

Report No. BC/MB/10.17.03/2.

Stage 1 Site Investigation Report on Land at the Former Tirbach Washery, Ystalyfera.

Prepared on behalf of:

HANSAK Ltd.

By:



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<i>Appendix II:</i>	<i>Geotechnical Trial Pit Logs.</i>
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<i>Appendix IV:</i>	<i>SPT Calibration Report.</i>
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<i>Appendix VI:</i>	<i>Laboratory Testing Results.</i>

Stage 1 Site Investigation Report on Land at Former Tirbach Washery, Ystalyfera.

1 Introduction

This report has been prepared on behalf of our client:

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and relates to a tract of land adjacent to Tirbach Road in Ystalyfera; the site of the former Tirbach Washery, (Grid ref. 277150E 209410N). The tract of land, the Site, has been accepted by the Local Authority as a candidate site for housing. The parcel of land that is the subject of this study is shown on the *Detailed Location Plan, drawing no. BC/MB/10.17.03.03* and on the various Ordnance Survey Extracts, *drawing no's. BC/MB/10.17.03.05 to BC/MB/10.17.03.15*. This report considers the geological and mining context of the Site and the history of the locality and discusses the findings of a site investigation programme undertaken at the Site. The report includes a Tier 1 Risk and Stage 1 Tier 2 Risk Assessment for contaminated soils, a Stage 1 Geotechnical Assessment and also a Coal Mining Risk Assessment.

The following sources of data have been used in the preparation of this report,

- i) Research of published geological records;*
- ii) Research of published groundwater vulnerability plans;*
- iii) The findings of The Coal Authority's mining report, reference no 51001696366001;*
- iv) The findings of Envirocheck report no. 145718763_1_1;*
- v) Research of Public Health England interactive Radon Gas map;*
- vi) Research of The Coal Authority's interactive map;*

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- vii) *The findings of the Site Investigation carried out on the Site and*
- viii) *Research of Blandford Consulting's archives.*

The findings of this report are necessarily based upon the data used in its compilation and may be amended in the future in the light of additional material information. The report must only be used in its entirety for its stated purpose.

2 Qualifications of Authors of the Report

Dr Malcolm Blandford is a Chartered Geologist and Fellow of the Geological Society of London and has over 40 years' experience of the geology and mining history of South Wales. Dr Blandford worked in the coal mining industry for 16 years before entering private practice and has extensive experience of exploration practice and of interpreting coal mining records. Dr Blandford has project managed a large number of site investigation programmes and environmental assessments.

David Blandford has a Master's degree in Environmental Risk Management and a Bachelor's degree in applied industrial science with particular regard to the environmental implications of the paper making processes. Since graduating with his Master's degree, David Blandford has been employed full time undertaking environmental assessments and the related site investigation works.

3 Brief Description of the Site

The parcel of land which is the subject of this report ('the Site') is situated in Ystalyfera in the Swansea Valley at its confluence with the valley of the Afon Twrch. It lies approximately 23km north-east of Swansea, and 1.7 km south-west of the centre of Ystradgynlais (see Figure 1 and *General Location Plan, drawing no. BC/MB/10.17.03.01*). The Site located between the built-up areas of Ystalyfera and Lower Cwmtwrch. The A 4067, Swansea to Brecon Road, runs

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along the south-eastern corner of the Site and the Afon Twrch forms the eastern boundary. A partially concreted track forms the western boundary, beyond which is a forested area. The Site generally slopes south-eastwards at various gradients that reflect the former uses of the Site as a colliery and as a washery. Slopes on the Site are largely man-made and there are several remains of buildings and foundations on the Site. The Site rises steeply along its western boundary above a public footpath and there are two distinct plateaux towards the northern end; the steeper part of the Site will not be developed for housing but are included in this assessment for completeness. The Site occupies an area of approximately 9.56 hectares, of which approximately 6.21 ha south of the footpath are planned to be developed for housing. Elevations on the Site vary from approximately 80m aod to approximately 130m aod.

