

HEXA

Co-op Academy Smithies Moor, Heckmondwike

Strategy for Stabilisation of Shallow Coal Mine Workings

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**Engineering
opportunity.**

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1.0 Introduction

1.1 Project Background

Hexa has been instructed by Bowmer & Kirkland (Client) to prepare a grouting scope following from the ground investigation at Co-op Academy Smithies Moor, Leeds Old Road, Heckmondwike, WF16 9BB.

It is understood the subject site is being considered for the demolition of the existing school building and a new school and hard MUGA/PE area to be constructed.

The proposed works can be seen in the drawing from One-Environments, Co-Op Academy Smithies Moor, Whole Site Plan (Ref : SRP1128-ONE-ZZ-XX-D-L-0003, REV: P08, Dated: 24.04.25) presented in Appendix A.

This grouting scope has been commissioned due to the findings of the previous ground investigations, which identified shallow coal workings and ground remediation is necessary for the proposed development.

1.2 Site Setting

The site address is Co-op Academy Smithies Moor, Leeds Old Road, Heckmondwike, WF16 9BB (NGR SE 22045 24954) and is approximately 1.6 km north from the centre of Heckmondwike.

1.2.1 Site Description

The site is approximately 0.9 Ha and comprises a two-storey school with a central courtyard and a smaller single storey extension to the north of the site. To the north of the school is a bituminous hardstanding car park, with access from Leeds Old Road. From the south west to the south east of the school building are areas of bituminous hardstanding that form the school playground and grassed soft landscaped areas.

To the north west are areas of soft landscaping and mature trees. To the north east of the site is an enclosed, overgrown, soft landscaped area. The site also includes part of the grassed public open space located to the east of the school.

The topography of the site generally is 126 m – 127.5 m Above Ordnance Datum (AOD) with the site sloping gently to the north. To the north east of the school building, the ground sits lower than the rest of the site at approximately 123 m AOD.

The site location plan is shown on Figure 1-1 and the red line boundary plan on Figure 1-2.

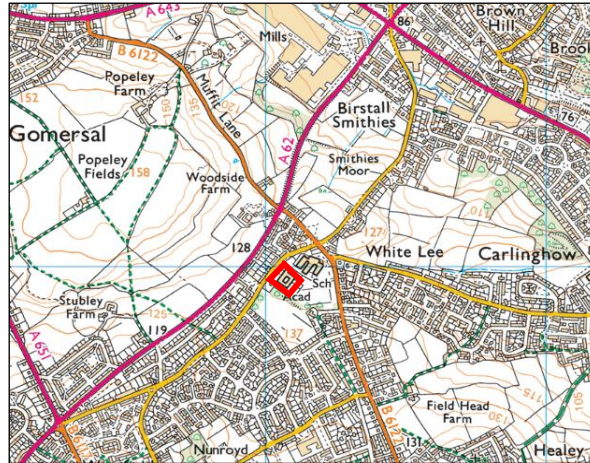


Figure 1-1 Site Location Plan



Figure 1-2 Red Line Boundary Plan

1.3 Sources of Information

The strategy has been written in general accordance with the requirements of C758D Abandoned Mine Workings Manual, C514 Grouting for Ground Engineering and BS EN 12715:2000 Execution of Special Geotechnical Work – Grouting.

In addition to the above, the report has also considered factual data within the following reports:

- Sweco, Coal Mining Risk Assessment, Co-op Academy, Smithies Moor, 65208318-SWE-XX-XX-T-GE-0001, C01, 17th February 2023.
- RSK Geosciences, Phase 1 and Phase 2 Geo-environmental and Geotechnical Factual and Interpretative, Co-op Academy Smithies Moor, 323197-R02 (00), 7th February 2024.

- Hexa, Ground Investigation Report, Co-op Academy Smithies Moor, Heckmondwike, 601124-HEX-XX-XX-RP-GE-0001-P02, 12th August 2025.

2.0 Summary of Coal and Coal Mining

The site is located within a Development High Risk Area as designated by the Coal Authority/ Mine Remediation Authority (MRA).

The ground conditions encountered was Made Ground consisting of bituminous hardstanding, topsoils, subbases and shallow workings on the south western side to maximum depth of 5.00 m bgl. This was underlain by the residual soil of the Pennine Lower Coal Measures, typically a firm clay containing mudstone and coal gravel, encountered at a maximum depth of 6.00 m bgl. A shallow coal seam is also present across the site and is worked on the south western side and is intact on the central and eastern side of the site. The solid geology of the Pennine Lower Coal Measures underlays this, predominantly interbedded mudstone and sandstones.

Two phases of intrusive investigation have been undertake at the site, the first by RSK in 2024 and supplementary investigation in 2025 undertaken by Hexa.

Across the two phases of investigation three potential seams/ zones of working have been identified within potential influencing depth of the surface of the site. The findings are summarised below and discussed in detail in the Hexa ground investigation report (Ref 601124-HEX-XX-XX-RP-GE-0001-P02).

1. Shallow Seam

- Depth Encountered: **0.80–6.15 m bgl** (126.02–120.72 m AOD)
- Encountered across the site.
- Presumed to have been **worked via excavation** along the south-western part of the site. This is on BGS map records and the encountered depth of Made Ground in these area). Seam is encountered **intact** in central and eastern areas.
- Likely extracted historically by **opencast methods**.

2. Middle Seam

- Depth: **13.00–20.00 m bgl** (112.98–106.46 m AOD).
- Maximum thickness of worked/ disturbed zone of **3.02 m**.
- Evidence of **coal workings recorded across the site**, predominantly as broken ground and associated loss of flush. Potential areas of voiding encountered in discrete positions.

