



Coal Mining Risk Assessment Report:

Land Adjacent to Glasier Road, Merthyr Tydfil

Prepared For: Merthyr Valley Homes

Issue Date: January 2021

Job No: 14545

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Prepared for:

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REPORT TITLE : Coal Mining Risk Assessment Report:
Land Adjacent to Glasier Road, Merthyr
Tydfil

REPORT STATUS : Final

JOB NUMBER : 14545

DATE : January 2021

PREPARED BY : 
Mr Mathew Lake

REVIEWED BY : 
Mr Tom Walby

APPROVED BY : 
Dr G. C. Lake

Executive Summary

Site Location	<i>The site is located to the northern side of Glasier Road in Merthyr Tydfil and is located at an approximate National Grid Reference of 305560 205500. The site is rectangular in shape and occupies an approximate plan area of 0.06 hectares.</i>
Site Works	<i>An intrusive site investigation was undertaken between the 16th and 18th December 2020 comprising four rotary open hole boreholes.</i>
Geology	<i>Based upon the investigation data, the stratigraphical sequence within 30m of the ground surface of the site is:</i> <i>• Made Ground</i> <i>• Boulder Clay</i> <i>• Measures</i> <i>• Backfilled Workings / Void</i> <i>• Measures</i> <i>Backfilled workings were encountered in BH1 and BH3. The encountered workings were voided in BH2 and BH4. The workings were encountered between 15.8m and 18.3m and ranged between 0.9m and 1.2m in thickness.</i>
Assessment of the Risk from Past Shallow Mining	<i>It is generally accepted that to prevent the collapse of old workings funnelling up to rock head and forming 'crown holes' at the ground surface there should be a 10:1 rockhead to void ratio.</i> <i>Open voids were encountered within BH2 and BH4 with a void thickness of 0.9m.</i> <i>There is insufficient rock cover to prevent the formation of crown holes should the workings collapse. It is recommended that the workings are stabilised by drilling and grouting.</i>
Drilling and Grouting Works	<i>It is recommended that a 3m by 3m grid is adopted across the footprint of the building and laundry room. Each borehole should be drilled to 1m below the workings.</i> <i>Workings should infilled with a cementitious grout. The makeup of grout can be determined by the appointed drilling and grouting contractor but should provide a minimum compressive strength of 1MPa. It is suggested that a 9:1 PFA to OPC mix is adopted to achieve this.</i> <i>Following completion of the drilling and grouting works, a raft foundation solution should be adopted. Given the presence of workings, it is also advised that gas protection measures are provided in line with the requirements for Gas Characteristic Situation 2 (CS2) outlined in CIRIA report C665.</i>

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SECTION 1 Introduction and Proposed Development

Merthyr Valley Homes are proposing the residential development of a plot of land adjacent to Glasier Road, Merthyr Tydfil

Terra Firma (Wales) Limited has been commissioned by Merthyr Valley Homes to undertake an Intrusive Coal Mining Risk Assessment Report (CMRA) for the site.

The main objectives of the CMRA were to:

- Determine the type of the underlying solid geology and the depth to and amount of sound rock head cover above the shallowest workable coal seam/ironstone vein
- Determine the risk, if any from past shallow underground mining
- Provide recommendations with regard to any other mining aspects pertaining to the development

In order to achieve the above objectives, Terra Firma (Wales) Limited carried out an assessment programme including a review of existing data.

1.1 Limitations and Exceptions

The CMRA has been conducted and this report has been prepared for the sole internal reliance of Merthyr Valley Homes and their design and construction team. This report shall not be relied upon or transferred to any other parties without the express written authorisation of Terra Firma (Wales) Limited. If an unauthorised third party comes into possession of this report they rely on it at their peril and the authors owe them no duty of care and skill.

The report represents the findings and opinions of experienced geo-environmental and geotechnical consultants. Terra Firma (Wales) Limited does not provide legal advice and the advice of lawyers may also be required.

SECTION 2 Review of Existing Data

2.1 Physical Setting and Current Site Use

The site is located to the northern side of Glasier Road in Merthyr Tydfil and is located at an approximate National Grid Reference of 305560 205500. The site is rectangular in shape and occupies an approximate plan area of 0.06 hectares. The location of the site is presented below in **Figure 2.1**.

