



**ARP GEOTECHNICAL LTD**  
CHARTERED CONSULTING ENGINEERS

**PWS/01**

**PAMELA DEWS**

JILL LANE, MIRFIELD

**SPECIFICATION FOR DRILLING & GROUTING OF MINE WORKINGS Rev A**

**APRIL 2026**

**1.0 BACKGROUND**

- 1.1 ARP Geotechnical Ltd (ARP) has been commissioned by Pamela Dews (the Client) to prepare a specification for the stabilisation of mine workings, by drilling and grouting, for a proposed residential dwelling with private garden.
- 1.2 A Coal Mining Risk Assessment by ARP (September 2023) identified three seams to be potentially present within 30m depth beneath the site. Two of these (Blocking Rider and Blocking Coal) were shown to be 0.2m and 0.6m thick and too deep to affect the site, whilst the shallower Middleton 11 Yard Coal was thicker (up to 1.1m thick) and at an estimated depth of only 4m, so could potentially affect the site.
- 1.3 To investigate potential coal and workings that could adversely affect stability of the proposed development, a rotary borehole investigation was, therefore, undertaken by ARP between the 28<sup>th</sup> November and 3<sup>rd</sup> December 2024 and reported in letter PWS/01/L17/WW, dated 13<sup>th</sup> December 2024. The investigation comprised the formation of three rotary boreholes (BH1, BH2 and BH3) to depths of between 12m and 28m, at the locations shown on the attached plan.
- 1.4 The rotary boreholes revealed mudstone rockhead to be present at depths of between 1.0m (BH1 and BH2) and 2.0m (BH3). Previous trial pits undertaken by ARP in close proximity to BH1 and BH2, encountered bedrock at 1.5m and 1.7m respectively and, therefore, these trial pit depths were used as the depth to bedrock for these locations, as they represent rock head depth more accurately.
- 1.5 Broken ground, believed to be at the level of the Middleton 11 Yard Coal, was encountered in BH1 and BH2, at depths of 5.5m to 6.0m and 5.8m to 6.7m respectively. Soft ground was encountered between 6.0m and 6.5m depth in BH3, again believed to be at the level of the Middleton 11 Yard Coal. BH1 and BH2 lost flush from the level of the broken ground. Strata below the workings were recorded as hard strata to the base of each borehole at 12.0m depth. BH3 retained flush through the soft ground and was drilled to a depth of 28m from the surface.
- 1.6 A small band of intact coal, 0.1m thick and considered likely to be the Blocking Coal was recorded at 22.5m. Mudstone was recorded throughout the remainder of the borehole. The thinner Blocking Rider Coal, expected to be above the Blocking Coal, was not found.

1.7 In the light of the above, coal mine workings identified from the rotary investigation do not have sufficient rock cover, across the whole site, and stabilisation treatment by injection of grout into a grid of boreholes (known as drilling and grouting) is required for proposed development. A 3m grid is recommended, continuing 3m beyond the proposed building footprint.

1.8 A proposed drilling and grouting plan for the site is attached.

## **2.0 GENERAL**

### CDM and Health and Safety

2.1 The Contract shall be undertaken in accordance with the Construction Design and Management (CDM) Regulations 2015. Risk assessments and method statements shall be provided by the Contractor for inclusion in the Health and Safety file.

2.2 The works will need to be undertaken in accordance with the terms of the pending Mine Remediation Authority Permit to Treat. To comply with the permit, water flush will be required on the site. Demolition and Geotechnical will be responsible for carrying out, and recording, continuous borehole/on-rig gas monitoring in accordance with the Permit. Boreholes/grout holes should be sealed/grouted appropriately, as soon as practically possible.

### Environmental Management

2.3 Site specific measures should include a risk assessment of pollution prevention controls required. Where possible, drill flush returns should be collected, to prevent air and watercourse pollution, or impact on any adjacent sites. Water flush systems should, ideally, recycle cleaned flush returns water into the drilling or (grout mixing process).

### Services

2.4 Plans of all known services will be provided to the Contractor by the Client, but it will be a requirement to provide an appropriate services detector on site for areas to be checked prior to drilling and grouting.