3. Lower Seam

- Encountered in both investigations but only in isolated boreholes and potentially in separate leaves.
- RSK Investigation:

- Potential workings at **25.50 m bgl (100.61 m AOD)**, drilling halted due to suspected metal obstruction.
 - Coal seam at **32.20–32.70 m bgl (92.98–92.48 m AOD)**, open-holed with **no evidence of workings**.
- Hexa Investigation:
 - Poor quality coal encountered at **21.90–22.07 m bgl (103.74–103.57 m AOD)** in RH206.

Presented in Table 2-1 is a summary table of all the worked and unworked coal seams from the recent ground investigations.

Table 2-1 Summary of Encountered Worked and Unworked Coal Seams from the Hexa Ground Investigation Report (2025) and RSK Ground Investigation Report (2024).

Exploratory Hole ID	Description	Seam	Depth Range (m bgl)	Depth Range (m AOD)	Thickness (m)
RH201	Potential Coal Workings	Middle	13.00-15.45	112.98-110.53	2.45
RH202	Potential Coal Workings	Shallow	4.25-6.15*	122.62-120.72*	1.90*
RH203	Potential Coal Workings	Shallow	3.30-4.00	123.40-123.10	0.70
	Coal Workings	Middle	17.60-19.50	109.10-107.20	1.90
RH204	Potential Coal Workings	Shallow	0.80-5.00	126.02-121.82	4.20
RH205	Potential Intact Coal	Shallow	2.40-4.60	124.06-121.86	2.20
	Potential Coal Workings	Middle	18.90-20.00*	107.56-106.46*	1.10*
RH206	Intact Coal	Shallow	2.60-3.35	123.04-122.29	0.75
	Coal Workings	Middle	17.05-17.65	108.59-107.87	0.60
	Poor Quality Coal	Lower	21.90-22.07	103.74-103.57	0.17
RH207	Intact Coal	Shallow	2.69-3.50	122.45-121.64	0.81
	Potential Coal Workings	Middle	15.60-18.62	109.54-106.52	3.02
RH208	Intact Coal	Shallow	1.70-3.84	123.49-121.35	2.14

Exploratory Hole ID	Description	Seam	Depth Range (m bgl)	Depth Range (m AOD)	Thickness (m)
	Coal Workings	Middle	14.70-17.70*	110.49-107.49*	3.0*
SA203	Intact Coal	Shallow	0.80-1.30	122.90-122.40	0.50
R01 (RSK)	Intact Coal	Shallow	2.20-3.00	123.91-123.11	0.80
	Potential Coal Workings	Lower	25.50	100.61	-(metal obstruction)
R02 (RSK)	Intact Coal	Shallow	4.65-5.05	121.78-121.38	0.40
R03 (RSK)	Intact Coal	Shallow	3.20-4.39	122.58-121.39	1.19
	Potential Coal Workings	Middle	15.90-17.60	109.88-108.18	1.70
R04 (RSK)	Intact Coal	Shallow	4.00-5.20	122.63-121.43	1.20
	Potential Coal Workings	Lower	20.90-21.90	105.73-104.73	1.0
R05 (RSK)	Intact Coal	Shallow	2.60-3.70	122.58-121.48	1.20
	Potential Coal Workings	Middle	17.00-17.70	108.18-107.48	0.70
	Intact Coal	Lower	32.20-32.70	92.98-92.48	0.50
WS01 (RSK)	Intact Coal	Shallow	1.50-2.70	125.0-123.8	1.20
WS02 (RSK)	Intact Coal	Shallow	5.10-5.20	121.60-121.50	0.10
WS03 (RSK)	Intact Coal	Shallow	1.80-1.90	124.56-124.46	0.10
WS05 (RSK)	Intact Coal	Shallow	2.50-3.70	123.09-121.89	1.20

*Depth to base not reached

2.1 Risk Assessment Summary

Shallow Seam: The risk associated with the shallow seam is considered low. This seam has been largely extracted through opencast methods, and any residual risk can be mitigated through appropriate structural and civil engineering design. Suitable measures include the use of piled foundations, suspended floor slabs, or equivalent solutions to address the presence of locally deeper Made Ground.

Middle Seam: Current investigations indicate insufficient competent rock cover above the middle seams to ensure adequate protection for future development in the event of collapse or

consolidation of the identified workings. Consequently, this seam represents a significant geotechnical risk to development.

Lower Seam: The lower seam poses a lower inherent risk than the middle seam due to its greater depth. However, the interaction between the lower and middle seams introduces a potential for cumulative collapse. Instability originating in the lower seam could transfer upward and compromise the middle seam, which in turn presents a greater risk to surface development.

This risk is more pronounced beneath the proposed structures, where changes to existing ground stresses (caused by imposed loads) are likely to be greatest.

The potential consequences of ground movement vary depending on the proposed land use. The impact is considered to be greatest beneath permanent structures and the Multi-Use Games Area (MUGA), where differential settlement or collapse could compromise structural integrity or usability.

By contrast, external hardstanding such as car parking areas presents a lower consequence of movement, as these zones are either located on areas of existing hard landscaping or within the footprint of current buildings. In these cases, the net applied loads are broadly similar to existing conditions or may even be reduced.

For general landscaped areas, the consequence of ground movement is minimal. Any minor settlement is expected to be cosmetic in nature and can be mitigated through routine landscaping or maintenance, particularly in trafficked zones.

