



**The Coal  
Authority**

## **Site Inspection Report**

### **L44 – Godre’r Graig Tips**



**Client: Earth Science Partnership**

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**Date: July 2019**

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## **1.0 Introduction**

The Coal Authority was instructed by Earth Science Partnership (ESP) to undertake an inspection of three quarry spoil / colliery spoil tips at Godre'r Graig, near Ystalyfera in the Swansea valley.

The purpose of the inspection was to provide an assessment of stability and safety issues pertaining to the site in conjunction with a stability report being prepared for ESP on behalf of Neath Port Talbot County Borough Council.

The site was inspected by Darren Bryant and Robert Sullivan of the Coal Authority, on the 13<sup>th</sup> June 2019.

Weather conditions at the time of inspection were mild and damp, with occasional drizzle and heavy showers.

The inspection has taken account of features observable at the time of inspection, and may not characterise all aspects of the site due to restrictions on access for safety reasons and extensive vegetation coverage. It is possible that evidence of ground movement may be present that could not be observed at the time of inspection.

## **2.0 Site Conditions**

The site comprises a series of disused quarry / colliery tips, situated to the north of the village of Godre'r Graig, near Ystalyfera in the Swansea Valley. The site was divided into three separate areas for the purposes of the inspection as shown on Figure 1 and as outlined below.

### Site 1 Quarry and adjacent spoil tip

Site 1 comprises a disused quarry (Cwar Pentwyn) and associated spoil tip. The topography extends from an elevation of around 155mAOD at the rear of a property named 'Glanderi', to approximately 180mAOD at the northern rim of the quarry.

The quarry appears to have been in operation for the extraction of road building material very recently, as evidenced by numerous spoil mounds and a recently refurbished access track.

Spoil material associated with quarry working and historic coal extraction from three adits was observed to be present along the southern section of the site. Recent tipping of quarry waste has taken place over previous colliery spoil tipping areas and partially over one of the three adits.

The majority of the tip flanks are well vegetated with many mature trees, ferns and brambles. The extent of vegetation prevented the viewing of spoil material in detail.

The dominant drainage feature at Site 1 is a small un-named watercourse, fed by a discharge from the vicinity of the adit locations. This feature has a partially lined invert and flows southeast to join a roadside surface water channel running along the edge of the un-named access road from Graig Road to Pentwyn Farm.

No other significant seepages or flows were observed within the boundary of Site 1.

### Site 2 Quarry and adjacent spoil tip

Site 2 comprises a disused un-named quarry and associated spoil tip. The topography extends from an elevation of around 95mAOD at the rear of Godre'r Graig Primary School, to approximately 185mAOD at the northern boundary.

The extent of vegetation and ground cover at Site 2 prevented a close inspection of any spoil or surface features in detail. The majority of vegetation in this area comprised ferns and brambles of up to 1.5m in height and the lack of access routes made inspection very difficult.

Occasional small boulders representing areas of quarry spoil were observed sporadically where vegetation was less extensive but the extent of the spoil could not be proven with accuracy.

The dominant drainage feature at Site 2 appeared to be a watercourse emanating from the vicinity of mine adit reference 274206-026 at NGR 274988E 206957N. A moderate seepage in the vicinity of the adit was observed forming a small marshy area, subsequently flowing overland and downslope in a south-easterly direction. The watercourse disappeared and reappeared at several locations, probably through the coarse quarry spoil present, appearing again as a spring type feature at approximate NGR 275067E 206915N. The watercourse then flowed in an unlined channel to enter a screened chamber at NGR 275135E 206891N, before entering a final chamber to the rear of Godre'r Graig Primary School at NGR 275157E 206892N. The watercourse then appeared to be culverted beneath the school.

### Site 3 Mine entries and associated spoil tips

Site 3 comprises a series of mine entries (all adits) along with a series of linear spoil tips at the base of a ridgeline. All of the adit mouths appeared to have collapsed many years ago. Although shown as a 'horseshoe' shaped feature on the original information supplied by ESP, the tips appear to comprise a narrower, linear form. The topography extends from an elevation of around 150mAOD to approximately 165mAOD.

The tip flanks are well vegetated with an extensive cover of ferns and brambles with occasional mature trees. The dense vegetation gave rise to only minor exposures of colliery spoil material.

There were no obvious drainage features observed within the area.

