



**Report on a Trial Drill & Grout to Establish the Shallow Mining  
Situation Beneath a Proposed Housing Development  
on Land at Gannow Lane, Burnley, BB12 6JG  
For David Lloyd Partnership**

**April 2017**

**Report F711/GI(100)/ABM/RE**

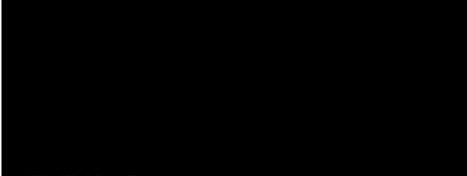
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**Report on a Trial Drill & Grout Investigation  
to Establish the Shallow Mining Situation  
Beneath a Proposed Housing Development  
on Land at Gannow Lane, Burnley, BB12 6JG**

This report was prepared in accordance with Forkers Limited Quality Management procedures.

Report prepared by:	Signature:	
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	Position:	Snr Geotechnical Engineer

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Report approved by:	Signature:	
	Name:	T P Forker
	Position:	Contracts Manager

For the Attention of Mr R Pollard  
David Lloyd Partnership  
Unit 2  
Settend Road West  
Shadsworth  
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**1. INTRODUCTION**

- 1.1. This report presents and discusses the findings of a trial drill and grout investigation undertaken to assess the implications of past shallow mining beneath a proposed residential development to be constructed on land at Gannow Lane, Burnley, Lancashire, BB12 6JG.
- 1.2. The site location is depicted on the accompanying Figure 1. The Ordnance Survey grid reference for the approximate centre of the development area is 381740 732670.
- 1.3. The site work was instructed by Acies Group on behalf of David Lloyd Partnership, the site developer.
- 1.4. Whilst confident in the findings of our report we are unable to give assurance they will be accepted by other authorities without question. We therefore advise that where appropriate our report and associated matters are submitted to approving bodies and approval obtained or sought before detailed design, site-works or other irrevocable action is embarked upon.
- 1.5. This report and related documents have been prepared for the sole use of the specified client in response to an agreed brief, for a stated purpose and at a particular time and its application must be made accordingly. No duty of care extends to any other party which may make use of the information contained herein.
- 1.6. It should be noted that soil and rock conditions are highly variable and may differ between sampling points and this may affect interpolation. Additional features may exist buried at depth and undetected by investigation. Other information may become available on the conditions of the site not available at the date of this report and thus site assessment may be subject to amendment in the light of such additional information becoming available.
- 1.7. This report is prepared and written in the context of the purpose stated above and should not be used in a differing context. Furthermore, new information, improved practices and legislation may necessitate an alteration to the report in the whole or in part after its submission.

**2. PRELIMINARY INFORMATION**

2.1. The geological map of the locality, published by the British Geological Survey, shows the proposed development area to be underlain by the following deposits.

- Glacial Till
- Pennine Lower Coal Measure deposits

The Pennine Lower Coal Measure (PLCM) deposits are described as interbedded grey mudstone, siltstone and pale grey sandstone, commonly with mudstones containing marine fossils in the lower part, and more numerous and thicker coal seams in the upper part.

A coal seam is inferred to sub-crop to the south of the site, dipping northwards at shallow angle beneath the site. This is indicated to be the Low Bottom Mine. According to the recognised geological sequence, the Inferior Cannel Coal (aka Fulfilled Thin Mine) should lie approximately 15-20m below the Low Bottom Mine.

A fault is recorded to be present along the eastern boundary of the site, orientated ~NNW-SSE, which locally displaces the strata downwards on the ENE side. A second NNW-SSE trending fault is located to the west of the site

2.2. Gannow Lane Colliery was formerly located only ≈30m southeast of the site (depth of shaft – 174.32m).

2.3. The following report, produced by LK Consult Ltd, was made available.

Unit 15, Gannow Lane, Burnley - Geo-environmental Investigation and Risk Assessment; report ref: LKC 15 1232, dated 5<sup>th</sup> February 2016.

2.4. As part of their report, LKC contracted The Land Consultancy (TLC), a specialist coal mining consultant to design and report upon an intrusive investigation of the potential shallow coal workings.