Development Area	Relative Risk of Ground Movement	Consequence if Movement Occurs	Mitigation / Management Approach
Proposed Structures (buildings, attenuation tanks, retaining wall)	High	Structural damage, service disruption, potential safety hazard	Ground treatment required
MUGA (Multi-Use Games Area)	Medium-High	Loss of surface integrity, uneven playing surface, reduced usability	Ground treatment required
Car Parking / External Hardstanding	Low-Medium	Localised settlement, cracking or surface deformation; unlikely to affect overall usability	Standard pavement design, localised repairs as required during operational life
General Landscaped Areas	Low	Cosmetic settlement (e.g. uneven ground, ponding); minimal effect on function	Routine landscaping/maintenance during operational life

2.2 Treatment Strategy

Shallow Seam

As outlined above, the risk associated with the shallow seam workings is considered low. It is recommended that this risk is managed primarily through structural design measures

incorporated into the development. No specific remediation is required beyond typical precautions already necessary for areas of locally deeper Made Ground. Standard construction considerations should also account for the possibility of encountering intact coal during excavation works.

Middle and Lower Seams

Based on the findings and assessments to date, the Middle and Lower seams present a residual risk of instability that cannot be addressed through structural design measures alone. It is therefore recommended that these seams be stabilised through targeted grouting. The injection of grout will aim to:

- Fill potential voids and reduce the likelihood of collapse or consolidation.
- Increase ground strength and continuity, providing a more competent foundation stratum.
- Mitigate the risk of cumulative failure, where instability in the deeper seam could propagate upward and compromise the middle seam and overlying development.

It is intended to treat as a minimum the proposed MUGA, proposed building footprint, attenuation tanks and northern retaining structure.

3.0 Grouting Strategy

The following grouting strategy is intended to outline general scope and requirements of the grouting operations for the grouting contractor and the supervising engineer or the review and approval of the Mining Remediation Authority.

3.1 General Requirements

All works will be overseen by an engineer, and the engineer will prepare progress reports and a photographic record.

Grouting is targeting the proposed building footprint, the hard PE/MUGA area, attenuation tanks and northern retaining structure.

Due the construction and demolition programme the grouting works may require phasing across two or more phases. The exact programme of works will be confirmed in discussion with the client (B&K) and appointed grouting specialist contractor.

3.1.1 Drilling

The works will involve drilling boreholes to allow the injection of grout into old mine workings and associated voids. Boreholes will be drilled using rotary or rotary percussive techniques, taken down through the overburden, through and beyond the pavement of old workings.

Holes will generally be a minimum diameter of 70 mm and will be cased through Made Ground and superficial deposits to rockhead. If required, casing may extend further into the strata to maintain borehole stability. Holes will be kept open until the associated grouting activities are complete.

Where drilling encounters obstructions or becomes abortive, re-drilling or adjustment of the borehole location/diameter will be undertaken.

3.1.2 Grouting

Grouting will be undertaken to stabilise seams and associated voids, cavities and disturbed ground encountered. The works will include checking boreholes for obstructions prior to grouting, installing grout pipes/tubes to the base of the holes, and injecting grout under controlled conditions.

Injection will generally be carried out until one of the following occurs:

- Grout pressures reach the design limits (10 kN/m² per m overburden, up to 200 kN/m² maximum).
- Grout is observed returning to surface near the point of injection.

Where high grout takes are experienced, a staged approach will be adopted, with grout injection suspended and resumed in accordance with agreed limits.

Cased boreholes will be grouted progressively as the casing is withdrawn. Care will be taken throughout to avoid undue uplift beneath existing buildings or services, and ground level monitoring may be carried out where there is a potential for impact.

Due to the potential for grouting to predate demolition and also to protect Root Protection Zones of trees to be retained select boreholes may need to be drilled on an angle. Where this is needed additional holes may need to be grouted to achieve the grouting grid and account for differing angles to treat the seams at the target depth and offset to the proposed structure(s).

3.1.3 Excessive Grout Take

In circumstances where unusually high grout takes are encountered, a staged approach will be adopted to control injection:

- If no pressure is achieved and no grout return is observed after approximately 15 tonnes of grout have been injected, the injection will be suspended and the grout tube removed.
- After a stand-down period of at least 12 hours, injection may resume with up to a further 10 tonnes of grout.
- If grout is still not taking effect, the suspension will be repeated, with subsequent injections carried out in smaller stages of around 5 tonnes after further rest periods.
- Should a total of 30 tonnes be injected into a single hole without signs of effective completion, the matter will be reviewed with the Engineer to agree whether injection should continue or alternative measures are required.

This approach is intended to balance effective treatment of voids while avoiding excessive or uncontrolled grout use.

3.1.4 Injection Pressures

Where boreholes are cased through rock, grout injection will generally continue as the casing is withdrawn, with pressures controlled to limits agreed with the Engineer. In all cases, injection

pressures will not exceed 10 kN/m² per metre of overburden, with an overall maximum of 200 kN/m² regardless of depth.

3.1.5 Protection of Adjacent Structures

Throughout the works, care will be taken to ensure that uplift pressures do not develop beneath nearby buildings, structures, or buried services. Where sensitive structures may be affected, additional supervision will be employed, and ground levels will be monitored by precise levelling at appropriate intervals before and during grouting.

Dependent on the proposed construction sequencing drilling beneath the existing (to be demolished) structure may be required and any location which may be affected will need to be drilled at an angle to achieve treatment.

3.1.6 Reporting

On completion, a full record of the works will be provided, including:

- Depth and position of each borehole.
- Details of any seams, cavities, or shafts encountered.
- Quantities and types of grout and other fill materials used.
- Any relevant observations relating to the condition of the old workings.

A completion certificate will be issued confirming that the site has been stabilised for development, subject to appropriate foundation design.

3.2 Grout Mixes and Properties

Prior to commencement of grouting works, a range of suitable grout mixes will be proposed for approval. These will be designed to meet the anticipated ground conditions, with alternative mixes available should conditions vary.

Where required, trial mixes will be prepared and tested to confirm their performance, with results shared in advance of operations.

