



RHONDDA
GEOTECHNICAL
SERVICES

VALIDATION REPORT

C.A. PERMIT No. 26229

M.T.C.B.C PLANNING REFERENCE PA/22/0046

LAND ADJACENT TO

SIX BELLS ESTATE

HEOLGERRIG

MERTHYR TYDFIL

CF48 1TU

19/05/2024

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INTRUSIVE INVESTIGATION VALIDATION REPORT

1. INTRODUCTION

This Validation Report has been produced for Mr Nick Meaney for two purposes. One is to discharge the Coal Authority Permit 26229 for which he is the permit holder. The land adjacent to Six Bells Estate, Heolgerrig has outline planning permission ref PA/22/0046 from Merthyr Tydfil C.B.C. for residential development. As part of the pre-planning consultation process the L.P.A. made several recommendations for information that would be required to accompany a full planning application. One of these was a C.M.R.A. The Heolgerrig area has a well-known history of intensive mining from the outset of the Industrial Revolution when. Merthyr Tydfil was one of the epicentres at the time. At one time the largest producer of iron in the world, the four massive ironworks in Merthyr required a prodigious amount of coal and ironstone mining in the local area. M.T.C.B.C. are aware of the mining legacy issues in the area. Their building Control Department routinely insist on raft foundations for the smallest development on existing properties in Heolgerrig unless it can be proved that this course of action is not necessary. A previous applicant had commissioned a C.M.R.A. from Terra Firma (Wales) Ltd. This was of a good standard and recommended an intrusive investigation.

Richard Davies BSc. (Hons), MSc., F.G.S. of Rhondda Geotechnical Services was commissioned by Mr Meaney as a competent person to review the findings of the original C.M.R.A. After reviewing the Terra Firma report, together with the author's long running experience in the area, this conclusion was definitely correct. Rather than apply for full planning with a C.M.R.A. recommending drilling, the applicant was advised that the most expedient course of action was to carry out the investigation and then present a Validation Report with the application for full planning. This is the second purpose of this report.

Rather than present the previous report in full, which includes geo-environmental information and has a large file size due to being scanned, a brief independently produced summary of relevant desk study information will follow to ensure anyone reviewing this report is familiar with the local geology. This is included to place the results of the intrusive investigation in context. This report will then advise if either ground remediation or specialist foundations are required. Alternatively, if foundation design will be entirely dependent on shallow ground conditions, independent of any mining legacy issues then this report will make that conclusion.

The site is centred on grid reference 303530, 206250 and is at an approximate elevation of 235m A.O.D. The proposed development site is rectangular with a curved southeast curtilage where the Six Bells Estate joins Heolgerrig Road. It covers approximately 0.1 Ha and is surrounded on all sides by residential development. A culverted watercourse which has been traced accurately runs southwest-northeast across the site. The site location is shown in Figure 1 overleaf. The site boundary is shown in Figure 2.