Inspection of the British Geological Survey sheet for the area indicates the solid strata underlying each site to comprise typical Coal Measures formations, comprising sandstones with interbedded siltstones, mudstones and coal seams.

There are 10 recorded mine entries within the site boundaries. The locations of these are shown on Figure 10, with details given below:

Reference	Type	Owner	Treatment Details
274206-011	Adit	CA	No record of treatment.
274206-025	Adit	CA	No record of treatment (water issuing).
274206-019	Adit	CA	No record of treatment.
274206-026	Adit	CA	No record of treatment (water issuing).
275207-024	Adit	CA	No record of treatment.
275207-023	Adit	CA	No record of treatment.
275207-022	Adit	CA	No record of treatment.
275207-021	Adit	CA	No record of treatment.
275207-020	Adit	CA	No record of treatment.
275207-019	Adit	CA	No record of treatment.

None of the mine entries were observed as being open. Two were observed as issuing water (identified in the table above).

### 3.0 History

Inspection of historic Ordnance Survey plans dating from 1877 indicates the overall site to have initially developed with the formation of two small quarries, one named Cwar Pentwyn (Site 1) and the other un-named and described as an 'old quarry' (Site 2). A mine entry (adit) is shown as an 'old coal level' at the south west corner of Site 1 with a small spoil tip immediately adjacent. Mounds of quarry waste are shown to the south and east of both quarries at Sites 1 and 2.

The 1898 plan shows Cwar Pentwyn to have expanded slightly, with a corresponding increase in spoil mounds to the south and east.

Both quarries appear to be disused on the 1918 Edition plan, with Godre'r Graig School having been constructed the period between surveys.

The 1962 Edition plan shows both quarries as disused and also indicated a row of mine entries (adits) and small spoil mounds at Site 3. These appear to have short lived ventures.

Recent quarrying activity was evident at Site 1, with access tracks having been created and numerous mounds of spoil deposited over the site.

### 4.0 Observations

Inspection on the 13<sup>th</sup> June 2019 began at the south-western extremity of Site 1, at the access track leading to Pentwyn Farm and the entrance to Cwar Pentwyn (photographs 1 and 2). It was noted that flows from the mine adits above were entering the roadside drainage channel along the Pentwyn Farm access road (photograph 3). The quarry access track was well used and mounds of what appeared to be quarried material were present over the location of the mine adits and the colliery spoil tip to the south of the track (photographs 4, 5 and 9).

The recorded adit positions in this area were evidenced by flows entering a partially lined channel, conveying water to the roadside channel along Pentwyn Farm access road (photographs 6 and 7).

The flanks of the colliery and quarry spoil mounds were very steep and densely vegetated, preventing a close inspecting of material and topography (photographs 8, 17, 18 and 19).

Very little evidence of recent instability was observed, with the exception of a small degraded shallow slip at approximate NGR 274910E 206861N (photograph 20) and some areas of soil creep.

The inspection then viewed the floor and high walls of Cwar Pentwyn. Recent quarrying activity appeared to have taken place, with mounds of excavated material present. Evidence of human activity was also observed as a 'Lazy Spa' type pool, tent and camp bed were present, along with electricity extension cables leading downslope toward the properties named 'Glander' and 'Darren View' (photographs 11 to 16).

The inspection route then accessed the area encompassed by Site 2, crossing a derelict fence-line and heading east across an area of dense fern and bramble vegetation with a sporadic cover of trees. The density of vegetation prevented close inspection of materials or topography and access was extremely difficult (photographs 22, 24 and 25).

Occasional exposures of small boulders were present, and a number of dry short gully type features were observed, covered in dense vegetation and generally orientated downslope.

At the northern boundary of the site, the overgrown remains of a former access track, presumably leading to the un-named quarry, appeared to be present (photograph 23).

A spring was observed emanating from the vicinity of mine adit reference 274206-026 at NGR 274988E 206957N (photograph 21). The spring was observed as forming a small marshy area, subsequently flowing overland and downslope in a south-easterly direction.

The watercourse disappeared and reappeared at several locations, probably through the coarse quarry spoil present, appearing again as a spring type feature at NGR 275067E 206915N (photograph 29). The watercourse then flowed in an unlined channel to enter a screened chamber at NGR 275135E 206891N (photograph 30), before entering a final chamber to the rear of Godre'r Graig Primary School at NGR 275157E 206892N (photograph 36). The watercourse then appeared to be culverted beneath the school.