2.5 The Contractor shall indemnify the Client against all claims in respect of any damage to services.

### Drainage

2.6 The Contractor shall take all steps to ensure that grout or drilling water does not enter any adopted or private sewers or watercourses and appropriate plans will be provided prior to commencement of the works. The Contractor shall indemnify the Client against all claims in respect of any damage/pollution to drainage systems or watercourses.

### Noise and Dust

2.7 The Contractor shall take all reasonable steps to ensure that noise emissions are kept within acceptable levels and control dust arising from the works.

### Protection of Adjacent Property

- 2.8 The works shall be carried out in a competent manner to ensure minimum disruption and no damage to any adjacent buildings, boundary fences or other property.

### Contract - Basis of Works

- 2.9 ARP is not party to the tendering process. However, the basis of the works shall be to drill and grout the required treatment area on a 3m grid. The Contractor will drill and grout the boreholes at the locations indicated on Drawing No. PWS/01/SI.01 Rev A (dated April 2026) or any subsequently agreed revisions. Perimeter holes may be spaced 3m generally but, if necessary, may be reduced to 1.5m centres to prevent grout flowing beyond the treatment area. The infill holes will be at 3m centres.
- 2.10 Validation boreholes will be required, in accordance with Section 5.0. If the tenderer is providing a fixed price, these shall be inclusive within the fixed price. Any additional drilling required as a result of failure of the proof holes shall also be included within the fixed price.

### Setting Out

- 2.11 The Client shall be responsible for setting out of corners of the buildings, or of suitable key positions to establish the grid.
- 2.12 The Contractor shall be responsible for setting out of the boreholes. The Contractor shall obtain sufficient setting out stations from the Client, to enable the grid of boreholes to be determined to within a horizontal accuracy of 0.3m. The borehole locations are indicated on the drawing, and it will be necessary to use the borehole numbering system shown on the grid.

## **3.0 DRILLING**

- 3.1 If any unexpected mine entries or surface-reaching void migrations are encountered which have not been identified and advised to the Contractor prior to mobilisation, these shall be treated based on a Schedule of Rates to be provided by the Contractor.
- 3.2 Holes shall be drilled by rotary or rotary percussion techniques using water flush.
- 3.3 A 3m x 3m grid will be set out across the areas of the site judged to be requiring treatment (shown on drawing number PWS/01/SI.01 Rev A), and the seam will be treated by injection of grout. The drilling pattern shown shall be followed. If necessary to prevent grout flowing beyond the treatment area, holes around the perimeter of any grout area shall be reduced from a 3m spacing to 1.5m spacing. Each borehole shall have an individual borehole reference number defined by the grid shown on the drawing, so that any borehole can be clearly distinguished from any other borehole.
- 3.4 Validation boreholes will be required, in accordance with Section 5.0, and testing should be inclusive within any fixed price. Any additional drilling required as a result of failure of the proof holes will also be included within any fixed price.
- 3.5 A systematic and accurate record shall be made of all the boreholes. Driller's logs shall be prepared and copied for the Engineer on a daily basis.
- 3.6 Holes shall be drilled vertically unless otherwise agreed.

- 3.7 Holes shall be a minimum 50mm diameter, to a depth of 1m below any workings or coal seam. Where it is impractical to drill at the minimum diameter for the full depth, or for operational reasons such as hole blockage concerns, the diameter of the hole shall be increased, as appropriate. Holes drilled for a perimeter curtain wall shall be a minimum 75mm diameter.
- 3.8 The boreholes should be provided with temporary casing, if ground conditions or flush loss require it, which if used, will have been completely removed from the borehole on completion of the grouting.
- 3.9 The Contractor shall provide an as-built plan referencing positions of all boreholes drilled on the site to the agreed layout.