Following completion of the site investigation (five rotary boreholes to 40m depth), TLC concluded the following:

*A coal seam (0.4 to 1.2m thick) was encountered within three of the rotary holes formed in the south of the site (BH01- BH03) at depths of between 22.7m and 32.4m. This seam is considered to be the Low Bottom Mine identified on published geological mapping. Using the borehole data, this seam has been calculated to dip down to the northwest at 14°.*

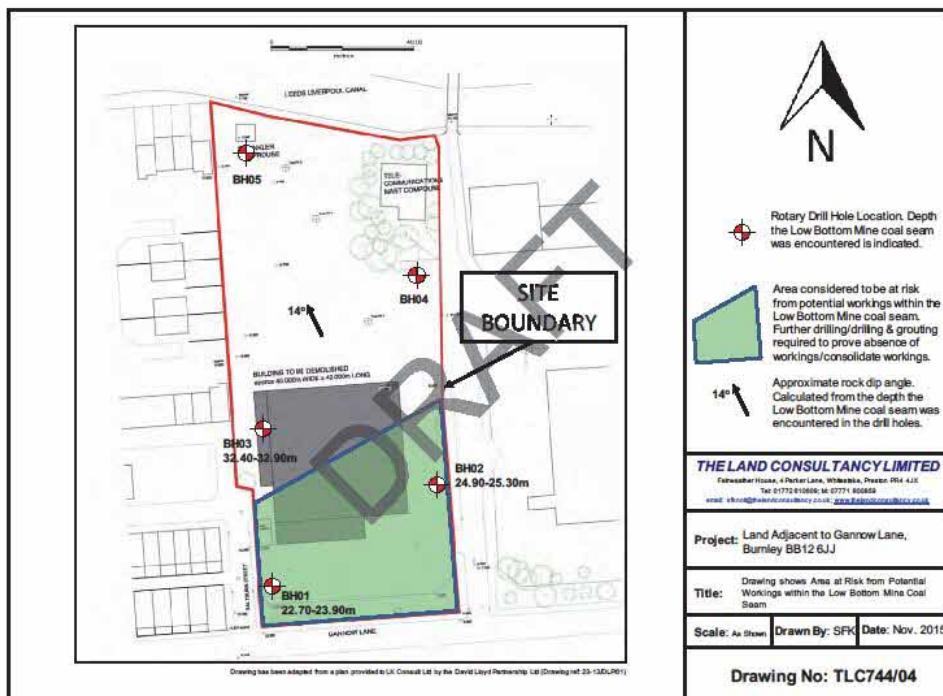
*No evidence of shallow coal workings was recorded within any of the drill holes formed. However, absence of evidence of workings within the Low Bottom Mine coal seam cannot be taken as proof for the absence of workings within this seam; BH01-BH03 may have intersected coal pillars left in place to support the roof of any coal workings.*

*There is insufficient thickness of rock and drift cover over the Low Bottom Mine coal seam in the south eastern third of the site to safeguard the proposed dwellings in*

*this area from the effects of future ground subsidence related to potential historical coal workings within this seam.*

*A further phase of drilling and/or proof drilling and grouting works is recommended in the south eastern third of the site to check for the possibility of workings in this area and/or consolidate workings if necessary in this area. The north western two thirds of the site are considered to be at very low risk of being affected by shallow workings and no further action is necessary here.*

- 2.5. The extent of the area considered to require a further phase of drilling and/or proof drilling and grouting works is shown on the TLC drawing provided below:



**3. SITE WORKS**

3.1. The scope of the works comprised the following:

Mineworkings Investigation & Treatment Works

- Obtain Coal Authority Permissions for the “works area” indicated by The Land Consultancy.
- Drill twenty-two rotary boreholes on a 12m wide grid across the building footprints within Phases 1 and 2 of the proposed development to depths of approximately 28.00m to determine the mining situation within the Low Bottom Mine coal.
- Injection of a cement grout into the boreholes.

3.2. The works were undertaken in accordance with “Permission to Enter or Disturb Coal Authority Mining Interests” Permit number 13118, dated 17/10/16. A copy of the permit is provided in Appendix A.

