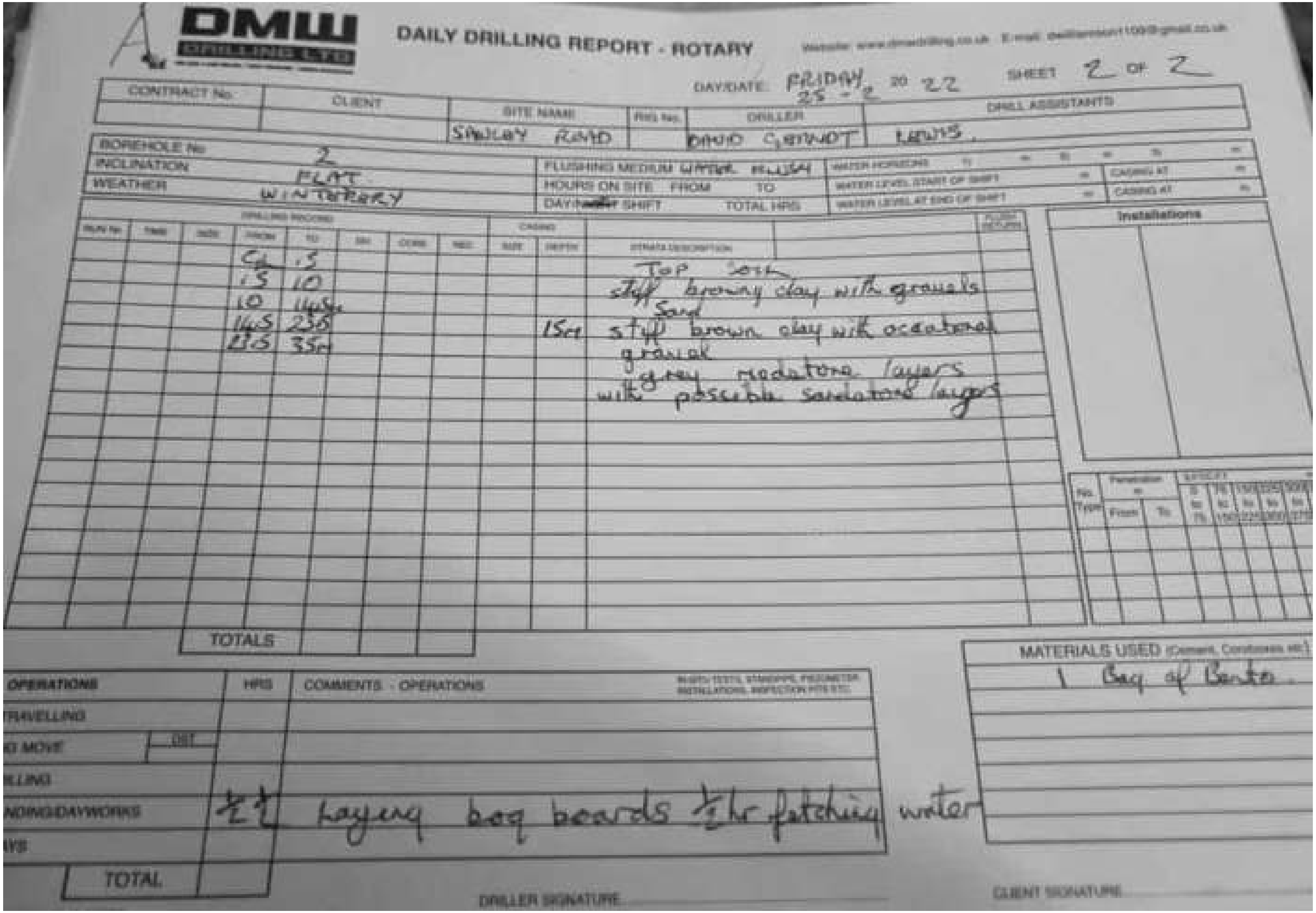
Installations

MATERIALS USED (Cement, Coreboxes etc)
2 Bags of Bento g'

OPERATIONS	HRS	COMMENTS OPERATIONS
RAVELLING	1	
G MOVE		
LLING		
NDING/DAYWORKS	91	Fatching Water TOWING VEHICLES AROUND SITE
YS	/	
TOTAL		

DRILLER SIGNATURE

CLIENT SIGNATURE



DMW DRILLING LTD

DAILY DRILLING REPORT - ROTARY

Website: www.dmwdrilling.co.uk E-mail: [illegible]@gmail.co.uk

DAY/DATE: FRIDAY 25 - 2 20 22 SHEET 2 OF 2

CONTRACT No.	CLIENT	SITE NAME	RIG No.	DRILLER	DRILL ASSISTANTS
		SAWLEY ROAD		DAVID GARNOT	LEWIS.

BOREHOLE No: 2

INCLINATION: FLAT

WEATHER: WINTERY

FLUSHING MEDIUM: WATER FLUSH

HOURS ON SITE FROM TO

DAY/~~NIGHT~~ SHIFT TOTAL HRS

WATER HORIZONS: TO m TO m TO m

WATER LEVEL START OF SHIFT m CASING AT m

WATER LEVEL AT END OF SHIFT m CASING AT m

DRILLING RECORD / CASING

RUN No.	TIME	SIZE	FROM	TO	SPT	CORE	REC	CASING SIZE	CASING DEPTH	STRATA DESCRIPTION	FLUSH RETURN
			GL	.3						TOP SOIL	
			.3	10						stiff browny clay with gravels	
			10	14.5m						Sand	
			14.5	23.5					15m	stiff brown clay with ocastonal	
			23.5	35m						gravel	
										grey mudstone layers	
										with possible sandstone layers	
		TOTALS									

Installations

No. Type	Penetration m From	To	S.P.T. 0 to 75	75 to 150	150 to 225	225 to 300	300 to 375

OPERATIONS	HRS	COMMENTS - OPERATIONS	IN-SITU TESTS, STANDPIPE, PIEZOMETER INSTALLATIONS, INSPECTION PITS ETC.
RAVELLING			
D MOVE DIST			
LLING			
NDING/DAYWORKS	½ hr	Laying bog boards ½hr fetching water	
YS			
TOTAL			

MATERIALS USED (Cement, Cenbonate etc)

1 Bag of Bento.

DRILLER SIGNATURE.........................

CLIENT SIGNATURE.........................

Cable Percussion Drilling Log

Location Number: **RBH01**			
Project Name: Nelsen Street, Manchester	Client: ISG Ltd	Date: 23/04/2024 - 24/04/2024	
Project ID:LKC 22 1670	Contractor:		
Equipment:	Level	Logged By CK	Scale 1:50
			Page Number Sheet 1 of 4

Depth (m)	Samples / Tests	Depth (m)	Legend	Stratum Description		Level (m)
				(1) Topsoil and Made Ground.		
		1.00		(1) CLAY		
1.20	N=23 (4,7/8,7,4,4)					
3.00	N=21 (1,3/5,5,5,6)					
		5.00		(1) SAND and GRAVEL with bands of clay.		
6.00	N=20 (3,3/4,5,6,5)					
9.00	N=27 (2,4/5,6,8,8)					

Hole Diameter		Casing Diameter		Water Strike Details		Chiselling		
Depth Base (m)	Diameter (mm)	Depth Base (m)	Diameter (mm)	Time Elapsed (mins)	Depth Water (m)	Depth Top (m)	Depth Base (m)	Duration (hh:mm)

Remarks:
(1) Drillers Description.

LK CONSULT	# Cable Percussion Drilling Log	Location Number: **RBH01**

Project Name: Nelsen Street, Manchester	Client: ISG Ltd	Date: 23/04/2024 - 24/04/2024
Project ID:LKC 22 1670	Contractor:	

Equipment:	Level	Logged By	Scale	Page Number
		CK	1:50	Sheet 2 of 4

Depth (m)	Samples / Tests	Depth (m)	Legend	Stratum Description		Level (m)
				(1) SAND and GRAVEL with bands of clay.		
					11	
12.00	N=25 (3,4/4,5,7,9)				12	
					13	
					14	
15.00	N=28 (5,4/6,7,8,7)				15	
					16	
					17	
18.00	N=30 (4,6/6,7,8,9)				18	
					19	
					20	

Hole Diameter		Casing Diameter		Water Strike Details		Chiselling		
Depth Base (m)	Diameter (mm)	Depth Base (m)	Diameter (mm)	Time Elapsed (mins)	Depth Water (m)	Depth Top (m)	Depth Base (m)	Duration (hh:mm)

Remarks:
(1) Drillers Description.

Cable Percussion Drilling Log

Location Number: **RBH01**				
Project Name: Nelsen Street, Manchester	Client: ISG Ltd		Date: 23/04/2024 - 24/04/2024	
Project ID:LKC 22 1670	Contractor:			
Equipment:	Level	Logged By CK	Scale 1:50	Page Number Sheet 3 of 4

Depth (m)	Samples / Tests	Depth (m)	Legend	Stratum Description		Level (m)
				(1) SAND and GRAVEL with bands of clay.		
21.00	N=32 (5,6/6,8,8,10)				21	
					22	
					23	
24.00	N=29 (5,7/5,7,8,9)				24	
					25	
					26	
27.00	N=34 (4,5/8,8,9,9)				27	
					28	
					29	
		29.50		(1) Grey clayey MUDSTONE.		
30.00	N=48 (6,6/7,7,19,15)				30	

Hole Diameter		Casing Diameter		Water Strike Details		Chiselling		
Depth Base (m)	Diameter (mm)	Depth Base (m)	Diameter (mm)	Time Elapsed (mins)	Depth Water (m)	Depth Top (m)	Depth Base (m)	Duration (hh:mm)

Remarks:
(1) Drillers Description.

Rotary Core Log

LK CONSULT	Location Number: **RBH01**			
Project Name: Nelsen Street, Manchester	Client: ISG Ltd	Date: 23/04/2024 - 24/04/2024		
Project No. : LKC 22 1670	Contractor:			
	Level	Logged By CK	Scale 1:50	Page Number Sheet 4 of 4

Depth (m)	Coring TCR	Coring SCR	Coring RQD
	100	92	88
	100	61	7
	47	32	13
	80	48	23
	100	68	56
	90	79	68

FI	Field Records
NI	Non-Intact
5	Closely spaced, horizontal, planar, rough, open with brecciated infilled discontinuities.
AZCL	Assumed Zone of Core Loss
5	Closely spaced, horizontal, planar, rough, open with brecciated infilled discontinuities.
AZCL	Assumed Zone of Core Loss
NI	Non-Intact
5	Closely spaced, horizontal, planar, smooth, open with brecciated infilled discontinuities.
NI	Non-Intact
8	Closely spaced, horizontal and vertical, planar and stepped, smooth and rough, open with both clean and brecciated infilled discontinuities.
6	Closely spaced, horizontal, planar, smooth, tight and clean discontinuities.
NI	Non-Intact
5	Close to medium spaced, horizontal, planar, smooth and rough, tight and open with both clean and brecciated infilled discontinuities.
NI	Non-Intact
10	Closely spaced, horizontal, planar and stepped, smooth, tight and open, clean discontinuities.

Depth (m)	Legend	Stratum Description		Level (m)
		(1) Grey clayey MUDSTONE.		
30.50		Light grey extremely weathered extremely weak MUDSTONE.		
35.50		Light grey highly weathered moderately strong SILTSTONE.		
39.50		End of Borehole at 39.50m		

31 32 33 34 35 36 37 38 39 40

Hole Diameter		Casing Diameter		Water Strike Details		Chiselling		
Depth Base (m)	Diameter (mm)	Depth Base (m)	Diameter (mm)	Time Elapsed (mins)	Depth Water (m)	Depth Top (m)	Depth Base (m)	Duration (hh:mm)

Remarks:
(1) Drillers Description.

LK CONSULT

Cable Percussion Drilling Log

Location Number: **RBH02**

Project Name: Nelsen Street, Manchester	Client: ISG Ltd	Date: 25/04/2024 - 26/04/2024
Project ID:LKC 22 1670		

Equipment:	Level	Logged By	Scale	Page Number
			1:50	Sheet 1 of 4

Depth (m)	Samples / Tests	Depth (m)	Legend	Stratum Description		Level (m)
			▨	(1) MADE GROUND: Brown gravelly clayey SAND with occasional brick fragments.		
1.20	N=20 (3,4/4,4,5,7)				1	
					2	
					3	
		4.00	▨	(1) Grey and brown mottled gravelly sandy CLAY.	4	
4.20	N=22 (1,3/4,4,7,7)					
					5	
		6.00	▨	(1) Brown SAND and GRAVEL with brown clay bands.	6	
7.20	N=23 (3,4/5,5,6,7)				7	
					8	
					9	
10.00	N=27 (4,5/5,7,7,8)				10	

Hole Diameter		Casing Diameter		Water Strike Details		Chiselling		
Depth Base (m)	Diameter (mm)	Depth Base (m)	Diameter (mm)	Time Elapsed (mins)	Depth Water (m)	Depth Top (m)	Depth Base (m)	Duration (hh:mm)

Remarks:

(1) Drillers description.

Cable Percussion Drilling Log

Location Number:
RBH02

Project Name: Nelsen Street, Manchester	Client: ISG Ltd	Date: 25/04/2024 - 26/04/2024
Project ID:LKC 22 1670		

Equipment:	Level	Logged By	Scale	Page Number
			1:50	Sheet 2 of 4

Depth (m)	Samples / Tests	Depth (m)	Legend	Stratum Description		Level (m)
			▨	(1) Brown SAND and GRAVEL with brown clay bands.		
					11	
					12	
13.00	N=24 (4,4/5,7,5,7)				13	
					14	
					15	
16.00	N=25 (3,4/5,6,6,8)				16	
					17	
					18	
19.00	N=26 (4,5/5,6,7,8)				19	
					20	

Hole Diameter		Casing Diameter		Water Strike Details		Chiselling		
Depth Base (m)	Diameter (mm)	Depth Base (m)	Diameter (mm)	Time Elapsed (mins)	Depth Water (m)	Depth Top (m)	Depth Base (m)	Duration (hh:mm)

Remarks:
(1) Drillers description.

LK CONSULT	# Cable Percussion Drilling Log	Location Number: **RBH02**

Project Name: Nelsen Street, Manchester	Client: ISG Ltd	Date: 25/04/2024 - 26/04/2024
Project ID:LKC 22 1670		

Equipment:	Level	Logged By	Scale	Page Number
			1:50	Sheet 3 of 4

Depth (m)	Samples / Tests	Depth (m)	Legend	Stratum Description		Level (m)
			▨	(1) Brown SAND and GRAVEL with brown clay bands.		
21.00	N=31 (3,5/7,7,8,9)				21	
					22	
					23	
24.00	N=39 (4,6/6,7,12,14)				24	
					25	
		25.50	▩	(1) Fractured weathered grey laminated MUDSTONE and SILTSTONE		
					26	
					27	
					28	
					29	
					30	

Hole Diameter		Casing Diameter		Water Strike Details		Chiselling		
Depth Base (m)	Diameter (mm)	Depth Base (m)	Diameter (mm)	Time Elapsed (mins)	Depth Water (m)	Depth Top (m)	Depth Base (m)	Duration (hh:mm)

Remarks:
(1) Drillers description.

LK CONSULT

Rotary Core Log

Location Number:	**RBH02**
Project Name: Nelsen Street, Manchester	Client: ISG Ltd
Date: 25/04/2024 - 26/04/2024	
Project No. : LKC 22 1670	
Level	
Logged By	
Scale	1:50
Page Number	Sheet 4 of 4

Depth (m)	Coring TCR	Coring SCR	Coring RQD	FI	Field Records
31.50	100	10	0	NI	Non-Intact.
31.90				50	Closely spaced 45 degrees and 10 degrees smooth planar, clean and tight fractures with no infill.
32.00				NI	Non-Intact.
	90	10	10		
33.00				5	Bedding 10 degrees. Medium to closely spaced open, tight striated undulating fractures with no infill.
	100	90	83		
	100	9	0	19	Medium to closely spaced 85 degrees and 5 degrees open, striated undulating fractures with clay infill.
	100	30	14	10	Medium to closely spaced 85 degrees and 5 degrees open, clean, striated undulating to smooth fractures with no infill.
	100	71	64	13	Medium to closely spaced 85 degrees and 5 degrees open, clean, smooth clean planar to striated undulating fractures with no infill.
	100	92	85	5	Closely spaced, horizontal, planar, smooth, tight and open with brecciated infilled and clean discontinuities.
				4	Closely spaced, horizontal, planar, smooth, tight and clean discontinuities.
39.00					

Depth (m)	Stratum Description
	(1) Fractured weathered grey laminated MUDSTONE and SILTSTONE
31.50	Grey heavily weathered SILTSTONE.
31.90	Highly weathered weak black Mudstone.
32.00	Extremely weathered extremely weak black lustrous Coal.
32.40	Highly weathered weak grey SILTSTONE.
33.00	Highly weathered strong grey SILTSTONE with rare fossils encountered at 36.50mbgl.
39.00	End of Borehole at 39.00m

31 32 33 34 35 36 37 38 39 40

Hole Diameter		Casing Diameter		Water Strike Details		Chiselling		
Depth Base (m)	Diameter (mm)	Depth Base (m)	Diameter (mm)	Time Elapsed (mins)	Depth Water (m)	Depth Top (m)	Depth Base (m)	Duration (hh:mm)

Remarks:
(1) Drillers description.

C. Static Design Calcs

Basis of Geotechnical Design

	Shaft friction is given by the equation	**End bearing is given by the equation**
Cohesive Strata	$q_s = \alpha \cdot \overline{C_u} \cdot A_s$	$Q_b = N_c \cdot C_{ub} \cdot A_b$
Cohesionless Strata	$q_s = k_s \cdot \overline{\sigma'_{vo}} \cdot tan(\delta) \cdot A_s$	$Q_b = N_q \cdot \sigma'_{vo} \cdot A_b$
Weak Rock	$q_s = f_s \cdot A_s$	$Q_b = q_b \cdot A_b$
Chalk	$\tau_{sf} = K \cdot \tan \delta' \cdot \ \sigma'_v = \ \beta \ \cdot \sigma'_v$	$Q_b = 200 \cdot N$

Where;

Cohesive Strata

$\alpha =$ Adhesion factor (0.5 – 0.6 for CFA piles)
$\overline{C_u} =$ Average cohesion value along shaft. (kPa)
$C_{ub} =$ Cohesion value at toe (4 to 6 × SPT ‘N’ value – Stroud and Butler 1976) (kPa)
$N_c =$ Bearing capacity factor (taken as 9)

Cohesionless Strata

$k_s =$ Coefficient of horizontal stress.
$\overline{\sigma'_{vo}} =$ Average overburden pressure along shaft. (kPa)
$\delta =$ Angle of friction between soil and pile $(\delta = \varphi)$
$\sigma'_{vo} =$ Overburden pressure at toe level. (kPa)
$N_q =$ Bearing capacity factor.

Weak Rock

$f_s =$ Unit skin friction, f_s = 0.45√UCS (Rowe and Armitage)
$A_s =$ Shaft area
$q_b =$ Unit base resistance, q_b = 2.5 x UCS (CIRIA R181)
$A_b =$ Shaft area
$N_q =$ Bearing capacity factor.

Chalk

$K =$ Coefficient of earth pressure
$\delta' =$ Effective angle of interface friction
$\sigma'_v =$ Average Vertical Effective Stress

CFA Pile Design Sheet

Project Title :	Varley Street Mancheter		
Job No :	233492		
Client :	ISG		
Calcs by :	MG	**Checked By :**	SAS
Date:	05/06/2024	**Strata:**	1 of 1
SI Reference:	LKC 22 1670 & Enviro Sol. CL102		

VAN ELLE PILING
Summit Close
Kirkby-in-Ashfield
Nottinghamshire
NG17 8GJ
www.van-elle.co.uk

Design Code
Eurocode

	Soil Properties				
	Depth (m)	**Cu (kPa)**	**SPT (No Blows)**	**Mudstone Shaft fs (kPa)**	**Mudstone Base qb (kPa)**
Top of Strata:	0.00			250	5600
Bottom of strata:	10.00			250	

Geotechnical Parameters		
γ'	12	kN/m³
ks		
α		
Nb		

Combination 1 Parameters		
γ_M	1.4	Model
γ_b	1.0	Base
γ_s	1.0	Shaft
$\gamma_{s:t}$	1.0	Tension

	Pile Properties
Pile Type:	Bored
Pile Diameter:	600 mm
Shaft area:	1.885 m² per m
Base area:	0.283 m²

Level of Load Testing:
No Testing

Strata Above Contirbution		
σ_v		kPa
q_s		kN
NSF		kN

Combination 2 Parameters		
γ_M	1.4	Model
γ_b	2.0	Base
γ_s	1.6	Shaft
$\gamma_{s:t}$	2.0	Tension
γ_c	2.0	Combined

Please Note when using a FoS of 1.2 on the Shaft a Settlement Calculation should be carried out.

STRATA 1		**Shaft Friction**			**End Bearing**		**Safe Working Load**			
Pile Length	**Soil Type**	f_s	q_s	**Shaft FoS**	**qb**	Q_b	**Compression Separate Factors**		**Tension**	
(m)	**Mudstone**	**(kPa)**	**(kN)**	**1.2**		**(kN)**	**Combination 1**	**Combination 2**	**Combination 1**	**Combination 2**
0	Mudstone	250.0	0	0	5600.0	1583.4	1131	565	0	0
0.25	Mudstone	250.0	118	98	5600.0	1583	1215	618	84	42
0.50	Mudstone	250.0	236	196	5600.0	1583	1299	671	168	84
0.75	Mudstone	250.0	353	295	5600.0	1583	1383	723	252	126
1.00	Mudstone	250.0	471	393	5600.0	1583	1468	776	337	168
1.25	Mudstone	250.0	589	491	5600.0	1583	1552	828	421	210
1.50	Mudstone	250.0	707	589	5600.0	1583	1636	881	505	252
1.75	Mudstone	250.0	825	687	5600.0	1583	1720	934	589	295
2.00	Mudstone	250.0	942	785	5600.0	1583	1804	986	673	337
2.25	Mudstone	250.0	1060	884	5600.0	1583	1888	1039	757	379
2.50	Mudstone	250.0	1178	982	5600.0	1583	1972	1091	841	421
2.75	Mudstone	250.0	1296	1080	5600.0	1583	2057	1144	926	463
3.00	Mudstone	250.0	1414	1178	5600.0	1583	2141	1197	1010	505
3.25	Mudstone	250.0	1532	1276	5600.0	1583	2225	1249	1094	547
3.50	Mudstone	250.0	1649	1374	5600.0	1583	2309	1302	1178	589
3.75	Mudstone	250.0	1767	1473	5600.0	1583	2393	1354	1262	631
4.00	Mudstone	250.0	1885	1571	5600.0	1583	2477	1407	1346	673
4.25	Mudstone	250.0	2003	1669	5600.0	1583	2562	1460	1431	715
4.50	Mudstone	250.0	2121	1767	5600.0	1583	2646	1512	1515	757
4.75	Mudstone	250.0	2238	1865	5600.0	1583	2730	1565	1599	799
5.00	Mudstone	250.0	2356	1963	5600.0	1583	2814	1617	1683	841
5.25	Mudstone	250.0	2474	2062	5600.0	1583	2898	1670	1767	884
5.50	Mudstone	250.0	2592	2160	5600.0	1583	2982	1723	1851	926
5.75	Mudstone	250.0	2710	2258	5600.0	1583	3066	1775	1935	968
6.00	Mudstone	250.0	2827	2356	5600.0	1583	3151	1828	2020	1010
6.25	Mudstone	250.0	2945	2454	5600.0	1583	3235	1880	2104	1052
6.50	Mudstone	250.0	3063	2553	5600.0	1583	3319	1933	2188	1094
6.75	Mudstone	250.0	3181	2651	5600.0	1583	3403	1986	2272	1136
7.00	Mudstone	250.0	3299	2749	5600.0	1583	3487	2038	2356	1178
7.25	Mudstone	250.0	3416	2847	5600.0	1583	3571	2091	2440	1220
7.50	Mudstone	250.0	3534	2945	5600.0	1583	3655	2143	2524	1262
7.75	Mudstone	250.0	3652	3043	5600.0	1583	3740	2196	2609	1304
8.00	Mudstone	250.0	3770	3142	5600.0	1583	3824	2248	2693	1346
8.25	Mudstone	250.0	3888	3240	5600.0	1583	3908	2301	2777	1388
8.50	Mudstone	250.0	4006	3338	5600.0	1583	3992	2354	2861	1431
8.75	Mudstone	250.0	4123	3436	5600.0	1583	4076	2406	2945	1473
9.00	Mudstone	250.0	4241	3534	5600.0	1583	4160	2459	3029	1515
9.25	Mudstone	250.0	4359	3632	5600.0	1583	4245	2511	3114	1557
9.50	Mudstone	250.0	4477	3731	5600.0	1583	4329	2564	3198	1599
9.75	Mudstone	250.0	4595	3829	5600.0	1583	4413	2617	3282	1641
10.00	Mudstone	250.0	4712	3927	5600.0	1583	4497	2669	3366	1683

D. Alp Analysis

Titles

```
Job No.:                                                                   233492
Job Title:                Varley Street Mancheter
Sub-title:                15kN Lateral Design
Calculation Heading:      SLS
Initials:                 MG
Checker:
Date Saved:               02-Feb-2023
Date Checked:
Notes:
File Name:                4. SLS.alw
File Path:                C:\Users\martin.grainey\Documents
```

General Data

```
Number of increments = 1
Increment applied loads only
Standard analysis type
```

Convergence Control

```
Maximum number of iterations = 300
Maximum displacement error [mm] = 0.0010000
Maximum pressure error [kN/m²] = 0.10000
Damping coefficient  = 1.0000
Maximum incremental deflection [m] = 2.0000
```

Partial Factors

```
Partial Factor Set    Variable Load  Permanent Load    Unit     Drained   Undrained   Shear
                      (Rest./Dist.)   (Rest./Dist.)   Weight   Cohesion   Cohesion   Angle
SLS                     1.000000/       1.000000/    1.000000  1.000000   1.000000  1.000000
                        1.000000        1.000000
```

Soil Data

```
Elastic-plastic soils
Factor on soil E value: 0.8000
No.    Level       E      Unit    Phi   Factored Factored c(top)    dc/dz
                           wt.              Kq       Kc
        [m]    [kN/m²] [kN/m³] [deg]                   [kN/m²] [kN/m²/m]
   1  0.000000  7500.0  18.000 24.000 -        -            0.0       0.0
   2 -4.000000  25000.  19.000 24.000 -        -            0.0       0.0
```

Calculated K_q and K_c Values

```
Node   Z/D    Kq     Kc
   1     0.0 3.0562 5.4162
   2 0.55556 3.5069 9.6976
   3  1.1111 3.8930 12.851
   4  1.6667 4.2273 15.270
   5  2.2222 4.5196 17.185
   6  2.7778 4.7775 18.739
   7  3.3333 5.0065 20.024
   8  3.8889 5.2114 21.105
   9  4.4444 5.3957 22.027
  10  5.0000 5.5624 22.823
  11  5.5556 5.7139 23.516
  12  6.0000 5.8255 24.010
  13  6.4444 5.9295 24.458
  14  6.8889 6.0266 24.866
  15  7.3333 6.1176 25.240
  16  7.7778 6.2030 25.583
  17  8.2222 6.2832 25.899
  18  8.6667 6.3588 26.191
  19  9.1111 6.4302 26.462
  20  9.5556 6.4976 26.713
  21  10.000 6.5614 26.948
```

Node	Z/D	K_q	K_c

Sections

Name	Input Type	Description	Material	Class	Effective Width [m]	EI [kNm²]
Section 1	Wizard Generated	STD%C%600	Concrete		0.60000	208900.

Pile Properties

Level [m]	Section
0.0	**Section 1**

Pile base at -6.000000 m

Applied Loads and Displacements

No.	Level [m]	Force [kN]	Moment [kNm]	Displacement [mm]
1	0.0	15.000	0.0	0.0

Restraints

No.	Node	Lateral Stiffness [kN/m]	Rotational Stiffness [kNm/rad]
1	1	0.0	25000.

Geometry and Initial state

Node	Level [m]	Soil	EI [kNm2]	Effective Width [m]	Water Pressure [kN/m²]	Soil Disp [mm]
1	0.0	1	208900.	0.60000	0.0	0.0
2	-0.33333	1	208900.	0.60000	3.3333	0.0
3	-0.66667	1	208900.	0.60000	6.6667	0.0
4	-1.0000	1	208900.	0.60000	10.000	0.0
5	-1.3333	1	208900.	0.60000	13.333	0.0
6	-1.6667	1	208900.	0.60000	16.667	0.0
7	-2.0000	1	208900.	0.60000	20.000	0.0
8	-2.3333	1	208900.	0.60000	23.333	0.0
9	-2.6667	1	208900.	0.60000	26.667	0.0
10	-3.0000	1	208900.	0.60000	30.000	0.0
11	-3.3333	1	208900.	0.60000	33.333	0.0
12	-3.6000	1	208900.	0.60000	36.000	0.0
13	-3.8667	1	208900.	0.60000	38.667	0.0
14	-4.1333	2	208900.	0.60000	41.333	0.0
15	-4.4000	2	208900.	0.60000	44.000	0.0
16	-4.6667	2	208900.	0.60000	46.667	0.0
17	-4.9333	2	208900.	0.60000	49.333	0.0
18	-5.2000	2	208900.	0.60000	52.000	0.0
19	-5.4667	2	208900.	0.60000	54.667	0.0
20	-5.7333	2	208900.	0.60000	57.333	0.0
21	-6.0000	2	208900.	0.60000	60.000	0.0

Output for load increment 1

Iteration	Max Inc Disp [mm]	at node	Disp error [mm]	Pressure error [kN/m²]
6	1.59	1	0.0006	0.01

- The file is not completely converged till the specified tolerance limit.

Node	Level [m]	Defl [mm]	Rotation [rad]	Soil	Pressure [kN/m²]	Bending [kNm]	Shear [kN]	
1	0.0	-1.5929	-378.05E-6	1	-4.5843	0.0	0.0	P
1	0.0					-9.4513	-15.000	
2	-0.33333	-1.4648	-389.27E-6	1	-9.3518	-4.6041	-13.606	P
3	-0.66667	-1.3342	-393.25E-6	1	-13.342	-0.38041	-11.337	
4	-1.0000	-1.2033	-391.19E-6	1	-12.033	2.9539	-8.7996	
5	-1.3333	-1.0739	-384.46E-6	1	-10.739	5.4860	-6.5225	
6	-1.6667	-0.94734	-374.26E-6	1	-9.4734	7.3022	-4.5013	
7	-2.0000	-0.82464	-361.67E-6	1	-8.2464	8.4868	-2.7293	

```
Node  Level       Defl      Rotation  Soil Pressure  Bending     Shear
       [m]        [mm]       [rad]         [kN/m²]    [kNm]       [kN]


   8  -2.3333   -0.70639 -347.63E-6    1  -7.0639    9.1217    -1.1982
   9  -2.6667   -0.59296 -332.95E-6    1  -5.9296    9.2857    0.10111
  10  -3.0000   -0.48442 -318.32E-6    1  -4.8442    9.0543     1.1785
  11  -3.3333   -0.38067 -304.32E-6    1  -3.8067    8.5000     2.0055
  12  -3.6000   -0.30093 -293.88E-6    1  -3.0093    7.8738     2.5889
  13  -3.8667   -0.22386 -284.32E-6    1  -2.2386    7.1193     3.0087
  14  -4.1333   -0.14920 -275.78E-6    2  -4.9734    6.2692     3.5857
  15  -4.4000  -0.076666 -268.46E-6    2  -2.5555    5.2069     4.1880
  16  -4.6667 -0.0058945 -262.57E-6    2 -0.19648    4.0356     4.4081
  17  -4.9333   0.063507 -258.19E-6    2   2.1169    2.8559     4.2545
  18  -5.2000    0.13193 -255.25E-6    2   4.3978    1.7666     3.7333
  19  -5.4667    0.19975 -253.58E-6    2   6.6583   0.86482     2.8488
  20  -5.7333    0.26726 -252.88E-6    2   8.9087   0.24718     1.6035
  21  -6.0000    0.33467 -252.73E-6    2   11.156 0.0096390 -0.0016666

- The letter "P" next to a result indicates that the effective earth pressure is greater than 0.99 times the
passive limit, but within the convergence pressure limit.
```

EXTREME values so far:-

```
  Deflections         Rotations          Moments        Shears
  Min     Max       Min         Max       Min    Max     Min    Max
 [mm]    [mm]      [rad]       [rad]     [kNm]  [kNm]   [kN]   [kN]
-1.5929 0.33467 -393.25E-6 -252.73E-6 -9.4513 9.2857 -15.000 4.4081
```

RESTRAINT FORCES

```
No.  Node Lateral Moment
           force

           [kN]   [kNm]
  1    1     0.0 9.4513
```

Titles

Job No.:	233492
Job Title:	Varley Street Mancheter
Sub-title:	15kN Lateral Design
Calculation Heading:	DA1-C1
Initials:	MG
Checker:	
Date Saved:	02-Feb-2023
Date Checked:	
Notes:	
File Name:	4. DA1-C1.alw
File Path:	C:\Users\martin.grainey\Documents

General Data

```
Number of increments = 1
Increment applied loads only
Standard analysis type
```

Convergence Control

```
Maximum number of iterations = 300
Maximum displacement error [mm] = 0.0010000
Maximum pressure error [kN/m²] = 0.10000
Damping coefficient  = 1.0000
Maximum incremental deflection [m] = 2.0000
```

Partial Factors

Partial Factor Set	Variable Load (Rest./Dist.)	Permanent Load (Rest./Dist.)	Unit Weight	Drained Cohesion	Undrained Cohesion	Shear Angle
BS EN 1997-1:2004 (EC7 - UK) DA1-1	**0.000000/ 1.500000**	**1.000000/ 1.350000**	**1.000000**	**1.000000**	**1.000000**	**1.000000**

Soil Data

```
Elastic-plastic soils
Factor on soil E value: 0.8000
```

No.	Level [m]	E [kN/m²]	Unit wt. [kN/m³]	Phi [deg]	Factored Kq	Factored Kc	c(top) [kN/m²]	dc/dz [kN/m²/m]
1	0.000000	7500.0	18.000	24.000	-	-	0.0	0.0
2	-4.000000	25000.	19.000	24.000	-	-	0.0	0.0

Calculated K_q and K_c Values

Node	Z/D	K_q	K_c
1	0.0	3.0562	5.4162
2	0.55556	3.5069	9.6976
3	1.1111	3.8930	12.851
4	1.6667	4.2273	15.270
5	2.2222	4.5196	17.185
6	2.7778	4.7775	18.739
7	3.3333	5.0065	20.024
8	3.8889	5.2114	21.105
9	4.4444	5.3957	22.027
10	5.0000	5.5624	22.823
11	5.5556	5.7139	23.516
12	6.0000	5.8255	24.010
13	6.4444	5.9295	24.458
14	6.8889	6.0266	24.866
15	7.3333	6.1176	25.240
16	7.7778	6.2030	25.583
17	8.2222	6.2832	25.899
18	8.6667	6.3588	26.191
19	9.1111	6.4302	26.462
20	9.5556	6.4976	26.713
21	10.000	6.5614	26.948

Node Z/D K_q K_c

Sections

Name	Input Type	Description	Material	Class	Effective Width [m]	EI [kNm²]
Section 1	Wizard Generated	STD%C%600	Concrete		0.60000	208900.

Pile Properties

Level [m]	Section
0.0	**Section 1**

Pile base at -6.000000 m

Applied Loads and Displacements

No.	Level [m]	Force [kN]	Moment [kNm]	Displacement [mm]
1	0.0	15.000	0.0	0.0

Restraints

No.	Node	Lateral Stiffness [kN/m]	Rotational Stiffness [kNm/rad]
1	1	0.0	25000.

Geometry and Initial state

Node	Level [m]	Soil	EI [kNm2]	Effective Width [m]	Water Pressure [kN/m²]	Soil Disp [mm]
1	0.0	1	208900.	0.60000	0.0	0.0
2	-0.33333	1	208900.	0.60000	3.3333	0.0
3	-0.66667	1	208900.	0.60000	6.6667	0.0
4	-1.0000	1	208900.	0.60000	10.000	0.0
5	-1.3333	1	208900.	0.60000	13.333	0.0
6	-1.6667	1	208900.	0.60000	16.667	0.0
7	-2.0000	1	208900.	0.60000	20.000	0.0
8	-2.3333	1	208900.	0.60000	23.333	0.0
9	-2.6667	1	208900.	0.60000	26.667	0.0
10	-3.0000	1	208900.	0.60000	30.000	0.0
11	-3.3333	1	208900.	0.60000	33.333	0.0
12	-3.6000	1	208900.	0.60000	36.000	0.0
13	-3.8667	1	208900.	0.60000	38.667	0.0
14	-4.1333	2	208900.	0.60000	41.333	0.0
15	-4.4000	2	208900.	0.60000	44.000	0.0
16	-4.6667	2	208900.	0.60000	46.667	0.0
17	-4.9333	2	208900.	0.60000	49.333	0.0
18	-5.2000	2	208900.	0.60000	52.000	0.0
19	-5.4667	2	208900.	0.60000	54.667	0.0
20	-5.7333	2	208900.	0.60000	57.333	0.0
21	-6.0000	2	208900.	0.60000	60.000	0.0

Output for load increment 1

Iteration	Max Inc Disp [mm]	at node	Disp error [mm]	Pressure error [kN/m²]
8	2.53	1	0.0005	0.01

- The file is not completely converged till the specified tolerance limit.

