

Bike Park Wales

**GETHIN WOODS, ABERCANAID, MERTHYR
TYDFIL**

Coal Mining Risk Assessment

12329/LP/18/CMRA

CLIENT: Bike Park Wales

PROJECT: Gethin Woods, Abercanaid, Merthyr Tydfil

TITLE: Coal Mining Risk Assessment Report

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1.0 INTRODUCTION

Bike Park Wales are proposing to expand their existing premises in Abercanaid for commercial use.

Intégral Géotechnique (Wales) Limited have been commissioned to carry out a Coal Mining Risk Assessment of the proposed development site, in order to provide a risk based approach to the development of the site.

The Coal Mining Risk Assessment:

- presents the available data on the coal mining issues which are pertinent to the site;
- assesses the risk to the site from any known coal mining issues;
- sets out appropriate mitigation (ground stabilisation) measures for dealing with these mining issues, which can then be followed during the design and development of the site.

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2.0 AVAILABLE INFORMATION

2.1 SITE LOCATION AND DESCRIPTION

The site is located in Gethin Woods approximately 0.5km west of Abercanaid at a National Grid Reference of 305160, 203410, see Figure 1.

The site is irregular in shape and occupies an area of approximately 5 hectares. The boundaries of the site are defined by existing undeveloped and wooded areas to the north, east and west and an extensive network of bike trails and tracks utilised by the bike park to the south and southwest. A site plan is presented in Figure 2.

The site is situated on sloping ground, towards the base of the valley, and falls in a north easterly direction towards the River Taff from an approximate maximum elevation of 260m AOD to an approximate minimum elevation of 220m AOD. Off site the ground rises more sharply to the southwest to reach a maximum elevation of 471m AOD.

The area of the proposed development is currently largely undeveloped with large parts being heavily wooded. Where the site is not wooded it is covered with scrub vegetation. There are existing car parking areas and existing tracks and trails within the development area. The car parking areas are within the southern and western parts of the site. Surface water drainage features are also indicated to cross the site. The western area of the site is currently occupied by an existing café building.

2.2 SITE HISTORY

The recent history of the site has been traced with the aid of historical maps included within an Envirocheck Report which has been obtained for the site. The Envirocheck Report includes the following scaled historical maps:

Map Scale	Dates
1:2,500	1881, 1900, 1919, 1957-1964, 1964-1983, 1983, 1988, 1993, 2000
1:10,560	1885, 1901, 1922, 1945, 1951
1:10,000	1964, 1969, 1970, 1982-1989, 1999, 2006, 2018

2.2 SITE HISTORY (CONTINUED)

The earliest edition of the map dated 1881 indicated the site and the surrounding areas to be undeveloped. The site was indicated to be covered by rough pasture with field boundaries passing through the site. The field boundaries were lined with non-coniferous trees, with trees also indicated within other parts of the site. The southwest and western areas of the site were occupied by mixed coniferous and non-coniferous trees. Surface water features are indicated to cross the site in a northwest to southeast and a west to east direction. Graig Brook was indicated to flow in a north easterly direction to the northwest of the site. A wooded and heavily vegetated area known as Graig Gethin was indicated to the southwest of the site. Wooded areas also extended to the northeast of the site. Gethin Pit No. 2 was indicated approximately 350m to the east of the site and with Gethin Pit No. 1 slightly further away and located approximately 750m to the east. Both pits were accessed via the existing Gethin Railway. An air shaft was indicated approximately 120m to the southeast of the site. Abercanaid itself was well established on the other side of the Glamorganshire Canal located approximately 450m to the northeast.

The 1900 edition of the map indicated the site to have remained undeveloped. Many of the wooded areas had been cleared leaving rough pasture across the site but with areas of non-coniferous trees within the western and eastern areas. The water feature to the northwest of the site was now known as Nant Graig. The railway to the northeast which served the two pits had been expanded and was now the Great Western Railway and Rhymney Joint Line (Merthyr and Quakers Yard). The two coal pits were still active. Gethin Pit No. 2 had expanded with a new engine house constructed and large spoil heaps evident to the north of the buildings.

The 1919 edition of the map indicated a small road or track to pass through the site, in a northwest to southeast direction, along the line of the existing surface water feature.

The remaining site area remained relatively unchanged. A coal level, accessed via a tramway running parallel to Nant Graig and associated with Waunwylt Colliery, was indicated approximately 30m to the northwest of the site. An air shaft was also indicated approximately 120m to the west. Gethin Pit No. 1 and No. 2 continued to operate to the east of the site. The Glamorganshire Canal was indicated to be disused by this time.

