GroundSolve Ltd
Consulting Geotechnical Engineers

Holly Hall, Jackson Lane, Dewsbury
Grouting Scheme

Job No. GSL3071

Date: 28/06/2024

Prepared for: Mr A Edwards

DOCUMENT CONTROL

Client:	**Mr A Edwards**
Report No. :	**3119R01-1**
Project:	**Holly Hall, Jackson Lane, Dewsbury**
Report Title:	**Grouting Scheme**
Report Status:	**FINAL**
Version No.:	**1**
Project Engineer:	**J Thorburn**
Date of Issue:	**28/06/2024**

This report has been prepared by GroundSolve Ltd with all reasonable care and diligence, within the best practice and guidance current at the time of issue within the proposed redline boundary and proposed Site end use as presented by the Client.

This report is confidential to the Client and GroundSolve Ltd accepts no responsibility whatsoever to third parties to whom this report is presented.

Version No.	Description	Date of Issue	Author	Reviewed & approved by
1	Final	28/06/2024	J Thorburn	Stefan D Imiolczyk
			BSc, FGS	BSc (Hons) MSc FGS CEng MICE

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1.0 INTRODUCTION

GroundSolve Ltd (GSL) was commissioned by Pennine Geotechnical Services Ltd ("the Client") to undertake a Grouting scheme for a proposed development at Holly Hall, Jackson Lane, Dewbury (the "Site"). The proposed development is for a new residential development.

A Phase 2 Intrusive Report was carried out by Geo Investigate Ltd for the proposed development. The conclusions of the investigations were that there is a potential for mining related instability and remedial measures are required.

This report therefore contains a grouting scheme, for the specified area, to treat and stabilise the site in order to allow its safe development.

2.0 THE SITE

2.1 Site Location and Description

The study site is located in Holly Hall, Jackson's Lane, Thornhill, Dewsbury WF12 0LS. The approx national grid reference for the centre of the site is 423290, 418472**.**

The new development is relatively small, covering an approx area of 460m2.

The Proposed Development is shown in **Figure 1**.

2.2 Geology

GSL reviewed BGS online mapping and 1:50,000 Sheet Mapping (Sheet 20, 1992) and 1:10,000 NZ15SW.

Superficial deposits are mapped to be absent from site with bedrock comprises the Emley Rock (Sandstone) from the Carboniferous Pennine Lower Coal Measures. The geological mapping show that the Flockton Thin (FN) and the 1st Brown Metal (1BM) coal seams are present within shallow depth beneath the site

2.3 Intrusive Works

An intrusive investigation was undertaken by Geo Investigate Ltd. This comprised 2no. Rotary Openhole boreholes to 30.0mbgl.

Based on the conditions encountered in the rotary boreholes, mine-workings are present at a shallow depth of 14.00m bgl, with some evidence of possible upward void migration. There was no evidence that there are further workings below this seam proven to 30m.

RH1 confirmed a seam thickness (including collapsed workings) of around 0.50m. Based on the previous Geoinvestigate Limited CMRA (G22280), this seam is likely to be the Flockton Thin coal seam. The worked coal seam, including possible upward void migration, is at a depth and thickness which would result in settlement at surface. Based on the above it was considered that the risk to the development from mine workings was medium/high and that the ground required stabilisation.

3.0 PROPOSED REMEDIATION

In line with CIRIA C758D the site will need to be grouted to mitigate the risk posed by the shallow workings.

The approach will comprise probe drilling and grouting on a grid pattern beneath the footprint and curtilages of the proposed structure, and the curtilages of the current building. Consequently it is proposed that drilling and grouting will be undertaken over the new residential house footprint on a 3m grid to a minimum depth of **16.00mbgl** or at **least 1m below base of workings / broken ground**, whichever is the deeper.

It should also be noted that there is an existing detached garage building. It is understood that this has not been stabilised. It is proposed that the garage building is also grouted by using a series of vertical and inclined boreholes to achieve the maximum treatment. The grouting will be carried out on 1.5m grid.

The proposed grouting location plan is shown in **Figure 2**, this is indicative and should be altered to allow a safe working distance from the building dependant on the size of the rig.