Node	Level [m]	Defl [mm]	Rotation [rad]	Soil	Pressure [kN/m²]	Bending [kNm]	Shear [kN]	
1	0.0	-2.5348	-599.16E-6	1	-4.5843	0.0	0.0	P
1	0.0					-14.979	-22.500	
2	-0.33333	-2.3318	-617.20E-6	1	-9.3518	-7.6317	-21.106	P
3	-0.66667	-2.1246	-624.01E-6	1	-20.763	-0.90801	-18.095	P
4	-1.0000	-1.9169	-621.20E-6	1	-19.169	4.4316	-14.102	
5	-1.3333	-1.7113	-610.89E-6	1	-17.113	8.4932	-10.474	
6	-1.6667	-1.5102	-595.01E-6	1	-15.102	11.414	-7.2521	
7	-2.0000	-1.3151	-575.28E-6	1	-13.151	13.328	-4.4268	

```
Node  Level      Defl      Rotation   Soil Pressure Bending     Shear
       [m]       [mm]        [rad]          [kN/m²]   [kNm]       [kN]


   8  -2.3333   -1.1270 -553.19E-6    1  -11.270   14.365    -1.9848
   9  -2.6667  -0.94641 -530.05E-6    1  -9.4641   14.651   0.088601
  10  -3.0000  -0.77359 -506.95E-6    1  -7.7359   14.306     1.8086
  11  -3.3333  -0.60833 -484.82E-6    1  -6.0833   13.445     3.1297
  12  -3.6000  -0.48127 -468.29E-6    1  -4.8127   12.465     4.0622
  13  -3.8667  -0.35845 -453.15E-6    1  -3.5845   11.279     4.7340
  14  -4.1333  -0.23945 -439.62E-6    2  -7.9817   9.9400     5.6593
  15  -4.4000  -0.12382 -428.01E-6    2  -4.1272   8.2606     6.6280
  16  -4.6667 -0.010979 -418.66E-6    2 -0.36595   6.4051     6.9874
  17  -4.9333  0.099683 -411.69E-6    2   3.3228   4.5340     6.7509
  18  -5.2000   0.20880 -407.02E-6    2   6.9599   2.8046     5.9283
  19  -5.4667   0.31694 -404.37E-6    2   10.565   1.3722     4.5263
  20  -5.7333   0.42460 -403.26E-6    2   14.153  0.39059     2.5489
  21  -6.0000   0.53209 -403.02E-6    2   17.736 0.012827 -0.0022844

- The letter "P" next to a result indicates that the effective earth pressure is greater than 0.99 times the
passive limit, but within the convergence pressure limit.
```

EXTREME values so far:-

```
  Deflections          Rotations          Moments         Shears
  Min      Max       Min        Max        Min     Max      Min     Max
 [mm]     [mm]      [rad]      [rad]      [kNm]   [kNm]    [kN]    [kN]
-2.5348 0.53209 -624.01E-6 -403.02E-6 -14.979 14.651 -22.500 6.9874
```

RESTRAINT FORCES

```
No.  Node Lateral Moment
           force

           [kN]   [kNm]
   1    1     0.0 14.979
```

Titles

Job No.:	233492
Job Title:	Varley Street Mancheter
Sub-title:	15kN Lateral Design
Calculation Heading:	DA1-C2
Initials:	MG
Checker:	
Date Saved:	02-Feb-2023
Date Checked:	
Notes:	
File Name:	4. DA1-C2.alw
File Path:	C:\Users\martin.grainey\Documents

General Data

Number of increments = 1
Increment applied loads only
Standard analysis type

Convergence Control

Maximum number of iterations = 300
Maximum displacement error [mm] = 0.0010000
Maximum pressure error [kN/m²] = 0.10000
Damping coefficient = 1.0000
Maximum incremental deflection [m] = 2.0000

Partial Factors

Partial Factor Set	Variable Load (Rest./Dist.)	Permanent Load (Rest./Dist.)	Unit Weight	Drained Cohesion	Undrained Cohesion	Shear Angle
BS EN 1997-1:2004 (EC7 - UK) DA1-2	0.000000/ 1.300000	1.000000/ 1.000000	1.000000	1.250000	1.400000	1.250000

Soil Data

Elastic-plastic soils
Factor on soil E value: 0.8000

No.	Level	E	Unit wt.	Phi	Factored Kq	Factored Kc	c(top)	dc/dz
	[m]	[kN/m²]	[kN/m³]	[deg]			[kN/m²]	[kN/m²/m]
1	0.000000	7500.0	18.000	24.000	-	-	0.0	0.0
2	-4.000000	25000.	19.000	24.000	-	-	0.0	0.0

Calculated K_q and K_c Values

Node	Z/D	K_q	K_c
1	0.0	2.2108	4.6038
2	0.55556	2.5161	8.0369
3	1.1111	2.7714	10.429
4	1.6667	2.9880	12.191
5	2.2222	3.1742	13.543
6	2.7778	3.3360	14.614
7	3.3333	3.4778	15.482
8	3.8889	3.6031	16.201
9	4.4444	3.7147	16.805
10	5.0000	3.8147	17.321
11	5.5556	3.9047	17.766
12	6.0000	3.9706	18.080
13	6.4444	4.0317	18.363
14	6.8889	4.0884	18.620
15	7.3333	4.1413	18.853
16	7.7778	4.1907	19.067
17	8.2222	4.2369	19.263
18	8.6667	4.2803	19.443
19	9.1111	4.3210	19.610
20	9.5556	4.3594	19.764
21	10.000	4.3956	19.907

Node	Z/D	K_q	K_c

Sections

Name	Input Type	Description	Material	Class	Effective Width [m]	EI [kNm²]
Section 1	Wizard Generated	STD%C%600	Concrete		0.60000	208900.

Pile Properties

Level [m]	Section
0.0	Section 1

Pile base at -6.000000 m

Applied Loads and Displacements

No.	Level [m]	Force [kN]	Moment [kNm]	Displacement [mm]
1	0.0	15.000	0.0	0.0

Restraints

No.	Node	Lateral Stiffness [kN/m]	Rotational Stiffness [kNm/rad]
1	1	0.0	25000.

Geometry and Initial state

Node	Level [m]	Soil	EI [kNm2]	Effective Width [m]	Water Pressure [kN/m²]	Soil Disp [mm]
1	0.0	1	208900.	0.60000	0.0	0.0
2	-0.33333	1	208900.	0.60000	3.3333	0.0
3	-0.66667	1	208900.	0.60000	6.6667	0.0
4	-1.0000	1	208900.	0.60000	10.000	0.0
5	-1.3333	1	208900.	0.60000	13.333	0.0
6	-1.6667	1	208900.	0.60000	16.667	0.0
7	-2.0000	1	208900.	0.60000	20.000	0.0
8	-2.3333	1	208900.	0.60000	23.333	0.0
9	-2.6667	1	208900.	0.60000	26.667	0.0
10	-3.0000	1	208900.	0.60000	30.000	0.0
11	-3.3333	1	208900.	0.60000	33.333	0.0
12	-3.6000	1	208900.	0.60000	36.000	0.0
13	-3.8667	1	208900.	0.60000	38.667	0.0
14	-4.1333	2	208900.	0.60000	41.333	0.0
15	-4.4000	2	208900.	0.60000	44.000	0.0
16	-4.6667	2	208900.	0.60000	46.667	0.0
17	-4.9333	2	208900.	0.60000	49.333	0.0
18	-5.2000	2	208900.	0.60000	52.000	0.0
19	-5.4667	2	208900.	0.60000	54.667	0.0
20	-5.7333	2	208900.	0.60000	57.333	0.0
21	-6.0000	2	208900.	0.60000	60.000	0.0

Output for load increment 1

Iteration	Max Inc Disp [mm]	at node	Disp error [mm]	Pressure error [kN/m²]
9	2.33	1	0.0004	0.00

- The file is not completely converged till the specified tolerance limit.

Node	Level [m]	Defl [mm]	Rotation [rad]	Soil	Pressure [kN/m²]	Bending [kNm]	Shear [kN]	
1	0.0	-2.3272	-546.38E-6	1	-3.3162	0.0	0.0	P
1	0.0					-13.660	-19.500	
2	-0.33333	-2.1420	-563.08E-6	1	-6.7095	-7.2701	-18.497	P
3	-0.66667	-1.9529	-569.94E-6	1	-14.781	-1.3279	-16.348	P
4	-1.0000	-1.7630	-568.11E-6	1	-17.630	3.6288	-13.107	
5	-1.3333	-1.5750	-559.30E-6	1	-15.750	7.4103	-9.7693	
6	-1.6667	-1.3908	-545.30E-6	1	-13.908	10.142	-6.8035	
7	-2.0000	-1.2118	-527.68E-6	1	-12.118	11.946	-4.2009	

```
Node  Level     Defl      Rotation   Soil Pressure Bending    Shear
       [m]      [mm]        [rad]         [kN/m²]   [kNm]      [kN]


   8  -2.3333   -1.0392 -507.83E-6    1  -10.392   12.942    -1.9499
   9  -2.6667  -0.87341 -486.94E-6    1  -8.7341   13.246  -0.037246
  10  -3.0000  -0.71459 -466.04E-6    1  -7.1459   12.967     1.5508
  11  -3.3333  -0.56262 -445.96E-6    1  -5.6262   12.212     2.7717
  12  -3.6000  -0.44573 -430.93E-6    1  -4.4573   11.338     3.6347
  13  -3.8667  -0.33268 -417.15E-6    1  -3.3268   10.274     4.2574
  14  -4.1333  -0.22312 -404.81E-6    2  -7.4375   9.0673     5.1185
  15  -4.4000  -0.11663 -394.22E-6    2  -3.8877   7.5437     6.0245
  16  -4.6667 -0.012694 -385.67E-6    2 -0.42313   5.8542     6.3694
  17  -4.9333  0.089254 -379.30E-6    2   2.9751   4.1466     6.1653
  18  -5.2000   0.18979 -375.03E-6    2   6.3262   2.5660     5.4211
  19  -5.4667   0.28943 -372.60E-6    2   9.6478   1.2554     4.1432
  20  -5.7333   0.38863 -371.58E-6    2   12.954  0.35633     2.3351
  21  -6.0000   0.48768 -371.36E-6    2   16.256 0.010010 -0.0017827

- The letter "P" next to a result indicates that the effective earth pressure is greater than 0.99 times the
passive limit, but within the convergence pressure limit.
```

EXTREME values so far:-

```
  Deflections          Rotations          Moments         Shears
   Min     Max       Min         Max       Min    Max      Min    Max
  [mm]    [mm]      [rad]       [rad]     [kNm]  [kNm]    [kN]   [kN]
-2.3272 0.48768 -569.94E-6 -371.36E-6 -13.660 13.246 -19.500 6.3694
```

RESTRAINT FORCES

```
No.  Node Lateral Moment
            force

           [kN]   [kNm]
  1    1     0.0 13.660
```

E. Structural Design

Geotechnical Analysis of Lateral Loads

There is a requirement for up to 15kN lateral load on the piles.

The lateral loads have been analysed on the pile section proposed considering the level of fixity offered by the pile arrangement. The lateral load analysis has been undertaken using OASYS Alp finite difference modelling software. Computer output files are attached and the resulting force acting on the pile is shown below.

Design Case	Pile Diameter (mm)	Characteristic Lateral Load (kN)	Characteristic Moment (kNm)	Design Moment (kNm)			Design shear, (kN)		
				SLS	C1	C2	SLS	C1	C2
1	600	15	-	10	15	14	15	23	20

Structural Design

Lengths of reinforcement are taken to sufficient depth to dissipate the bending moment acting on the pile. The computer programme 'OASYS Adsec' has been used to design the steel reinforcement in the piles. Computer output files are attached to this report.

Design Case	Pile Diameter (mm)	Axial (kN)	Design Moment (kNm)	Reinforcement Required
1	600	Variable	15	6 B20 × 6.00m, 450mm OD w/ 8mm helical @ 300mm c/c

Job number	233492
Job title	Varley Street Manchester
Subtitle	Section 1
Calculation heading	Structural Cage Design
By	MG
Checked by	SAS

1 Units

The following units are used throughout this calculation.

Force	kN	*Area*	mm^2
Length	m	*Second moment of area*	mm^4
Section dimensions	mm	*Section modulus*	mm^3
Stress	N/mm²	*Area per unit length*	mm^2/m
Strain	ε	*Angle*	°
Moment	kNm	*Axial stiffness*	kN
Curvature	ε/m	*Bending stiffness*	kNm^2
Density	t/m^3		

2 Design code

The following design code is used: Eurocode 2 (part 1), National Annex: UK

3 Materials

The following materials are used in these calculations.

3.1 Concrete

- C30/37

Strength, f_{ck}:	30 N/mm²
Elastic modulus, E:	32837 N/mm²
Density, ρ:	2.4 t/m^3

3.2 Reinforcement

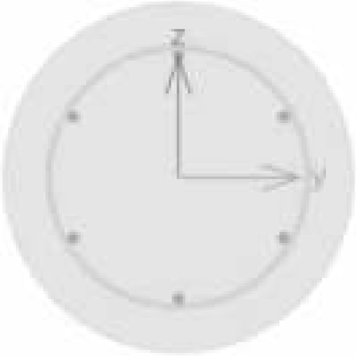
- 500B

Strength, f_{yk}:	500 N/mm²

Elastic modulus, E:	200e3 N/mm²
Density, ρ:	7.85 t/m^3

4 Sections

4.1 Section 1



Definition		*Reinforcement*	
Material	Concrete	*Type*	*Description*
Grade	C30/37	*LINK*	B8
Profile	STD C(MM) 600.	*PERIMETER*	6B20
Cover	75mm		

4.1.1 Analysis

4.1.1.1 ULS Results Summary

Case	*F_x (kN)*	*M_{yy} (kNm)*	*M_{zz} (kNm)*	*Utilisation*	*Status*
1	0	15	0	8%	✓
2	0	0	15	8%	✓

F. Settlement Calcs

Project Title :	Varley Street Mancheter		
Job No :	233492	**Date:**	05/06/2024
Client :	ISG	**Calcs By:**	MG
Pile Settlement		**Checked :**	SAS

PILE SETTLEMENT CALCULATION

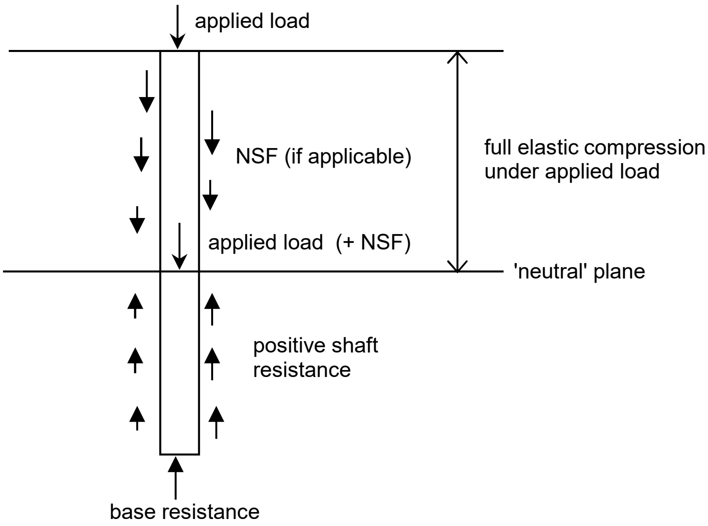
Settlement of an individual pile may be calculated as

$$r = (W_s + 2W_b)\, L / 2\, A_s\, E_p \quad + \quad p\, W_b\, B\, (1 - n^2)\, I_p / 4\, A_b\, E_b$$

(Pile Design and Construction Practice - M J Tomlinson)

where L is that length of pile providing positive resistance to loading

and Ws is applied load + NSF applied to pile shaft at top of L


applied load
NSF (if applicable)
full elastic compression
under applied load
applied load (+ NSF)
'neutral' plane
positive shaft
resistance
base resistance

PPL	0.00	mOD
COL	0.00	mOD
Estimated Length	-31.75	m
Resistance from:	-28.00	mOD

Ws = see above
Wb = base load
total pile length = -31.75 m
pile length in Free/NSF zone = 28 m
pile length providing positive resistance L = -59.75 m

B	=	pile diameter	=	0.600	m
As	=	Ab	=	0.283	m2
Ep	=	pile modulus	=	28000	MPa
n	=	Poisson's ratio	=	0.30	
Ip	=	influence factor	=	0.5	
Eb	=	soil modulus at toe	=	100	MPa

Applied load at pile head = 1150 kN
pile elastic compression in NSF zone - re = 4.07 mm
NSF = 0 kN
load at neutral plane = applied load at pile head + NSF load
= 1150 kN
positive shaft friction Ws = 1035 kN Allow for 90% of pile load to be carried on shaft.
and Wb (load transfer to pile base) = 115 kN
r - positive resistance pile length = -4.77 + 0.8721 mm
= -3.90 mm
r = re + r
= 4.07 + -3.90
r = 0.2 mm

G. Pile Loads

Available Pile Diameters (mm)			
600mm	0	0	0

Significance
0.25

				Pile Loads						Lateral Loads			PILE LENGTHS					
				SLS F_{rep}		Combination 1 $E_{d,STR}$		Combination 2 $E_{d,GEO}$					Compression			Tension		
Pile No.	Pile Diameter (mm)	PPL (mAOD)	COL (mAOD)	Max. Case	Min. Case	Max. Case	Min. Case	Max. Case	Min. Case	SLS	Combination 1	Combination 2	**PILE LENGTH (SHAFT) (m)**	**PILE LENGTH (Combination 1) (m)**	**PILE LENGTH (Combination 2) (m)**	**PILE LENGTH (Combination 1) (m)**	**PILE LENGTH (Combination 2) (m)**	**Pile Length (m)**
P01	600mm	0	56.208	1150	-	1639	-	1323	-	15	23	20	3.00	1.75	3.75			3.75
P02	600mm	0	56.208	1150	-	1639	-	1323	-	15	23	20	3.00	1.75	3.75			3.75
P03	600mm	0	56.208	1150	-	1639	-	1323	-	15	23	20	3.00	1.75	3.75			3.75
P04	600mm	0	56.208	1150	-	1639	-	1323	-	15	23	20	3.00	1.75	3.75			3.75
P05	600mm	0	56.208	1150	-	1639	-	1323	-	15	23	20	3.00	1.75	3.75			3.75
P06	600mm	0	56.208	1150	-	1639	-	1323	-	15	23	20	3.00	1.75	3.75			3.75
P07	600mm	0	56.208	1150	-	1639	-	1323	-	15	23	20	3.00	1.75	3.75			3.75
P08	600mm	0	56.208	1150	-	1639	-	1323	-	15	23	20	3.00	1.75	3.75			3.75
P09	600mm	0	56.633	1150	-	1639	-	1323	-	15	23	20	3.00	1.75	3.75			3.75
P10	600mm	0	56.633	1150	-	1639	-	1323	-	15	23	20	3.00	1.75	3.75			3.75
P11	600mm	0	56.633	1150	-	1639	-	1323	-	15	23	20	3.00	1.75	3.75			3.75
P12	600mm	0	56.633	1150	-	1639	-	1323	-	15	23	20	3.00	1.75	3.75			3.75
P13	600mm	0	56.633	1150	-	1639	-	1323	-	15	23	20	3.00	1.75	3.75			3.75
P14	600mm	0	56.633	1150	-	1639	-	1323	-	15	23	20	3.00	1.75	3.75			3.75
P15	600mm	0	56.633	1150	-	1639	-	1323	-	15	23	20	3.00	1.75	3.75			3.75
P16	600mm	0	56.633	1150	-	1639	-	1323	-	15	23	20	3.00	1.75	3.75			3.75

H. Pile Installation Schedule

PILE SCHEDULE

Project Title:	Varley Street Mancheter		
Job No:	233492	**Checked by:**	SAS
Client:	ISG	**Schedule:**	C1
Schedule by:	MG	**Drawing Ref:**	Clancy Consulting,VAR-CCL-ZZ-00-DR-S-40002, Rev C01
Date:	05/06/2024		
Plot / Title:	Bearing Pile Schedule		

Notes:

Concrete Grade	**C30/37**	**DC-2**

VAN ELLE PILING
Summit Close
Kirkby in Ashfield
NOTTINGHAMSHIRE
NG17 8GJ
www.van-elle.co.uk

																Frep Loads				
Pile Ref	**Pile Diameter**	**Socket Length**	**Main Reinforcement**				**Helical/Links**				**Gewi Standard Threadbar**				**De-bonding**	**Axial Load**	**Shear**	**Tension**	**PPL**	**COL**
	(mm)	**(m)**	**No**	**Type**	**x**	**Length**	**OD**	**Type**	**@**	**Pitch**	**No**	**Type**	**x**	**Length**	**(m)**	**(kN)**	**(kN)**	**(kN)**	**(mOD)**	**(mOD)**
P01	600	3.75	6	B20	x	6.00	450	B8	@	300					TBC	1150.0	15.0	-	0.000	56.208
P02	600	3.75	6	B20	x	6.00	450	B8	@	300					TBC	1150.0	15.0	-	0.000	56.208
P03	600	3.75	6	B20	x	6.00	450	B8	@	300					TBC	1150.0	15.0	-	0.000	56.208
P04	600	3.75	6	B20	x	6.00	450	B8	@	300					TBC	1150.0	15.0	-	0.000	56.208
P05	600	3.75	6	B20	x	6.00	450	B8	@	300					TBC	1150.0	15.0	-	0.000	56.208
P06	600	3.75	6	B20	x	6.00	450	B8	@	300					TBC	1150.0	15.0	-	0.000	56.208
P07	600	3.75	6	B20	x	6.00	450	B8	@	300					TBC	1150.0	15.0	-	0.000	56.208
P08	600	3.75	6	B20	x	6.00	450	B8	@	300					TBC	1150.0	15.0	-	0.000	56.208
P09	600	3.75	6	B20	x	6.00	450	B8	@	300					TBC	1150.0	15.0	-	0.000	56.633
P10	600	3.75	6	B20	x	6.00	450	B8	@	300					TBC	1150.0	15.0	-	0.000	56.633
P11	600	3.75	6	B20	x	6.00	450	B8	@	300					TBC	1150.0	15.0	-	0.000	56.633
P12	600	3.75	6	B20	x	6.00	450	B8	@	300					TBC	1150.0	15.0	-	0.000	56.633
P13	600	3.75	6	B20	x	6.00	450	B8	@	300					TBC	1150.0	15.0	-	0.000	56.633
P14	600	3.75	6	B20	x	6.00	450	B8	@	300					TBC	1150.0	15.0	-	0.000	56.633
P15	600	3.75	6	B20	x	6.00	450	B8	@	300					TBC	1150.0	15.0	-	0.000	56.633
P16	600	3.75	6	B20	x	6.00	450	B8	@	300					TBC	1150.0	15.0	-	0.000	56.633

I. Designers Risk Assessment

CONSTRUCTION DESIGN MANAGEMENT REGULATIONS STATEMENT

The Client and Principal Designer for this project are subject to certain duties under the CDM (2015) Regulations. It is the duty of the Principal Designer to ensure that the client is aware of these duties prior to commencing the design. Van Elle is responsible for an elemental part of the design only and is not the Principal Designer. This design has been undertaken on the premise that this duty has been carried out by the Principal Designer, and no separate approach, in respect of this element design, by Van Elle is required.

In accordance with the CDM (2015) Regulations any specific design residual risks and construction sequences relevant to this design are communicated. As stated in the CDM (2015), whilst we have assessed the design risks for our works we have only listed the risks we consider significant to the design and which we consider are not likely to be obvious to a competent contractor or other designer. It is the responsibility of the Client and the Principal Designer to ensure a competent Principal Contractor is appointed for these works. The residual risks should be added to any relevant construction drawing or method statements and copied to relevant designers and contractors on site.

Project Title :	Varley Street, Manchester	**Rev:**	C1
Job No :	233492	**Date:**	05/06/2024
Client :	ISG	**Calcs by :**	MG
Designers Risk Assessment (DRA)		**Checked :**	SAS

	Probability	**People (P) Severity**	**Environment (E) Severity**	**Structure (S) Severity**	**Risk = Probability x Severity**	
Interpretation	1 - Improbable Occurrence	1 - No First Aid Required	1 - Negligible - No remedial measures required	0 - Negligible - Hairline Cracks >0.1mm	Minimal Risk	1 - 4
	2 - 1 in 100 years	2 - First Aid Only Required	2 - Minor incident - non-reportable	1 - Very Slight - Fine cracks, treated during decoration	Tolerable Risk	5 - 9
	3 - 1 in 10 years	3 - 3 Day Injury as defined in RIDDOR	3 - Moderate incident - reportable	2 Slight - Cracks easily filled in/externally	Moderate Risk	10 - 14
	4 - Annually	4 - Serious Injury as defined by RIDDOR	4 - Significant environmental damage	3 - Moderate - Cracks, doors/windows sticking, pipe fracture, watertightness impaired	Substantial Risk	15 - 19
	5 - Monthly	5 - Fatality	5 - Major environmental incident	4 - Severe - Extensive repair required	Intolerable Risk	= 20+
				5 - Very Severe - Major repair, involving complete and partial rebuilding	Intolerable Risk	= 20+

ID	**Activity/Element**	**Hazard/Risk**	**What is at risk?**	**Probability**	**Severity**	**Risk**	**Control Measures**	**Residual Probability**	**Residual Risk**	**Risk Owner**
1	Sequence of construction.	Unsafe working conditions (restricted access, rail, highways etc).	P	4	4	16	Plan for safe, practical and economic working. Pre-contract planning meetings to be undertaken.	3	12	Client
2	Working platforms.	Rig overturning.	P&S	4	5	20	Design a suitable working platform and issue a FPS Working Platform Certificate (WPC).	3	15	Client
3	Underground and/or overground services.	Damaged infastructure, delays, injury & fatality.	All	4	5	20	Positively identify services & issue a permit to dig/work.	3	15	Client
4	Unexploded explosive ordnance (UXO).	Project delays, explosions, fatalities.	All	3	5	15	Client to undertake relevant surveys to manage UXO risk and implement any mitigation prior to the piling works.	2	10	Client
5	Design assumptions	Assumptions not verified.	All	4	4	16	Verify design assumptions.	3	12	Client
6	Unforseen Ground Conditions	Actual ground conditions not as per the design assumptions.	All	4	5	20	Client to undertake adequate site investigation and any additional site investigation (or provide any documentation) requested by Van Elle.	3	15	Client
7	Ground movements behind retaining walls.	Damage and or instability of adjacent structures.	P&S	3	4	12	Van Elle to provide wall deflections to client for holistic analysis.	2	8	Client
8	Anchorage	Structural failure.	S	3	4	12	Client to design anchorage for the super structure.	2	8	Client
9	Integrity of adjacent shaft	Damage to adjacent shaft	All	4	4	16	Client to ensure the piling works do not impact the adjacent shaft and surrounding infrastructure.	2	8	Client

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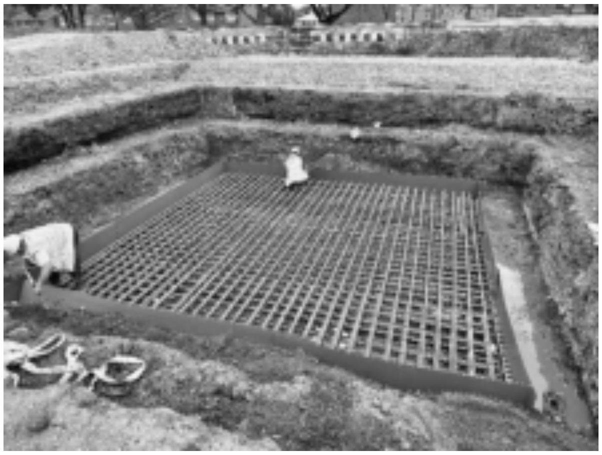
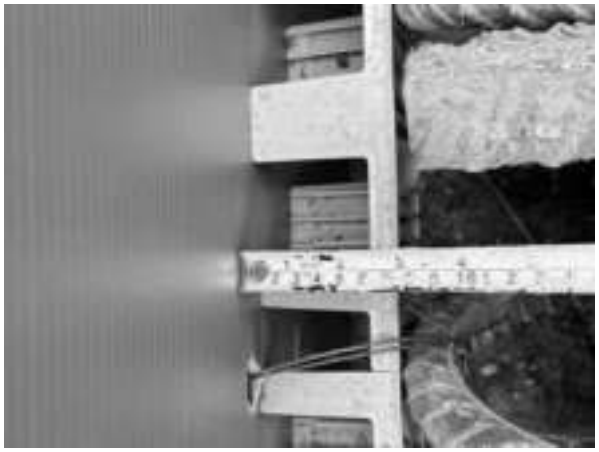
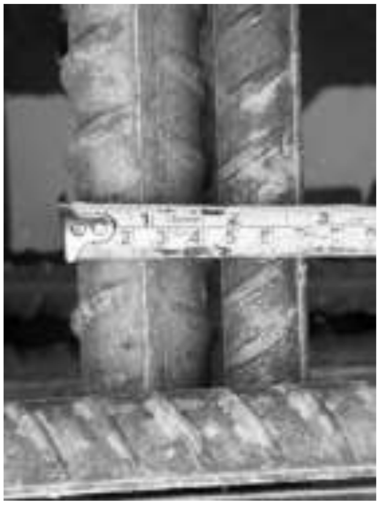
Appendix J Site Inspection Report

Site Inspection Report

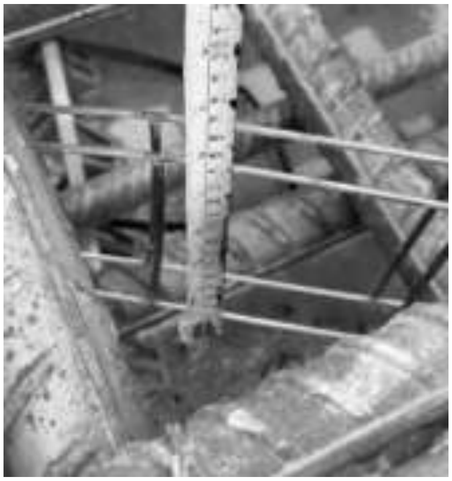
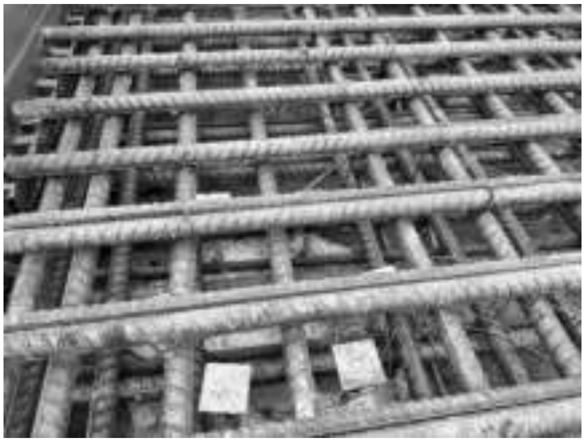
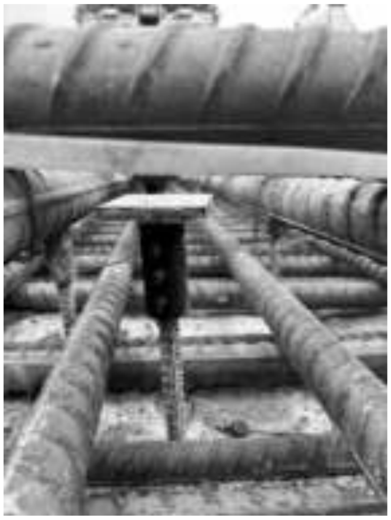
Project Reference	1-21628
Project Name	Varley Street SEND School
Inspection By	Naveera Fasahat
Inspection Date	19/08/2024
Location / Site Area	Varley Street SEND School, Miles Platting, East Manchester

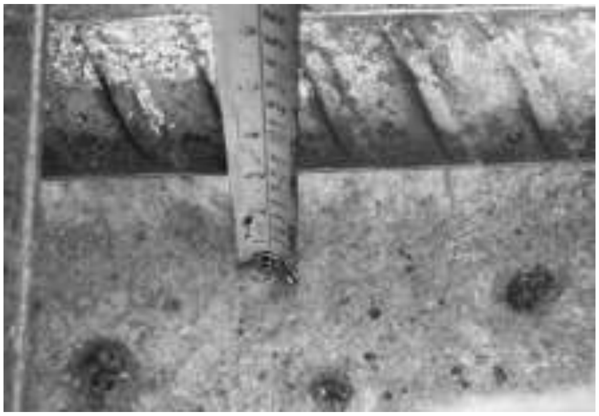
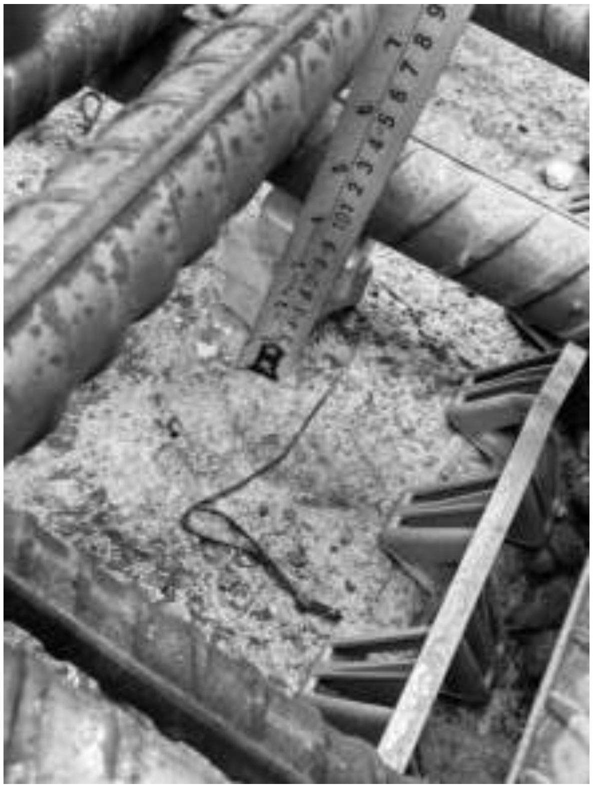
Inspection Notes

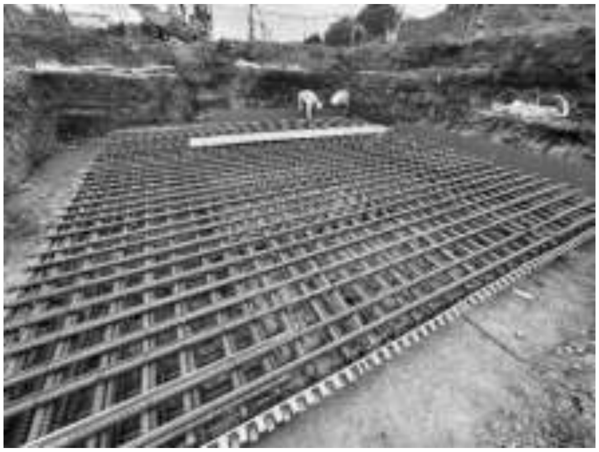
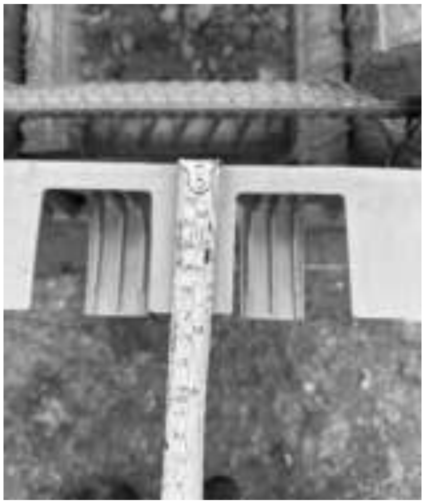
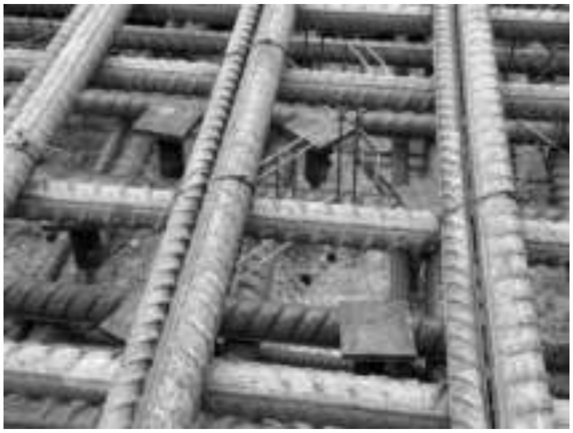
The following is a record of observations and discussions during our site visit on the above date. The site walk-over was with James Hardy Jones (ISG). The purpose of the visit was to inspect the mine shaft capping slabs prior to concrete pour.

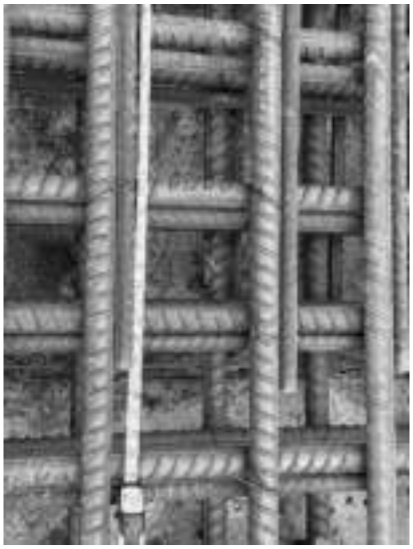
WORKS IN PROGRESS	OBSERVATIONS	ACTIONS
	- **SHAFT 1** - Shaft location 1 overall view. - Overcast skies. - Cage fix complete and shutter fix in progress. Backfill also in progress.	- **No action**
	- **SHAFT 1** - Concrete side cover observed as 75 mm.	- **No action**
	- **SHAFT 1** - Main bar and edge U-bars diameters.	- **No action**

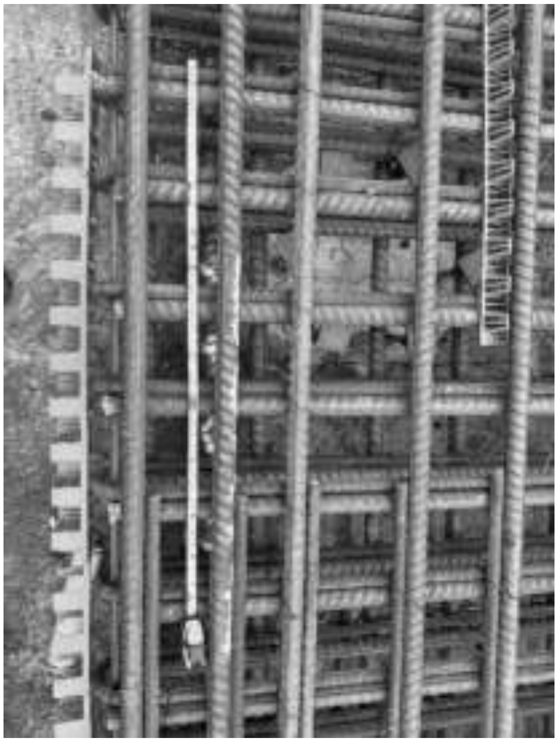
WORKS IN PROGRESS	*OBSERVATIONS*	*ACTIONS*
	- **SHAFT 1** - Edge U-bar lengths.	- **No action**

WORKS IN PROGRESS	*OBSERVATIONS*	*ACTIONS*
	• **SHAFT 1** • Alternative to chair bars used to provide top and bottom reinforcement spacing.	• **No action**
 	• **SHAFT 1** • Ancon MBT headed anchors over pile anchor bars.	• **No action**

WORKS IN PROGRESS	*OBSERVATIONS*	*ACTIONS*
 	• **SHAFT 1** • Initially insufficient bottom cover found during inspection.	• **Mesh raised to achieve required bottom cover, confirmed and verified. (See second photo)**

WORKS IN PROGRESS	*OBSERVATIONS*	*ACTIONS*
	• **SHAFT 2** • Overall view of Shaft Location 2. • Overcast with light rain. • Cage fix in progress, followed by shutter fix and backfill prior to pour.	• **No action**
	• **SHAFT 2** • Concrete side cover observed as 75 mm.	• **No action**
	• **SHAFT 2** • Ancon MBT headed anchors over pile anchor bars.	• **No action**

WORKS IN PROGRESS	*OBSERVATIONS*	*ACTIONS*
	- **SHAFT 2** - Capping slab bottom cover	- **No action**
 	- **SHAFT 2** - Edge U-bar lengths	- **No action**

WORKS IN PROGRESS	*OBSERVATIONS*	*ACTIONS*
 	- **SHAFT 2** - Bar spacings	- **No action**

Non-Conformance / Actions

None

Report by:	Date:
Naveera Fasahat	20/08/24
On behalf of Clancy Consulting Limited	

Appendix K Completion Report

231836

Land off Varley Street, Manchester

Factual Report

Probing, Locating, Drilling and Treatment of Former Mineshafts and Shallow Mine Workings

Van Elle
Summit Close
Kirkby-in-Ashfield
Nottinghamshire
NG17 8GJ
01773 580580

Contents

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Introduction 4
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Methodology – Drill and Grouting 6
Conclusion 8

Control Sheet

This report has been prepared for the sole benefit, use and information of ISG for the purposes set out in the instructions commissioning it. The liability of Van Elle Ltd in respect of the information contained in the report will not extend to any third party. It is now the client's responsibility to fulfil the Coal Authority's requirements with regards to the Coal Authority Permit.

Prepared by	Paul Grocott MIMMM FGS	[redacted]	Date 24/06/2024
Approved by	Dave Bourne	[redacted]	Date 24/06/2024

Introduction

ISG, in their capacity as Principal Contractor, instructed Van Elle (VE) to prepare a design and specification, and subsequently carry out the stabilisation and consolidation of 2 former mine shafts (CA References 386399-016 and 386399-0021) as well as the stabilisation of shallow mine workings at the site of a new SEN School off Varley Street, Manchester. found during investigation works.

The stabilisation was to be carried out by Drilling and Grouting, an industry wide term, used to describe the processes identified and described below.

The site is located between Sawley Road (NW), Vickers Street (NE), Nelson Street (SW) and James Street (SE) in Manchester. The site is bordered by residential properties on the North West side and industrial buildings on the South West and South East sides.