There were no significant changes to the site and the surrounding areas over the subsequent years. Gethin Pit No. 1 and No. 2 were indicated to be disused by 1951.

3.0 SITE HISTORY (CONTINUED)

By the edition of the map dated 1957-1964 there was no longer any evidence of Waunwyllt Colliery. An old air shaft and old coal level were indicated to the west of the site and the tramway which served the colliery was shown to be dismantled. The railway to the northeast was also indicated to be dismantled by this time.

The edition of the map dated 1963-1986 indicated the site to be planted with mainly coniferous trees but interspersed with non-coniferous varieties. Sinks were indicated within the western area of the site associated with the surface water feature which crossed the site from the east. The surrounding areas remained relatively unchanged and undeveloped.

By 1983-1989 tracks had been constructed across the site to access a picnic site and a playground area. Car parking areas and new access routes were also constructed within the western area and along the southwest boundary of the site.

The site remained relatively unchanged over the subsequent years with the area becoming known as Gethin Woodland Centre. By 2013 a café building was in construction within the western area of the site. Additional car parking areas were also constructed within the southern area of the site by this time. By 2013 extensive mountain bike trails were indicated to the southwest of the site and Bike Park Wales continued to establish up until the present day.

2.3 GEOLOGY

The 1:10,560 scale geological map of the area (SO 00 SE) indicates the site to be underlain by southerly dipping strata of the South Wales Middle Coal Measures Formation of the Carboniferous Period. The dip of strata in the vicinity of the site is indicated to be 6°-10° to the south.

These rocks typically comprise grey productive coal-bearing mudstones/siltstones, with seatearths and minor sandstones.

The conjectural outcrop of the Lower Cwmgorse Marine Band is indicated traversing approximately through the centre of the site on a northwest to southeast trend, while the conjectural outcrop of the underlying Foraminifera and Upper Cwmgorse Marine Bands are indicated just to the north and the south respectively of the site.

A number of conjectural outcrops of various coal seams are indicated in the vicinity of the site.

2.3 GEOLOGY (CONTINUED)

The known and conjectured outcrops of the Pentre Rider, the Pentre and the Lower Pentre are indicated to the north of the site. Due to the southerly strata dips these seams would be expected to underlie the northern and central parts of the site at shallow depths, deepening in a southerly direction. Former adits and shafts are recorded along these seam outcrops indicating that these seams have been mined underground in the area. The nearest of these adits are less than 200m to the north of the site.

The Graig and Abergorky seams are shown to outcrop (or conjectured to outcrop) approximately through the centre of the site just below the Lower Cwmgorse Marine Band. Given the southerly dip of the strata, these seams would underlie the southern half of the site at shallow depths. An adit is shown on the Graig/Abergorky outcrop, approximately 150m to the northwest of the site, again indicating that these seams have been mined underground in the area.

The conjectural outcrop of the Hafod seam is indicated to pass beneath the site, running approximately parallel to the south western edge and therefore this seam could also be shallow beneath these parts of the site.

The solid strata are indicated to be overlain by superficial deposits of Devensian Till of the Quaternary Period. These deposits generally comprise a poorly sorted and variable composition of clays, sands and gravel, with some cobbles and occasional boulders. Superficial deposits are not indicated to overly the bedrock along the southwest edge of the site.

Made ground could be encountered above the superficial deposits in the vicinity of existing buildings and where car parking areas have been constructed. Made ground is not anticipated to be widespread.

A summary of the anticipated geological succession is given below in Table 1.

2.3 GEOLOGY (CONTINUED)

Table 1: Summary of Anticipated Site Geology		
Geological unit	Horizon	Description
Recent	Topsoil or made ground	Various materials
Quaternary	Devensian Till	Clays, sands and gravels with varying matrix, some cobbles and occasional boulders
Carboniferous	South Wales Middle Coal Measures Formation	Grey productive coal-bearing mudstones/siltstones, with seatearths and minor sandstones

2.4 MINING

A Coal Mining Report for the site has been obtained from the Coal Authority and a copy is included in Appendix A.

The Coal Authority states that the property is in a surface area that could be affected by underground mining in 7 seams of coal at 100m to 280m depth, and last worked in 1955.

Any movement in the ground due to coal mining activity associated with these workings should have stopped by now.