The proposed mixes will be assessed for strength and flow characteristics, ensuring they are appropriate for infill treatments. Where directed, independent laboratory testing may be arranged to provide confirmation of strength development at 14 and 28 days.

3.2.1 General Guidance on Mixes

For planning purposes, the following types of grout mixes are anticipated:

1. Narrow Cavities (< 500 mm high)

- Mixes typically based on Cement : Pulverised Fuel Ash (PFA) in ratios around 1:12, or Cement : PFA : Sand in ratios around 1:10:2 where limiting grout spread is desirable.
- Cement content not less than 75 kg/m³ in dry or unsaturated conditions.
- In waterlogged conditions, cement content may be increased to approximately 100 kg/m³ to counter dilution.

2. Large or Interconnecting Cavities (> 500 mm high)

- Mixes typically based on Cement : PFA : Sand in ratios around 1:6:1.
- Cement content not less than 100 kg/m³ in dry or unsaturated conditions, rising to around 125 kg/m³ in waterlogged conditions.
- Where required, admixtures such as bentonite may be incorporated to help control grout spread during injection.
- To achieve consolidation, pea gravel may be introduced alongside grout injection, forming stable cones within the voids.

All proposed mixes will be supported by evidence that they are capable of meeting the minimum strength, durability, and workability requirements for the project. Adjustments to mix proportions will be made as needed, depending on actual ground conditions encountered during the works.

3.2.2 Mix Proportions and Workability

Grout mixes will generally be prepared with water-to-cement/PFA ratios in the range of 0.40–0.45 (including moisture present in the aggregates). These mixes are expected to produce a pumpable grout with a fluidity (lucidity) in the range of 300–600 mm. Fluidity will be checked on site during grouting operations using a flow meter to ensure consistency and suitability for injection.

3.2.3 Bleed Control

High-bleed grouts will be avoided, with bleed capacity limited to a maximum of 5%. Testing of bleed will be undertaken using clear graduated cylinders (minimum 50 mm diameter, approximately 1,000 ml volume). The cylinders will be covered to prevent evaporation, and measurements will be taken at hourly intervals:

- For neat cement grouts: monitoring for at least 3 hours.
- For cement/PFA grouts: monitoring for at least 6 hours.

3.2.4 Strength Testing

Strength of the grout will be verified by preparing sets of six test cubes at agreed surface positions throughout the works. Cubes will be cured, handled, and tested in line with BS 1881 to confirm performance. Target strengths are expected to be not less than 1.0 N/mm² (1 MPa) at 28 days, with results recorded at both 14 and 28 days.

3.2.5 Approval and Adjustments

Initial grout proportions will be determined by the Contractor for approval prior to commencement, based on drilling conditions and any trial mix or cube test results. If test outcomes suggest adjustments are required, mix proportions will be modified accordingly.

Where directed, independent laboratory testing may be carried out to verify results, with certified records provided. Provisional allowances will be included in the works for such independent testing.

3.2.6 Injection Performance

Grout viscosity at the time of injection will be controlled to ensure penetration into voids, while achieving a rapid gel formation with minimal bleeding and shrinkage (typically within three hours of injection).

Permeability will be assessed by drilling test holes and carrying out grout acceptance testing at pressures appropriate to the depth, in accordance with infill grouting requirements.

If grout take in validation holes is excessive (greater than the nearest surrounding primary/secondary grid positions) further holes will be drilled and treated as required to confirm ground consolidation.

The number of validation holes across the site will be the greater of 2% of the total holes drilled or a minimum of five holes

Depending on grout takes, mix performance, or changes in drilling conditions, the Engineer may require additional validation holes.

3.3 Grout Sequence/Process

The following outlines the intended sequence of grout treatment across the site. It is intended that grouting will be progressed in a non targeted grid across the development area.

The proposed grouting extents are highlighted on Drawings 601124-HEX-XX-XX-D-GE-0001-P01 provided in Appendix A, however, the actual number of treatment holes will be dependent on site findings.

3.3.1 Primary Grid

A primary grid is proposed across all proposed building and hardstanding areas (including MUGA), proposed attenuation tanks and northern retaining structure.

The Primary Grid shallow shall be set out no greater than on a 6 m x 6 m grid.

The Primary Grid will extend to ensure that both the Lower and Middle Seams have received treatment a minimum of 6 m beyond the proposed building footprint (or site boundary) for the lower seam and 3 m beyond the proposed building footprint (or to the site boundary) for the middle seam.

The Primary Grid will target both the Lower and Middle Seams, grouting the Lower Seam First and then the Middle Seam.

All locations within the primary grid will be drilled to a minimum of 35 m or minimum of 2 m below suspected/identified workings in the Lower Seam whichever is greater.

3.3.2 Secondary Grid

An infill/ offset Secondary Grid of 6 m x 6 m is proposed within the building footprint.

The Secondary Grid will extend to ensure that both the Lower and Middle Seams have received treatment a minimum of 6 m beyond the proposed building footprint (or to the site boundary) for the lower seam and 3 m beyond the proposed building footprint (or to the site boundary) for the middle seam.

The Secondary Grid will target both the Lower and Middle Seams, grouting the Lower Seam First and then the Middle Seam.

Dependent on grout take within the Primary the Secondary Grid may be advanced beneath the MUGA and External Areas. The requirement for this will be if excessive grout (see Section 3.1.3) take is noted in either seam during Primary Grid treatment.

All locations within the primary grid will be drilled to a minimum of 35 m or minimum of 2 m below suspected/identified workings in the Lower Seam which ever is greater.

3.3.3 Additional Drilling

It is anticipated at this stage that the Primary and Secondary Grids will provide adequate treatment, however, additional Drilling and Grouting may be required if grout takes in the Secondary Grid are excessive (see Section 3.1.3) or where validation suggests that grouting works have been unsuccessful (see Section 3.2.6).