A suitably qualified and competent drilling contractor (the Contractor) shall be appointed to undertake the works.

The estimated number of grout holes, shown in **Figure 2**, is 15no. holes for the main house and 12no. holes for the existing garage.

It should be noted that the above quantities are based on area extents and proposed primary hole spacings. Adjustments to grid spacings or requirements for secondary holes have not been considered. Further grouting may be required dependant on the ground conditions encountered and the grout uptake of the workings encountered. If any of the boreholes accept more than 5 tonnes (T) of grout then extra adjacent boreholes may need to be drilled.

Minor adjustments to borehole locations may be made to avoid surface obstructions. The development layout is presented on **Figure 1** and the Proposed Grouting Plan is shown in **Figure 2**.

4.0 TECHNICAL SPECIFICATION

4.1 General Requirements

The Contractor is to satisfy themselves that the risk to themselves from buried services and overhead cables has been mitigated. Up to date service plans must be used alongside Cable Avoidance Tools and a suitably robust risk assessment.

The proposed extent of grout works is provided in **Figure 2**. This should be reviewed by the Contractor and any alterations must be agreed with the Engineer a minimum of two weeks prior to commencement of the works.

Although not recorded within published information, there is potential for unrecorded mine shafts or workings to be present as with any site within coal mining areas. Should these, or any unusual ground conditions be encountered the Engineer should be notified immediately.

The Contractor shall work in accordance with all current Coal Authority Guidance and CIRIA C758D.

The Contractor shall provide a set of Risk Assessments and Method Statements for the work to be undertaken and this shall be made available for approval by the Engineer and the Coal Authority.

It shall be the Contractor's responsibility to liaise with the Coal Authority and other relevant environmental organisations to secure permits for the works prior to the commencement of said works. The Client and Engineer shall be provided with a copy of this licence. The Contractor shall undertake the Works in accordance with the requirements of the licence.

4.2 Drilling

All boreholes to be used for the injection of grout shall be drilled by rotary or rotary percussive techniques, with water flush to help prevent combustion of seams and gas monitoring during the works.

As broken ground was encountered, a minimum diameter of 70mm shall be used, which will allow for casing reductions if necessary. If it is impracticable to drill at the minimum diameter for the full depth the diameter of the holes shall be increased in the upper length to allow for this.

Each borehole shall be suitably logged, these records should comprise a factual description of the ground conditions encountered (e.g. material, fracture state, voids, groundwater etc.). Should unusual ground conditions be encountered, such as large differences from strata encountered by the previous investigation, the contractor must inform the client and their engineers.

The boreholes shall be cased using steel, screw fit, casing within the superficial deposits and sealed at an appropriate depth into rockhead to prevent grout loss into the superficial deposits during the injection works. Due to identified broken ground within the bedrock, deeper casing may be required.

If an adequate seal is not provided between the casing and the superficial deposits, then it may be necessary to grout the annulus between the casing and the surrounding soils.

All boreholes shall be kept open to their full depth to ensure the injection of grout into the mine workings and any voids, breaks or fissures in the overlying rock strata along their full length. Collapsed or obstructed holes will need to be re-drilled and suitably cased.

Casing shall not be withdrawn until the Grouting Works are complete in any given borehole.

Arisings must be removed from site and suitably disposed of. The Contractor shall allow for testing such spoil for human health and waste acceptance criteria. Allowance should be made for the disposal of contaminated spoil off site and no contaminated arisings shall remain on the site surface upon completion of the works.

Mine gas monitoring shall be undertaken during the duration of the drilling works. Due to the potential risk from flammable gasses smoking should not be allowed onsite, nor the use of naked flames.

Due to the proximity of existing properties to the site, monitoring may be required within adjacent buildings. This risk should be addressed by the Contractors Risk Assessment and Method Statement.

4.3 Grouting

The grout material does not need to be high strength and will only require a crushing strength of 1.00MN/m^2 at 28 days.

The moisture content must be properly controlled in order to prevent 'settling out' issues.

The proposed grout will consist of bentonite cement (5:1 ratio).

