

GEOTECHNICAL REPORT
ON SLOPE STABILITY
AT
MERTHYR MOTOR AUCTIONS
PANT ROAD
DOWLAIS
MERTHYR TYDFIL
CF48 3SH
10/11/2020

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INTRODUCTION

Merthyr Motor Auctions have been established for many years at Pant Road, Dowlais. The planned dualling of the A465 will result in a loss of a significant proportion of their vehicle storage area which is vital to the function of the business. At the request of Dean Davies, the owner of M.M.A., Rhondda Geotechnical Services were commissioned to investigate the possibility of removing an embankment from within the site to create some additional yard space. The brief is to assess slope stability at present, assess how much additional land could be gained and if it is economically feasible. In addition a design for a safe new slope profile needs to be produced for consultation with M.T.C.B.C Planning and Building Control.

1. SITE DESCRIPTION

The site is centred on Grid Reference 306480, 208430 with the yard at an elevation of approximately 330m A.O.D. The top of the existing embankment is approximately four metres higher than the yard. The site is a working commercial yard of featureless gently sloping tarmac. The eastern perimeter of the yard is a high rockface. The yard then narrows and passes to a lower area still under the ownership of M.M.A. There are no surface watercourses. The site location and site boundary (embankment area only) can be seen overleaf in Figures 1 and 2

2. SITE HISTORY

Reference to historic O.S. maps show that the site was formerly a large railway complex serving the Ivor Ironworks to the southeast of the site. The high rockface at the eastern site boundary is actually a railway cutting which was formerly occupied by up to four track beds. The site was cleared and constructed in its present form in 1994-1995. The northern slope of the embankment was profiled at this time.

3. SITE INVESTIGATION

After an initial site meeting and appraisal a detailed inspection of the embankment was carried out on Monday 2/11/2020. The embankment is at the same level as the elevated garden of no. 43 Llewellyn Street and is separated from it by a steel palisade fence with dense conifers behind it. It should be emphasised that the houses in Llewellyn Street are at approximately the same level as the yard of the auctions, only the gardens are at a higher level. These

back onto the former railway cutting mentioned in the site history. The embankment has a flat top running away from the palisade fence and ranging from 8m-12m wide before running down to the yard level at an average slope of 30°. The top of the embankment and the slope are grassed over with three medium sized trees on the western part of the slope. A small hand dug trial pit was excavated on the top of the embankment. This revealed a gravelly soil which appeared to be made ground. On the eastern flank of the embankment the underlying bedrock is exposed. This can be seen in Figures 3 and 4. The bedrock is a thinly interbedded series of Siltstone and Mudstone with Ironstone nodule horizons. This can be seen in Figure 5. The bedrock has been cut back, presumably as part of the railway cutting. As can be seen in Figure 6, the slope angle is approximately 70°. Figure 7 is an extract of the Geological Survey sheet covering the site. The rock underlying the site is of Carboniferous age, more specifically the Lower Coal Measures. The outcrop of the Sun Seam can be seen marked close to the embankment. An outcrop log across the other side of the yard records the thickness as 13" (0.32m). This seam was never commercially exploited, but is an important stratigraphic marker. Above the seam, and below the Massive Sandstone (The Farewell Rock) exposed in the rockface opposite, the Geological Memoirs record 10m of interbedded strata. This is the material exposed on the side of the embankment. This means that somewhere further into the gardens of Llewelyn Street is the outcrop of the Farewell Rock.



FIGURE 1
SITE LOCATION (ARROWED)