Figure 1
Aerial View of Site



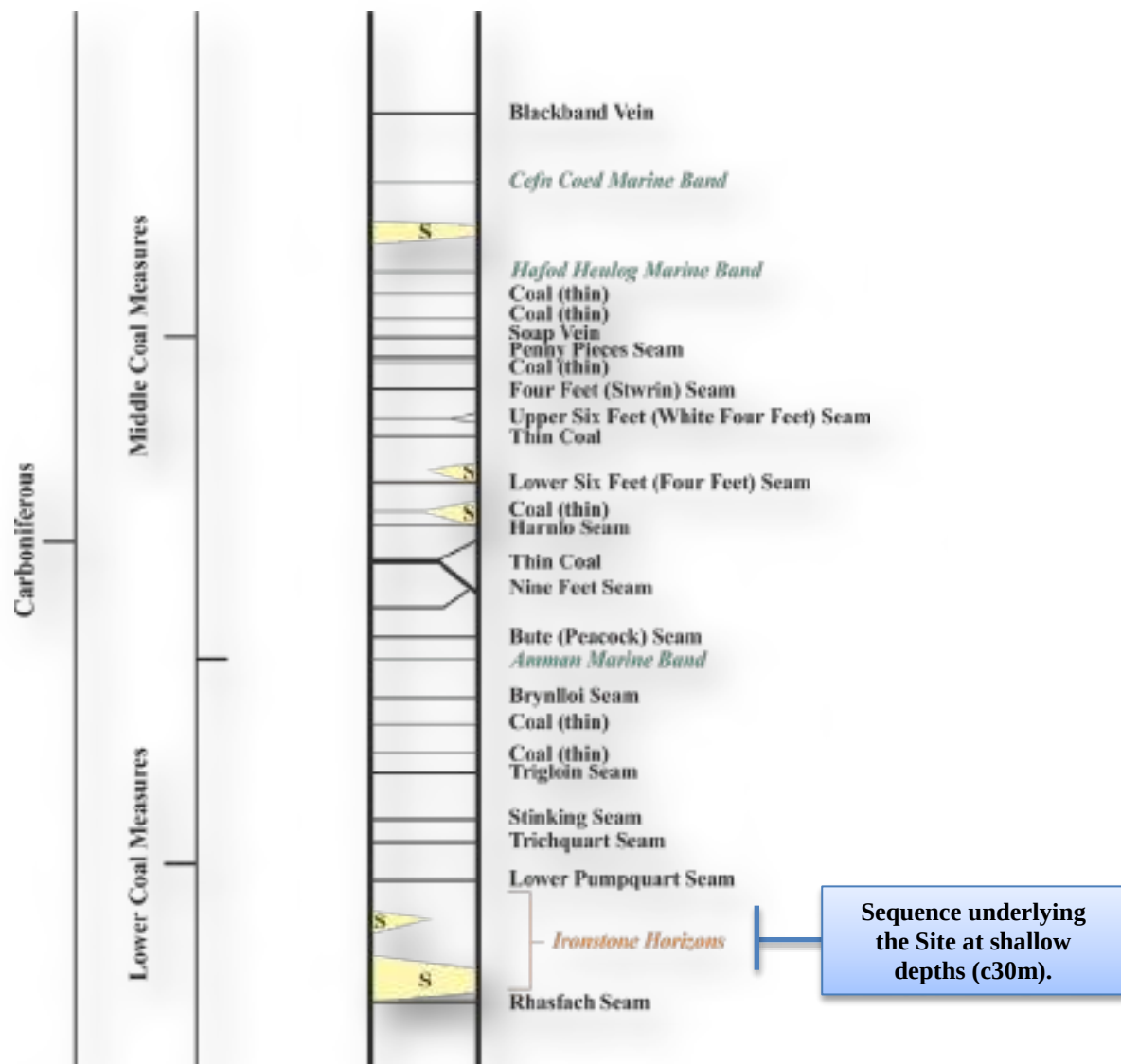
4 Geology of the Site

The Site is situated to the northern margins of the former South Wales Coalfield and is underlain at shallow depths by strata assigned to the Lower Coal Measures. The most recently

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published geological sheet (SN 70 NE at 1:10,560 scale) shows the Site to lie close to the junction of the large Palleg Fault with the Swansea Valley Disturbance; the Palleg Fault passes through the western part of the Site. The published geological sheet also identifies a lag fault passing centrally through the Site. Consequently, the coal measures underlying the Site are severely disturbed. The Coal seams likely to be underlying the Site at shallow depths east of the Palleg Fault are the Triquart and Pumpquart. The outcrop of the Four Feet Vein is shown to be present at the western margins of the Site, west of the Palleg Fault (see *Geology Plan*, drawing no. BC/MB/10.17.03.02).