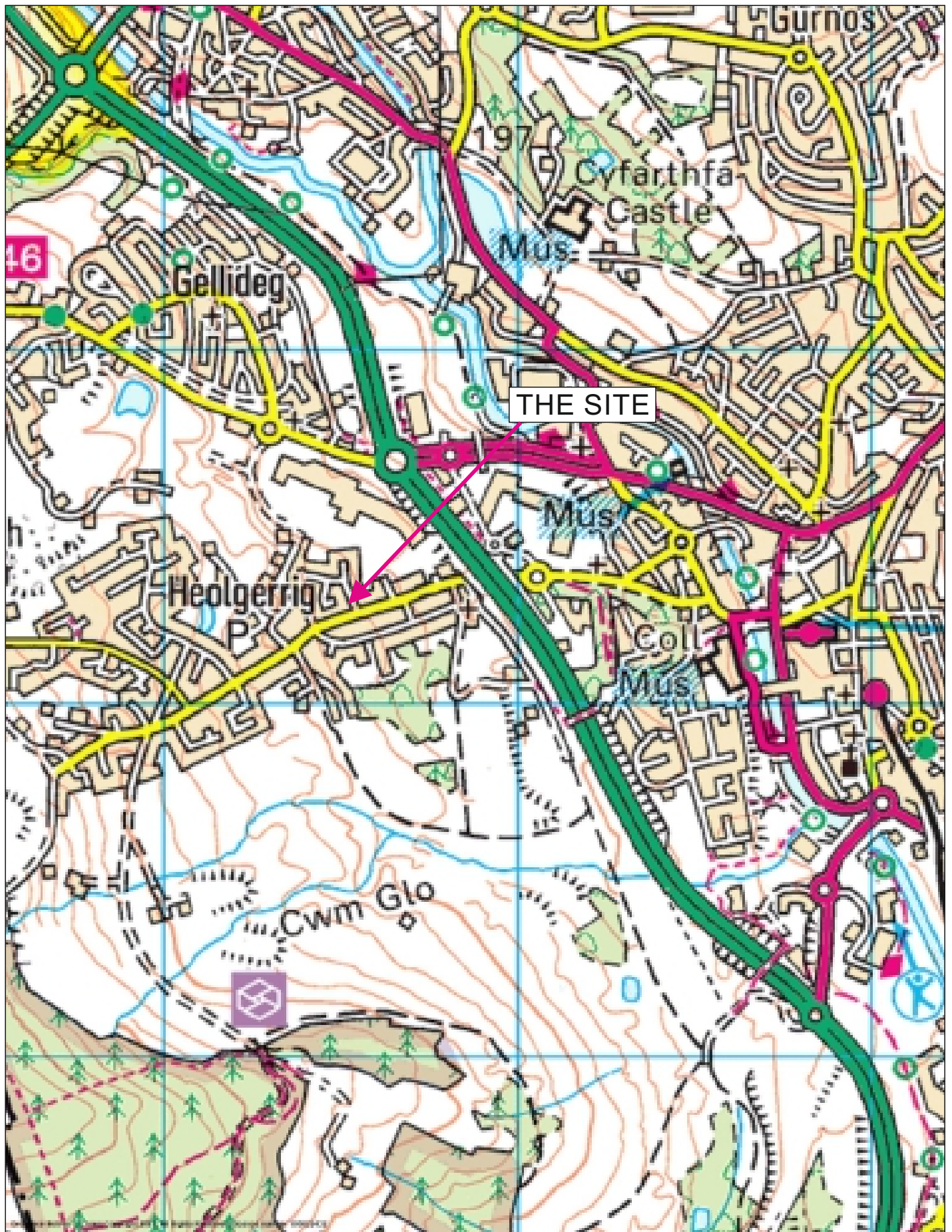


FIGURE 1
SITE LOCATION PLAN



The map shows a proposed 'SITE' outlined in red, located in the Fair View area of New York City. The site is situated between Lexington Avenue and Madison Avenue, and between Madison Place and the Fair View House. The map includes a grid of coordinates ranging from 296194 to 296219 on the vertical axis and 296194 to 296219 on the horizontal axis. The site is labeled 'SITE' and is surrounded by various buildings and streets, including Madison Avenue, Lexington Avenue, Madison Place, and the Fair View House. The map also shows the location of the Fair View House and the Corner View. The map is overlaid with a grid of coordinates ranging from 296194 to 296219 on the vertical axis and 296194 to 296219 on the horizontal axis.

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2. BRIEF DESK STUDY

Figure 3 is a section of the Coal Authority Interactive Viewer. The hatched areas are classed as Development High Risk by the C.A. The site position is shown. The different colours represent different reasons for the High-Risk classification. The purple areas are buffer zones above seam outcrops. Although hard to distinguish, there are lighter, violet areas. These cover areas of suspected unrecorded shallow mining. Much of the mining under Heolgerrig had ceased by the time the keeping of mine plans became a legal requirement. Nevertheless, commercial rivalry and mineral rights boundaries means there are extensive mine plans from the early nineteenth century still extant. The blue represents areas of recorded shallow mining. The site appears to lie within one of these. The Terra Firma C.M.R.A. used a CON29 as the starting point whereas a Consultants Report would have highlighted available mine plans beneath the site. A single mine plan was used to inform the report. This is purported to show workings in the vicinity of the site in 1827. These are in the Seven Foot Seam and the author considers this irrelevant (see below).

Figure 4 is a section of Geological Survey Sheet SO 00NW. The site has been highlighted in blue. L.C.M. stands for Lower Coal Measures. The seam outcrops have been annotated by the author. The outcrop of the Garw Seam is shown north of the site. This is the lowest workable coal seam in the South Wales Coalfield although in the Merthyr area there is intensive mining of the Rosser Veins beneath the Garw. These are a group of 3-5 Ironstone Veins. The broad arrow symbols are levels (sub-horizontal mine entrances) driven on the outcrop. The thin arrow symbols are measured dips of 5° and 13° both to the southeast, i.e. toward the site. The contour lines are complicated by the extensive spoil heaps and made ground. As a generalisation the hillside is rising to the southwest. The combination of dip and topography means that any workings in the Garw would probably be at a “safe” depth of 30m+ although this would need to be confirmed. The C.M.R.A. concluded that the site was underlain by the Five Foot and Gellideg Seams at shallow depth with the Seven Foot outcropping across the site. It is difficult to disagree with the conclusion regarding the Five Foot and Gellideg. The outcrop of the Gellideg is truncated just before the site. The Survey Memoirs record the Gellideg as the lowest of three closely spaced coals, with the upper two forming the Five Foot. All three are often combined as one seam formerly known in Merthyr as the Lower Four Foot. The truncation of the Gellideg outcrop merely means the Survey were unclear how close together the seams were beneath the site, probably due to lack of mining records. Southeast of the site the Coedcae Level is shown driven on the Five Foot outcrop. The Seven Foot outcrop appears not to cross the site, but to be slightly above it stratigraphically and topographically. There is a level shown driven on

the Seven Foot outcrop northwest of the site. The methods used by the Survey to mark outcrops are varied. One of them is projecting seams to the surface from underground records. This method takes no account of superficial deposits or Made Ground. Both are believed to be present at the site. The subcrop of the seam is likely to be slightly further south than shown because of glacial erosion/deposits and is considered unlikely by the author to be encountered below the site as stated in the C.M.R.A.