The inspection route then turned north east and viewed the series of recorded mine adits above Site 3, the entrances to which appeared to have collapsed many years ago. The colliery tips associated with these mine entries comprised a liner low mound of spoil forming a ridgeline at the head of Site 3 (photographs 26 to 28).

The inspection route traversed the slope behind Godre'r Graig Primary School, viewing the route of the watercourse referenced above and the drainage chambers to the rear of the school. A stone filled cut off drain with several manhole chambers was observed in the grazing field to the rear of the school, along with a spring located at approximate NGR 275164E 206992N. Flows from the spring were captured by the stone cut off drain (photographs 33, 35 and 37).

A derelict stable and several stands of Japanese Knotweed were observed present in this area (photographs 32 to 34).

The approximate route is shown on Figure 11.

## **5.0 Consequences of Failure**

### **Site 1**

Very little evidence of recent instability was observed, with the exception of a small degraded shallow slip at approximate NGR 274910E 206861N and occasional areas of soil creep. Surcharging of existing historic colliery and quarry spoil materials could take place following recent deposition of materials. A significant failure of the spoil heaps would impact on the access road to Pentwyn Farm and the properties along the access road. Blockage of the water course emanating from the mine entries could lead to a build-up of pore pressure and saturation of the spoil, leading to failure.

### **Site 2**

No evidence of recent movement was observed within this area, however the dense vegetation coverage prevented detailed inspection. Occasional exposures of small boulders were present, and a number of dry short gully type features were observed, suggesting that localised minor movement, probably by surface water erosion, is taking place. A change in flow from the spring adjacent the mine adit at the crest of the site could potentially lead to more significant erosion and minor slope failures, although the likely coarse and free draining nature of the quarry spoil would provide some mitigation in terms of slope stability. A major failure of the quarry spoil could potentially reach Godre'r Graig School. Although unlikely, a slope stability analysis based on available information supported by ground investigation data would be beneficial to assess the extent and likelihood of such a failure.

Blockages of the drainage infrastructure to the rear of Godre'r Graig Primary School would result in flooding and potential slope instability.

### **Site 3**

Evidence of slow soil creep and falls of rock from the escarpment above the line of adits was observed but these likely to present a low risk to public safety.

A significant failure of the tip complex could result in a flow of material downslope to the east with the potential to reach Godre'r Graig Cemetery. This scenario is considered to have a low probability.

## 6.0 Recommendations

In order to ensure the risk of instability and public safety remains low, the following recommendations are provided for consideration:

- Investigate ownership of Site 1 and establish what measures, if any, have been taken with regard to placing recent materials over historic spoil materials.
- Investigate activity within Cwar Pentwyn to establish if planning or quarry regulations have been breached.
- Ensure drainage system from adit positions at Cwar Pentwyn is maintained.
- Consider clearing vegetation to allow inspection of drainage routes at Site 2.
- Ensure drainage infrastructure to the rear of Godre'r Graig Primary School is regularly inspected and maintained.
- Consider undertaking a slope stability analysis for Site 2 based on available information supplemented by ground investigation.
- Consider spraying of Japanese Knotweed to rear of school.
- Undertake an inspection during winter, when vegetation has died back to allow a more detailed viewing of the site with less vegetation constraints. The requirement for further inspections should be determined following the winter inspection.