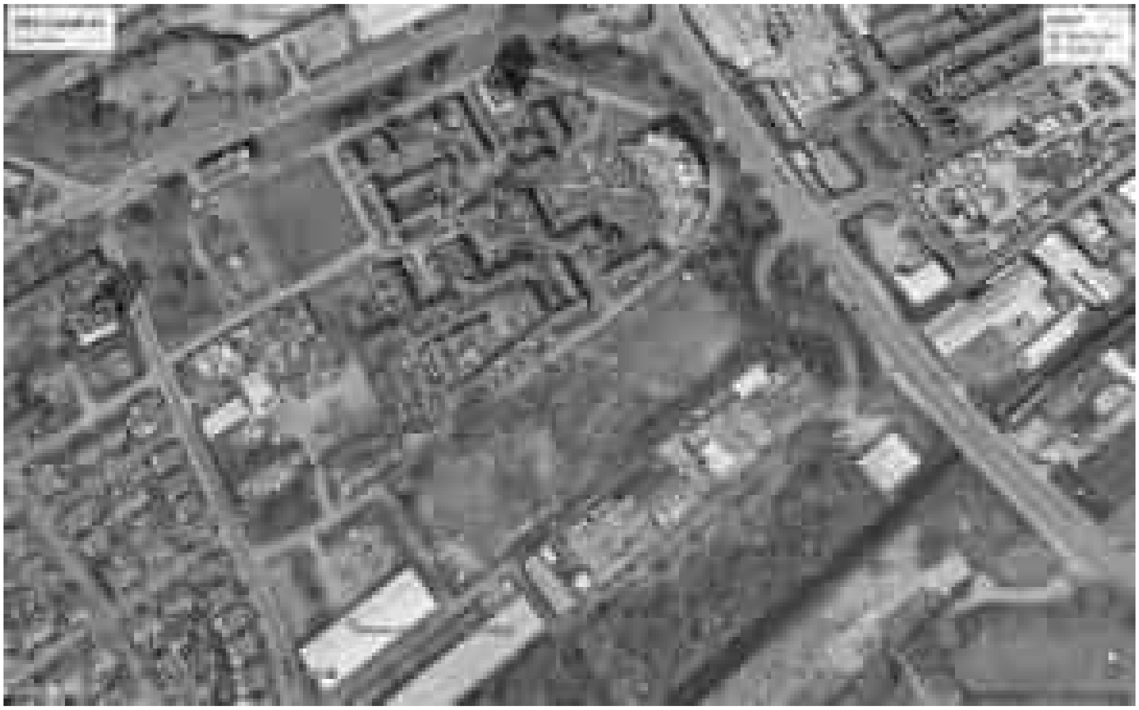

Figure 1: Site plan

As part of the pre-construction phase of the redevelopment, several desk top studies, risk assessments and a site investigation were commissioned to assess the land and to identify any risk posed by a former mining environment given the areas history.

The works were carried out by LK Group and reported within their Report reference: LKC 22 1670 dated June 2023, which concluded that both shafts would need to be accurately located and treating; and, that the building footprint would need to be treated to stabilise and consolidate the shallow mine workings risk.

All works were carried out in line with recommendations given in CIRIA Publication 758D and Van Elle Specification dated November 2023 (see Appendix 1)

The works were carried out between 26th March and 29th April 2024. Works began with the treatment of the two shafts in line with the Coal Authority's recommendations. These works involved the drilling of 6No. treatment / testing boreholes and 9No. probe holes due to the setting out of the shafts being incorrect (based on CA Coordinates).

The shaft works were carried out from the 26th March and were completed on 8th April; the main drill and grout works were then started.

Methodology – Drill and Grouting of Former Mine Shafts

Due to information ascertaining to the backfilling of former mine shafts being largely unknown; it is necessary to approach the drilling and subsequent grouting of former shafts with heightened caution.

This is due to the fact a shaft may be completely voided, backfilled with unconsolidated materials (which may in turn be highly saturated), partial backfilled with building rubble, head gear and steel and any other readily available materials when the shaft was decommissioned.

It is therefore recommended that all former shafts with no formal records of backfilling be treated by the injection of cementitious grout under pressure to stabilise the shaft column and prevent a catastrophic collapse.

Guidance of how to treat former shafts is contained within section 14.7 of CIRIA Publication 758D 2019.

To reduce the risk to the drill rig and its operatives a shaft safety platform must be placed above the shaft to allow the grouting to take place and also to prevent the rig falling into the shaft in the case of a collapse.

The safety platform consists of a series of steel H Girders bolted together to form a 12m long (as can be seen below) "bailey bridge" which sits on the spanning the shaft. Each individual section is 2.280m by 4.0m long are bolted together using 24 no. M36 Grade 10.9 HSFG Bolts. (see figure 2 below).

Once the frame is in place railways sleepers and track boards are placed on top to create a working platform. Each operative is also secured to a stable point outside of the shafts zone of influence by fall arrestor and full body harness.

The works then involved the drilling in of 101mm steel casing doe to the bottom of the shaft. The drilling was then advanced a further 5m into the base of the shaft to prove the bottom was not a staging (an artificial base) so that grouting could commence.

All works were carried out by a Casagrande C6 rotary percussive drill rig, using water as the flushing medium to assist in the drilling through the shaft column (and any backfilled materials) and to reduce the risk of releasing perched mine gases.

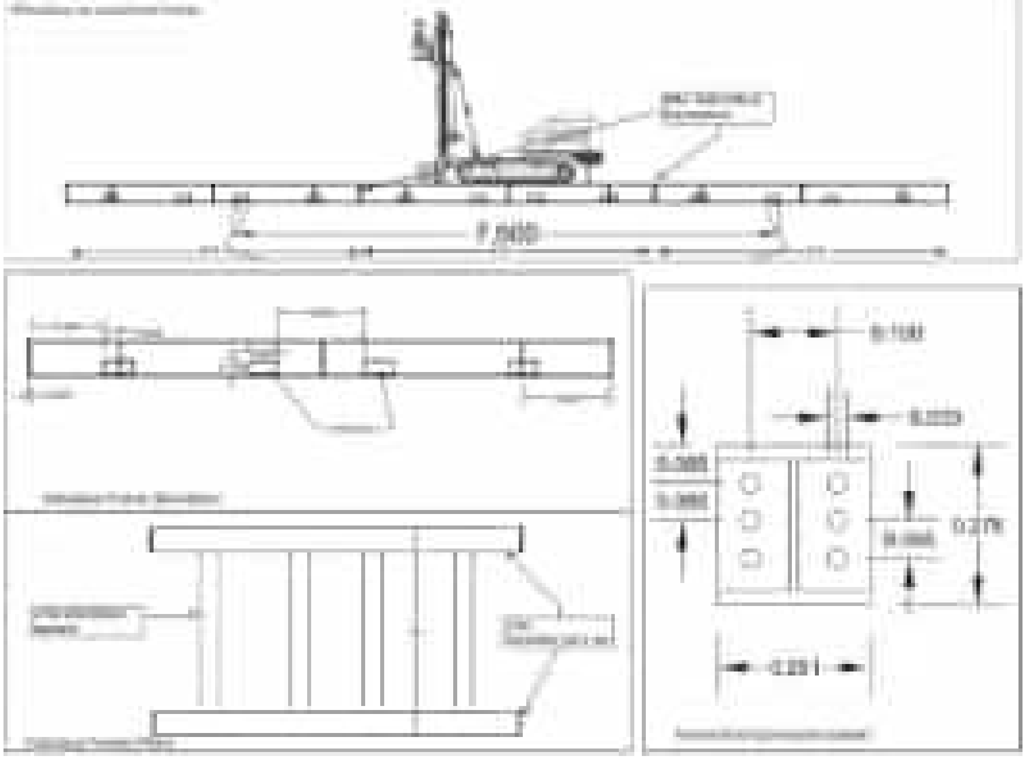

Figure 2: Shaft Safety Platform

The drill crew set up the drill rig on the safety platform and began drilling with the initial lengths of 101mm casing installed on the mast. The driller then commenced drilling and installed the first lengths casing into the ground. With the initial casing lengths installed, the driller split off the drill head from the casing, then raising the drill head to a suitable position for accepting the next length of the casing. This process was repeated until the casing reached the base of the mineshaft.

Once the casing was installed, smaller diameter drill rods (T38) were added to the mast and a 72mm drill bit fitted to drill down 5m into the base of the shaft to check for a false bottom.

Once the base was proven, the entire drill string was then removed, and the borehole deemed complete and ready for grouting.

During the drilling process, accurate logs of depths, loss of flush, and materials encountered were recorded. Logs can be found in Appendix 2.

The grout consisted of 10:1 PFA / OPC cementitious grout, mixed and injected through a P11 Putzmeister Grout Pump.

Methodology – Drill and Grouting

The works involved the drilling of 101mm/72mm diameter boreholes to access the underlying workings/geology to ascertain if treatment was required.

All works were carried out by a Casagrande C6 rotary percussive drill rig, using water as the flushing medium to assist in the drilling through hard strata and to reduce the risk of releasing perched mine gases.

The drill crew set up the drill rig at the drilling location with the initial lengths of 101mm casing installed on the mast. The driller then commenced drilling and installed the first lengths casing into the ground. With the initial casing lengths installed, the driller split off the drill head from the casing, then raising the drill head to a suitable position for accepting the next length of the casing. This process was repeated until the casing reached rockhead, where it was socketed in to give a tight seal, thus preventing grout loss.

Once the casing was installed to rockhead and sealed, the smaller diameter drill rods (T38) were added to the mast and a 72mm drill bit fitted to drill down to the target seam.

Once the target seam had been reached and an open borehole achieved, the borehole was further cleaned out by moving the rods up and down on the mast, allowing any materials that had spalled into the borehole to be removed.

The entire drill string was then removed, and the borehole deemed complete and ready for grouting.

During the drilling process, accurate logs of depths, loss of flush, geology and any workings encountered were recorded. Logs attached and can be found in Appendix 2.

Grouting works commenced once there were enough holes drilled out within the treatment area to permit and accommodate the batching of a full grout mix with minimal wastage.

The grout consisted of 12:1 PFA / OPC cementitious grout, mixed and injected through a Putzmeister P11 Self Powered Grout pump. Grout was pumped to each borehole through a series of 3" and 2" Grout lines. All boreholes were grouted to surface.

Summary of Works Carried Out

Shaft 386399-001

Shaft 386399-001 was set up and drilled on 26th March 2024 with the base of the shaft being confirmed at 73m with poor unconsolidated backfill within. Treatment to stabilise the shaft column commenced on the 27th with the primary grouting borehole accepting 26.18 tons.

Following the primary treatment borehole, the shaft frame and rig were moved to drill the secondary hole. Due to the original position being set out (as per provided Coal Authority Coordinates) on the very edge of the shaft, the next 2 probe positions were outside the shaft. Borehole 4 eventually encountered the shaft once again, so drilling down to the base could recommence. As Borehole 1, the base of the shaft was found to be 73m deep, again through soft backfill with evidence of grout. The secondary borehole accepted 9.625 tons of grout.

Again, the rig was moved, but again due to the setting out probes 5 through 11 (at 0.5m spacing) were not within the shaft column. Borehole 12 did hit the shaft and therefore the third, final and verification borehole could be drilled. This treatment / validation borehole accepted 1.76 tons. It is therefore deemed that Shaft 386399-001 has been treated in line with CIRIA 758D and is ready for capping.

Shaft 386399-016

Shaft 386399-016 was set up and drilled on 4th April 2024 with the base of the shaft being confirmed at 58m with poor unconsolidated backfill within. Treatment to stabilise the shaft column commenced on the same day with the primary grouting borehole accepting 19.8 tons.

The secondary borehole was then drilled successfully with the base again being proven to be at 58m with soft fill and evidence of grout as the backfill. This treatment hole accepted 3.63 tons of grout.

The third, final and validation borehole was again drilled within the shaft column, with the base again recorded at 58m. This treatment / validation hole accepted 1.98 tons of grout. We therefore deem that Shaft 386399-016 has been treated in line with CIRIA 758D and is ready for capping.

School Footprint Shallow Mine Workings

Works on the main drill and grout works commenced on 8th April 2024 after the works were complete on the 2 mine shafts, as per the Coal Authorities recommendations.

The area of the proposed school building was drilled on a 6m x 6m grid to an average depth of 36m. In total 170 boreholes were drilled amounting to 6, 192m with the majority of the boreholes recording no coal and solid geology. Of the 170 boreholes drilled, only 12 recorded any coal; this was unworked and on average 0.5m thick.

Given the relative nature of the underlying geology and the absence of any workings grout takes were minimal (a total of 55.25T for the entire drilling grid).

Conclusion

Shafts 386399-001 and 386399-016 were located, probed and treated in line with CIRIA 758D and we deem them ready for capping (by others) to complete their treatment.

Each shaft was backfilled with a 10:1 PFA /OPC grout to stabilise shaft column and the poorly consolidated backfill.

Van Elle are satisfied that the mineshaft has been stabilised and is ready to be capped by a reinforced shaft cap by others.

The drill and grouting exercise within the building footprint did not identify any workings and as such treatment was not required. The boreholes were backfilled with a 12:1 PFA /OPC grout to prevent any potential for coal bed gases to reach the surface.

As with all formerly mined sites, there is always a possibility of unknown mineshafts/bell pits/adits and previously formed crown holes being present on site. We would suggest that there is a watching brief whilst undertaking any excavation/earthworks on site and any changes in fill material or colour are noted and investigated.

Appendix 1:

Drill and Grout Specification

VAN ELLE
TOTAL FOUNDATION SOLUTIONS

231836

Varley Street, Manchester

Specification for Consolidation of Mine Workings with Shaft Treatment

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  1.2 Ground Conditions & Geology 4
  1.3 Purpose of the Works 4
  1.4 Permissions 4
    1.4.1 Coal Authority 4
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  2.1 Design 1
  2.2 Supervision 1
  2.3 Drilling 1
    2.3.1 Treatment Grid 1
    2.3.2 Perimeter 1
    2.3.3 Shaft treatment 1
    2.3.4 Records 1
  2.4 Grouting 2
    2.4.1 Materials & Mix 2
    2.4.2 Equipment 2
    2.4.3 Water 2
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Control Sheet

This report has been prepared for the sole benefit, use and information of ISG for the purposes set out in the instructions commissioning it. The liability of Van Elle Ltd in respect of the information contained in the report will not extend to any third party.

Prepared by	Sam Palmer	Signed S.Palmer	Date 13/07/2023
Approved by	Dave Bourne	Signed	Date 13/07/2023

1.0 Introduction

ISG, in their capacity as Principal Contractor, has instructed Van Elle (VE) to consolidate potential mine workings through a program of drilling and grouting on a 6m x 6m grid (closing to 4.25m grid if workings are encountered) to an average depth of 36m bgl or 12m of rock cover. The drilling and grouting layout is shown in Appendix 2.

The works also include treatment of 2No. mineshafts, Ref: 386399-001 (potentially partially treated) and 386399-016 (untreated), assumed 75m deep and 2.5m wide and partially backfilled. The treatment will be from the base of the shaft (plus 5m solid).

There is also a potential third mineshaft, Ref: 386399-002 which is suspected to be around 5m south west of the site boundary, which the site team will remain aware of in case it is in fact within the site boundary.

1.1 Site Location and Description

The site is located between Sawley Road (NW), Vickers Street (NE), Nelson Street (SW) and James Street (SE) in Manchester. The site is bordered by residential properties on the North West side and industrial buildings on the South West and South East sides.

1.2 Ground Conditions & Geology

The geology of the site has been summarised as superficial Devensian Till (Diamicton), underlain by the Pennine Upper Coal Measures Formation (interbedded mudstone, sandstone and siltstone), dipping 18° SW. There are two expected subcropping coal seams, both striking NW to SE: Bradford Four Foot NE and Bradford Threequarters SW. (As per Envirosolution Ltd CMRA 2022, referenced in the provided SHALLOW MINING SITE INVESTIGATION WORKS by LKC Group.)

It was therefore recommended that the seams be investigated, and if found to show evidence of workings, consolidated by drilling and grouting.

There are no known faults within the site.

1.3 Purpose of the Works

Treatment is required where less than ten times seam thickness of rock cover exists between the top of the worked seam and the base of the proposed piles/rock head.

Treatment is required to stabilise the identified mineshafts by the injection of a cementitious grout.

1.4 Permissions

1.4.1 Coal Authority

A permit to treat the workings and shafts will be obtained from the Coal Authority. A copy of the permit shall be kept on site by the foreman.

2.0 Specification

2.1 Design

A 6m grid has been superimposed on the footprint of the site. This can be reduced to a 4.25m grid if workings are encountered.

The shaft will be treated by pressure grouting from the bottom up in 2m sections. Two treatment boreholes will be drilled, with one validation borehole.

2.2 Supervision

A full time non-working foreman will be on site during the project, who will be responsible for ensuring the works comply with the specification. They will liaise with VE contract management staff on a weekly basis.

2.3 Drilling

Drilling will be carried out using hydraulic driven rotary percussive drill rig, advancing 101mm casing into the target seam to allow grouting and consolidation. 101mm diameter casing will also be advanced into the shaft to allow grouting and consolidation. Rotary percussive drilling techniques will be used with water as the flushing medium. The rigs will be fitted with a fully interlocked guard, which will be operation at all times that drilling is being carried out.

2.3.1 Treatment Grid

A treatment grid of 6m will be drilled, with boreholes extending to average 36m bgl or 12m of rock cover. This grid will be reduced to 4.25m if workings are encountered. The integrity of the boreholes within the fill/overburden shall be maintained using 101mm casing.

2.3.2 Perimeter

At the discretion of the foreman/engineer a perimeter may be installed at 3m or 1.5m centres as appropriate. This is only generally necessary if there is a significant dip within the workings.

2.3.3 Shaft treatment

The treatment boreholes will be drilled to the base of the shaft (approx. 75m deep) plus 5m into the base to ensure that the bottom is at rockhead and is not an installed staging. They will then pressure grouted under 2 bar of pressure in 2m sections from base to surface.

The validation test hole will then be drilled and grouted using the same methodology in order to ensure the shaft has been sufficiently treated.

2.3.4 Records

Full records shall be maintained during the works, showing job name and location, hole reference number, date, plant in use and crew members, inclination of borehole, daily and cumulative length drilled depth to each major change in stratum, description noting where stratum is broken, details of any voids or suspected workings and depth of completed borehole.

2.4 Grouting

2.4.1 Materials & Mix
Grout materials shall consist of Pulverised Fuel Ash and Ordinary Portland Cement, mixed at a ratio of 12:1 for the treatment grid and 10:1 for the mineshafts with a water solids ratio of no more than 40%. No thixotropic or thickening agents will be added during agitation. OPC shall comply with BS12 and PFA shall be in accordance with BS 3892: part 2. Pea gravel may be introduced if deemed necessary (where voids exceeding 500mm are encountered, as per CIRIA Guidance).

2.4.2 Equipment
Grout will be batched and pumped on site using a suitable electric mixer and pump arrangement. All plant shall be certified safe and maintained properly throughout the operation.

2.4.3 Water
A source of water will be provided to Van Elle from a hydrant with a standpipe.

2.4.4 Testing
Sets of 4 grout cubes will be taken and tested at 7-, 14- and 28-day intervals to achieve a minimum strength of 1N/mm^2 after 28 days.

The foreman shall ensure that mixes are tested regularly for flow and bleed using a Colcrete type flowmeter and graduated beaker respectively. Flows should be with the range of 300-600mm, and bleed should be no more than 2% by volume.

2.5 Testing

2.5.1 Test holes for the treatment grid
Test holes will be drilled at the site to validate the works. The position of the test holes will be chosen to correspond with the areas of the site where the highest grout takes are recorded. The position of the test holes will be indicated on the Grout borehole layout plan. All test holes will be pressurised to correspond with the amount of overburden (ie 10kN/m of overburden) for 2 minutes. The test shall be considered a pass where not more than 1t can be injected, and the pressure drops by no more than 10% for 2 minutes. Drilling and Grouting records of test holes will be kept.

2.5.2 Test holes for the mineshafts
Test holes will be drilled and will be pressurised to 2bar and held for 2 minutes. The tests shall be considered a pass where the pressure does not drop by no more than 10% for 2 minutes. Drill and Grout records of test holes will be kept.

2.5.3 Gas testing
A gas monitor shall be used throughout the consolidation program to monitor for the presence of three harmful gases, carbon monoxide (CO), hydrogen sulphide (H_2S) and Methane (CH_4). Levels of airborne Oxygen (O_2) will also be monitored. The gas alarms

have visible and aural alarms should concentrations of any of these gases touch pre-determined trigger levels. Records of the gas monitoring shall be kept.

3.0 Reporting

A completion report will be compiled following completion of the works. The report will include drilling records, grouting records, testing records and a location plan showing the location of the boreholes and any test holes carried out. It will also summarise total length drilled, and quantities of grout materials.

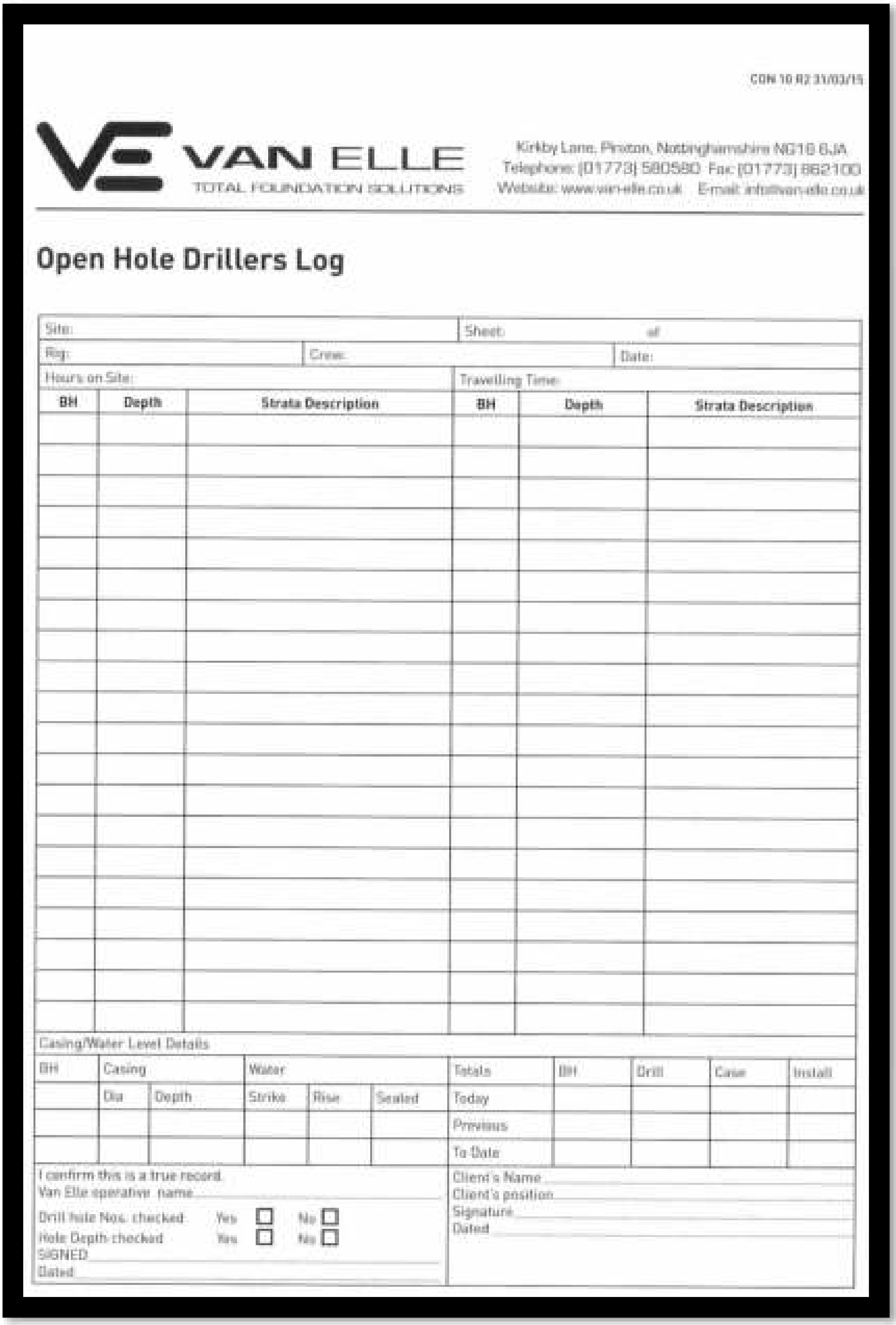
4.0 References

CIRIA Special Publication C758D – Abandoned Mineworkings

LKC Group, 2023 - VARLEY AND NELSON STREET MANCHESTER SHALLOW MINING SITE INVESTIGATION WORKS

Appendix 1

Sample Drilling & Grouting Records



CON 10 R2 31/03/15

VAN ELLE
TOTAL FOUNDATION SOLUTIONS

Kirkby Lane, Pinxton, Nottinghamshire NG16 6JA
Telephone: (01773) 580580 Fax: (01773) 862100
Website: www.van-elle.co.uk E-mail: info@van-elle.co.uk

Open Hole Drillers Log

Site: Sheet: of

Rig: Crew: Date:

Hours on Site: Travelling Time:

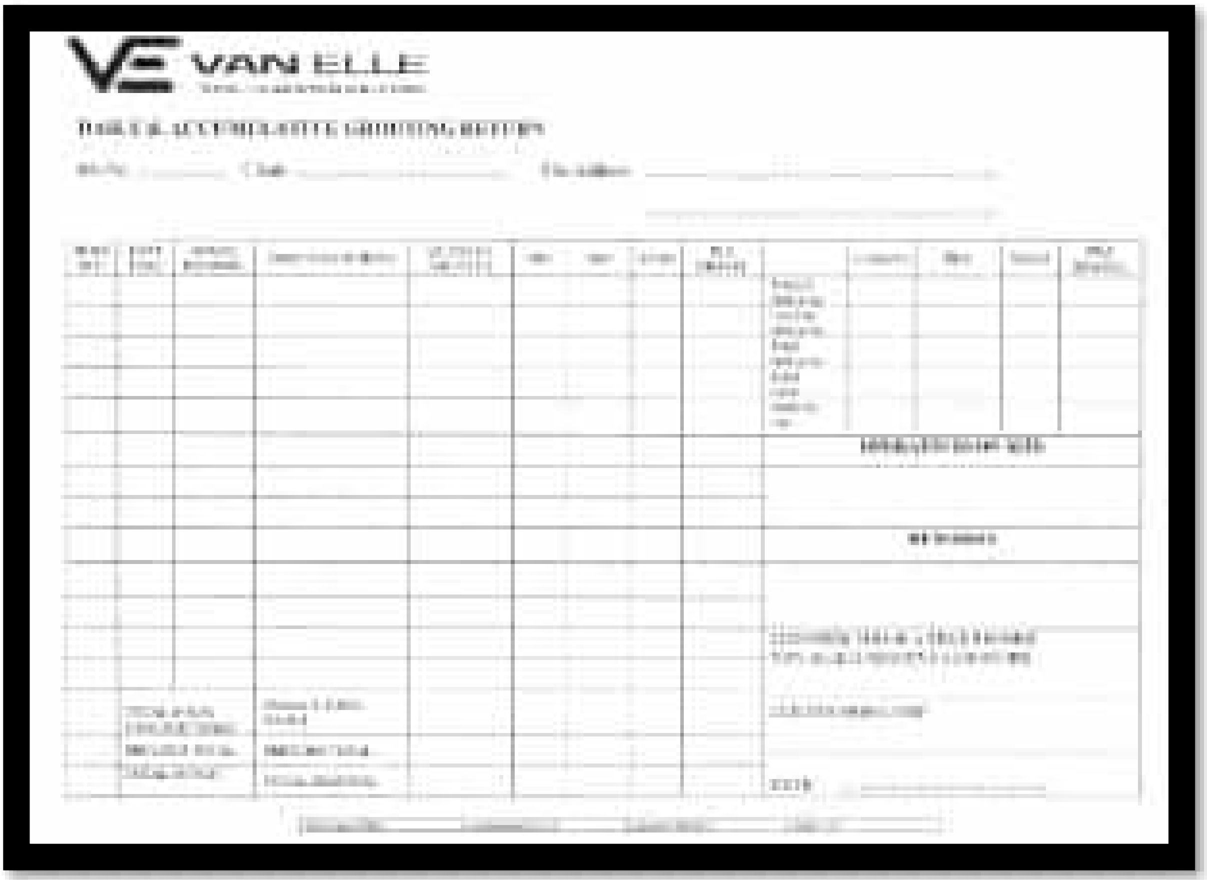
BH	Depth	Strata Description	BH	Depth	Strata Description

Casing/Water Level Details

BH	Casing		Water			Totals	BH	Drill	Case	Install
	Dia	Depth	Strike	Rise	Sealed	Today				
						Previous				
						To Date				

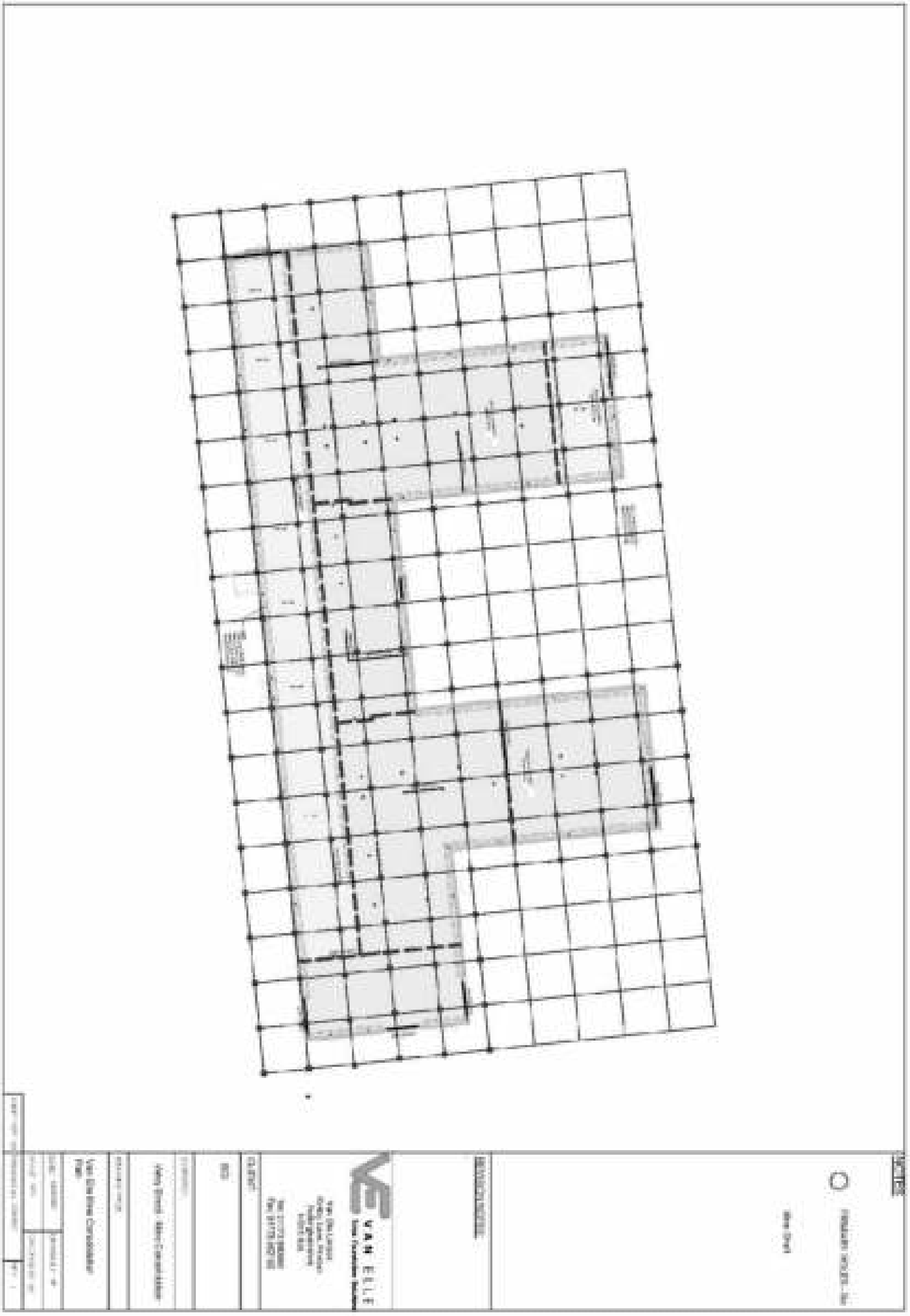
I confirm this is a true record.
Van Elle operative name
Drill hole Nos. checked Yes ☐ No ☐
Hole Depth checked Yes ☐ No ☐
SIGNED
Dated

Client's Name
Client's position
Signature
Dated



Appendix 2

Proposed Grouting Layout


NOTES
VAN ELLE

Appendix 2:
Drill Logs

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TOTAL FOUNDATION SOLUTIONS

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Telephone: (01773) 580580 Fax: (01773) 862100
Website: www.van-elle.co.uk E-mail: info@van-elle.co.uk

Open Hole Drillers Log

Site: VARLEY ST - MANCHESTER
Sheet: 1 of 1
Rig: SM 14
Crew: K PURDHAM - D. BRAY
Date: 26-3-24
Hours on Site:
Travelling Time:

BH	Depth	Strata Description	BH	Depth	Strata Description
		SHAFT 001			
	0-73-0	SOFT FILL			
	73-0-78-0	MUDSTONE			
		76M CASING			
		NO RETURNS WHILST			
		CASING			
		FULL RETURNS WHEN			
		DRILLING			

Casing/Water Level Details

BH	Casing		Water			Totals	BH	Drill	Case	Install
	Dia	Depth	Strike	Rise	Sealed	Today	1	78-0	76-0	
						Previous	/	/	/	
						To Date	1	78-0	76-0	

I confirm this is a true record.
Van Elle operative name C. HENDERSON
Drill hole Nos. checked Yes ☑ No ☐
Hole Depth checked Yes ☑ No ☐
SIGNED C.
Dated 26-3-24

Client's Name R Forrester
Client's position SM
Signature
Dated 27/3/24

CON 10 R2 31/03/15

VAN ELLE
TOTAL FOUNDATION SOLUTIONS

Kirkby Lane, Pinxton, Nottinghamshire NG16 6JA
Telephone: (01773) 580580 Fax: (01773) 862100
Website: www.van-elle.co.uk E-mail: info@van-elle.co.uk

Open Hole Drillers Log

Site: VARLEY ST – MANCHESTER
Sheet: 1 of 1
Rig: SM 14
Crew: K. PUDHAM – D. BRAY
Date: 28-3-24
Hours on Site:
Travelling Time:

BH	Depth	Strata Description	BH	Depth	Strata Description
		SHAFT 001			
B/H2	0-29-0	OVERBURDEN			
	29-0-32-0	MUDSTONE			
		20m CASING			
		NOT IN SHAFT			
B/H3	0-29-0	OVERBURDEN			
	29-0-32-0	MUDSTONE			
		20m CASING			
	DRILLED	ON ISG CENTRE PEG			
	NOT	IN SHAFT			
B/H4	0-73-0	SOFT FILL			
	73-0-78-0	MUDSTONE			
		76m CASING			

Casing/Water Level Details

BH	Casing		Water			Totals	BH	Drill	Case	Install
	Dia	Depth	Strike	Rise	Sealed	Today	3	142-0	116-0	
						Previous	1	78-0	76-0	
						To Date	4	220-0	192-0	

I confirm this is a true record.
Van Elle operative name C. HENDERSON
Drill hole Nos. checked Yes ☑ No ☐
Hole Depth checked Yes ☑ No ☐
SIGNED
Dated 28-3-24

Client's Name [illegible]
Client's position [redacted]
Signature
Dated 4/4/24

VAN ELLE
TOTAL FOUNDATION SOLUTIONS

Kirkby Lane, Pinxton, Nottinghamshire NG16 6JA
Telephone: (01773) 580580 Fax: (01773) 862100
Website: www.van-elle.co.uk E-mail: info@van-elle.co.uk

Open Hole Drillers Log

Site: VARLEY ST - MANCHESTER
Sheet: 1 of 1
Rig: SM 14
Crew: K. CUNNINGHAM - D. BRAY
Date: 2-4-24
Hours on Site:
Travelling Time:

BH	Depth	Strata Description	BH	Depth	Strata Description
B/H5	0-30-0	OVERBURDEN	B/H10	0-36-0	BACKFILL
	30032-0	MUDSTONE			20m CASING
		20m CASING			
B/H6	0-36-0	BACKFILL			
		20m CASING			
B/H7	0-36-0	BACKFILL			
		20m CASING			
B/H8	0-30-0	OVERBURDEN			
	30-0-32-0	MUDSTONE			
		20m CASING			
B/H9	0-30-0	OVERBURDEN			
	30-0-32-0	MUDSTONE			
		20m CASING			

Casing/Water Level Details

BH	Casing		Water		
	Dia	Depth	Strike	Rise	Sealed

Totals	BH	Drill	Case	Install
Today	6	204-0	120-0	
Previous	4	220-0	192-0	
To Date	10	424-0	312-0	

I confirm this is a true record.
Van Elle operative name C. HENDERSON
Drill hole Nos. checked Yes ☑ No ☐
Hole Depth checked Yes ☑ No ☐
SIGNED
Dated 2-4-24

Client's Name R. Forrest
Client's position [redacted]
Signature
Dated 4/4/24

CON 10 R2 31/03/15

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Open Hole Drillers Log

Site: VARLEY ST - MANCHESTER
Sheet: 1 of 1
Rig: SM 14
Crew: K PURDHAM - D. BAH
Date: 3-4-24
Hours on Site:
Travelling Time:

BH	Depth	Strata Description	BH	Depth	Strata Description
		SHAFT 001			
BH 11	0-30-0	OVERBURDEN			
	30-0-32-0	MUDSTONE			
		20m CASING			
B/H12	0-73-0	SOFT - GROUT - FILL			
T/H	73-0-78-0	MUDSTONE			
		76m CASING			
		FULL RETURNS			

Casing/Water Level Details

BH	Casing		Water			Totals	BH	Drill	Case	Install
	Dia	Depth	Strike	Rise	Sealed	Today	2	110-0	96-0	
						Previous	10	424-0	312-0	
						To Date	12	534-0	408-0	

I confirm this is a true record.
Van Elle operative name C. HEJRANOJ
Drill hole Nos. checked Yes ☑ No ☐
Hole Depth checked Yes ☑ No ☐
SIGNED
Dated 3-4-24

Client's Name R. Forrest
Client's position [redacted]
Signature SM
Dated 4/4/24

CON 10 R2 31/03/15

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Open Hole Drillers Log

Site: VARLEY ST - MANCHESTER
Sheet: 1 of 1
Rig: SM14
Crew: K. PUNDHAM - D. BRAY
Date: 4-4-24
Hours on Site:
Travelling Time:

BH	Depth	Strata Description	BH	Depth	Strata Description
		SHAFT 002			
BH1	0-58-0	SOFT FILL			
	58-0-63-0	SOLID - NO RETURNS			
		58m CASING			

Casing/Water Level Details

BH	Casing		Water		
	Dia	Depth	Strike	Rise	Sealed

Totals	BH	Drill	Case	Install
Today	1	63-0	58-0	
Previous	-	-	-	
To Date	1	63-0	58-0	

I confirm this is a true record.
Van Elle operative name C. HENDERSON
Drill hole Nos. checked Yes ☑ No ☐
Hole Depth checked Yes ☑ No ☐
SIGNED C.
Dated 4-4-24

Client's Name R FORRESTER
Client's position S
Signature [redacted]
Dated 5/4/24

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Open Hole Drillers Log

Site: VANLEY ST- MANCHESTER
Sheet: ~~2~~ 1 of ~~2~~ 1
Rig: SM 14
Crew: K. PULHAM - D. BAAH
Date: 5-4-24
Hours on Site:
Travelling Time:

BH	Depth	Strata Description	BH	Depth	Strata Description
		SHAFT 002			
B/H 2	0-58-0	SOFT FILL - GROUT			
	58-0-63-0	MUDSTONE			
		58m CASING			

Casing/Water Level Details

BH	Casing		Water		
	Dia	Depth	Strike	Rise	Sealed

Totals	BH	Drill	Case	Install
Today	1	63-0	58-0	
Previous	1	63-0	58-0	
To Date	2	126-0	116-0	