A section of the stratigraphic column from the map is shown in Figure 5 with the approximate site level marked. The site is underlain by the Five Foot and Gellideg (or a combined seam) at shallow depth. These are not known to be worked beneath the site. The Garw seam is known to be possibly worked beneath the site but is thought to be at a safe depth. This would mean workings in the Rosser Veins would also be at a safe depth. Not marked in Figure 5 are multiple Ironstone Veins above the Garw Seam. These include (in ascending order) the Lumpy, Blue, Red Yellow and Spotted Veins. Any of these veins could possibly be worked beneath the site. For the purposes of the intrusive investigation, unrecorded workings in all the above-mentioned horizons could possibly pose a threat to ground stability at the site. This means that although the risk from recorded workings in the Seven Foot are not considered a threat by the author, it is agreed that an intrusive investigation as recommended by the C.M.R.A. is entirely merited due to the wealth of mineable minerals beneath the site.

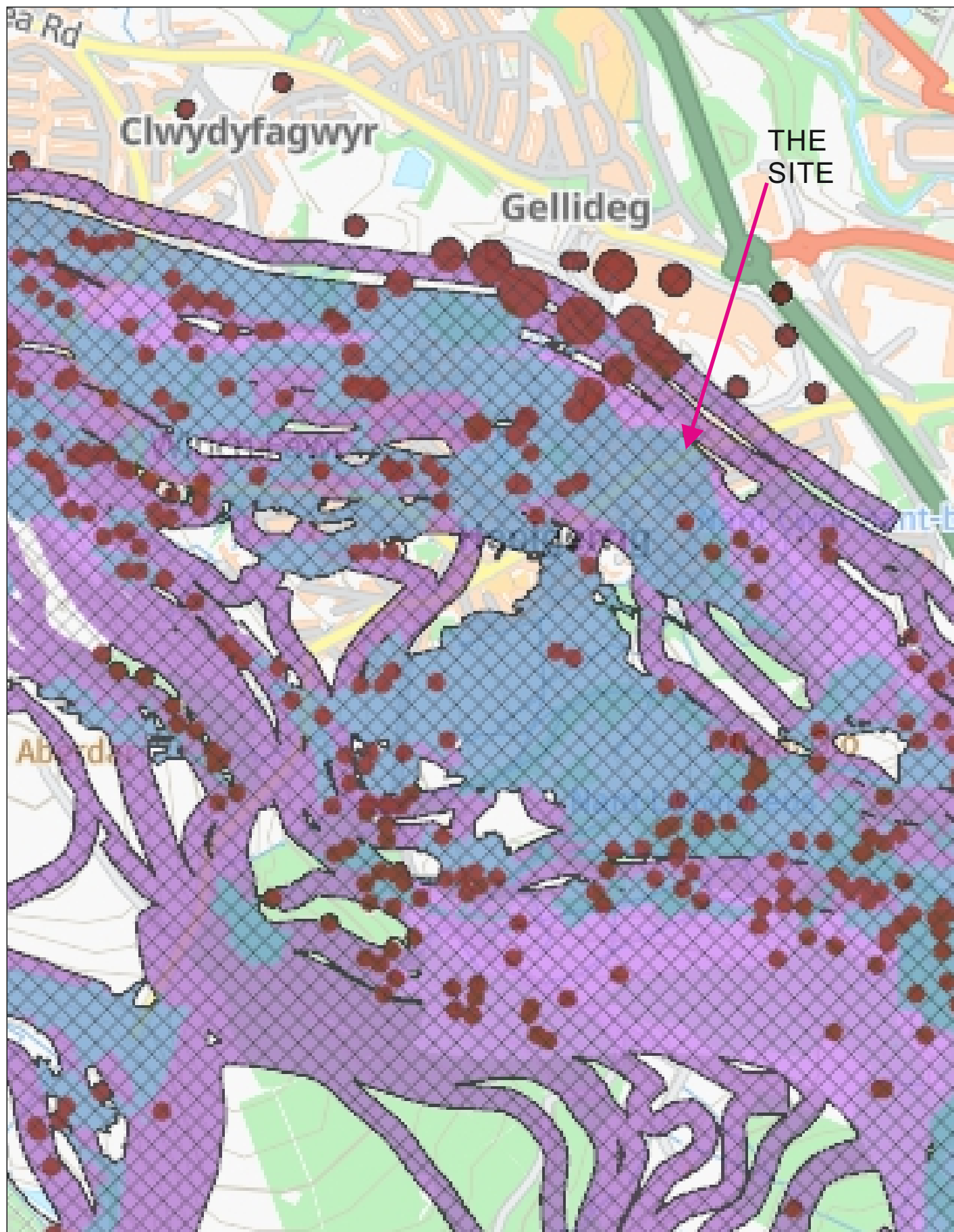


FIGURE 3
THE EXTENT OF DEVELOPMENT HIGH RISK IN WEST MERTHYR.