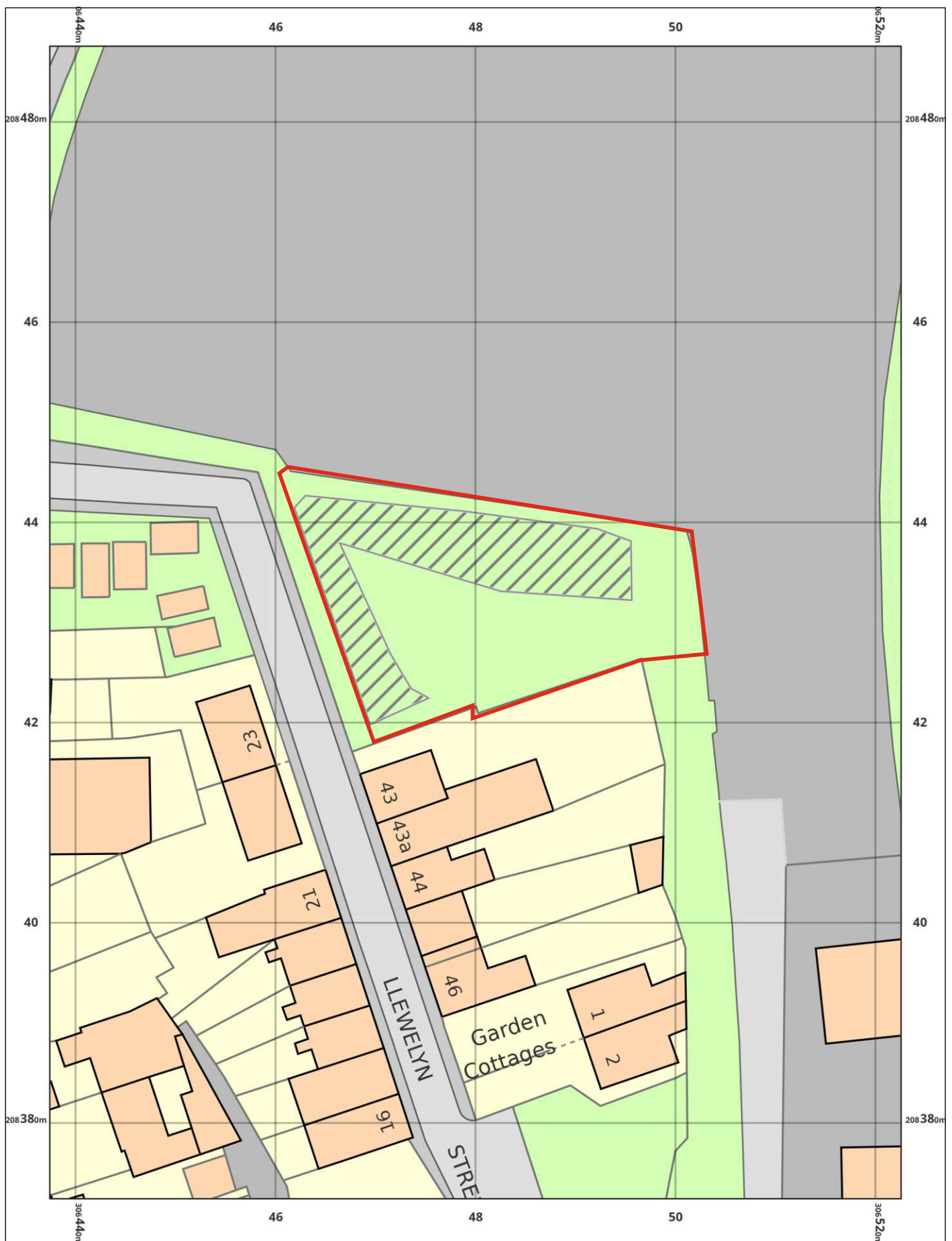


FIGURE 2

THE EMBANKMENT (HIGHLIGHTED) AND SURROUNDING AREA.
GRID SQUARES ARE TWENTY METRES ACROSS.



FIGURE 3

THE SURVEY STAFF IS OPEN TO 5m BUT IS LEANING BACK. THE BEDROCK IS SEEN APPROXIMATELY 3m ABOVE THE YARD LEVEL, BUT THEN APPEARS TO DROP AWAY.



FIGURE 4
WITH THE STAFF HELD VERTICALLY THE TOP OF THE
EMBANKMENT AT THE CORNER OF THE PALLISADE FENCE
WAS APPROXIMATELY 4.2m ABOVE THE YARD LEVEL



FIGURE 5
INTERBEDDED MUDSTONE, SILTSTONE AND IRONSTONE NODULES
EXPOSED IN THE EMBANKMENT.



FIGURE 6
BEDROCK PROFILE AT 70° LOOKING SOUTH FROM BENEATH
THE CORNER OF THE PALLISADE FENCE.



FIGURE 7
EXTRACT OF GEOLOGICAL SURVEY SHEET SO 00NE. THE O.S. BASE MAP IS FROM 1965 AND THE RAILWAY SERVING THE IVOR WORKS IS STILL IN EXISTENCE.

4. SLOPE STABILITY ANALYSIS

The embankment has been in its current form for 25 years and is clearly stable. The granular superficial material has an internal friction angle higher than 30° and there is no sign of slumping or shear on the northern slope. When re-profiling the embankment it is intended to keep this angle for any superficial deposits on top of the bedrock. The height of the bedrock above the yard level is unknown within the mass of the embankment. It is observed at approximately 3m above yard level close to the palisade fence but then is obscured by loose material. The bedrock is stable at a 70° profile as seen in the eastern embankment side but it may be more prudent to reduce this angle to 60° in any new cut. The bedrock position within the embankment will control the profile of any new cut as seen in the cross section in Figure 8. This in turn will affect the amount of area gained in the yard when removing the embankment. What is not a variable is the 2.5m wide stand-off zone from the palisade fence. This is a very conservative figure for ground which is underlain by bedrock at slightly over a metre depth. This must be retained whatever the final slope design is. The slope will then be contoured down at 30° through the superficial deposits. If bedrock is not encountered during this operation the 30° slope will be continued to yard level as a proven safe angle for the granular material. It is far more likely that bedrock will be encountered and two possible scenarios are shown in Figure 8 with bedrock at different depths. The bedrock can then be cut down at a 60° angle which is perfectly acceptable for a cut between 2m-3m high. The variable effect bedrock depth will have on the amount of additional yard space created is shown in Figure 9 in plan view.