3.3. The twenty-two investigative rotary percussive water flush boreholes were drilled by Forkers Ltd between 25<sup>th</sup> and 27<sup>th</sup> October 2016. A summary of the boreholes, based on the driller’s visual interpretation of the flush returns and the rates of penetration, are provided in Appendix B. The borehole locations are depicted on Figure 2. Due to access restrictions Row A boreholes were incline drilled from the reciprocal borehole on Row E.

3.4. The drilling method provides information on distinctive changes in nature of the flush returns, coal, for example, can be readily identified by the change in colour in the flush. A rapid change in the penetration rates and a loss of flush can similarly be identified as indicative of the presence of voids or weak ground associated with past mining. The time for flush returns to reach the surface and visual assessment of the flush returns as drilling fragments, does not, however, enable the same accuracy of logging to be achieved as with other investigatory techniques (such as rotary coring). The depths and descriptions provided by the drilling logs should, therefore, be interpreted as approximate and should not be used to interpret the engineering properties of the ground. All the recorded depths relate to ground level at the time of drilling.

3.5. The twenty-two boreholes confirmed a similar sequence to the published geological information and previous boreholes drilled at the site by TLC.

3.6. All encountered artificial ground (fill) overlying glacial superficial deposits to depths of between 12.00 m and 17.50 m.

3.7. Coal Measures strata were encountered beneath the superficial deposits. These comprised of interbedded grey mudstone and sandstone with one intact seam of coal, interpreted to be the Low Bottom Mine coal.

3.8. The pavement level of the Low Bottom Mine coal was encountered in the boreholes at depths between 21.65 m and 27.50 m, dipping to the north by approximately 6-7°.

- 3.9. The seam was recorded as a 0.45-0.50 m thick solid seam (locally 1.00m thick due to partings of black mudstone within the coal).
- 3.10. The two northernmost boreholes, Y25 and Y29, did not encounter any coal due to the dip of the strata taking the seam deeper than the base of the boreholes (28.00m).
- 3.11. Continuous gas detection was undertaken using alarm set monitors fitted to the drilling rigs to establish whether any elevated levels of methane, carbon monoxide, carbon dioxide or hydrogen sulphide were being exhaled from the boreholes. No elevated gas readings were recorded.
- 3.12. On completion of drilling, each borehole was backfilled with cement grout.



**4. DISCUSSION & CONCLUSIONS**

- 4.1. It is inferred the coal encountered in the boreholes, at depths between 21.65 m and 27.50 m, is the Low Bottom Mine coal as depicted on the published geological map as likely to be present at shallow depth.
- 4.2. There were no rapid changes of penetration or losses of the drilling flush to indicate the presence of the past working of coal or any other mineral horizon in any of the twenty-two boreholes.

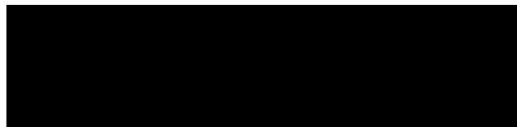
Furthermore, the risk that all twenty-two boreholes may have intersected coal pillars left in place to support the roof of any coal workings is considered to be negligible.

Therefore, as no evidence of past shallow mine workings within the Low Bottom Mine coal was encountered, no further drilling or treatment works are required within Phases 1 and 2 of the development.

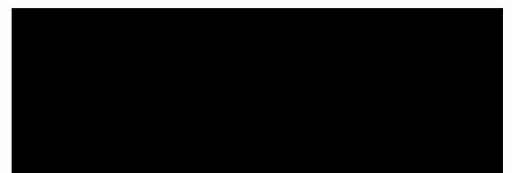
- 4.3. The dip of the strata based on our proof drilling and grouting works is estimated to be between 6-7° to the north across the Phase 1 and 2 areas which is less than the 14° dip indicated by TLC for the whole site. This may be due to downward displacement of the strata to the north of Phases 1 and 2 by the NNW-SSE trending fault that is recorded along the eastern margin of the site.

However, there is no evidence to imply this is likely to have any influence on site stability as a consequence of mining or tectonic influences and no precautions are deemed necessary in development of the site as a consequence of its existence.

- 4.4. There is always a risk where coal seams are present that unrecorded excavations and pits could have been sunk into the coal from surface. Excavations should be inspected for signs, such as circular brickwork, timber or sudden changes in near surface materials, which might indicate the presence of an unrecorded mineshaft. If any such features are encountered, either filled or open, then technical advice should be sought on their implications.