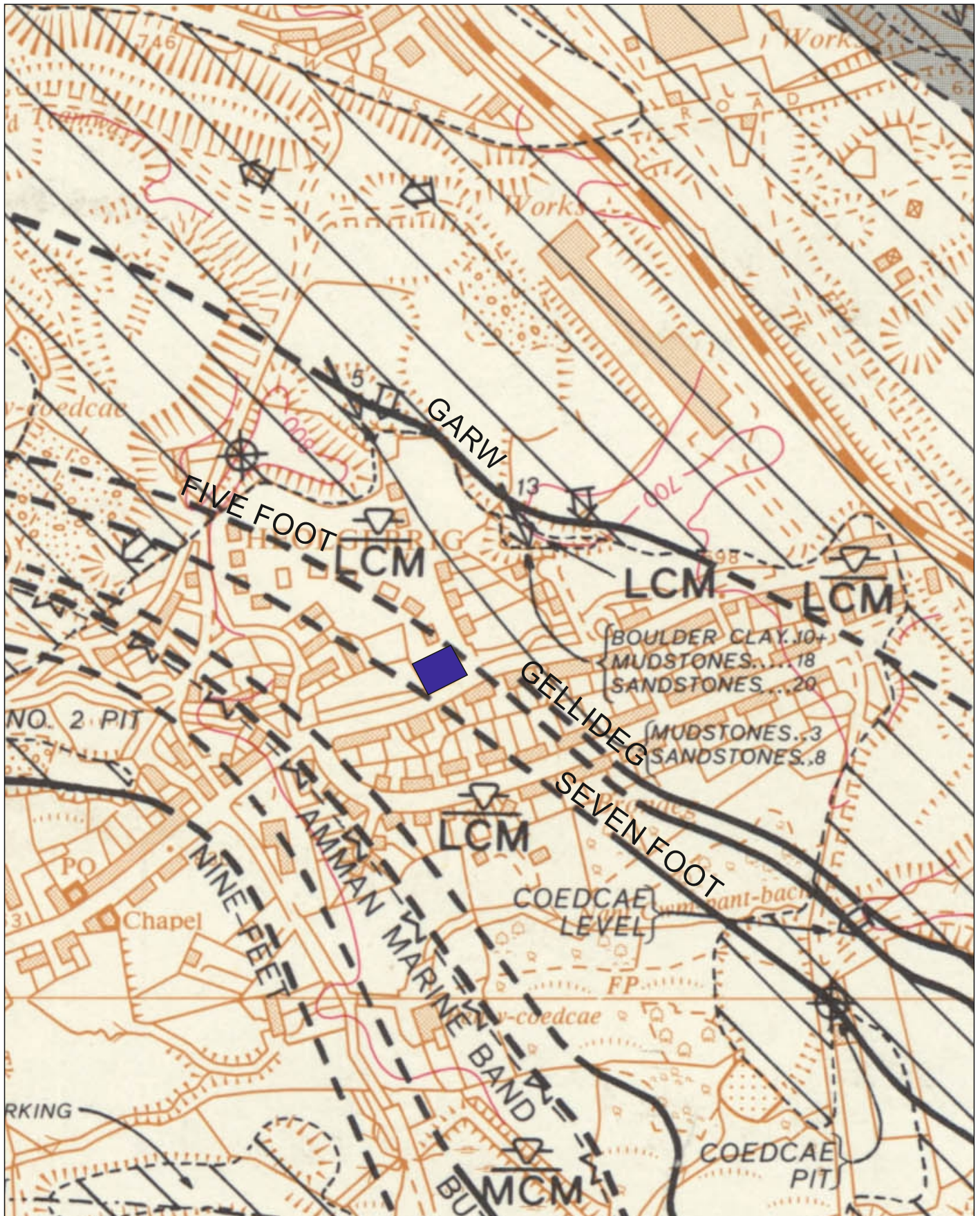


FIGURE 4
SECTION OF GEOLOGICAL SURVEY SHEET SO 00NW.
THE SITE IS HIGHLIGHTED IN BLUE.

