

CAP 13m 69ch CS 454 Assessment and Inspection Report

Includes BE4 MEXE Assessment

Glyntaff Road Bridge, Pontypridd, Rhondda Cyon Taf

Document no: 0451742

Revision no: Form AA/BA/BAA Rev02

National Highways – Historical Railways Estate
VAR9/7410

HRE Assessment Programme
April 2025



CAP 13m 69ch CS 454 Assessment and Inspection Report

Client name:	National Highways – Historical Railways Estate		
Project name:	HRE Assessment Programme		
Client reference:	VAR9/7410	Project no:	B38380BA
Document no:	0451742	Project manager:	
Revision no:	Form AA/BA/BAA Rev02	Prepared by:	
Date:	April 2025	File name:	CAP 13m 69ch CS 454 Assessment and Inspection Report

Document history and status

Revision	Date	Description	Author	Checked	Reviewed	Approved
Form AA/BA Rev 01	Apr 25	CAP 13m 69ch CS 454 Assessment and Inspection Report				
Form AA/BA Rev 02	Apr 25	CAP 13m 69ch CS 454 Assessment and Inspection Report Includes BE4 MEXE Assessment				

Distribution of copies

Revision	Issue approved	Date issued	Issued to	Comments

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Executive Summary

Structure Type: Single span overbridge

Superstructure Form: Square span brick arch

Substructure Form: Gravity type brick abutments and wingwalls

Span: 8.32m

Assessment Code:	CS 454	BE4
Live Load Capacity:	13 tonnes GVW	Tandem 7 ton axles
Modified Axle Load:	-	7 tons
Restriction:	13 tonnes	7 ton axles
Capacity factor:	0.81	-

Condition: Poor

Local Authority: Vale of Glamorgan

OS Reference: ST 085 894

This report presents the load carrying capacity for the bridge and identifies the data used to derive the assessment. It has been prepared by Jacobs for the exclusive use by HRE and should not be relied on by third parties. It has been based on site measurements and investigation by Jacobs or historical information provided by HRE, as appropriate.

The description of condition does not represent a principal inspection, nor should it be relied on for the development of maintenance works. Close inspection of members was limited by the constraints of safe access possible within a single visit.

Identification of defects is principally based on ground level observation of visible members. The structural arrangement of the bridge meant that the following elements were not examined as part of the inspection for assessment:

- The arch barrel extrados and the soil faces of the spandrel walls were considered to be built-in parts not amenable to inspection. Assessment followed standard methods based on appraisal of the visible parts of the bridge.

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1. General Description and Structural Details

1.1 Introduction

Jacobs was appointed by National Highways – Historical Railways Estate (HRE) to undertake a CS 454 assessment of structure CAP 13m 69ch with the brief later extended to include a BE4 MEXE assessment.

HRE Works Contractor Hammond Ltd. excavated a trial pit at the crown of the arch to determine the arch barrel thickness. Trial pits were excavated against both abutments to expose the springing points of the arch.

1.2 Location and General Description

Structure CAP 13m 69ch 'Glyntaff Road' carries Graig-Yr-Helfa Road over the former Caerphilly & Pontypridd railway line in Pontypridd, Rhondda Cynon Taf. The OS Grid reference is ST 085 894.

The structure carries a single carriageway with two marked lanes. There are no footways or verges over the structure. The total width of the carriageway at the centre of the span is 6.06m. Refer to the plan at road level in Appendix D for carriageway dimensions.

The former Caerphilly & Pontypridd railway line was opened circa 1884, and it is likely that the bridge also dates from this time. The railway below the bridge was closed in 1965, and since then, the bridge has been partially infilled to just below springing level.

1.3 Construction Type

The structure is a skewed, single span brick arch overbridge. The clear skew span is 8.32m, and the clear square span is 7.63m giving a skew angle of 23°.

The arch barrel profile is segmental and constructed from four rings of common red brick with a rise at the crown of 1.35m. Excavation of a trial pit on top of the arch revealed the arch barrel thickness to be 460mm at the crown. The depth of fill and road construction at the crown is approximately 270mm.

The arch is supported on gravity type abutments constructed from snecked ashlar stone. The wingwalls, spandrels and parapets are also constructed from stone.

Sketches of the plan at road level, section at the crown and the elevations are included in Appendix D.

2. Information Search

2.1 Services Search

A services search was carried out by Jacobs. Information is supplied in Appendix F.

2.2 Site Investigation Description and Results

Hammond Ltd. excavated a trial pit on top of the arch to determine the arch barrel thickness. The site investigation results are supplied in Appendix D.

2.3 Existing Drawings

No existing record drawings have been provided by HRE.

3. Structure Condition

3.1 General

The survey and inspection for assessment were undertaken on Monday 4th December 2023. Weather conditions were overcast and wet with a temperature of 4°C. Parking was available on Glyntaff Road to the northeast of the structure. Access to the formation was gained down the northwest embankment slope from Graig-Yr-Halfa Road.

A laser scan was undertaken during the survey to confirm the structure's dimensions.

3.2 Structure Condition

3.2.1 Arch Barrel

The arch barrel shows signs of flattening at the crown (Photograph 7). Soot and damp staining are present across the central section of the arch. Water ingress was observed throughout the arch, with water seeping through the south end of the west haunch during the inspection. It was noted that water was leaking from a catch pit located behind the south parapet, percolating down through the haunch (Photograph 25).

The brickwork exhibits washout and calcite staining, most significantly across the east and west haunches (Photograph 6 and 8). There are spalled bricks across the soffit, up to a depth of 60mm, and a single brick is missing towards the south end of the soffit. Areas of mortar loss and joints, open to 40mm were also noted.

A trial pit excavated at the arch crown identified that the backfill comprises granular material.

In the CS 454 assessment, a 20mm reduction in contact lengths along the intrados will be considered. This adjustment accounts for the water seepage and mortar loss observed across the arch soffit. The arch ring thickness will be reduced by 20mm to address the spalling observed across the soffit. To account for the apparent flattening of the arch barrel at the crown, a general condition factor of 0.9 will be applied to the assessment results. The angle of internal friction of the backfill (ϕ) is taken as 30°, and the density is assumed to be 1850 kg/m³.

The BE4 assessment will consider a ring factor of 0.9 (BE4 Table III) to account for some deterioration of the building bricks evidenced by staining, water ingress, and spalling observed across the arch barrel. A fill factor of 0.7 is recommended for the well compacted granular backfill identified on site (BE4 Table IV). A width factor of 0.9 will be applied for joint widths between ¼" and ½" (BE4 Table V). To account for mortar loss and open joints observed across the soffit, a depth factor of 0.95 and mortar factor of 0.95 are deemed appropriate (BE4 Tables VI and VII). The condition factor will be taken as 0.9 to account for the flattening of the arch barrel at the crown. This corresponds to the general condition factor applied in the CS 454 assessment.

3.2.2 Abutments

The east and west abutments are buried within the partial infill to just below the springing level (Photograph 9 and 10). The top 1m of the abutments are exposed. The visible portion of the abutments exhibit well-filled joints throughout. There are individual weathered blocks, but no significant spalling associated. The abutments were visibly wet with standing water noted to the base of both walls.

3.2.3 Spandrels

The spandrels display isolated areas of deep open joints and perished pointing (Photograph 15 to 18). Open joints/separation fractures were evident between the arch ring and spandrels upwards from both abutments (Photograph 23 and 24)

3.2.4 Wingwalls

All wingwalls exhibit isolated open joints with vegetation growth from joints (Photograph 11 to 14). The north east wingwall is obscured by dense ivy growth and vegetation to the base of the wall.

3.2.5 Parapets

The north and south parapets (Photograph 26 and 27) display evidence of pointing repairs. The west end of the south parapet has been reconstructed; steel dowels could be seen extending through the coping stone (Photograph 28).

3.2.6 Formation

The formation to the north of the structure has been partially infilled with mature vegetation established (Photograph 29). The formation to the south of the structure has been infilled and the land has been developed (Photograph 31). The area under the bridge shows evidence of fly tipping (Photograph 30).

3.2.7 Road Surface and Traffic Flow

The road surface over the structure is in good condition with no signs of settlement or tracking (Photograph 5). There is some minor degradation to the surface. For this assessment the surfacing will be taken as 'poor' to consider the potential for deterioration.

Occasional HGV use was witnessed during the survey, and traffic flow is low. The designation for HGV use (AAHHGVF) will be taken as 'low'.

4. Assessment to CS 454

4.1 Methodology

The assessment was conducted by a mechanism analysis using LimitState RING.

The arch ring thickness was reduced by 20mm to account for spalling to the arch barrel. 'Mortar Loss' was taken as 20mm throughout the intrados of the arch. This was due to water percolation associated with the staining across visible faces and mortar loss exhibited across the arch soffit. To account for the apparent flattening of the arch barrel at the crown, a general condition factor of 0.9 was applied to the assessment results.

A unit weight of 20.58kN/m³ was assumed for the masonry. A characteristic strength of 2.3 N/mm² was adopted based on common red bricks. A unit weight of 18.15kN/m³ was considered appropriate for the granular fill material (CS 454 Table 4.1.1a). A unit weight of 23.5kN/m³ was adopted for the surfacing material (CS 454 Table 4.1.1a).

The spandrels and abutments were assessed qualitatively.

4.2 Results

4.2.1 Ring Analysis – CS 454 Normal Traffic Vehicle and Axle Loading

Table 1: CS 454 Table 7.3.1a Authorised Axle Loads Normal Traffic

Case	C (Ultimate Capacity)	Capacity Factor* *C _{min} of 1.2 Applied (CS 454 CL 7.2)	PLS	CS 454 Assessment Result
Single Axle (11.5t)	1.04	0.87	0.83	Fail
Double Axle (16t)	1.13	0.94	0.89	Fail
Double Axle (19t)	1.02	0.85	0.81	Fail
Double Axle (20t)	1.07	0.89	0.85	Fail
Triple Axle (21t)	1.16	0.97	0.88	Fail
Triple Axle (24t)	1.19	0.99	0.87	Fail
Single Axle (9t)	1.33	1.11	1.06	13T GVW

A minimum live load capacity factor (C_{min}) of 1.2 in accordance with CS 454 Clause 7.2 has been included in the overall 'Capacity Factor' results presented above for the Ultimate Limit State. This live load capacity factor corresponds to the loads frequently reaching levels that could result in further distress and reduce the life of the arch. A Capacity Factor of greater than 1.0 represents a 'pass' for normal traffic.

An alternative approach to using C_{min} , i.e. the Permissible Limit State PLS method as outlined in CIRIA C800 and referenced in CS 454 version 1.1.0 (Sept 2022) clause 7.2.1 note 3 was investigated. The difference in the PLS adequacy factor and the capacity factor with C_{min} applied is dependent on various parameters including span, fill properties and fill depth. The PLS capacity was found to be critical. This indicates that the bridge is sensitive to repeated loading and therefore the PLS capacity is the best representation of the allowable capacity.

4.2.2 Substructure

By qualitative assessment, the substructure appears to be satisfactory for Normal Traffic Loading. The defects described in Section 3.2 of this report are not considered to be detrimental to the load bearing capacity.

4.2.3 Spandrels

With no verges separating the spandrels from the carriageway, loading can be immediately adjacent to the

parapet. The depth of fill is small, so the tendency will be for most of the load to go directly into the arch rather than laterally to the spandrels through live load surcharge. There is no indication of any ongoing movement to the spandrels, therefore by qualitative assessment, the spandrels appear to be satisfactory for normal traffic loading on the carriageway.

5. Assessment to BE4

5.1 Methodology

The following table summarises the condition/modifying factors used in the modified MEXE method of assessment as outlined in Part III of BE4. The factors represent the general condition of the elements of the structure, as taken from justifications in Section 3.2.1 of this report.

The following factors were used indicating the condition of the arch for the MEXE assessment:

Table 2: Factors used in BE4 MEXE Analysis

Description	Modifying Factor BE4
Barrel Factor, F_b	0.9
Fill Factor, F_f	0.7
Width of Joint Factor, F_w	0.9
Depth Factor, F_d	0.95
Mortar Factor, F_{mo}	0.95
General Condition Factor of Bridge, F_{cm}	0.9

5.2 Results

5.2.1 Modified MEXE Method - BE4 C&U Loading

Table 3: BE4 MEXE Analysis Results

Arch Span	Modified Axle Load	BE4 Assessment Result
8.32m	7 tons	Fail under full C&U loading

The minimum modified axle load obtained from the BE4 MEXE analysis was 7 tons. According to BE4 Part III (Assessment of Masonry and Brick Arch Bridges) a rating greater than 9 tons is required for unrestricted vehicle loading. A 'fail' under full C&U loading is therefore indicated.

5.2.2 Substructure

By qualitative assessment, the substructure appears to be satisfactory for vehicles conforming to Construction and Use regulations (1967). The defects described in Section 3.2 of this report are not considered to be detrimental to the load bearing capacity.

5.2.3 Spandrels

There is no indication of any ongoing movement to the spandrels, therefore by qualitative assessment, the spandrels appear to be satisfactory for C&U loading on the carriageway.

6. Conclusions and Recommendations

A weight restriction over the structure is necessary as determined by the RING assessment. The assessment indicates a 13 tonnes GVW weight restriction is required in accordance with CS 454. This is the highest restriction level that does not impose the 11.5 tonne single axle for which the assessment gives a 'fail' result.

The CS 454 RING assessment applied a 0.9 general condition factor to account for the flattening of the arch barrel at the crown. With this factor applied, the structure marginally passes under 13 tonne traffic loading. It is appreciated that evaluation and application of condition factors is somewhat subjective, though the calculation indicates that even if the factor is not applied, there is still a marginal failure under Normal traffic loading and hence the same 13T GVW limit is indicated.

The BE4 MEXE assessment indicates a 7 ton axle weight restriction is required in accordance with BE4. The BE4 assessment applies the same 0.9 condition factor to account for the flattening of the arch barrel as adopted in the CS 454 assessment.

There is no existing assessment of this structure on file. Until 2022, examination reports noted the structure as being in 'poor' condition, with main concerns regarding the soffit, ring faces, and parapets. Repairs have since been carried out on the parapets, and subsequent examination reports consider the structure to be in 'fair/good' condition. However, these examinations have not included the soffit due to access issues, as the structure is considered a confined space.

As this structure is partly infilled already, it is recommended to complete the infill. This would restore the capacity of the structure and provide a maintenance-free solution to the structural issues while removing the Client's liability for the structure. It would also negate the need for examiners to access a confined space.

Appendix A. Photographs



Photograph 1: North elevation



Photograph 2: South elevation



Photograph 3: Road approach looking east



Photograph 4: Road approach looking west



Photograph 5: Road over structure



Photograph 6: Soffit at east haunch



Photograph 7: Soffit at crown



Photograph 8: Soffit at west haunch



Photograph 9: East abutment



Photograph 10: West abutment



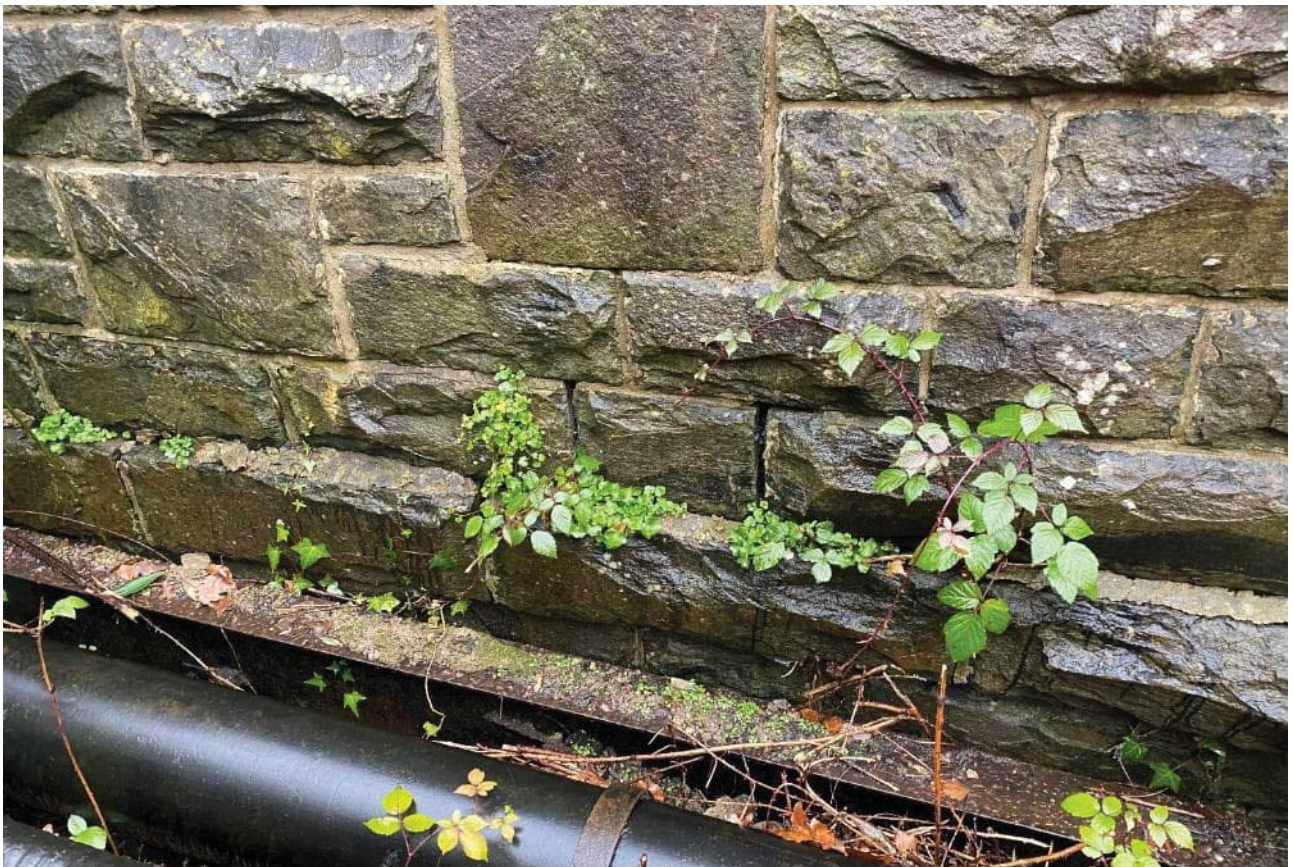
Photograph 11: North east wingwall



Photograph 12: North west wingwall



Photograph 13: South east wingwall



Photograph 14: South west wingwall



Photograph 15: North east spandrel



Photograph 16: North west spandrel



Photograph 17: South east spandrel



Photograph 18: South west spandrel



Photograph 19: Arch soffit at crown displaying washout and calcite staining



Photograph 20: Spalling to individual bricks north west haunch



Photograph 21: Individual missing brick to soffit



Photograph 22: Mortar loss and spalling to arch soffit



Photograph 23: North elevation arch – open joints



Photograph 24: South elevation arch ring – open joints



Photograph 25: Water leaking behind south parapet



Photograph 26. North parapet



Photograph 27. South parapet



Photograph 28: Steel dowels through cope



Photograph 29. Formation looking north



Photograph 30. Formation under the structure



Photograph 31. Formation looking south



Photograph 32: Trial pit on top of the arch

Appendix B. Form AA

FORM 'AA' (BRIDGES)**GC/TP0356**

ELR / Bridge No: CAP 13m 69ch

Appendix: 4

Issue: 1

Revision: B (Nov 2000)

APPROVAL IN PRINCIPLE FOR ASSESSMENT**Bridge/Line Name: Glyntaff Road Bridge/ Caerphilly & Pontypridd****ELR/Bridge No. CAP 13m 69ch****Brief Description of Existing Bridge:**

Dimensions and condition factors are obtained from site measurements and inspection. (See Jacobs report "VAR9-7410 Assessment Programme – Assessment and Inspection Report – Bridge Ref.: CAP 13m 69ch – April 2025).

(a) Span Arrangement

The structure is a skewed, single span brick arch overbridge. The clear skew span is 8.32m, and the clear square span is 7.63m giving a skew angle of 23°.

(b) Superstructure Type

The arch barrel profile is segmental and constructed from four rings of common red brick with a rise at the crown of 1.35m. Excavation of a trial pit on top of the arch revealed the arch barrel thickness to be 460mm at the crown.

(c) Substructure Type

The arch is supported on gravity type abutments constructed from snecked ashlar stone. The wingwalls, spandrels and parapets are also constructed from stone.

(d) Planned highway works/modifications at this site

None.