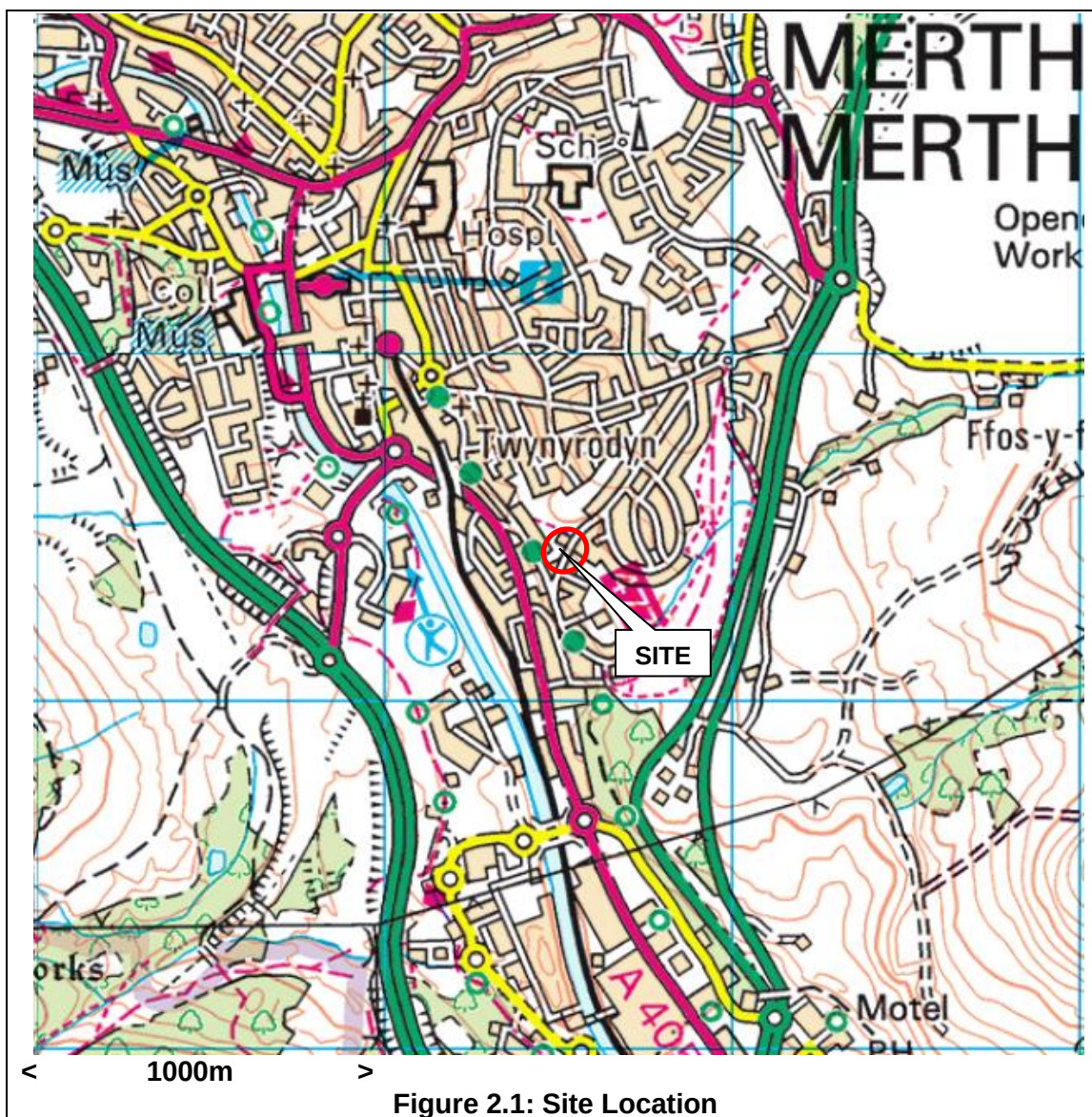


Figure 2.1: Site Location

2.2 Geology

The BGS 1:50,000 scale and 1:10,560 geological maps record the site to be underlain by the South Wales Lower Coal Measures Formation of Carboniferous Age which comprise grey, coal-bearing mudstones/siltstones, with seatearths and minor sandstones. The Gellideg Coal Seam outcrops some 250m east of the site and does not underlie the site.