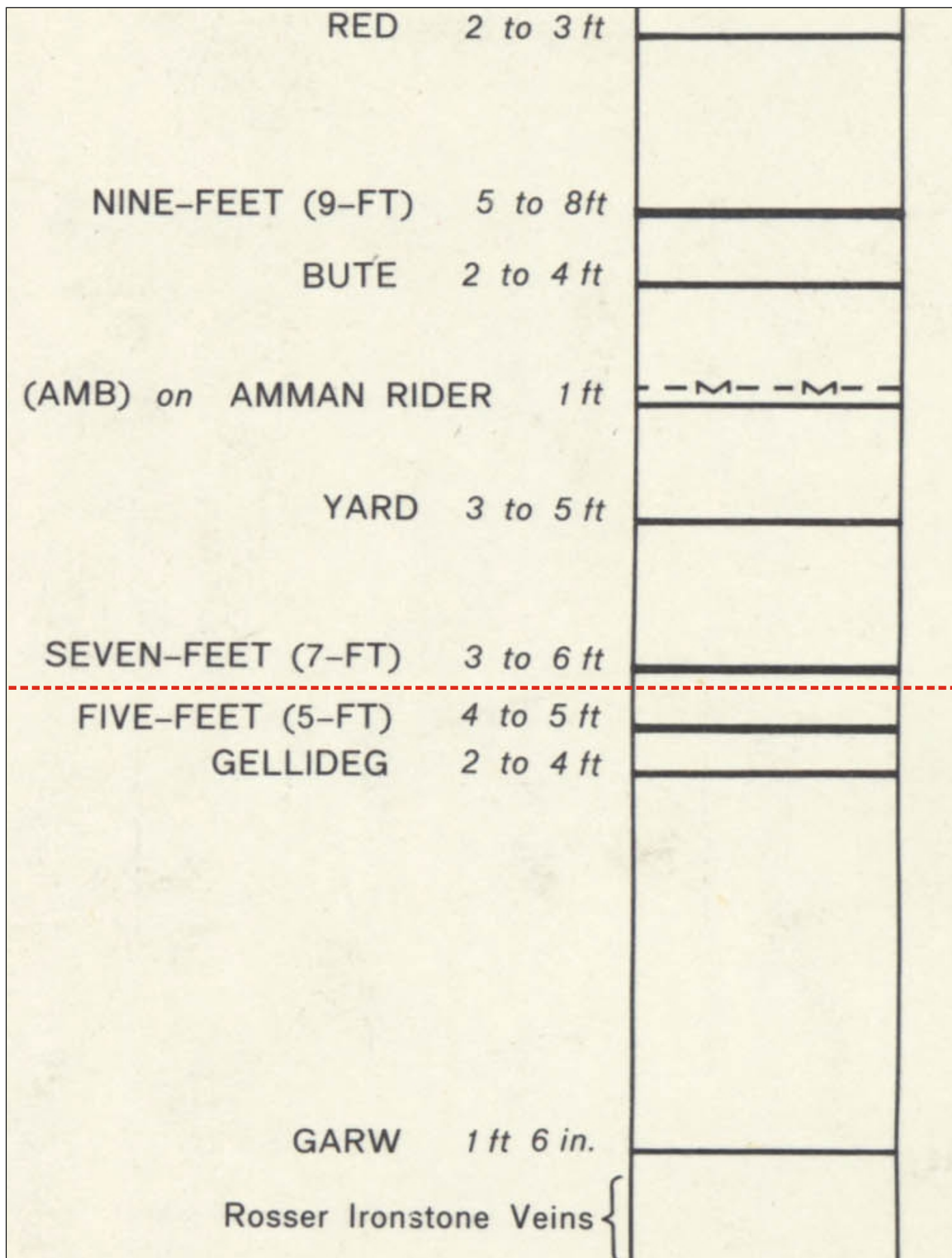


FIGURE 5
SECTION OF THE STRATIGRAPHIC COLUMN FROM SO 00NW.
THE APPROXIMATE SITE LEVEL IS MARKED IN RED.

3. INVESTIGATION DESIGN

Between the time the author was engaged to start the permit application process and the actual site investigation, the nature and design of the proposed development was drastically changed. This was nothing to do with potential shallow mining but was a combination of M.T.C.B.C. comments on building lines and highway access. Figure 6 shows the borehole location plan that accompanied the permit application. The original development footprint is shown. A combination of the new footprint, the culvert position and geological conditions encountered meant that Figure 7 is the borehole plan as drilled, superimposed on the new design.

4. INVESTIGATION RESULTS

The boreholes were drilled between 7-9/03/2023. Apex Drilling used a compact Beretta T44 rotary rig to drill the boreholes. All permit conditions were adhered to, with water flush being employed from rockhead after the superficial deposits were cased using air flush and Odex/Symatrex casing. Continuous gas monitoring at the rig, and regular monitoring in the surrounding area detected no mine gases. Full borehole logs are contained in Appendix 1. In summary, 10 boreholes were drilled to a maximum depth of 34m. The boreholes proved between 2.7m-5.3m of gravelly Glacial Drift. Some of this appeared to have been disturbed/tipped which was possibly linked to the culvert construction. The culvert is relatively modern and is constructed from spun concrete rings. Rockhead was grey mudstone in all boreholes. BH1 encountered workings/ broken ground at shallow depth (9.6m-13.0m). All flush was lost. Once a metre of solid rock was proven beneath the broken ground, the borehole was stopped because of the risk of jamming the drill string. BHs 2-6 were all drilled to 34m. No workings were encountered. Correlation between the boreholes was good. The Gellideg and Five Foot seams were clearly identified with depths thicknesses and spacings very much as described in the Geological Survey Memoirs. The Gellideg was apparently absent in BH2, but there was no suggestion it had been removed. Local seam washouts are a very common phenomenon in the Lower Coal Measures. The Garw Seam was not reached by any of the boreholes. Below the seatearth of the Gellideg the strata were predominantly mudstone. There were thin interbedded harder layers. These might well have been Ironstone Veins but with rotary open hole methods it is impossible to differentiate between Ironstone and thin sandstones with any certainty. After the initial six boreholes, BH7 encountered 2.2m of broken ground. There was a partial loss of flush, but the returns were sufficient to prove the base of the Five Foot Seam, the entire Gellideg Seam and drill on to 20m. It is likely that BH7 had been drilled through a pillar, hence the only partial loss of flush. Both BH1 and BH7

were in the southwest corner of the site, away from the proposed building footprint. It was now important to delineate the extent of any workings. BHs 3 and 6 had not proved the Garw Seam in positions where it would have been at its shallowest. Therefore, the decision was taken to cut borehole lengths down to 20m on the basis that the Five Foot and Gellideg could be checked for workings, with anything below being too deep to affect ground stability at the site. BHs 8-10 all proved both seams to be intact. BH9 was only 2.5m from BH1.