I confirm this is a true record.
Van Elle operative name C. HENDERSON
Drill hole Nos. checked Yes ☑ No ☐
Hole Depth checked Yes ☑ No ☐
SIGNED
Dated 5-4-24

Client's Name R. FORRESTER
Client's position SM
Signature [redacted]
Dated 09/04/24

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Open Hole Drillers Log

Site: VARLEY ST – MANCHESTER
Sheet: 1 of 1
Rig: SM14
Crew: K. RADHAM – D. BRAY
Date: 8-4-24
Hours on Site:
Travelling Time:

BH	Depth	Strata Description	BH	Depth	Strata Description
		SHAFT 002			
B/H3	0-58-0	SOFT FILL-GROUT			
T/H	58-0-63-0	MUDSTONE			
		58m CASING			

Casing/Water Level Details

BH	Casing		Water		
	Dia	Depth	Strike	Rise	Sealed

Totals	BH	Drill	Case	Install
Today	1	63-0	58-0	
Previous	2	126-0	116-0	
To Date	3	189-0	174-0	

I confirm this is a true record.
Van Elle operative name C. HENDERSON
Drill hole Nos. checked Yes ☑ No ☐
Hole Depth checked Yes ☑ No ☐
SIGNED
Dated 8-4-24

Client's Name R. FORRESTER
Client's position SM
Signature R
Dated 09/4/24

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Open Hole Drillers Log

Site: VARLEY ST - MANCHESTER		Sheet: 1	of 1
Rig: SM 14	Crew: K. PURDHAM - D. BRAY		Date: 8-4-24
Hours on Site:		Travelling Time:	

BH	Depth	Strata Description	BH	Depth	Strata Description
A11	0-27-20	OVERBURDEN			
	27-20-40-0	MUDSTONE			
		28m CASING			
C11	0-26-20	OVERBURDEN			
	26-20-38-90	MUDSTONE			
		26m CASING			
E11	0-25-50	OVERBURDEN			
	25-50-37-50	MUDSTONE			
		26m CASING			
G11	0-25-0	OVERBURDEN			
	25-0-37-0	MUDSTONE			
		25m CASING			

Casing/Water Level Details

BH	Casing		Water		
	Dia	Depth	Strike	Rise	Sealed

Totals	BH	Drill	Case	Install
Today	4	153-20	105-0	
Previous	/	/	/	
To Date	4	153-20	105-0	

I confirm this is a true record.
Van Elle operative name C. [illegible]
Drill hole Nos. checked Yes ☑ No ☐
Hole Depth checked Yes ☑ No ☐
SIGNED C.
Dated 8-4-24

Client's Name R. FORRESTER
Client's position [redacted]
Signature
Dated 09/04/24

CON 10 R2 31/03/15

VAN ELLE
TOTAL FOUNDATION SOLUTIONS

Kirkby Lane, Pinxton, Nottinghamshire NG16 6JA
Telephone: (01773) 580580 Fax: (01773) 862100
Website: www.van-elle.co.uk E-mail: info@van-elle.co.uk

Open Hole Drillers Log

Site: VARLEY ST - MANCHESTER
Sheet: 1 of 1
Rig: SM14
Crew: K. BURNHAM - D. BRAY
Date: 9-4-24
Hours on Site:
Travelling Time:

BH	Depth	Strata Description	BH	Depth	Strata Description
I11	0-25-0	OVERBURDEN	G9	0-25-0	OVERBURDEN
	25-0-37-0	MUDSTONE		25-0-34-80	MUDSTONE
		25m CASING		34-80-35-20	COAL
				35-20-36-20	MUDSTONE
A9	0-27-0	OVERBURDEN			25m CASING
	27-0-39-0	MUDSTONE			
		27m CASING	I9	0-25-0	OVERBURDEN
				25-0-34-50	MUDSTONE
C9	0-26-80	OVERBURDEN		34-50-35-0	COAL
	26-80-39-0	MUDSTONE		35-0-36-0	MUDSTONE
		27m CASING			25m CASING
E9	0-26-0	OVERBURDEN	I7	0-25-0	OVERBURDEN
	26-0-38-0	MUDSTONE		25-0-34-0	MUDSTONE
		26m CASING		34-0-34-60	COAL
				34-60-36-0	MUDSTONE
					25m CASING

Casing/Water Level Details

BH	Casing		Water		
	Dia	Depth	Strike	Rise	Sealed

Totals	BH	Drill	Case	Install
Today	7	261-20	180-0	
Previous	4	153-20	105-0	
To Date	11	414-40	285-0	

I confirm this is a true record.
Van Elle operative name C. HENDERSON
Drill hole Nos. checked Yes ☑ No ☐
Hole Depth checked Yes ☑ No ☐
SIGNED C.
Dated 9-4-24

Client's Name R. Forrester
Client's position [redacted]
Signature
Dated 10/4/24

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TOTAL FOUNDATION SOLUTIONS

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Website: www.van-elle.co.uk E-mail: info@van-elle.co.uk

Open Hole Drillers Log

Site: VARLEY ST - MANCHESTER		Sheet: 1	of 1
Rig: SM14	Crew: K - PUNDHAM - D. BAAY	Date: 10-4-24	
Hours on Site:		Travelling Time:	

BH	Depth	Strata Description	BH	Depth	Strata Description
G7	0-24-50	OVERBURDEN	I5	0-24-0	OVERBURDEN
	24-50-35-20	MUDSTONE		24-0-34-0	MUDSTONE
	35-20-35-70	COAL		34-0-34-50	COAL
	35-70-36-70	MUDSTONE		34-50-36-0	MUDSTONE
		25m CASING			24m CASING
E7	0-26-70	OVERBURDEN	G5	0-24-50	OVERBURDEN
	26-70-36-50	MUDSTONE		24-50-34-20	MUDSTONE
	36-50-36-80	COAL		34-20-34-70	COAL
	36-80-37-80	MUDSTONE		34-70-36-0	MUDSTONE
		25m CASING			25m CASING
C7	0-25-50	OVERBURDEN	E5	0-25-0	OVERBURDEN
	25-50-37-50	MUDSTONE		25-0-37-0	MUDSTONE
		26m CASING			25m CASING
A7	0-25-50	OVERBURDEN	C5	0-25-50	OVERBURDEN
	25-50-37-50	MUDSTONE		25-50-37-50	MUDSTONE
		26m CASING			26m CASING

Casing/Water Level Details

BH	Casing		Water		
	Dia	Depth	Strike	Rise	Sealed

Totals	BH	Drill	Case	Install
Today	8	296-0	202-0	
Previous	11	414-40	285-0	
To Date	19	710-40	487-0	

I confirm this is a true record.
Van Elle operative name C. HENDERSON
Drill hole Nos. checked Yes ☑ No ☐
Hole Depth checked Yes ☑ No ☐
SIGNED
Dated 10-4-24

Client's Name R. FORRESTER
Client's position
Signature [redacted]
Dated 12/4/24

CON 10 R2 31/03/15

VAN ELLE
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Open Hole Drillers Log

Site: VARLEY ST - MANCHESTER
Sheet: 1 of 1
Rig: SM14
Crew: K. PLUNDHAM - D. BAAI
Date: 11-4-24
Hours on Site:
Travelling Time:

BH	Depth	Strata Description	BH	Depth	Strata Description
A5	0-25-80	OVERBURDEN		35-30-36-30	MUDSTONE
	25-80-37-80	MUDSTONE			26m CASING
		26m CASING			
			C3	0-25-60	OVERBURDEN
I-3	0-24-50	OVERBURDEN		25-60-36-0	MUDSTONE
	26-50-33-0	MUDSTONE		36-0-36-50	COAL
	33-0-33-90	COAL		36-50-37-50	MUDSTONE
	33-90-36-0	MUDSTONE			26m CASING
		25m CASING			
			A3	0-26-0	OVERBURDEN
G3	0-24-50	OVERBURDEN		26-0-38-0	MUDSTONE
	24-80-33-70	MUDSTONE			26m CASING
	33-70-34-20	COAL			
	34-20-36-0	MUDSTONE	I1	0-25-50	OVERBURDEN
		25m CASING		25-50-30-0	MUDSTONE
				30-0-30-50	COAL
E3	0-25-40	OVERBURDEN		30-50-36-0	MUDSTONE
	25-40-34-80	MUDSTONE			26m CASING
	34-80-35-30	COAL			

Casing/Water Level Details

BH	Casing		Water		
	Dia	Depth	Strike	Rise	Sealed

Totals	BH	Drill	Case	Install
Today	7	257-60	180-0	
Previous	19	710-40	487-0	
To Date	26	968-0	667-0	

I confirm this is a true record.
Van Elle operative name C. HENDERSON
Drill hole Nos. checked Yes ☑ No ☐
Hole Depth checked Yes ☑ No ☐
SIGNED C
Dated 11-4-24

Client's Name R. FORREST
Client's position SM
Signature [redacted]
Dated 12/4/24

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Telephone: (01773) 580580 Fax: (01773) 862100
Website: www.van-elle.co.uk E-mail: info@van-elle.co.uk

Open Hole Drillers Log

Site: VARLEY ST - MANCHESTER
Sheet: 1 of 1
Rig: C6XP
Crew: C WINGATE - L FENWICK
Date: 15 - 4 - 24
Hours on Site:
Travelling Time:

BH	Depth	Strata Description	BH	Depth	Strata Description
G1	0-25-0	OVERBURDEN	K17	0-26-0	OVERBURDEN
	25-0-37-0	MUDSTONE		26-0-38-0	MUDSTONE
		25m CASING			26m CASING
K11	0-25-70	OVERBURDEN	K19	0-26-0	OVERBURDEN
	25-70-38-0	MUDSTONE		26-0-35-0	MUDSTONE - COAL TRACES
		26m CASING			26m CASING
K13	0-25-70	OVERBURDEN	K21	0-26-0	OVERBURDEN
	25-70-38-0	MUDSTONE - COAL TRACES	1°	26-0-38-0	MUDSTONE
		26m CASING			26m CASING
I13	0-25-70	OVERBURDEN	I15	0-26-0	OVERBURDEN
	25-70-38-0	MUDSTONE	1°	26-0-35-0	MUDSTONE - COAL TRACES
		26m CASING			26m CASING
K15	0-26-0	OVERBURDEN			
	26-0-38-0	MUDSTONE - COAL TRACES			
		26m CASING			

Casing/Water Level Details

BH	Casing		Water			Totals	BH	Drill	Case	Install
	Dia	Depth	Strike	Rise	Sealed	Today	9	341-0	233-0	
						Previous	26	968-0	667-0	
						To Date	35	1,309-0	900-0	

I confirm this is a true record.
Van Elle operative name C HUDSON
Drill hole Nos. checked Yes ☐ No ☐
Hole Depth checked Yes ☐ No ☐
SIGNED
Dated 15 4 24

Client's Name R. [illegible]
Client's position [illegible] [redacted]
Signature
Dated 16/4/24

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Open Hole Drillers Log

Site: VARLEY STREET – MANCHESTER
Sheet: 1 of 2
Rig: C6XP
Crew: C WINSTON – D LOUGHLOW
Date: 16-4-24
Hours on Site:
Travelling Time:

BH	Depth	Strata Description	BH	Depth	Strata Description
I17	0-26-0	OVERBURDEN	M13	0-26-0	OVERBURDEN
1°	26-0-38-0	MUDSTONE		26-0-35-0	MUDSTONE COAL TRACE
		26m CASING			26m CASING
I19	0-26-0	OVERBURDEN	M17	0-26-0	OVERBURDEN
1°	26-0-38-0	MUDSTONE		26-0-35-0	MUDSTONE
		26m CASING			26m CASING
I21	0-26-0	OVERBURDEN	M19	0-26-0	OVERBURDEN
1°	26-0-38-0	MUDSTONE		26-0-35-0	MUDSTONE
		26m CASING			26m CASING
M11	0-26-0	OVERBURDEN	M21	0-25-50	OVERBURDEN
	26-0-35-0	MUDSTONE	1°	25-50-38-0	MUDSTONE
		26m CASING			26m CASING
M15	0-26-0	OVERBURDEN			
	26-0-35-0	MUDSTONE			
		26m CASING			

Casing/Water Level Details

BH	Casing		Water		
	Dia	Depth	Strike	Rise	Sealed

Totals	BH	Drill	Case	Install
Today	9	342-0	234-0	
Previous	35	1309-0	900-0	
To Date	44	1651-0	1134-0	

I confirm this is a true record.
Van Elle operative name C WINSTON

Drill hole Nos. checked Yes ☑ No ☐
Hole Depth checked Yes ☑ No ☐
SIGNED
Dated 16-4-24

Client's Name R. FORRESTER
Client's position SITE MANAGER
Signature [redacted]
Dated 17/4/24

CON 10 R2 31/03/15

VAN ELLE
TOTAL FOUNDATION SOLUTIONS

Kirkby Lane, Pinxton, Nottinghamshire NG16 6JA
Telephone: (01773) 580580 Fax: (01773) 862100
Website: www.van-elle.co.uk E-mail: info@van-elle.co.uk

Open Hole Drillers Log

Site: VARLEY STREET - MANCHESTER
Sheet: 2 of 2
Rig: SM 14
Crew: L. TAYLOR - L. FENWICK
Date: 16-4-24
Hours on Site:
Travelling Time:

BH	Depth	Strata Description	BH	Depth	Strata Description
E1	0-26-0	OVERBURDEN	O1	0-26-0	OVERBURDEN
	26-0-38-0	MUDSTONE		26-0-35-0	MUDSTONE
		26m CASING			26m CASING
C1	0-25-10	OVERBURDEN	Q1	0-26-0	OVERBURDEN
	25-10-37-10	MUDSTONE		26-0-35-0	MUDSTONE
		26m CASING			26m CASING
A1	0-25-10	OVERBURDEN	S1	0-26-0	OVERBURDEN
	25-10-37-10	MUDSTONE - COAL TRACES		26-0-35-0	MUDSTONE
		26m CASING			26m CASING
K1	0-26-0	OVERBURDEN	K2	0-25-10	OVERBURDEN
	26-0-38-0	MUDSTONE		25-10-37-10	MUDSTONE
		26m CASING			26m CASING
M1	0-26-0	OVERBURDEN			
	26-0-35-0	MUDSTONE			
		26m CASING			

Casing/Water Level Details

BH	Casing		Water		
	Dia	Depth	Strike	Rise	Sealed

Totals	BH	Drill	Case	Install
Today	9	340-10	234-0	
Previous	44	1,651-0	1,134-0	
To Date	53	1,991-10	1,368-0	

I confirm this is a true record.
Van Elle operative name C. WILKINSON
Drill hole Nos. checked Yes ☑ No ☐
Hole Depth checked Yes ☑ No ☐
SIGNED
Dated 16-4-24

Client's Name R. FORREST
Client's position SITE MANAGER
Signature [redacted]
Dated 17/4/24.

CON 10 R2 31/03/15

VAN ELLE
TOTAL FOUNDATION SOLUTIONS

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Open Hole Drillers Log

Site: VARLEY STREET - MANCHESTER
Sheet: 1 of 2
Rig: SH14
Crew: C TAYLOR - L FENWICK
Date: 17-4-24
Hours on Site:
Travelling Time:

BH	Depth	Strata Description	BH	Depth	Strata Description
M3	0-25.00	OVERBURDEN			
	25.00-37.0	MUDSTONE			
		26m CASING			
O3	0-25.0	OVERBURDEN			
	25.0-37.0	MUDSTONE			
		26m CASING			
Q3	0-25.0	OVERBURDEN			
	25.0-37.0	MUDSTONE			
		26m CASING			
K5	0-25.0	OVERBURDEN			
	25.0-37.0	MUDSTONE			
		26m CASING			

Casing/Water Level Details

BH	Casing		Water		
	Dia	Depth	Strike	Rise	Sealed

Totals	BH	Drill	Case	Install
Today	4	148-0	106-0	
Previous	53	1,991-50	1,368-0	
To Date	57	2,139-50	1,472-0	

I confirm this is a true record.
Van Elle operative name [illegible]
Drill hole Nos. checked Yes ☑ No ☐
Hole Depth checked Yes ☑ No ☐
SIGNED
Dated 17-4-24

Client's Name D. Forrester
Client's position [illegible]
Signature [redacted]
Dated 17/4/24

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TOTAL FOUNDATION SOLUTIONS

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Open Hole Drillers Log

Site: VARLEY STREET - MANCHESTER
Sheet: 2 of 2
Rig: C6 X 1
Crew: C WINGATE - D. [illegible]
Date: 17-4-24
Hours on Site:
Travelling Time:

BH	Depth	Strata Description	BH	Depth	Strata Description
O11	0-25-70	OVERBURDEN	O21	0-25-70	OVERBURDEN
	25-70-38-0	MUDSTONE - COAL TRACES	1°	25-70-38-0	MUDSTONE
		26m CASING			26m CASING
O13	0-25-70	OVERBURDEN	Q11	0-25-60	OVERBURDEN
	25-70-38-0	MUDSTONE - COAL TRACES		25-60-38-0	MUDSTONE
		26m CASING			26m CASING
O15	0-25-70	OVERBURDEN	Q13	0-25-70	OVERBURDEN
	25-70-38-0	MUDSTONE		25-70-35-0	MUDSTONE
		26m CASING			26m CASING
O17	0-25-70	OVERBURDEN			
	25-70-38-0	MUDSTONE			
		26m CASING			
O19	0-25-50	OVERBURDEN			
	25-50-38-0	MUDSTONE			
		26m CASING			

Casing/Water Level Details

BH	Casing		Water		
	Dia	Depth	Strike	Rise	Sealed

Totals	BH	Drill	Case	Install
Today	8	304-0	208-0	
Previous	57	2139-0	1,472-0	
To Date	65	2443-0	1680-0	

I confirm this is a true record.
Van Elle operative name C WINGATE
Drill hole Nos. checked Yes ☐ No ☐
Hole Depth checked Yes ☐ No ☐
SIGNED
Dated 17-4-24

Client's Name R. [illegible]
Client's position [redacted]
Signature
Dated 18/4/24

CON 10 R2 31/03/15

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TOTAL FOUNDATION SOLUTIONS

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Open Hole Drillers Log

Site: VARLEY STREET - MANCHESTER
Sheet: 1 of 2
Rig: CDX2
Crew: C WINGATE - D WILLITON
Date: 15-4-20
Hours on Site:
Travelling Time:

BH	Depth	Strata Description	BH	Depth	Strata Description
Q15	0-25-70	OVERBURDEN	U11	0-25-70	OVERBURDEN
	25-70-38-0	MUDSTONE		25-70-38-0	MUDSTONE
		26m CASING			26m CASING
Q17	0-25-70	OVERBURDEN	W11	0-25-70	OVERBURDEN
	25-70-38-0	MUDSTONE		25-70-38-0	MUDSTONE
		26m CASING			26m CASING
Q19	0-25-70	OVERBURDEN	Y11	0-25-00	OVERBURDEN
	25-70-38-0	MUDSTONE		25-00-38-0	MUDSTONE
		26m CASING			26m CASING
Q21	0-25-50	OVERBURDEN	K9	0-26-0	OVERBURDEN
1°	25-50-38-0	MUDSTONE		26-0-38-0	MUDSTONE
		26m CASING			26m CASING
S11	0-25-70	OVERBURDEN			
	25-70-38-0	MUDSTONE			
		26m CASING			

Casing/Water Level Details

BH	Casing		Water		
	Dia	Depth	Strike	Rise	Sealed

Totals	BH	Drill	Case	Install
Today	9	342-0	234-0	
Previous	65	2443-0	1680-0	
To Date	74	2785-0	1914-0	

I confirm this is a true record.
Van Elle operative name C WINGATE
Drill hole Nos. checked Yes ☑ No ☐
Hole Depth checked Yes ☑ No ☐
SIGNED
Dated 15-4-20

Client's Name [illegible]
Client's position [illegible]
Signature [redacted]
Dated 15/4/20

CON 10 R2 31/03/15

VAN ELLE
TOTAL FOUNDATION SOLUTIONS

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Open Hole Drillers Log

Site: VARLEY STREET - MANCHESTER
Sheet: 2 of 2
Rig: SM16
Crew: C. [illegible] - C. [illegible]
Date: 15-4-24
Hours on Site:
Travelling Time:

BH	Depth	Strata Description	BH	Depth	Strata Description
Q5	0-25-0	OVERBURDEN			
	25-0-37-0	MUDSTONE			
		25m CASING			
Q5	0-25-0	OVERBURDEN			
	25-0-37-0	MUDSTONE			
		25m CASING			
M5	0-25-0	OVERBURDEN			
	25-0-37-0	MUDSTONE			
		25m CASING			
K7	0-25-0	OVERBURDEN			
	25-0-37-0	MUDSTONE			
		25m CASING			
M7	0-25-0	OVERBURDEN			
	25-0-37-0	MUDSTONE			
		25m CASING			

Casing/Water Level Details

BH	Casing		Water		
	Dia	Depth	Strike	Rise	Sealed

Totals	BH	Drill	Case	Install
Today	5	155-0	125-0	
Previous	74	2,755-0	1,914-0	
To Date	79	2,910-0	2,039-0	

I confirm this is a true record.
Van Elle operative name C. [illegible]
Drill hole Nos. checked Yes ☐ No ☐
Hole Depth checked Yes ☐ No ☐
SIGNED
Dated 15-4-24

Client's Name [illegible]
Client's position S[illegible]
Signature [redacted]
Dated 15/4/24

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Open Hole Drillers Log

Site: VARLEY STREET – MANCHESTER
Sheet: 1 of 1
Rig: C6XP
Crew: C. WINGATE – D. LOWNSON
Date: 19-4-24
Hours on Site:
Travelling Time:

BH	Depth	Strata Description	BH	Depth	Strata Description
M9	0-25-0	OVERBURDEN	W9	0-25-0	OVERBURDEN
	25-0-37-0	MUDSTONE		25-0-37-0	MUDSTONE
		25m CASING			25m CASING
Q9	0-25-0	OVERBURDEN			
	25-0-37-0	MUDSTONE			
		25m CASING			
U9	0-25-0	OVERBURDEN			
	25-0-37-0	MUDSTONE			
		25m CASING			
O9	0-25-0	OVERBURDEN			
	25-0-37-0	MUDSTONE			
		25m CASING			
S9	0-25-0	OVERBURDEN			
	25-0-37-0	MUDSTONE			
		25m CASING			

Casing/Water Level Details

BH	Casing		Water			Totals	BH	Drill	Case	Install
	Dia	Depth	Strike	Rise	Sealed	Today	6	222-0	150-0	
						Previous	79	2,970-50	2,039-0	
						To Date	85	3,192-50	2,189-0	

I confirm this is a true record.
Van Elle operative name C. HENDERSON
Drill hole Nos. checked Yes ☑ No ☐
Hole Depth checked Yes ☑ No ☐
SIGNED C.
Dated 19-4-24

Client's Name R. FORRESM
Client's position SM
Signature [redacted]
Dated 22/4/24

CON 10 R2 31/03/15

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TOTAL FOUNDATION SOLUTIONS

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Open Hole Drillers Log

Site: VARLEY ST - MANCHESTER
Sheet: 1 of 2
Rig: SM14
Crew: L. TAYLOR - L. FENWICK
Date: 22-4-24
Hours on Site:
Travelling Time:

BH	Depth	Strata Description	BH	Depth	Strata Description
O7	0-25-0	OVERBURDEN	Y7	0-25-0	OVERBURDEN
	25-0-37-0	MUDSTONE		25-0-37-0	MUDSTONE
		25m CASING			25m CASING
Q7	0-25-0	OVERBURDEN	S5	0-24-0	OVERBURDEN
	25-0-37-0	MUDSTONE		24-0-36-0	MUDSTONE
		25m CASING			24m CASING
S7	0-25-0	OVERBURDEN	U5	0-23-0	OVERBURDEN
	25-0-37-0	MUDSTONE		23-0-35-0	MUDSTONE
		25m CASING			24m CASING
U7	0-25-0	OVERBURDEN	W5	0-23-0	OVERBURDEN
	25-0-37-0	MUDSTONE		23-0-35-0	MUDSTONE
		25m CASING			24m CASING
W7	0-25-0	OVERBURDEN			
	25-0-37-0	MUDSTONE			
		25m CASING			

Casing/Water Level Details

BH	Casing		Water		
	Dia	Depth	Strike	Rise	Sealed

Totals	BH	Drill	Case	Install
Today	9	328-0	202-0	
Previous	85	3,192-50	2,189-0	
To Date	94	3,520-50	2,391-0	

I confirm this is a true record.
Van Elle operative name C. HUDSON
Drill hole Nos. checked Yes ☑ No ☐
Hole Depth checked Yes ☑ No ☐
SIGNED
Dated 22-4-24

Client's Name R. FORRESTER
Client's position S.M
Signature [redacted]
Dated 23/4/24

VAN ELLE
TOTAL FOUNDATION SOLUTIONS

Kirkby Lane, Pinxton, Nottinghamshire NG16 6JA
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Open Hole Drillers Log

Site: VARLEY ST – MANCHESTER
Sheet: 2 of 2
Rig: C6X8
Crew: C. WINGATE – D. LOWANSON
Date: 22-4-24
Hours on Site:
Travelling Time:

BH	Depth	Strata Description	BH	Depth	Strata Description
Y9	0-23-0	OVERBURDEN	Y21	0-23-0	OVERBURDEN
	23-0-35-0	MUDSTONE – SANDSTONE	1°	23-0-35-0	MUDSTONE – SANDSTONE
		23m CASING			23m CASING
Y13	0-25-0	OVERBURDEN	AA9	0-23-0	OVERBURDEN
	25-0-37-0	MUDSTONE – SANDSTONE		23-0-35-0	MUDSTONE – SANDSTONE
		25m CASING			23m CASING
Y15	0-23-0	OVERBURDEN	AA11	0-23-0	OVERBURDEN
	23-0-35-0	MUDSTONE – SANDSTONE		23-0-35-0	MUDSTONE – SANDSTONE
		23m CASING			23m CASING
Y17	0-23-0	OVERBURDEN	AA13	0-23-0	OVERBURDEN
	23-0-35-0	MUDSTONE – SANDSTONE		23-0-35-0	MUDSTONE – SANDSTONE
		23m CASING			23m CASING
Y19	0-23-0	OVERBURDEN			
	23-0-35-0	MUDSTONE – SANDSTONE			
		23m CASING			

Casing/Water Level Details

BH	Casing		Water		
	Dia	Depth	Strike	Rise	Sealed

Totals	BH	Drill	Case	Install
Today	9	317-0	209-0	
Previous	94	3,520-50	2,391-0	
To Date	103	3,837-50	2,600-0	

I confirm this is a true record.
Van Elle operative name C. HENDANSON
Drill hole Nos. checked Yes ☑ No ☐
Hole Depth checked Yes ☑ No ☐
SIGNED
Dated 22-4-24

Client's Name R FORRESTER
Client's position SM
Signature [redacted]
Dated 23/4/24

VAN ELLE
TOTAL FOUNDATION SOLUTIONS

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Open Hole Drillers Log

Site: VARLEY ST - MANCHESTER
Sheet: 1 of 2
Rig: SH14
Crew: L TAYLOR - L. BRUNWICK
Date: 23-4-24
Hours on Site:
Travelling Time:

BH	Depth	Strata Description	BH	Depth	Strata Description
U1	0-24-0	OVERBURDEN	Y3	0-23-0	OVERBURDEN
	24-0-36-0	MUDSTONE		23-0-35-0	MUDSTONE
		24m CASING			24m CASING
W1	0-24-0	OVERBURDEN	W3	0-23-0	OVERBURDEN
	24-0-36-0	MUDSTONE		23-0-35-0	MUDSTONE
		24m CASING			24m CASING
Y1	0-24-0	OVERBURDEN	U3	0-24-0	OVERBURDEN
	24-0-36-0	MUDSTONE		24-0-36-0	MUDSTONE
		24m CASING			24m CASING
AA1	0-24-0	OVERBURDEN	S3	0-24-0	OVERBURDEN
	24-0-36-0	MUDSTONE		24-0-36-0	MUDSTONE
		24m CASING			24m CASING
Y5	0-23-0	OVERBURDEN			
	23-0-35-0	MUDSTONE			
		24m CASING			

Casing/Water Level Details

BH	Casing		Water			Totals	BH	Drill	Case	Install
	Dia	Depth	Strike	Rise	Sealed	Today	9	321-0	216-0	
						Previous	103	3,837-50	2,600-0	
						To Date	112	4,158-50	2,816-0	

I confirm this is a true record.
Van Elle operative name C. HENDERSON
Drill hole Nos. checked Yes ☑ No ☐
Hole Depth checked Yes ☑ No ☐
SIGNED
Dated 23-4-24

Client's Name R. FORRESTER
Client's position SM
Signature [redacted]
Dated 24/4/24

CON 10 R2 31/03/15

VAN ELLE
TOTAL FOUNDATION SOLUTIONS

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Open Hole Drillers Log

Site: VARLEY ST - MANCHESTER			Sheet: 2	of 2	
Rig: C6 XP	Crew: C. WINGATE - D. LOWNSON		Date: 23-4-24		
Hours on Site:			Travelling Time:		
BH	**Depth**	**Strata Description**	**BH**	**Depth**	**Strata Description**
AA15	0-23-0	OVERBURDEN	AC13	0-23-0	OVERBURDEN
	23-0-35-0	SANDSTONE - MUDSTONE		23-0-35-0	SANDSTONE - MUDSTONE
		24m CASING			24m CASING
AA19	0-23-0	OVERBURDEN	AA7	0-23-0	OVERBURDEN
	23-0-35-0	SANDSTONE - MUDSTONE		23-0-35-0	SANDSTONE - MUDSTONE
		24m CASING			24m CASING
AA17	0-23-0	OVERBURDEN	AC15	0-23-0	OVERBURDEN
	23-0-35-0	SANDSTONE - MUDSTONE		23-0-35-0	SANDSTONE - MUDSTONE
		24m CASING			24m CASING
AA21	0-23-0	OVERBURDEN	AC17	0-23-0	OVERBURDEN
10	23-0-35-0	SANDSTONE - MUDSTONE		23-0-35-0	SANDSTONE - MUDSTONE
		24m CASING			24m CASING
AC11	0-23-0	OVERBURDEN			
	230-35-0	SANDSTONE - MUDSTONE			
		24m CASING			

Casing/Water Level Details

BH	Casing		Water			Totals	BH	Drill	Case	Install
	Dia	Depth	Strike	Rise	Sealed	Today	9	315-0	216-0	
						Previous	112	4,158-50	2,816-0	
						To Date	121	4,473-50	3,032-0	

I confirm this is a true record.
Van Elle operative name C. HENDERSON
Drill hole Nos. checked Yes ☑ No ☐
Hole Depth checked Yes ☑ No ☐
SIGNED C.
Dated 23-4-24

Client's Name R. FORRESTER
Client's position SM
Signature [redacted]
Dated 24/4/24

CON 10 R2 31/03/15

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TOTAL FOUNDATION SOLUTIONS

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Open Hole Drillers Log

Site: VARLEY ST – MANCHESTER
Sheet: 1 of 2
Rig: C6XP
Crew: C. WINGATE – D. LOWNSON
Date: 24-4-24
Hours on Site:
Travelling Time:

BH	Depth	Strata Description	BH	Depth	Strata Description
AC19	0-23-0	OVERBURDEN	AE17	0-23-0	OVERBURDEN
	23-0-35-0	SANDSTONE – MUDSTONE		23-0-35-0	SANDSTONE – MUDSTONE
		24m CASING			24m CASING
AC21	0-23-0	OVERBURDEN	AE19	0-23-0	OVERBURDEN
10	23-0-35-0	SANDSTONE – MUDSTONE		23-0-35-0	SANDSTONE – MUDSTONE
		24m CASING			24m CASING
AE11	0-23-0	OVERBURDEN	AE21	0-23-0	OVERBURDEN
	23-0-35-0	SANDSTONE – MUDSTONE	10	23-0-35-0	SANDSTONE – MUDSTONE
		24m CASING			24m CASING
AE13	0-23-0	OVERBURDEN	AG11	0-23-0	OVERBURDEN
	23-0-35-0	SANDSTONE – MUDSTONE		23-0-35-0	SANDSTONE – MUDSTONE
		24m CASING			24m CASING
AE15	0-23-0	OVERBURDEN			
	23-0-35-0	SANDSTONE – MUDSTONE			
		24m CASING			

Casing/Water Level Details

BH	Casing		Water			Totals	BH	Drill	Case	Install
	Dia	Depth	Strike	Rise	Sealed	Today	9	315-0	216-0	
						Previous	121	4,473-50	3,032-0	
						To Date	130	4,788-50	3,248-0	

I confirm this is a true record.
Van Elle operative name C. HENDARSON
Drill hole Nos. checked Yes ☑ No ☐
Hole Depth checked Yes ☑ No ☐
SIGNED
Dated 24-4-24

Client's Name R Forrester
Client's position SM
Signature [redacted]
Dated 25/4/24

CON 10 R2 31/03/15

VAN ELLE
TOTAL FOUNDATION SOLUTIONS

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Open Hole Drillers Log

Site: VARLEY ST - MANCHESTER		Sheet: 2	of 2
Rig: C6xP	Crew: L. TAYLOR - L. FENWICK	Date: 24-4-24	
Hours on Site:		Travelling Time:	

BH	Depth	Strata Description	BH	Depth	Strata Description
AM1	0-23-0	OVERBURDEN	AE1	0-23-0	OVERBURDEN
	23-0-35-0	MUDSTONE		23-0-35-0	MUDSTONE
		24m CASING			24m CASING
AM3	0-23-0	OVERBURDEN	AG1	0-23-0	OVERBURDEN
	23-0-35-0	MUDSTONE		23-0-35-0	MUDSTONE
		24m CASING			24m CASING
AK3	0-23-0	OVERBURDEN	AI1	0-23-0	OVERBURDEN
	23-0-35-0	MUDSTONE		23-0-35-0	MUDSTONE
		24m CASING			24m CASING
AI3	0-23-0	OVERBURDEN	AK1	0-23-50	OVERBURDEN
	23-0-35-0	MUDSTONE		23-50-35-50	MUDSTONE
		24m CASING			24m CASING
AC1	0-23-0	OVERBURDEN			
	23-0-35-0	MUDSTONE			
		24m CASING			

Casing/Water Level Details

BH	Casing		Water		
	Dia	Depth	Strike	Rise	Sealed

Totals	BH	Drill	Case	Install
Today	9	315-50	216-0	
Previous	130	4,788-50	3,248-0	
To Date	139	5,104-0	3,464-0	

I confirm this is a true record.
Van Elle operative name C. HENDERSON
Drill hole Nos. checked Yes ☑ No ☐
Hole Depth checked Yes ☑ No ☐
SIGNED
Dated 24-4-24

Client's Name R FORRESTER
Client's position SM
Signature [redacted]
Dated 25/4/24.

CON 10 R2 31/03/15

VAN ELLE
TOTAL FOUNDATION SOLUTIONS

Kirkby Lane, Pinxton, Nottinghamshire NG16 6JA
Telephone: (01773) 580580 Fax: (01773) 862100
Website: www.van-elle.co.uk E-mail: info@van-elle.co.uk

Open Hole Drillers Log

Site: VARLEY ST – MANCHESTER			Sheet: 1	of 2	
Rig: SM14		Crew: L. TAYLOR – L. FENWICK			Date: 25-4-24
Hours on Site:			Travelling Time:		

BH	Depth	Strata Description	BH	Depth	Strata Description
AG3	0-23-0	OVERBURDEN	AC5	0-23-0	OVERBURDEN
	23-0-35-0	MUDSTONE		23-0-35-0	MUDSTONE
		23m CASING			23m CASING
AE3	0-23-0	OVERBURDEN	AE5	0-23-0	OVERBURDEN
	23-0-35-0	MUDSTONE		23-0-35-0	MUDSTONE
		23m CASING			23m CASING
AC3	0-23-0	OVERBURDEN	AG5	0-23-0	OVERBURDEN
	23-0-35-0	MUDSTONE		23-0-35-0	MUDSTONE
		23m CASING			23m CASING
AA3	0-23-0	OVERBURDEN	AI5	0-24-0	OVERBURDEN
	23-0-35-0	MUDSTONE		24-0-36-0	MUDSTONE
		23m CASING			24m CASING
AA5	0-24-0	OVERBURDEN			
	24-0-36-0	MUDSTONE			
		24m CASING			

Casing/Water Level Details

BH	Casing		Water		
	Dia	Depth	Strike	Rise	Sealed

Totals	BH	Drill	Case	Install
Today	9	317-0	209-0	
Previous	139	5,104-0	3,464-0	
To Date	148	5,421-0	3,673-0	

I confirm this is a true record.
Van Elle operative name C. HENDERSON
Drill hole Nos. checked Yes ☑ No ☐
Hole Depth checked Yes ☑ No ☐
SIGNED
Dated 25-4-24

Client's Name R. Forrester
Client's position SM
Signature [redacted]
Dated 26/4/24

CON 10 R2 31/03/15

VAN ELLE
TOTAL FOUNDATION SOLUTIONS

Kirkby Lane, Pinxton, Nottinghamshire NG16 6JA
Telephone: (01773) 580580 Fax: (01773) 862100
Website: www.van-elle.co.uk E-mail: info@van-elle.co.uk

Open Hole Drillers Log

Site: VARLEY ST – MANCHESTER
Sheet: 2 of 2
Rig: C6XP
Crew: C-WINGATE – D. EDWARDSON
Date: 25-4-24
Hours on Site:
Travelling Time:

BH	Depth	Strata Description	BH	Depth	Strata Description
AG13	0-23-0	OVERBURDEN	AI 11	0-23-0	OVERBURDEN
	23-0-35-0	SANDSTONE – MUDSTONE		23-0-35-0	SANDSTONE – MUDSTONE
		24m CASING			24m CASING
AG15	0-23-0	OVERBURDEN	AK11	0-23-0	OVERBURDEN
	23-0-35-0	SANDSTONE – MUDSTONE		23-0-35-0	SANDSTONE – MUDSTONE
		24m CASING			24m CASING
AG17	0-23-0	OVERBURDEN			
	23-0-35-0	SANDSTONE – MUDSTONE			
		24m CASING			
AG19	0-23-0	OVERBURDEN			
	23-0-35-0	SANDSTONE – MUDSTONE			
		24m CASING			
AG21	0-24-0	OVERBURDEN			
2°	24-0-36-0	SANDSTONE – MUDSTONE			
		24m CASING			

Casing/Water Level Details

BH	Casing		Water			Totals	BH	Drill	Case	Install
	Dia	Depth	Strike	Rise	Sealed	Today	7	246-0	168-0	
						Previous	148	5,421-0	3,673-0	
						To Date	155	5,667-0	3,841-0	

I confirm this is a true record.
Van Elle operative name C. HETRINGTON
Drill hole Nos. checked Yes ☑ No ☐
Hole Depth checked Yes ☑ No ☐
SIGNED
Dated 25-4-24

Client's Name R. Forrester
Client's position [redacted]
Signature
Dated 26/4/24.