# **Appendices**

**Figures**

**Photographs**

Figure 1 – Site Locations

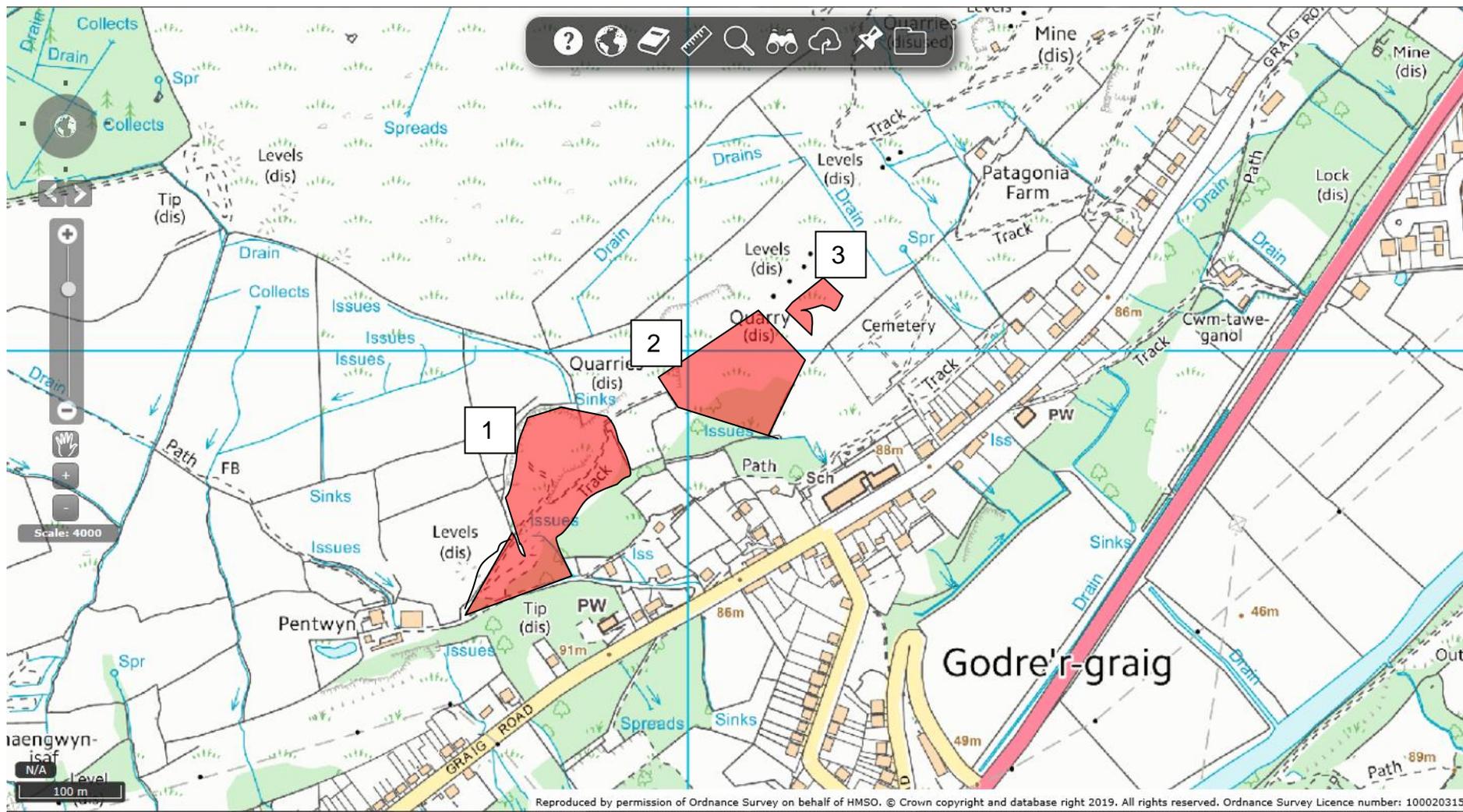


Figure 2 – Google Earth Image



Figure 3 – Contour Plan