There is potential for thin coal seams and ironstone seams to underlie the site at shallow depth.

Glacial Till superficial deposits are shown to overlie the solid geology. Glacial Till typically comprises sandy, silty clay but can contain gravel-rich, or laminated sand layers.

SECTION 3 Field Investigation

3.1 Site Works

An intrusive site investigation was undertaken between the 16th and 18th December 2020 comprising four rotary open hole boreholes.

The fieldwork was supervised by Terra Firma (Wales) Limited. The proposed locations of the exploratory holes were determined by Terra Firma (Wales) Ltd.

Boreholes referenced BH01 to BH04, were formed using a tracked rotary drilling rig using water as the flushing medium.

The borehole logs are presented in **Annex A**.

Exploratory hole locations are shown on **Drawing 01**.

3.2 Ground Conditions

The ground conditions encountered by the exploratory holes can in general be summarised as shown in **Table 3.1**.

Table 0.1 Summary of Ground Conditions		
Depth (m)	Thickness (m)	Stratum
0.0 To 4.5/4.8	4.5 to 4.8	MADE GROUND
4.5/4.8 To 8.7/10.3	4.2 to 5.5	BOULDER CLAY
8.7/10.3 To 17.1/15.8	5.5 to 8.4	COAL MEASURES
17.1/15.8 To 18.3/16.7	0.9 to 1.2	VOID (0.9m) / BACKFILLED WORKINGS
18.3/16.7 To >30.0	Unproven past 30m	COAL MEASURES

3.3 Water Strikes

Boreholes were recorded as wet at 5.5m depth.

3.4 Ground Gas

Gas monitoring was undertaken at each borehole location during drilling. Carbon dioxide, Methane, Oxygen and Hydrogen Sulphide were monitored during the investigation. No gasses were recorded during the drilling works.

SECTION 4 Assessment of the Risk from Past Shallow Coal Mining

4.1 Underground Mining

Based upon the investigation data, the stratigraphical sequence within 30m of the ground surface of the site is:

- Made Ground
- Boulder Clay
- Measures
- **Backfilled Workings / Void**
- Measures

Backfilled workings were encountered in BH1 and BH3. The encountered workings were voided in BH2 and BH4. The workings were encountered between 15.8m and 18.3m and ranged between 0.9m and 1.2m in thickness.

4.2 Adits and Shafts

There are no mine entries within the boundary, or within influencing distance of the site.

4.3 Conclusions

It is generally accepted that to prevent the collapse of old workings funnelling up to rock head and forming 'crown holes' at the ground surface there should be a 10:1 rockhead to void ratio.

Open voids were encountered within BH2 and BH4 with a void thickness of 0.9m. A minimum rock head cover of 9m is therefore required.

The minimum rockhead cover above the working is less than 9m and is therefore insufficient to prevent the formation of crown holes should the workings collapse. It is recommended that the workings are stabilised by drilling and grouting. These works are discussed in **Section 5**.

Following completion of the stabilisation works, a validation report should be compiled containing pictorial evidence of the stabilisation works and borehole/grout logs.

SECTION 5 Stabilisation Works

5.1 Drilling and Grouting

Stabilisation works are required to prevent future collapse of the identified workings. This should consist of a drilling and grouting programme.

A proposed drilling and grouting layout is attached in **Drawing 02**. It is recommended that a 3m by 3m grid is adopted across the footprint of the building and laundry room. Each borehole should be drilled to 1m below the workings.

Workings should be infilled with a cementitious grout. The makeup of grout can be determined by the appointed drilling and grouting contractor but should provide a minimum compressive strength of 1MPa. It is suggested that a 9:1 PFA to OPC mix is adopted to achieve this. At this stage, it is envisaged that approximately 150 tonnes of grout will be required to fill the workings beneath the site.