5. CONCLUSIONS

The site investigation proved the following:-

- The Garw Seam is in excess of 34m beneath the site.
- The Ironstone Veins above the Garw Seam have not been mined.
- The Seven Foot Seam does not underlie the site.
- The Five Foot and Gellideg were confidently identified by the S.I.
- The Gellideg was unworked.
- Workings in the Five Foot were confined to the southwest corner of the site. This is well away from the footprint of the proposed building. It would appear that the Five Foot was taken in preference to the Gellideg. The seam separation averaged 3m. This is too great to take both seams together as has been done elsewhere in the coalfield where the seam separation is much less. The seams could not have been mined separately. If the Gellideg was taken after the Five Foot, roof conditions would have been extremely hazardous. If the Five Foot was taken after the Gellideg the position would be reversed, with the floor prone to collapse. It is likely that the Five Foot was being worked back toward outcrop from one of the recorded levels in the area, possibly the Coedcae Level which is approximately 400m away. This is a hazardous practice. The mudstone roof is only 3m-4m thick over the workings in BHs 1 and 7. Buried glacial erosion features make it even more dangerous and it would appear the workings were halted at that point.

There is no risk to ground stability at the site due to mining legacy issues. No remediation is required, neither are specialist foundations. Foundation design will be entirely dependent on shallow ground conditions. Standard strip footings can be used if the soils at the site have sufficient bearing capacity. This will need to be checked on site and is outside the remit of this report.