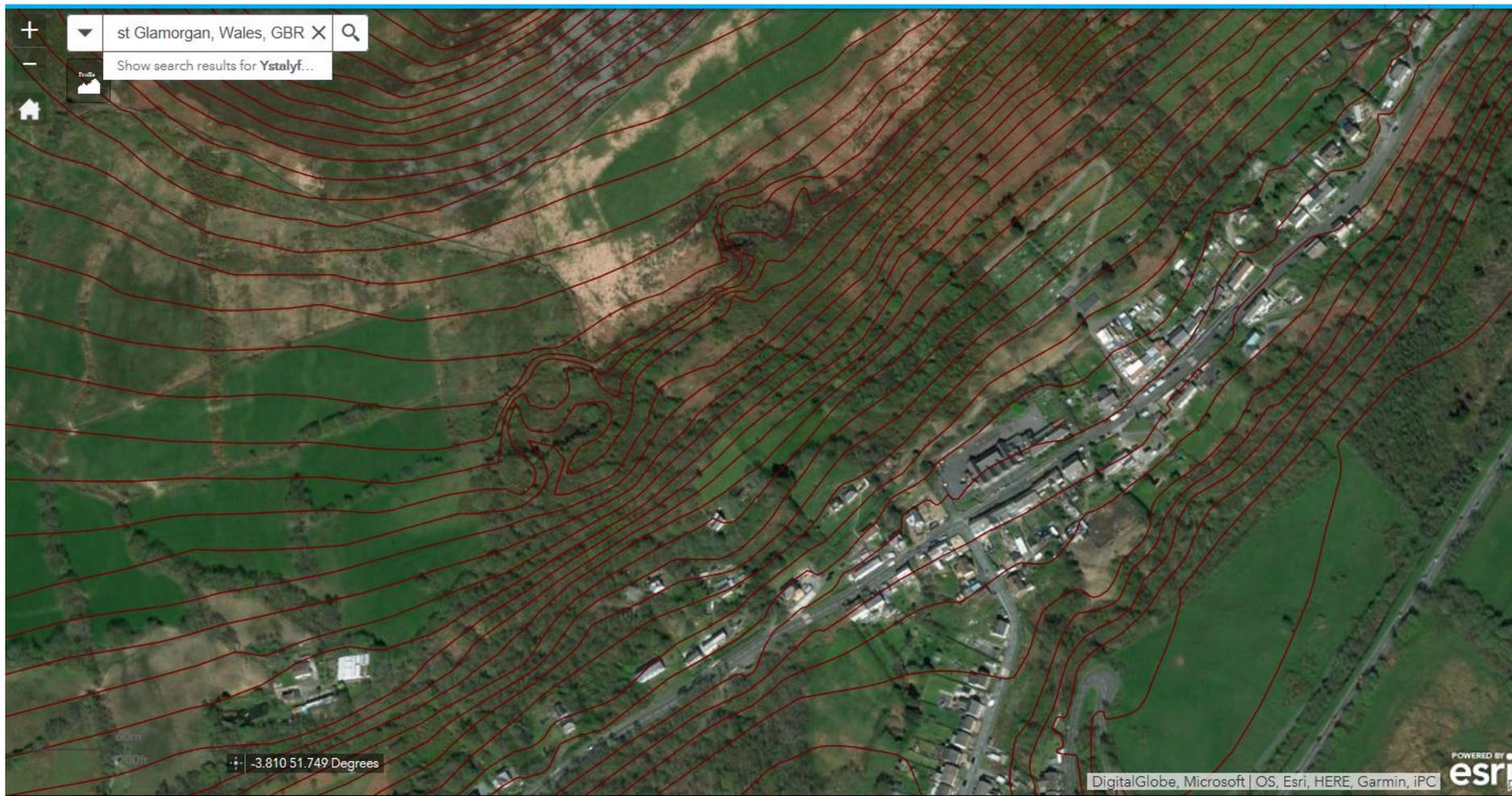


Figure 4 – LIDAR Relief Map

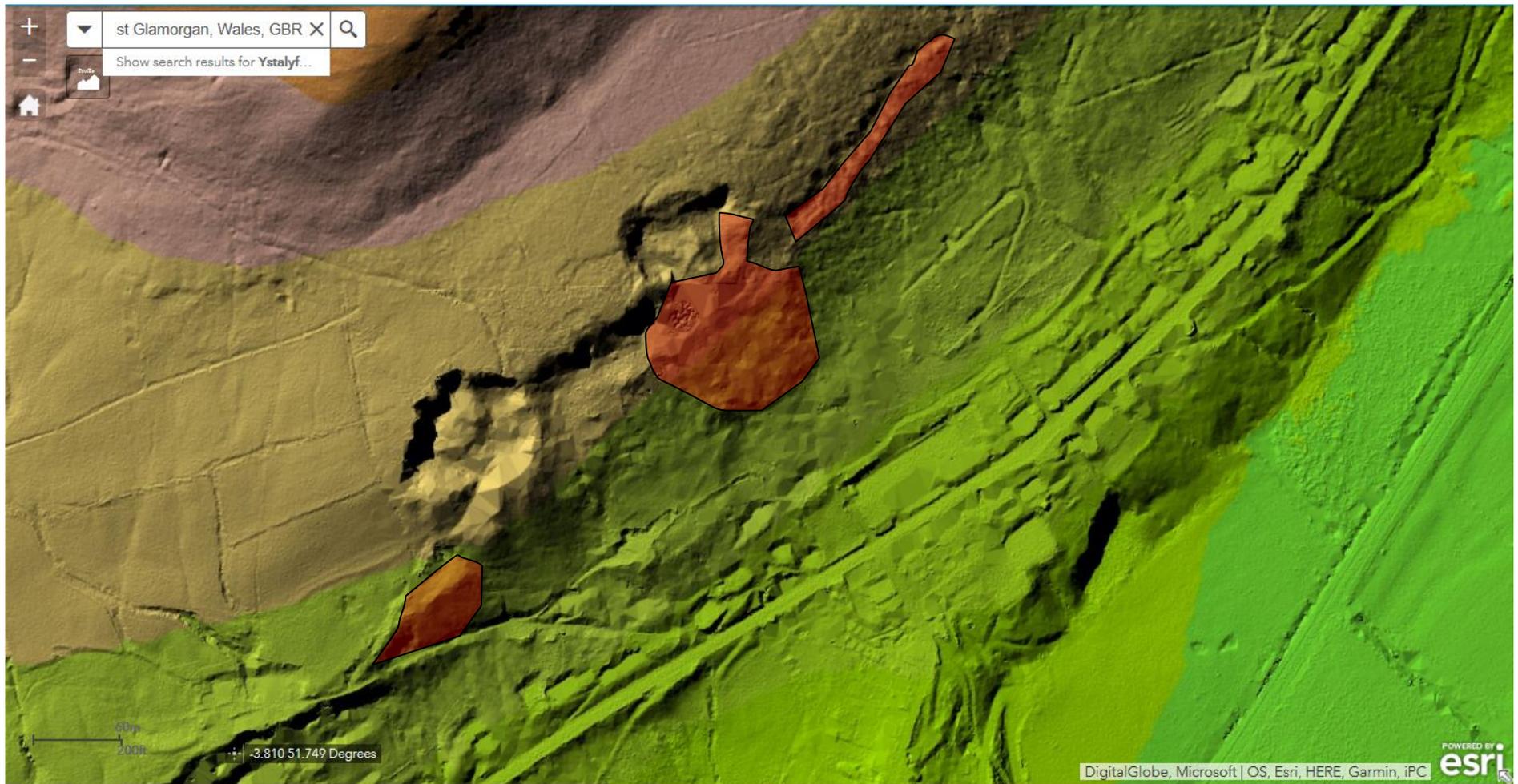


Figure 5 – Geological Plan





Figure 7 – 1898 Ordnance Survey ([www.old-maps.co.uk](http://www.old-maps.co.uk))



Figure 8 – 1918 Ordnance Survey (partial) ([www.old-maps.co.uk](http://www.old-maps.co.uk))