However, the property is in an area where the Coal Authority believe there is coal at or close to the surface. This coal may have been worked at some time in the past and the presence of unrecorded workings cannot be ruled out. The potential presence of coal workings at or close to the surface should be considered, particularly prior to any site works or future development activity.

The Coal Authority mining report confirms that there are no known coal mine entries within, or within 20 metres of, the site boundary.

The Coal Authority states that it is not aware of any damage due to geological faults or other lines of weakness affected by coal mining.

2.4 MINING (CONTINUED)

The recorded workings, discussed within the Coal Authority Report, are likely to be within the seams of coal conjectured to outcrop between approximately 600m and 1300m to the north of the site including the Two Feet Nine, Four Feet, Upper Six Feet, Lower Six Feet, Nine feet, and Bute seams. With the strata dips in the area indicated to be 10°, these seams would underlie the site at depths of between 100m and 280m, as stated in the Coal Authority Report and would not pose a shallow mining risk beneath the site.

As discussed in Section 2.3, the geology map indicates that a number of coal seams are likely to underlie the site at shallow depths. These seams include the Lower Pentre, Pentre, Pentre Rider, Abergorky and Graig and the Hafod seam, all of which are indicated (by the generalized vertical section of the geology map) to be typically 1ft-2 ft (0.3m-0.6m) thick.

However, despite their thin nature, all of these seams are shown to have associated adits and occasional shafts further along their outcrops, beyond, but often not far from, the site. These mine entries indicate that these seams have been mined near to and possibly beneath the site, although the geology map does not show any mine entries within the site itself.

The Coal Authority interactive viewer does indicate the site to be within a high-risk development area. Shallow coal mine workings are not indicted beneath the site on the interactive viewer, but the presence of unrecorded workings cannot be ruled out without investigation. Further investigations are therefore recommended prior to development.

3.0 RISK OF PAST COAL MINING TO PROPOSED DEVELOPMENT

The Coal Authority states that the property is in a surface area that could be affected by underground mining in 7 seams of coal at 100m to 270m depth, and last worked in 1955.

The recorded workings, discussed within the Coal Authority Report, are likely to be within the seams of coal conjectured to outcrop between approximately 600m and 1300m to the north of the site including the Two Feet Nine, Four Feet, Upper Six Feet, Lower Six Feet, Nine feet, and Bute seams. With the strata dips in the area indicated to be 10°, these seams would underlie the site at depths of between 100m and 270m, as stated in the Coal Authority Report. These would not pose a shallow mining risk beneath the site and therefore should not be of concern for any future development.

The geological map indicates that a number of coal seams are likely to underlie the site at shallow depths. These seams include the Lower Pentre, Pentre, Pentre Rider, Abergorky and Graig and the Hafod seam, all of which are indicated (by the generalized vertical section of the geology map) to be typically 1ft-2 ft (0.3m-0.6m) thick. However, despite their thin nature, all of these seams are shown to have associated adits and occasional shafts further along their outcrops, beyond, but often not far from, the site. These mine entries indicate that these seams have been mined near to and possibly beneath the site, although the geology map does not show any mine entries within the site itself.

There is therefore a risk that unrecorded workings, within the above discussed seams, could be present at shallow depths beneath the site. The presence of such workings cannot be ruled out without investigation.

The collapse of any workings in shallow seams could lead to void migration up to the surface, if there is insufficient rock cover above the workings to prevent this happening. Any resulting surface subsidence could cause subsequent structural damage to buildings and infrastructure within the site.

In view of this, a borehole investigation would be required to confirm the presence and depth of any shallow coal seams beneath the site and to assess the risk of associated mining risks. The risk could be present across the entire site, although the shallowest workings would be more likely within the northern and central areas of the site.

There is also potential risk of old unrecorded mine entries or bell pits to the Graig/Abergorky seams which are conjectured to outcrop beneath the site. Soil stripping and/or geophysical surveys may therefore be required to check for possible old unrecorded mine entries.

4.0 SITE INVESTIGATION TO ASSESS RISKS FROM PAST COAL MINING

4.1 COAL AUTHORITY PERMISSION

Prior to carrying out any investigation works, it will be necessary to obtain permission from the Coal Authority for any works that intersect coal seams or associated workings. Appropriate risk assessments will need to be carried out as part of the permission application.

4.2 SHALLOW MINE WORKINGS

In order to confirm the findings and conclusions of the desk study it is recommended that boreholes are drilled across the site.