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18/05/2024

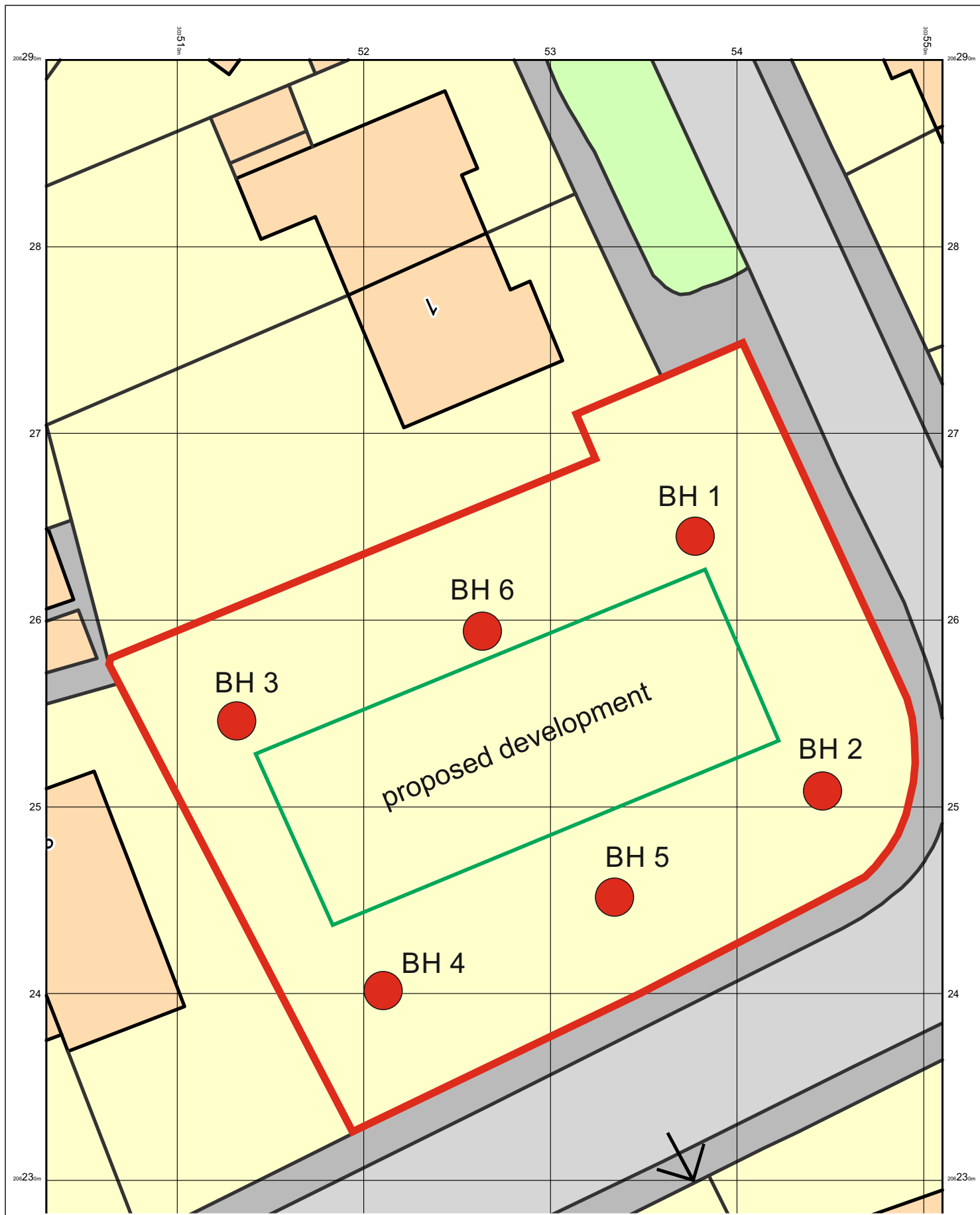


FIGURE 6
BOREHOLE LOCATION PLAN AT SIX BELLS ESTATE
(SUBJECT TO TRACING CULVERT)

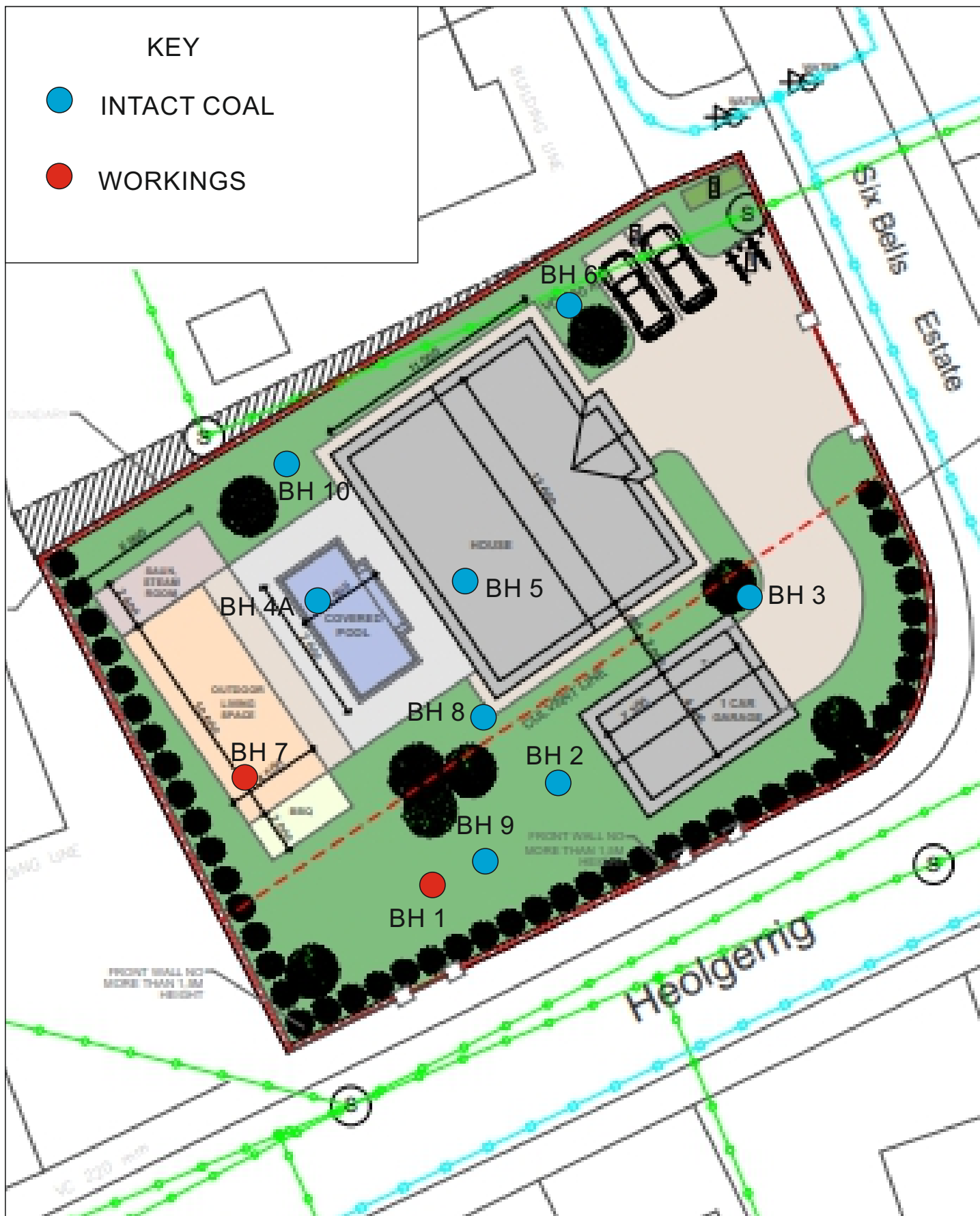


FIGURE 7
BOREHOLE POSITIONS AS DRILLED AT SIX BELLS
SUPERIMPOSED ON THE PROPOSED DEVELOPMENT..