3.4 Mine Entry Treatment

No evidence of mine entries has been recorded on site, nor have any been identified during investigations to date. However, as with any site within the coalfield, a background risk remains due to the possibility of unrecorded workings.

Should a suspected mine shaft or similar feature be encountered during drilling, the Supervising Engineer must be notified immediately. A site-specific treatment strategy will then be developed, which is likely to include:

- Proof grouting to stabilise the ground and seal any associated voids.
- Design and installation of a structural cap, prepared in consultation with a suitably qualified Structural Engineer.

3.5 Gas Monitoring

The Hexa Ground Investigation Report 2025 characterised the site as having a 'low' risk to receptors from ground gas sources. However, the presence of underlying mine workings remains a factor. The ground gas should be reassessed during and after any grouting works. This may include monitoring of existing or new monitoring wells during the works.

It is also possible that the Coal Authority/MRA permit stipulates that there is a need for continuous gas monitoring during and after the grouting works.

4.0 Health and Safety, Licences and Permits

All drilling and grouting activities will be undertaken in accordance with current UK Health & Safety legislation, Coal Authority requirements, and HSE guidance relating to construction and mining environments. The Contractor will be responsible for ensuring that safe systems of work are in place, that risks are appropriately managed, and that all legal permissions are obtained before works commence.

4.1 Permitting and Coal Authority Requirements

The Contractor must obtain a Permit to Enter or Disturb Coal Mines from the Coal Authority prior to any works that intersect, enter, or otherwise disturb historical mine workings or mine entries.

Works must also comply with the Coal Authority Guidance on Permits for Ground Investigations, Drilling and Site Activity in Coal Mining Areas (latest version).

In the event of encountering unrecorded mine entries, voids, or evidence of old workings, works will stop immediately. The Contractor will notify the Coal Authority without delay, fence off the affected area, and await further instructions.

The Contractor shall allow within their programme and pricing for any delays resulting from Coal Authority inspections, gas monitoring, or additional safety assessments.

4.2 Insurance and Legal Liability

The Contractor will arrange adequate insurance cover to protect against injury to persons and damage to property.

Insurance cover will be in place prior to site mobilisation and maintained for the full duration of the Contractor's liability.

4.3 Safe Systems of Work

All activities will be carried out by competent personnel in line with the Construction (Design and Management) Regulations 2015 (CDM 2015).

Risk assessments and method statements (RAMS) will be prepared before commencement, covering both normal operations and emergency procedures, including responses to ground instability, mine gas emissions, and service strikes.

Where utilities or drainage runs are suspected, initial excavation may be carried out by hand in accordance with HSE guidance.

4.4 Gas Monitoring and Mine Atmosphere Safety

Continuous monitoring for noxious, flammable, or asphyxiant gases will be undertaken throughout the works, using approved gas detection equipment. The Contractor will ensure the availability of equipment, training, and emergency response procedures in line with Coal Authority safety protocols and HSE Mines Regulations 2014.

Where gas is detected, works will cease immediately, and the Coal Authority will be contacted for further direction.

5.0 Conclusions & Reporting

The Contractor will be responsible for maintaining accurate records of all drilling and grouting activities. These records will be made available for inspection throughout the works and submitted to the Engineer.

5.1 Site Plans

Up-to-date site plans will be maintained showing:

- The position and surface levels of all boreholes.
- Sections through rows of holes, with details of strata encountered, voids, grout volumes, and other relevant observations.
- Levels referenced to a site datum agreed with the Engineer.

5.2 Daily Drilling Records

A daily record will be prepared for each borehole, including (as applicable):

- Project and hole identification details (job title, location, hole reference, date).
- Contractor details, plant in use, crew members, and hours worked.
- Drilling method, flushing medium, drill bit type, casing details, and final depth.
- Progress of drilling (depths achieved, daily and cumulative metres drilled).
- Ground conditions encountered (strata, groundwater, voids, emissions of gas or water).
- Operational notes (loss of flushing medium, standing times, obstructions, settlement or heave).
- Details of samples or underground services identified.

5.3 Daily Grouting Records

For each hole grouted, a daily record will be provided, including:

- Project and hole identification details.
- Type of injection method used (e.g. tremie injection) and grout-line dimensions.
- Mix proportions, volumes injected, and pressures recorded at depth.
- Details of casing left in place or abandoned.