Sufficient boreholes will need to be drilled to enable the depth to the shallow coal seams/associated workings and the thickness of the overlying rock cover to be understood and assessed. The boreholes should be drilled down to depths of typically 10 to 15m, this being greater than 10 times the seam thickness, which is a general rule for shallow mine workings. The shallow seams are anticipated to be 0.3 to 0.6m in thickness but the workings may include main roadways up to approximately 1.5m in height.

The seam depth and rock cover thickness data derived from the borehole investigations will enable the potential mining risk from shallow underlying recorded or unrecorded workings to be assessed and appropriate mitigation measures to be decided.

As discussed above, a risk assessment should be carried out as part of the application for permission to drill, in order to consider and minimise any risks from a rotary drilling investigation, such as potential displacement of mine gases from workings underneath neighbouring properties and houses. The likely volatility of the coal seam and the potential for spontaneous combustion should also be considered.

Air flush drilling techniques could be used, provided that they are located sufficiently far enough away from any neighbouring houses or structures, such that they do not present a significant risk. If any boreholes need to be drilled within 50m of existing properties, then water mist/flush should be used to reduce the potential risks.

On completion of the drilling investigation, the boreholes will need to be backfilled and sealed with a cement based material, in order to prevent ingress of air workings.

4.3 MINE ENTRIES

The Coal Authority Report states that there are no known mine entries within, or within 20m of the site. However, records could be incomplete and consequently there may be in mine entries in the local area which The Coal Authority has no knowledge of.

Soil stripping and/or geophysical surveys may therefore be required to check for possible unrecorded mine entries.

5.0 REMEDIAL STABILISATION WORKS

If remedial works are required, their scale will depend on the level of mining risk that is assessed from the borehole investigations.

5.1 COAL AUTHORITY PERMISSION

It will be necessary to obtain the relevant permission from the Coal Authority prior to carrying out any proof drilling or drilling and grouting works, if these should become required.

5.2 SHALLOW MINE WORKINGS

Once the general site geology has been confirmed and the level of risk from shallow mine workings has been assessed, it may be considered that some parts of the site are at risk from shallow mining and, therefore, that these areas may require remedial works or appropriate precautions.

Whenever a coal seam, and possible/proven associated workings, are found to be present within potential influencing depths of the site surface, remedial works may be required in order to develop the site safely.

Prior to finalising any foundation design, proof drilling and grouting measures may be required wherever a coal seam and/or associated proven/potential workings are found to underlie the site within potential influencing shallow depths.

The level of the required foundation reinforcement could range from light reinforcement where the risk of shallow mining related subsidence is thought to be low, to raft foundations capable of spanning 3m voids with 1.5m cantilever effects at the edges, where the shallow mining risk is thought to be high.

Proof drilling works may confirm that the seam/workings are not present within shallow potentially influencing depths, or that there is sufficient overlying rock cover above any old workings to prevent any remnant uncollapsed voids migrating up to the site's surface from proven or potential underlying shallow workings, thereby causing surface subsidence.

Proof drilling may also establish that the workings, although shallow, are already collapsed or mostly collapsed. Therefore, the incorporation of appropriate reinforcement within the foundations may be considered sufficient protection against possible remnant mining subsidence risk.

5.2 SHALLOW MINE WORKINGS (CONTINUED)

Where a coal seam and/or workings are considered to be shallow enough, consideration could alternatively be given to carrying out bulk coal recovery excavations if this is practical and acceptable. This would effectively remove any risk from shallow mining, but would require closely supervised replacement of the excavated overburden soils and rocks to an appropriately engineered standard that would be suitable for the proposed development.

5.3 MINE ENTRIES

No mine entries are recorded within, or within 20m of, the site. However, the possibility that unrecorded mine entries might be present cannot be ruled out.

Any encountered unrecorded mine entries should be suitably investigated and assessed for any associated treatment / building exclusion zones.

In the case of an unrecorded shaft, boreholes should be drilled down the shaft in order to establish the depth of the base of the shaft and the state of any backfill. Safety stagework will need to be established across the shaft prior to any drilling works. A borehole would also need to be drilled outside the shaft in order to confirm the rock head level around the shaft.

Subject to the depth of the surrounding rockhead, the cap can be constructed ideally on the rockhead or, alternatively, (if the rocks are considered to be too deep) at shallower depths within suitably competent overlying soils.