Cement shall comprise of Portland cement, complying with BS EN 197-1:2011 and PFA complying with BS EN 12715:2020 and obtained from an approved supplier.

Grout should be injected into the base of the borehole and shall proceed upwards to the superficial deposits. Adding significant amounts of grout to the superficial deposits should be avoided.

A pressure of 10kN/m^2 per meter of overburden shall be used.

Care needs to be taken to ensure that the pressure obtained is current and not the result of a line blockage.

If grout has not appeared at the point of injection after the introduction of 5T of grout, sand may be added to the mix. If the pressure limit is not reached after excessive injection of grout (around 15T), the pipe should be lifted and the borehole left for 24 hours to allow the mix to set before returning and retreating. If the problem persists an increased density of grouting holes may need to be drilled.

The volumes of grout used should be recorded by drillers.

4.4 Testing and Validation

Test cubes shall be taken from the proposed mixes, cured in water and compression tested with due recourse to BS 1881, BS EN 12350 and BS EN 12390. The testing shall be carried out in a UKAS accredited laboratory. Results of these tests shall be provided to the engineer for verification before the commencement of the grouting works.

The flow properties of each batch of mixed grout must be tested prior to use and additional random tests may be required to ensure compliance.

During the site works the following testing must be undertaken.

Each day onsite, the Contractor shall take two sets of 100mm grout cubes. The cubes shall be sent to a UKAS accredited laboratory within 36 hours of casting. The cubes are to be cured and crushed, with two crushed after 7 days and the remaining four crushed at 28 days.

The cubes shall be marked, transported and stored in line with BS 1881. It may be prudent to take extra samples as spares.

If, on consideration of the results, the Contractor or Engineer decide it is necessary to change the grouting mix composition all parties must be informed and further testing undertaken.

4.5 Validation

On completion of the drilling and grouting work, all information including locations, borehole logs, grout volumes and testing should be collated by the engineer and a validation report produced.

This validation report can then be provided to the Coal Authority to satisfy them that the work has been undertaken to a suitable standard and that the risk from mining has been suitably mitigated.

FIGURES

GABIONS
GABIONS
161.011
BRICK RETAINING WALL
Official site boundary
Neighbours site boundary
154.30 (Proposed Garage FFL)
154.75 (Proposed Dwelling FFL)
ROOF 160.80
159.22 ROOF
ROOF 158.99
RL 161.40
EL 160.02
ON GABIONS 158.99
ON GABIONS 157.80
FLAGS
STEPS
TARMAC
SETTS
UNSURFACED
BUSHES
STONE WALL HT 1.2
STONE RETAINING WALL
ROUGHGRASS
OVERHEAD CABLE
OVERGROWN
STONE WALL
STEPS UP --->
STONE RET WALL
OVERGROWN
HAWTHORN HEDGE
ST01 154.469
ST02A 152.795
EXISTING SITE LAYOUT Scale 1:100