A B Mellor (BEng, FGS, CGeol)  
Senior Geotechnical Engineer



T P Forker  
Contracts Manager

Forkers Ltd

GANNOW LANE, BURNLEY, BB12 6JG

COMPLETION REPORT – TRIAL DRILL & GROUT

07/04/17

## FIGURES

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COMPLETION REPORT – TRIAL DRILL & GROUT

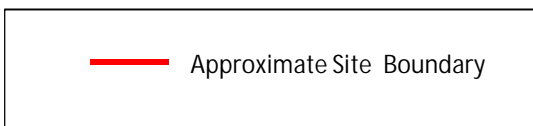
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**Figure 1      Site Location Plan**



<https://osmaps.ordnancesurvey.co.uk/osm-aps/53.7897819239,-2.2797444569,17>

1/1



<b>Forkers Ltd</b> Civil & Ground Engineering Contractors				
Site: Gannow Lane, Burnley				
Title: Site Location Plan				
Scale NTS	Drawn ABM	Checked HCM	Approved	Job No F711
Sheet 1/1	Date 09/11/16	Date 05/04/17	Date	Figure 1

**Forkers Ltd**

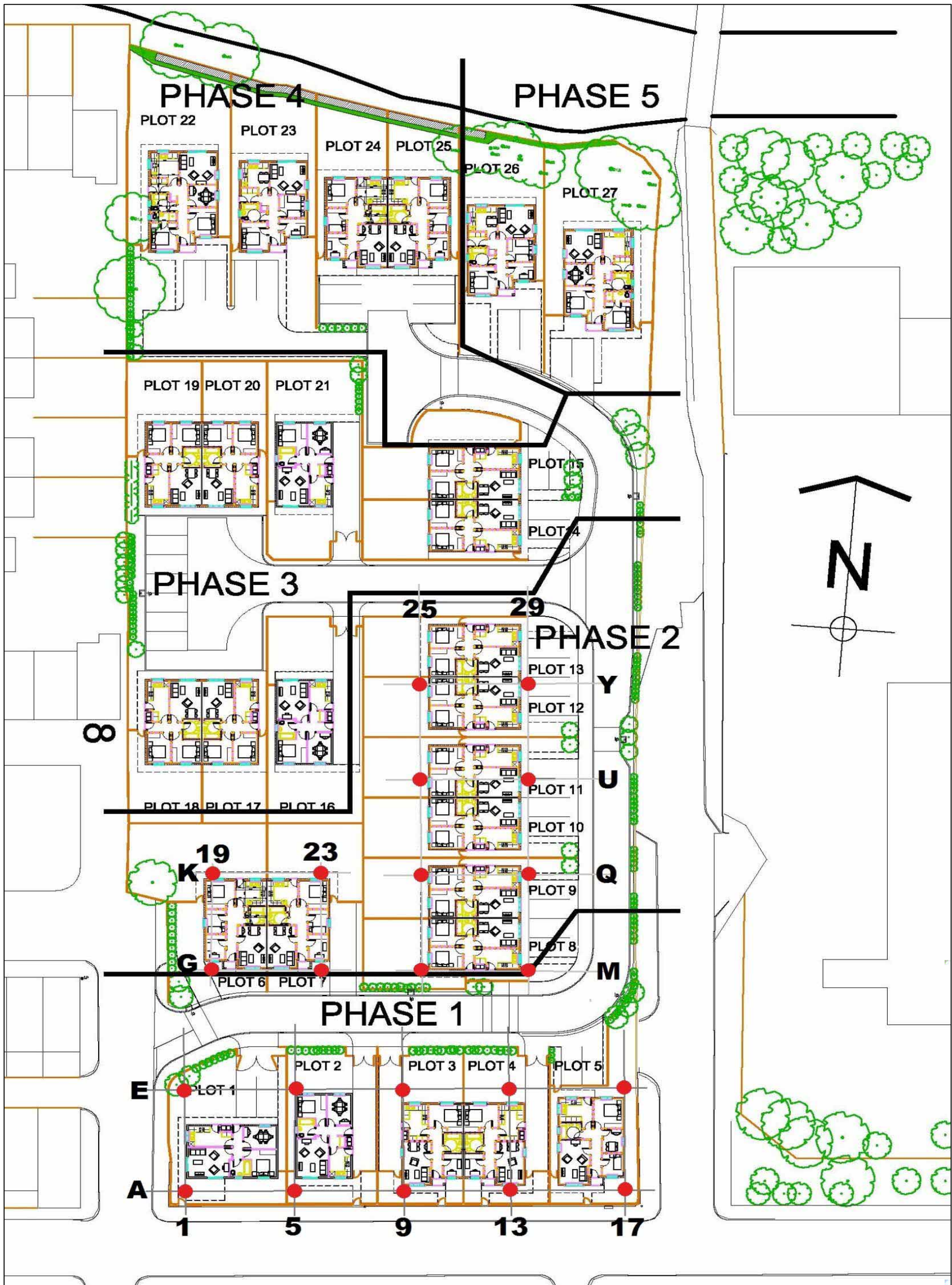
**GANNOW LANE, BURNLEY, BB12 6JG**

**COMPLETION REPORT – TRIAL DRILL & GROUT**


**07/04/17**

**Figure 2      Mineworkings Treatment Borehole Plan**





**KEY**

 Primary Borehole Location (12m Grid Spacing)

<b>Forkers Ltd</b> Civil & Ground Engineering Contractors				
Site: Gannow Lane, Burnley				
Title: Mineworkings Treatment Borehole Plan				
Scale NTS	Drawn ABM	Checked HCM	Approved	Job No F711
Sheet 1/1	Date 11/09/16	Date 05/04/17	Date	Figure 2