(e) Road designation class and whether classed as a heavy load route

Structure CAP 13m 69ch 'Glyntaff Road' carries Graig-Yr-Helfa Road over the former Caerphilly & Pontypridd railway line in Pontypridd.

The road is a single carriageway with two marked lanes. The overall width between the parapets, and effective carriageway width for assessment purposes is 6.06m.

The traffic flow category has been taken as 'Low (L)'. The road surface category has been taken as 'poor'.

FORM 'AA' (BRIDGES)**GC/TP0356**

ELR / Bridge No: CAP 13m 69ch

Appendix: 4

Issue: 1

Revision: B (Nov 2000)

APPROVAL IN PRINCIPLE FOR ASSESSMENT

(f) Any other requirements

None.

Assessment Criteria

(a) Loadings and Speed

CS 454:

The full range of single, double and triple axle bogies appropriate to 'Normal traffic' loading from CS 454 Table 7.3.1a will be analysed and a minimum adequacy factor obtained. Should this be below 1.0, further checks for reduced loading levels will be made.

BE4:

A standard axle loading up to twin 9 ton axles or a single 11 ton axle will be assessed: this is representative of permitted BE4 C&U vehicles.

(a) Codes to be used

CS 454 - Assessment of highway bridges and structures

CS 459 - The assessment of bridge substructures, retaining structures and buried structures

BE4 - The Assessment of Highway Bridges for Construction and Use Vehicles, 1967

(b) Proposed Method of Structural Analysis

CS 454:

The assessment will be conducted by a mechanism analysis using LimitState RING.

The arch ring thickness will be reduced by 20mm to account for spalling to the arch barrel. 'Mortar Loss' will be taken as 20mm throughout the intrados of the arch. This is due to water percolation associated with the staining across visible faces and mortar loss exhibited across the arch soffit. To account for the apparent flattening of the arch barrel at the crown, a general condition factor of 0.9 will be applied to the assessment results.

The following analysis parameters are proposed for the RING model:

- A characteristic strength of brick masonry of 2.3N/mm^2 will be adopted in the analysis using CS 454 Figure 4.2.7a.
- Unit weight of 18.15kN/m^3 was considered appropriate for gravel fill: (CS 454 Table 4.1.1a).

FORM 'AA' (BRIDGES)

GC/TP0356

ELR / Bridge No: CAP 13m 69ch

Appendix: 4

Issue: 1

Revision: B (Nov 2000)

APPROVAL IN PRINCIPLE FOR ASSESSMENT

- Angle of internal friction for the fill: 30°.
- Unit weight of surfacing material: 23.5kN/m³ (CS 454 Table 4.1.1a).
- Dispersion angle: 26.6° (CS 454 Cl. 6.7).

The spandrels and abutments will be assessed qualitatively.

BE4:

It is proposed to use the modified MEXE method outlined in BE4 Part III to assess the arch barrel capacity. The following factors are proposed for the modified MEXE assessment:

Description	Modifying Factor BE4
Barrel Factor, F_b	0.9
Fill Factor, F_f	0.7
Width of Joint Factor, F_w	0.9
Depth Factor, F_d	0.95
Mortar Factor, F_{mo}	0.95
General Condition Factor of Bridge, F_{cm}	0.9

The spandrels and abutments will be assessed qualitatively.

FORM 'AA' (BRIDGES)**GC/TP0356**

ELR / Bridge No: CAP 13m 69ch

Appendix: 4

Issue: 1

Revision: B (Nov 2000)

APPROVAL IN PRINCIPLE FOR ASSESSMENT**Senior Civil Engineer's Comments**

None

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Proposed Category for Independent Check1

Superstructure1

Substructure1

Name of Checker suggested if Cat 2 or 3Not applicable

Category 1

The above assessment, with amendments shown, is approved in principle:

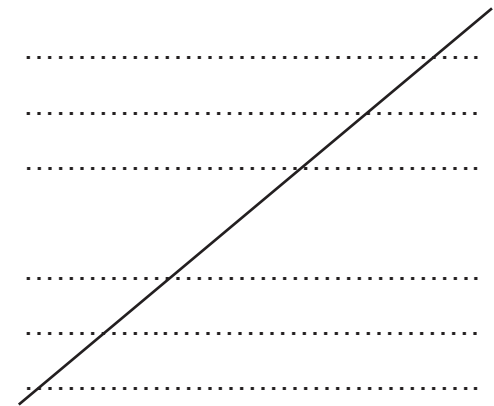
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+Q1'QQ'
TitleSenior Civil Engineer
Date06/05/2025

Category 2 and 3

The above assessment, with amendments shown, is approved in principle:

Signed
Title
Date

Signed
Title
Date



Appendix C. Form BA

FORM 'BA' (BRIDGES)**GC/TP0356**

ELR/ Bridge No: CAP 13m 69ch

Appendix: 4

Issue: 1

Revision: A (Dec 2005)

CERTIFICATION FOR ASSESSMENT CHECK**Assessment Group:** Jacobs UK Ltd**Bridge/Line Name:** Glyntaff Road Bridge/ Caerphilly & Pontypridd**Category of Check:** 1**ELR/ Bridge No:** CAP 13m 69ch

We certify that reasonable professional skill and care have been used in the assessment of the above structure with a view to securing that:

- (1) It has been assessed in accordance with the principles that have been recorded in the accompanying Form AA.
- (2) It has been checked for compliance with the following principal British Standards, Codes of Practice, BRB (Residuary) Limited technical notes and Assessment standards:
- CS 454 - Assessment of highway bridges and structures
 - CS 459 - The assessment of bridge substructures, retaining structures and buried structures
 - BE4 - The Assessment of Highway Bridges for Construction and Use Vehicles, 1967

List any departures from the above and additional methods or criteria adopted, with reference and justification for their acceptance.

None.

Category 1NameSignatureDate

Assessor



CEng MICE



Assessment Checker



Authorised signatory of the firm of Consulting Engineers to whom Assessor/Checker is responsible.

FORM 'BA' (BRIDGES)

GC/TP0356

ELR/ Bridge No: CAP 13m 69ch

Appendix: 4

Issue: 1

Revision: A (Dec 2005)

CERTIFICATION FOR ASSESSMENT CHECK

Category 2 and 3 (Note: Category 1 check must also be signed)

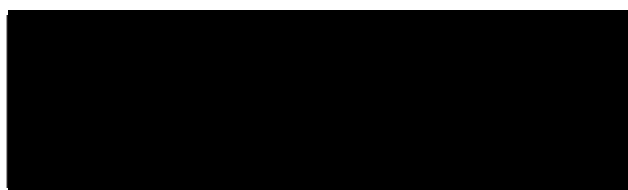
(a) Assessment

<u>Name</u>	<u>Signature</u>	<u>Date</u>
.....	Assessor	
.....	Assessment Checker	
.....	Authorised signatory of the firm of Consulting Engineers to whom Assessor/Checker is responsible.	

(b) Check

<u>Name</u>	<u>Signature</u>	<u>Date</u>
.....	Assessor	
.....	Assessment Checker	
.....	Authorised signatory of the firm of Consulting Engineers to whom Assessor/Checker is responsible.	

This Certificate is accepted by...



FORM 'BAA' (BRIDGES)

GC/TP0356

ELR/ Bridge No CAP 13m 69ch

Appendix: 4

Issue: 1

Revision: A (Dec 2005)

CERTIFICATION FOR ASSESSMENT CHECK

Notification of Assessment Check

Assessment Group	Jacobs UK Ltd.
Bridge Name/Road No.	Glyntaff Road Bridge
Line Name	Caerphilly & Pontypridd
ELR Code/Structure No.	CAP 13m 69ch

The above bridge has been assessed and checked in accordance with Standards which are listed on the appended Form BA. A summary of the results of the assessment in terms of capacity and restrictions is as follows:-

STATEMENT OF CAPACITY

Masonry arch (RING assessment) (MEXE assessment)	CS 454 BE4	13 tonnes GVW Tandem 7 ton axles
Substructure (Qualitative assessment)	CS 454 BE4	Normal Traffic Loading Full C&U Loading
Spandrel Walls (Qualitative assessment)	CS 454 BE4	Normal Traffic Loading Full C&U Loading

Recommended Loading Restrictions

13 tonnes GVW – CS 454 RING assessment
7 ton axles – BE4 MEXE assessment

Description of Structural Deficiencies and Recommended Strengthening

The structure is in poor condition with the arch visibly deformed, showing signs of flattening at the crown. There is extensive water seepage, mortar loss, and spalling across the soffit of the arch.

As this structure is partly infilled already, it is recommended to complete the infill. This would restore the capacity of the structure and provide a maintenance-free solution to the structural issues while removing the Client's liability for the structure. It would also negate the need for examiners to access a confined space.

FORM 'BAA' (BRIDGES)

GC/TP0356

ELR/ Bridge No CAP 13m 69ch

Appendix: 4

Issue: 1

Revision: A (Dec 2005)

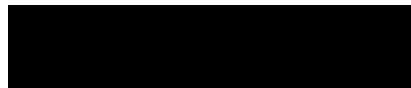
CERTIFICATION FOR ASSESSMENT CHECK

Name

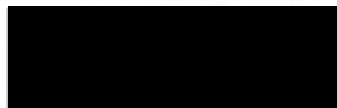
Signature

Date

H. Rae



Assessor

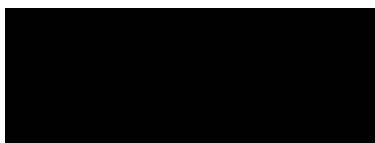


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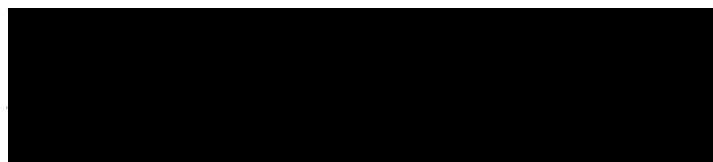
Assessment Checker

...



..... Authorised signatory of the
firm of Consulting
Engineers to whom
Assessor/Checker is
responsible.

This Certificate is accepted by.



Appendix D. Site Investigation Report

Site Investigation Report

Contract No:	HRE1885	Region:	South Wales
Location:	Graig-yr-Helfa Bridge	HRE Engineer:	
Structure Number:	CAP 13m 69ch	Site Start:	04/12/2023
Grid Reference:	ST085894	Site Completion:	08/12/2023

Minor Works Requirement:

- Site investigation as detailed in Jacobs Specification for Site Investigation, July 2023

Summary of work completed:

1. Obtained permits and liaised with the relevant authorities.
2. Provided pedestrian and traffic management over the structure to facilitate trial pits, EDM survey and to segregate the public from the works area.
3. Cleared vegetation and excavated fill beneath the arch to allow access to inspect the soffit.
4. Excavated 1no. trial pits, 0.5m x 0.5m minimum, to expose arch extrados and allow the EDM survey to determine arch barrel thickness.
Please refer to Fig. 1 which provides information obtained from this item of work.
5. Conducted an EDM survey to capture the profile of the arch barrel including springing levels and deck/carriageway levels.
6. Produced a general arrangement drawing of the structure showing the fill depth measured from the survey levels and arch barrel thickness.
Please refer to Fig. 2 which provides the deliverables relating to this work.
7. Provided site support to Jacobs, including welfare and Safe System of Work (SSoW) to allow close and full examination of all elements of the structure.

Figure 1.

Hammond excavated 1no. trial pit, 0.5m x 0.5m in plan, to expose the arch extrados and allow the EDM survey to determine arch barrel thickness.

Results from the trial pit

Included below is a cross-sectional drawing of the trial pit, showing tarmac layer, carriageway fill and arch thickness.

Also included is a screenshot taken from Centre Point Surveys Topographical Survey Drawing. (Drawing no. HAM_26082023_2D).

Please note that pink levels are the base of the excavation and green levels are road surface levels.

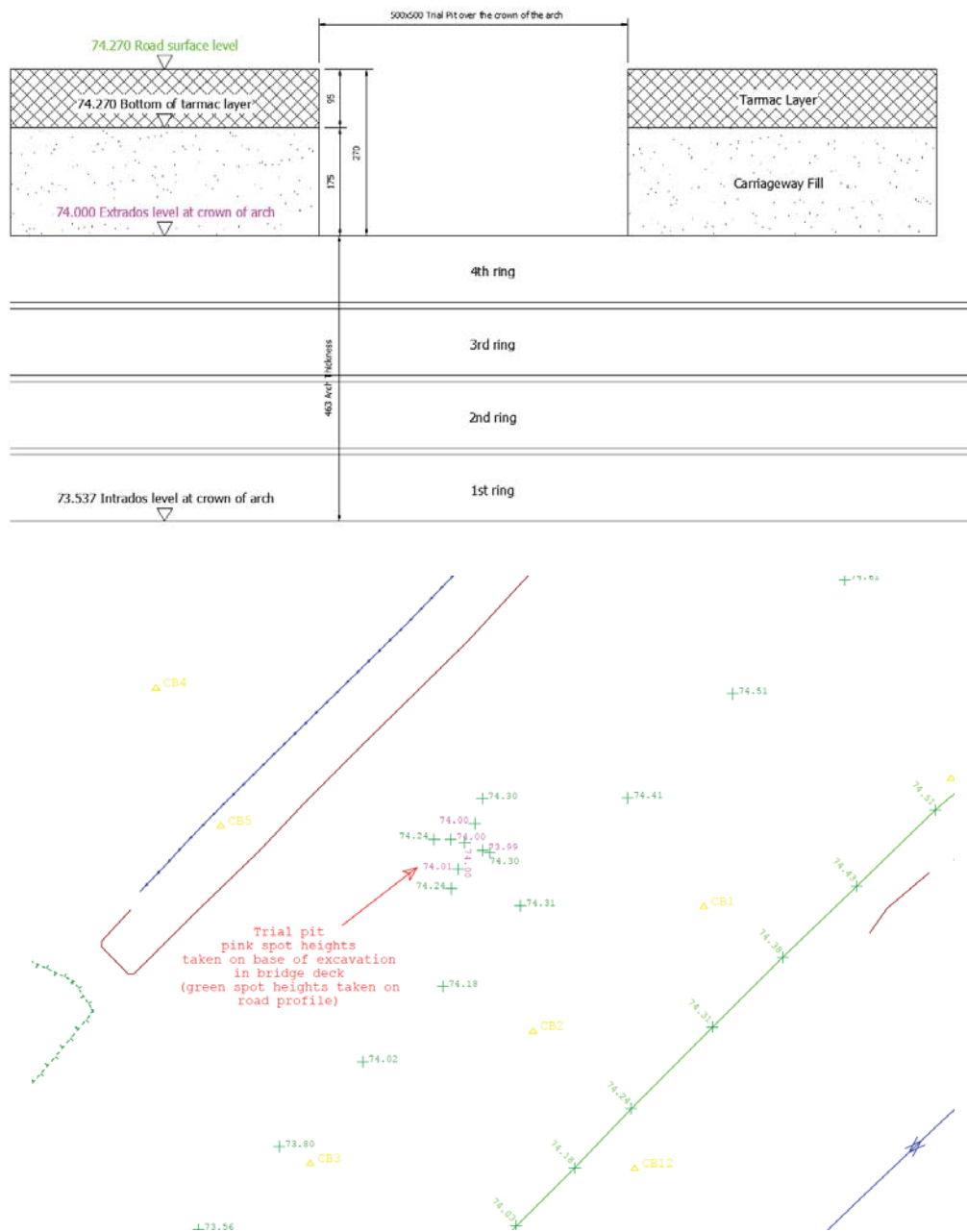




Figure 2.

Hammond contracted Centre Point Surveys and CUB³D who conducted an EDM survey to capture the profile of the arch barrel including springing levels and deck/carriageway levels.

They produced a general arrangement drawing of the structure showing the fill depth measured from the survey levels and arch barrel thickness.

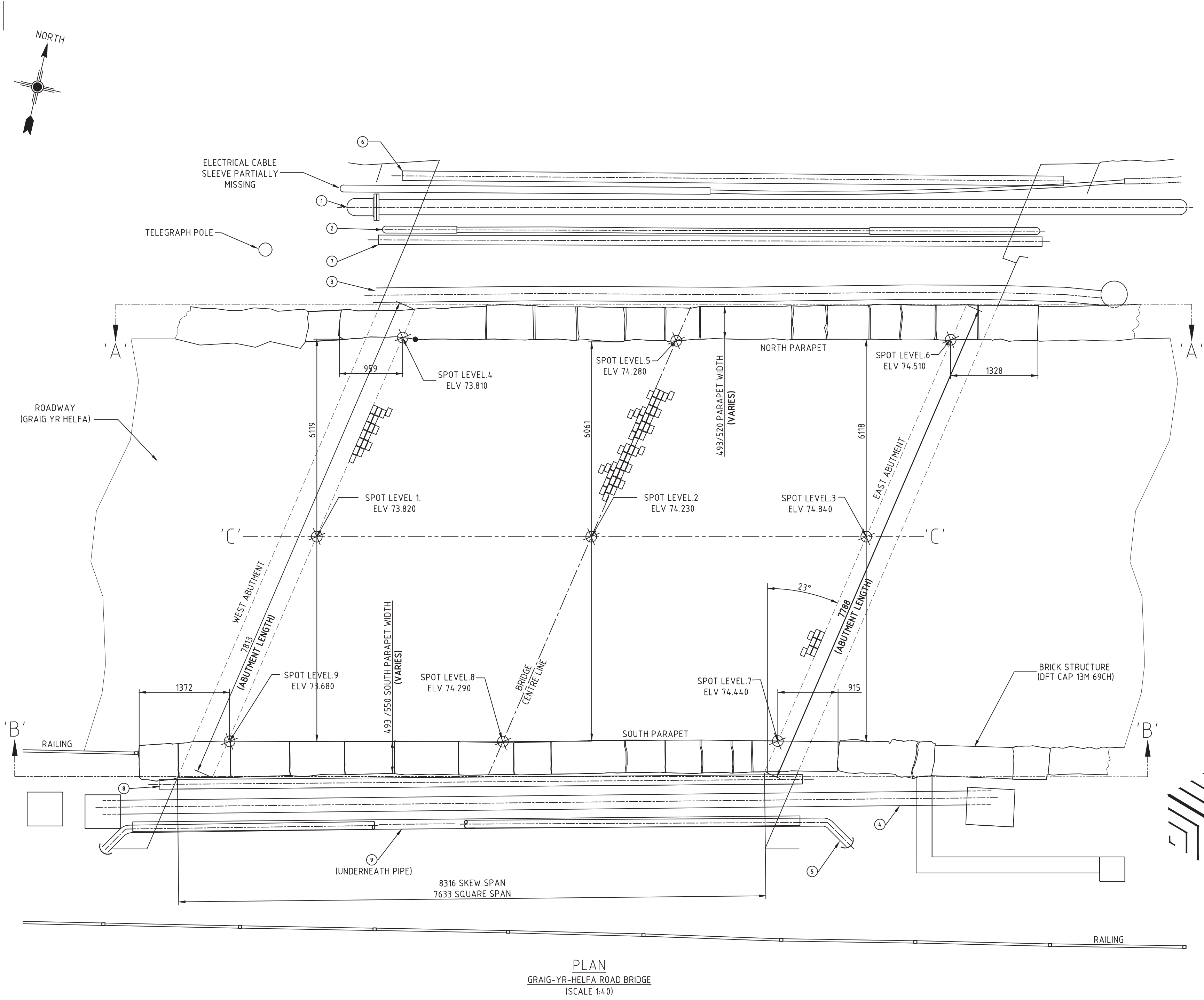
The following drawings are provided in the report and included as separate PDF and DWG documents.