STATUS BUILDING_REGULATIONS

SCALE	DRAWN	APPROVED	DATE
1:50@A1	RPD	RPD	JAN'23

JOB No.	DWG No.	REVISION
RD0300	340	C

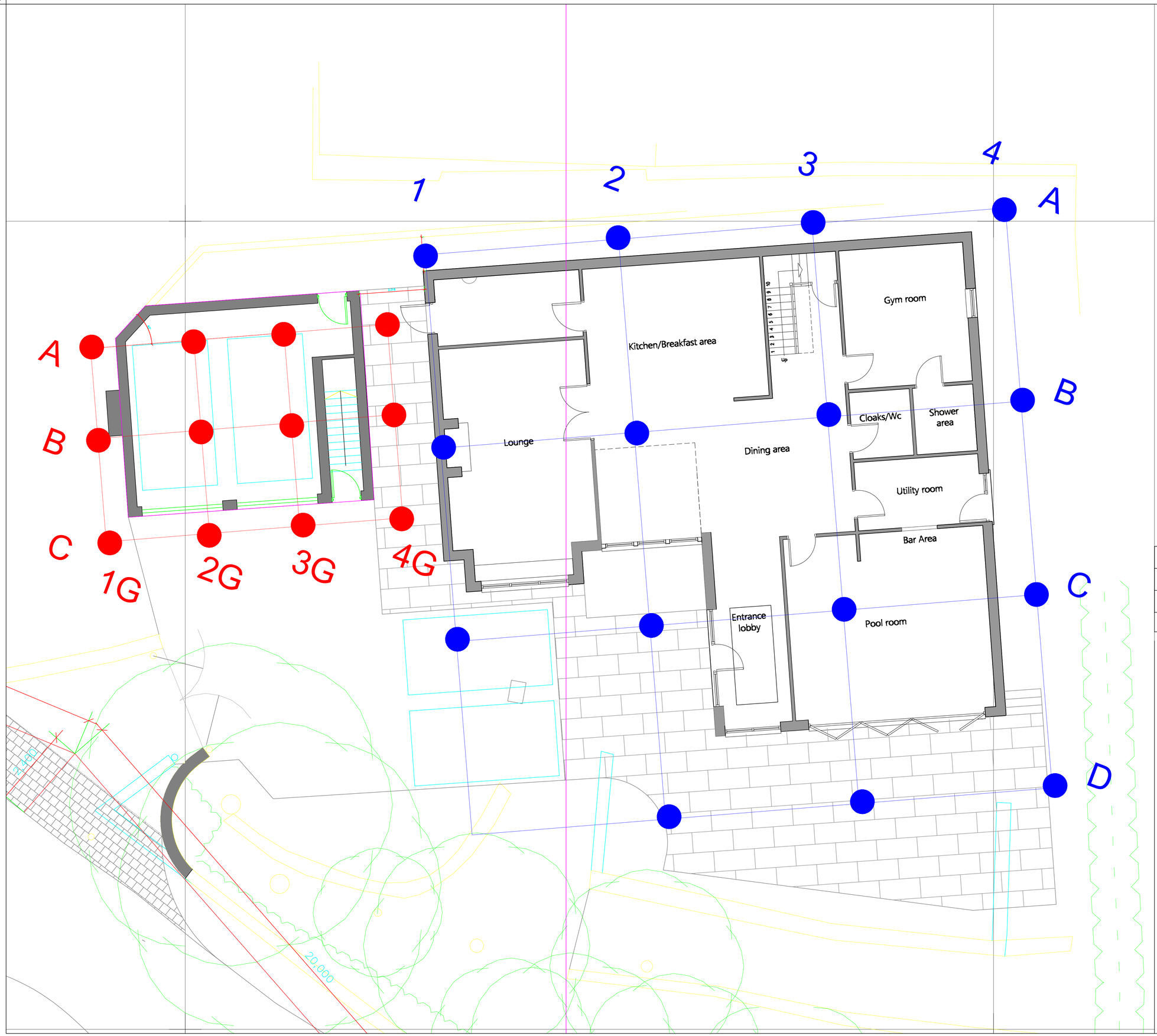
PROJECT
HOLLY_HALL
JACKSON_LANE
DEWSBURY
WF12_0

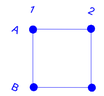
Client
MR_A_EDWARDS

RD Architecture + Design
Studio Address: Suite 3a, Milner House, Milner Way, Ossett, Wakefield, WF5 9JE
Email: robdawtrey@gmail.com
Website: www.rdarchitectureanddesign.com
Tel: 07834547300

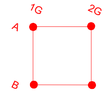
TITLE
SITE_SETTING_OUT

A3





Grouting Grid for new house - 3m centres



Grouting Grid for garage (already constructed)
Note central holes will be drilled by inclined drilling - 1.5m centres

A		
Revision	Description	Date

GroundSolve Ltd
Consulting Geotechnical Engineers

Unit 1, Charter Court
Well House Barns
Chester Road Bretton
Flintshire CH4 0DH

Tel: 01244 661361
Fax: 01244 661289

Job Title

Holly Hall, Jackson Lane, Dewsbury

Drawing Title

Grouting Scheme Plan

Drawing Scale	Drawn By	Approved By
Do not scale	JT	SI

Drawing Status	Date of Issue
Draft	06/2024

Drawing No	Revision
3119-1-001	