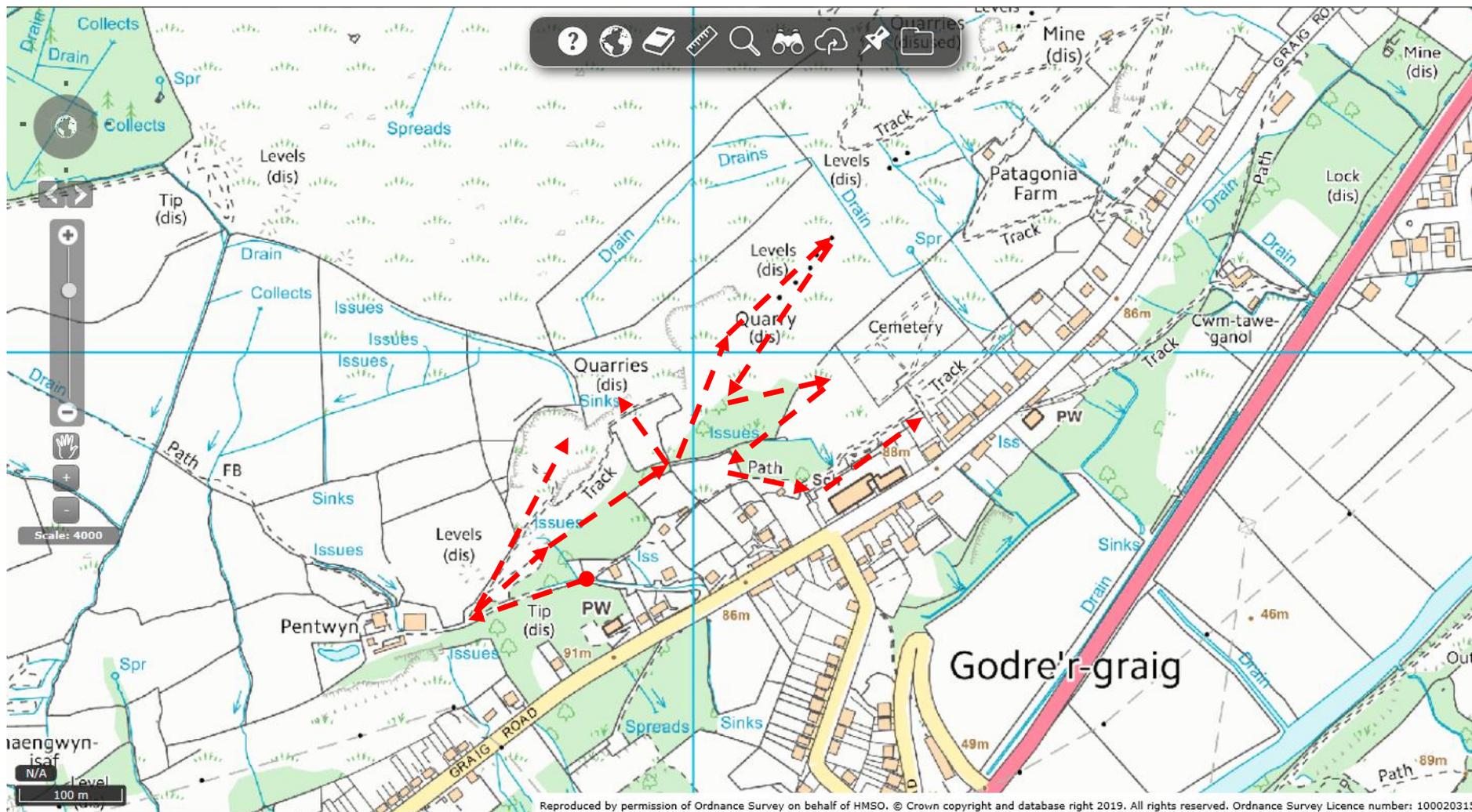


Figure 9 – 1962 Ordnance Survey (www.old-maps.co.uk)





Figure 11 – Inspection Route



**Photograph 1 – Access road to Pentwyn Farm**



**Photograph 2 – Access Road to Pentwyn Quarry**



**Photograph 3 – Flows from adit positions to Pentwyn Farm access track**



**Photograph 4 – Recent tipping of material at Site 1**



**Photograph 5 – Recent tipping of material at Site 1**



**Photograph 6 – Discharge from adit positions at Site 1**



**Photograph 7 – Discharge from adit positions at Site 1**



**Photograph 8 – Steep densely vegetated flanks of Site 1**



**Photograph 9 – Recent tipping of material at Site 1**



**Photograph 10 – Access track to Pentwyn Quarry**



**Photograph 11 – High wall of Pentwyn Quarry showing recent tipping**



**Photograph 12 – Pentwyn Quarry floor**



**Photograph 13 – Pentwyn Quarry recent excavations**



**Photograph 14 – ‘Lazy Spa’ located in quarry floor**



**Photograph 15 – Recently used shelter in quarry floor**



**Photograph 16 – Shelter showing electricity cables**



**Photograph 17 – Steep densely vegetated flanks of Site 1**



**Photograph 18 – Steep densely vegetated flanks of Site 1**



**Photograph 19 – Overgrown access path along toe of Site 1**



**Photograph 20 – Small slip on flank of Site 1**



**Photograph 21 – Minor watercourse at head of Site 2**



**Photograph 22 – General view of Site 2 showing dense vegetation coverage**



**Photograph 23 – Quarry face above Site 2**



**Photograph 24 – Mid point of Site 2 showing dense undergrowth**



**Photograph 25 – View down-slope from crest of Site 2**



**Photograph 26 – View of Site 3 from toe**



**Photograph 27 – View of Site 3 from toe**



**Photograph 28 – View of Site 3 showing collapsed adit positions**



**Photograph 29 – Moderate seepage at SW section of Site 2**



**Photograph 30 – Inlet chamber to rear of school**



**Photograph 31 – Field to rear of school**



**Photograph 32 – Field to rear of school showing Japanese Knotweed**



**Photograph 33 – Stone filled cut off drain to rear of school**



**Photograph 34 – Derelict stable to rear of school**



**Photograph 35 – Strong seepage to rear of school**



**Photograph 36 – Inlet chamber at rear of school**



**Photograph 37 – Manhole cover on line of stone filed cut off drain**



**Photograph 38 – Access gate to field at rear of school**