Drawings from CUB³D

- Plan Drawing. (CPS-23-038-GA-1000 rev.C0)
- Elevation North and South Parapet Drawing. (CPS-23-038-GA-1001 rev.C0)
- Mid Span Section Drawing. (CPS-23-038-GA-1002 rev.C0)

Drawings from Centre Point Surveys

- Topographical Survey Drawing. (Drawing no. HAM_26082023_2D)

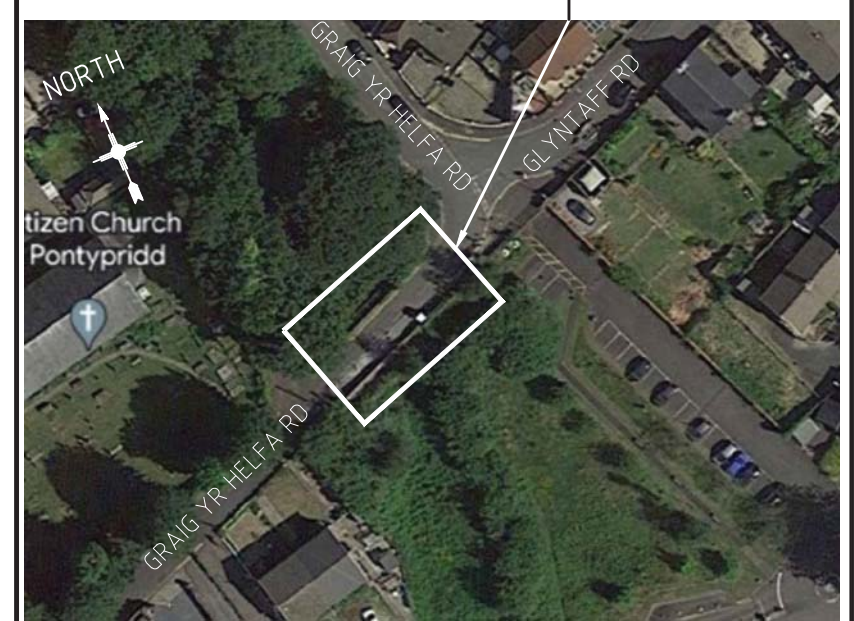


PLAN
GRAIG-YR-HELFA ROAD BRIDGE
(SCALE 1:40)

NOTES

1. ALL DIMENSIONS ARE GIVEN IN MILLIMETRES UNLESS NOTED OTHERWISE.
2. ALL LEVELS ARE GIVEN IN METRES AND ARE RELATIVE TO ORDNANCE SURVEY DATUM.

THIS DRAWING
STRUCTURE REF:
CAP/13M 69CH



KEY PLAN

PIPE = ①②③④⑤
METAL GIRDER = ⑥⑦⑧⑨

REFERENCE DRAWINGS

CPS-23-038-GA-1001 - ELEVATION
CPS-23-038-GA-1002 - SECTION

REV	DATE	DESCRIPTION OF REVISION
A0	29.09.23	ISSUED FOR REVIEW
A0	03.10.23	ISSUED AS COMPLETE

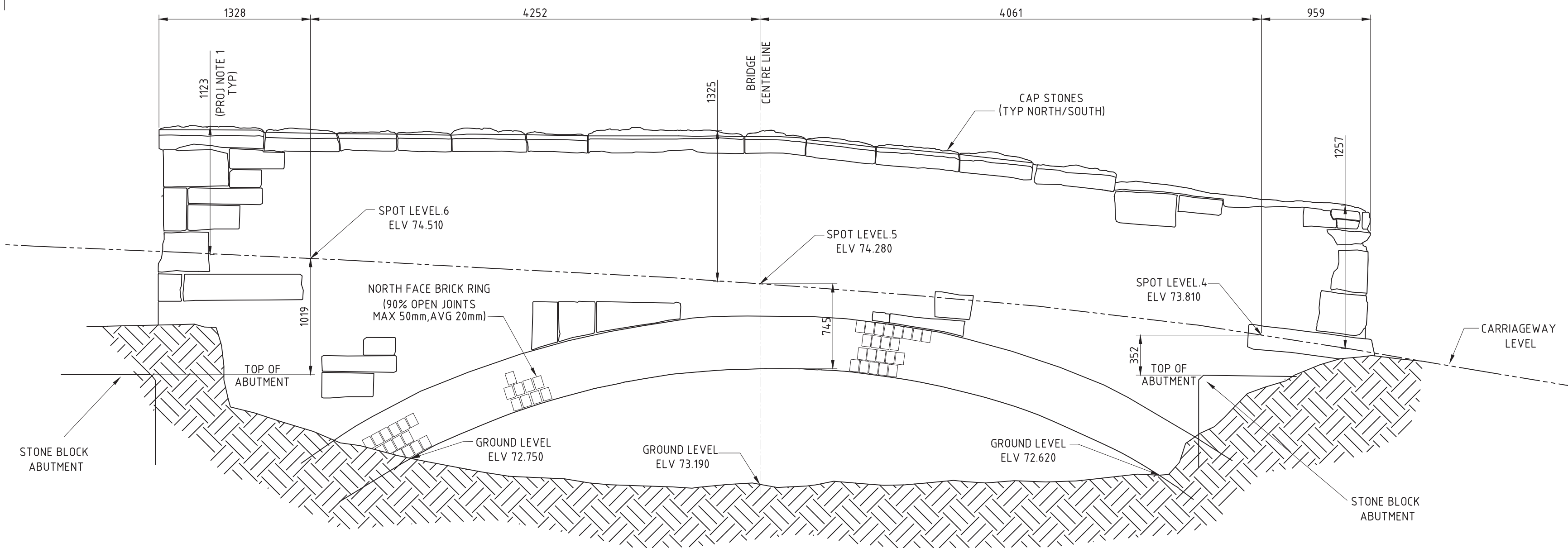
CENTRE POINT SURVEYS LTD
LAND SURVEYORS & SITE ENGINEERING
21 The Crescent, Cwmdare,
Aberdare, Mid Glamorgan.
CF44 8TN
Tel/Fax: 01685 871944



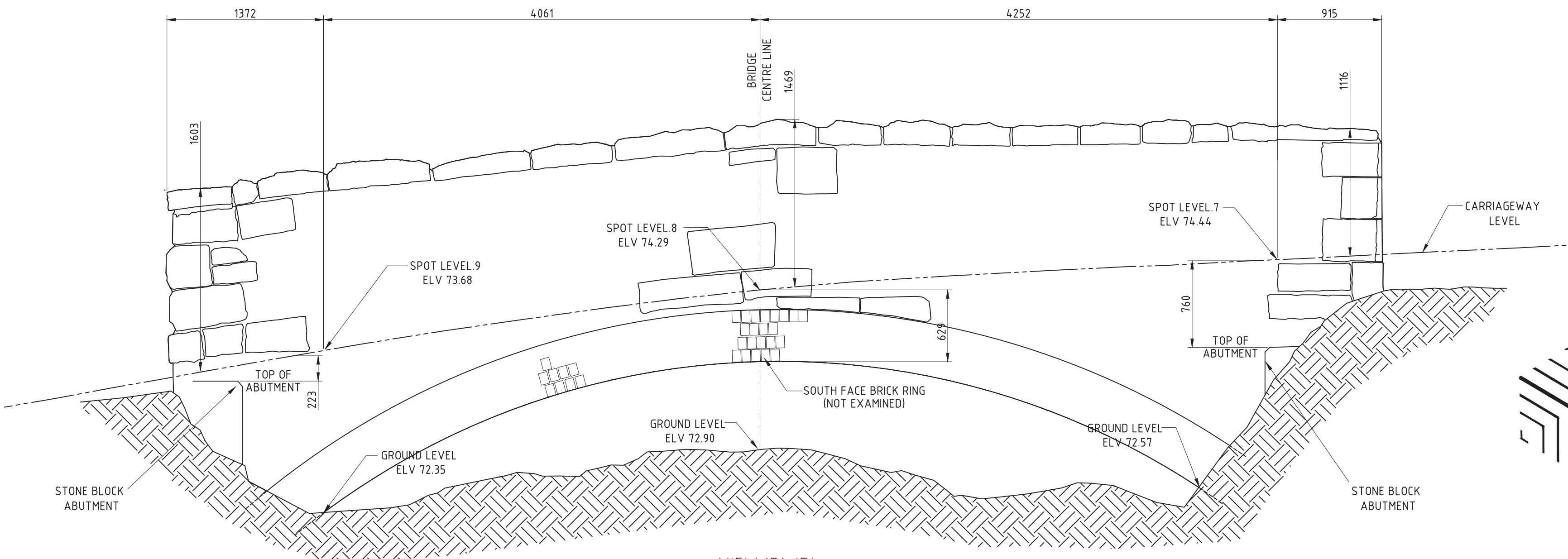
DRAWN S.W. DATE	CHECKED L.C. DATE	APPROVED N.C. DATE
03.10.23	03.10.23	03.10.23

PLAN
GRAIG YR HELFA ROAD BRIDGE
(BRIDGE CAP 13M 69CH)

PROJECT No.	Sht No.	SCALE
C3D-CPS-23-038	01	1:40



VIEW 'A'-'A'
NORTH FACE PARAPET
(SCALE 1:30)



VIEW 'B'-'B'
SOUTH FACE PARAPET
(SCALE 1:30)

PROJECT NOTE

1. NORTH & SOUTH PARAPET HEIGHT DIMENSION FROM TOP OF ROAD TO TOP OF CAP STONE.

NOTES

1. ALL DIMENSIONS ARE GIVEN IN MILLIMETRES UNLESS NOTED OTHERWISE.
2. ALL LEVELS ARE GIVEN IN METRES AND ARE RELATIVE TO ORDNANCE SURVEY DATUM.

REFERENCE DRAWINGS

CPS-23-038-GA-1000 - PLAN VIEW
CPS-23-038-GA-1002 - SECTION

REV	DATE	DESCRIPTION OF REVISION
A0	29.09.23	ISSUED FOR REVIEW
C0	03.10.23	ISSUED AS COMPLETE

CENTRE POINT SURVEYS LTD
LAND SURVEYORS & SITE ENGINEERING
21 The Crescent, Cwmdare,
Aberdare, Mid Glamorgan.
CF44 8TN
Tel/Fax: 01685 871944



CUB³D

6 Cedar Court
Havens Head Business Park
Milford Haven,
Pembrokeshire.
SA73 3LS

DRAWN S.W. DATE	CHECKED L.C. DATE	APPROVED N.C. DATE
03.10.23	03.10.23	03.10.23

ELEVATION NORTH & SOUTH PARAPET
GRAIG YR HELFA ROAD BRIDGE
(BRIDGE CAP 13M 69CH)

PROJECT No.	ShT No.	SCALE
C3D-CPS-23-023	01	1:30

DRAWING NUMBER	REVISION
CPS-23.038-GA-1001	C0

- NOTES
1.

ALL DIMENSIONS ARE GIVEN IN MILLIMETRES UNLESS NOTED OTHERWISE.
2.

ALL LEVELS ARE GIVEN IN METRES AND ARE RELATIVE TO ORDNANCE SURVEY DATUM.

REFERENCE DRAWINGS

CPS-23-038-GA-1000 - PLAN VIEW

CPS-23-038-GA-1001 - ELEVATION

REV	DATE	DESCRIPTION OF REVISION
A0	29.09.23	ISSUED FOR REVIEW
C0	03.10.23	ISSUED AS COMPLETE

CENTRE POINT SURVEYS LTD

LAND SURVEYORS & SITE ENGINEERING



21 The Crescent, Cwmdare,
Aberdare, Mid Glamorgan.
CF44 8TN
Tel/Fax: 01685 871944



DRAWN S.W DATE	CHECKED L.C DATE	APPROVED N.C DATE
03.10.23	03.10.23	03.10.23

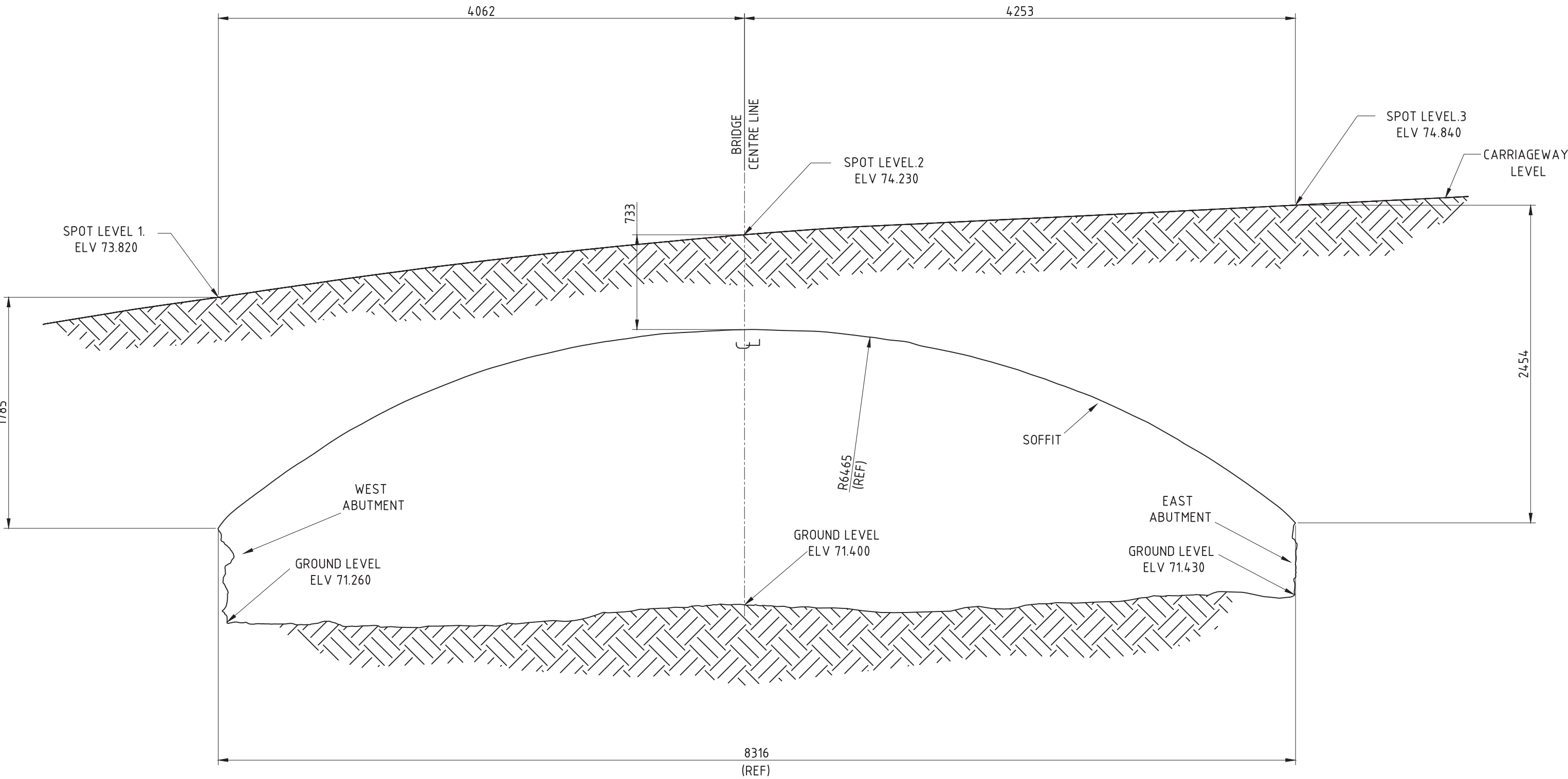
MID SPAN SECTION

GRAIG YR HELFA ROAD BRIDGE

(BRIDGE CAP 13M 69CH)

PROJECT No.	Sht No.	SCALE
C3D-CPS-23-038	01	1:30

DRAWING NUMBER	REVISION
CPS-23-038-GA-1002	C0



MID SPAN SECTION 'C'-'C'

SPOT LEVEL POSITIONS

(SCALE 1:30)



Station	Eastwing	Northing	Level
C81	308545.949	189453.328	71.588
C85	308545.685	189453.659	71.598
C83	308540.739	189449.899	71.351
C84	308530.684	189456.250	73.222
C85	308545.445	189449.907	71.685
C86	308544.782	189460.441	73.578
C87	308543.887	189459.299	73.587
C88	308540.745	189446.115	74.762
C89	308542.747	189448.231	74.782
R10	308542.000	189448.001	74.782
C811	308545.733	189453.524	75.170
C812	308545.603	189449.822	74.850
C813	308545.078	189450.666	74.850
G1	308564.336	189476.136	75.938
G2	308549.227	189455.641	74.539
G3	308551.004	189457.977	84.408
R1	308568.922	189468.677	79.251
R2	308571.121	189476.458	79.958

LEGEND

	15%L		RN
	ARROW RIGHT		BOLLARD
	ARROW AHEAD		B TELECOM WHOLE
	ARROW LEFT		CCTV POST
	ARMO BARRIER		RAN WATER PIPE
	ARROW RIGHT		DRAW PIT CHAMBER
	BOTTOM BANK		ELEC. WIRE
	BENCH		ELECTRIC POLE
	BUILDING		EARTH ROD
	BUILDING OPEN		FIRE HYDRANT
	BASE PLATE		GATE POST
	BASE WALL		GPS STATION
	CHANNEL		GALLEY
	CABINET		GAS VALVE
	C_CROWNED_FENCE		HYDRANT VALVE
	CONCRETE		INSPECTION COVER
	CHANGE SURFACE		INTERCOM POINT
	CANOPY		JUNCTION BOX
	DROP KERB		LAMP POLE
	DRAIN		MAN HOLE
	EDGE OVERGROWTH		MANHOLE CIRCULAR
	FENCE		GAS MARKER
	FOOTPATH		MARKER
	PAUSADE FENCE		POST
	GATE		RODDING EYE
	IC		ROLLER
	DUCT LINE		ROAD SIGN
	OVER HEAD LINE		SPOT LEVEL
	POST & RAIL		STOP VALVE
	ROAD SIGN		TREE
	TOP OF BANK		TOP BASE LEVEL
	TOP OF DITCH		TELEGRAPH POST
	THRESHOLD		PLATE LEVEL
	TOP OF KERB		TOP + SLEEPER
	TRACK		TOP OF WALL
	TOP OF WALL		WATER CANNON
	ROAD SIGN 0.075M DIA. POLE		ROAD SIGN ILLUMINATED
	VISI RAIL		UNDER SIDE SIGN LEVEL
	COOPER BN.		
	BREAK SLOPE		
	HAND RAIL		
	RAILWAY		
	STEPS		

	Survey coordinated to O.S. by G.P.S. methods. ODN19 Coordinate System Local scale factor removed														
CLIENT	Harrowood EDS Ltd Canal Road Kembsley Rhonda Cynon Taff CF44 0AE														
DRAWING TITLE & SCHEME	Bridge CAP 13M 69CH Glyntaff Road Bridge Topographic Survey 2023														
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Drawing Number		Drawn By :	DB												
HAM_200802023_2D															
Date :	Scale	Checked :													
04/01/2024	1 : 50 A3		0000												

Appendix E. Calculations

CALCULATION COVER SHEET

Jacobs

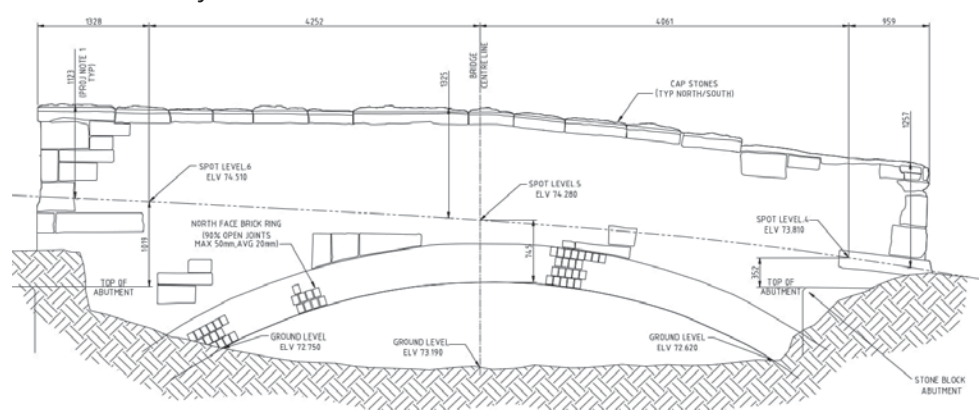
Project Title: HRE Assessment Programme		Calc. No.:	0451742
Job No: B38380BA		File:	CAP 13m 69ch Calcs
Project Manager		Subject: CAP 13m 69ch Glyntaff Road Bridge, Pontypridd, Rhondda Cyon Taf CS 454 Assessment	
Assessor			
Project Group	31200		

	Total Sheets	Made by	Date	Checked by	Date	Reviewed by	Date		
Original			Mar-25		Apr-25		Apr-25		
Rev									
Rev									
Rev									
Rev									
Rev									

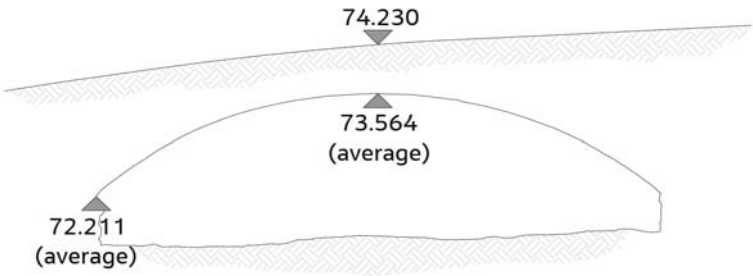
Superseded by Calculation No.	Date
For assessment criteria, refer to Approval in Principle (Form AA) document	