CON 10 R2 31/03/15

VAN ELLE
TOTAL FOUNDATION SOLUTIONS

Kirkby Lane, Pinxton, Nottinghamshire NG16 6JA
Telephone: (01773) 580580 Fax: (01773) 862100
Website: www.van-elle.co.uk E-mail: info@van-elle.co.uk

Open Hole Drillers Log

Site: VARLEY ST - MANCHESTER
Sheet: 1 of 2
Rig: C6XP
Crew: C. WINGATE - D. LAWRENSON
Date: 26-4-24
Hours on Site:
Travelling Time:

BH	Depth	Strata Description	BH	Depth	Strata Description
AM9	0-23-0	OVERBURDEN	AI9	0-23-0	OVERBURDEN
	23-0-35-0	SANDSTONE - MUDSTONE		23-0-35-0	SANDSTONE - MUDSTONE
		24m CASING			24m CASING
AK9	0-23-0	OVERBURDEN	AG9	0-23-0	OVERBURDEN
	23-0-35-0	SANDSTONE - MUDSTONE		23-0-35-0	SANDSTONE - MUDSTONE
		24m CASING			24m CASING
AE9	0-23-0	OVERBURDEN			
	23-0-35-0	SANDSTONE - MUDSTONE			
		24m CASING			
AC9	0-23-0	OVERBURDEN			
	23-0-35-0	SANDSTONE - MUDSTONE			
		24m CASING			
AM11	0-23-0	OVERBURDEN			
	23-0-35-0	SANDSTONE - MUDSTONE			
		24m CASING			

Casing/Water Level Details

BH	Casing		Water			Totals	BH	Drill	Case	Install
	Dia	Depth	Strike	Rise	Sealed	Today	7	245-0	168-0	
						Previous	155	5,667-0	3841-0	
						To Date	162	5,912-0	4,009-0	

I confirm this is a true record.
Van Elle operative name C. HENDERSON
Drill hole Nos. checked Yes ☑ No ☐
Hole Depth checked Yes ☑ No ☐
SIGNED C.
Dated 26-4-24

Client's Name R. FORREST
Client's position SM
Signature [redacted]
Dated 29/4/24

VAN ELLE
TOTAL FOUNDATION SOLUTIONS

Kirkby Lane, Pinxton, Nottinghamshire NG16 6JA
Telephone: (01773) 580580 Fax: (01773) 862100
Website: www.van-elle.co.uk E-mail: info@van-elle.co.uk

Open Hole Drillers Log

Site: VARLEY ST – MANCHESTER
Sheet: 2 of 2
Rig: SM14
Crew: L. TAYLOR – L. FENWICK
Date: 26-4-24
Hours on Site:
Travelling Time:

BH	Depth	Strata Description	BH	Depth	Strata Description
AK5	0-23-0	OVERBURDEN	AE7	0-23-0	OVERBURDEN
	23-0-35-0	MUDSTONE		23-0-35-0	MUDSTONE
		24m CASING			24m CASING
AM5	0-23-0	OVERBURDEN	AC7	0-23-0	OVERBURDEN
	23-0-35-0	MUDSTONE		23-0-35-0	MUDSTONE
		24m CASING			24m CASING
AM7	0-23-0	OVERBURDEN	AF7	0-23-0	OVERBURDEN
	23-0-35-0	MUDSTONE		23-0-35-0	MUDSTONE
		24m CASING			24m CASING
AK7	0-23-0	OVERBURDEN			
	23-0-35-0	MUDSTONE			
		24m CASING			
AG7	0-23-0	OVERBURDEN			
	23-0-35-0	MUDSTONE			
		24m CASING			

Casing/Water Level Details

BH	Casing		Water		
	Dia	Depth	Strike	Rise	Sealed

Totals	BH	Drill	Case	Install
Today	8	280-0	192-0	
Previous	162	5,912-0	4,009-0	
To Date	170	6,192-0	4,201-0	

I confirm this is a true record.
Van Elle operative name C. HENDERSON
Drill hole Nos. checked Yes ☑ No ☐
Hole Depth checked Yes ☑ No ☐
SIGNED
Dated 26-4-24

Client's Name R. Forrester
Client's position SM
Signature [redacted]
Dated 29/4/24

Appendix 3:
Grout Logs

VAN ELLE
TOTAL FOUNDATION SOLUTIONS

SHEET 1 OF 3

27-3-24

DAILY & ACCUMULATIVE GROUTING RETURN

Job No. 231836 Client I. S. G. Site Address VARLEY ST - MANCHESTER

HOLE REF.	DEPT H (M)	ANGLE/ PRESSURE	BRIEF LOG OF HOLE	QUANT OF GROUT (T)	OPC	PFA	SAND	PEA GRAVEL
B/41			SHAFT 001					
76m			SOFT		0-8	8-0		
74m		PRESSURED	TO 2 BAR HELD	2 mins	0-08	0-8		
72m		"	"	"	0-06	0-6		
70m		"	"	"	0-06	0-6		
68m		"	"	"	0-04	0-4		
66m		"	"	"	0-06	0-6		
64m		"	"	"	0-03	0-3		
62m		"	"	"	0-03	0-3		
60m		"	"	"	0-03	0-3		
58m		"	"	"	0-04	0-4		
56m		"	"	"	0-04	0-4		
	TOTAL HOLES GROUTED TODAY		TODAY'S TOTAL GROUT		1-270	12-70		
	PREVIOUS TOTAL		PREVIOUS TOTAL		—	—		
	TOTAL TODATE		TOTAL GROUTING		1-270	12-70		

	CEMENT	PFA	SAND	PEA GRAVEL
Today's Deliveries	15-0	56-40		
Previous Deliveries	—	—		
Total Deliveries	15-0	56-40		
Total Used	1-270	12-70		
Stock on Site	13-730	43-70		

OPERATIVES ON SITE

C. HENDERSON - S. BELL
K. PUNDHAM - D. BRAY
D. LOWERSON

REMARKS

P-F-A - 24324 4 CUBES TAKEN
P-F-A - 25136

I CONFIRM THIS IS A TRUE RECORD
VAN ELLE OPERATIVE SIGNATURE

C.

[redacted]

DATE 27-3-24

VAN ELLE
TOTAL FOUNDATION SOLUTIONS

SHEET 2 OF 3

27-3-24

DAILY & ACCUMULATIVE GROUTING RETURN

Job No. 231836 Client I.S.G Site Address VARLEY ST — MANCHESTER

HOLE REF.	DEPT H (M)	ANGLE/ PRESSURE	BRIEF LOG OF HOLE	QUANT OF GROUT (T)	OPC	PFA	SAND	PEA GRAVEL
B/H1			SHAFT 001					
54m		PRESSURISED TO 2 BAR HELD 2 MINS			0-03	0-3		
52m		"	"	"	0-03	0-3		
50m		"	"	"	0-03	0-3		
48m		"	"	"	0-04	0-4		
46m		"	"	"	0-03	0-3		
44m		"	"	"	0-1	1-0		
42m		"	"	"	0-1	1-0		
40m		"	"	"	0-03	0-3		
38m		"	"	"	0-03	0-3		
36m		"	"	"	0-03	0-3		
34m		"	"	"	0-03	0-3		
32m		"	"	"	0-04	0-4		
	TOTAL HOLES GROUTED TODAY		TODAY'S TOTAL GROUT		0-490	4-90		
	PREVIOUS TOTAL		PREVIOUS TOTAL		1-270	12-70		
	TOTAL TODATE		TOTAL GROUTING		1-760	17-60		

	CEMENT	PFA	SAND	PEA GRAVEL
Today's Deliveries	—	—		
Previous Deliveries	—	—		
Total Deliveries	15-0	56-40		
Total Used	1-760	17-60		
Stock on Site	13-240	38-80		

OPERATIVES ON SITE

REMARKS

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C.

CLIENTS SIGNATURE

[redacted]

DATE 27-3-24

VAN ELLE
TOTAL FOUNDATION SOLUTIONS

SHEET 3 OF 3

27-3-24

DAILY & ACCUMULATIVE GROUTING RETURN

Job No. 231836.... Client ......I.S.G.................... Site Address ....VARLEY...ST - MANCHESTER.........

....

HOLE REF.	DEPT H (M)	ANGLE/ PRESSURE	BRIEF LOG OF HOLE	QUANT OF GROUT (T)	OPC	PFA	SAND	PEA GRAVEL
B/H 1			SHAFT 001					
30m		PRESSURISED	TO 2 BAR HELD	2 MINS	0-1	1-0		
28m		"	"	"	0-04	0-4		
26m		"	"	"	0-03	0-3		
24m		"	"	"	0-03	0-3		
22m		"	"	"	0-04	0-4		
20m		"	"	"	0-04	0-4		
18m		"	"	"	0-1	1-0		
16m		"	"	"	0-1	1-0		
14m		"	"	"	0-06	0-6		
12m		"	"	"	0-04	0-4		
10m	BROKE SEAL		GROUT CAME	UP SIDE	0-04	0-4		
	OF	CASING	B/H 1 COMPLETE					
1	TOTAL HOLES GROUTED TODAY		TODAY'S TOTAL GROUT		0-620	6-20		
—	PREVIOUS TOTAL		PREVIOUS TOTAL		1-760	17-60		
1	TOTAL TODATE		TOTAL GROUTING		2-380	23-80		

	CEMENT	PFA	SAND	PEA GRAVEL
Today's Deliveries	—	—		
Previous Deliveries	—	—		
Total Deliveries	15-0	56-40		
Total Used	2-380	23-80		
Stock on Site	12-620	32-60		

OPERATIVES ON SITE

REMARKS

I CONFIRM THIS IS A TRUE RECORD
VAN ELLE OPERATIVE SIGNATURE

....

CLIENTS SIGNATURE

[redacted]

DATE .....27-3-24.................

VAN ELLE
TOTAL FOUNDATION SOLUTIONS

SHEET 1 OF 3

2-4-24

DAILY & ACCUMULATIVE GROUTING RETURN

Job No 231836 Client I.S.G. Site Address VARLEY ST - MANCHESTER

SHAFT 001

HOLE REF.	DEPT H (M)	ANGLE/ PRESSURE	BRIEF LOG OF HOLE	QUANT OF GROUT (T)	OPC	PFA	SAND	PEA GRAVEL
BH2			MUDSTONE	FULL	0-03	0-300		
BH3			"	"	0-03	0-300		
BH4 76m		PRESSURISED	TO 2 BAR	HELD 2 MINS	0-280	2-80		
74m		"	"	"	0-02	0-200		
72m		"	"	"	0-02	0-200		
70m		"	"	"	0-02	0-200		
68m		"	"	"	0-03	0-300		
66m		"	"	"	0-02	0-200		
64m		"	"	"	0-02	0-200		
62m		"	"	"	0-02	0-200		
60m		"	"	"	0-02	0-200		
58m		"	"	"	0-02	0-200		
56m		"	"	"	0-02	0-200		
2	TOTAL HOLES GROUTED TODAY		TODAY'S TOTAL GROUT		0-550	5-50		
1	PREVIOUS TOTAL		PREVIOUS TOTAL		2-380	23-80		
3	TOTAL TODATE		TOTAL GROUTING		2-930	29-30		

	CEMENT	PFA	SAND	PEA GRAVEL
Today's Deliveries	–	56-780		
Previous Deliveries	15-0	56-40		
Total Deliveries	15-0	113-180		
Total Used	2-930	29-30		
Stock on Site	12-070	83-880		

OPERATIVES ON SITE

C. HENDINSON - D. COWANSON
D. BRAY - K PUTNAM

REMARKS

P-F-A - 28-580 - 21757
P-F-A - 28-260 - 209 25

I CONFIRM THIS IS A TRUE RECORD
VAN ELLE OPERATIVE SIGNATURE

CLIENTS SIGNATURE [redacted]

DATE 2-4-24

VAN ELLE
TOTAL FOUNDATION SOLUTIONS

SHEET 2 OF 3

2-4-24

DAILY & ACCUMULATIVE GROUTING RETURN

Job No. 231536 Client I. S. G. Site Address VARLEY ST - MANCHESTER

HOLE REF.	DEPT H (M)	ANGLE/ PRESSURE	BRIEF LOG OF HOLE	QUANT OF GROUT (T)	OPC	PFA	SAND	PEA GRAVEL
54m		PRESSURISED TO 2 BAR HELD		2 MINS	0-015	0-150		
52m		..	..	..	0-015	0-150		
50m		..	..	..	0-015	0-150		
48m		..	..	..	0-015	0-150		
46m		..	..	..	0-02	0-200		
44m		..	..	..	0-02	0-200		
42m		..	..	..	0-015	0-150		
40m		..	..	..	0-015	0-150		
38m		..	..	..	0-015	0-150		
36m		..	..	..	0-015	0-150		
34m		..	..	..	0-015	0-150		
32m		..	..	..	0-015	0-150		
30m		..	..	..	0-015	0-150		
/	TOTAL HOLES GROUTED TODAY		TODAY'S TOTAL GROUT		0-205	2-05		
3	PREVIOUS TOTAL		PREVIOUS TOTAL		2-930	29-30		
3	TOTAL TODATE		TOTAL GROUTING		3-135	31-350		

	CEMENT	PFA	SAND	PEA GRAVEL
Today's Deliveries	/	/		
Previous Deliveries	/	/		
Total Deliveries	15-0	113-180		
Total Used	3-135	31-350		
Stock on Site	11-865	81-830		

OPERATIVES ON SITE

REMARKS

I CONFIRM THIS IS A TRUE RECORD
VAN ELLE OPERATIVE SIGNATURE

C.

CLIENTS SIGNATURE

[redacted]

DATE 2-4-24

VAN ELLE
TOTAL FOUNDATION SOLUTIONS

SHEET 3 OF 3 2-4-24

DAILY & ACCUMULATIVE GROUTING RETURN

Job No. 231836 Client I. S. G. Site Address VARLEY ST – MANCHESTER

HOLE REF.	DEPTH (M)	ANGLE/ PRESSURE	BRIEF LOG OF HOLE	QUANT OF GROUT (T)	OPC	PFA	SAND	PEA GRAVEL
28m		PRESSURISED TO 2 BAR HELD 2 MINS			0-015	0-150		
26m		..	..	..	0-015	0-150		
24m		..	..	..	0-015	0-150		
22m		..	..	..	0-015	0-150		
20m		..	..	..	0-015	0-150		
18m		..	..	..	0-015	0-150		
16m		..	..	..	0-015	0-150		
14m		..	..	..	0-015	0-150		
12m		..	..	..	0-015	0-150		
10m		..	..	..	0-015	0-150		
8m	BROKE SEAL		GROUT CAME UP SIDE		0-03	0-300		
		OF CASING						
1	TOTAL HOLES GROUTED TODAY		TODAY'S TOTAL GROUT		0-180	1-80		
3	PREVIOUS TOTAL		PREVIOUS TOTAL		3-135	31-350		
4	TOTAL TODATE		TOTAL GROUTING		3-315	33-150		

	CEMENT	PFA	SAND	PEA GRAVEL
Today's Deliveries	–	–		
Previous Deliveries	–	–		
Total Deliveries	15-0	113-150		
Total Used	3-315	33-150		
Stock on Site	11-685	80-030		

OPERATIVES ON SITE

REMARKS

I CONFIRM THIS IS A TRUE RECORD
VAN ELLE OPERATIVE SIGNATURE

CLIENTS SIGNATURE
[redacted]

DATE 2-4-24

VAN ELLE
TOTAL FOUNDATION SOLUTIONS

3-4-24

DAILY & ACCUMULATIVE GROUTING RETURN

Job No. 231836 Client I. S. G. Site Address VARLEY ST - MANCHESTER

SHAFT 001

HOLE REF.	DEPT H (M)	ANGLE/ PRESSURE	BRIEF LOG OF HOLE	QUANT OF GROUT (T)	OPC	PFA	SAND	PEA GRAVEL
B/H 5			SOFT	FULL	0-03	0-300		
B/H 6			"	"	0-03	0-300		
B/H 7			"	"	0-03	0-300		
B/H 8			"	"	0-03	0-300		
B/H 9			"	"	0-03	0-300		
B/H 10			"	"	0-03	0-300		
B/H 11			"	"	0-03	0-300		
B/H 12 T/H	PRESSURISED	ALL	THE WAY UP	FROM 76m	0-160	1-60		
TO	16m	IN 2m	INCREMENTS TO	2 BAR				
T/H	SOLID -	BROKE	SEAL AT	16m				
	SHAFT 001 - FINISHED							
8	TOTAL HOLES GROUTED TODAY		TODAY'S TOTAL GROUT		0-370	3-70		
4	PREVIOUS TOTAL		PREVIOUS TOTAL		3-315	33-150		
12	TOTAL TODATE		TOTAL GROUTING		3-685	36-850		

	CEMENT	PFA	SAND	PEA GRAVEL
Today's Deliveries	–	27-900		
Previous Deliveries	–	113-180		
Total Deliveries	15-0	141-080		
Total Used	3-685	36-850		
Stock on Site	11-315	104-230		

OPERATIVES ON SITE

D. LOWERSON - D. BRAY
K. PUNSHAM

REMARKS

P-F-A - 24101 - 27-900 T
NO GAS DETECTED

I CONFIRM THIS IS A TRUE RECORD
VAN ELLE OPERATIVE SIGNATURE C.

CLIENTS SIGNATURE [redacted]

DATE 3-4-24

VAN ELLE
TOTAL FOUNDATION SOLUTIONS

SHEET 1 OF 2

4-4-24

DAILY & ACCUMULATIVE GROUTING RETURN

Job No. 231826... Client ....I. S. G.................... Site Address ....VAUXHALL ST - MANCHESTER........

SHAFT 002

HOLE REF.	DEPT H (M)	ANGLE/ PRESSURE	BRIEF LOG OF HOLE	QUANT OF GROUT (T)	OPC	PFA	SAND	PEA GRAVEL
B/H 1	58m	PRESSURISED TO 2 BAR HELD 2 MINS			0-8	8-0		
	56m	"	"	"	0-03	0-3		
	54m	"	"	"	0-03	0-3		
	52m	"	"	"	0-04	0-4		
	50m	"	"	"	0-05	0-5		
	48m	"	"	"	0-03	0-3		
	46m	"	"	"	0-03	0-3		
	44m	"	"	"	0-03	0-3		
	42m	"	"	"	0-05	0-5		
	40m	"	"	"	0-05	0-5		
	38m	"	"	"	0-03	0-3		
	36m	"	"	"	0-03	0-3		
/	TOTAL HOLES GROUTED TODAY		TODAY'S TOTAL GROUT		1-20	12-0		
12	PREVIOUS TOTAL		PREVIOUS TOTAL		3-685	36-850		
12	TOTAL TODATE		TOTAL GROUTING		4-885	48-850		

	CEMENT	PFA	SAND	PEA GRAVEL
Today's Deliveries	/	/		
Previous Deliveries	/	/		
Total Deliveries	15-0	141-080		
Total Used	4-885	48-850		
Stock on Site	10-115	92-230		

OPERATIVES ON SITE

D. LOWANSON - D. BRAY
K. CUNDHAM

REMARKS

I CONFIRM THIS IS A TRUE RECORD
VAN ELLE OPERATIVE SIGNATURE

C. K

CLIENTS SIGNATURE

[redacted]

DATE ....4-4-24....

VAN ELLE
TOTAL FOUNDATION SOLUTIONS

SHEET 2 OF 2

4-4-24

DAILY & ACCUMULATIVE GROUTING RETURN

Job No. 231834 Client I. S. G. Site Address VALLEY ST - MANCHESTER

SHAFT 002

HOLE REF.	DEPT H (M)	ANGLE/ PRESSURE	BRIEF LOG OF HOLE	QUANT OF GROUT (T)	OPC	PFA	SAND	PEA GRAVEL
BH1	34m	PRESSURISED TO 2 BAR HELD 2 MINS			0-03	0-3		
	32m	"	"	"	0-04	0-4		
	30m	"	"	"	0-04	0-4		
	28m	"	"	"	0-03	0-3		
	26m	"	"	"	0-06	0-6		
	24m	"	"	"	0-1	1-0		
	22m	"	"	"	0-03	0-3		
	20m	"	"	"	0-04	0-4		
	18m	"	"	"	0-04	0-4		
	16m	"	"	"	0-03	0-3		
	14m	"	"	"	0-03	0-3		
	12m	"	"	"	0-03	0-3		
	10m	BROKE SEAL GROUT CAME U/SIDE OF CASING			0-1	1-0		
1	TOTAL HOLES GROUTED TODAY		TODAY'S TOTAL GROUT		0-6	6-0		
12	PREVIOUS TOTAL		PREVIOUS TOTAL		4-855	48-850		
13	TOTAL TODATE		TOTAL GROUTING		5-485	54-850		

	CEMENT	PFA	SAND	PEA GRAVEL
Today's Deliveries	—	—		
Previous Deliveries	—	—		
Total Deliveries	15-0	141-080		
Total Used	5-485	54-850		
Stock on Site	9-515	86-230		

OPERATIVES ON SITE

REMARKS

I CONFIRM THIS IS A TRUE RECORD
VAN ELLE OPERATIVE SIGNATURE

CLIENTS SIGNATURE

[redacted]

DATE 4-4-24

VAN ELLE
TOTAL FOUNDATION SOLUTIONS

SHAFT 1 OF 2 5-4-24

DAILY & ACCUMULATIVE GROUTING RETURN

Job No 231836 Client I.S.G. Site Address VARLEY ST - MANCHESTER

SHAFT 002

HOLE REF.	DEPT H (M)	ANGLE/ PRESSURE	BRIEF LOG OF HOLE	QUANT OF GROUT (T)	OPC	PFA	SAND	PEA GRAVEL
BH2	58m	PRESSURISED	TO 2 BAR HELD	2 mins	0-06	0-600		
	56m	"	"	"	0-01	0-100		
	54m	"	"	"	0-01	0-100		
	52m	"	"	"	0-01	0-100		
	50m	"	"	"	0-01	0-100		
	48m	"	"	"	0-01	0-100		
	46m	"	"	"	0-01	0-100		
	44m	"	"	"	0-01	0-100		
	42m	"	"	"	0-01	0-100		
	40m	"	"	"	0-01	0-100		
	38m	"	"	"	0-01	0-100		
	36m	"	"	"	0-01	0-100		
	34m	"	"	"	0-01	0-100		
/	TOTAL HOLES GROUTED TODAY		TODAY'S TOTAL GROUT		0-150	1-50		
13	PREVIOUS TOTAL		PREVIOUS TOTAL		5-485	56-550		
13	TOTAL TODATE		TOTAL GROUTING		5-665	56-650		

	CEMENT	PFA	SAND	PEA GRAVEL
Today's Deliveries	/	/		
Previous Deliveries	/	/		
Total Deliveries	15-0	141-080		
Total Used	5-665	56-650		
Stock on Site	9-335	84-430		

OPERATIVES ON SITE

SAME AS 4-4-24

REMARKS

4 CUBES TAKEN

I CONFIRM THIS IS A TRUE RECORD
VAN ELLE OPERATIVE SIGNATURE

C.

CLIENTS SIGNATURE

[redacted]

DATE 5-4-24

VAN ELLE
TOTAL FOUNDATION SOLUTIONS

SHEET 2 OF 2 5-4-24

DAILY & ACCUMULATIVE GROUTING RETURN

Job No. 231836 Client I. S. G. Site Address VAUXY ST – MANCHESTER

SHAFT 002

HOLE REF.	DEPT H (M)	ANGLE/ PRESSURE	BRIEF LOG OF HOLE	QUANT OF GROUT (T)	OPC	PFA	SAND	PEA GRAVEL
BH2	32m	PRESSURISED TO 2 BAR HELD 2 MINS			0-01	0-100		
	30m	"	"	"	0-01	0-100		
	28m	"	"	"	0-01	0-100		
	26m	"	"	"	0-01	0-100		
	24m	"	"	"	0-01	0-100		
	22m	"	"	"	0-01	0-100		
	20m	"	"	"	0-01	0-100		
	18m	"	"	"	0-01	0-100		
	16m	"	"	"	0-01	0-100		
	14m	"	"	"	0-01	0-100		
	12m	"	"	"	0-01	0-100		
	10m	"	"	"	0-01	0-100		
	8m	BROKE SEAL GROUT CAME UP SIDE OF CASING			0-03	0-300		
1	TOTAL HOLES GROUTED TODAY		TODAY'S TOTAL GROUT		0-150	1-50		
13	PREVIOUS TOTAL		PREVIOUS TOTAL		5-665	56-650		
14	TOTAL TODATE		TOTAL GROUTING		5-815	58-150		

	CEMENT	PFA	SAND	PEA GRAVEL
Today's Deliveries	–	–		
Previous Deliveries	–	–		
Total Deliveries	15-0	141-080		
Total Used	5-815	58-150		
Stock on Site	9-185	82-930		

OPERATIVES ON SITE

REMARKS

I CONFIRM THIS IS A TRUE RECORD
VAN ELLE OPERATIVE SIGNATURE

CLIENTS SIGNATURE [redacted]

DATE 5-4-24

VAN ELLE
TOTAL FOUNDATION SOLUTIONS

8-4-24

DAILY & ACCUMULATIVE GROUTING RETURN

Job No. 231836 Client I. S. G. Site Address VARLEY ST - MANCHESTER

SHAFT 002

HOLE REF.	DEPTH (M)	ANGLE/ PRESSURE	BRIEF LOG OF HOLE	QUANT OF GROUT (T)	OPC	PFA	SAND	PEA GRAVEL
B/H3			PRESSURISED ALL THE WAY UP FROM		0-180	1-80		
T/H			58m TO 10m IN 2m INCREMENTS					
			TO 2 BAR T/H SOLID BADIKE					
			SEAL AT 10m					
			SHAFT 002 FINISHED					
1	TOTAL HOLES GROUTED TODAY		TODAY'S TOTAL GROUT		0-180	1-80		
14	PREVIOUS TOTAL		PREVIOUS TOTAL		5-815	58-150		
15	TOTAL TODATE		TOTAL GROUTING		5995	59-950		

	CEMENT	PFA	SAND	PEA GRAVEL
Today's Deliveries	–	–		
Previous Deliveries	–	–		
Total Deliveries	15-0	141-080		
Total Used	5-995	59-950		
Stock on Site	9-005	81-130		

OPERATIVES ON SITE

C. HENDERSON – D. LOWINSON – D. BAGH
K PUNJAB

REMARKS

I CONFIRM THIS IS A TRUE RECORD
VAN ELLE OPERATIVE SIGNATURE

CLIENTS SIGNATURE

[redacted]

DATE 8-4-24

VAN ELLE
TOTAL FOUNDATION SOLUTIONS

11-4-24

DAILY & ACCUMULATIVE GROUTING RETURN

Job No. 231936 Client I.S.G. Site Address VALLEY ST - MANCHESTER

HOLE REF.	DEPT H (M)	ANGLE/ PRESSURE	BRIEF LOG OF HOLE	QUANT OF GROUT (T)	OPC	PFA	SAND	PEA GRAVEL
G5	I5		COAL	FULL	0-05	0-600		
E7 ~~E6~~	G7		,,	,,	0-05	0-600		
I7	G9		,,	,,	0-05	0-600		
I9			,,	,,	0-025	0-300		
C5	E5		NO COAL	FULL	0-05	0-600		
A7	C7		,,	,,	0-05	0-600		
A9	C9		,,	,,	0-05	0-600		
E9	A11		,,	,,	0-05	0-600		
C11	E11		,,	,,	0-05	0-600		
G11	I11		,,	,,	0-05	0-600		
19	TOTAL HOLES GROUTED TODAY		TODAY'S TOTAL GROUT		0-475	5-70		
–	PREVIOUS TOTAL		PREVIOUS TOTAL		5-995	59-950		
19	TOTAL TODATE		TOTAL GROUTING		6-470	65-650		

	CEMENT	PFA	SAND	PEA GRAVEL
Today's Deliveries	–	–		
Previous Deliveries	–	–		
Total Deliveries	15-0	141-080		
Total Used	6-470	65-650		
Stock on Site	8-530	75-430		

OPERATIVES ON SITE

C. HENDERSON - D. LOWERSON
K. PUNDHAM - D. BRAY

REMARKS

4 CUBES TAKEN
GROUT TOTALS CARRIED ON FROM
2 SHAFTS

I CONFIRM THIS IS A TRUE RECORD
VAN ELLE OPERATIVE SIGNATURE C. K

CLIENTS SIGNATURE [redacted]

DATE 11-4-24

VAN ELLE
TOTAL FOUNDATION SOLUTIONS

17-4-24

DAILY & ACCUMULATIVE GROUTING RETURN

Job No. 231836 Client I.S.G. Site Address VARLEY ST - MANCHESTER

HOLE REF.	DEPTH (M)	ANGLE/ PRESSURE	BRIEF LOG OF HOLE	QUANT OF GROUT (T)	OPC	PFA	SAND	PEA GRAVEL
A1	A3	A5	NO COAL	FULL	0-075	0-900		
C1	E1	G1	"	"	0-075	0-900		
I13	I15	I17	"	"	0-075	0-900		
I19	I21	K1	"	"	0-075	0-900		
K3	K11	K13	"	"	0-075	0-900		
K15	K17	K19	"	"	0-075	0-900		
K21	M1	M11	"	"	0-075	0-900		
M13	M15	M17	"	"	0-075	0-900		
M19	M21	O1	"	"	0-075	0-900		
Q1	S1		"	"	0-05	0-600		
I1	C3	E3	COAL	FULL	0-075	0-900		
G3	I3		"	"	0-05	0-600		
			"	"				
34	TOTAL HOLES GROUTED TODAY		TODAY'S TOTAL GROUT		0-850	10-200		
19	PREVIOUS TOTAL		PREVIOUS TOTAL		6-470	65-650		
53	TOTAL TODATE		TOTAL GROUTING		7-320	75-850		

	CEMENT	PFA	SAND	PEA GRAVEL
Today's Deliveries	-	-		
Previous Deliveries	-	-		
Total Deliveries	15-0	141-080		
Total Used	7-320	75-850		
Stock on Site	7-680	65-230		

OPERATIVES ON SITE

C. HENDERSON - L. TAYLOR - L. FENWICK
C. WINGATE - D. LOWANSON

REMARKS

4 - CUBES TAKEN

I CONFIRM THIS IS A TRUE RECORD
VAN ELLE OPERATIVE SIGNATURE

[redacted]

DATE 17-4-24

VAN ELLE
TOTAL FOUNDATION SOLUTIONS

19-4-24

DAILY & ACCUMULATIVE GROUTING RETURN

Job No. 231836 Client I.S.G. Site Address VARLEY ST – MANCHESTER

HOLE REF.	DEPTH (M)	ANGLE/ PRESSURE	BRIEF LOG OF HOLE	QUANT OF GROUT (T)	OPC	PFA	SAND	PEA GRAVEL
M3	O3	Q3	NO COAL	FULL	0-075	0-900		
K5	M5	O5	"	"	0-075	0-900		
Q5	K7	M7	"	"	0-075	0-900		
K9	M9	O9	"	"	0-075	0-900		
Q9	S9	U9	"	"	0-075	0-900		
W9	O11	Q11	"	"	0-075	0-900		
S11	U11	O13	"	"	0-075	0-900		
Q13	O15	Q15	"	"	0-075	0-900		
O17	Q17	O19	"	"	0-075	0-900		
Q19	O21	Q21	"	"	0-075	0-900		
30	TOTAL HOLES GROUTED TODAY		TODAY'S TOTAL GROUT		0-750	9-0		
53	PREVIOUS TOTAL		PREVIOUS TOTAL		7-320	75-850		
83	TOTAL TODATE		TOTAL GROUTING		8-070	84-850		

	CEMENT	PFA	SAND	PEA GRAVEL
Today's Deliveries	–	–		
Previous Deliveries	–	–		
Total Deliveries	15-0	141-080		
Total Used	8-070	84-850		
Stock on Site	6-930	56-230		

OPERATIVES ON SITE

C. HENDERSON – D. LOWERSON – L. STAICON
C. WINGATE – L. FENWICK

REMARKS

I CONFIRM THIS IS A TRUE RECORD
VAN ELLE OPERATIVE SIGNATURE

C.

C[redacted]

DATE 19-4-24

VAN ELLE
TOTAL FOUNDATION SOLUTIONS

SHEET 1 OF 2

29-4-24

DAILY & ACCUMULATIVE GROUTING RETURN

Job No. 231836 Client I.S.G Site Address VARLEY ST - MANCHESTER

HOLE REF.	DEPTH (M)	ANGLE/ PRESSURE	BRIEF LOG OF HOLE	QUANT OF GROUT (T)	OPC	PFA	SAND	PEA GRAVEL
U1	W1 Y1	AA1 AC1	NO COAL	FULL	0-1	0-2		
AE1	AG1	AI1 AK1	"	"	0-1	1-2		
AM1	S3	U3 W3	"	"	0-1	1-2		
Y3	AA3	AC3 AE3	"	"	0-1	1-2		
AG3	AI3	AK3 AM3	"	"	0-1	1-2		
S5	U5	W5 Y5	"	"	0-1	1-2		
AA5	AC5	AE5 AG5	NO COAL	FULL	0-1	1-2		
AI5	AK5	AM5 O7	"	"	0-1	1-2		
Q7	S7	U7 W7	"	"	0-1	1-2		
Y7	AA7	AC7 AE7	"	"	0-1	1-2		
AG7	AI7	AK7 AM7	"	"	0-1	1-2		
Y9	AA9	AC9 AE9	"	"	0-1	1-2		
AG9	AI9	AK9 AM9	"	"	0-1	1-2		
52	TOTAL HOLES GROUTED TODAY		TODAY'S TOTAL GROUT		1-30	15-60		
83	PREVIOUS TOTAL		PREVIOUS TOTAL		8-070	94-850		
135	TOTAL TODATE		TOTAL GROUTING		9-370	100-450		

	CEMENT	PFA	SAND	PEA GRAVEL
Today's Deliveries	/	/		
Previous Deliveries	/	/		
Total Deliveries	15-0	141-080		
Total Used	9-370	100-450		
Stock on Site	5-630	40-630		

OPERATIVES ON SITE

C. HADMASON
C. WINGATE
D. LOWKNSON

REMARKS

4 CUBES TAKEN

I CONFIRM THIS IS A TRUE RECORD
VAN ELLE OPERATIVE SIGNATURE

C. Le

CLIENTS SIGNATURE [redacted]

DATE 29-4-24

VAN ELLE
TOTAL FOUNDATION SOLUTIONS

SHEET 2 OF 2 29-4-24

DAILY & ACCUMULATIVE GROUTING RETURN

Job No. 231836 Client I.S.G Site Address VARLEY ST- MANCHESTER

HOLE REF.	DEPT H (M)	ANGLE/ PRESSURE	BRIEF LOG OF HOLE	QUANT OF GROUT (T)	OPC	PFA	SAND	PEA GRAVEL
W11	Y11	AA11 AC11	NO COAL		0-1	1-2		
AE11	AG11	AI11 AK11	"		0-1	1-2		
AM11	Y13	AA13 AC13	"		0-1	1-2		
AE13	AG13	Y15 AA15	"		0-1	1-2		
AC15	AE15	AG15 Y17	"		0-1	1-2		
AA17	AC17	AE17 AG17	"		0-1	1-2		
Y19	AA19	AC19 AE19	"		0-1	1-2		
AG19	Y21	AA21 AC21	"		0-1	1-2		
AE21	AG21	55	"		0-075	0-900		
35	TOTAL HOLES GROUTED TODAY		TODAY'S TOTAL GROUT		0-875	10-500		
135	PREVIOUS TOTAL		PREVIOUS TOTAL		9-390	100-450		
170	TOTAL TODATE		TOTAL GROUTING		10-265	110-950		

	CEMENT	PFA	SAND	PEA GRAVEL
Today's Deliveries	—	—		
Previous Deliveries	—	—		
Total Deliveries	15-0	141-080		
Total Used	10-265	110-950		
Stock on Site	4-735	30-130		

OPERATIVES ON SITE

—

REMARKS

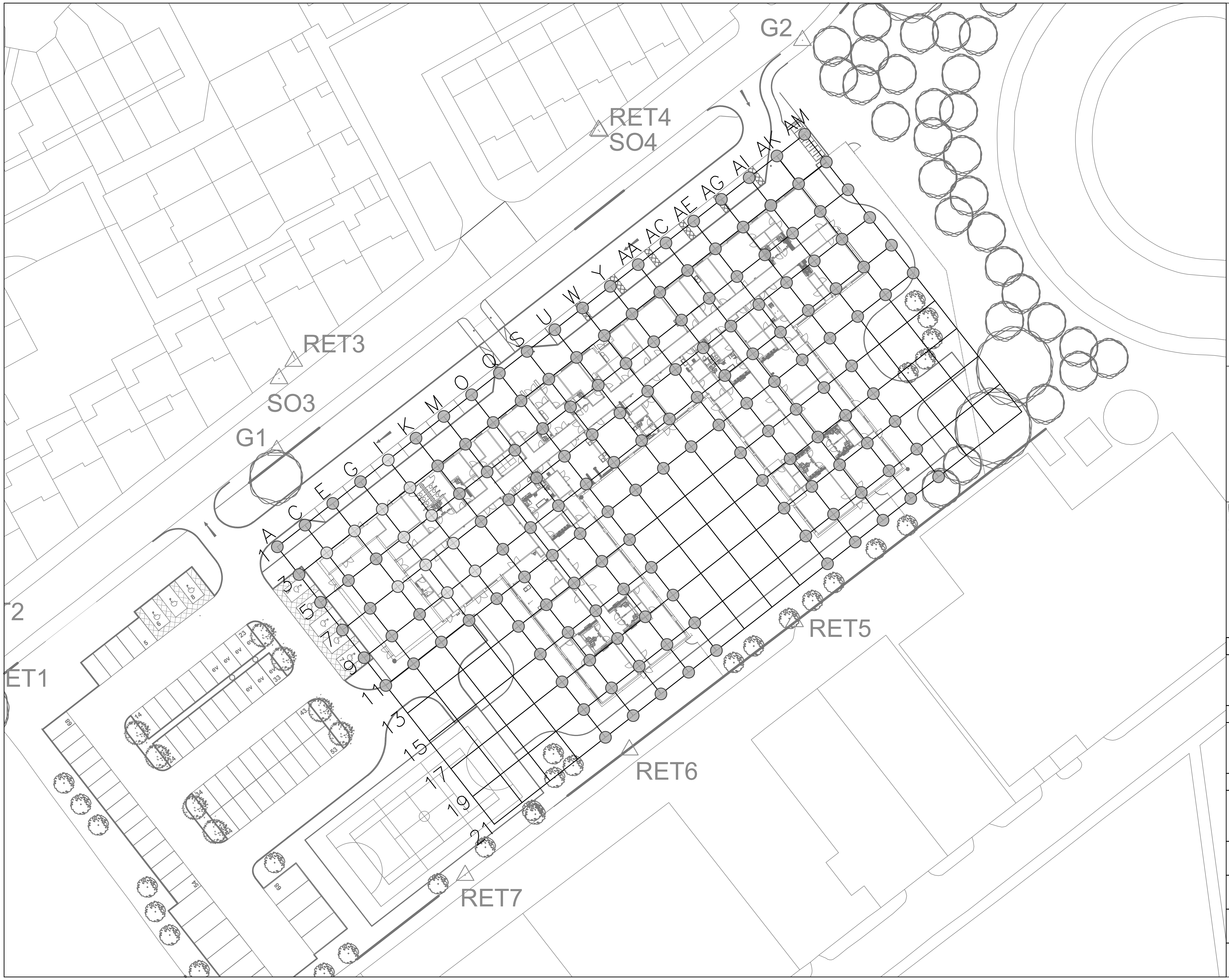
—

I CONFIRM THIS IS A TRUE RECORD
VAN ELLE OPERATIVE SIGNATURE

[redacted]

DATE 29-4-24

Appendix 4:
Drilling Summary
(D&G Grid)


G2
RET4
SO4
RET3
SO3
G1
1 A C E G I K M O Q S U W Y AA AC AE AG AI AK AM
3
5
7
9
11
13
15
17
19
21
T2
ET1
RET5
RET6
RET7
ev
5
6
8
14
23
24
33
34
43
53
54
68

NOTES:

○ Coal

● No Coal

REVISION NOTES:

Van Elle Limited
Summit Close
Kirkby in Ashfield
Nottinghamshire
NG17 8GJ

Tel: 01773 580580

CLIENT:

ISG

CONTRACT:

Varley Street - Mine Consolidation

DRAWING TITLE

Van Elle Drilling Summary

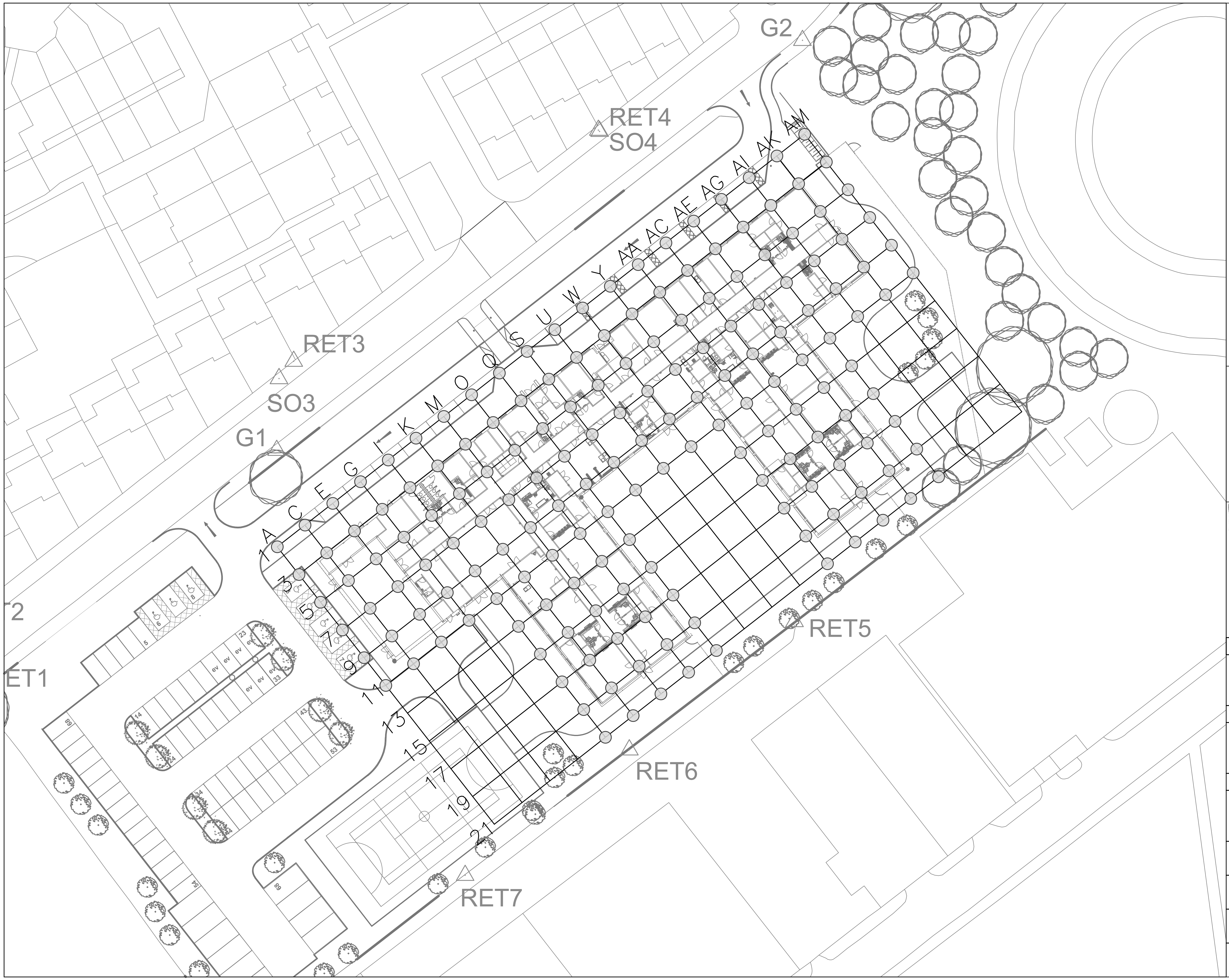
DATE: 16/05/2024

DRAWN BY: SP CHECKED BY: PG

SCALE: NTS SHEET SIZE: A3

DRAWING NO: 231836VEDS REV: -

Appendix 5:
Grouting Summary
(D&G Grid)


G2
RET4
SO4
RET3
SO3
G1
1 A
C
E
G
I
K
M
O
Q
S
U
W
Y
AA
AC
AE
AG
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AM
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9
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21
RET5
RET6
RET7
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33
34
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53
54
68
69

NOTES:

● 0.325T

REVISION NOTES:

VAN ELLE

Van Elle Limited
Summit Close
Kirkby in Ashfield
Nottinghamshire
NG17 8GJ

Tel: 01773 580580

CLIENT:

ISG

CONTRACT:

Varley Street - Mine Consolidation

DRAWING TITLE

Van Elle Grouting Summary

DATE: 16/05/2024

DRAWN BY: SP	CHECKED BY: PG
SCALE: NTS	SHEET SIZE: A3
DRAWING NO: 231836VEGS	REV: -

Appendix 6:

Coal Authority Permit & Closure Form

The Coal
Authority

Permit to Enter or Disturb Coal Authority Interests

Permit 27171

Name and Address of Permit Holder:

Manchester City Council
Town Hall Extension
Mount Street
Manchester
M2 5DB

Site Location:

Varley Street
Manchester
M40 8EF

This certificate hereby grants the above named Permit Holder a Permit to carry out:-

Treatment of shallow mine workings by drilling and grouting to 36m on 6m (4.25m)grid, treatment of two mine entries by grouting (386399-016, 386399-001) within the Authority's interests at the identified site location above as shown on the Grant Permit Boundary (overleaf) for the period of **12 months** from the granted date shown below. *The granting of this Permit does not constitute advice given by the Authority in relation to the proposed operations. It is the Permit Holder's responsibility to obtain appropriate health, safety, environmental, technical and legal advice.*

Conditions:

- *Manned entry (i.e.) into mine entries/workings) is strictly prohibited.*
- *Water flush*
- *Gas Monitoring CO, CH_4, CO_2, O_2, H_2S at borehole and rig*
- *Operators undertaking the work must be in possession of this certificate and the Permit boundary plan at the time of works*
- *Appropriate borehole sealing without delay and to withstand site level changes*

Signed: [redacted] Granted Date: ***17/08/2023***

For and on behalf of The Coal Authority

Nominated Representative: Jake Morris, Permitting Manager;

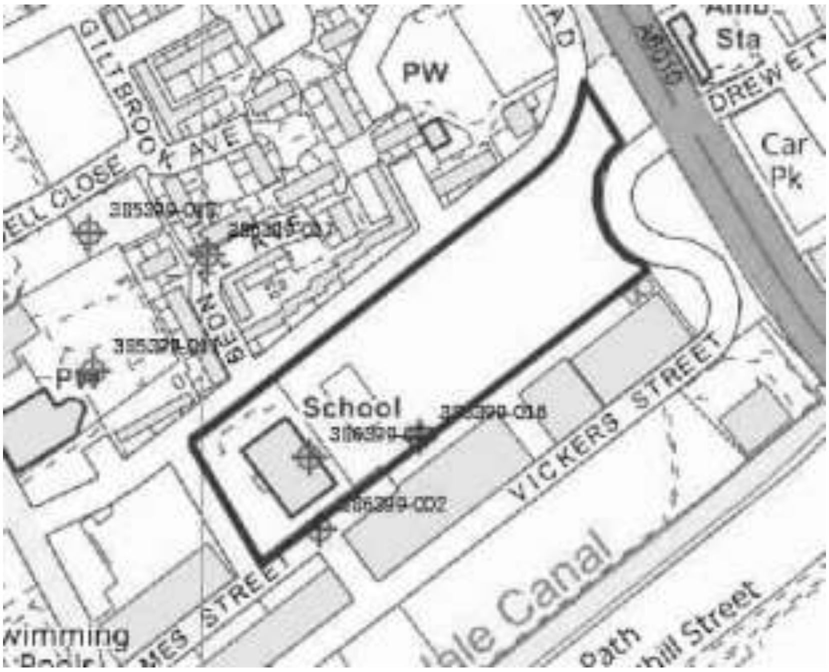
The Coal Authority, Permitting Office, 200 Lichfield Lane, Mansfield, Notts, NG18 4RG

[redacted]

Granted Permit Boundary

Permit Ref: 27171

Permit Boundary:



Amb Sta
A6010
DREWET
Car Pk
PW
GILTBROOK AVE
ELL CLOSE
BEDON
PW
School
VICKERS STREET
385399-002
MES STREET
wimming Pools
le Canal
Path
hill Street

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The Coal Authority

Permit Closure Summary Form

Permit Ref.	**27171**	**Project / Site Location**	**Varley Street, Manchester, M40 8EF**

Please supply all relevant documents, including this completed form within 3 months of the permitted works being completed.

Where relevant the report should include; borehole logs and details of mine or mine entry treatment works carried out (incl. engineering drawings, grout takes etc.) and a scaled site layout plan (correlated to O.S N' Grid) showing all relevant mine entry positions, coal seams, voids and broken ground proved by the works.

Summary of works **Start date** 26/03/2024 **Finish date** 29/04/2024

Have any variations occurred? **X** No ☐ Yes **If so was the Authority notified?** ☐ No ☐ Yes

Please describe;

N/A

Did if any of the following incidents occur?

☐ Spontaneous combustion ☐ Water emission ☐ Gas emission (elevated or above action levels)

☐ Geotechnical instability ☐ Legal issues incl. damage or potential claims **X None**

If yes, please detail each item;

N/A

Were any of the following encountered? Please give a brief summary of the works undertaken.

X Intact coal only ☐ Broken ground **X** Backfilled ground ☐ Voids

Description;

Backfilled ground encountered in shaft positions
Shaft 001 slightly away from expected position

Solid coal encountered in of the 170 drilling and grouting positions

Will further works be necessary that require a Permit? ☐ No **X** Yes

If yes, please describe, including any recommendations;

Capping of shafts

Name: Sam Palmer	[redacted]
Company: Van Elle	

Appendix 7:
Grout Cube Results

29 Rufford Court
Woolston
Warrington
WA1 4RF
United Kingdom
Tel: +44(0) 1925 286220

CONCRETE TEST CUBE REPORT

UKAS TESTING
0001

SOCOTEC

Date: 28/05/2024

Report no: WAB51539008_01

Client: VAN ELLE LTD

Scheme: 231836 Varley Street, Manchester M40 8EF

Contract no: 51079321

Request Sheet No.	Lab Ref.	Client Ref.	Date Made	Time Made	Date Received in Laboratory	Date Tested	Age days	Dimensions mm	Density kg/m³	Failure Load kN	Compressive Strength N/mm²	Specified Strength N/mm²
SOU079411	51539008	3	30/04/2024	1000	01/05/2024	28/05/2024	28	100x100x100	1440	16.4	1.6	not given

Location: END

Mix details: 12-1

The following apply unless otherwise stated under Remarks.

1) Laboratory curing range 18°-22°C.
2) Cube appearance as received satisfactory.
3) Test moisture condition and density saturated.
4) Cube failure normal. Concrete appearance normal.
5) Volume determined by measurement or designated size. Any fins removed by abrasive stone.
6) Laboratory curing conditions cannot be assured during tank cleaning.
7) Certificate of sampling not received. Certificate of making and curing not received.

8) Rate of Loading 0.4 to 0.8 N/mm² per sec.

Certified that curing of the hardened concrete in the laboratory and testing for shape, dimensions, density and compressive strength was carried out in accordance with BS EN 12390-1:2021, BS EN 12390-2:2019, BS EN 12390-7:2019 and BS 12390-3:2019
Air Content deter[redacted]

Signed [redacted] Julie Schofield - Concrete Section Manager

for and on behalf of SOCOTEC UK Limited

Issued to: VAN ELLE LTD (2)

The results relate to the items tested only. Opinions and interpretations expressed herein are outside the scope of UKAS accreditation.
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Woolston
Warrington
WA1 4RF
United Kingdom
Tel: +44(0) 1925 286220

CONCRETE TEST CUBE REPORT

0001

Date: 15/05/2024

Report no: WAB51536567_01

Client: VAN ELLE LTD

Scheme: 231836 Varley Street, Manchester M40 8EF

Contract no: 51079321

Request Sheet No.	Lab Ref.	Client Ref.	Date Made	Time Made	Date Received in Laboratory	Date Tested	Age days	Dimensions mm	Density kg/m³	Failure Load kN	Compressive Strength N/mm²	Specified Strength N/mm²
SOU079410	51536567	1X9	17/04/2024	0900	24/04/2024	15/05/2024	28	100x100x100	1510	21.7	2.2	not given

Location: EN7

Mix details: 12-1

The following apply unless otherwise stated under Remarks.

1) Laboratory curing range 18°-22°C.
2) Cube appearance as received satisfactory.
3) Test moisture condition and density saturated.
4) Cube failure normal. Concrete appearance normal.
5) Volume determined by measurement or designated size. Any fins removed by abrasive stone.
6) Laboratory curing conditions cannot be assured during tank cleaning.
7) Certificate of sampling not received. Certificate of making and curing not received.

8) Rate of Loading 0.4 to 0.8 N/mm² per sec.

Certified that curing of the hardened concrete in the laboratory and testing for shape, dimensions, density and compressive strength was carried out in accordance with BS EN 12390-1:2021, BS EN 12390-2:2019, BS EN 12390-7:2019 and BS 12390-3:2019
Air Content determined in accordance with BS EN 12350-7:2019, Slump test carried out in accordance with BS EN 12350-2:201 [redacted]

Signed Julie Schofield - Concrete Section Manager

for and on behalf of SOCOTEC UK Limited

Issued to: VAN ELLE LTD (2)

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CONCRETE TEST CUBE REPORT

UKAS TESTING 0001

SOCOTEC

Date: 09/05/2024

Report no: WAB51533733_01

Client: VAN ELLE LTD

Scheme: 231836 Varley Street, Manchester M40 8EF

Contract no: 51079321

Request Sheet No.	Lab Ref.	Client Ref.	Date Made	Time Made	Date Received in Laboratory	Date Tested	Age days	Dimensions mm	Density kg/m³	Failure Load kN	Compressive Strength N/mm²	Specified Strength N/mm²
SOU079409	51533733	1Z	11/04/2024	1000	18/04/2024	09/05/2024	28	100x100x100	1460	11.9	1.2	not given

Location: END

Mix details: 12-1

The following apply unless otherwise stated under Remarks.

1) Laboratory curing range 18°-22°C.
2) Cube appearance as received satisfactory.
3) Test moisture condition and density saturated.
4) Cube failure normal. Concrete appearance normal.
5) Volume determined by measurement or designated size. Any fins removed by abrasive stone.
6) Laboratory curing conditions cannot be assured during tank cleaning.
7) Certificate of sampling not received. Certificate of making and curing not received.

8) Rate of Loading 0.4 to 0.8 N/mm² per sec.

Certified that curing of the hardened concrete in the laboratory and testing for shape, dimensions, density and compressive strength was carried out in accordance with BS EN 12390-1:2021, BS EN 12390-2:2019, BS EN 12390-7:2019 and BS 12390-3:2019
Air Content determined in accordance with BS EN 12350-7:2019, Slump test carried out in accordance with BS EN 12350-2:201 [redacted]

Signed Julie Schofield - Concrete Section Manager

for and on behalf of SOCOTEC UK Limited

Issued to: VAN ELLE LTD (2)

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CONCRETE TEST CUBE REPORT

UKAS TESTING
0001

SOCOTEC

Date: 02/05/2024

Report no: WAB51531511_01

Client: VAN ELLE LTD

Scheme: 231836 Varley Street, Manchester M40 8EF

Contract no: 51079321

Request Sheet No.	Lab Ref.	Client Ref.	Date Made	Time Made	Date Received in Laboratory	Date Tested	Age days	Dimensions mm	Density kg/m³	Failure Load kN	Compressive Strength N/mm²	Specified Strength N/mm²
SOU079408	51531511	1+9	04/04/2024	1000	10/04/2024	02/05/2024	28	100x95x100	1530	17.2	1.8	not given

Location: SHAFT 002

Mix details: 10-1
Remarks: Does not meet the BSEN for Squareness & Flatness. Annex B Procedure used. Outside dimensional tolerances stated in BS EN 12390:3:2009.

The following apply unless otherwise stated under Remarks.

1) Laboratory curing range 18°-22°C.
2) Cube appearance as received satisfactory.
3) Test moisture condition and density saturated.
4) Cube failure normal. Concrete appearance normal.
5) Volume determined by measurement or designated size. Any fins removed by abrasive stone.
6) Laboratory curing conditions cannot be assured during tank cleaning.
7) Certificate of sampling not received. Certificate of making and curing not received.

8) Rate of Loading 0.4 to 0.8 N/mm² per sec.

Certified that curing of the hardened concrete in the laboratory and testing for shape, dimensions, density and compressive strength was carried out in accordance with BS EN 12390-1:2021, BS EN 12390-2:2019, BS EN 12390-7:2019 and BS 12390-3:2019
Air Content determined in accordance with BS EN 12350-7:2019, Slump test carried out in accordance with BS EN 12350-2:20 [redacted]

Signed Julie Schofield - Concrete Section Manager

for and on behalf of SOCOTEC UK Limited

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CONCRETE TEST CUBE REPORT

0001

Date: 24/04/2024

Report no: WAB51531507_01

Client: VAN ELLE LTD

Scheme: 231836 Varley Street, Manchester M40 8EF

Contract no: 51079321

Request Sheet No.	Lab Ref.	Client Ref.	Date Made	Time Made	Date Received in Laboratory	Date Tested	Age days	Dimensions mm	Density kg/m³	Failure Load kN	Compressive Strength N/mm²	Specified Strength N/mm²
SOU079407	51531507	1+9	27/03/2024	0900	10/04/2024	24/04/2024	28	100x100x100	1470	20.6	2.1	not given

Location: SHAFT 001

Mix details: 10-1

The following apply unless otherwise stated under Remarks.

1) Laboratory curing range 18°-22°C.
2) Cube appearance as received satisfactory.
3) Test moisture condition and density saturated.
4) Cube failure normal. Concrete appearance normal.
5) Volume determined by measurement or designated size. Any fins removed by abrasive stone.
6) Laboratory curing conditions cannot be assured during tank cleaning.
7) Certificate of sampling not received. Certificate of making and curing not received.

8) Rate of Loading 0.4 to 0.8 N/mm² per sec.

Certified that curing of the hardened concrete in the laboratory and testing for shape, dimensions, density and compressive strength was carried out in accordance with BS EN 12390-1:2021, BS EN 12390-2:2019, BS EN 12390-7:2019 and BS 12390-3:2019
Air Content determined in accordance with BS EN 12350-7:2019, Slump test carried out in accordance with BS EN 12350-2:201[redacted]

Signed [redacted] Julie Schofield - Concrete Section Manager

for and on behalf of SOCOTEC UK Limited

Issued to: VAN ELLE LTD (2)

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From:	Sam Palmer <[redacted]>
Sent:	24 June 2024 16:31
To:	Ben Jackson
Cc:	Paul Grocott; Alisdair Pye; Dave Bourne
Subject:	RE: [EXTERNAL] Varley Street: As built update - CA permit
Attachments:	SP231836 Varley Street Factual Report.pdf

WARNING: External Email

Hi Ben,

Please see attached Completion Report for our works at Varley Street. This has also been sent to The Coal Authority for closure of the permit.

Any queries, please let us know.

Best,

Sam Palmer MEng GMICE
Contracts Engineer
Summit Close, Kirkby in Ashfield, Nottinghamshire, NG17 8GJ
[redacted] | **W** www.van-elle.co.uk

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From: Paul Grocott <[redacted]>
Sent: Monday, June 24, 2024 3:25 PM
To: Ben Jackson <[redacted]>
Cc: Sam Palmer <[redacted]>
Subject: RE: [EXTERNAL] Varley Street: As built update - CA permit

Hi Ben

We have drafted the report, and it will be with you this week, the CA closure form will also form part of that and a copy will goto them.

With regards

Paul

Paul Grocott BSc (Hons) MIMMM FGS
Contracts Manager
Summit Close, Kirkby in Ashfield, Nottinghamshire, NG17 8GJ
[redacted]

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From: Ben Jackson <[redacted]
Sent: Monday, June 24, 2024 2:55 PM
To: Paul Grocott <[redacted]
Subject: [EXTERNAL] Varley Street: As built update - CA permit

> **Caution:** This email originated from outside of Van Elle. Do not click links or open attachments unless you recognise the sender and know the content is safe. Definitely do not enter your ID and password. When in doubt, contact IT Support

Hi Paul
Please can you give me an update on status of the as installed handover pack and CA permit close out.

Thanks
Ben

Ben Jackson | Senior Project Manager | UK Construction | ISG
18th Floor Blue Tower, Blue Road, MediaCity UK, Salford Quays, M50 2AB
[redacted]
isgltd.com | LinkedIn

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Appendix L Pre-Pour Inspections

CGC
CheltenhamGreenCivils

Concrete Pre-Pour Inspection & Sign Off

Project:	**Varley St**	Project Reference:	**CG153**
Pour Reference Number:	**Mineshaft 1**	Pour Date:	**Pour Location: Mineshaft 1**

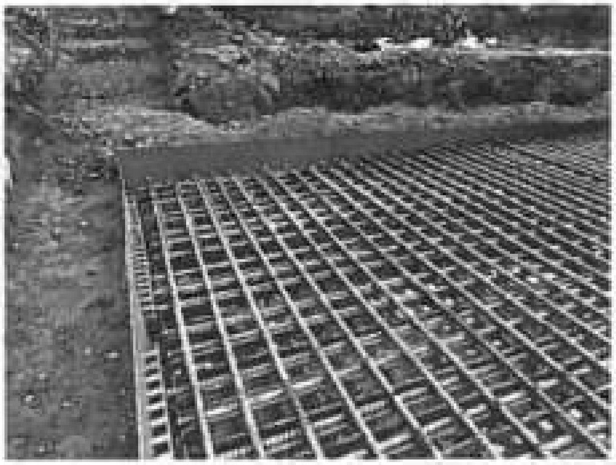
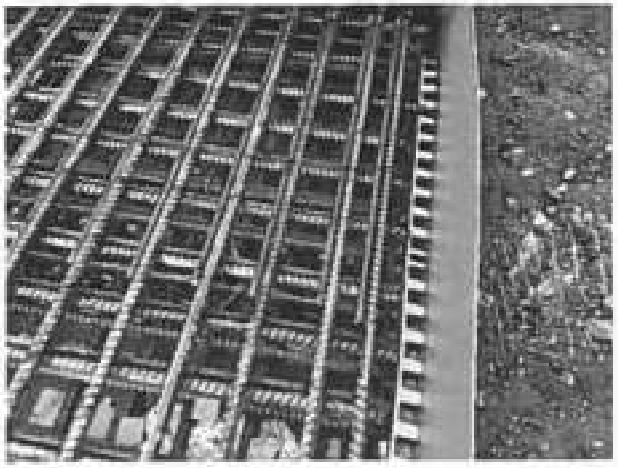
Items	Details	Pass	Fail	Adjustments	Pass	Fail
Formation Level	VIRGIN CLAY (NO SOFT SPOTS)	✓				
Blinding Line / Level	CORRECT	✓				
Final Formation	CLAY	✓				
Type of Formwork	PEKAFILL SHEETS	✓				
Position of Formwork	CORRECT – CHECKED 19.08.24	✓				
Reinforcement Fabric / Type	UP TO 40MM REBAR	✓				
Reinforcement Fabric Lap / Spacing	AS PER DRAWING	✓				
Spacer Type / Cover	BOTTOM = 100MM CHAIRS & BLOCK SPACERS SIDES = 75MM TRIC TRAC	✓				
Reinforcement Bar Correct Type	AS PER ATTACHED SCHEDULES	✓				
Bar Position	CORRECT	✓				
Reinforcement Ties	CORRECT	✓				
Bolt Line	N/A	N/A				
Bolt Position	N/A	N/A				
Bolt Projection	N/A	N/A				
Concrete Mix	C40/50 DS1 125MM SLUMP (PUMP MIX)	✓				
Concrete Target Slump	125MM	✓				
Concrete Cover To Reinforcement	75MM ALL SIDES AND 100MM BOTTOM	✓				
Type of Concrete Compaction	HIGH FREQUENCY POKER 58MM	✓				
Volume Of Concrete	19.6 m3	✓				
Waterbar / Weepholes	N/A	N/A				
Cleanliness	GOOD	✓				
Finish Required / Level Control	EASY FLOAT / ROTATAING LASER	✓				
Method Of Pouring / Access Plant	CONCRETE PUMP	✓				
Weather Forecast (Frost)	DRY	✓				

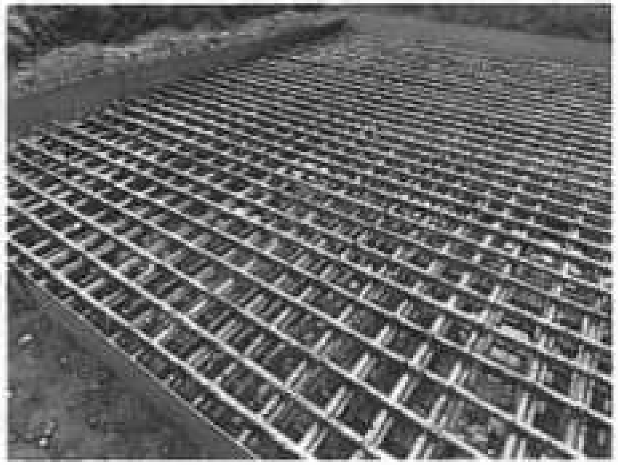
ANCON PILE ANCHORS INSTALLED AS PER CLANCY SPECIFICATION.

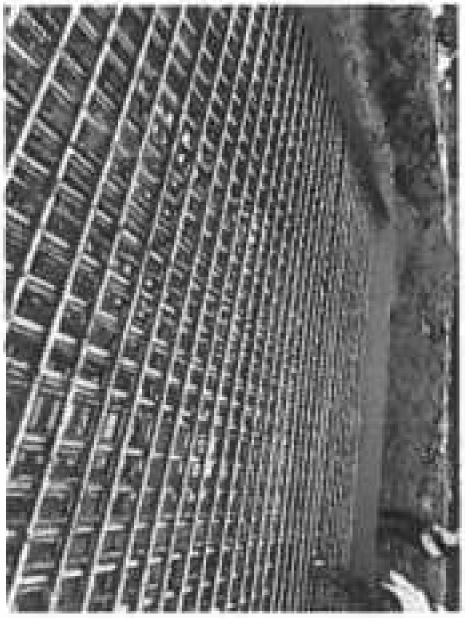
INSPECTED BY CLANCY WITH COMMENTS REGARDING BOTTOM CONCRETE COVER. RESOLVED ON SITE AND AGREED WITH ISG.

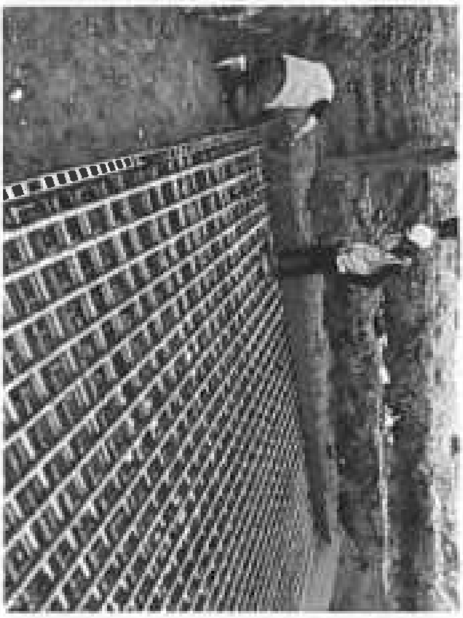
Cheltenham Green Representative Name:	[redacted] **Jack Layfield**		
Cheltenham Green Representative Signature:	[redacted]	Date:	**19/08/24**
Cleint Representatives Name:	[redacted]		
Client Representatives Signature:	[redacted]	Date:	19/8/24
Building Control Representative Name:	[redacted]		
Building Control Representative Signature:		Date:	

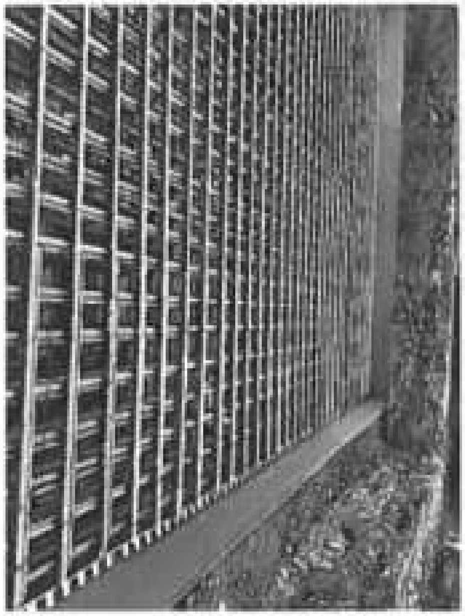
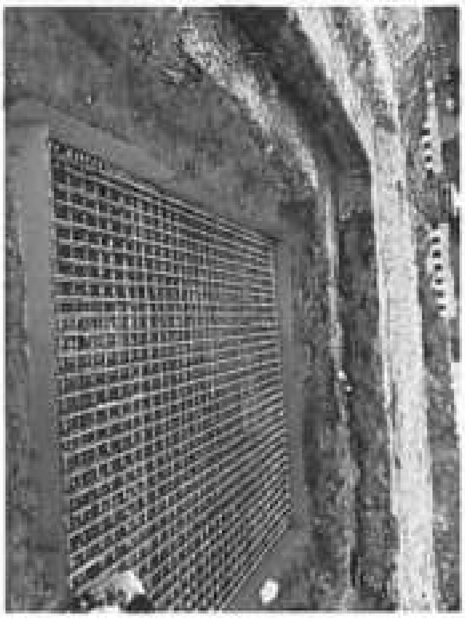
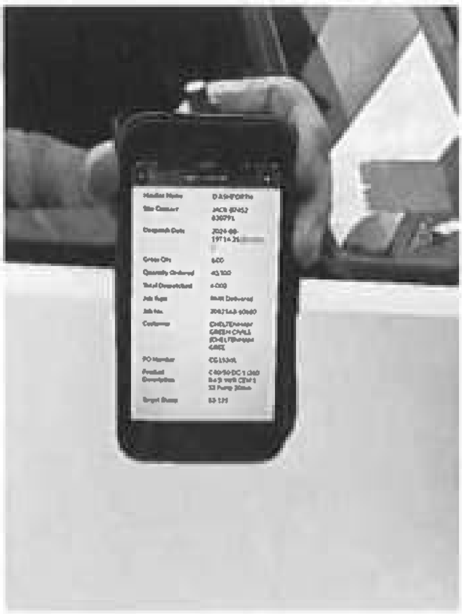
QSM002

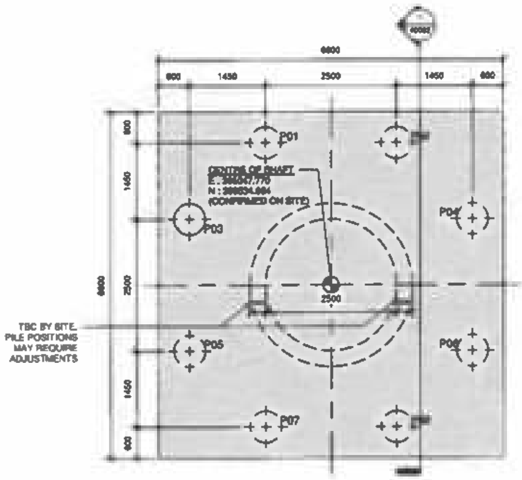











6800
600
1450
2500
1450
600
P01
P03
P04
P05
P06
P07
CENTRE OF SHAFT
E : 386047.770
N : 388534.864
(CONFIRMED ON SITE)
2500
TBC BY SITE.
PILE POSITIONS
MAY REQUIRE
ADJUSTMENTS

MINE SHAFT 1 TCA REF: [redacted]

EXISTING TCA DETAILS:

GROUND LEVEL	= 58.883m (CONFIRMED ON SITE)
DEPTH TO SHAFT TOP	= 5.5m BGL
SHAFT DIA	[redacted] 2.5m (CONFIRMED ON SITE)
SHAFT WALL THICKNESS	= 300mm (ASSUMED)
COORDINATES (CENTRE)	[redacted] 386047 770 N: 388534.864 (CONFIRMED ON [redacted]
SHAFT DEPTH	= 73m (CONFIRMED ON [redacted]
SHAFT TREA[redacted]	[redacted] NO

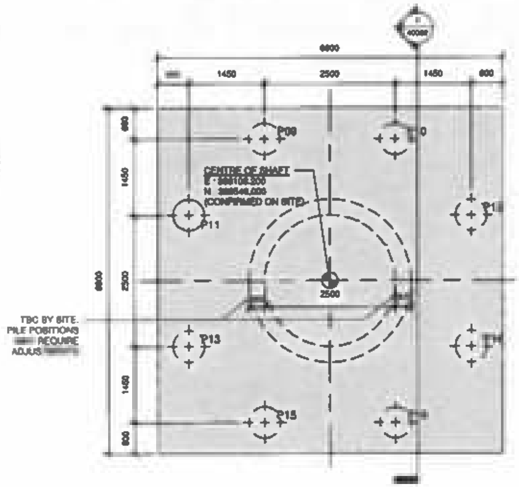
NEW CAPPING DETAILS:

CAPPING SIZE	= 6.8x6.8m
CAPPING THICKNESS	= [redacted]45m
CLEAR SPAN	= 5.4m (2.15 Dia)
CONCRETE GRADE	= C40/50
REINFORCEMENT	= H40 @ 200c/c (T) BOTH WAYS H40 @ 200c/c (B) BOTH WAYS H25 U-BARS A[redacted] 200c/c TO PERIMETER
CONCRETE COVER	[redacted] 75mm
DESIGN LIFE	= 100 YEARS
SULPHATE/ACEC	= DS-[redacted] / AC-1

SHAFT TREATEMENT DETAILS:

METHOD	= BORE & HIGH PRESSURE PUMPED GROUT OR AGGREGATE CONCRETE WHERE LARGE VOIDS ENCOUNTERED
MIXTURE	[redacted] 10:1 FLY ASH/OPC OR PFA/OPC
TREATMENT DEPTH	[redacted] 73m (DEPTH OF SHAFT)

SHAFT 1 PROPOSED
MINESHAFT CAPPING PLAN [redacted]
TCA REF [redacted] 386399-001
1 [redacted] 50



6800
1450
2500
1450
600
P08
P10
P11
P12
P13
P14
P15
P16
CENTRE OF SHAFT
E : 386108.200
N : 388546.000
(CONFIRMED ON SITE)
2500
TBC BY SITE.
PILE POSITIONS
REQUIRE
ADJUS

MINE SHAFT 2 TCA REF: [redacted]

EXISTING TCA DETAILS:

GROUND LEVEL	= 59.108m (CONFIRMED ON SITE)
DEPTH TO SHAFT TOP	= 2.6m BGL
SHAFT DIA	= 2.5m
SHAFT WALL THICKNESS	[redacted] 300mm (ASSUMED)
COORDINATES	[redacted] 386108.2 N: 388546.[redacted] (CONFIRMED ON [redacted]
SHAFT DEPTH	= 58m (CONFIRMED ON SITE)
SHAFT TREATED	[redacted] YES

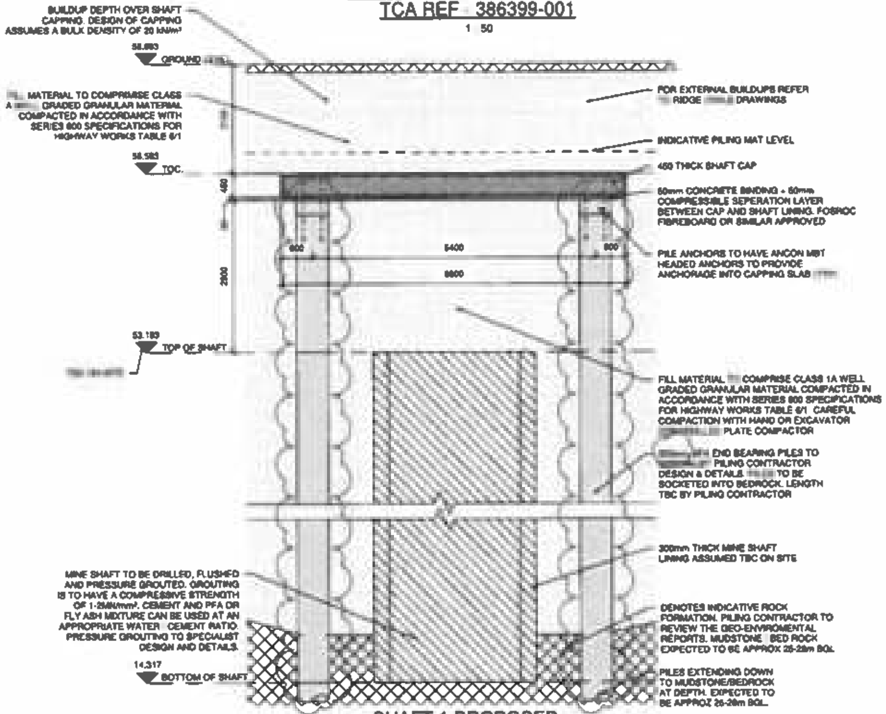
NEW CAPPING DETAILS.

CAPPING SIZE	= 6.8x6.8m
CAPPING THICKNESS	[redacted] 0.45m
CLEAR SPAN	= 5.4m (2.1[redacted] Dia)
CONCRETE GRADE	[redacted] C40/50
REINFORCEMENT	[redacted] H40 @ 200c/c (T) BOTH WAYS H40 @ 200c/c (B) BOTH WAYS H25 U-BARS AT 200c/c TO PERIMETER
CONCRETE COVER	[redacted] 75mm
DESIGN LIFE	[redacted] YEARS
SULPHATE/ACEC	[redacted] DS-1[redacted] AC-[redacted]

SHAFT TREATEMENT DETAILS:

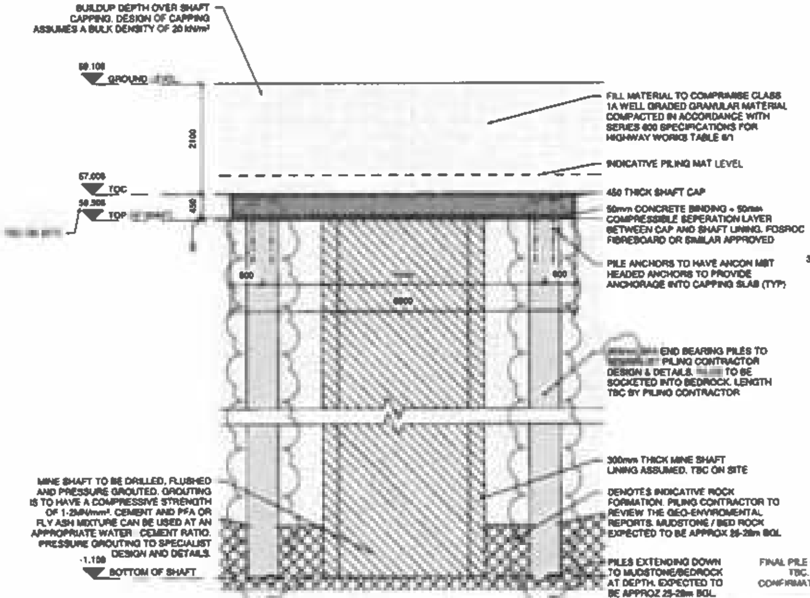
METHOD	= BORE & HIGH PRESSURE PUMPED GROUT OR AGGREGA[redacted] CONCRETE WHERE LARGE VOIDS ENCOUNTERED
MIXTURE	[redacted] 0:1 [redacted] Y ASH/OPC OR PFA/OPC
TREATMENT DEPTH	= 58m (DEPTH OF SHAFT)

SHAFT 2 PROPOSED
MINESHAFT CAPPING PLAN -
TLA REF 386399-016
1 [redacted] 50



BUILDUP DEPTH OVER SHAFT CAPPING. DESIGN OF CAPPING ASSUMES A BULK DENSITY OF 20 kN/m³
58.883
GROUND [redacted]
[redacted] MATERIAL TO COMPRIMISE CLASS A [redacted] GRADED GRANULAR MATERIAL COMPACTED IN ACCORDANCE WITH SERIES 600 SPECIFICATIONS FOR HIGHWAY WORKS TABLE 6/1
58.583
TOC.
53.183
TOP OF SHAFT
[redacted]
FOR EXTERNAL BUILDUPS REFER [redacted] RIDGE [redacted] DRAWINGS
INDICATIVE PILING MAT LEVEL
450 THICK SHAFT CAP
50mm CONCRETE BINDING + 50mm COMPRESSIBLE SEPERATION LAYER BETWEEN CAP AND SHAFT LINING. FOSROC FIBREBOARD OR SIMILAR APPROVED
PILE ANCHORS TO HAVE ANCON MBT HEADED ANCHORS TO PROVIDE ANCHORAGE INTO CAPPING SLAB [redacted]
450
600
5400
6800
FILL MATERIAL [redacted] COMPRISE CLASS 1A WELL GRADED GRANULAR MATERIAL COMPACTED IN ACCORDANCE WITH SERIES 600 SPECIFICATIONS FOR HIGHWAY WORKS TABLE 6/1 CAREFUL COMPACTION WITH HAND OR EXCAVATOR [redacted] PLATE COMPACTOR
[redacted] END BEARING PILES TO [redacted] PILING CONTRACTOR DESIGN & DETAILS. [redacted] TO BE SOCKETED INTO BEDROCK. LENGTH TBC BY PILING CONTRACTOR
300mm THICK MINE SHAFT LINING ASSUMED TBC ON SITE
MINE SHAFT TO BE DRILLED, FLUSHED AND PRESSURE GROUTED. GROUTING IS TO HAVE A COMPRESSIVE STRENGTH OF 1-2MN/mm². CEMENT AND PFA OR FLY ASH MIXTURE CAN BE USED AT AN APPROPRIATE WATER [redacted] CEMENT RATIO. PRESSURE GROUTING TO SPECIALIST DESIGN AND DETAILS.
14.317
BOTTOM OF SHAFT
DENOTES INDICATIVE ROCK FORMATION. PILING CONTRACTOR TO REVIEW THE GEO-ENVIROMENTAL REPORTS. MUDSTONE [redacted] BED ROCK EXPECTED TO BE APPROX 25-28m BGL
PILES EXTENDING DOWN TO MUDSTONE/BEDROCK AT DEPTH. EXPECTED TO BE APPROZ 25-28m BGL.