The design and construction of the cap will need to comply with Coal Authority specifications and will need to be agreed with the Coal Authority. A building exclusion zone should be established around the shaft, and its size will be dependent on the depth to the rockhead around the shaft.

If an old uncharted level should be found, the entrance should be investigated and, if necessary, treated in order to ensure that the ground has been fully collapsed and that the infill has been appropriately engineered to allow developments at the surface. The orientation of the entry should be established and boreholes may be required to establish the line of any cross measures drivages connecting the level entrances to the coal seam workings. Bulk excavations may be required in order to appropriately remediate any encountered level entrances.

Wherever feasible, it would be preferable to design the site layout such that the proposed structures are located away from the locations of the former level entrances.

6.0 CONCLUSION

Based upon the findings of this Coal Mining Risk Assessment, we are of the opinion that the site can be suitably and safely developed, subject to carrying out the recommended mining site investigation works and then carrying out the mitigation measures detailed in Section 5.0, if they should be considered necessary.

APPENDIX A

COAL AUTHORITY MINING REPORT



The Coal
Authority

Resolving the **impacts** of mining

CON29M Non-Residential Mining Report

GETHIN WOODLAND CENTRE
A470 PENTREBACH TO RHYDYCAR
NORTHBOUND
ABERCANAID
MERTHYR TYDFIL
MERTHYR TYDFIL UA
CF48 1YZ

Date of enquiry: 20 November 2018
Date enquiry received: 20 November 2018
Issue date: 20 November 2018

Our reference: 51001973882001
Your reference: 12329/LP/A



CON29M Non-Residential Mining Report

This report is based on, and limited to, the records held by the Coal Authority, at the time we answer the search.

Client name

INTEGRAL GEOTECHNIQUE (WALES) LTD.

Enquiry address

GETHIN WOODLAND CENTRE, A470 PENTREBACH
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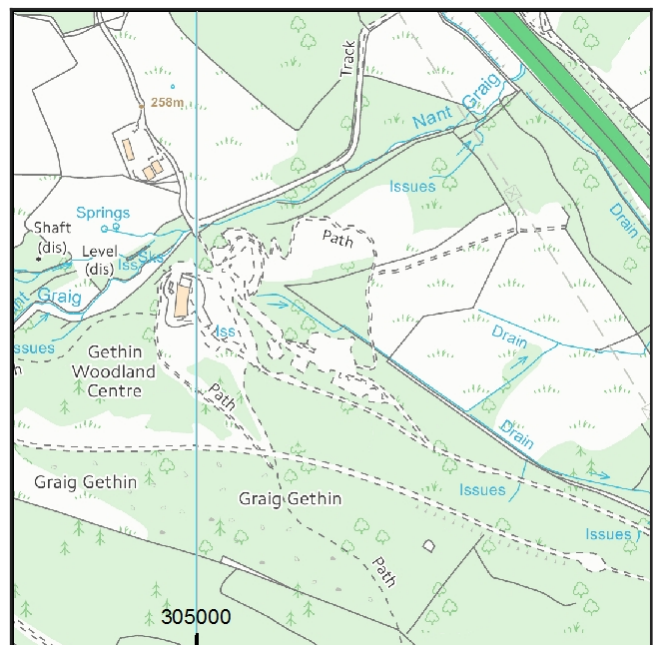
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Approximate position of property



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Summary

Has the search report highlighted evidence or potential of		
1	Past underground coal mining	Yes
2	Present underground coal mining	No
3	Future underground coal mining	Yes
4	Mine entries	No
5	Coal mining geology	No
6	Past opencast coal mining	No
7	Present opencast coal mining	No
8	Future opencast coal mining	No
9	Coal mining subsidence	No
10	Mine gas	No
11	Hazards related to coal mining	No
12	Withdrawal of support	No
13	Working facilities order	No
14	Payments to owners of former copyhold land	No

For detailed findings, please go to page 4.

Detailed findings

1. Past underground coal mining

The property is in a surface area that could be affected by underground mining in 7 seams of coal at 100m to 280m depth, and last worked in 1955.

Any movement in the ground due to coal mining activity associated with these workings should have stopped by now.

In addition the property is in an area where the Coal Authority believes there is coal at or close to the surface. This coal may have been worked at some time in the past. The potential presence of coal workings at or close to the surface should be considered, particularly prior to any site works or future development activity, as ground movement could still be a risk. Your attention is drawn to the Comments on the Coal Authority information section of the report.