#### **4.0 GROUTING**

- 4.1 Immediately prior to grouting any borehole, the Contractor shall check that the borehole is open and unobstructed throughout its depth.
- 4.2 Grouting works shall be carried out with grout introduced under pressure in all but perimeter holes and solid coal holes, to ensure that workings will fully receive grout to all interstices. The gauge reading pressure shall not exceed 20kN/m<sup>2</sup> (3 PSI or 0.2 bar) to avoid ground heave. Where significant water is present within any borehole at the time of grout injection, the grout shall be introduced from the base of the hole using a tremie pipe.
- 4.3 In any infill borehole, if grout has not emerged at the surface after approximately 15 tonnes has been injected, the grout hole shall be left for between 12 and 24 hours before being retreated with reduced quantities of grout. This process shall be repeated until the grout is confirmed to be at the surface and holding the required pressure.
- 4.4 Grout shall be mixed to a ratio of 1: 10 cement: pulverised fuel ash (PFA).
- 4.5 Cement shall be Ordinary Portland Cement (OPC) complying with BS EN 197-1 or sulphate resisting Portland Cement complying with BS 407.
- 4.6 PFA shall be conditioned hopper ash, or dry powder ash of a type suitable as a constituent for grout, shall be obtained from an approved supplier and shall conform to the requirements of BS 3892.
- 4.7 Sands shall comply with BS EN 12620 and be of a grading suitable for use within the works.
- 4.8 Where it is considered that grout may be being lost beyond the treatment area, consideration shall be given to drilling intermediate holes to form a perimeter and introducing pea gravel. Pea gravel may also be introduced to infill holes where voids in excess of 1.5m high are encountered. Holes into which pea gravel are introduced must be at least 75mm in diameter.
- 4.9 Pea gravel shall comply with BS EN 12620 and be of a grading which would be satisfactory for use in the works.
- 4.10 Cement shall be stored in a dry location and the sequence of deliveries recorded so that the cement can be used in rotation. Different brands of cement shall not be mixed together. PFA shall be kept covered and slightly damp to minimise nuisance of dust, but without affecting its performance.
- 4.11 Grouting logs shall be prepared and copied for the Engineer on a daily basis.

- 4.12 Tickets or records of all materials delivered to site shall be copied for the Engineer for validation purposes.