Figure 2
Indicative Stratigraphic Column.
 Scale: Not to Scale



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The published geological sheet for this area shows the measures to be covered with locally derived soils across much of the Site and with River Alluvium along its eastern margins. The mining history of the Site has resulted in Made Ground, comprised of colliery spoil, being present on several areas of the Site and was found to be present in all the trial pits and boreholes. Published information also indicates that the Site is not affected by landslip. The published geological sheet shows two large areas of ancient landslip to the west of the site at Ystalyfera. The two areas are remote from this Site and the geological provenance of the Site is not the same as that of the areas of landslip

5 Mining Risk

The general area has experienced extensive underground mining for both coal and ironstone since at least the earliest part of the nineteenth century. The workings were prosecuted from a large number of adits driven into the valley sides at or near the outcrops of coal seams or ironstone veins, or elsewhere for water drainage purposes. A number of shafts were also sunk into the coal measures in the general area. The Site, itself, was the surface area of the Tirbach Colliery, which included a coal washery facility. Our searches identified that the western extremity of the Site could be affected by past underground workings in five coal seams, beyond the Palleg Fault. The depth of the old workings ranges between shallow (less than 30m) to 140m. The abandonment plans for the Tirbach Colliery show that the old workings were all on the west side of the Palleg Fault, which was the limiting factor for the development eastwards of the workings (see *Extract from Tirbach Colliery, Lower Vein, Abandonment Plan, drawing no. BC/MB/10.17.03.19*). The plan shows that the old workings lie outside the western boundary of the development site and do not underlie the Site. Underground mining operations in the area ceased in 1939.

The Coal Authority has records of seventeen disused mine entries within the confines of the Site or 20m of its boundary; one shaft and sixteen adits; of these, eight, all adits, are within or close to the area where the residential development is proposed. The Coal Authority has no record of any treatment to seal up or stabilise eleven of the mine entries. The Coal Authority has