2. Present underground coal mining

The property is not within a surface area that could be affected by present underground mining.

3. Future underground coal mining

The property is not in an area where the Coal Authority has received an application for, and is currently considering whether to grant a licence to remove or work coal by underground methods.

The property is not in an area where a licence has been granted to remove or otherwise work coal using underground methods.

The property is not in an area likely to be affected from any planned future underground coal mining.

However, reserves of coal exist in the local area which could be worked at some time in the future.

No notices have been given, under section 46 of the Coal Mining Subsidence Act 1991, stating that the land is at risk of subsidence.

4. Mine entries

There are no known coal mine entries within, or within 20 metres of, the boundary of the property.

5. Coal mining geology

The Coal Authority is not aware of any damage due to geological faults or other lines of weakness that have been affected by coal mining.

6. Past opencast coal mining

The property is not within the boundary of an opencast site from which coal has been removed by opencast methods.

7. Present opencast coal mining

The property does not lie within 200 metres of the boundary of an opencast site from which coal is being removed by opencast methods.

8. Future opencast coal mining

There are no licence requests outstanding to remove coal by opencast methods within 800 metres of the boundary.

The property is not within 800 metres of the boundary of an opencast site for which a licence to remove coal by opencast methods has been granted.

9. Coal mining subsidence

The Coal Authority has not received a damage notice or claim for the subject property, or any property within 50 metres of the enquiry boundary, since 31 October 1994.

There is no current Stop Notice delaying the start of remedial works or repairs to the property.

The Coal Authority is not aware of any request having been made to carry out preventive works before coal is worked under section 33 of the Coal Mining Subsidence Act 1991.

10. Mine gas

The Coal Authority has no record of a mine gas emission requiring action.

11. Hazards related to coal mining

The property has not been subject to remedial works, by or on behalf of the Coal Authority, under its Emergency Surface Hazard Call Out procedures.

12. Withdrawal of support

The property is not in an area where a notice to withdraw support has been given.

The property is not in an area where a notice has been given under section 41 of the Coal Industry Act 1994, cancelling the entitlement to withdraw support.

13. Working facilities order

The property is not in an area where an order has been made, under the provisions of the Mines (Working Facilities and Support) Acts 1923 and 1966 or any statutory modification or amendment thereof.

14. Payments to owners of former copyhold land

The property is not in an area where a relevant notice has been published under the Coal Industry Act 1975/Coal Industry Act 1994.

Comments on the Coal Authority information

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In view of the mining circumstances a prudent developer would seek appropriate technical advice before any works are undertaken.

Therefore if development proposals are being considered, technical advice relating to both the investigation of coal and former coal mines and their treatment should be obtained before beginning work on site. All proposals should apply good engineering practice developed for mining areas. No development should be undertaken that intersects, disturbs or interferes with any coal or mines of coal without the permission of the Coal Authority. Developers should be aware that the investigation of coal seams/former mines of coal may have the potential to generate and/or displace underground gases and these risks both under and adjacent to the development should be fully considered in developing any proposals. The need for effective measures to prevent gases entering into public properties either during investigation or after development also needs to be assessed and properly addressed. This is necessary due to the public safety implications of any development in these circumstances.

Additional remarks

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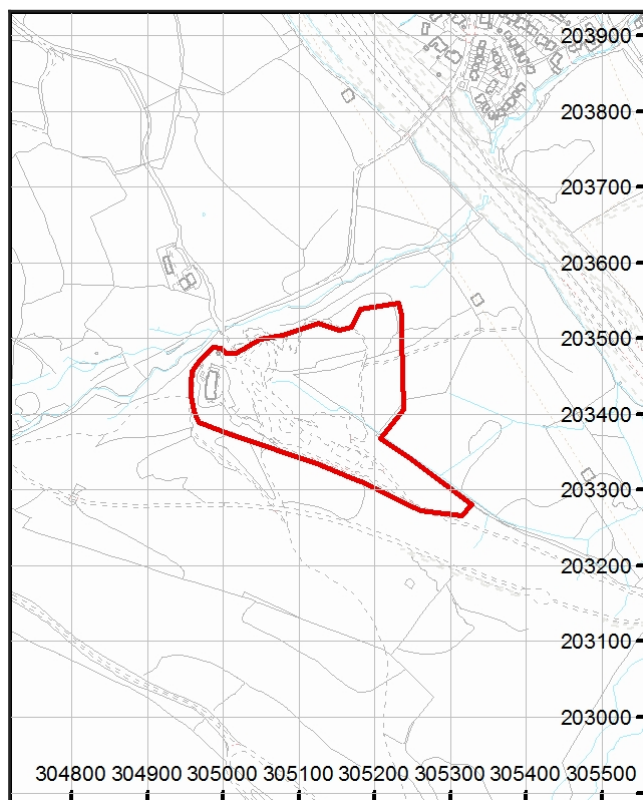
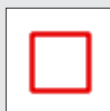
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Enquiry boundary