Office	Glasgow		Calc No.	0451742
Title	VAR9/7410 HRE CS 454 Assessment	Originator		Date Mar-25
Section	CAP 13m 69ch - Geometry	Checker		Date Apr-25

CAP 13m 69ch Survey Sketch of North Elevation



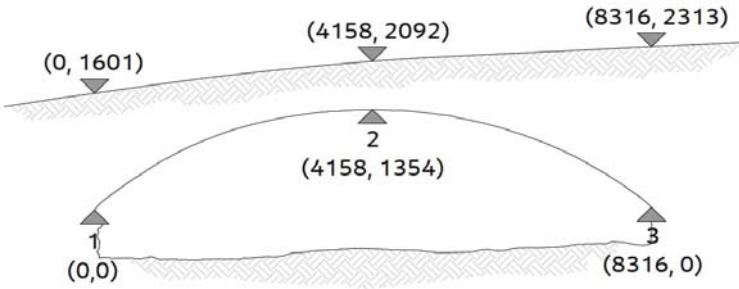
Arch cross section (showing average rise crown and springer levels for analysis)



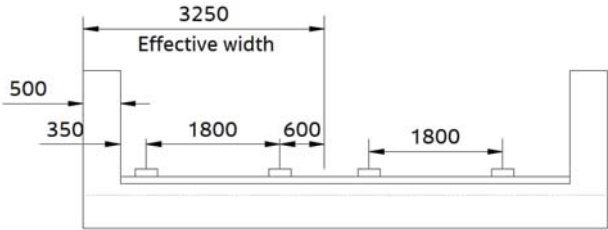
Span
Rise at crown
Arch thickness

8316 mm
1354 mm
460 mm

Global Road & Arch Coordinates:



Effective width



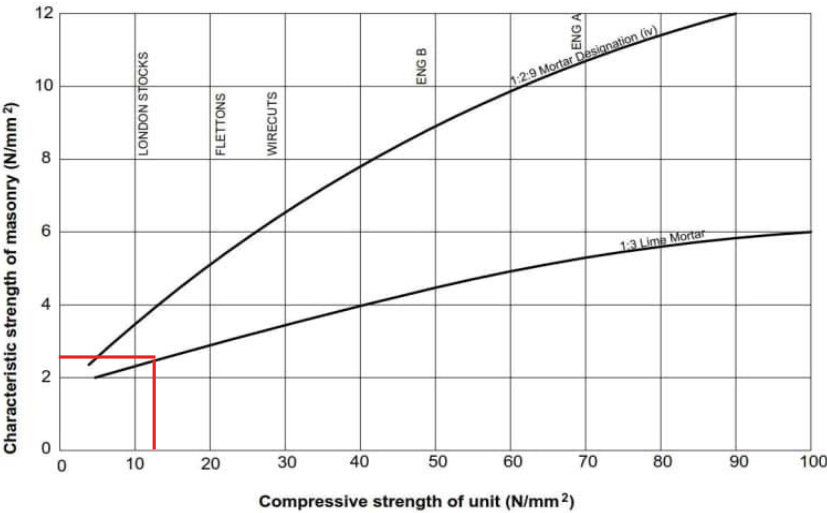
Bridge width	=	6.1	m						
Wheel spacing	=	1.8	m						
Effective width	=	0.5	+	0.35	+	1.8	+	0.6	= 3.25 m

Office	Glasgow			Calc No.	0451742
Title	VAR9/7410 HRE CS 454 Assessment	Originator		Date	Mar-25
Section	CAP 13m 69ch - Material Properties	Checker		Date	Apr-25

CS 454
Fig. 4.2.7a

Masonry Properties

The arch barrel is constructed from common red brick. Use CS 454 Figure 4.2.7a to estimate strength.



Characteristic strength

Density

2100 kg/m³

2.3 N/mm²
20.58 kN/m³

Fill Properties

Backfill material - granular material

Assume internal angle of friction

Earth pressure coefficient

The earth pressure coefficient has been set as 1.0 as limitation on the deformation is already accounted for in the live load capacity factor, C.

Surfacing Material - Macadam (tar), Density 2400 kg/m³

1850 kg/m³

18.15 kN/m³
30 °
1

23.5 kN/m³

Office	Glasgow			Calc No.	0451742
Title	VAR9/7410 HRE CS 454 Assessment	Originator		Date	Mar-25
Section	CAP 13m 69ch - Live Loading	Checker		Date	Apr-25
CS 454 Table 5.9a	Safety factors An impact factor for 'poor' surface category will be applied to the critical axle A traffic flow factor for 'low' traffic flow category shall be applied Partial factor for vertical traffic loads - normal traffic and restricted traffic				1.8 0.90 1.5
CS 454 cl. 7.2.1	Capacity factor	For normal and restricted traffic		γ_{fl} C_{min}	1.20

LimitState:RING idealizes a masonry arch bridge as an assemblage of rigid blocks and uses computational limit analysis methods to directly model the mode of response. The factor that would, when applied to the specified live loads, lead to the ULS (collapse) or PLS (service load limit) being reached is reported, unless in support movement mode. This factor is termed the Adequacy Factor. When appropriate partial factors are included in the model, the Adequacy Factor should be greater than 1.0 for a safe and serviceable structure, considering the ULS and PLS respectively.

For more information, refer to the LimitState:RING User Manual.

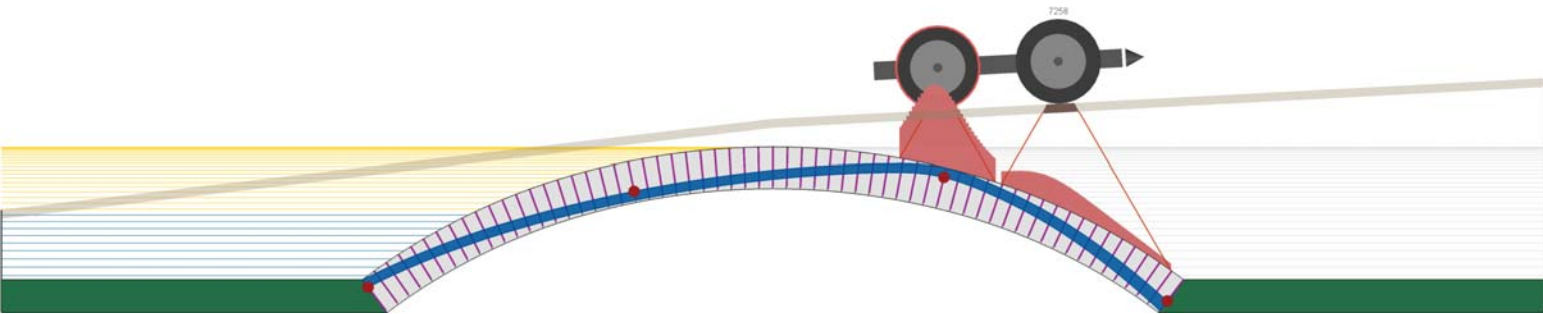
Summary

Bridge name	Location	Reference No.	Map reference
Glyntaff Road Bridge	Pontypridd, Rhondda Cynon Taf	0451742	ST 085 894

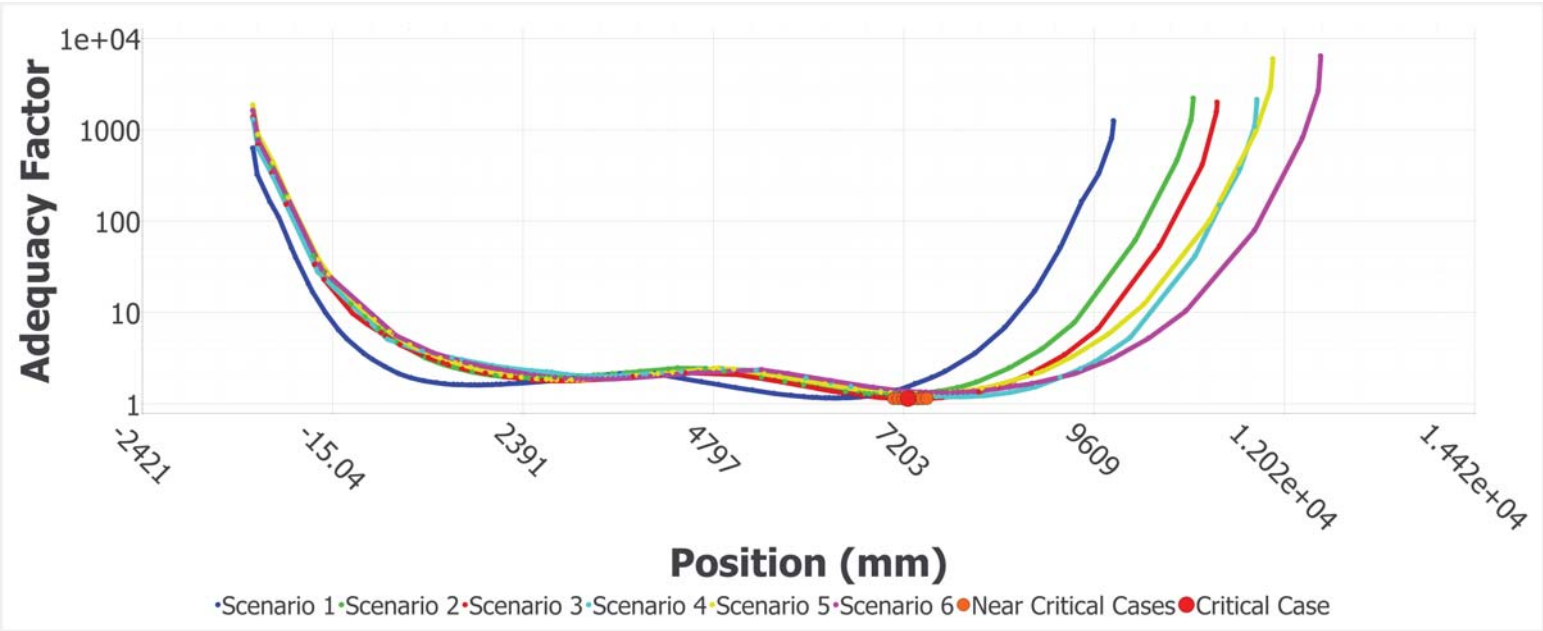
Bridge type	Name of assessor	Assessing organization	Date of assessment
Highway		Jacobs	Wed Apr 9 2025

Analysis result	Analysis Type	Solver
Adequacy factor = 1.13764; Scenario 3 @ 7258mm (this is the critical case)	ULS	CLP

Mode of response at current load case



Adequacy Factor vs Load Position



Unless specified otherwise, the following units are used throughout this report:

Distance	Force (per m width)	Moment (per m width)	Angle	Unit weight	Material strength
mm	kN	kNm	Degrees	kN/m ³	N/mm ²

* = per metre width

Effective Bridge Width

Calculation	Width (mm)
User specified	3250

Geometry

Global

No. Spans	Effective bridge width
1	3250

Span 1

Span 1:	Type	Shape	No. Rings
	Multi-ring	Multi-segment	1
Intrados points:			
	x	y	
	0	0	
	2079	1047	
	4158	1345	
	6238	1047	
	8316	0	
Ring 1:	No. Blocks	Ring thickness	
	60	440	

Fill Profile Properties

x	y	Surface fill depth
0	1506	95
4158	1997	95
8316	2218	95

Coordinates relative to left intrados springing of Span 1

Partial Factors

Name	Application	Type	Value
Load effects factor	Load effects factor	Multiplier	0.9
Vehicle loads	Axle load	Multiplier	1.5
	Dynamic / impact	Multiplier	1.8
Material loads	Surface fill unit weight	Multiplier	1

Name	Application	Type	Value
	Masonry unit weight	Multiplier	1
	Fill unit weight	Multiplier	1
Material strength	Masonry compressive strength	Divisor	1
	Masonry shear bond strength	Divisor	1
	Masonry friction	Divisor	1

Material Properties

Masonry

Property	Value
Unit weight	20.58
Model crushing	Yes
Compressive strength	2.3
Model radial sliding	No
Radial friction	Varies
Radial shear	Varies
Model inter-ring sliding	No
Inter-ring friction	Varies
Inter-ring shear	Varies

Backfill Basic Properties

Unit weight	Angle of friction	Cohesion	Model live load dispersion	Model horizontal pressures	Backing compressive strength
18.15	30	0	Yes	Yes	5

Backfill Advanced Properties

Property	Value
Live load dispersion type	Boussinesq
Cutoff angle	30
Soil arch interface: Friction multiplier	0.66
Soil arch interface: Adhesion multiplier	0.5

Backfill spandrel zone parameters

Parameter	ULS / PLS	Active / Passive	Value
Factor ma	ULS	Active	0
maKa	ULS	Active	0
Factor mp	ULS	Passive	0.33
mpKp	ULS	Passive	1
Factor mpc	ULS	Passive	0.05
mpcKpc c	ULS	Passive	0
mpKp >= 1	ULS	Passive	Yes

Auto apply horizontal pressures = Yes

Position	Horizontal pressures
Abutment 0	Auto
Abutment 1	Auto

Surface Fill

Unit weight	Angle of dispersion of live loads
23.5	26.6

Vehicles

Name	Axle #	Force	Local position	Width	Contact
Default 100kN Single Axle	1	100	0	1800	300
[18t+ GVW] 11.5t Single Axle (CS454)	1	112.82	0	1800	300
[Normal GVW] 2x 8t, 1.0m Axle Spacing (CS454)	1	78.48	0	1800	300
[Normal GVW] 2x 8t, 1.0m Axle Spacing (CS454)	2	78.48	-1000	1800	300
[26t+ GVW] 2x 9.5t, 1.3m Axle Spacing (CS454)	1	93.2	0	1800	300
[26t+ GVW] 2x 9.5t, 1.3m Axle Spacing (CS454)	2	93.2	-1300	1800	300
[Normal GVW] 2x 10t, 1.8m Axle Spacing (CS454)	1	98.1	0	1800	300
[Normal GVW] 2x 10t, 1.8m Axle Spacing (CS454)	2	98.1	-1800	1800	300
[Normal GVW] 3x 8t, 1.3m Axle Spacing (CS454)	1	78.48	0	1800	300
[Normal GVW] 3x 8t, 1.3m Axle Spacing (CS454)	2	78.48	-1300	1800	300
[Normal GVW] 3x 8t, 1.3m Axle Spacing (CS454)	3	78.48	-2600	1800	300
[Normal GVW] 3x 7t, 1.0m Axle Spacing (CS454)	1	68.67	0	1800	300
[Normal GVW] 3x 7t, 1.0m Axle Spacing (CS454)	2	68.67	-1000	1800	300
[Normal GVW] 3x 7t, 1.0m Axle Spacing (CS454)	3	68.67	-2000	1800	300

Critical Load Cases

Scenario	Type	Vehicle	Position	Direction	Effective Width	Dynamic Axles	Adequacy Factor
Scenario 1	Auto	[18t+ GVW] 11.5t Single Axle (CS454)	6322	Left to right	3250	1	1.158

Scenario	Type	Vehicle	Position	Direction	Effective Width	Dynamic Axles	Adequacy Factor
Scenario 2	Auto	[Normal GVW] 2x 8t, 1.0m Axle Spacing (CS454)	7061	Left to right	3250	2	1.257
Scenario 3	Auto	[26t+ GVW] 2x 9.5t, 1.3m Axle Spacing (CS454)	7258	Left to right	3250	2	1.138
Scenario 4	Auto	[Normal GVW] 2x 10t, 1.8m Axle Spacing (CS454)	7798	Left to right	3250	2	1.192
Scenario 5	Auto	[Normal GVW] 3x 7t, 1.0m Axle Spacing (CS454)	7490	Left to right	3250	2	1.293
Scenario 6	Auto	[Normal GVW] 3x 8t, 1.3m Axle Spacing (CS454)	7755	Left to right	3250	2	1.324

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For more information, refer to the LimitState:RING User Manual.

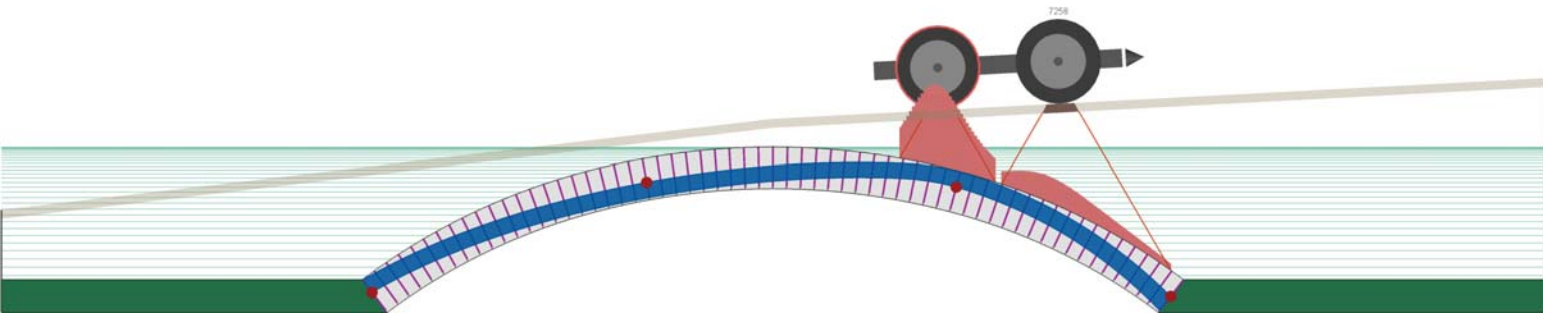
Summary

Bridge name	Location	Reference No.	Map reference
Glyntaff Road Bridge	Pontypridd, Rhondda Cyon Taf	0451742	ST 085 894

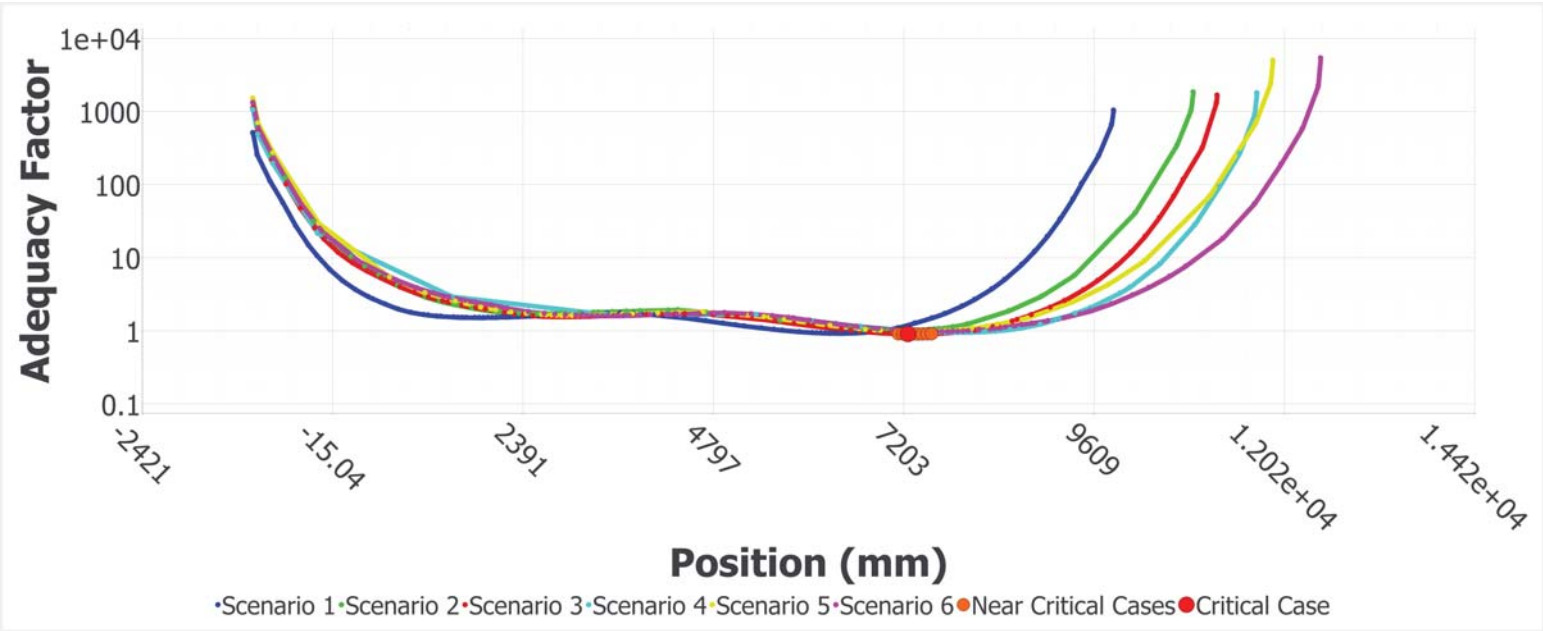
Bridge type	Name of assessor	Assessing organization	Date of assessment
Highway		Jacobs	Wed Apr 9 2025