SHAFT 1 PROPOSED
MINESHAFT ELEVATION
(TCA REF: 386399-001)
1 [redacted] 50



BUILDUP DEPTH OVER SHAFT CAPPING. DESIGN OF CAPPING ASSUMES A BULK DENSITY OF 20 kN/m³
59.108
GROUND [redacted]
2100
57.008
TOC
56.508
TOP [redacted]
[redacted]
450
FILL MATERIAL TO COMPRAMISE CLASS 1A WELL GRADED GRANULAR MATERIAL COMPACTED IN ACCORDANCE WITH SERIES 600 SPECIFICATIONS FOR HIGHWAY WORKS TABLE 6/1
INDICATIVE PILING MAT LEVEL
450 THICK SHAFT CAP
50mm CONCRETE BINDING + 50mm COMPRESSIBLE SEPERATION LAYER BETWEEN CAP AND SHAFT LINING. FOSROC FIBREBOARD OR SIMILAR APPROVED
PILE ANCHORS TO HAVE ANCON MBT HEADED ANCHORS TO PROVIDE ANCHORAGE INTO CAPPING SLAB (TYP)
600
6800
[redacted] END BEARING PILES TO [redacted] PILING CONTRACTOR DESIGN & DETAILS. [redacted] TO BE SOCKETED INTO BEDROCK. LENGTH TBC BY PILING CONTRACTOR
300mm THICK MINE SHAFT LINING ASSUMED. TBC ON SITE
MINE SHAFT TO BE DRILLED, FLUSHED AND PRESSURE GROUTED. GROUTING IS TO HAVE A COMPRESSIVE STRENGTH OF 1-2MN/mm². CEMENT AND PFA OR FLY ASH MIXTURE CAN BE USED AT AN APPROPRIATE WATER [redacted] CEMENT RATIO. PRESSURE GROUTING TO SPECIALIST DESIGN AND DETAILS.
-1.108
BOTTOM OF SHAFT
DENOTES INDICATIVE ROCK FORMATION. PILING CONTRACTOR TO REVIEW THE GEO-ENVIROMENTAL REPORTS. MUDSTONE / BED ROCK EXPECTED TO BE APPROX 25-28m BGL
PILES EXTENDING DOWN TO MUDSTONE/BEDROCK AT DEPTH. EXPECTED TO BE APPROZ 25-28m BGL.

SHAFT 2 PROPOSED
MINESHAFT CAPPING
ELEVATION
(TCA REF: 386399-016)
1 : 50

FINAL PILE CUT OFF LEVEL TBC. AWAITING SITE CONFIRMATION OF TOP OF SHAFT LEVEL

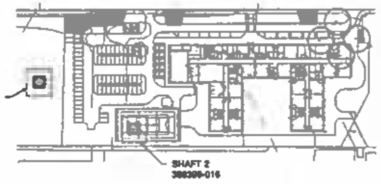
Structural Piling Schedule

[redacted]	PILE [redacted] (mm)	[redacted]	Qk [redacted]	Wk [redacted] kN)	EHF GK [redacted] kN)	EHF QK [redacted] kN)	SHEAR (W)	AD (kN)	[redacted] CUT OFF LEVEL (m
P01	600	576	575	-	-	-	15	-	56.208
[redacted]	600	575	575	-	-	-	15	-	56.208
[redacted]	600	575	575	-	-	-	15	-	56.208
P04	600	575	575	-	-	-	15	-	56.208
[redacted]	600	575	575	-	-	-	15	-	56.208
[redacted]	600	575	575	-	-	-	15	-	56.208
P07	600	575	575	-	-	-	15	-	56.208
[redacted]	600	575	575	-	-	-	15	-	56.208
[redacted]	600	575	575	-	-	-	15	-	56.633
P10	600	575	575	-	-	-	15	-	56.633
P1[redacted]	600	575	575	-	-	-	15	-	56.633
P1[redacted]	600	575	575	-	-	-	15	-	56.633
P13	600	575	575	-	-	-	15	-	56.633
P1[redacted]	600	575	575	-	-	-	15	-	56.633
P1[redacted]	600	575	575	-	-	-	15	-	56.633
P16	600	575	575	-	-	-	15	-	56.633

SAFETY HEALTH AND ENVIRONMENTAL INFORMATION BOX

Construction Risks	Maintenance/Cleaning Risks	Demolition/Adaptation Risks
[illegible]	[illegible]	[illegible]

IN ADDITION TO THE HAZARDS / RISKS NORMALLY ASSOCIATED WITH THE TYPE OF WORK DETAILED ON THIS DRAWING. THE CONTRACTOR IS TO TAKE NOTE OF THE ABOVE & ALSO THE HAZARDS IDENTIFIED IN THE RISK ASSESSMENT DOCUMENT
IT IS ASSUMED THAT ALL WORKS DETAILED ON THIS DRAWING WILL BE PERFORMED BY A COMPETENT CONTRACTOR WORKING, WHERE APPROPRIATE, TO AN APPROVED METHOD STATEMENT.



SHAFT 1
386399-001
SHAFT 2
386399-016

KEY PLAN
1 : 1500

REV	DATE	DESCRIPTION	BY	Chk	App
C02	[illegible]	PILE DIAMETER REVISED [redacted]	[illegible]	[illegible]	[illegible]
C01	[illegible]	CONSTRUCTION [redacted]	[illegible]	[illegible]	[illegible]
P03	[illegible]	INCORPORATING MAIN CONTRACTOR COMMENTS	[illegible]	[illegible]	[illegible]
P0[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]

Client

ISG LTD

Project VARLEY STREET
SEN SCHOOL

Office MANCHESTER

Title MINESHAFT CAPPING SLAB
& PILE GA

Scale @ A1 As indicated

Status CONSTRUCTION

clancy consulting

CCL Project No. 1-21[illegible]

Project Ref	Originator	Volume	Level
VAR	CCL	ZZ	00

File Type	Discipline	Drawing No.	Revision
DR	S	40002	C02

CheltenhamGreenCivils

Concrete Pre-Pour Inspection & Sign Off

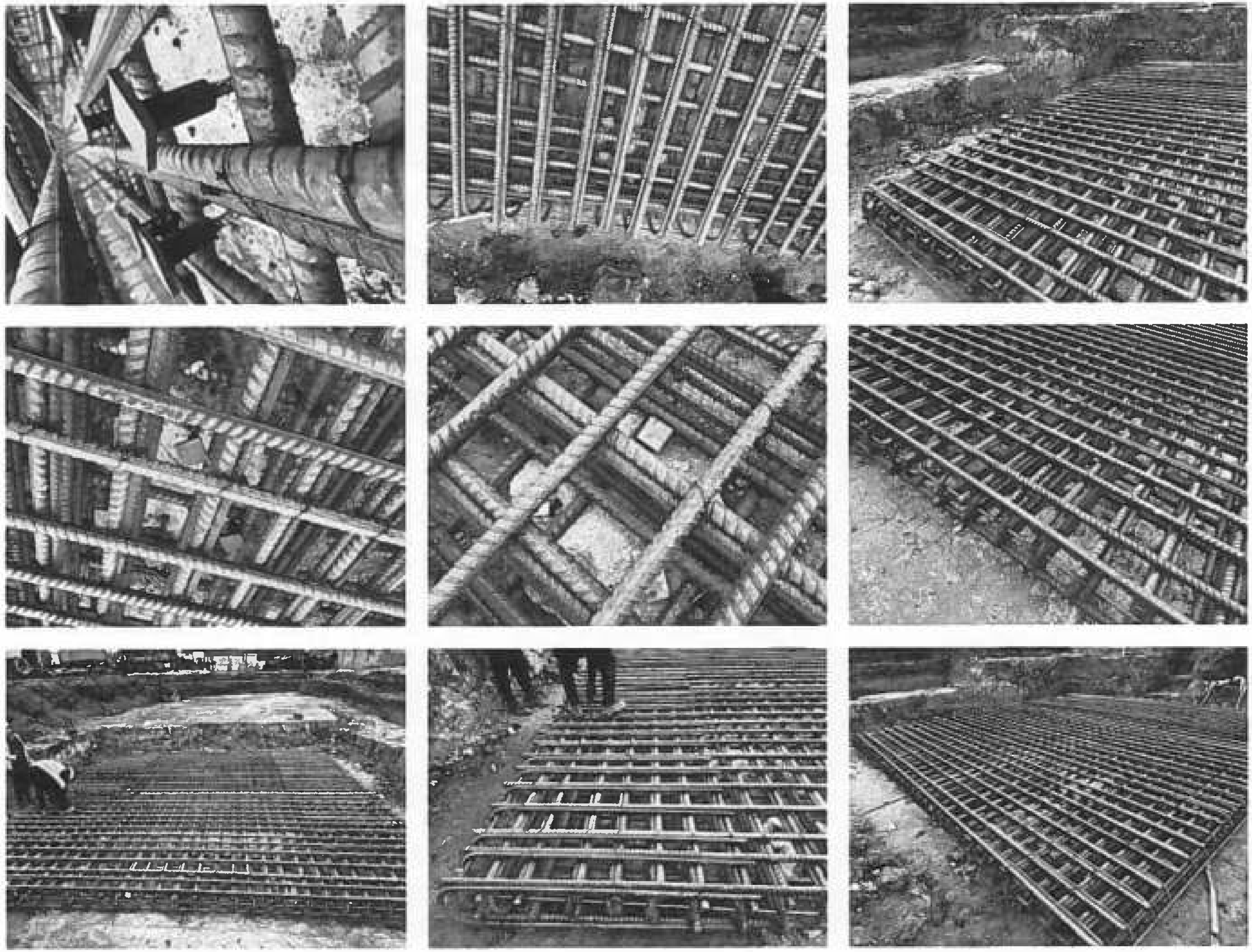
Project:	**Varley St**	Project Reference:	**CG153**
Pour Reference Number:	**Mineshaft 2 (16)**	Pour Date:	**Pour Location: Mineshaft 2 (16)**

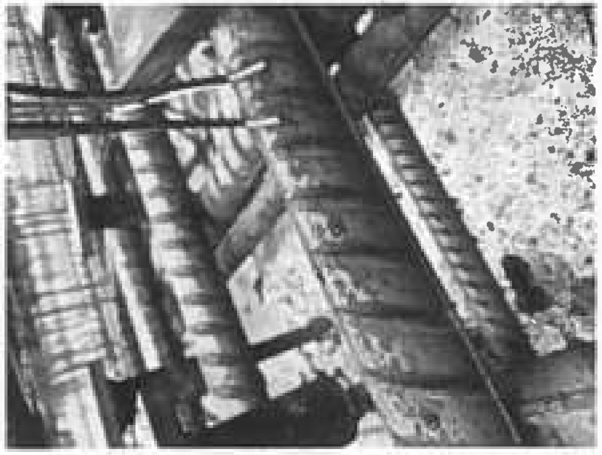
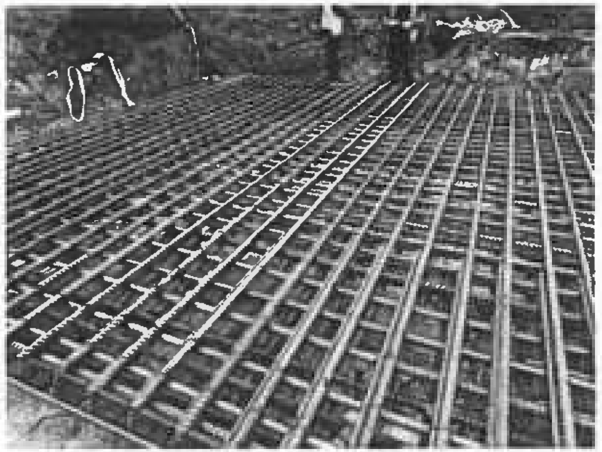
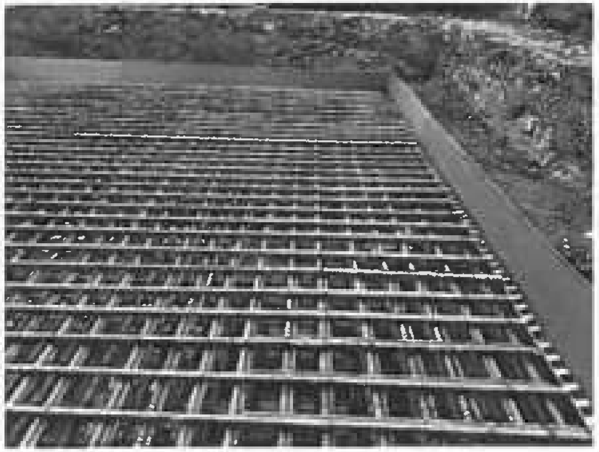
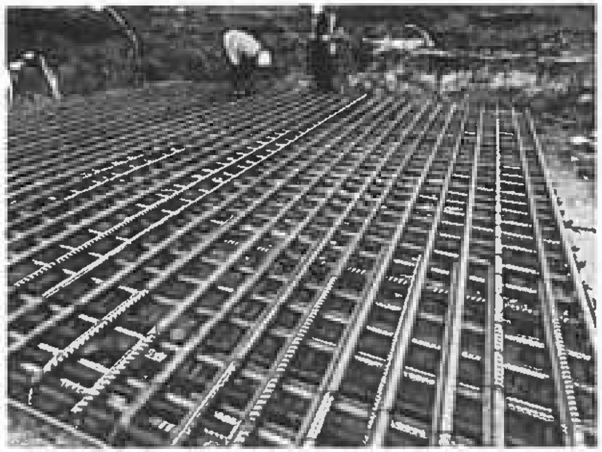
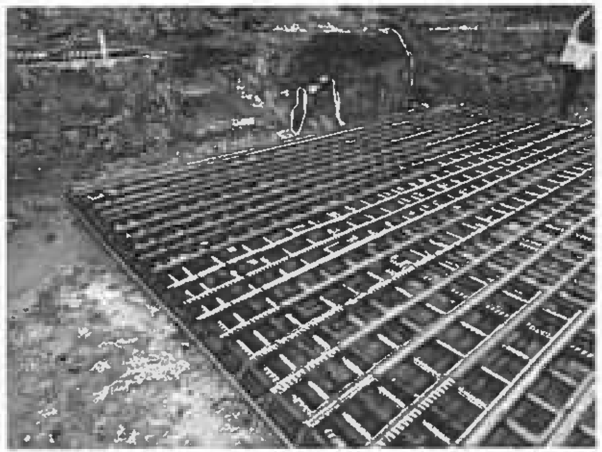
Items	Details	Pass	Fail	Adjustments	Pass	Fail
Formation Level	VIRGIN CLAY (NO SOFT SPOTS)	✓				
Blinding Line / Level	CORRECT	✓				
Final Formation	CLAY	✓				
Type of Formwork	PEKAFILL SHEETS	✓				
Position of Formwork	CORRECT – CHECKED 19.08.24	✓				
Reinforcement Fabric / Type	UP TO 40MM REBAR	✓				
Reinforcement Fabric Lap / Spacing	AS PER DRAWING	✓				
Spacer Type / Cover	BOTTOM = 100MM CHAIRS & BLOCK SPACERS SIDES = 75MM TRIC TRAC	✓				
Reinforcement Bar Correct Type	AS PER ATTACHED SCHEDULES	✓				
Bar Position	CORRECT	✓				
Reinforcement Ties	CORRECT	✓				
Bolt Line	N/A	N/A				
Bolt Position	N/A	N/A				
Bolt Projection	N/A	N/A				
Concrete Mix	C40/50 DS1 125MM SLUMP (PUMP MIX)	✓				
Concrete Target Slump	125MM	✓				
Concrete Cover To Reinforcement	75MM ALL SIDES AND 100MM BOTTOM	✓				
Type of Concrete Compaction	HIGH FREQUENCY POKER 58MM	✓				
Volume Of Concrete	19.6 m3	✓				
Waterbar / Weepholes	N/A	N/A				
Cleanliness	GOOD	✓				
Finish Required / Level Control	EASY FLOAT / ROTATAING LASER	✓				
Method Of Pouring / Access Plant	CONCRETE PUMP	✓				
Weather Forecast (Frost)	DRY	✓				

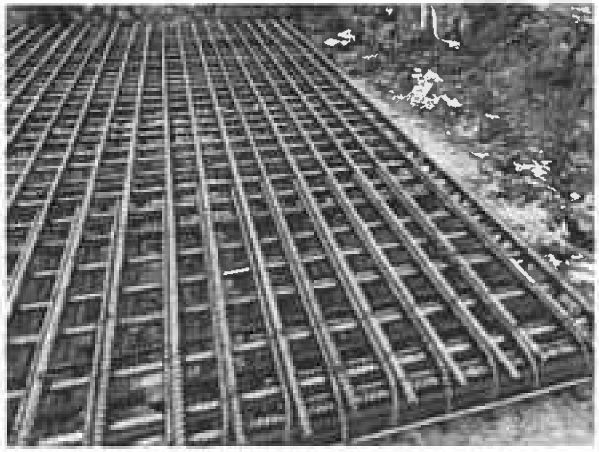
ANCON PILE ANCHORS INSTALLED AS PER CLANCY SPECIFICATION.

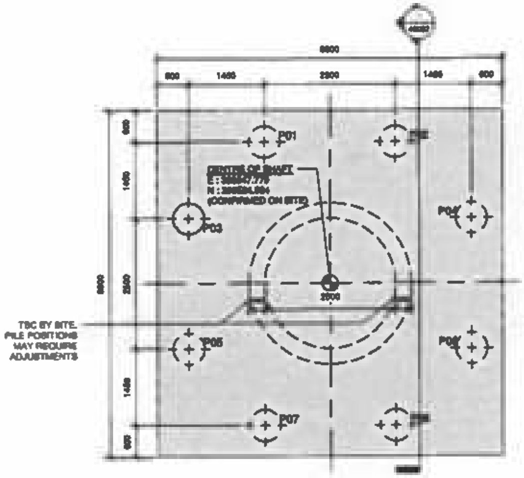
INSPECTED BY CLANCY AND APPROVED FOR POUR.

Cheltenham Green Representative Name	[redacted]	**Jack Layfield**		
Cheltenham Green Representative Signature			Date:	**19/08/24**
Cleint Representatives Name				
Client Representatives Signature			Date:	19/8/24.
Building Control Representative Name				
Building Control Representative Signature:			Date:	






6800
600
1450
2800
1450
600
P01
P02
P03
P04
P05
P06
P07
P08
CENTRE OF SHAFT
E : 386047.770
N : 398634.864
(CONFIRMED ON SITE)
2500
TBC BY SITE.
PILE POSITIONS
MAY REQUIRE
ADJUSTMENTS

SHAFT 1 PROPOSED MINESHAFT CAPPING PLAN - TCA REF - 386399-001

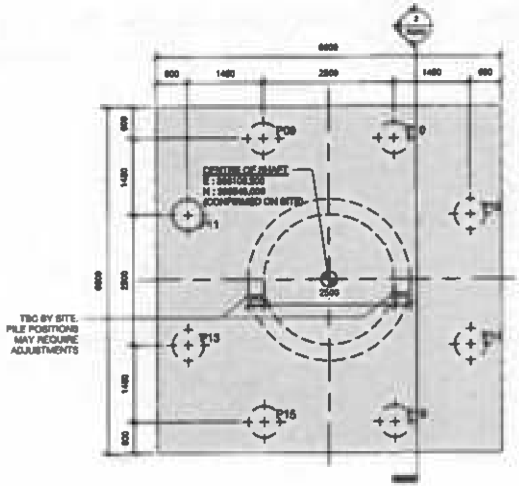
1 : 50

MINE SHAFT 1 TCA REF: 386399-001

EXISTING TCA DETAILS:
GROUND LEVEL = 58.893m (CONFIRMED ON SITE)
DEPTH TO SHAFT TOP = 5.5m BGL
SHAFT DIA = 2.5m (CONFIRMED ON SITE)
SHAFT WALL THICKNESS = 300mm (ASSUMED)
COORDINATES (CENTRE) = E: 386047.770 N: 398634.864 (CONFIRMED ON SITE)
SHAFT DEPTH = 73m (CONFIRMED ON SITE)
SHAFT TREATED = NO

NEW CAPPING DETAILS:
CAPPING SIZE = 6.8x6.8m
CAPPING THICKNESS = 0.45m
CLEAR SPAN = 5.4m (2.15 Dia)
CONCRETE GRADE = C40/50
REINFORCEMENT = H40 @ 200c/c (T) BOTH WAYS
H40 @ 200c/c (B) BOTH WAYS
H25 U-BARS AT 200c/c TO PERIMETER
CONCRETE COVER = 75mm
DESIGN LIFE = 100 YEARS
SULPHATE/ACEC = DS-1 / AC-1

SHAFT TREATEMENT DETAILS:
METHOD = BORE & HIGH PRESSURE PUMPED GROUT OR AGGREGATE CONCRETE WHERE LARGE VOIDS ENCOUNTERED
MIXTURE = 10:1 FLY ASH/OPC OR PFA/OPC
TREATMENT DEPTH = 73m (DEPTH OF SHAFT)


6800
600
1450
2800
1450
600
P09
P10
P11
P12
P13
P14
P15
P16
CENTRE OF SHAFT
E : 386108.2
N : 398646.8
(CONFIRMED ON SITE)
2500
TBC BY SITE.
PILE POSITIONS
MAY REQUIRE
ADJUSTMENTS

SHAFT 2 PROPOSED MINESHAFT CAPPING PLAN - TLA REF 386399-016

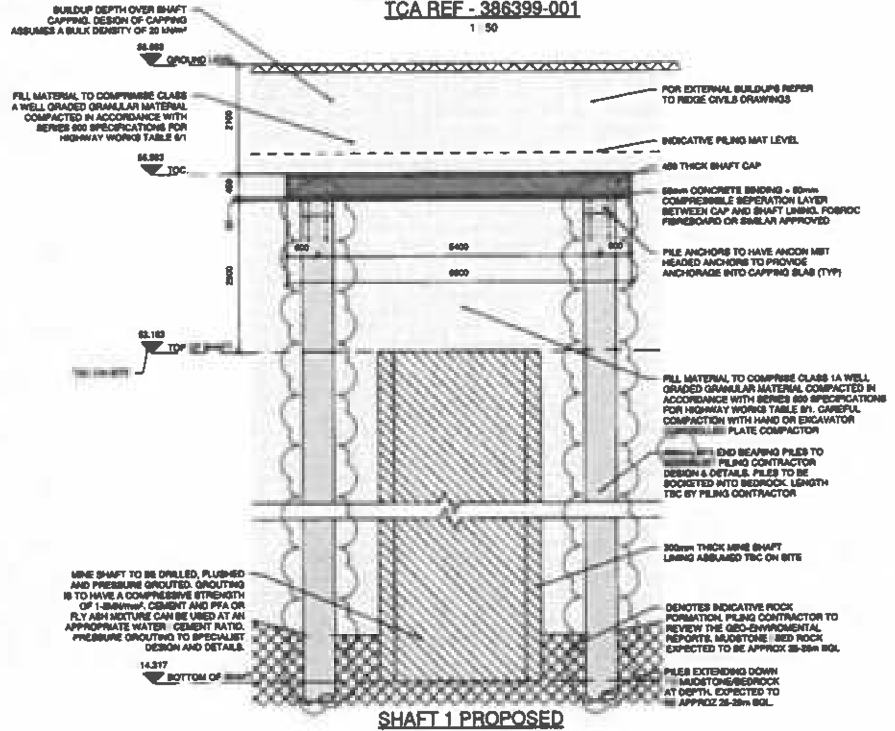
1 : 50

MINE SHAFT 2 TCA REF: 386399-016

EXISTING TCA DETAILS:
GROUND LEVEL = 58.108m (CONFIRMED ON SITE)
DEPTH TO SHAFT TOP = 2.0m BGL
SHAFT DIA = 2.5m
SHAFT WALL THICKNESS = 300mm (ASSUMED)
COORDINATES = E: 386108.2 N: 398646.8 (CONFIRMED ON SITE)
SHAFT DEPTH = 58m (CONFIRMED ON SITE)
SHAFT TREATED = YES

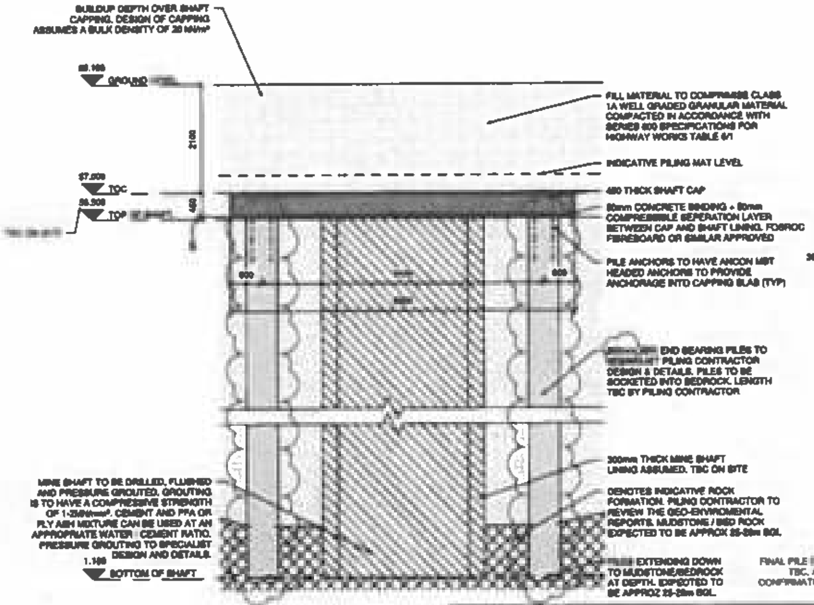
NEW CAPPING DETAILS:
CAPPING SIZE = 6.8x6.8m
CAPPING THICKNESS = 0.45m
CLEAR SPAN = 5.4m (2.15 Dia)
CONCRETE GRADE = C40/50
REINFORCEMENT = H40 @ 200c/c (T) BOTH WAYS
H40 @ 200c/c (B) BOTH WAYS
H25 U-BARS AT 200c/c TO PERIMETER
CONCRETE COVER = 75mm
DESIGN LIFE = 100 YEARS
SULPHATE/ACEC = DS-1 / AC-1

SHAFT TREATEMENT DETAILS:
METHOD = BORE & HIGH PRESSURE PUMPED GROUT OR AGGREGATE CONCRETE WHERE LARGE VOIDS ENCOUNTERED
MIXTURE = 10:1 FLY ASH/OPC OR PFA/OPC
TREATMENT DEPTH = 58m (DEPTH OF SHAFT)


BUILDUP DEPTH OVER SHAFT CAPPING. DESIGN OF CAPPING ASSUMES A BULK DENSITY OF 20 kN/m³
GROUND LEVEL
FILL MATERIAL TO COMPRISE CLASS 1A WELL GRADED GRANULAR MATERIAL COMPACTED IN ACCORDANCE WITH SERIES 600 SPECIFICATIONS FOR HIGHWAY WORKS TABLE 6/1
TOC
TOP OF SHAFT
BOTTOM OF SHAFT
14.317
2100
450
2500
600
5400
6800
FOR EXTERNAL BUILDUPS REFER TO RIDGE CIVILS DRAWINGS
INDICATIVE PILING MAT LEVEL
450 THICK SHAFT CAP
50mm CONCRETE BINDING + 50mm COMPRESSIBLE SEPERATION LAYER BETWEEN CAP AND SHAFT LINING. FOSROC FIBREBOARD OR SIMILAR APPROVED
PILE ANCHORS TO HAVE ANCON MBT HEADED ANCHORS TO PROVIDE ANCHORAGE INTO CAPPING SLAB (TYP)
FILL MATERIAL TO COMPRISE CLASS 1A WELL GRADED GRANULAR MATERIAL COMPACTED IN ACCORDANCE WITH SERIES 600 SPECIFICATIONS FOR HIGHWAY WORKS TABLE 6/1. CAREFUL COMPACTION WITH HAND OR EXCAVATOR PLATE COMPACTOR
END BEARING PILES TO PILING CONTRACTOR DESIGN & DETAILS. PILES TO BE SOCKETED INTO BEDROCK. LENGTH TBC BY PILING CONTRACTOR
300mm THICK MINE SHAFT LINING ASSUMED. TBC ON SITE
DENOTES INDICATIVE ROCK FORMATION. PILING CONTRACTOR TO REVIEW THE GEO-ENVIRONMENTAL REPORTS. MUDSTONE / BED ROCK EXPECTED TO BE APPROX 25-28m BGL
PILES EXTENDING DOWN TO MUDSTONE/BEDROCK AT DEPTH. EXPECTED TO BE APPROZ 25-28m BGL
MINE SHAFT TO BE DRILLED, FLUSHED AND PRESSURE GROUTED. GROUTING IS TO HAVE A COMPRESSIVE STRENGTH OF 1-2N/mm². CEMENT AND PFA OR FLY ASH MIXTURE CAN BE USED AT AN APPROPRIATE WATER : CEMENT RATIO. PRESSURE GROUTING TO SPECIALIST DESIGN AND DETAILS.

SHAFT 1 PROPOSED MINESHAFT ELEVATION (TCA REF: 386399-001)

1 : 50


BUILDUP DEPTH OVER SHAFT CAPPING. DESIGN OF CAPPING ASSUMES A BULK DENSITY OF 20 kN/m³
GROUND LEVEL
TOC
TOP OF SHAFT
BOTTOM OF SHAFT
2100
450
600
FILL MATERIAL TO COMPRISE CLASS 1A WELL GRADED GRANULAR MATERIAL COMPACTED IN ACCORDANCE WITH SERIES 600 SPECIFICATIONS FOR HIGHWAY WORKS TABLE 6/1
INDICATIVE PILING MAT LEVEL
450 THICK SHAFT CAP
50mm CONCRETE BINDING + 50mm COMPRESSIBLE SEPERATION LAYER BETWEEN CAP AND SHAFT LINING. FOSROC FIBREBOARD OR SIMILAR APPROVED
PILE ANCHORS TO HAVE ANCON MBT HEADED ANCHORS TO PROVIDE ANCHORAGE INTO CAPPING SLAB (TYP)
END BEARING PILES TO PILING CONTRACTOR DESIGN & DETAILS. PILES TO BE SOCKETED INTO BEDROCK. LENGTH TBC BY PILING CONTRACTOR
300mm THICK MINE SHAFT LINING ASSUMED. TBC ON SITE
DENOTES INDICATIVE ROCK FORMATION. PILING CONTRACTOR TO REVIEW THE GEO-ENVIRONMENTAL REPORTS. MUDSTONE / BED ROCK EXPECTED TO BE APPROX 25-28m BGL
PILES EXTENDING DOWN TO MUDSTONE/BEDROCK AT DEPTH. EXPECTED TO BE APPROZ 25-28m BGL.
MINE SHAFT TO BE DRILLED, FLUSHED AND PRESSURE GROUTED. GROUTING IS TO HAVE A COMPRESSIVE STRENGTH OF 1-2N/mm². CEMENT AND PFA OR FLY ASH MIXTURE CAN BE USED AT AN APPROPRIATE WATER : CEMENT RATIO. PRESSURE GROUTING TO SPECIALIST DESIGN AND DETAILS.
FINAL PILE CUT OFF LEVEL TBC. AWAITING SITE CONFIRMATION OF TOP OF SHAFT LEVEL

SHAFT 2 PROPOSED MINESHAFT CAPPING ELEVATION (TCA REF: 386399-016)

1 : 50

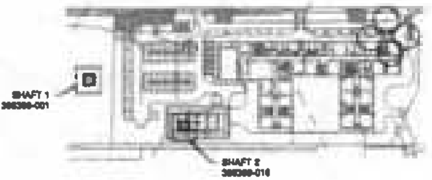
SAFETY HEALTH AND ENVIRONMENTAL INFORMATION BOX

Construction Risks	Maintenance/Cleaning Risks	Demolition/Adaptation Risks
[illegible]	[illegible]	[illegible]

IN ADDITION TO THE HAZARDS / RISKS NORMALLY ASSOCIATED WITH THE TYPE OF WORK DETAILED ON THIS DRAWING, THE CONTRACTOR IS TO TAKE NOTE OF THE ABOVE & ALSO THE HAZARDS IDENTIFIED IN THE RISK ASSESSMENT DOCUMENT. IT IS ASSUMED THAT ALL WORKS DETAILED ON THIS DRAWING WILL BE PERFORMED BY A COMPETENT CONTRACTOR WORKING, WHERE APPROPRIATE, TO AN APPROVED METHOD STATEMENT

Structural Piling Schedule

[illegible]	PILE [illegible] (mm)	[illegible]	Qk [illegible]	Wk +/- [illegible]	EHF GK (+/- [illegible])	EHF QK +/- kN)	SHEAR [illegible]	AD [illegible]	[illegible] CUT [illegible] LEVEL (m)
P01	600	575	575				15		56.208
[illegible]	600	575	575				15		56.208
[illegible]	600	575	575	-			15		56.208
P04	600	575	575	-	-	-	15	-	56.208
[illegible]	600	575	575	-	-	-	15	-	56.208
[illegible]	600	575	575	-	-	-	15	-	56.208
[illegible]	600	575	575	-	-	-	15	-	56.208
[illegible]	600	575	575	-	-	-	15	-	56.208
[illegible]	600	575	575	-	-	-	15	-	56.633
P10	600	575	575	-	-	-	15	-	56.633
[illegible]	600	575	575	-	-	-	15	-	56.633
[illegible]	600	575	575	-	-	-	15	-	56.633
P13	600	575	575	-	-	-	15	-	56.633
[illegible]	600	575	575	-	-	-	15	-	56.633
[illegible]	600	575	575	-	-	-	15	-	56.633
P16	600	575	575	-	-	-	15	-	56.633


SHAFT 1
386399-001
SHAFT 2
386399-016

KEY PLAN

1 : 1500

REV | DATE | DESCRIPTION | BY | CHK

Client
ISG LTD

Project
VARLEY STREET
SEN SCHOOL

Office
MANCHESTER

Title
MINESHAFT CAPPING SLAB
& PILE GA

Scale @ A1: As indicated
Status: CONSTRUCTION

clancy consulting

Project Ref	Originator	Volume	Level
VAR	CCL	ZZ	00
File Type	Discipline	Drawing No.	Revision
DR	S	40002	C02

Appendix M Pile Logs

VAN ELLE
TOTAL FOUNDATION SOLUTIONS

CFA DAILY RECORD SHEET

CON59 26.11.2018

Record No.:	Contract: Varley St.	Job No.: 233492.
Date: 24/7/24	Start Time:	Finish Time:

Pile Dia. (mm)	600			
Total Piles in Contract				
Piles Installed Today	10.			
Total Installed to Date				
Piles Remaining				

CONCRETE DETAILS	
Supplier	C30/37 DC-2
Mix Details	
Qty. Delivered Today	100 M³
Qty. Rejected Today	M³☐ Reason

Rig Type: LAMADA P160-02 Rig Hours: 3418

Pile No/Ref	Dia. (mm)	Length (m)	Main Steel No/Type/Dia./Length	Tension Steel	De-bonding Details	Remarks, Obstructions, etc...
P10	600	30.0m	6x B20mm x 8.0m		3.19m	
P11	600	30.0m	6x B20mm x 8.0m		3.19m.	
P14	600	30.0m	6x B20mm x 8.0m		3.19m.	
P15	600	30.0m	6x B20mm x 8.0m		3.19m	
P12	600	30.0m	6x B20mm x 8.0m		3.19m	
P9	600	30.0m	6x B20mm x 8.0m.		3.19m	Blocked.
P16	600	30.0	6x B20mm x 8.0m		3.19m	Blocked
P13	600	30.0m	6x B20mm x 8.0m		3.19m	
P8	600	30.0m	6x B20mm x 7.0m		2.17m	
P4.	600	30.0m	6x B20mm x 7.0m		2.17m	
Total		300m				

Pile Schedule Rev. No.: C2

Pile Schedule Issue Date: 10/7/24

Today:

To Date:

Drawing No./Rev. C01

Cubes Made By	No.	Ticket No.	Pile Ref:	Slump Test	Yes	No
C.Bibby	5	35004175	11	200		
	3	35004188	8	195-		

Pump Type CPS90

Efficiency (%) 77%

Calibration Date 24/7/24

General Remarks (including instructions received)

I Confirm this is a true Record: - Yes

Van Elle Operative Name:

Client Name:

Client Position:

Pile Nos. Checked **(VEL)**	Yes ☑	No ☐	(tick)	Pile Nos. Checked **(Client)**	Yes ☐	No ☐	(tick)
Pile Depth Checked **(VEL)**	Yes ☑	No ☐	(tick)	Pile Depth Checked **(Client)**	Yes ☐	No ☐	(tick)
END OF DAY SITE CHECK				All Bores Filled & Made Safe	**Yes** ☑	**No** ☐	**(tick)**
Fuel Bowser(s) Locked	**Yes** ☑	**No** ☐	**(tick)**	All Plant Locked & Keys Removed	**Yes** ☑	**No** ☐	**(tick)**
Rig Computer Safe	**Yes** ☑	**No** ☐	**(tick)**	Store Shed Locked and Protected	**Yes** ☑	**No** ☐	**(tick)**

Signed (VEL):

Date: 24/7/24

Signature (Client): [redacted]

Date: 26/7/24

cn checked.