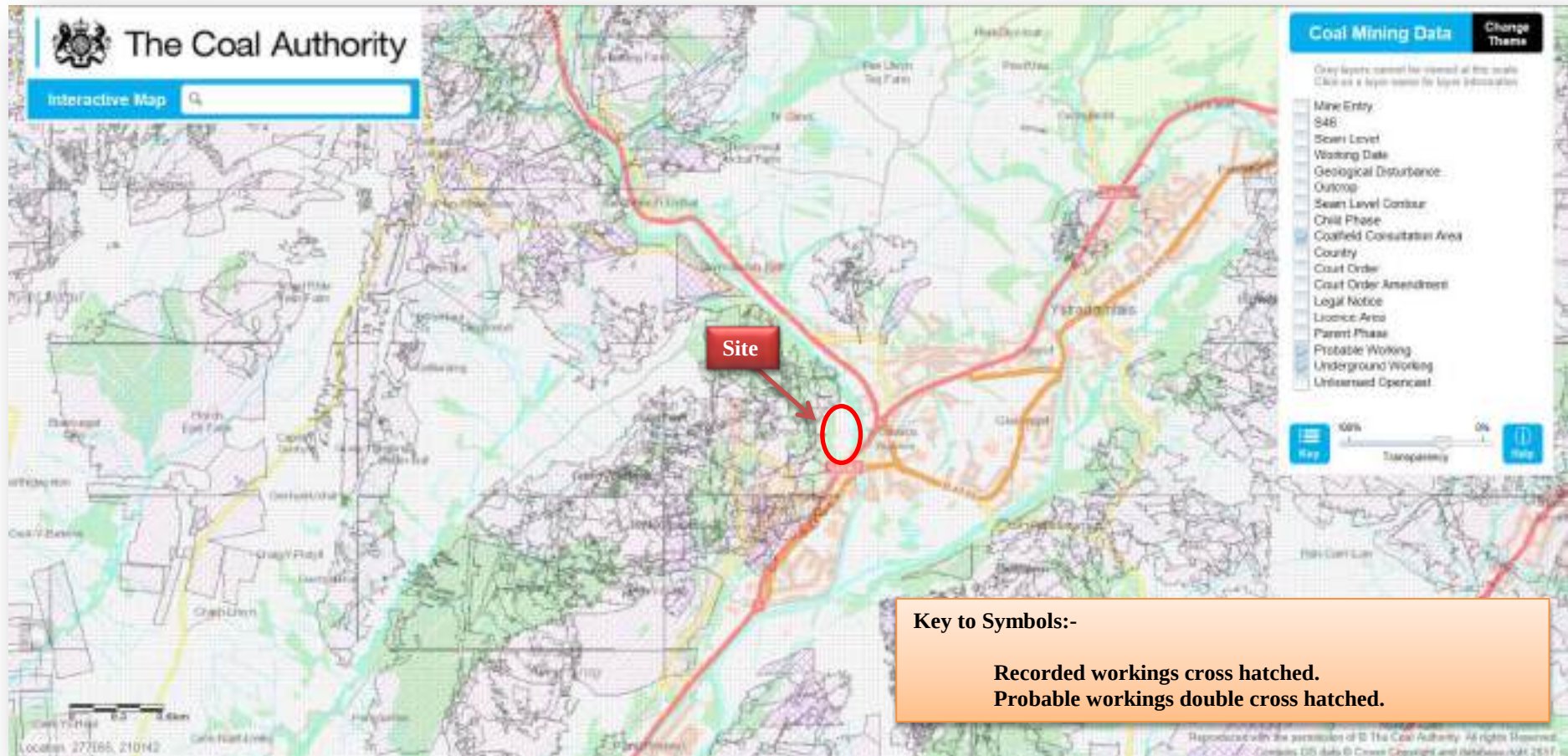
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Figure 3
Mining Risk: The Coal Authority's Interactive Map
(Interrogated 16th November 2017)



/Cont....

Figure 4
Mining Risk: The Coal Authority's Interactive Map
(Interrogated 16th November 2017)



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records to varying degrees of detail on work that has been carried out to seal up six of the adits. Some of the adits are readily identifiable on Site. The adits and the risk they pose to the proposed development are described and discussed in greater detail in Sections 12.3 and 13.2 below.

There are no active mines in the locality and the Site has not been part of an opencast coal site.

6 Mine Gases

When coal is mined methane gas is released and may accumulate with other mine gases in the mining voids. The mine gases that accumulate in shallow mine workings frequently vent to atmosphere and mine gases in deeper mining voids become displaced as the mining voids flood with mine water. When mine gases accumulate in building voids they can result in asphyxiation, fire or explosion. A number of studies of the old workings across South Wales and dating back to the mid to late twentieth century have shown that there is little risk from mine gases. This may be as a result of the nature of the coal seams or because the shallow old workings have vented most of the mine gases to atmosphere or is as a result of the combination of the two. The Coal Authority has no record of a mine gas emission at the Site that has required action.

7 Hydrology and Hydrogeology

7.1 Hydrology

There are no streams crossing the Site. Temporary ponds are present in a hollow towards the southern end of the Site. The Site is shown on maps published by the Natural Resources Wales not to be liable to flooding from rivers.

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7.2 Hydrogeology

The Groundwater Vulnerability Map for Gwent published jointly by the Environment Agency, British Geological Survey and the Soil Survey and Land Research Centre, identifies the local strata as a Minor Aquifer having high permeability (see *Groundwater Vulnerability Map, drawing no. BC/MB/10.17.03.04*).