Analysis result	Analysis Type	Solver
Adequacy factor = 0.900501; Scenario 3 @ 7258mm (this is the critical case)	PLS	CLP

Mode of response at current load case



Adequacy Factor vs Load Position



Unless specified otherwise, the following units are used throughout this report:

Distance	Force (per m width)	Moment (per m width)	Angle	Unit weight	Material strength
mm	kN	kNm	Degrees	kN/m ³	N/mm ²

* = per metre width

Effective Bridge Width

Calculation	Width (mm)
User specified	3250

Geometry

Global

No. Spans	Effective bridge width
1	3250

Span 1

Span 1:	Type	Shape	No. Rings
	Multi-ring	Multi-segment	1
Intrados points:			
	x	y	
	0	0	
	2079	1047	
	4158	1345	
	6238	1047	
	8316	0	
Ring 1:	No. Blocks	Ring thickness	
	60	440	

Fill Profile Properties

x	y	Surface fill depth
0	1506	95
4158	1997	95
8316	2218	95

Coordinates relative to left intrados springing of Span 1

Partial Factors

Name	Application	Type	Value
Load effects factor	Load effects factor	Multiplier	0.9
Vehicle loads	Axle load	Multiplier	1
	Dynamic / impact	Multiplier	1.8
Material loads	Surface fill unit weight	Multiplier	1

Name	Application	Type	Value
	Masonry unit weight	Multiplier	1
	Fill unit weight	Multiplier	1
Material strength	Masonry compressive strength	Divisor	2
	Masonry shear bond strength	Divisor	2
	Masonry friction	Divisor	1

Material Properties

Masonry

Property	Value
Unit weight	20.58
Model crushing	Yes
Compressive strength	2.3
Model radial sliding	No
Radial friction	Varies
Radial shear	Varies
Model inter-ring sliding	No
Inter-ring friction	Varies
Inter-ring shear	Varies

Backfill Basic Properties

Unit weight	Angle of friction	Cohesion	Model live load dispersion	Model horizontal pressures	Backing compressive strength
18.15	30	0	Yes	Yes	5

Backfill Advanced Properties

Property	Value
Live load dispersion type	Boussinesq
Cutoff angle	30
Soil arch interface: Friction multiplier	0.66
Soil arch interface: Adhesion multiplier	0.5

Backfill spandrel zone parameters

Parameter	ULS / PLS	Active / Passive	Value
Factor maKa	PLS	Active	1
Factor mpKp	PLS	Passive	1

Auto apply horizontal pressures = Yes

Horizontal pressures

Position	Horizontal pressures
Abutment 0	Auto
Abutment 1	Auto

Unit weight	Angle of dispersion of live loads
23.5	26.6

Vehicles

Name	Axle #	Force	Local position	Width	Contact
Default 100kN Single Axle	1	100	0	1800	300
[18t+ GVW] 11.5t Single Axle (CS454)	1	112.82	0	1800	300
[Normal GVW] 2x 8t, 1.0m Axle Spacing (CS454)	1	78.48	0	1800	300
[Normal GVW] 2x 8t, 1.0m Axle Spacing (CS454)	2	78.48	-1000	1800	300
[26t+ GVW] 2x 9.5t, 1.3m Axle Spacing (CS454)	1	93.2	0	1800	300
[26t+ GVW] 2x 9.5t, 1.3m Axle Spacing (CS454)	2	93.2	-1300	1800	300
[Normal GVW] 2x 10t, 1.8m Axle Spacing (CS454)	1	98.1	0	1800	300
[Normal GVW] 2x 10t, 1.8m Axle Spacing (CS454)	2	98.1	-1800	1800	300
[Normal GVW] 3x 8t, 1.3m Axle Spacing (CS454)	1	78.48	0	1800	300
[Normal GVW] 3x 8t, 1.3m Axle Spacing (CS454)	2	78.48	-1300	1800	300
[Normal GVW] 3x 8t, 1.3m Axle Spacing (CS454)	3	78.48	-2600	1800	300
[Normal GVW] 3x 7t, 1.0m Axle Spacing (CS454)	1	68.67	0	1800	300
[Normal GVW] 3x 7t, 1.0m Axle Spacing (CS454)	2	68.67	-1000	1800	300
[Normal GVW] 3x 7t, 1.0m Axle Spacing (CS454)	3	68.67	-2000	1800	300

Critical Load Cases

Scenario	Type	Vehicle	Position	Direction	Effective Width	Dynamic Axles	Adequacy Factor
Scenario 1	Auto	[18t+ GVW] 11.5t Single Axle (CS454)	6430	Left to right	3250	1	0.9199
Scenario 2	Auto	[Normal GVW] 2x 8t, 1.0m Axle Spacing (CS454)	7120	Left to right	3250	2	0.9933

Scenario	Type	Vehicle	Position	Direction	Effective Width	Dynamic Axles	Adequacy Factor
Scenario 3	Auto	[26t+ GVW] 2x 9.5t, 1.3m Axle Spacing (CS454)	7258	Left to right	3250	2	0.9005
Scenario 4	Auto	[Normal GVW] 2x 10t, 1.8m Axle Spacing (CS454)	7861	Left to right	3250	2	0.9443
Scenario 5	Auto	[Normal GVW] 3x 7t, 1.0m Axle Spacing (CS454)	7362	Left to right	3250	2	0.9756
Scenario 6	Auto	[Normal GVW] 3x 8t, 1.3m Axle Spacing (CS454)	7621	Left to right	3250	2	0.9711

LimitState:RING idealizes a masonry arch bridge as an assemblage of rigid blocks and uses computational limit analysis methods to directly model the mode of response. The factor that would, when applied to the specified live loads, lead to the ULS (collapse) or PLS (service load limit) being reached is reported, unless in support movement mode. This factor is termed the Adequacy Factor. When appropriate partial factors are included in the model, the Adequacy Factor should be greater than 1.0 for a safe and serviceable structure, considering the ULS and PLS respectively.

For more information, refer to the LimitState:RING User Manual.

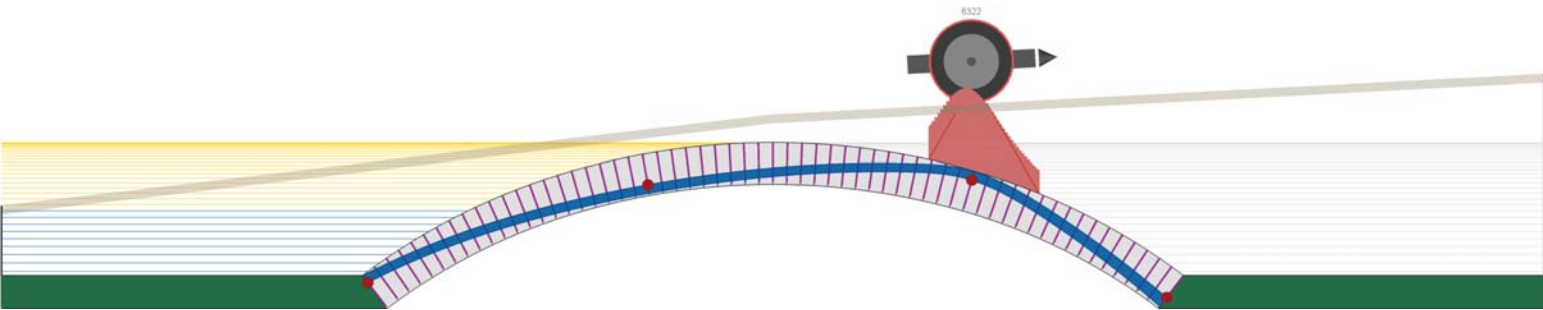
Summary

Bridge name	Location	Reference No.	Map reference
Glyntaff Road Bridge	Pontypridd, Rhondda Cynon Taf	0451742	ST 085 894

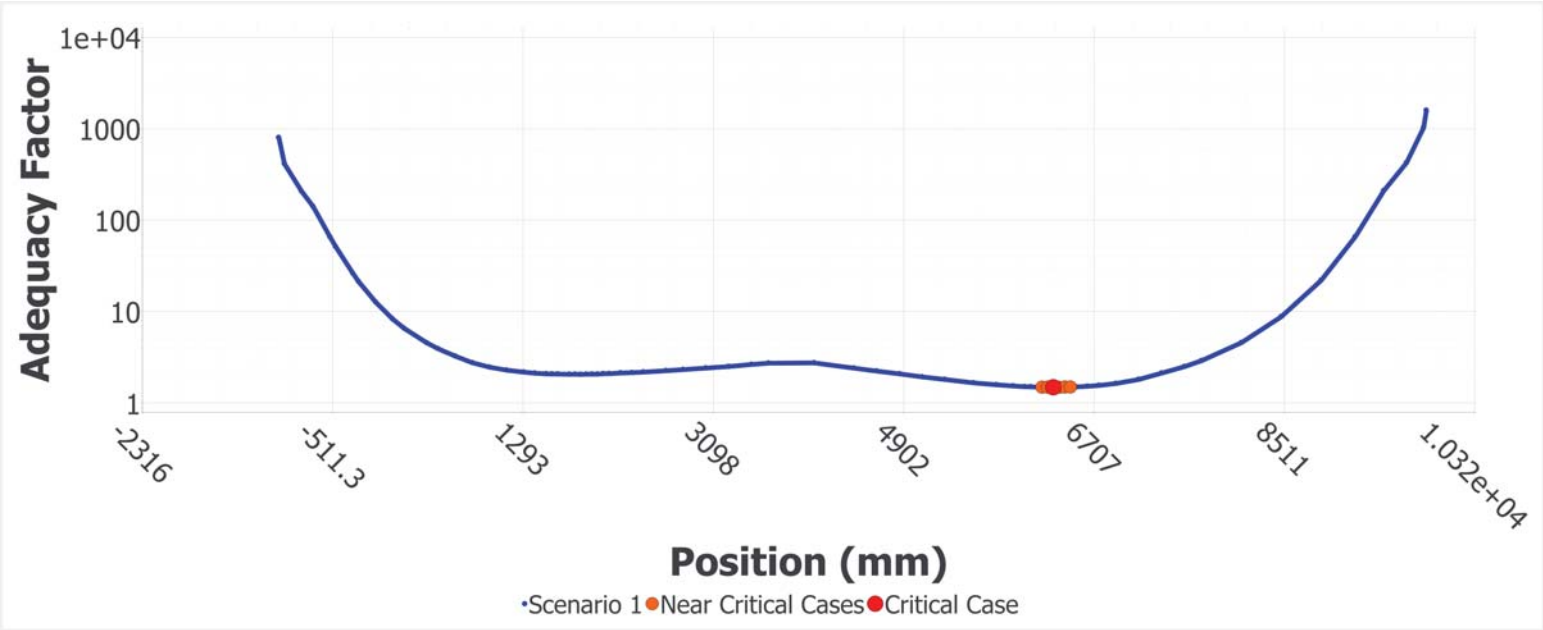
Bridge type	Name of assessor	Assessing organization	Date of assessment
Highway		Jacobs	Wed Apr 9 2025

Analysis result	Analysis Type	Solver
Adequacy factor = 1.4795; Scenario 1 @ 6322mm (this is the critical case)	ULS	CLP

Mode of response at current load case



Adequacy Factor vs Load Position



Unless specified otherwise, the following units are used throughout this report:

Distance	Force (per m width)	Moment (per m width)	Angle	Unit weight	Material strength
mm	kN	kNm	Degrees	kN/m ³	N/mm ²

* = per metre width

Effective Bridge Width

Calculation	Width (mm)
User specified	3250

Geometry

Global

No. Spans	Effective bridge width
1	3250

Span 1

Span 1:	Type	Shape	No. Rings
	Multi-ring	Multi-segment	1
Intrados points:			
	x	y	
	0	0	
	2079	1047	
	4158	1345	
	6238	1047	
	8316	0	
Ring 1:	No. Blocks	Ring thickness	
	60	440	

Fill Profile Properties

x	y	Surface fill depth
0	1506	95
4158	1997	95
8316	2218	95

Coordinates relative to left intrados springing of Span 1

Partial Factors

Name	Application	Type	Value
Load effects factor	Load effects factor	Multiplier	0.9
Vehicle loads	Axle load	Multiplier	1.5
	Dynamic / impact	Multiplier	1.8
Material loads	Surface fill unit weight	Multiplier	1

Name	Application	Type	Value
	Masonry unit weight	Multiplier	1
	Fill unit weight	Multiplier	1
Material strength	Masonry compressive strength	Divisor	1
	Masonry shear bond strength	Divisor	1
	Masonry friction	Divisor	1

Material Properties

Masonry

Property	Value
Unit weight	20.58
Model crushing	Yes
Compressive strength	2.3
Model radial sliding	No
Radial friction	Varies
Radial shear	Varies
Model inter-ring sliding	No
Inter-ring friction	Varies
Inter-ring shear	Varies

Backfill Basic Properties

Unit weight	Angle of friction	Cohesion	Model live load dispersion	Model horizontal pressures	Backing compressive strength
18.15	30	0	Yes	Yes	5

Backfill Advanced Properties

Property	Value
Live load dispersion type	Boussinesq
Cutoff angle	30
Soil arch interface: Friction multiplier	0.66
Soil arch interface: Adhesion multiplier	0.5

Backfill spandrel zone parameters

Parameter	ULS / PLS	Active / Passive	Value
Factor ma	ULS	Active	0
maKa	ULS	Active	0
Factor mp	ULS	Passive	0.33
mpKp	ULS	Passive	1
Factor mpc	ULS	Passive	0.05
mpcKpc c	ULS	Passive	0
mpKp >= 1	ULS	Passive	Yes

Auto apply horizontal pressures = Yes

Position	Horizontal pressures
Abutment 0	Auto
Abutment 1	Auto

Surface Fill

Unit weight	Angle of dispersion of live loads
23.5	26.6

Vehicles

Name	Axle #	Force	Local position	Width	Contact
Default 100kN Single Axle	1	100	0	1800	300
[13t GVW] 9t Single Axle (CS454)	1	88.29	0	1800	300
[10t GVW] 7t Single Axle (CS454)	1	68.67	0	1800	300
[7.5t GVW] 5.5t Single Axle (CS454)	1	53.96	0	1800	300
[3t GVW] 2t Single Axle (CS454)	1	19.62	0	1800	300

Critical Load Cases

Scenario	Type	Vehicle	Position	Direction	Effective Width	Dynamic Axles	Adequacy Factor
Scenario 1	Auto	[13t GVW] 9t Single Axle (CS454)	6322	Left to right	3250	1	1.48

LimitState:RING idealizes a masonry arch bridge as an assemblage of rigid blocks and uses computational limit analysis methods to directly model the mode of response. The factor that would, when applied to the specified live loads, lead to the ULS (collapse) or PLS (service load limit) being reached is reported, unless in support movement mode. This factor is termed the Adequacy Factor. When appropriate partial factors are included in the model, the Adequacy Factor should be greater than 1.0 for a safe and serviceable structure, considering the ULS and PLS respectively.

For more information, refer to the LimitState:RING User Manual.

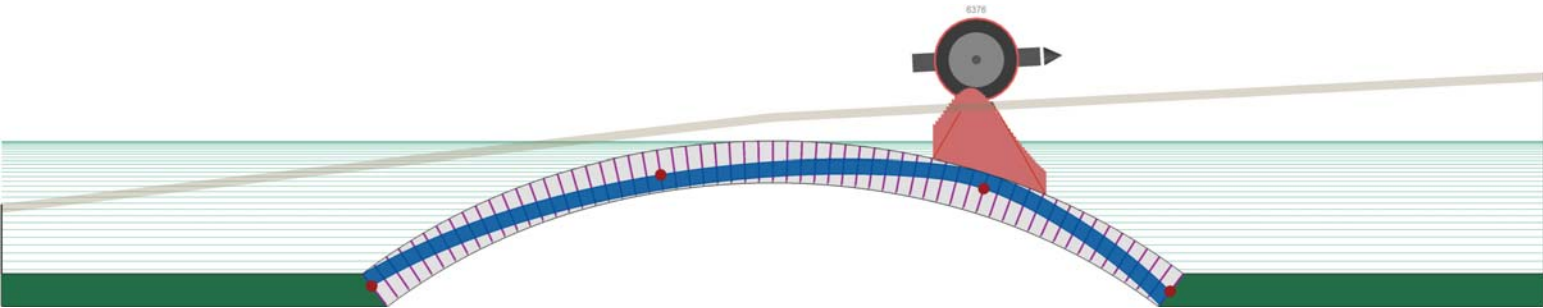
Summary

Bridge name	Location	Reference No.	Map reference
Glyntaff Road Bridge	Pontypridd, Rhondda Cyon Taf	0451742	ST 085 894

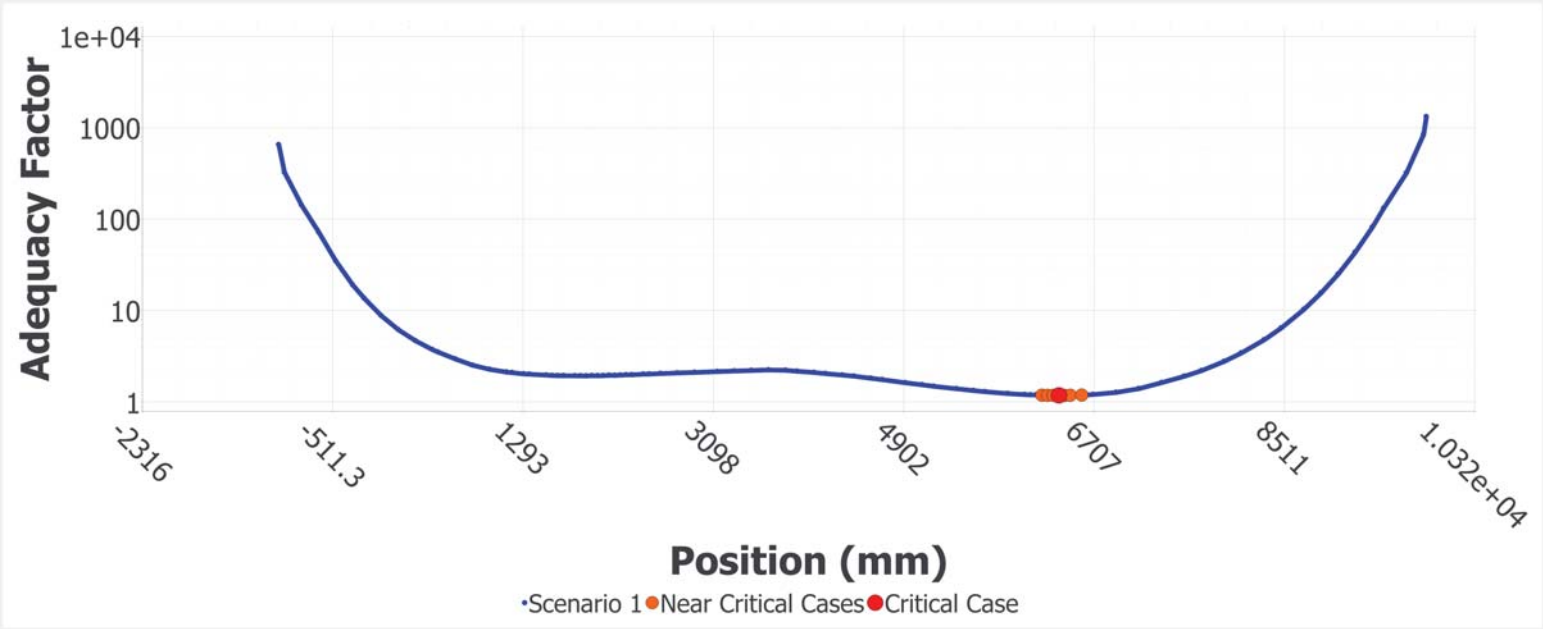
Bridge type	Name of assessor	Assessing organization	Date of assessment
Highway		Jacobs	Wed Apr 9 2025