APPENDIX 1

ROTARY BOREHOLE LOGS

FROM

SIX BELLS ESTATE

HEOLGERRIG

MERTHYR

BH1 SIX BELLS, HEOLGERRIG	
Strata Depth (m)	Strata Description
G.L.-3.2	GRAVELLY, SANDY CLAY (MADE GROUND)
3.2-5.8	GLACIAL TILL
5.8-9.6	GREY MUDSTONE
9.6-13.0	BROKEN GROUND, TOTAL LOSS OF FLUSH
13.0-14.0	NORMAL DRILL-NO RETURNS

BH7 SIX BELLS, HEOLGERRIG	
Strata Depth (m)	Strata Description
G.L.-5.3	GRAVELLY, SANDY CLAY (PROBABLY TOP 2m IS MADE GROUND)
5.3-8.1	GREY MUDSTONE
8.1-10.2	BROKEN GROUND, LOSS OF FLUSH
10.2-11.4	COAL
11.4-13.7	GREY MUDSTONE
13.7-15.6	COAL
15.6-20.0	GREY MUDSTONE

BH2 SIX BELLS, HEOLGERRIG	
Strata Depth (m)	Strata Description
G.L.-2.7	GRAVELLY, SANDY CLAY (MADE GROUND)
2.7-9.8	GREY MUDSTONE. VERY BROKEN AND WEATHERED TOP METRE
9.8-11.9	COAL
11.9-17.5	GREY MUDSTONE, OCCASIONAL CARBONACEOUS TRACES
17.5-34.0	INTERBEDDED SANDSTONE AND MUDSTONE

BH3 SIX BELLS, HEOLGERRIG	
Strata Depth (m)	Strata Description
G.L.-5.1	GRAVELLY, SANDY CLAY (POSSIBLY MADE GROUND FOR 1.5m)
5.1-8.9	GREY MUDSTONE
8.9-11.1	COAL
11.1-14.6	GREY MUDSTONE
14.6-16.9	COAL
16.9-18.3	GREY MUDSTONE
18.3-34.0	INTERBEDDED SANDSTONE AND MUDSTONE. OCCASIONAL CARBONACEOUS TRACES

BH4A SIX BELLS, HEOLGERRIG	
Strata Depth (m)	Strata Description
G.L.-3.8	GRAVELLY, SANDY CLAY (PROBABLY MADE GROUND)
3.8-9.4	GREY MUDSTONE
9.4-11.2	COAL WITH THIN PARTING
11.2-14.8	GREY MUDSTONE
14.8-16.7	COAL
16.7-20.3	GREY MUDSTONE
20.3-34.0	INTERBEDDED SANDSTONE AND MUDSTONE WITH OCCASIONAL CARBONACEOUS TRACES

N.B. BH4 WAS ABORTED AT 2.0m, CASING STUCK IN CONCRETE OBSTRUCTION

BH5 SIX BELLS, HEOLGERRIG	
Strata Depth (m)	Strata Description
G.L.-3.8	GRAVELLY, SANDY CLAY (PROBABLY MADE GROUND)
3.8-9.4	GREY MUDSTONE
9.4-11.2	COAL WITH 0.5m PARTING
11.2-14.6	GREY MUDSTONE
14.6-16.6	COAL
16.6-20.1	GREY MUDSTONE
20.1-34.0	INTERBEDDED SANDSTONE AND MUDSTONE WITH OCCASIONAL CARBONACEOUS TRACES

BH6 SIX BELLS, HEOLGERRIG	
Strata Depth (m)	Strata Description
G.L.-4.6	GRAVELLY, SANDY CLAY (PROBABLY TOP 2m IS MADE GROUND)
4.6-7.0	GREY MUDSTONE
7.0-9.5	COAL
9.5-10.1	GREY MUDSTONE
10.1-11.0	COAL
11.0-11.3	GREY MUDSTONE
11.3-13.1	COAL
13.1-15.9	GREY MUDSTONE
15.9-34.0	INTERBEDDED SANDSTONE AND MUDSTONE WITH OCCASIONAL CARBONACEOUS TRACES

BH8 SIX BELLS, HEOLGERRIG	
Strata Depth (m)	Strata Description
G.L.-3.9	GRAVELLY, SANDY CLAY (PARTIALLY MADE GROUND)
3.9-9.5	GREY MUDSTONE
9.5-11.4	COAL
11.4-14.7	GREY MUDSTONE
14.7-16.7	COAL
	GREY MUDSTONE

BH9 SIX BELLS, HEOLGERRIG	
Strata Depth (m)	Strata Description
G.L.-4.1	GRAVELLY, SANDY CLAY (PARTIALLY MADE GROUND)
4.1-10.3	GREY MUDSTONE
10.3-12.5	COAL
12.5-15.7	GREY MUDSTONE
15.7-17.8	COAL
17.8-20.0	GREY MUDSTONE

BH10 SIX BELLS, HEOLGERRIG	
Strata Depth (m)	Strata Description
G.L.-3.6	GRAVELLY, SANDY CLAY (PROBABLY MADE GROUND)
3.6-9.5	GREY MUDSTONE
9.5-11.1	COAL WITH THIN PARTING
11.1-14.6	GREY MUDSTONE
14.6-16.6	COAL
16.6-20.0	GREY MUDSTONE