Groundwater Protection Policy (GP3) and the Water Framework Directive (WFD) Maps are managed by Natural Resources Wales (NRW) and inspection of these maps indicated the following:

- The Site is not within a designated Afon or coastal flood risk zone.
- There is a risk of surface flooding on a limited area of the northern part of the Site, outside the proposed build area.
- The Site is not within a Groundwater Source Protection Zone.
- The Superficial Aquifer designation for the Site is undesignated across the western part of the Site and Secondary A across the eastern part of the Site.
- The Bedrock Aquifer designation for the Site is Secondary A.
- The Site is within a High Risk element of the “Minor Aquifer” designation on the Groundwater Vulnerability Map.
- The Site is not within a designated Drinking Water Safeguard Zone.
- There are no designated Water Abstraction Licences within influencing distance.

8 History of the Site

8.1 1878 Edition

A review of the history of the Site has been undertaken by means of research of the various editions of Ordnance Survey maps. The 1878 Edition (scale 1:2,500) shows the Site (see *Extract from Ordnance Survey Sheet 1878, drawing no. BC/MB/10.17.03.05*) to

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have been situated in an area widely affected by mining operations. Several 'old' coal levels (disused) are evident in and around the Site and a number of tramways were present within its curtilage for transporting coal and colliery spoil. Made Ground, almost certainly colliery spoil, occupied the northern part of the Site and an area of woodland was present centrally in the Site. A Railway line passed the south-east corner of the Site and the Afon Twrch was present along the eastern boundary of the Site, meandering in and out of the Site.

8.2 1889 Edition

The 1889 Edition (scale 1:10,000) shows that a brickworks had been established on the eastern bank of the Afon Twrch, opposite the north-eastern corner of the Site and approximately 90m distant from it (see *Extract from Ordnance Survey Sheet 1899, drawing no. BC/MB/10.17.03.06*). The previously identified tramway/rail/colliery spoil features were also present at this time.

8.3 1899 Edition

By 1899 the Tirbach Brickworks had been established within the Site and the Gurnos Tinplate Works had been established opposite the Site, on the eastern banks of the Afon Twrch, approximately 30m distant from the Site (see *Extract from Ordnance Survey Sheet 1899, drawing no. BC/MB/10.17.03.07*). Two saw mills were then present, approximately 250m east of the Site. The Swansea Vale Railway line is shown to have been still operating, whilst the tramway lines were not.

8.4 1918 Edition

The 1918 Edition (scale 1:2,500) shows the Gurnos Brickworks, the Gurnos Tinplate Works and the Tirbach Brickworks all to have still been present (see *Extract from Ordnance Survey Sheet 1918, drawing no. BC/MB/10.17.03.09*). The Tirbach Colliery had been established within the Site with a series of colliery surface buildings, tramways and railway lines, the latter connected with the Swansea Vale Line near the Gurnos

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Junction, south of the Site. A feature interpreted as being a shaft is evident approximately 80m west of the Engine House at Tirbach Colliery. There is no evidence of buildings near the feature, suggesting that it may be an air shaft. The area occupied by Made Ground at the northern end of the Site had been extended southwards. A gravel pit was present at the northern edge of the Site, straddling its northern boundary. The gravel was exported via a bridge across the Afon Twrch. A clay pit was present immediately outside the south-western corner of the Site; a tramway connected it to the Tirbach Brickworks.

8.5 1921 Edition

The 1921 Edition (scale 1:10,000) shows that the settlement was expanding with residential developments to the south-west of the Site (see *Extract from Ordnance Survey Sheet 1921, drawing no. BC/MB/10.17.03.10*).

8.6 1964 Edition

The 1964 Edition (scale 1:2,500) shows the buildings and tramways of the Tirbach Colliery to have been still present, but mining records indicate that it had ceased operating (see *Extract from Ordnance Survey Sheet 1964, drawing no. BC/MB/10.17.03.11*). There is no evidence of the feature thought to be an air shaft or of the Tirbach Brickworks and the Gurnos Brickworks appears to have closed. The Gurnos Tinplate Works is annotated as 'disused'. A slag heap was present on the southern part of the Site, as well as a second smaller one on the northern half. The Swansea Vale Line appears to have been still in operation as a mineral line. The previously identified gravel pit, straddling the north boundary of the Site, was no longer evident at this time and the area had been re-profiled.