5. CONCLUSIONS

Removing part of the embankment as detailed above will present no threat to the ground stability of the garden of 43 Llewelyn Street south of the embankment. This is providing the stand-off zone and slope angles are kept to the specifications in Figure 8. The embankment is already sloping gently to street level on its western margin so there will be no change on that side. Likewise, there will be no alteration to the eastern boundary other than the actual embankment removal. This cannot affect the lower ground of the yard. There is no other ground or structure that will be affected by the proposed earthworks. The final fine tuning of the design will need to be decided on site during excavation works. This will need to be done by a qualified geotechnical engineer with reference to the level and competency of the bedrock exposed during initial

excavations. The final position of the second break of slope will be entirely dependent on this.

Richard Davies BSc. (Hons.), MSc., F.G.S.

10/11/2020

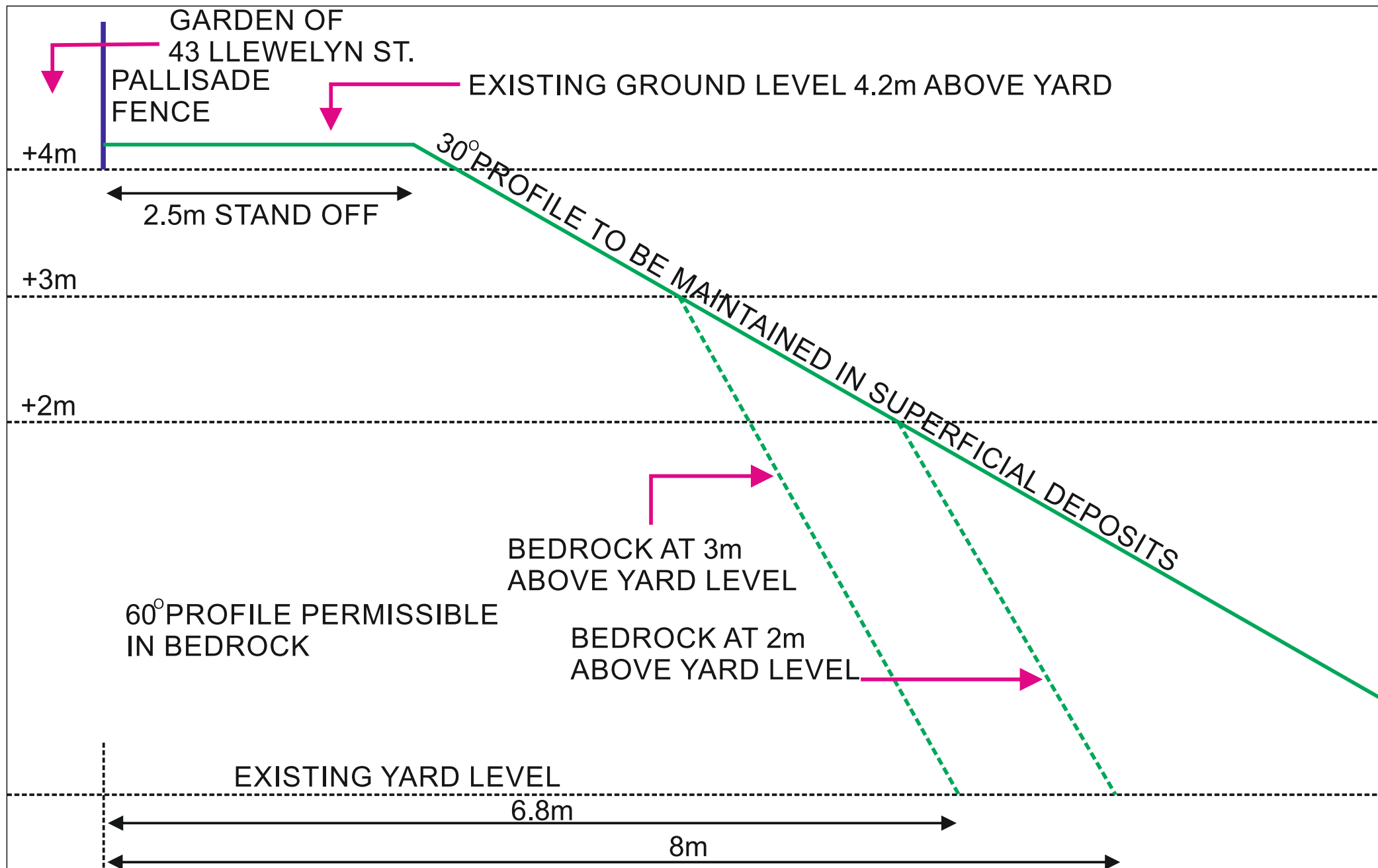


FIGURE 8
PROPOSED CUT PROFILES AT MERTHYR MOTOR AUCTIONS DEPENDENT
ON BEDROCK LEVEL ENCOUNTERED DURING EXCAVATION

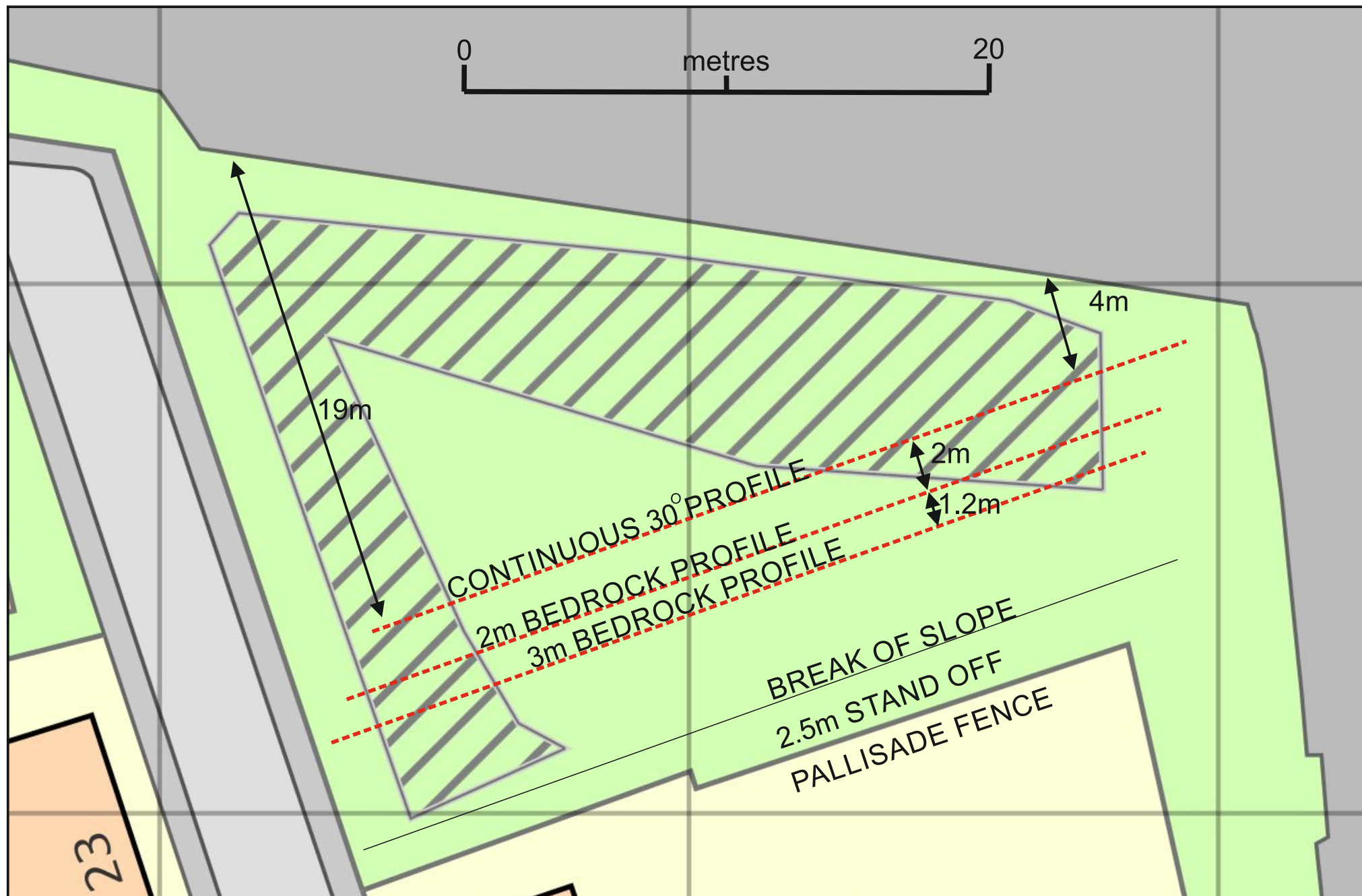


FIGURE 9
PLAN VIEW OF THE AREA CLEARED WITH THE THREE ALTERNATIVE SLOPE PROFILES