Analysis result	Analysis Type	Solver
Adequacy factor = 1.17549; Scenario 1 @ 6376mm (this is the critical case)	PLS	CLP

Mode of response at current load case



Adequacy Factor vs Load Position



Unless specified otherwise, the following units are used throughout this report:

Distance	Force (per m width)	Moment (per m width)	Angle	Unit weight	Material strength
mm	kN	kNm	Degrees	kN/m ³	N/mm ²

* = per metre width

Effective Bridge Width

Calculation	Width (mm)
User specified	3250

Geometry

Global

No. Spans	Effective bridge width
1	3250

Span 1

Span 1:	Type	Shape	No. Rings
	Multi-ring	Multi-segment	1
Intrados points:			
	x	y	
	0	0	
	2079	1047	
	4158	1345	
	6238	1047	
	8316	0	
Ring 1:	No. Blocks	Ring thickness	
	60	440	

Fill Profile Properties

x	y	Surface fill depth
0	1506	95
4158	1997	95
8316	2218	95

Coordinates relative to left intrados springing of Span 1

Partial Factors

Name	Application	Type	Value
Load effects factor	Load effects factor	Multiplier	0.9
Vehicle loads	Axle load	Multiplier	1
	Dynamic / impact	Multiplier	1.8
Material loads	Surface fill unit weight	Multiplier	1

Name	Application	Type	Value
	Masonry unit weight	Multiplier	1
	Fill unit weight	Multiplier	1
Material strength	Masonry compressive strength	Divisor	2
	Masonry shear bond strength	Divisor	2
	Masonry friction	Divisor	1

Material Properties

Masonry

Property	Value
Unit weight	20.58
Model crushing	Yes
Compressive strength	2.3
Model radial sliding	No
Radial friction	Varies
Radial shear	Varies
Model inter-ring sliding	No
Inter-ring friction	Varies
Inter-ring shear	Varies

Backfill Basic Properties

Unit weight	Angle of friction	Cohesion	Model live load dispersion	Model horizontal pressures	Backing compressive strength
18.15	30	0	Yes	Yes	5

Backfill Advanced Properties

Property	Value
Live load dispersion type	Boussinesq
Cutoff angle	30
Soil arch interface: Friction multiplier	0.66
Soil arch interface: Adhesion multiplier	0.5

Backfill spandrel zone parameters

Parameter	ULS / PLS	Active / Passive	Value
Factor maKa	PLS	Active	1
Factor mpKp	PLS	Passive	1

Auto apply horizontal pressures = Yes

Horizontal pressures

Position	Horizontal pressures
Abutment 0	Auto
Abutment 1	Auto

Unit weight	Angle of dispersion of live loads
23.5	26.6

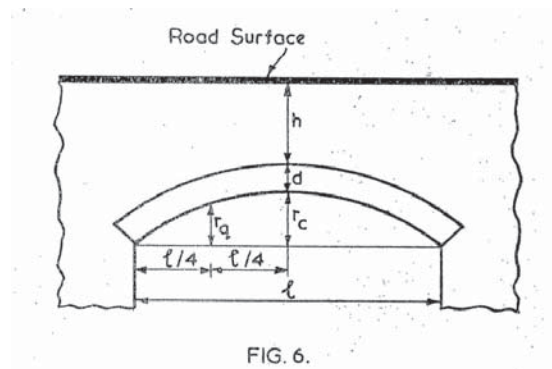
Vehicles

Name	Axle #	Force	Local position	Width	Contact
Default 100kN Single Axle	1	100	0	1800	300
[13t GVW] 9t Single Axle (CS454)	1	88.29	0	1800	300
[10t GVW] 7t Single Axle (CS454)	1	68.67	0	1800	300
[7.5t GVW] 5.5t Single Axle (CS454)	1	53.96	0	1800	300
[3t GVW] 2t Single Axle (CS454)	1	19.62	0	1800	300

Critical Load Cases

Scenario	Type	Vehicle	Position	Direction	Effective Width	Dynamic Axles	Adequacy Factor
Scenario 1	Auto	[13t GVW] 9t Single Axle (CS454)	6376	Left to right	3250	1	1.175

Office	Glasgow			Calc No.	0451742
Title	VAR9/7410 HRE CS 454 Assessment	Originator		Date	Apr-25
Section	CAP 13m 69ch - BE4 Modified MEXE Method	Checker		Date	Apr-25



Span	l	8.316 m
Rise of arch barrel at crown	r_c	1.354 m
Rise of arch barrel at 1/4 pts	r_q	1.047 m
Thickness of arch barrel adjacent to keystone	d	0.460 m
Average depth of fill between road surface & arch barrel at crown	h	0.111 m

PAL	$PAL = 740[d+h]^2/L^{1.3}$	15.368
PAL	(max = 42)	15.368

Span/Rise Ratio		6.143
Span/Rise factor	(4 or less = span/rise factor = 1)	$F_{sr} = 0.738$

Profile factor	$F_p = 2.3([r_c - r_q]/r_c)^{0.6}$ (Max = 1)	$F_p = 0.944$ 0.944
----------------	---	------------------------

Barrel factor	(Table 3 BE4)	$F_r = 0.9$
---------------	---------------	-------------

Fill factor	(Table 4 BE4)	$F_f = 0.7$
-------------	---------------	-------------

Material Factor	$F_m = [(f_r \cdot d) + (f_f \cdot h)] / (d + h)$	$F_m = 0.861$
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Width factor	(Table 5 BE4)	$F_w = 0.9$
--------------	---------------	-------------

Depth Factor	(Table 6 BE4)	$F_d = 0.95$
--------------	---------------	--------------

Mortar factor	(Table 7 BE4)	$F_m = 0.95$
---------------	---------------	--------------

Joint Factor	$F_j = F_w \cdot F_d \cdot F_m$	$F_j = 0.812$
--------------	---------------------------------	---------------

Condition factor	(0= poor, 1 = good condition)	$F_{cm} = 0.9$
------------------	-------------------------------	----------------

Span factor	(from RT/CE/C015 Section 5: 2.5.9)	1.0
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MODIFIED AXLE LOAD	$MAL = F_{sr} \cdot F_p \cdot F_m \cdot F_j \cdot F_{cm} \cdot PAL$	6.74 7 tons
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< 9 tons » structure does not have sufficient capacity for full C&U loading

Appendix F. Services Search Results



National One Call

Protecting People and Services in the UK

Online: www.national-one-call.co.uk

Call us: 0800 009 6273 (Mon-Fri, 9am-5pm)

Retriever Planning Pack

Jacobs UK Ltd

Enquiry Date	19/05/23	Enquiry	NOC/NEFW158
Contact		Service	Retriever
Asset Owners	16	Enquiry Status	Complete
Price Status	Actual	Payment Status	Unpaid

Enquiry Specification

Option	What is it?	Selected
Enquiry Type	Enquiry by National One Call	✓
Express	Emailing of Plans as they arrive	✗
Fusion Plan	Compile Plans into 1 Drawing	✗
Delivery	Delivery of Completed Pack by Email	✓

Enquiry Documentation

Document	What is it?	Included
PlanToDig Enquiry	Details of Enquiry	✓
Asset Owner Contacts	List of Selected Asset Owners	✓
Text Responses	Instructions from Asset Owners	✓
CoRE	Certificate of Registered Enquiry	✓

Appendix A: Asset Owner Plans

See Plans section Cover Page for Details

Appendix B: Enquiry Accounting

Invoice	Invoice for Enquiry	✓
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For Guidance on PlanToDig

[View / download our PlanToDig Guide](#)



National One Call

Protecting People and Services in the UK

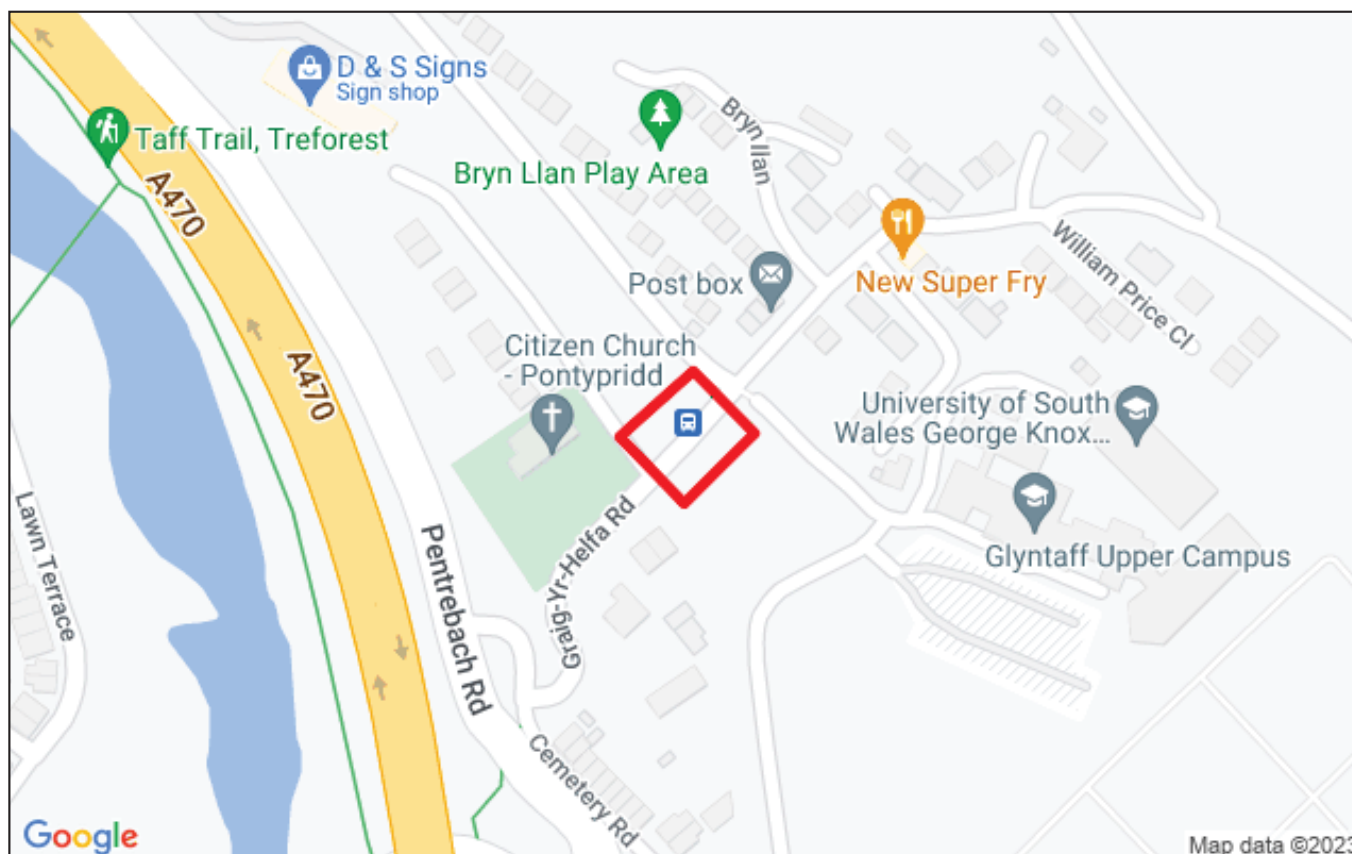
Online: www.national-one-call.co.uk

Call us: 0800 009 6273 (Mon-Fri, 9am-5pm)

PlanToDig Enquiry

Jacobs UK Ltd

Date	19/05/23	Enquiry	NOC/NEFW158
Contact		Status	Complete



Enquiry Site

Graig-Yr-Helfa Rd, Pontypridd CF37 4AY

Disused Railway Bridge - CAP 13m 69ch (**Public Street / Road**)

OS Centre(Approx):308562,189511 (@1086 sq.mtrs)

Work Intentions

Intention	Start	Duration
Works Intended	2023-05-29	1 Day

Please send client waiver letter to all known service providers

Enquiry is Complete

Status: This Enquiry has Completed; you should now have all Responses from Asset Owners.

Asset Owners: Charges from 16 Asset Owners have been Confirmed

Timing: As Asset Owner Areas of Interest and Plans change frequently, please do not rely on Enquiries or Responses that are more than 30 days old.

Content: Asset Owner responses should be considered 'indicative only' until physically verified. Follow guidance in HSG(47)/NRSWA/CDM etc relating to services verification and excavation methods.



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Summary of Asset Owner Contacts for NOC/NEFW158

Enquiry Date	19/05/23	Enquiry	NOC/NEFW158
Selected Contacts	16	Closed	16
Est. Charges	£184.75	Act. Charges	£131.55

Contact List

Asset Owner	Status	Txt	Est.	Act.
Affected by Enquiry				
Electricity				
National Grid Electricity Distribution (WPD SW)	Closed		£15.00	£15.00
Gas				
Wales and the West Utilities Ltd (Gas Distribution)	Closed	T	£36.00	£36.00
Pipeline				
Linesearch (Pipeline search service)	Closed	T	-	-
Telecommunications				
BT Openreach	Closed		-	-
Virgin Media	Closed		£45.55	£45.55
Water / Sewerage				
Dwr Cymru (Welsh Water)	Closed		£35.00	£35.00
See Response Text				
Electricity				
Utility Assets Ltd	Closed	T	-	-
Not Affected				
Electricity				
National Grid Electricity Transmission	Closed		-	-
Gas				
National Gas Transmission	Closed		-	-
Multi-utility				
Brookfield Utilities UK	Closed	T	-	-
Telecommunications				
BSkyB Telecommunications Services Ltd	Closed	T	-	-
CityFibre	Closed	T	-	-
Colt Telecoms	Closed	T	-	-
Lumen Technologies	Closed	T	-	-
Verizon Business	Closed	T	-	-
Vodafone Limited	Closed	T	£53.20	-



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Contact Comments

Some Asset Owners provide guidance / notes when making their Response - in the interests of safety, these should be provided to any Site Operatives along with any Plans.

Asset Owner	Comments
Affected by Enquiry	
Gas	
Wales and the West Utilities Ltd (Gas Distribution)	Our records show those pipes owned by Wales & West Utilities (WWU) in its role as a Licensed Gas Transporter (GT). On some occasions, blank maps may be sent to you. This is due to your proposed work being in a no gas area, but within our operational boundaries. Service pipes, valves, syphons, stub connections, etc. may not be shown, but their presence should be anticipated. No warranties are therefore given in respect of it. They also provide indications of gas pipes owned by other GTs, or otherwise privately owned, which may be present in this area. This information is not information of WWU and WWU is unable to verify this information or to confirm whether it is accurate or complete.
Pipeline	
Linesearch (Pipeline search service)	NGED Wales and W&W Gas in Zone of Interest.
See Response Text	
Electricity	
Utility Assets Ltd	We will check whether we have any plant present at your site and contact you within 5 - 7 working days ONLY if we own any plant in the vicinity. If we do not reply, we do not have any apparatus in the area of your works. However, PLEASE TAKE CARE when excavating around electricity cables in the event that not all cables present may be accurately shown. We recommend you use detecting equipment to map the site before excavating and fully comply with HSG47. DO NOT assume that a cable is dead if you don't have a record of its presence. The cable must be treated as live unless PROVEN DEAD by the cable owner. In case of emergency please contact your local electricity distribution company.
Not Affected	
Multi-utility	
Brookfield Utilities UK	GTC Apparatus Not Found In Search Area Our Plant Enquiry Service Ref: 3399795, Your Enquiry Ref: NOC/NEFW158
Telecommunications	
BSkyB Telecommunications Services Ltd	Please be advised that Sky Telecommunications Services Ltd will not be affected by your proposal.



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CityFibre	Title: NOC/NEFW158Comment:Please find attached a plan of the area of your interest that may contain plant which may be affected by your proposed works.The validity of this response is 6 weeks, after such time a new enquiry would need to be made.
Colt Telecoms	We can confirm that Colt Technology Services do not have apparatus near the above location as presented on your submitted plan, if any development or scheme amendments fall outside the 50 metre perimeter new plans must be submitted for review.
Lumen Technologies	We can confirm that Lumen Technologies (formerly CenturyLink Communications UK Limited, Level 3, Global Crossing (UK) Ltd, Global Crossing PEC, Fibernet UK Ltd and Fibrespan Ltd) do not have any apparatus within the indicated works area.
Verizon Business	We have reviewed your plans and have determined that Verizon (Formally known as MCI WorldCom, MFS) has no apparatus in the areas concerned.
Vodafone Limited	Please accept this email as confirmation that Vodafone: Fixed does not have apparatus within the vicinity of your proposed works



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Asset Owner Plans Cover

Plans received from Asset Owners will be sent to you by email; these may require specialist printers, sometimes up to A0.

Plans may be accompanied by Disclaimers / Instructions etc. which will be contained in the Asset Owner Comments document. These Comments are often as important as the plans themselves as they give direction and context to the plan.

Treat All Plans as 'Indicative' until physically verified.

Sometimes an Asset Owner may have provided a Plan even if they considered that they are 'Not Affected'.

It is also possible that an Asset Owner has responded as 'Affected' but is unable to provide a Plan of their services; this will be stated in the Asset Owner Comments.

Ensure that Asset Owner Comments accompany Plans



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Certificate of Registered Enquiry (CoRE)

Enquiry Date	19/05/23	Enquiry	NOC/NEFW158
Work Intention	Works Intended	Site Type	Public Street / Road

Asset Owners Contacted

A CoRE is issued on completion of a PlanToDig Enquiry, when all Responses have been received from the selected Asset Owners. Due to risk of changes to Asset Owner presences / their Area of Interest (AoI), and the probability of changes to plans and service presences, an Enquiry should only be considered 'good' for 30 days following Enquiry Date.

Asset Owner	Comments
Affected by Enquiry	
Electricity	
National Grid Electricity Distribution (WPD SW)	
Gas	
Wales and the West Utilities Ltd (Gas Distribution)	✓
Pipeline	
Linesearch (Pipeline search service)	✓
Telecommunications	
BT Openreach	
Virgin Media	
Water / Sewerage	
Dwr Cymru (Welsh Water)	
See Response Text	
Electricity	
Utility Assets Ltd	✓
Not Affected	
Electricity	
National Grid Electricity Transmission	
Gas	
National Gas Transmission	
Multi-utility	
Brookfield Utilities UK	✓
Telecommunications	
BSkyB Telecommunications Services Ltd	✓
CityFibre	✓
Colt Telecoms	✓
Lumen Technologies	✓
Verizon Business	✓



National One Call

Protecting People and Services in the UK

Online: www.national-one-call.co.uk

Call us: 0800 009 6273 (Mon-Fri, 9am-5pm)

Vodafone Limited	✓
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Our Ref: Ref shown on map

Date of issue: shown on map

email: nnhc@openreach.co.uk

Dear Customer,

NR & SW ACT 1991 – PROPOSED WORKS AT: Graig-Yr-Helfa Rd, Pontypridd.

Prior to commencement of work: For free onsite guidance and accurate up to date location of BT Apparatus please contact our Plant Protection Service by the following methods:-

Email the Click Before You Dig Team CBYD@openreach.co.uk

Visit the Click Before You Dig Website www.openreach.co.uk/cbyd

Thank you for your request of **NOC/NEFW158** describing the above proposals.

Enclosed are copies of our drawings marked up to show the approximate locations of BT apparatus in the immediate vicinity of your works. It is intended for general guidance only. No guarantee is given of its accuracy.

The drawings are valid for 90 days from the date of issue and should not be relied upon after this time period has expired.

When planning excavation work or other works near to BT apparatus, please be mindful our apparatus may exist at various depths and may deviate from the marked route.