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COMPLETION REPORT – TRIAL DRILL & GROUT

07/04/17

## APPENDICES

**Forkers Ltd**

**GANNOW LANE, BURNLEY, BB12 6JG**

**COMPLETION REPORT – TRIAL DRILL & GROUT**

**07/04/17**

**Appendix A Coal Authority Permit 13118**





The Coal  
Authority

# Permit to Enter or Disturb Coal Authority Mining Interests

**Permit Reference Number 13118**

**Name and Address of Permit Holder:**

*David Lloyd Partnership  
Unit 2  
Settend Road West  
Shadsworth  
Blackburn  
Lancashire  
BB1 2NP*

**Site Location:**

*Unit 15  
Gannow Lane  
Burnley  
Lancashire  
BB12 6QH*

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

***Investigation by boreholes of possible shallow mine workings. (If treatment works are required please contact us prior to these works commencing to advise us of the final treatment specification)***

**within the Authority's mining interests at the identified site location 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 Applicant's responsibility to obtain appropriate health, safety, environmental, technical and legal advice.**

Signed: \_\_\_\_\_  \_\_\_\_\_ Granted Date: 17.10.16

For and on behalf of The Coal Authority

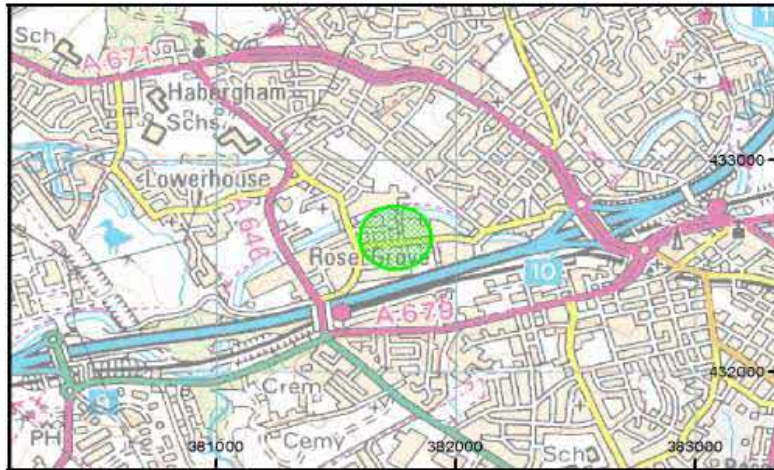
*Nominated Representative: Helen Bennett, Permitting Manager;*