Following completion of the drilling and grouting works, a raft foundation solution should be adopted. Given the presence of workings, it is also advised that gas protection measures are provided in line with the requirements for Gas Characteristic Situation 2 (CS2) outlined in CIRIA report C665.

5.2 Verification of the Works

Once completed, it is recommended that a number of boreholes are drilled across the footprints of the buildings in order to confirm the success of the grouting works. Any additional boreholes should be backfilled completely with either remaining grout or a bentonite grout mix.

The stabilisation works should be documented in a verification report. The report should include drillers logs, grouting records, confirmation of grout compressive strength and details of additional verification boreholes and any additional remedial works that may arise during grouting.

Annex A
Borehole Logs and Permit



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Pentwyn, Cardiff
CF23 7HA

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info@terrafirmawales.co.uk
www.terrafirmawales.co.uk

Borehole No.

BH1

Sheet 1 of 2

Project Name:	Glasier Road	Project No:	14545	Co-ords:		Hole Type	RO
Location:	Merthyr Tydfil	Level:				Scale	1:100
Client:	Merthyr Valley Homes	Dates:	16/12/2020 -			Logged By	

Water Strikes	Sample and In Situ Testing			Depth (m)	Level (m)	Well	Legend	Stratum Description	
	Depth (m)	Type	Results						
				4.80			COLLIERY SPOIL (drillers description)		1
									2
									3
									4
				8.80			BOULDER CLAY (drillers description)		5
									6
									7
									8
							MUDSTONE (drillers description)		9
									10
									11
									12
									13
									14
				16.50			BACKFILLED WORKINGS (drillers description)		15
									16
				17.80			SOFT DRILL (drillers description)		17
									18
				18.80			NORMAL DRILL - No returns (drillers description)		19
									20

Remarks:



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Borehole No.

BH1

Sheet 2 of 2

Project Name: Glasier Road Project No: 14545 Co-ords:

Hole Type
RO

Location: Merthyr Tydfil

Level:

Scale
1:100

Client: Merthyr Valley Homes

Dates: 16/12/2020 -

Logged By

Water Strikes	Sample and In Situ Testing			Depth (m)	Level (m)	Well	Legend	Stratum Description	
	Depth (m)	Type	Results						
								NORMAL DRILL - No returns (drillers description)	21
									22
									23
									24
									25
									26
									27
									28
									29
				30.00					30
								End of Borehole at 30.000m	31
									32
									33
									34
									35
									36
									37
									38
									39
									40

Remarks:



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Borehole No.

BH2

Sheet 1 of 2

Project Name: Glasier Road

Project No:
14545

Co-ords:

Hole Type
RO

Location: Merthyr Tydfil

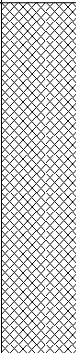
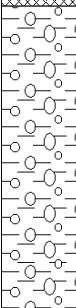
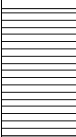
Level:

Scale
1:100

Client: Merthyr Valley Homes

Dates: 16/12/2020 -

Logged By

Water Strikes	Sample and In Situ Testing			Depth (m)	Level (m)	Well	Legend	Stratum Description	
	Depth (m)	Type	Results						
				4.70				COLLIERY SPOIL (drillers description)	1
								BOULDER CLAY (drillers description)	2
				8.70				MUDSTONE (drillers description)	3
									4
									5
									6
									7
									8
									9
									10
									11
									12
									13
									14
									15
									16
				17.10				CAVITY (drillers description)	17
				18.30				MUDSTONE (drillers description)	18
									19
									20

Remarks:



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Borehole No.

BH2

Sheet 2 of 2

Project Name: Glasier Road Project No: 14545 Co-ords:

Hole Type
RO

Location: Merthyr Tydfil

Level:

Scale
1:100

Client: Merthyr Valley Homes

Dates: 16/12/2020 -

Logged By

Water Strikes	Sample and In Situ Testing			Depth (m)	Level (m)	Well	Legend	Stratum Description	
	Depth (m)	Type	Results						
								MUDSTONE (drillers description)	21
									22
									23
									24
									25
									26
									27
									28
									29
				30.00					30
								End of Borehole at 30.000m	31
									32
									33
									34
									35
									36
									37
									38
									39
									40

Remarks:



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Borehole No.