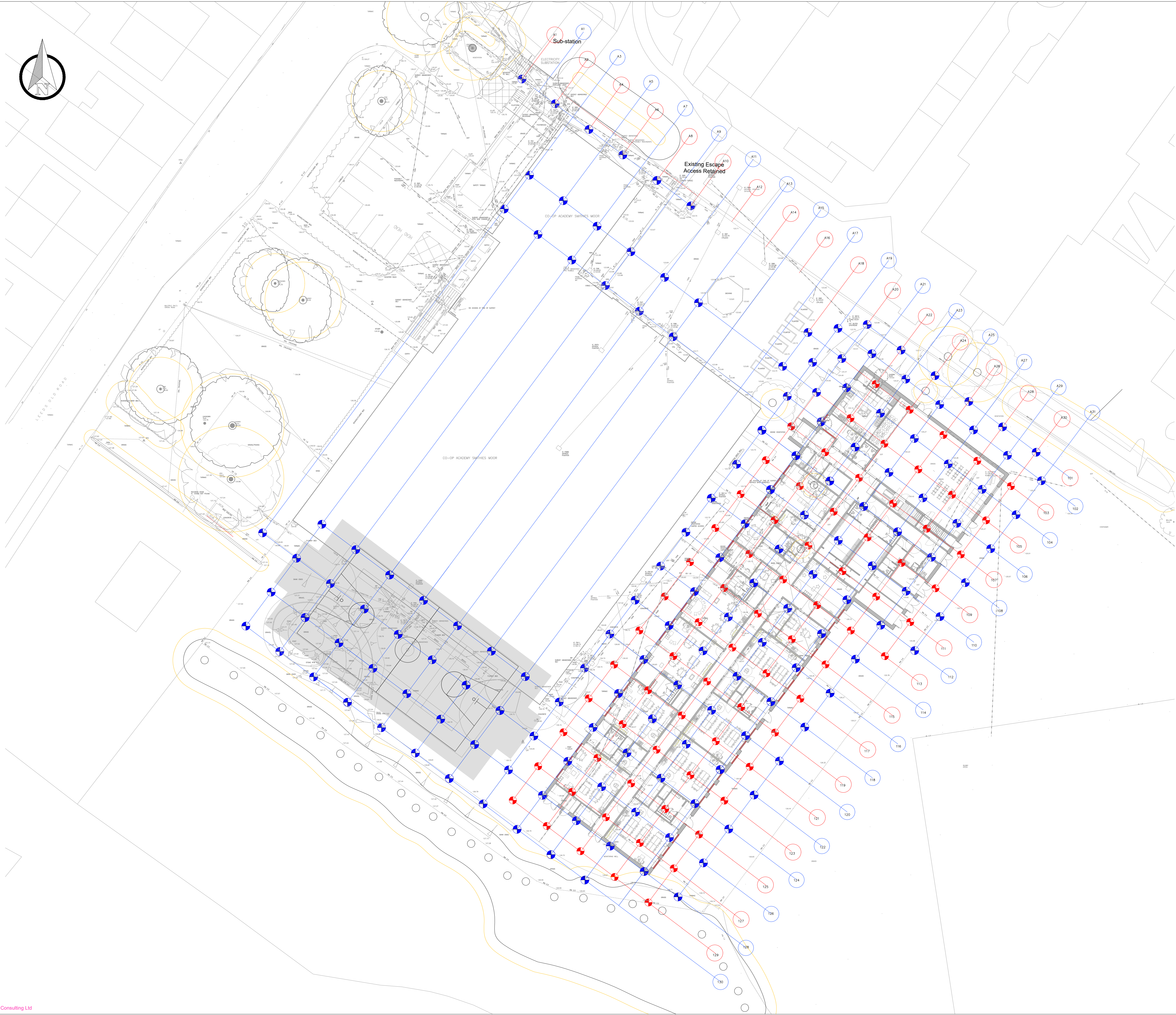
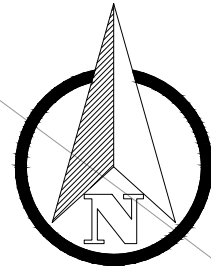
5.4 Completion Reporting

On completion of the works, the Contractor will submit a factual report summarising:

- The works undertaken.
- Records of all boreholes drilled and grouted.
- Grout volumes, pressures, and mixes used.
- Ground and groundwater conditions encountered.
- Any notable features (e.g. voids, mine workings, gas emissions).

The final report will provide a clear record of treatment undertaken and ground conditions relevant to future development.

Appendix A – Drawings



Notes

1. Do not scale this drawing. All dimensions must be checked/ verified on site, if in doubt ask.
2. This drawing is to be read in conjunction with all relevant architects, engineers and specialists drawings and specifications.
3. All dimensions in meters unless noted otherwise. All levels in metres unless noted otherwise.
4. Any discrepancies noted on site are to be reported to the engineer immediately.
5. This drawing should be printed and read in colour.

Design Notes

1.

Legend

- Primary Grid
- Secondary Grid

5m SCALE 1:250

P03	09.10.25	Addition of RPZs to drawing	XX	XX
Rev	Date	Details of Issue	Drawn	R'wd