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

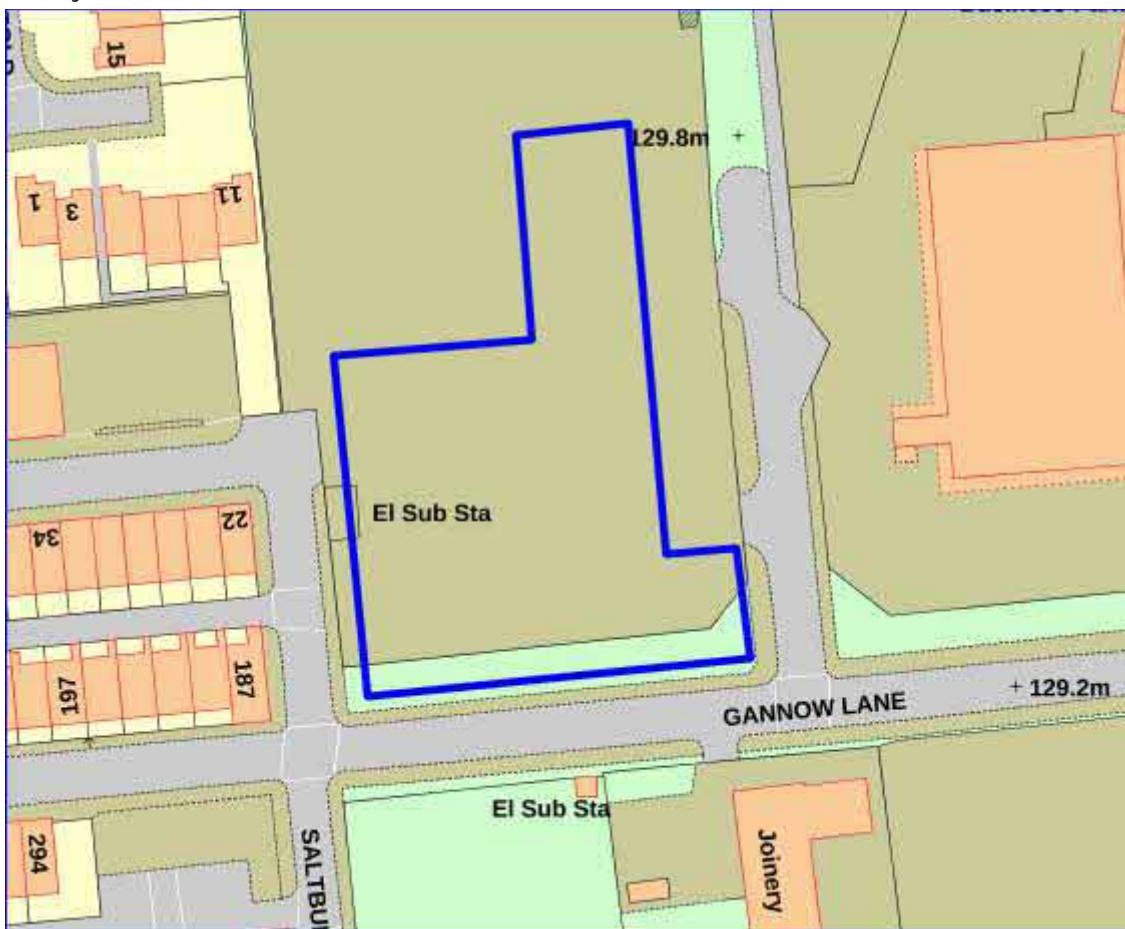
*Tel: 01623 637339; E-Mail: [permissions@coal.gov.uk](mailto:permissions@coal.gov.uk)*



Overview map



Permit Boundary



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**GANNOW LANE, BURNLEY, BB12 6JG**

**COMPLETION REPORT – TRIAL DRILL & GROUT**

**07/04/17**

**Appendix B Drill & Grout Summary Table**

**F711 - GANNOW LANE, BURNLEY (TREATMENT RECORDS)**

Boreholes drilled with water flush. Casing diameter 101mm. Borehole diameter 70-75mm.

Casing = Superficial Deposits - Made ground, glacial deposits and weathered Coal Measures bedrock.

Drilling - Green shaded (Coal not worked, full flush returns). Red highlighted (workings, lost flush returns).