Key

Approximate position of enquiry boundary shown



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FIGURES



NORTH

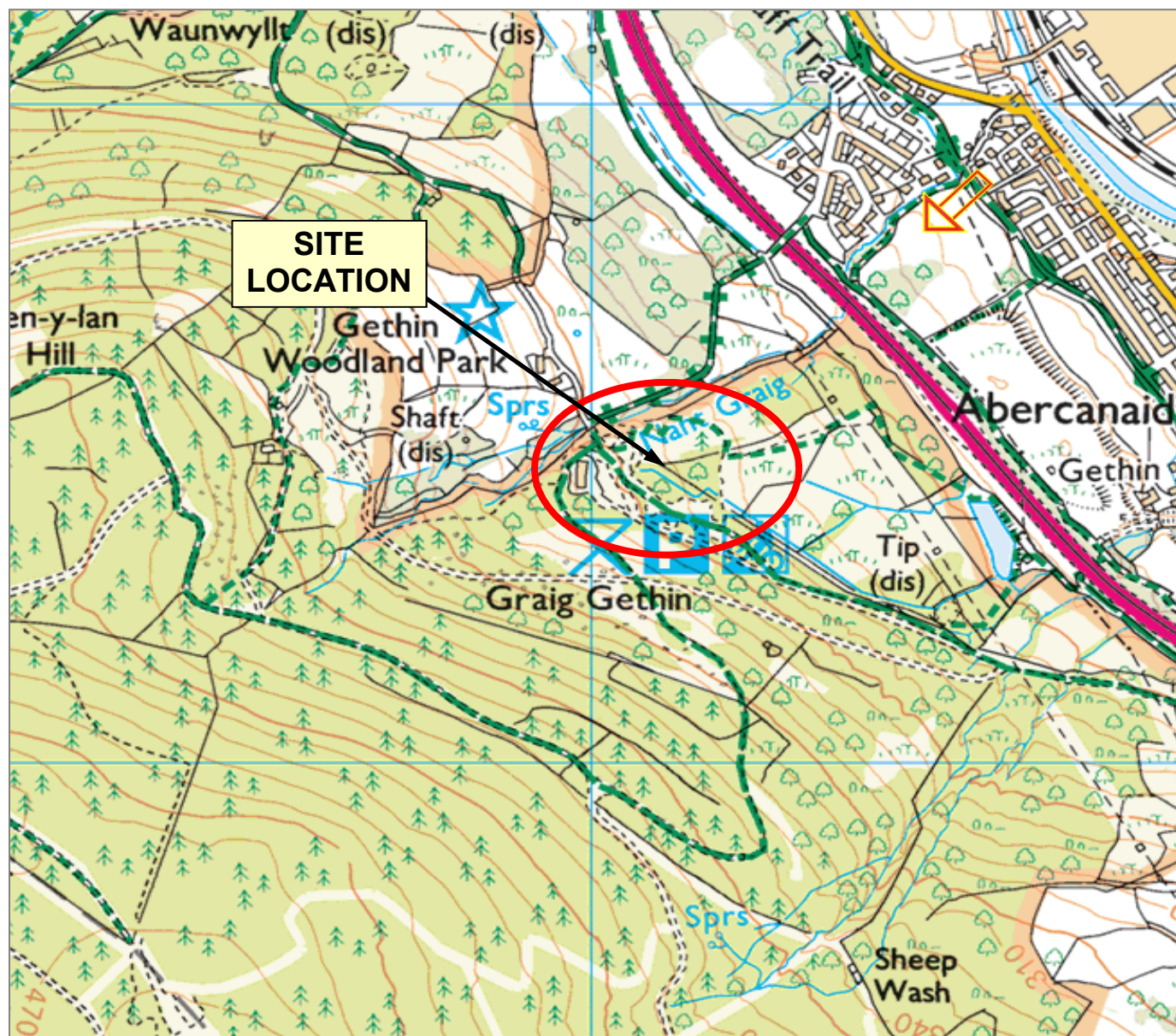


FIGURE 1: SITE LOCATION

Bike Park Wales, Abercanaid, Merthyr Tydfil

Intégral
Géotechnique