Issues & Revisions

Consultant

HEXA

Client

Project Title

CO-OP ACADEMY SMITHIES MOOR

Drawing Title

PROPOSED GROUTING GRID - SCHOOL BLOCK, HARD PE/MUGA, RETAINING WALL AND ATTENUATION TANKS

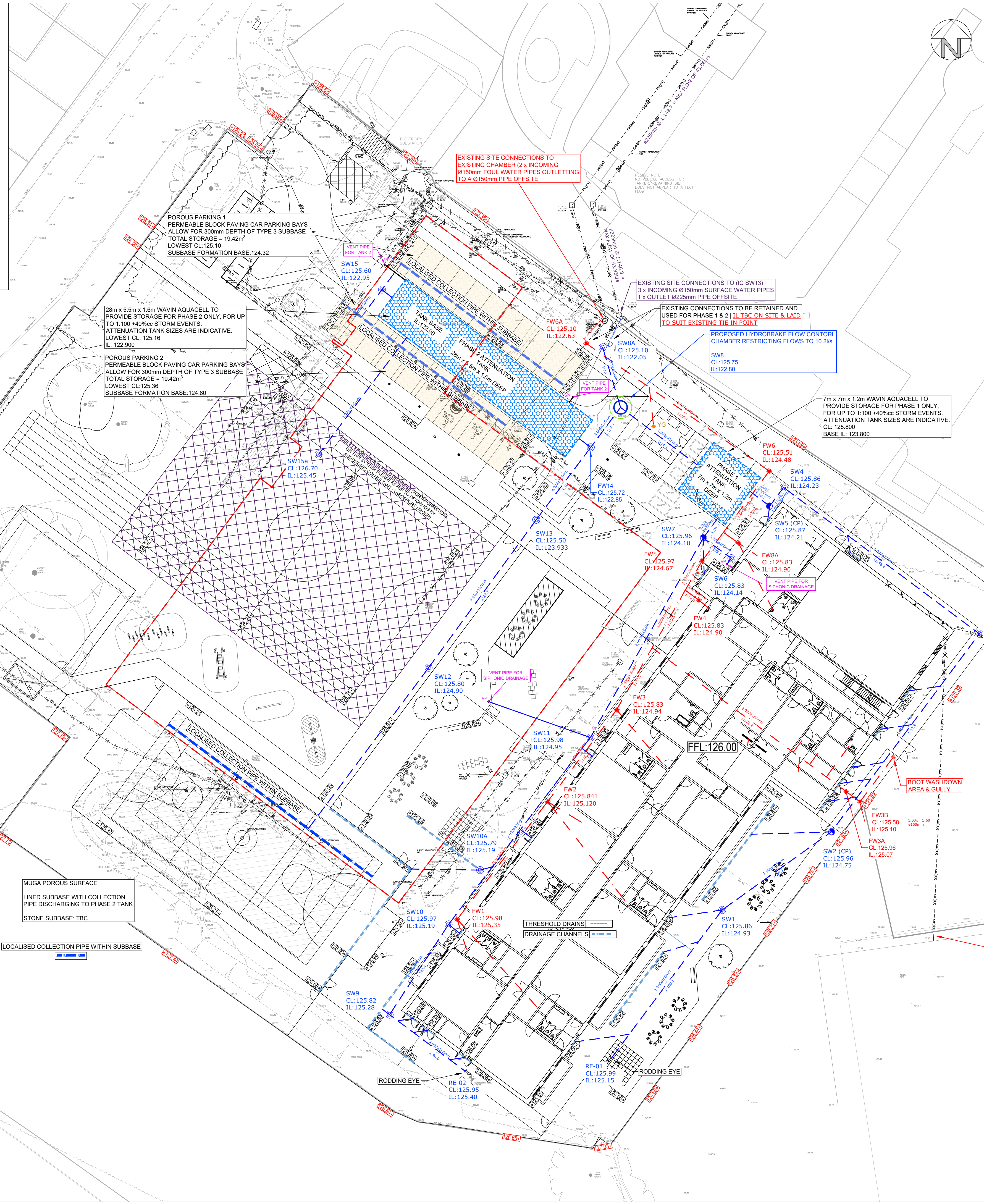
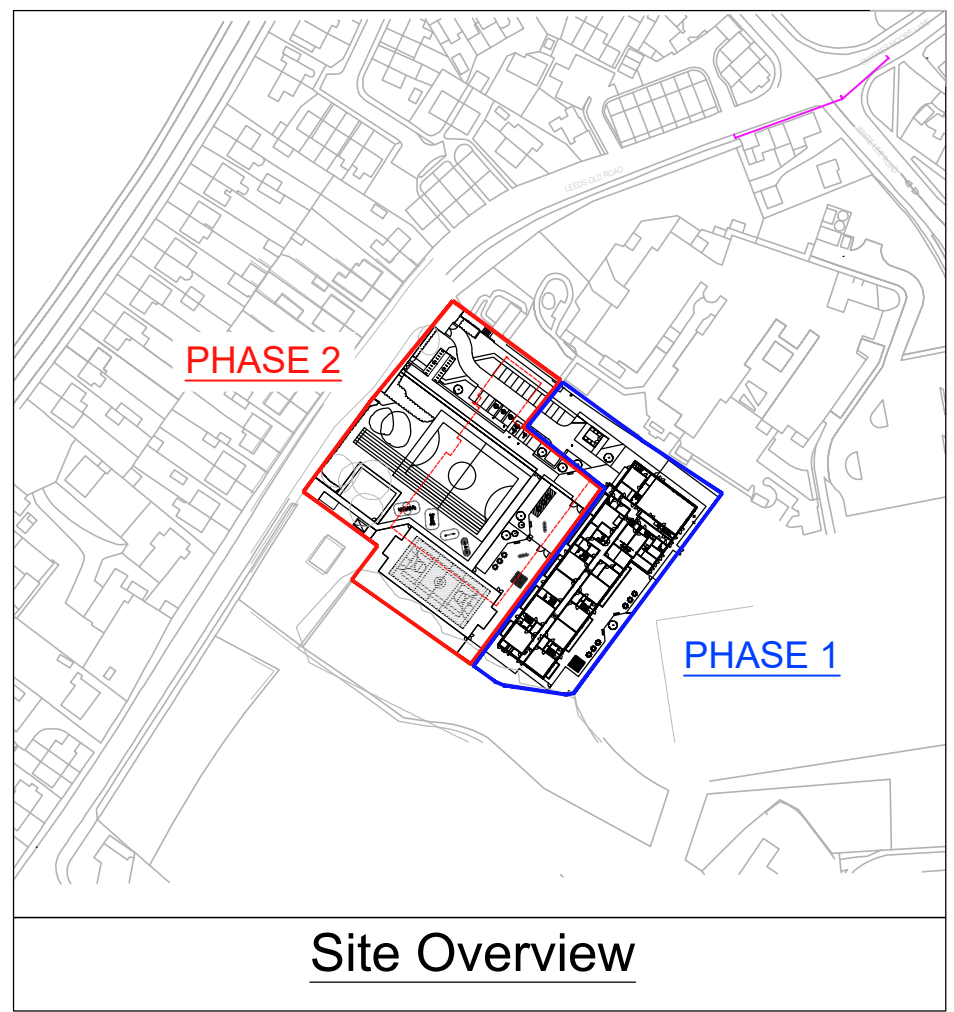
Drawn By	PS	Reviewed By	ML
Hexa Ref	601124	Scale at A1	1:250

Purpose of Issue

WORK IN PROGRESS

Status

Project - Originator - Zone - Level - Type - Revision
SRP1128-HEX-XX-XX-D-GE-0001 P03