BH3

Sheet 1 of 2

Project Name: Glasier Road

Project No:
14545

Co-ords:

Hole Type
RO

Location: Merthyr Tydfil

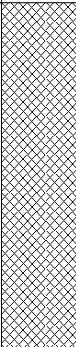
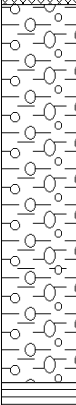
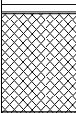
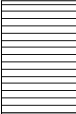
Level:

Scale
1:100

Client: Merthyr Valley Homes

Dates: 17/12/2020 -

Logged By

Water Strikes	Sample and In Situ Testing			Depth (m)	Level (m)	Well	Legend	Stratum Description	
	Depth (m)	Type	Results						
				4.60				COLLIERY SPOIL (drillers description)	1
								BOULDER CLAY (drillers description)	2
				9.90				MUDSTONE (drillers description)	3
				16.00				BACKFILLED WORKINGS (drillers description)	4
				17.30				SOFT DRILL (drillers description)	5
				18.50				NORMAL DRILL - No returns (drillers description)	6
									7

Remarks:



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Borehole No.

BH3

Sheet 2 of 2

Project Name:	Glasier Road	Project No:	14545	Co-ords:		Hole Type	RO
Location:	Merthyr Tydfil	Level:				Scale	1:100
Client:	Merthyr Valley Homes	Dates:	17/12/2020 -			Logged By	

Water Strikes	Sample and In Situ Testing			Depth (m)	Level (m)	Well	Legend	Stratum Description	
	Depth (m)	Type	Results						
								NORMAL DRILL - No returns (drillers description)	21
									22
									23
									24
									25
									26
									27
									28
									29
				30.00					30
								End of Borehole at 30.000m	31
									32
									33
									34
									35
									36
									37
									38
									39
									40

Remarks:



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Borehole No.

BH4

Sheet 1 of 2

Project Name:	Glasier Road	Project No:	14545	Co-ords:		Hole Type	RO
Location:	Merthyr Tydfil	Level:		Scale	1:100	Logged By	
Client:	Merthyr Valley Homes	Dates:	17/12/2020 -				

Water Strikes	Sample and In Situ Testing			Depth (m)	Level (m)	Well	Legend	Stratum Description	
	Depth (m)	Type	Results						
				4.50				COLLIERY SPOIL (drillers description)	1
									2
									3
									4
				10.30				BOULDER CLAY (drillers description)	5
									6
									7
									8
									9
									10
								MUDSTONE (drillers description)	11
									12
									13
				15.80					14
									15
				16.70				CAVITY (drillers description)	16
									17
								SOFT DRILL (drillers description)	18
				18.20					19
								MUDSTONE (drillers description)	20

Remarks:



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Borehole No.

BH4

Sheet 2 of 2

Project Name:	Glasier Road	Project No:	14545	Co-ords:		Hole Type	RO
Location:	Merthyr Tydfil	Level:				Scale	1:100
Client:	Merthyr Valley Homes	Dates:	17/12/2020 -			Logged By	

Water Strikes	Sample and In Situ Testing			Depth (m)	Level (m)	Well	Legend	Stratum Description	
	Depth (m)	Type	Results						
								MUDSTONE (drillers description)	21
									22
									23
									24
									25
									26
									27
									28
									29
				30.00					30
								End of Borehole at 30.000m	31
									32
									33
									34
									35
									36
									37
									38
									39
									40

Remarks:



The Coal
Authority

Permit to Enter or Disturb Coal Authority Interests

Permit 21218

Name and Address of Permit Holder:

*Terra Firma (Wales) Ltd
5 Deryn Court
Wharfedale Road
Pentwyn
Cardiff
CF23 7HA*

Site Location:

*Glasier Road
Merthyr Tydfil*

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

Ground investigation by four boreholes to 30m to determine ground conditions

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:

- *Water flush*
- *Gas Monitoring CO, CH₄, CO₂, O₂, H₂S 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: _____

Granted Date: _____

11-12-2020

For and on behalf of The Coal Authority

Nominated Representative: Keith Banton, 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

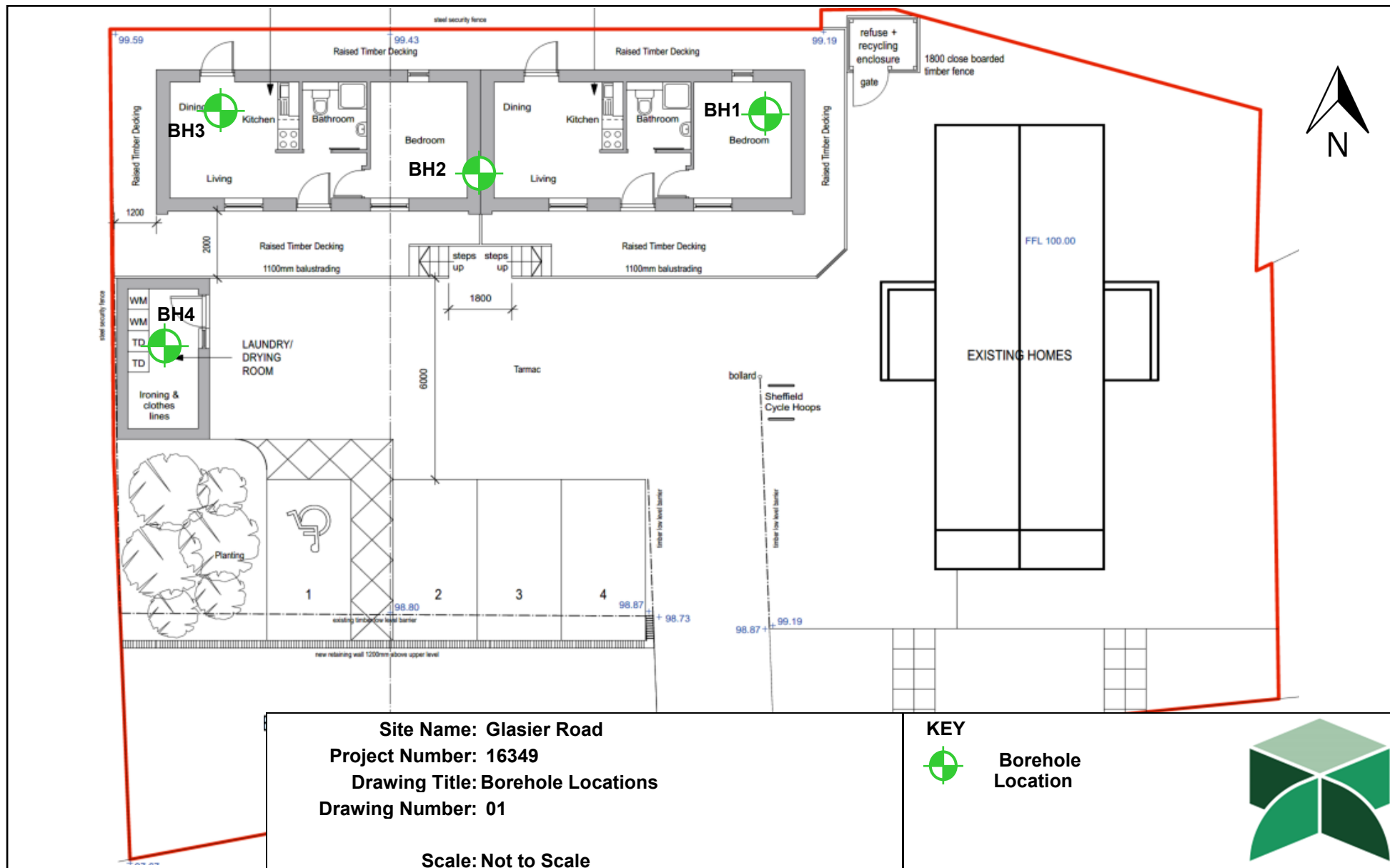
Permit Ref: 21218

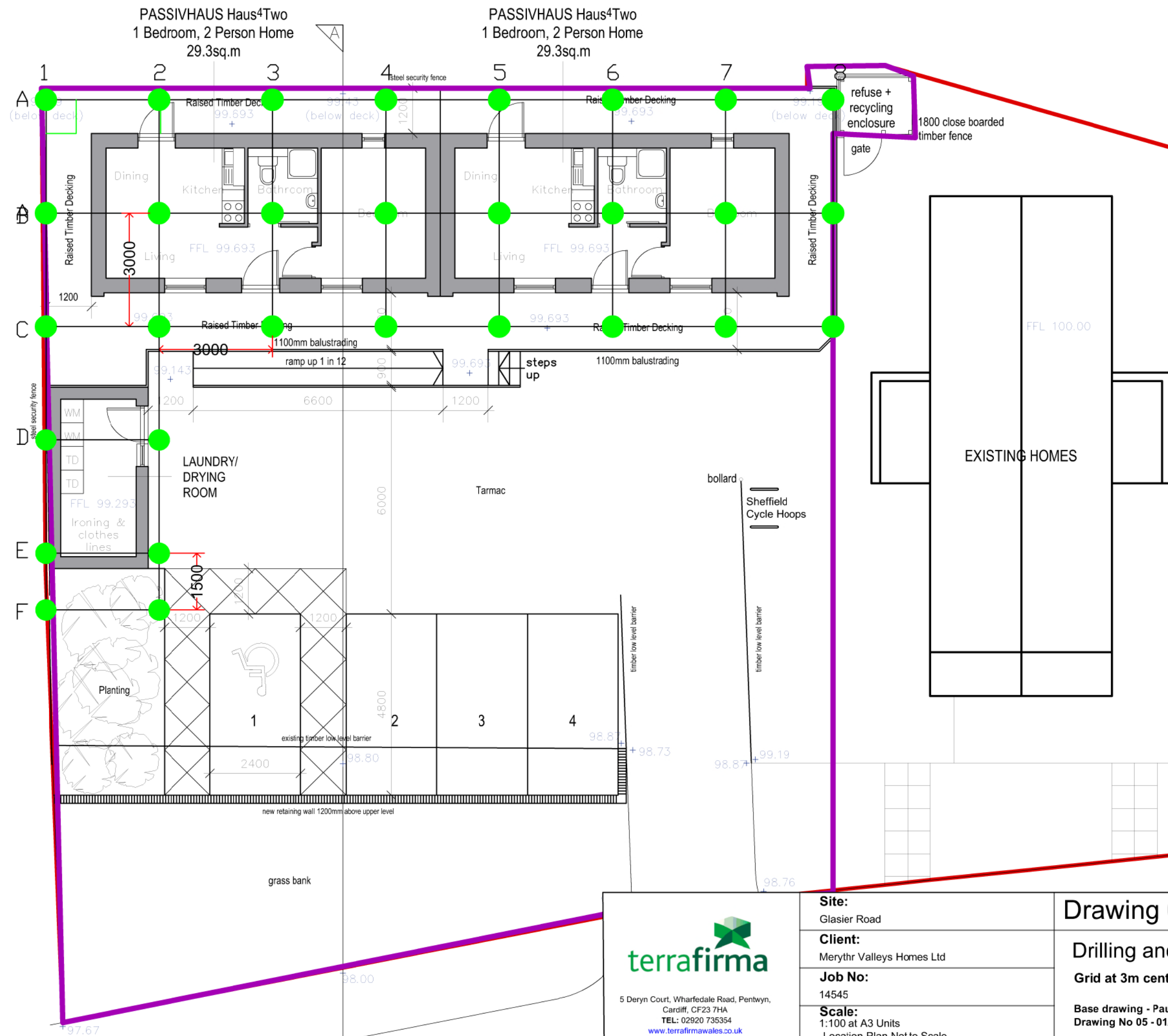
Permit Boundary:



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Drawings







Terra Firma (Wales) Ltd. 5 Deryn Court, Wharfedale Road, Pentwyn, Cardiff CF23 7HA
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