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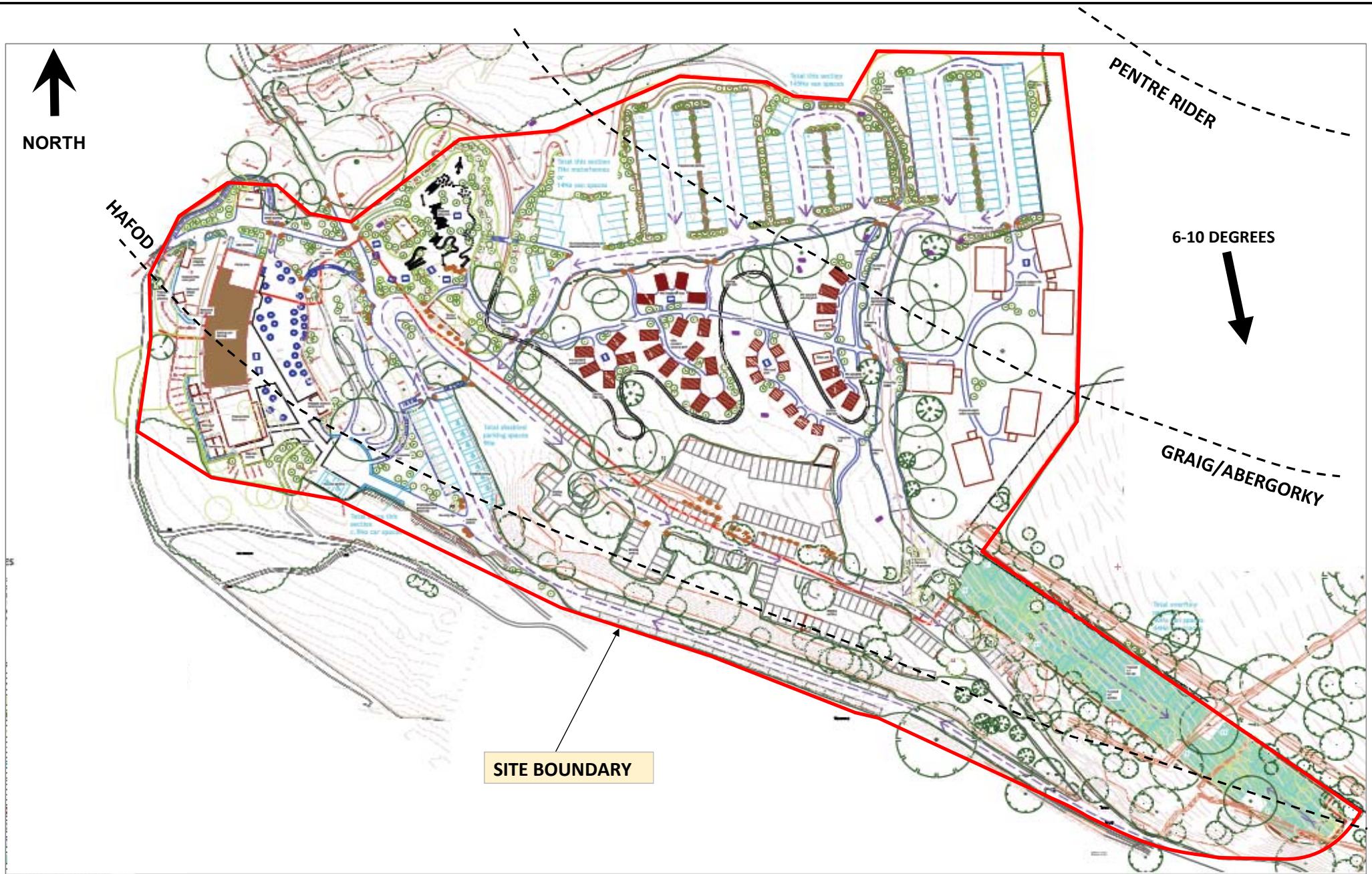


FIGURE 2: SITE PLAN AND APPROXIMATE CONJECTURAL OUTCROPS

Bike Park Wales, Abercanaid, Merthyr Tydfil

Intégral
Géotechnique

Intégral House
7 Beddau Way
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