DRAINAGE LEGEND

	EXISTING PUBLIC SW SEWER (& MANHOLE)
	EXISTING PUBLIC FW SEWER (& MANHOLE)
	EXISTING PUBLIC COMBINED SEWER (& MANHOLE)
	EXISTING STORM DRAINS & MH RETAINED DURING PHASE 1 WORKS
	EXISTING FOUL DRAINS & MH RETAINED DURING PHASE 1 WORKS
	EXISTING DRAINAGE TO BE REMOVED
	PROPOSED STORM DRAIN
	PROPOSED FOUL DRAINS
	PROPOSED STORM MANHOLE
	PROPOSED STORM INSPECTION CHAMBER
	PROPOSED CATCHPIT / SUMP CHAMBER
	PROPOSED FOUL INSPECTION CHAMBER
	PROPOSED SIPHONIC ROOF DRAINAGE OUTLET*
	PROPOSED FOUL STUB STACK*
	PROPOSED SOIL VENT PIPE*
	PROPOSED FLOOR GULLY
	PROPOSED YARD GULLY
	THRESHOLD DRAIN
	CHANNEL DRAIN WITH DIRECT OUTLET TO RAINGARDEN / SWALE
	RODDING POINT
	PROPOSED FOUL CONNECTION 1000
	PERFORATED UNDERDRAIN TO BASE OF RAINGARDENS / PERMEABLE PAVING
	PROPOSED CELLULAR ATTENUATION TANK
	PROPOSED SPOT LEVEL
	EXISTING TIE IN LEVEL
	EXISTING SPOT LEVEL
	MUGA PERMEABLE PLAY SURFACE WITH POROUS SURFACE & LINED SUBBASE
	PERMEABLE PARKING BAYS

(*) INDICATES INDICATIVE LOCATIONS - AWAITING ADDITIONAL INFORMATION

SIPHONIC DRAINAGE LOCATIONS ARE INDICATIVE ONLY
ROOF CATCHMENT AREA DRAINING TO EACH OUTLET TO BE CONFIRMED

GEOCELLULAR STORAGE CRATES BY SDS (GEOLIGHT),
WAVIN (AQUACELL), POLYPIPE (POLYSTORM) OR SIMILAR
APPROVED TO MANUFACTURERS DESIGN

SURVEYS HAVE BEEN COMPLETED AND ASSUME
THE EXISTING CONNECTION IS ABANDONED AND
UNUSED.
S185 DIVERSION IF CONNECTION IS LIVE.

MUGA POROUS SURFACE
LINED SUBBASE WITH COLLECTION
PIPE DISCHARGING TO PHASE 2 TANK
STONE SUBBASE: TBC

THRESHOLD DRAINS
DRAINAGE CHANNELS

BOOT WASHDOWN
AREA & GULLY

CCTV SURVEY INDICATES CONNECTION IS
NOT IN USE & ABANDONED



- LEGEND**
- Application Boundary
 - Asphalt Concrete (Vehicular Grade)
 - Asphalt Concrete (Pedestrian Grade)
 - Permeable PCC Concrete Block Paving Type 1
 - Permeable PCC Concrete Block Paving Type 2
 - Permeable PCC Concrete Block Paving Type 3
 - Concrete Hardstanding
 - Asphalt Concrete Multi Use Games Area (HPE25)
 - Cycle Parking (40 Spaces)
 - Accessible Cycle Parking (2 spaces)
 - External Canopy
 - 1.8m high Timber Close Board Fence with Matching Lockable Gate (with other fence types)
 - 3.0m high Sport Weldmesh Fencing (with matching lockable gates where indicated)
 - 2.4m high Secure Weldmesh Fencing (with matching lockable gates where indicated)
 - 1.8m high Secure Weldmesh Fencing (with matching lockable gates where indicated)
 - 1.2m high Bow Top Fencing (with matching lockable gates where indicated)
 - 900mm high Diamond Knee Rail
 - Existing Fence Retained (Subject to condition)
 - Active EV Charging Bays (4)
 - Accessible Bays (2)
 - Seats
 - Benches
 - Legacy Furniture Relocated (Subject to condition)
 - Legacy Storage Units
 - Legacy Cycle Storage Retained (Subject to condition)
 - Adventure Play Equipment (Spec tbc.)
 - Storage Container
 - Removable Bollard
 - Proposed Dwarf Wall
 - Proposed Tree Planting
 - Native Hedge Planting
 - Species Rich Ornamental Planting
 - Species Rich Native Scrub Planting
 - Amenity Grass
 - Existing Grassland & Vegetation Retained & Enhanced
 - Existing Trees & Vegetation Retained
 - Existing Trees & Vegetation Removed

NOTES

REVISION P06	DATE 28.05.25	BY HN	CHECKED KP
Revised in accordance with CEM6 feedback. 12m high timber fencing changed to 12m high bow top metal fencing			
REVISION P07	DATE 18.06.25	BY KP	CHECKED JE
Application boundary revised to include rugby field access. Car park turning head amended in accordance with latest swept path analysis. Planting numbers updated in accordance with BNG.			
REVISION P08	DATE 14.07.25	BY KP	CHECKED JE
Existing main gate access retained for field maintenance access. Tree relocated. Bollards to car park increased, 1200mm spacing. Bin store access improved.			

CLIENT	Bowmer + Kirkland		
PROJECT	Co-Op Academy Smithies Moor		
DRAWING TITLE	Whole Site Plan		
DRAWING No.	SRP1128-ONE-ZZ-XX-D-L-0003	REVISION	P08
STATUS	PRELIMINARY		
SCALE	1:500 @ A1	DATE	24.04.25
		DRAWN BY	KP



ONE-
ENVIRONMENTS