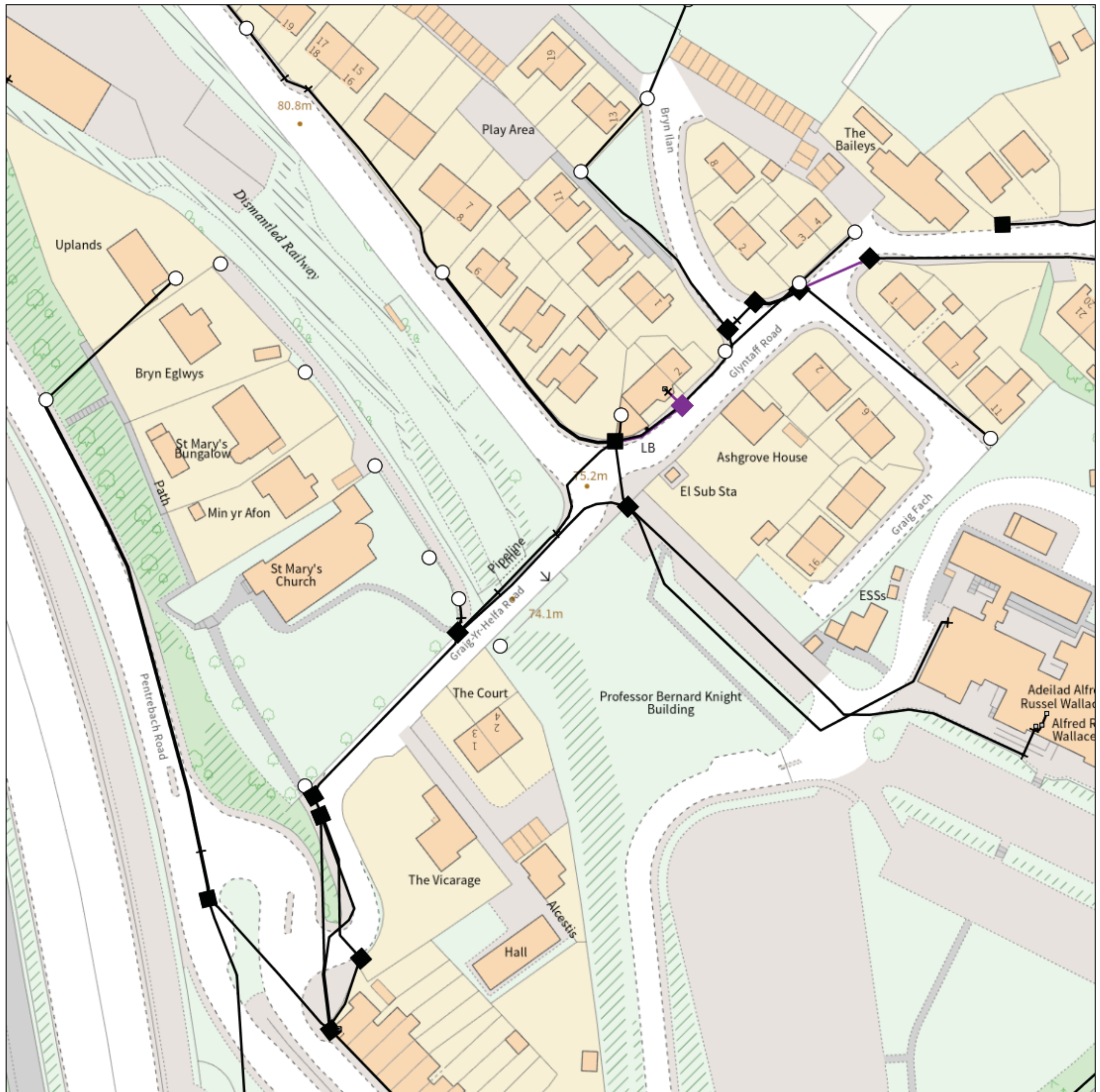
To avoid damage it is recommended that mechanical excavators or borers are not used within 600mm of BT apparatus. If scaffolding is erected, please ensure that our equipment is not enclosed, blocked, covered or otherwise obstructed by the scaffolding.

In the event of BT apparatus being in the area of your works we recommend that your plant/vehicle crossing is either resited, or apply for a budget estimate by submitting detailed plans to our Network Relocation Team at <https://www.ournetwork.openreach.co.uk/altering-our-network.aspx>

Yours faithfully,


NNHC & MBE Manager

Maps by email Plant Information Reply



IMPORTANT WARNING

Information regarding the location of BT apparatus is given for your assistance and is intended for general guidance only. No guarantee is given of its accuracy. It should not be relied upon in the event of excavations or other works being made near to BT apparatus which may exist at various depths and may deviate from the marked route.



openreach

CLICK BEFORE YOU DIG

FOR PROFESSIONAL FREE ON SITE ASSISTANCE PRIOR TO COMMENCEMENT OF EXCAVATION WORKS INCLUDING LOCATE AND MARKING SERVICE

email cbyd@openreach.co.uk

ADVANCE NOTICE REQUIRED

(Office hours: Monday - Friday 08.00 to 17.00)

www.openreach.co.uk/cbyd

Accidents happen

If you do damage any Openreach equipment please let us know by calling 0800 023 2023 (opt 1 + opt 1) and we can get it fixed ASAP

KEY TO BT SYMBOLS

	Planned	Live	Change Of State	+	Hatchings	
PCP			Split Coupling	×	Built	
Pole			Duct Tee	▲	Planned	
Box			Building		Inferred	
Manhole			Kiosk		Duct	
Cabinet			Other proposed plant is shown using dashed lines. BT Symbols not listed above may be disregarded. Existing BT Plant may not be recorded. Information valid at time of preparation. Maps are only valid for 90 days after the date of publication.			
	Pending Add	In Place	Pending Remove	Not In Use		
Power Cable						
Power Duct				N/A		

BT Ref : BKK09278Z

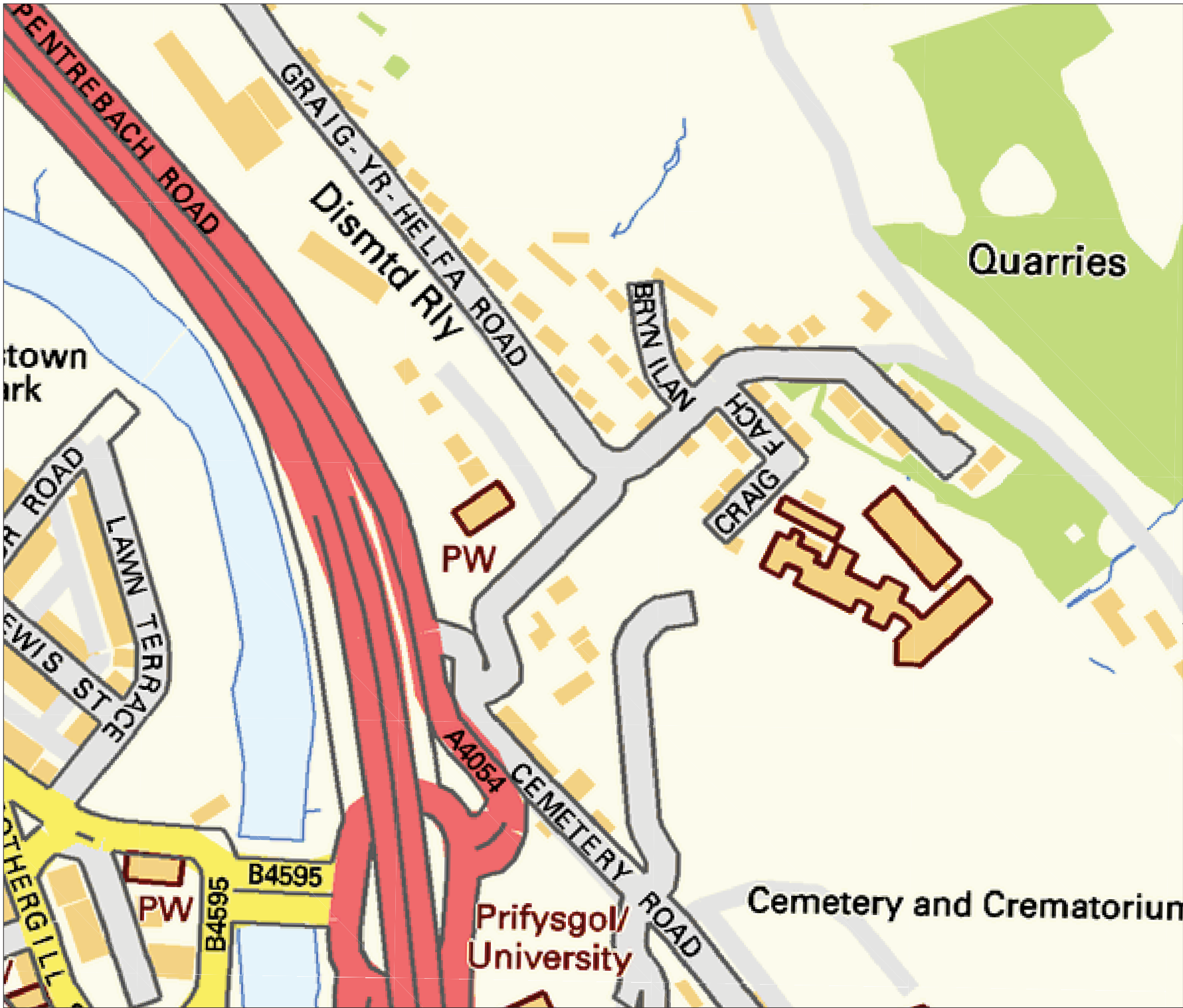
Map Reference : (centre) ST0854989462

Easting/Northing : (centre) 308549,189462

Issued : 19/05/2023 09:27:39

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WARNING: IF PLANNED WORKS FALL INSIDE HATCHED AREA IT IS ESSENTIAL BEFORE PROCEEDING THAT YOU CONTACT THE NATIONAL NOTICE HANDLING CENTRE. PLEASE SEND E-MAIL TO: nnhc@openreach.co.uk



bitmap_layout select_raster

LEGEND

- EXISTING PLANT
- EXISTING PLANT

bitmap_layout select_raster

Head Office
CityFibre Holdings Ltd
15 Bedford Street,
London,
WC2E 9HE

Tel: 0845 293 0774
Web: www.cityfibre.com

Asset Office
CityFibre Holdings Ltd,
Rutherford House,
Birchwood,
Warrington,
WA3 6ZH

Email: asset.team@cityfibre.com

Disclaimer:

Information shown on this plan is for general guidance only.
No warranty is made as to its accuracy.
This plan must not be solely relied upon in the event of
excavation or other works being carried out in the vicinity
of Cityfibre plant.
No liability of any kind is accepted by Cityfibre, its agents or
servants for any error, omission, discrepancy or
deviation. This information is valid for the date printed.

Project

Plant Enquiry

Drawing

Existing Plant

Drawn by:

smallworld

Date: 19/05/2023

Drawing No.

CFH_EP_000001

Revision

001

Scale: 1:2500

A4



Our Ref: 29542453 Your Ref: NOC/NEFW158

Friday, 19 May 2023

██████████
Barclay Waldie House Mill Road Ind Est Linlithgow Bridge
Linlithgow
West Lothian
EH49 7SF

Dear Brian McMaster

Thank you for your enquiry dated Friday, 19 May 2023

I now enclose a copy of our plan showing existing National Grid Electricity Distribution (NGED) Electricity / National Grid Telecoms (NGT) apparatus in the vicinity of your proposed works. This information is given as a general guide only and its accuracy cannot be guaranteed. Please note that all NGED equipment on site should be assumed to be LIVE until NGED prove otherwise and provide you with confirmation to this effect in writing. Recent additions to our network, or service connections between the main cable and a building or street lamp may not be shown.

Damage to underground cables and contact with overhead lines can cause severe injury or may prove fatal. If you are excavating on site in the vicinity of either NGED Electrical apparatus or NGT Telecoms apparatus you must comply with the requirements of the following:-

Health & Safety Executive guidance HS(G)47, Avoiding Danger from underground services.

Work taking place in the vicinity of our plant is also regulated under the:-

Electricity at Work Regulations 1989, Health and Safety Act 1974, CDM Regulations 2015.
Safe working procedures should be defined and practiced

Please ensure that the use of mechanical excavators in the vicinity of our plant is kept to a minimum. NGT Telecoms ducts contain fibre cables, which are expensive to repair. Therefore, extreme care must be taken whilst working in the vicinity of these ducts, hand digging methods being used to determine their precise position.

If there are overhead lines crossing your site and your proposal involves building works which may infringe the clearance to our overhead system then you should call the relevant general enquiries number (see page 2 of this letter) for advice. Where overhead lines cross your site you must comply with the requirements of Health & Safety Executive guidance as laid down in GS6, Avoidance of Danger from Overhead Electric Lines.

Where diversions to NGED apparatus are needed to allow change to occur on site, the cost of these alterations may be charged to the persons responsible for the works.

If you require advice in connection with your proposals please contact the relevant general enquiries number (see page 2 of this letter)

Following consultation the local NGED team will where necessary prepare detailed proposals and provide a quotation for any necessary alterations and/or development of our equipment on the site.

This information is given as a guide only and its accuracy cannot be guaranteed. This plan is based on data from our Geographic Information System, which is updated every 24 hours to reflect changes to our network. The information contained in this plan reflects the most recent network GIS data, however changes to the network (including network additions and new service

**National Grid Electricity
Distribution**

Mapping Centre

Toll End Road

Tipton

West Midlands

United Kingdom

DY4 0HH

www.nationalgrid.co.uk

Map Response

T 0121 623 9780

NGED.MapResponse

@nationalgrid.co.uk

National Grid Electricity
Distribution

South West - 02366894

South Wales - 02366985

East Midlands - 02366923

West Midlands - 03600574

Registered in
England and Wales

Registered Office:

Avonbank

Feeder Road

Bristol

BS2 0TB

connections) may not be shown. You are advised to obtain an up to date plan on the date of commencing on-site works.

Yours sincerely
NGED Map Response Team

Contact Us

Emergency or Power Supply issues

In an emergency call 105, 24 hours a day.

Mapping Enquiries

If you have an enquiry relating to this letter or the attached map plan, please contact us using the following information:

Telephone 0121 623 9780
Email NGED.MapResponse@nationalgrid.co.uk

General Enquiries

If you have a general enquiry, please call us on the following telephone number:

All areas 0800 096 3080

LSBUD

If you have an enquiry relating to the use of the LSBUD website please contact LSBUD using the following information:

Telephone 0345 437 7365
Email enquiries@LSBUD.co.uk
Website www.LSBUD.co.uk

Steps to help keep you safe

- **If you are working within 10 metres of our 33kV, 66kV, 132kV underground electricity cables or within 10 meters of an overhead electricity line you should call the relevant General Enquiries for free safety advice.**

Safety Documents – please download our informative safety documents to help ensure that you, your staff and the public are kept safe whilst working in the vicinity of electricity.

<https://www.nationalgrid.co.uk/customers-and-community/health-safety/public-safety-advice>

- **Make sure you have up to date plans** - remember that recent additions to our network or service connections between the main cable and a building or street lamp may not be shown.
- **Look for signs of service cables** - an electricity meter box or nearby streetlamp may give you an indication that service cables are present in your area of work.
- **Non NGED Network** - electricity cables, lines and equipment owned by others may also be present in addition to NGED network. They are unlikely to be shown on our plans.
- **Use a cable locator** - trace electricity cables and mark the position of them using paint or other waterproof marking on the ground.
- **Hand dig trial holes** - to confirm the position of cables in close proximity to your area of your work and use spades and shovels rather than picks, pins or forks.
- **Have an emergency plan** - so that everyone working on site understands what to do in the event of an underground electricity cable being damaged or contact being made with an overhead electricity line.
- **If you are working within 10 meters** of an overhead electricity line then it may be necessary for you to erect warning signs and markers, or height restriction goal posts. Ensure that you comply with the requirements of Health & Safety Executive guidance laid down in GS6, Avoidance of Danger from Overhead Electric Lines.
- **If you are erecting a structure** that could allow anyone standing on it, or its access device (ladder, scaffold, MEWP), to come within 3m of any overhead electric line then **you must inform us**. This is your duty and a legal requirement under the Electricity Safety, Quality & Continuity Regulations 2002.
- **If you cannot work safely** around the underground electricity cable or overhead electricity line, then you may need to get it moved to allow your works to go ahead. Call the general enquiry numbers above for guidance.
- **It is possible that cables or pipes may be embedded in concrete** - electricity cables embedded in concrete **MUST** be made 'dead' by Western Power Distribution or the cable owner before the concrete is broken out. Alternatively, another safe way of working should be agreed.
- **Cables are sometimes covered by tiles or a marker tape** - these can be concrete, polythene or earthenware and are a useful early warning of the presence of cables; you should avoid disturbing any tiles or tape to expose the cable. Not all cables have these warning indicators.

Contact Us

Mapping Enquiries:

General Enquiries:

All areas

0121 623 9780

All areas

0800 096 3080

Report damage immediately – KEEP EVERYONE AWAY FROM THE AREA

0800 6783 105

Date Requested: 19/05/2023

Job Reference: 29542453

Site Location: 308550 189456

Requested by: Mr Brian McMaster

Your Scheme/Reference: NOC/NEFW158

Exact Scales:

1:1250 Area or Circle dig site

1:500 Line dig site

IMPORTANT NOTICES

- This information is given as a guide only and its accuracy cannot be guaranteed. Services or recent additions to the network may not be shown.
- Cables, overhead lines & substations owned by other electricity network owners or private companies may be present and may not be shown.
- You should always verify exact locations of cables using a cable locator and by careful use of hand tools in accordance with HSE guidance note HSG47.
- When working within 10m of any overhead electric line you should follow the requirements of HSE Guidance Note GS6.
- For further advice on working near our electricity cables or lines, call our Contact Centre on 0800 096 3080.
- Advice should be sought from the National Grid Electricity Distribution Contact Centre for any work that is to take place in proximity to 66kV or 132kV underground cables and 66kV 132kV overhead lines – 0800 096 3080

Overhead Line

National Grid Telecoms

Underground Cable

Pilot Cables

Link Box

Site Location

Line/Area

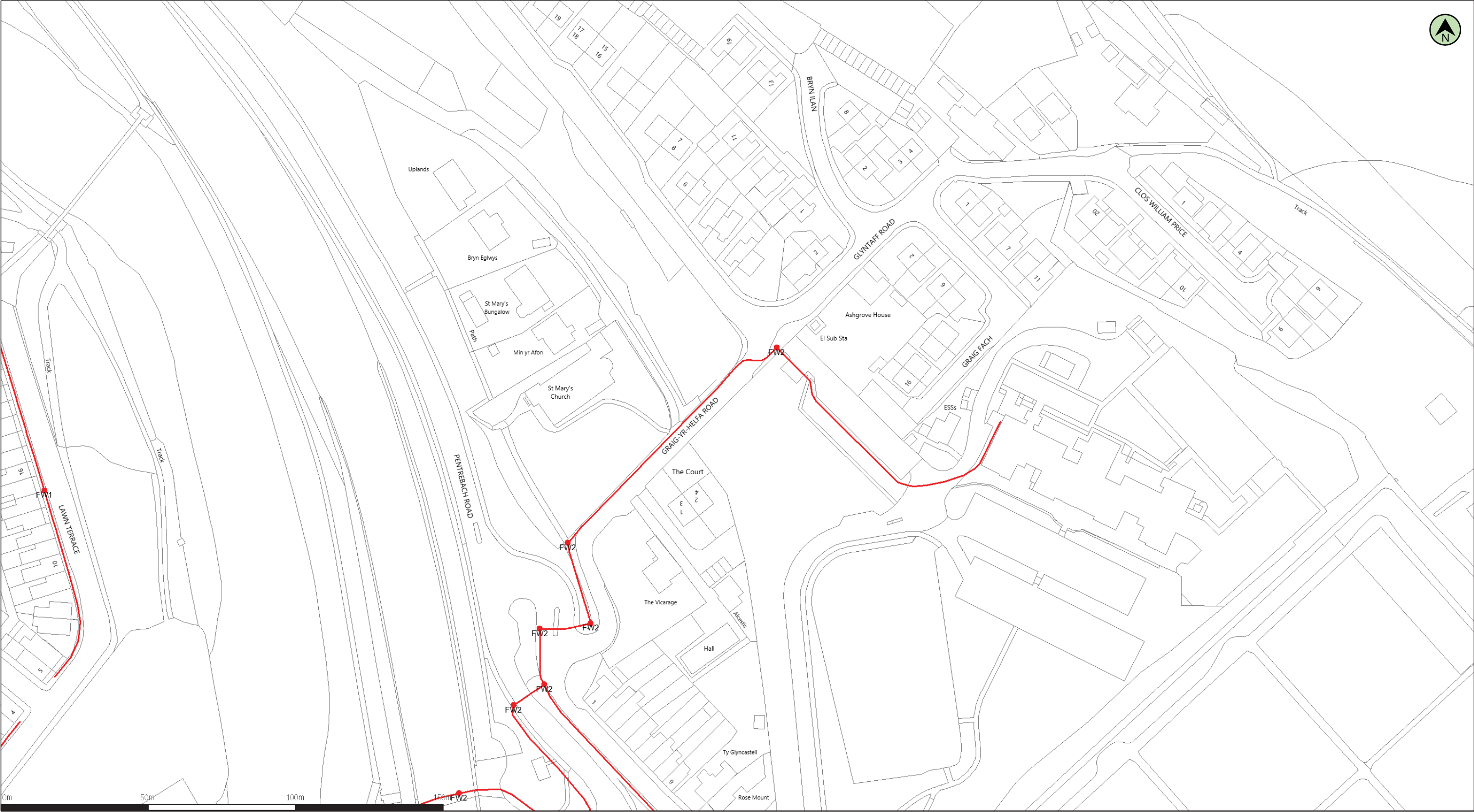
PME Earth

Underground Earth

Pole Mounted Transformer

Ground Mounted Transformer

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NGED Copyright: This copy has been made by or with the authority of National Grid Electricity Distribution (NGED) pursuant to Section 47 of the Copyright Designs and Patents Act 1988 unless that Act provides a relevant exception to copyright the copy must not be copied without the prior permission of the copyright owner.