Grouting - 100% Cement Grout

Hole Ref No.	Incl. or Vert	Cased (m)	Depth * (m)	Lower Bottom Mine *		Coal Seam Info	Date Started	Date Filled	Sheet Number	Grout Take 1	Grout Take 2	Grout Take 3	Total Injected	Hole No.
				Roof (m)	Floor (m)									
<b>Primary Grid</b>														
A1	23	17.50	26.70	23.00	23.50	25.00-25.50m Coal - 100% Flush Returns	27/10/2016	27/10/2016	G1	0.18			0.18	A1
A5	23	15.00	26.70	22.10	22.55	24.00-24.50m Coal - 100% Flush Returns	27/10/2016	27/10/2016	G1	0.18			0.18	A5
A9	23	15.50	26.70	23.10	22.55	24.00-24.50m Coal - 100% Flush Returns	27/10/2016	27/10/2016	G1	0.18			0.18	A9
A13	23	14.50	26.70	21.65	22.10	23.50-24.00m Coal - 100% Flush Returns	27/10/2016	27/10/2016	G1	0.18			0.18	A13
A17	23	14.50	26.70	21.15	21.65	23.00-23.50m Coal - 100% Flush Returns	27/10/2016	27/10/2016	G1	0.18			0.18	A17
E1	V	15.50	28.00	22.50	23.00	22.50-23.00m Coal - 100% Flush Returns	26/10/2016	27/10/2016	G1	0.18			0.18	E1
E5	V	13.80	28.00	23.00	23.50	23.00-23.50m Coal - 100% Flush Returns	27/10/2016	27/10/2016	G1	0.18			0.18	E5
E9	V	14.00	28.00	22.50	23.00	22.50-23.00m Coal - 100% Flush Returns	27/10/2016	27/10/2016	G1	0.18			0.18	E9
E13	V	13.00	28.00	22.00	22.50	22.00-22.50m Coal - 100% Flush Returns	27/10/2016	27/10/2016	G1	0.18			0.18	E13
E17	V	13.00	28.00	22.00	22.50	22.00-22.50m Coal - 100% Flush Returns	27/10/2016	27/10/2016	G1	0.18			0.18	E17
G19	V	13.20	28.00	25.50	26.00	25.50-26.00m Coal - 100% Flush Returns	26/10/2016	27/10/2016	G1	0.18			0.18	G19
G23	V	12.80	28.00	25.00	25.50	25.00-25.50m Coal - 100% Flush Returns	26/10/2016	27/10/2016	G1	0.18			0.18	G23
K19	V	12.00	28.00	26.00	26.50	26.00-26.50m Coal - 100% Flush Returns	26/10/2016	27/10/2016	G1	0.18			0.18	K19
K23	V	12.50	28.00	26.00	26.50	26.00-26.50m Coal - 100% Flush Returns	26/10/2016	27/10/2016	G1	0.18			0.18	K23
M25	V	12.50	28.00	24.00	25.00	24.00-25.00m Coal - 100% Flush Returns	26/10/2016	27/10/2016	G1	0.18			0.18	M25
M29	V	13.80	28.00	23.50	24.00	23.50-24.00m Coal - 100% Flush Returns	26/10/2016	27/10/2016	G2	0.18			0.18	M29
Q25	V	12.70	28.00	25.00	25.50	25.00-25.50m Coal - 100% Flush Returns	26/10/2016	27/10/2016	G2	0.18			0.18	Q25
Q29	V	13.00	28.00	25.50	26.00	25.50-26.00m Coal - 100% Flush Returns	25/10/2016	27/10/2016	G2	0.18			0.18	Q29
U25	V	12.50	28.00	26.00	27.00	26.00-27.00m Mudstone with coal traces - 100% Flush Returns	25/10/2016	27/10/2016	G2	0.18			0.18	U25
U29	V	12.00	28.00	26.50	27.50	26.50-27.50m Mudstone with coal traces - 100% Flush Returns	25/10/2016	27/10/2016	G2	0.18			0.18	U29
Y25	V	13.20	28.00			NO COAL	25/10/2016	27/10/2016	G2	0.18			0.18	Y25
Y29	V	12.50	28.00			NO COAL	25/10/2016	27/10/2016	G2	0.18			0.18	Y29

\* Depths corrected for angle of inclination