VAN ELLE
TOTAL FOUNDATION SOLUTIONS

CFA DAILY RECORD SHEET

CON59 26.11.2018

Record No.:	Contract: ISG	Job No.: 233492
Date: 25/7/24	Start Time:	Finish Time:

Pile Dia. (mm)	600				**CONCRETE DETAILS**	
Total Piles in Contract					Supplier	Cemex
Piles Installed Today					Mix Details	
Total Installed to Date					Qty. Delivered Today	M^3
Piles Remaining					Qty. Rejected Today	M^3 ☐ Reason
	Rig Type: LAMADA P160-02				Rig Hours: 3427	

Pile No/Ref	Dia. (mm)	Length (m)	Main Steel No/Type/Dia./Length	Tension Steel	De-bonding Details	Remarks, Obstructions, etc...
P7	600	30.0m	6x B20mm x 7.0m		2.17m	
P6	600	30.0m	6x B20mm x 7.0m		2.17m	
5	600	30.0m	6x B20mm x 7.0m		2.17m	
2	600	30.0m	6x B20mm x 7.0m		2.17m	
3	600	30.0m	6x B20mm x 7.0m		2.17m	
1	600	30.0m	6x B20mm x 7.0m		2.17m	
Total						

Pile Schedule Rev. No.: C2

Pile Schedule Issue Date: 10/7/24

Today:	To Date:		Drawing No./Rev. C02			
Cubes Made By	No.	Ticket No.	Pile Ref:	Slump Test	Yes	No
	5.		P5	190		
C.Bibby						

Pump Type: CPS 90

Efficiency (%): 77%

Calibration Date: 24/7/24

General Remarks (including instructions received)

I Confirm this is a true Record: Yes [redacted]

Van Elle Operative Name: [redacted]

Client Name:

Client Position:

Pile Nos. Checked **(VEL)**	Yes ☑	No ☐	(tick)	Pile Nos. Checked **(Client)**	Yes ☑	No ☐	(tick)
Pile Depth Checked **(VEL)**	Yes ☑	No ☐	(tick)	Pile Depth Checked **(Client)**	Yes ☑	No ☐	(tick)
END OF DAY SITE CHECK				All Bores Filled & Made Safe	**Yes** ☑	**No** ☐	**(tick)**
Fuel Bowser(s) Locked	**Yes** ☑	**No** ☐	**(tick)**	All Plant Locked & Keys Removed	**Yes** ☑	**No** ☐	**(tick)**
Rig Computer Safe	**Yes** ☑	**No** ☐	**(tick)**	Store Shed Locked and Protected	**Yes** ☑	**No** ☐	**(tick)**

Signed (VEL): [redacted]

Date: 25/7/24

Signature (Client): [redacted]

Date: 26/7/24
un-checked.

Appendix N Pile Concrete Cube Strength Tests

MURRAY RIX

ANDREW HOUSE, HADFIELD STREET
DUKINFIELD, CHESHIRE SK16 4QX
TEL 0161 475 0870

TEST CERTIFICATE
CONCRETE CUBE COMPRESSIVE STRENGTH TEST

BS EN 12390-3:2019

Client Cheltenham Green Civils Ltd **Certificate** 4943 Final
Site Varley Street

Order/Ref No. CG153
Location of Pour Mineshaft 1 & 2
Date Cast 19 August 2024 **Date Received** 22 August 2024

Certificates Received **Sampling** Yes **Preparation** Yes **Curing** No

Time of Sampling Not Advised **Made by** Client
Place of Sampling Not Advised **Grade of Concrete** C40/50
Concrete Supplier Breedon **Cement Type** CEM 1
Supply Depot Not Advised **Cement Content** Not Advised kg/m^3
Ticket Number Not Advised **Admixture** Not Advised

Specified Strength 40/50 N/mm^2 at 28 days
Method of Compaction Tamp Bar
Additional Information
Any Deviations from Test Method No

TEST RESULTS

Site Mark	MRN No.	Test Date	Test Age	Dimensions l (mm)	w (mm)	h (mm)	Mass (g)	Density (kg/m^3)	Load (kN)	Compressive Strength (N/mm^2)
42 A	49431	26/08/24	7	150.3	150.2	150.1	8096	2390	647.4	28.7
42 B	49432	16/09/24	28	150.0	150.0	150.0	8124	2390	748.0	33.2
42 C	49433	16/09/24	28	150.0	150.0	150.0	8276	2390	712.8	31.7
42 D	49434	14/10/24	56	150.0	150.0	150.0	8220	2390	1218.9	54.2

Comments -

Mass reported as saturated weighed in air, Cubes tested in moist condition if tested within 72 hours of receipt.
Any cube received outside dimensional tolerances tested as instructed by client.
All received in satisfactory condition unless otherwise noted
All modes of failure are normal unless otherwise stated
Any fins were removed prior to test using an abrasive stone
Density calculated in accordance with BS EN 12390-7:2019 (water displacement method)
Cubes cured since receipt in accordance with BS EN 12390-2:2019
Laboratory temperature in the range 20 ± 5°C unless otherwise stated
Tested in accordance with BS EN 12390-3:2019 and BS EN 12390-1:2021

Name S.J. Hutchings Signature Date 14 October 2024
(Director)

MURRAY RIX

ANDREW HOUSE, HADFIELD STREET
DUKINFIELD, CHESHIRE SK16 4QX
TEL 0161 475 0870

TEST CERTIFICATE
CONCRETE CUBE COMPRESSIVE STRENGTH TEST

BS EN 12390-3:2019

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Specified Strength 40/50 N/mm^2 at 28 days
Method of Compaction Tamp Bar
Additional Information
Any Deviations from Test Method No

TEST RESULTS

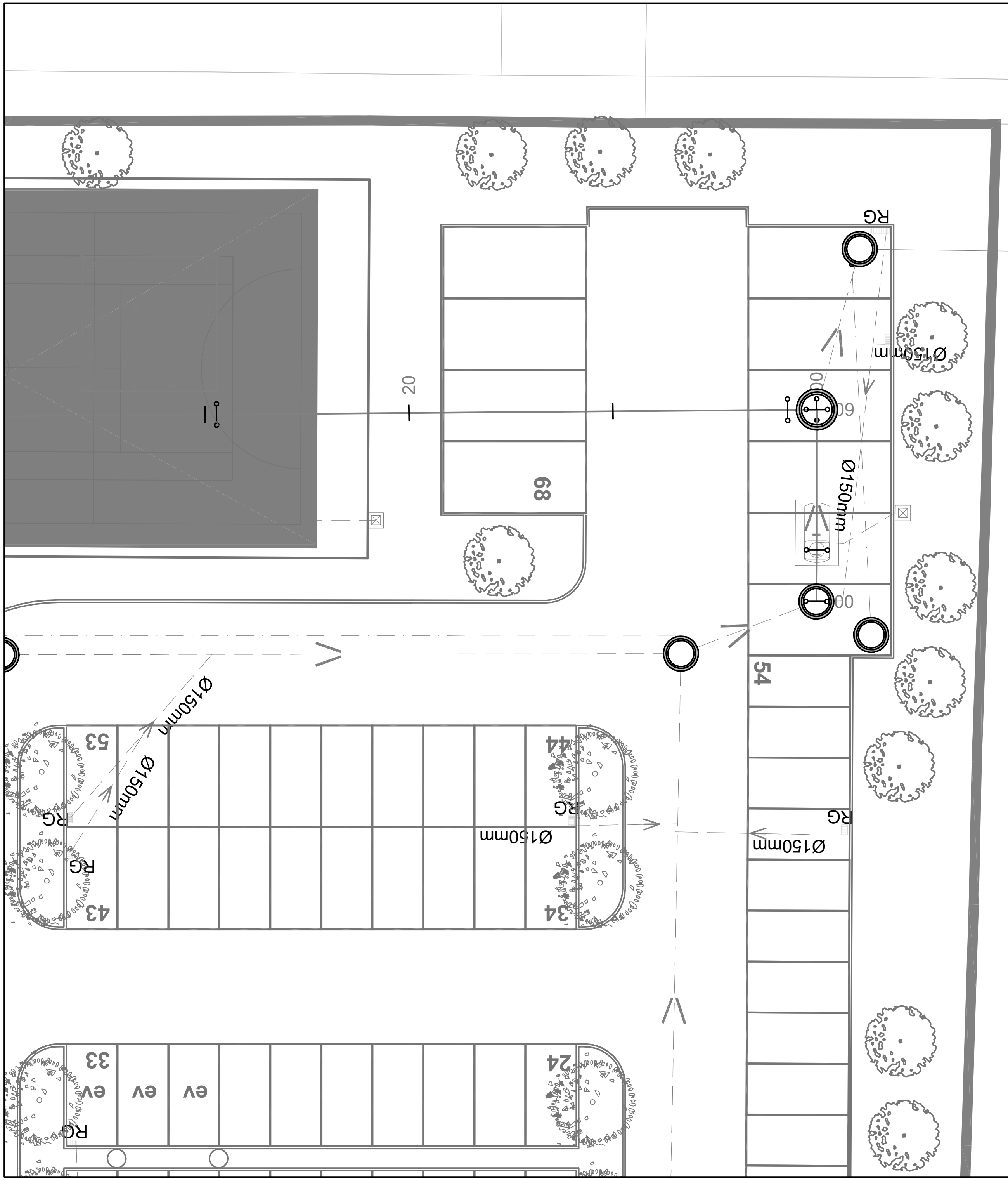
Site Mark	MRN No.	Test Date	Test Age	Dimensions			Mass (g)	Density (kg/m^3)	Load (kN)	Compressive Strength (N/mm^2)
				l (mm)	w (mm)	h (mm)				
43 A	49441	26/08/24	7	150.3	150.0	150.0	8155	2380	543.6	24.1
43 B	49442	16/09/24	28	150.0	150.0	150.0	8124	2390	888.5	39.5
43 C	49443	16/09/24	28	150.0	150.0	150.0	8121	2380	894.0	39.7
43 D	49444	14/10/24	56	150.0	150.0	150.0	8123	2390	1211.0	53.8

Comments -

Mass reported as saturated weighed in air, Cubes tested in moist condition if tested within 72 hours of receipt.
Any cube received outside dimensional tolerances tested as instructed by client.
All received in satisfactory condition unless otherwise noted
All modes of failure are normal unless otherwise stated
Any fins were removed prior to test using an abrasive stone
Density calculated in accordance with BS EN 12390-7:2019 (water displacement method)
Cubes cured since receipt in accordance with BS EN 12390-2:2019
Laboratory temperature in the range 20 ± 5°C unless otherwise stated
Tested in accordance with BS EN 12390-3:2019 and BS EN 12390-1:2021

Name S.J. Hutchings Signature Date 14 October 2024
(Director)

Appendix O As-Built Survey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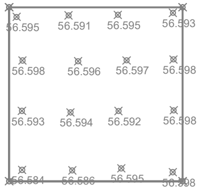
MINESHAFT SLAB CORNER COORDINATES		
MS1 (1)	386052.402	399534.298
MS1 (2)	386048.335	399539.496
MS1 (3)	386047.204	399530.231
MS1 (4)	386043.137	399535.429
MS2 (1)	386112.833	399545.435
MS2 (2)	386107.635	399541.368
MS2 (3)	386108.766	399550.633
MS2 (4)	386103.568	399546.566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NOTES:

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KEY

—	AS-BUILT POSITION OF MINESHAFTS
59.700	AS-BUILT TOC LEVEL OF MINESHAFT CAPPING SLAB

CGC
CheltenhamGreenCivils

Issue	Description	Date	Designed
A	Issued for Information	21/08/24	Jack Layfield

CLIENT:
ISG

PROJECT:
VARLEY ST

DRAWING TITLE:
MINESHAFT CAPPING SLAB
AS-BUILT SURVEY

DRAWING NO:
CGC153-EX-004

REVISION:
A

Appendix P Photos

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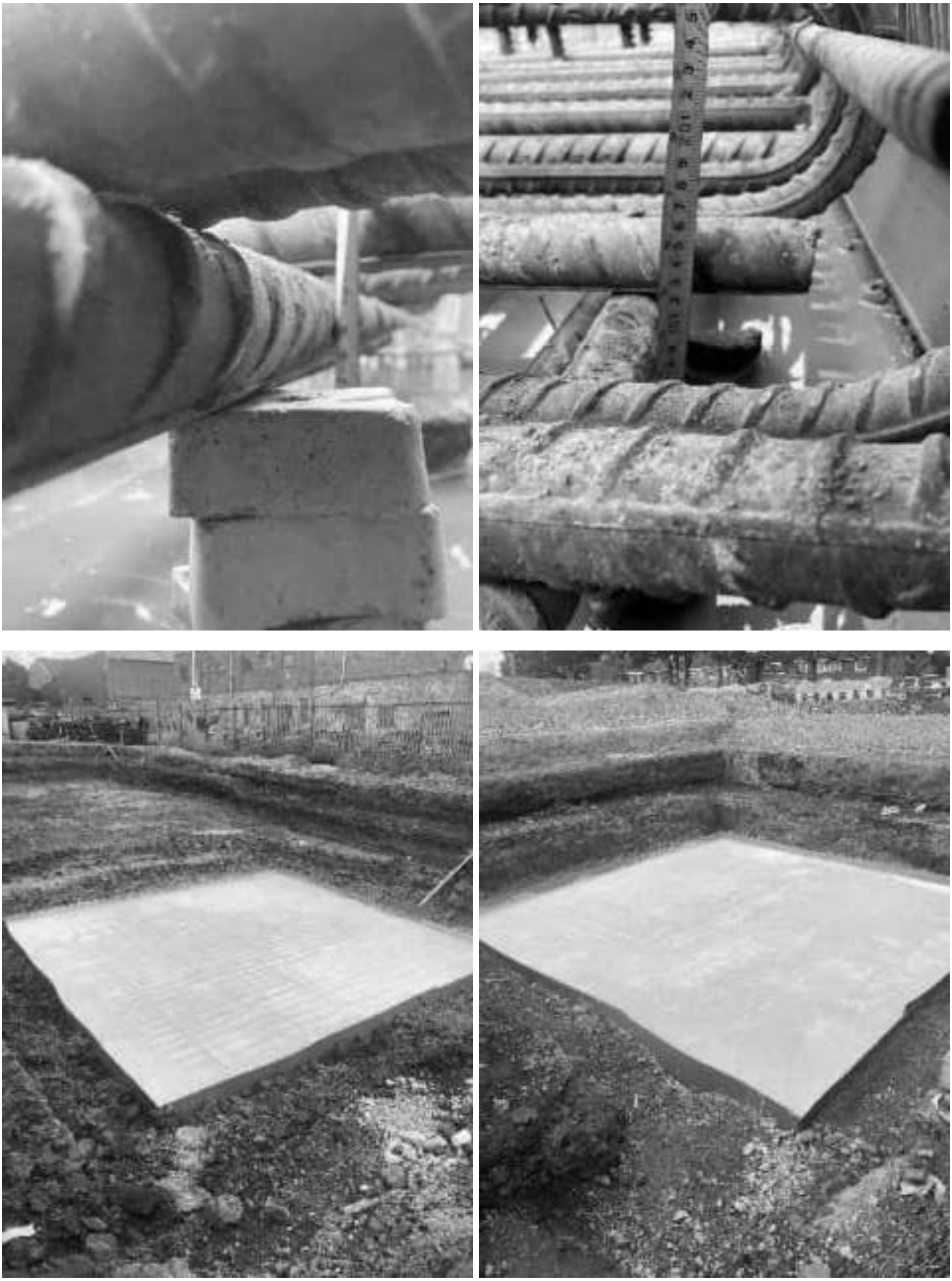
Advent



Appendix Q Permit 27778

The Coal Authority

Permitting Office
Coal Authority
200 Lichfield Lane
Mansfield
Nottinghamshire
NG18 4RG

T 01623 637450 (Permitting)
www.gov.uk/coalauthority

Our Ref: 27778
Your Ref:

15th January 2024

Clancy Consulting Ltd
Dunham Court
2 Walkden Road
Altrincham
WA14 4NX

For the attention of Carl Bebbington

Dear Sir/Madam

Varley Street, Manchester, M40 8EF
Application for a Permit to Enter or Disturb Coal Authority Mining Interests

I refer to your application on behalf of your client, for permission to enter the Coal Authority's property. Attached to this letter is the signed permit certificate and supporting documentation which allows you to carry out the works to the specifications in the documents you submitted within "the site" as shown on the attached plan.

Please note that you may require permission from other property owners such as the surface land owner or other mineral owners.

You should be aware that mine gas may be present within coal seams, voids in shallow mine workings, mine entries, voids above such workings and in any permeable strata or surface fill material. More guidance on managing the risk of hazardous gases can be viewed on our website.

Consequently there is a risk of encountering mine gas during the proposed works. All boreholes and excavations should be regularly tested, particularly at times of falling barometric pressure, for all gases associated with coal mining, commonly carbon dioxide, carbon monoxide, methane, oxygen and hydrogen sulphide.

If mine gas or mine water is encountered, you should ensure that such occurrences are documented and that appropriate actions are taken. Any surface construction must take account of the risks associated with building on land that may be susceptible to surface emissions of mine gases and mining related instability. Care should be taken to ensure any exposed coal seams and all boreholes and excavations are effectively sealed with a cement based material at the earliest opportunity to prevent continued ingress of air.

Please ensure that the site supervisor and operatives working under this Permit, have a copy of and are familiar with the attached *Guidance for site operatives on the risk of hazardous gases when drilling or piling through coal.*

The accompanying permit certificate and supporting documentation should be distributed to all interested parties (especially the site operatives) and be available on site for inspection by ourselves or by the HSE.

This permit certificate is issued on the understanding that, under no circumstances will works other than those specified, be carried out without the prior written approval of the Authority.

You must employ systems for managing health and safety; identifying hazards, assessing risks, creating risk profiles and establishing control measures to control risk to ‘As low As Reasonably Practicable’ (ALARP). You must ensure at all times that control measures are maintained to prevent and if necessary mitigate against any loss of control. Risks must be controlled to ALARP.

It is your duty to consider if the Borehole Sites and Operations Regulations 1995 apply to your activity and comply with the regulations as required. However, your health and safety systems should include as assessment of potential hazards and if relevant, a plan for the prevention of fire and explosions including the potential for blowouts (gas/fluids); on-site and off-site receptors should be considered and how any risks to them will be mitigated.

Manned entry into Coal Authority property is strictly prohibited. Under no circumstances should any person enter any Coal Authority property such as mine entries, underground workings or crop-workings.

It is the responsibility of the Designer to ensure that the proposed works are sufficient for any planned developments at the site, especially if the discharge of a planning condition is necessary. If at any point you consider that additional works may be required please contact me to discuss this.

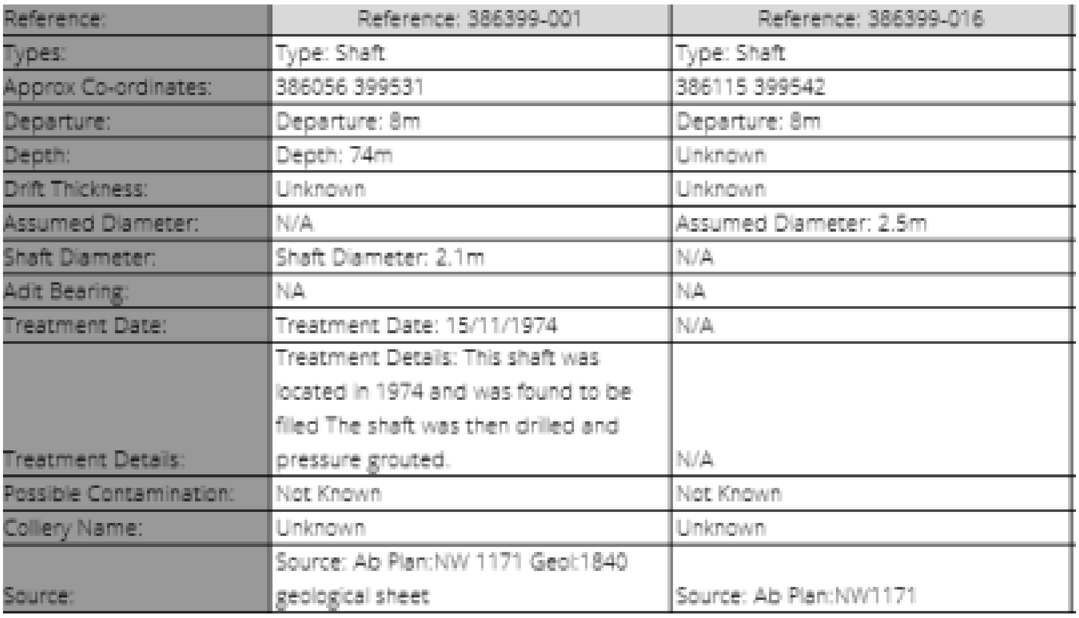
Please submit full details of all works undertaken as required by section 13 of the permit terms and conditions, when the works are complete but before the expiry of the Permit Certificate. If you wish to discuss this or any other matter, please do not hesitate to contact me using the contact details shown.

Important:

Information about coal mining related hazards may be available from the Coal Authority’s online interactive viewer (http://mapapps2.bgs.ac.uk/coalauthority/home.html): NOTE – the online viewer may not contain the latest information in the Coal Authority’s possession. The Coal Authority’s online viewer should not be used as a sole reference.

Shallow workings or workings that may be disturbed by your proposed works are recorded beneath or near the site. The actual extent of workings may differ from that recorded. Please be aware unrecorded mine workings may also be present beneath or near the site that may be disturbed by your proposed works.

I can provide basic information regarding the recorded mine entry/ies on/near the site:



Reference:	Reference: 386399-001	Reference: 386399-016
Types:	Type: Shaft	Type: Shaft
Approx Co-ordinates:	386056 399531	386115 399542
Departure:	Departure: 8m	Departure: 8m
Depth:	Depth: 74m	Unknown
Drift Thickness:	Unknown	Unknown
Assumed Diameter:	N/A	Assumed Diameter: 2.5m
Shaft Diameter:	Shaft Diameter: 2.1m	N/A
Adit Bearing:	NA	NA
Treatment Date:	Treatment Date: 15/11/1974	N/A
Treatment Details:	Treatment Details: This shaft was located in 1974 and was found to be filled The shaft was then drilled and pressure grouted.	N/A
Possible Contamination:	Not Known	Not Known
Colliery Name:	Unknown	Unknown
Source:	Source: Ab Plan:NW 1171 Geol:1840 geological sheet	Source: Ab Plan:NW1171

Please note that the mine entry dimensions and coordinates provided above are approximate. Where mine entries have not been physically located the positions are estimated based on historic sources (OS map, abandonment plan, other plans), such plans may have inherent inaccuracies. The Departure provided in the details is a generalised indication of the assumed accuracy of the historic source material, it should not be interpreted and as a definite measure.

Other information sources for these features may be exist elsewhere. It is the applicant's responsibility to examine the source material themselves to assess the position and characteristics of any mine entry. It may be prudent to ensure the Coal Authority's plotted positions are investigated if you do not discover the shafts in your own plotted positions. You should also be aware of the potential limitations in accuracy of positioning systems when transposing the approximate coordinates onto the site. Please ensure any search or standoff areas are designed to accommodate the potential variables described above.

Mine entries pose significant hazards such as mine gas, mine water and catastrophic ground failure. Working in close proximity to mine entries increases the risks from those hazards. The zone of collapse is often proportional to the depth of superficial material above rockhead and may extend offsite. Please ensure all appropriate measures and steps are taken to ensure the shafts are investigated safely. Drilling into shafts can cause collapse of fill material and rapid displacement of air and gases through any attached workings to offsite receptors via pathways such as offsite mine entries.

In historical mining areas there may be mine entries the Authority is unaware of. Please ensure a sufficient search area to prove its presence or absence from the site beyond reasonable doubt. A minimum area of 10m radius from the best estimated location of the shaft is investigated before concluding a mine entry is not present at that location. A mine entry may exist outside estimated stated departure. Trench or probe spacing should be conservative and appropriate based on the diameter of the shaft.

If any mine entries are encountered during your proposed works you are required to provide the Authority with the results of your investigations together with the proposed specification for any treatment and capping, for comment and approval, prior to treatment works commencing.

The presence of mine entries, where they are not assignable to known workings, may indicate unrecorded shallow workings.

Building over or within the influencing distance of a mine entry raises significant risks and potential liabilities and should be avoided wherever possible. I draw your attention to our adopted policy regarding new development and mine entries:

https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/363064/policy-for-building-over-or-within-the-influencing.pdf

Please quote the Coal Authority Reference No.27778 on all future correspondence.

If you want further information on the Permitting process, please visit:
https://www.gov.uk/get-a-permit-to-deal-with-a-coal-mine-on-your-property

The Permitting Office is open: Monday to Thursday – 8:45am to 5pm and Friday – 8:45am to 4.30pm for any queries.

Yours faithfully

[redacted]

Permitting Manager

[redacted]

The Coal
Authority

Permit to Enter or Disturb Coal Authority Interests

Permit 27778

Name and Address of Permit Holder:

Manchester City Council
Town Hall Extension
Mount Street
Manchester
M2 5DB

Site Location:

Varley Street
Manchester
M40 8EF

This certificate hereby grants the above named Permit Holder a Permit to carry out:-

Treatment of two mine entries by digging down to shaft level, formation of a piling mat, installation of piles surrounding the shafts, fixing of reinforcement and casting of a new suspended reinforced concrete cap including backfilling (386399-001, 386399-016) within the Authority's interests at the identified site location above as shown on the Grant Permit Boundary (overleaf) for the period of **12 months** from the granted date shown below. *The granting of this Permit does not constitute advice given by the Authority in relation to the proposed operations. It is the Permit Holder's responsibility to obtain appropriate health, safety, environmental, technical and legal advice.*

Conditions:

- *Manned entry (i.e.) into mine entries/workings) is strictly prohibited.*
- *Water flush*
- *Gas Monitoring CO, CH_4, CO_2, O_2, H_2S at borehole and rig*
- *Operators undertaking the work must be in possession of this certificate and the Permit boundary plan at the time of works*
- *Appropriate borehole sealing without delay and to withstand site level changes*

Signed: [redacted] Granted Date: ***25/01/2024***

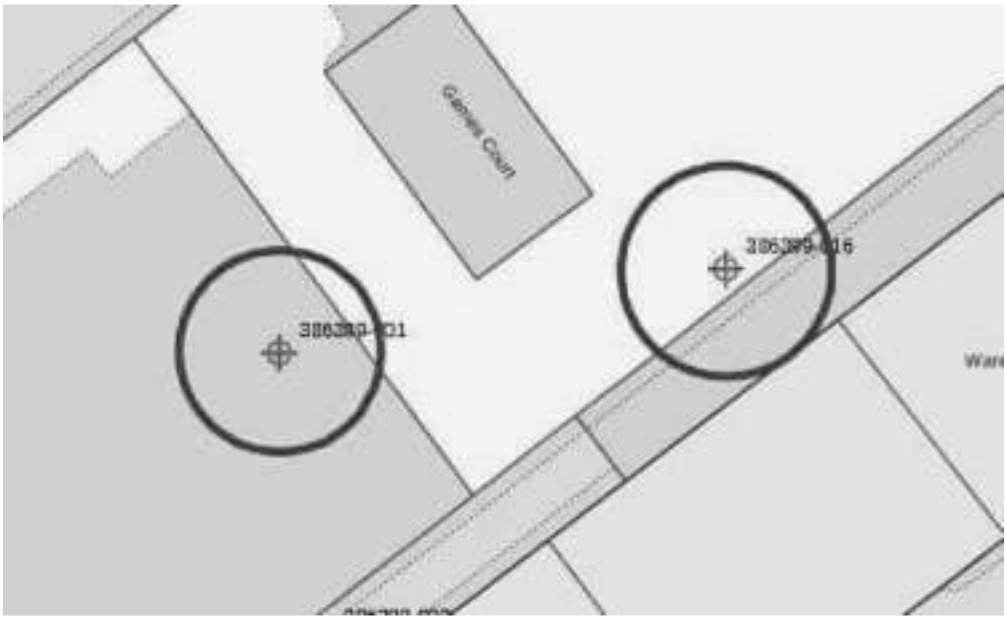
For and on behalf of The Coal Authority

Nominated Representative: Jake Morris, Permitting Manager;
[redacted]ne, Mansfield, Notts, NG18 4RG

Granted Permit Boundary

Permit Ref: 27778

Permit Boundary:



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The Coal
Authority

Permit Terms and Conditions –
https://www.gov.uk/government/publications/coal-mining-permit-terms-and-conditions-application-form

Terms of reference (for further information please refer to our Guidance and FAQ):

Client: this is the proposed Permit Holder. The person who must accept these terms and conditions in order to obtain a Permit.
Agent: The Client (Permit Holder) can appoint an agent to act on its behalf to complete and submit the Permit application. The Agent is authorised to represent the Client in discussions with the Coal Authority, and enter into and / or create binding obligations with the Coal Authority.

1. The Client shall, for a period of 12 years from the effective date (as defined on the Permit Certificate), indemnify the Coal Authority ("the Authority") against liability for any claims, losses or damages, including those made under the Coal Mining Subsidence Act 1991, from any party, arising as a result of any works carried out on the site by the Client, Client's Agent its Designers, and/or Contractors. This provision applies to all works carried out on the site affecting Coal Authority property. Accordingly, in addition to works authorised by the Permit, the indemnity also applies to any works which go beyond the scope of works permitted in the Permit Certificate (i.e. unauthorised works, whether foreseen or otherwise) and works which would otherwise have been required to have been authorised by the Authority.

2. It is the sole responsibility of the Client to appoint a Designer (if required) for the works and comply with all relevant legal and regulatory requirements (including, but not limited to, safety) for the works. In issuing a Permit Certificate (or otherwise authorising works), the Authority is not providing any confirmation or approval of the design of the works, and will have no liability for the design and/or safety of the works. All responsibility for suitable and sufficient design and risk assessment ultimately rests with the Client.

3. In accepting these Terms & Conditions, I confirm that my Agent (see Agent Details box at Condition 24 below) is authorised to complete and submit the Permit application form on my behalf, liaise with any other parties, make decisions on my behalf and represent me in all discussions with the Coal Authority and enter into and/or create binding obligations on my behalf with the Coal Authority.

4 It is a material condition of a Permit Certificate being issued that the Client or the Clients Agent completing the application form confirms the details of all contractors to be engaged in works at the site. This information must be provided in the Permit application form. No contractor is to be permitted access to a site affecting Coal Authority property without the prior approval of the Coal Authority Unless the Client is representing themselves in discussions with the Authority, they must confirm to the Authority using Condition 24 below, which party (if any) is authorised to act as its Agent with regard to permitting matters with the Authority. A Permit Certificate will not be issued until all of this information is provided to the Authority. If additional contractors are engaged during the course of the works, or the authorised agent is changed, the Client must advise the Authority of any such changes within 5 working days. Until the Coal Authority is notified by the Client to the contrary, the Coal Authority will continue to deal with an Agent as an agent authorised to act on behalf of the Client

The Client will be considered in breach of these terms and conditions if:

(i) the Client, their Agent or Contractors are in breach of conditions referred to on a Coal Authority Permit Certificate issued to them or in writing thereafter by a Permitting Manager;

(ii) the Client, their Agent or Contractors employ a method of working not declared in writing by the Authority or on a valid Permit Variation Certificate; and/or

(iii) the Client, their Agent or Contractors undertake any works on Authority property that is not within the latest permit boundary plan issued to them by the Authority or on features that are not within the scope of the Permit Certificate

5 Any permission granted will cease at any point that the Client no longer has significant control

over the site or works being undertaken The Terms and Conditions will continue to apply to all works carried out at the site by the Client, its Designers and/or Contractors. This includes but is not limited to, the full provisions in Condition 1 (Indemnity) and Condition 6(Insurance) which will continue to apply in respect of the works carried out

6. It is a material condition of a Permit Certificate being issued that the Client has reliance on suitable and sufficient insurance to cover the full liability of the Client under Condition 1 (Indemnity) above. Such insurance must be maintained for the period of 12 years from the effective date (as defined in the Permit Certificate). Failure to obtain (or maintain) adequate insurance will not affect the liability of the Permit Holder under any of the conditions in these Terms and Conditions (including but not limited to Condition 1 above). However, the Authority may request evidence that insurance cover is in place at any time during the period of these terms and conditions.

7. If at any time the Authority considers the Client, the Client's Agent Designers or Contractors to be in substantial breach of any of the obligations or conditions of these Terms and Conditions or the application form, the Authority may terminate the Permit (or authorisation for works) by written notice. Where a Permit Termination Notification is served, all activities interfering with the Authority's interest must cease with immediate effect In the event that the Permit (or authorisation) is terminated, the Client will be required to reimburse the Authority for all costs incurred by the Authority in making works at the site which affect the Authority's property safe and, if deemed required by the Authority, returning the same to the pre-works condition These Terms and Conditions will continue to apply to all works carried out at the site by the Client, its Designers and/or Contractors up to the date of termination of the Permit (or authorisation) for the works. This includes, but is not limited to, the full provisions in Condition 1 (Indemnity) above which will apply in respect of the works. Where such breaches of these Terms and Conditions or the application form do not, in the opinion of the Authority (acting reasonably), jeopardise public safety, the Client may be given reasonable opportunity (as determined by the Authority) to remedy any such breach prior to the Permit (or authorisation) being terminated. In that event, a Permit Suspension Notification form will be issued to the Client. Where such a notification is served, no further works can be carried out until the Client is notified by the Authority These Terms and Conditions will

continue to apply for the whole period whilst the Permit is suspended

8. The Permit Holder must notify the Authority as soon as reasonably practicable, using the 24 hour Emergency Service on 0800 288 4242, when there is evidence of spontaneous combustion of coal, uncontrolled/ harmful emissions of mine gas or water or other mining related hazards, has occurred during the course of the permitted activities.

9 In the event that the Client identifies that any additional works are required beyond the scope of the Permit granted by the Authority, the Client must obtain further permission from the Authority to cover all such works (to enter, disturb or change coal mines or coal owned by the Authority) to be carried out This permission must be sought before the additional works are carried out. This obligation applies to all additional works beyond the scope of the Permit, with the exception of emergency works required to mitigate against an immediate threat to life or the environment. In that event, the Authority must be notified of the works as soon as reasonably practicable The Client must also obtain further authorisation from the Authority to change the method for carrying out authorised works or to extend the period for the works beyond the 12 month term authorised in the Permit Certificate. The Authority will review the application and, if approved, will issue a Permit Variation Certificate for the additional works and/or alteration to the method for the works. In no circumstances may the Client, the Client's Agent or its Designers, and/or Contractors, carry out any works until such time as a Permit Variation Certificate has been issued by the Authority, authorising the works. In the event that unauthorised works are carried out before a Permit Variation Certificate is issued (including emergency works), the provisions of any of the conditions in these Terms and Conditions (including but not limited Condition 1 (Indemnity) above shall nonetheless apply. The Client will be liable under the indemnity provisions for all works relating to Authority property that have been carried out.

10. Unless otherwise agreed a Permit shall be valid for 12 months from the effective date, as defined on the Permit Certificate

11. All costs incurred in compliance of the terms of this Permit shall be borne by the Client

12. The Client shall provide all facilities, reasonably necessary, to allow the Authority to inspect the site and carry out its statutory duties, powers and obligations.

13 Unless otherwise agreed, a report or reports commissioned detailing the works undertaken, including any interpretations and recommendations together with the Authority Closure Summary Form, must be submitted by the Client before the permit expiry date (usually 12 months), in order that the Authority's records can be updated The Client must also provide to the Authority copies of all reports relative to all investigative and treatment works carried out. The Authority will place reliance upon any statement made or information contained within the Permit Closure Form, completion report(s), and any other information submitted with the form, for the purposes updating and maintaining its records and discharging its statutory obligations

14. In accepting the closure information and closing the permit file, the Authority does not confirm the adequacy or accuracy of the works carried out or the sufficiency of the information provided in the Permit Closure Form.

15 The granting of a Permit does not give the Client, the Client's Agent its Designers and/or Contractors, any right to explore or exploit coal or derivatives, coal mine methane, coal-bed methane, other minerals in the ownership of the Authority or to occupy property in the ownership of the Authority. Where it is necessary to dig and carry away coal, or occupy Authority property, a separate agreement must be obtained in advance of any such works being carried out.

16. The Client, the Client's Agent its Designers and/or Contractors must ensure that nothing, other than that agreed by the Authority through the Permit, is deposited, falls or flows into any mine entry, mine working, mining collapse, excavation or borehole unless duly authorised.

17. All parties involved in the works must be competent and have the necessary experience and resources to safely undertake the proposed works, and shall adopt appropriate safe practices

and procedures for interacting with potentially hazardous conditions associated with coal bearing strata and former coal mining activities

18 All parties involved in the works shall execute the works in accordance with applicable legislation, standards and good practice guidance.

19. All other rights, consents or permissions necessary (as required by the Authority and / or under statute) to undertake the works shall be obtained before any works proceed.

20. Where the Authority requests additional information to validate a Permit application, the applicant shall provide that information within 14 days. Failure to provide the information within the requested period will result in the Permit application being deemed withdrawn and the fee being forfeited A new Permit application and fee will then need to be submitted if the applicant wishes to continue work. No work should be undertaken until a permit certificate is received

21. A fee (as prescribed in the fee schedule) must be paid. In the event that any payment is subsequently dishonoured or is otherwise unpaid, any Permit that has already been issued will be withdrawn. These Terms and Conditions will continue to apply to all works carried out at the site by the Client, the Client's Agent, its Designers and/or Contractors up to the date on which the Permit is withdrawn. This includes, but is not limited to, the full provisions in Condition 1 (Indemnity) and Condition 6(Insurance) which will continue to apply in respect of works carried out

22. These terms and conditions are non-negotiable and must be signed by the Client and submitted to the Authority when applying for a permit. These terms and conditions will continue to apply to all works carried out at the site by the Client, the Client's Agent its Designers and or Contractors up to the date of termination of the Permit (or authorisation) for the works. This includes, but is not limited to, the full provisions in Condition 1 above.

23 Further Information can be obtained by contacting

Permitting and Licensing, 200 Lichfield Lane, Mansfield, Nottinghamshire, NG18 4RG (Tel: 01623 637450, Email: permissions@coal.gov.uk, the direct website link is: https://www.gov.uk/get-a-permit-to-deal-with-a-coal-mine-on-your-property

The office is open: Monday to Thursday – 8.45 am to 5 pm, Friday – 8.45 am to 4.30 pm.

24. Unless they are self-representing, the Client must confirm their agent's details here: (the Coal Authority will only accept one Agent)

Agent Details:	
Company Name................	Clancy Consulting
Contact Name..................	Carl Babbington

In accepting these terms and conditions, I confirm that my Agent (see Agent details above) is authorised to complete and submit the Permit application form on my behalf, liaise with any other parties, make decisions on my behalf, represent me in all discussions with the Authority and enter into and/or create binding obligations on my behalf with the Authority. I confirm acceptance of, agree to be bound by, and agree that all works will be governed by the foregoing terms and conditions.

I acknowledge and accept that unless or until I notify the Coal Authority in writing to the contrary, the Coal Authority will continue to deal with my Agent as an agent authorised to act on behalf of the Client.

REBECCA MADDISON MANCHESTER CITY COUNCIL

Print name / company name of Client (this may be typed*)

[redacted]

Signature (this may be typed*)

8th December 2023

Date (this may be typed*)

*This document may be signed by electronic means **ONLY** where:

- The Client (Permit Holder) is representing themselves in discussions with the Authority

Or

- The signed Terms and Conditions are supported by an email, from an email address identifiable as belonging to the Client (Permit Holder), confirming they have themselves signed and accepted the Terms and Conditions (template text to be used is provided below. We cannot accept any Terms and Conditions signed on behalf of the Client (Permit Holder).

The email must be sent to the Agent completing the application form so it is included in the submission_

Template email text (copy and paste into email and inset Agent and Client names):

FAO Coal Authority,

I confirm that I have myself accepted the terms and conditions to be submitted by my Agent [Agent Name].and agree to be bound by the Terms and Conditions.

Regards

[Name of Client]

The Coal Authority

Permit Closure Summary Form

Permit Ref.	27778	**Project / Site Location**	**Varley Street, Manchester, M40 8EF**

Please supply all relevant documents, including this completed form within 3 months of the permitted works being completed.

Where relevant the report should include; borehole logs and details of mine or mine entry treatment works carried out (incl. engineering drawings, grout takes etc.) and a scaled site layout plan (correlated to O.S N' Grid) showing all relevant mine entry positions, coal seams, voids and broken ground proved by the works.

Summary of works

Start date 01/05/2024. **Finish date** 31/09/2024

Have any variations occurred? ☒ No ☐ Yes **If so was the Authority notified?** ☐ No ☐ Yes

Please describe;

None.

Did if any of the following incidents occur?

☐ Spontaneous combustion ☐ Water emission ☐ Gas emission (elevated or above action levels)

☐ Geotechnical instability ☐ Legal issues incl. damage or potential claims ☒ **None**

If yes, please detail each item;

Were any of the following encountered? Please give a brief summary of the works undertaken.

☐ Intact coal only ☐ Broken ground ☒ Backfilled ground ☐ Voids

Description;

Backfilled ground encountered in shaft positions

Will further works be necessary that require a Permit? ☒ No ☐ Yes

If yes, please describe, including any recommendations;

N/A

Name: Carl Bebbington

Company: Clancy Consulting Ltd

[redacted]