(c) Crown copyright and database rights 2023 Ordnance Survey 100019209 Date: 23/05/23 Scale: 1:1250 Map Centre: 308552,189452 Data updated: 03/04/23 Our Ref: 1183635 - 1 Telecoms Plan A3

Important Information - please read The purpose of this plan is to identify Virgin Media apparatus. We have tried to make it as accurate as possible but we cannot warrant its accuracy. In addition, we caution that within Virgin Media apparatus there may be instances where mains voltage power cables have been placed inside green, rather than black ducting. Further details can be found using the "Affected Postcodes.pdf", which can be downloaded from this website. Therefore, you must not rely solely on this plan if you are carrying out any excavation or other works in the vicinity of Virgin Media apparatus. The actual position of any underground service must be verified by cable detection equipment, etc. and established on site before any mechanical plant is used. Accordingly, unless it is due to the negligence of Virgin Media, its employees or agents, Virgin Media will not have any liability for any omissions or inaccuracies in the plan or for any loss or damage caused or arising from the use of and/or any reliance on this plan. This plan is produced by Virgin Media Limited (c) Crown copyright and database rights 2023 Ordnance Survey 100019209.

Duct, Trench



Chamber / Pole



Cabinet



brian.mcmaster@national-one-call.co.uk

NOC/NEFW158



**Company Address**

Wales and West Utilities Ltd,
Wales and West House,
Spooner Close, Celtic,
Springs, Coedkernew,
Newport, NP10 8FZ

Our Ref: 29542453 NOC/NEFW158

Friday, 19 May 2023

[REDACTED]
Barclay Waldie House Mill Road Ind Est Linlithgow Bridge
Linlithgow
West Lothian
EH49 7SF

Dear Brian McMaster

Thank you for contacting us regarding Wales & West Utilities equipment at the above site.

I enclose an extract from our mains records of the area covered by your proposals together with a comprehensive list of General Conditions for your guidance. This information is given as a general guide and its accuracy cannot be guaranteed. Service pipes, valves, syphons, stub connections, etc., are not shown but their presence should be anticipated.

No liability of any kind whatsoever is accepted by Wales and West Utilities (WWU), its agents or servants for any error or omission. Please note that all WWU equipment on site should be assumed to be LIVE until proven otherwise.

Safe digging practices, in accordance with HS(G)47, Avoiding Danger from underground services must be used to verify and establish the actual position of mains, pipes, services and other apparatus on site before any mechanical plant is used. It is your responsibility to ensure that this information is provided to all persons (either direct labour or contractors) working for you on or near gas apparatus. Safe working procedures should be defined and practiced.

WWU reserves its position completely to enforce the terms of any existing easement against the landowner, even if this results in any planning permission granted not being able to be fully implemented.

You must not build over any of our plant or enclose our apparatus.

Wales & West Utilities have no planning objections to these proposals, although it should be noted that Wales & West's apparatus is held pursuant to easements and it has other private law rights in relation to the use of the land in the vicinity of its apparatus. Wales & West's private law land rights are not material planning considerations and therefore no comment is made in relation to those rights and they have no impact on whether or not planning permission should be granted, or whether, if permission is granted, it can lawfully be implemented. It should also be noted that Wales & West's apparatus may be at risk during construction works and should the planning application be approved, then we require the promoter of these works to contact us directly to discuss our requirements in detail. Should diversion works be required these will be fully chargeable.

Where diversions to WWU apparatus are needed to allow change to occur on site, the cost of these alterations may be charged to the persons responsible for the works.

If you have requested a new connection the WWU connections team will where necessary prepare detailed proposals and provide a quotation for any necessary alterations and/or development of our equipment on the site.

If you require advice in connection with your proposals please contact the relevant number below.

Yours sincerely,

**Company Address**

Wales and West Utilities Ltd,
Wales and West House,
Spooner Close, Celtic,
Springs, Coedkernew,
Newport, NP10 8FZ

WWU Dig Team

Gas Emergency Number:

In an emergency call 0800 111 999, 24 hours a day.

Mapping Enquiries:

If you have an enquiry relating to this letter or the attached map plan, please contact us using the following information:

Telephone 02920 278912
Email dig@wwutilities.co.uk

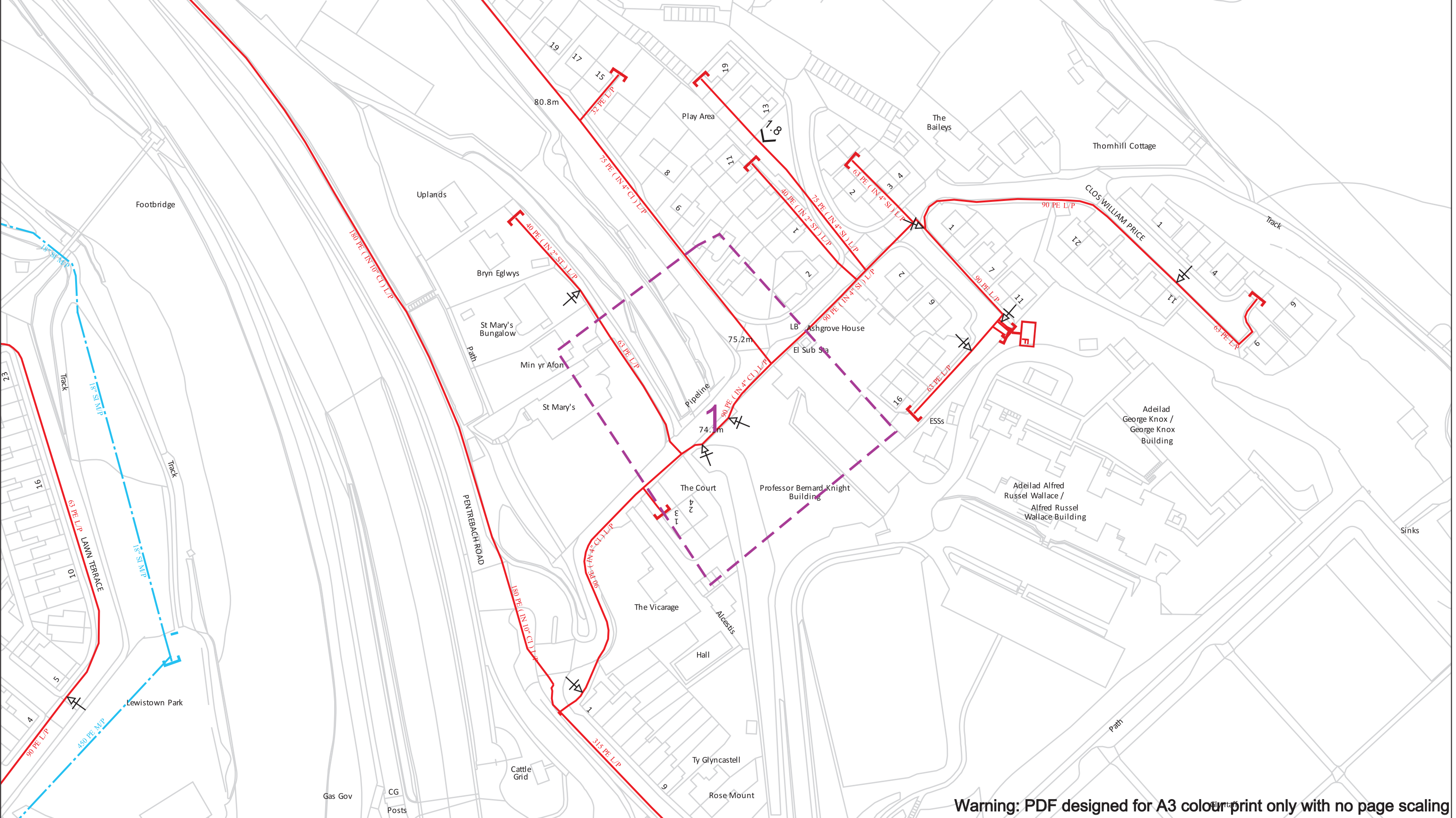
General Enquiries:

If you have a general enquiry, please call us on the following number
All areas 0800 912 29 99

LinesearchbeforeUdig:

If you have an enquiry relating to the use of the LinesearchbeforeUdig website please contact LinesearchbeforeUdig using the following information:

Telephone 0845 437 7365
Email enquiries@linesearchbeforeudig.co.uk
Website www.linesearchbeforeudig.co.uk



Warning: PDF designed for A3 colour print only with no page scaling

Contact Us
Mapping Enquiries: 02920 278 912
General Enquiries: 0800 912 2999

Date Requested: 19/05/2023
Job Reference: 29542453
Site Location: 308549 189462

Requested by:
Mr Brian McMaster
Your Scheme/Reference:
NOC/NEFW158

Scale: 1:1250 (When plotted at A3)

IMPORTANT NOTICES

- This information is given as a guide only and its accuracy cannot be guaranteed
- The plan only shows those pipes owned by Wales & West Utilities (WWU) as its role as a licensed Gas Transporter
- Service pipes, valves, syphons, stub connections etc. may not be shown but their presence should be anticipated
- You must use safe digging practices in accordance with HS(G)47 to establish the actual position of mains, services and other apparatus before any mechanical excavation is used
- It is your responsibility to ensure this information is provided to all persons working near our plant
- If in doubt call the WWU dig team on 02920 278912

In case of an emergency call 0800 111 999

Dig Sites

Area: Line:

Low Pressure (LP) 21mbar – 75mbar

Medium Pressure (MP) 350mbar – 2bar

Intermediate Pressure (IP) 2bar – 7bar

High Pressure (HP) >7bar

Line/Fire Valve

Governor Station

Change of Diameter

End Cap

Depth of cover

Smell gas?
Call the Gas Emergency Service on
0800 111 999.

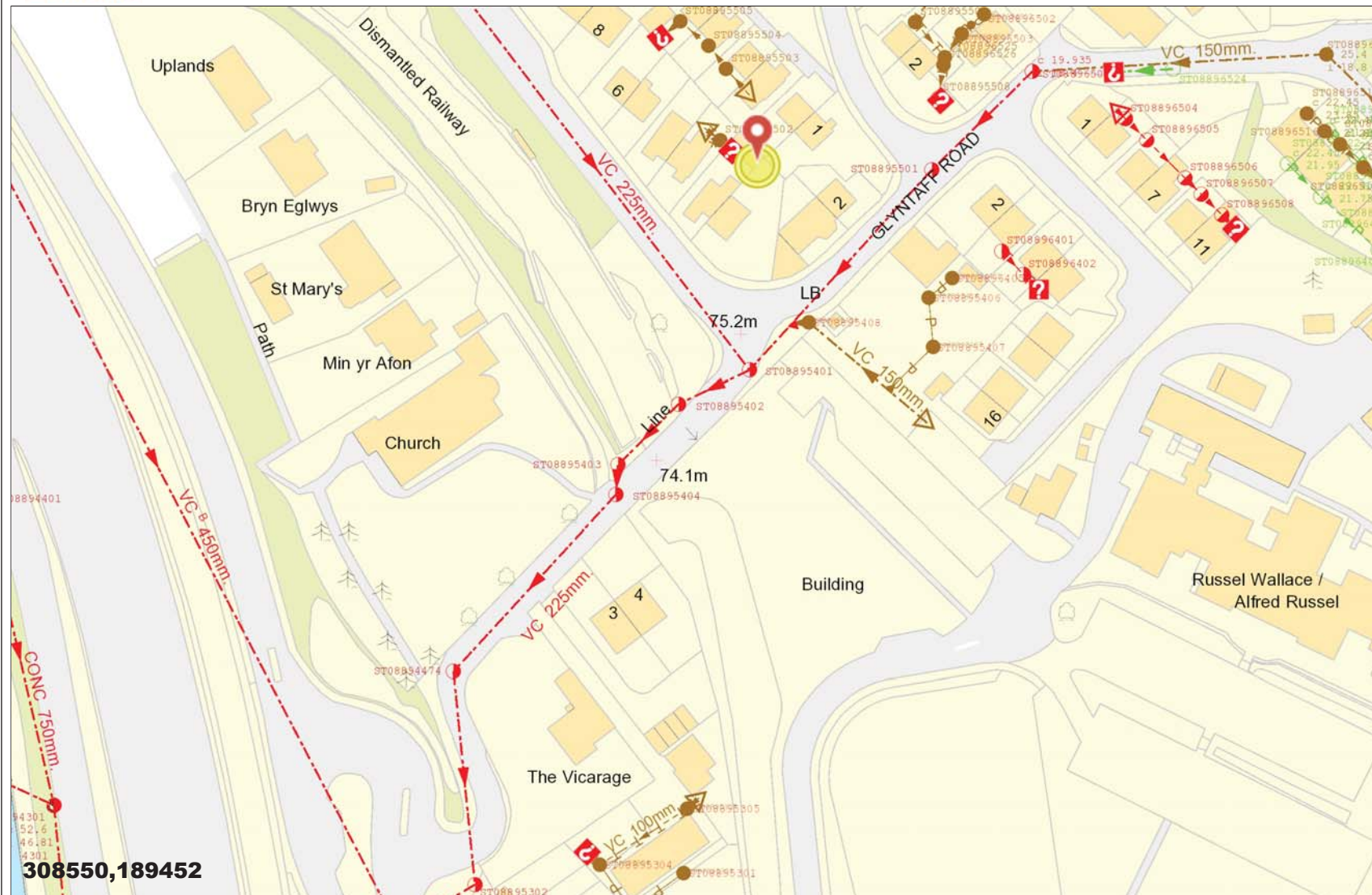
Dial
before you dig

Investigate
Before you dig, make sure
you know what's below.

Go ahead
Done your research?
Now you can dig safely.



Scale: 1: 1250



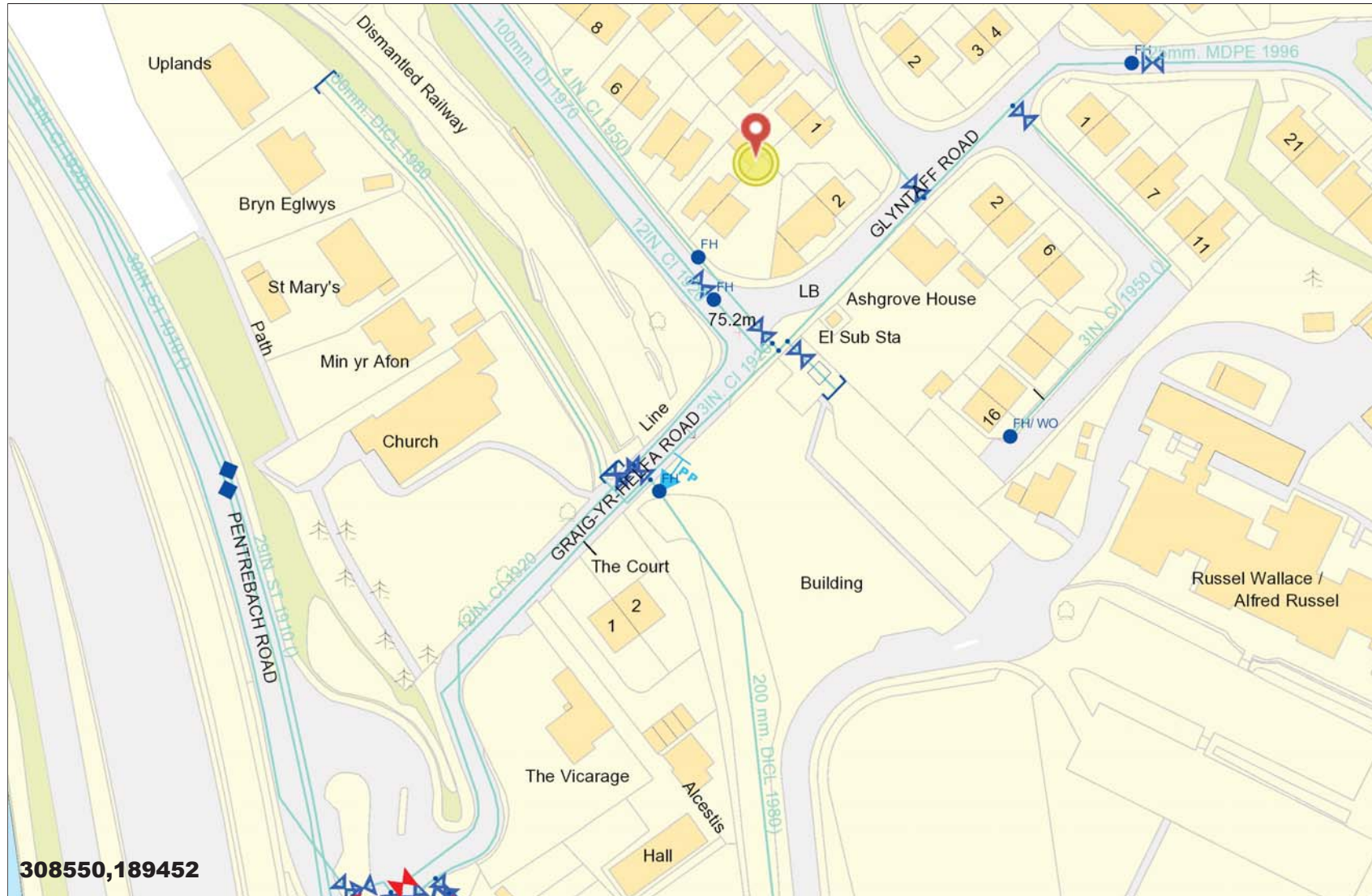
- Inspection Chamber**

**EXACT LOCATION OF
ALL APPARATUS TO
BE DETERMINED ON
SITE**

Whilst every reasonable effort has been taken to correctly record the pipe material of DCWW assets, there is a possibility that in some cases pipe material (other than Asbestos Cement or Pitch Fibre) may be found to be Asbestos Cement (AC) or Pitch Fibre (PF). It is therefore advisable that the possible presence of AC or PF pipes be anticipated and considered as part of any risk assessment prior to excavation



Scale: 1: 1250



LEGEND

Clean Water

- Sluice Val
- Air Val, SINGLE
- Tap
- Pressure Reducing Valve
- Meter
- BULK Meter
- FH
- Cap
- Existing Main
- NON COMPANY

Sewerage External

- Foul
- Surface Water
- Combined
- Rising Main
- Private
- Treatment Works
- Pumping Station
- Special Purpose
- Unknown End
- Change, Combined Overflow
- Outfall, FOUL
- Lamp Hole, Foul
- Private Sewer Transfer
- Lateral Drain
- Inspection Chamber

308550,189452

Dŵr Cymru Cyfyngedig ('the Company') gives this information as to the position of its underground apparatus by way of general guidance only and on the strict understanding that it is based on the best information available and no warranty as to its correctness is relied upon in the event of excavations or other works made in the vicinity of the company's apparatus and any onus of locating the apparatus before carrying out any excavations rests entirely on you. The information which is supplied hereby by the company, is done so in accordance with statutory requirements of sections 198 and 199 of the water industry Act 1991 based upon the best information available and in particular, but without prejudice to the generality of the foregoing, it should be noted that the records that are available to the Company may not disclose the existence of a drain sewer or disposal main laid before 1 September 1989, or if they do, the particulars thereof including their position underground may not be accurate. It must be understood that the furnishing of this information is entirely without prejudice to the provision of the New Roads and Street Works Act 1991 and the company's right to be compensated for any damage to its apparatus.

**EXACT LOCATION OF
ALL APPARATUS TO
BE DETERMINED ON
SITE**

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Whilst every reasonable effort has been taken to correctly record the pipe material of DCWW assets, there is a possibility that in some cases pipe material (other than Asbestos Cement or Pitch Fibre) may be found to be Asbestos Cement (AC) or Pitch Fibre (PF). It is therefore advisable that the possible presence of AC or PF pipes be anticipated and considered as part of any risk assessment prior to excavation