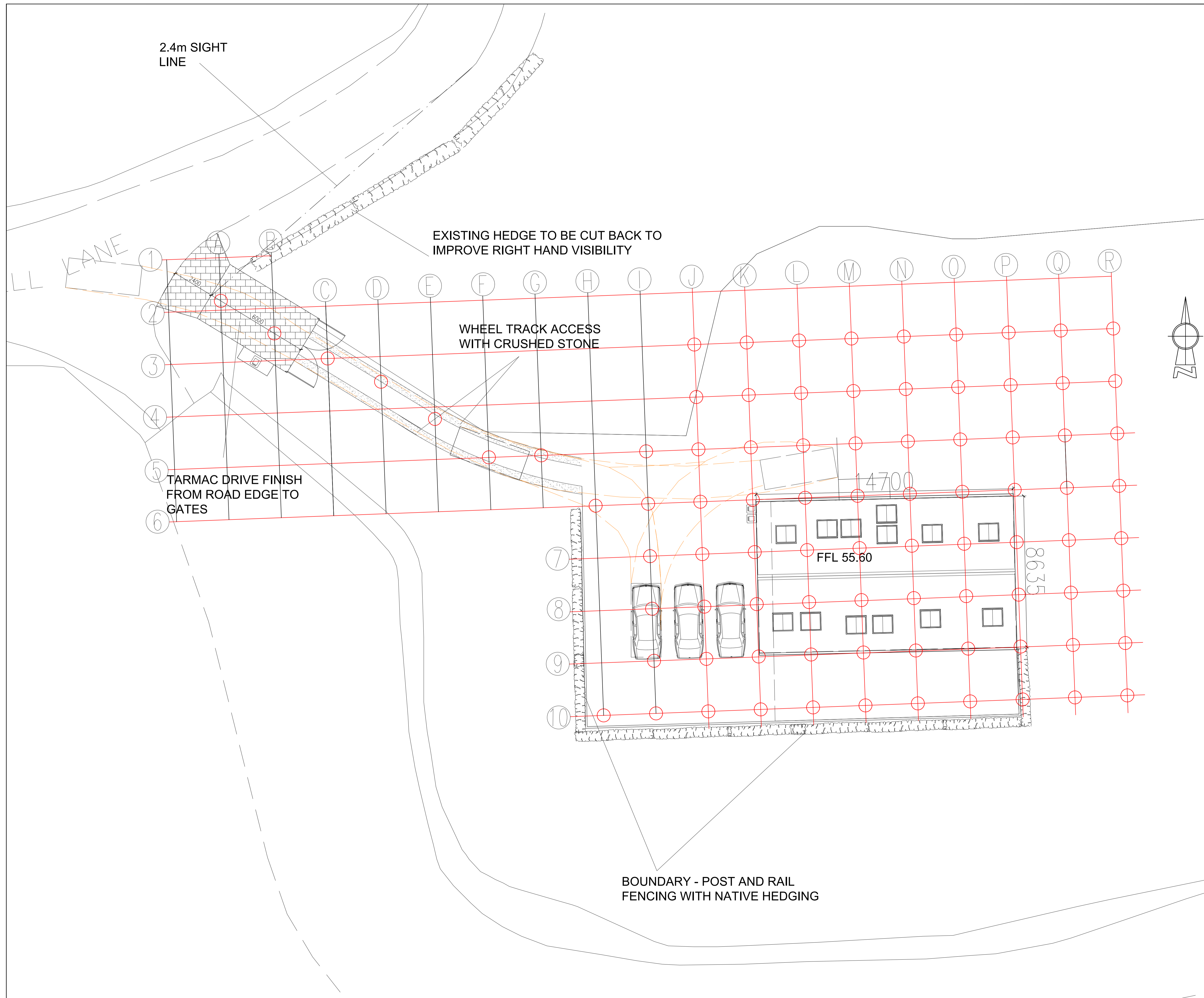
## **5.0 GROUT PROPERTIES AND TESTING**

- 5.1 The Contractor shall check the flowability of the grout on site at regular intervals during the grouting works by means of a "Colcrete" type flow meter, and readings between 300mm and 600mm shall be obtained. If required, the mix shall be adjusted immediately, and the test repeated. All tests must be recorded on the grouting logs.
- 5.2 The bleed capacity of the grout shall also be checked each morning of grouting using a graduated beaker. Once in the beaker, the grout shall be covered to avoid evaporation, and bleed capacity measured at hourly intervals for six hours. Bleed capacity results shall be maintained below 5%. All tests must be recorded on the grouting logs.
- 5.3 A set of six grout cubes shall be taken at random times (of the Engineer's choosing) once each week during the grouting works and tested by a UKAS accredited laboratory to confirm the 14- and 28-day strengths of the grout. The strength shall be at least 1.0MN/m<sup>2</sup> after 28 days. Any individual cube set shall be tested at both 14 and 28 days.
- 5.4 On completion of the works, validation holes shall be drilled at locations selected by the Engineer, to prove that the grout has filled interstices within the specified grid, to ensure that the works have been implemented to a satisfactory standard, and that stabilisation of the voided or broken ground has been achieved. Therefore, the Contractor shall allow for a total of four validation boreholes.
- 5.5 The validation holes shall consist of drilling to below the level of the workings, recording the integrity of the ground through the borehole during drilling, and then grouting at a pressure appropriate to the depth, using a packer. The pressure shall be maintained for a period of not less than three minutes. The grout takes, pressure, and borehole logs, shall be recorded in conjunction with the Engineer. Where the Engineer considers that grout take is excessive, the pressure has not held, or there is evidence of untreated workings, then further holes shall be drilled and grouted in the surrounding area, as necessary.

1. The proposed layout as base is Fox Architecture and Design drawing number 2317/110
2. If proposed layout is updated then this then this will require updating to reflect the changes
3. The Grout Treatment is subject to regulatory approval
4. Do not scale of this drawing.

**K E Y**

○ Borehole (Total No. of boreholes = 69)



A	JW	13.04.26	Issued for Approval	OG	OG
Rev	By	Date	Revision	Chk	Apvd.

**ARP** ARP ASSOCIATES  
Chartered Consulting Engineers

Northwest House • 5 & 6 Northwest Business Park • Servia Hill, Leeds • LS6 2QH  
0113 245 6498 (or 0113 244 3864) • leeds@arpassociates.co.uk • www.arpassociates.co.uk

ARP Associates is a trading division of ARP Geotechnical Ltd, a company registered in England and Wales with company number 3773833, whose registered office is at 5/6 Northwest Business Park, Servia Hill, Leeds LS6 2QH

TITLE  
**PROPOSED DRILLING & GROUTING BOREHOLE PLAN**

PROJECT  
**JILL LANE MIREFIELD**

CLIENT  
**PAM DEWS**

DRAWING STATUS  
**FOR APPROVAL**

Scale	Date	Drawn	JW
1:100 @ A1	APR 26	Chk.	OG

Org. No.	Rev
PWS/01/S1.01	A