8.7 1971 Edition

The 1971 Edition (scale 1:2,500) shows that a number of the Tirbach Colliery buildings had been demolished; some remained, together with a conveyor and hopper (see *Extract from Ordnance Survey Sheet 1971, drawing no. BC/MB/10.17.03.13*). The Swansea Vale

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Line is annotated as 'disused'. The surrounding area had experienced an expansion of mixed residential developments.

8.8 Present

The Site was last used as a training facility for drivers of small plant; it is now unoccupied and only very few of the former colliery buildings remain together with some foundations of former buildings and structures (see *Environmental Review Plan*, drawing no. BC/MB/10.17.03.16).

9 Environmental Issues

No part of the Site lies within an area designated as having a sensitive land use, including designated landscape areas.

Approximately half of the Site is shown to be potentially filled land (non-water); the south-eastern part is unaffected in this respect. There are no Control of Major Incident Sites (COMAH), explosive sites, Notification of Installations Handling Hazardous Substances status (NIHHS) or planning hazardous substance consents within 250m of the Site.

10 Risk Assessment – Tier 1

A conceptual model (see diagram) was developed in order to provide a basis for the Risk Assessment; it was based on the *source-pathway-receptor* approach. Several sources of potential contamination can be identified from registered sources: the former use of part of the land as a railway track, tramway lines, colliery spoil, brick works, tin plate works, in-filled ground and a colliery (including associated colliery spoil heaps).

The topography of the Site has changed over the last century as a result of the industrial activity on the Site at the time. From records it can be seen that all above-ground features have

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been removed and the entire Site re-profiled with 'non-water' material; this is assumed to be colliery spoil. As a result of the industrial history of the area there are numerous potential contaminants that could be persistent in the soils; these include heavy metals, hydrocarbons, mineral oils, inorganic compounds. There are no identified potential sources of gas because all in-filled land is recorded as being undertaken with non-water and so it's assumed that the colliery spoil present on the land at any one time has been used for the re-profiling. There is no historic source of asbestos.

Conceptual Model

Source	Pathway	Receptor	Probability & Consequence	Risk
Railway land, colliery, tramway, brick works, tin plate works <i>Hydrocarbons, inorganics, metals, mineral oils</i>	Ingestion/ Dermal Contact	Future on-site users (commercial)	Likely/mild	Moderate
		Construction workers	Unlikely/ Mild	Low (assumes the use of PPE)
		Maintenance workers		
		Adjacent commercial/ residential land users	Unlikely/ Mild	Low
	Permeation	Subsurface plastic water pipes	Likely/medium	Moderate
	Vertical Groundwater Migration	Minor aquifer	Low likelihood/mild	Low <i>No source protection zone or abstraction points</i>
Gas <i>No sources identified</i>	n/a	n/a	n/a	Negligible

11 Radon Gas

Recent government guidelines recommend that the potential for Radon gas should be assessed for all new buildings; the advice has been implemented by interrogating the Public Health England interactive map. The map was accessed on the 17th November and shows the Site to lie within an area where the maximum Radon potential is 1 - 3%.

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12 Site Investigation

12.1 Site Investigation Programme

A detailed walkover survey of the Site was undertaken with the specific purpose of examining those mine entries that could affect the proposed housing development. A programme of sixteen number trial pits and four number cable tool boreholes was designed to investigate the ground conditions at the Site; the conclusions of the above Tier 1 Risk Assessment was used to inform the design of the site investigation. Due to the presence of Japanese Knotweed, Trial Pits (TP) 1 and TP 2 were not excavated. The trial pits were excavated to a maximum depth of 3.5m and the cable tool percussive boreholes were drilled to a maximum depth of 16.5m. Three water samples were taken at locations deemed to be “long term” surface water or ponding features.

The soils were logged and sampled in accordance with BS 5930: 2015: Code of Practice for Site Investigations British Standards Institution and in accordance with BS EN 1997-2 (2007). Geotechnical Logs for the Trial Pits are included at the rear of this report.

In-situ testing carried out in the cable tool percussive boreholes was comprised of SPT/CPT hammer tests deriving unmodified N values; they were undertaken at predetermined depths to standard test methods. The Borehole Logs and results of the associated in-situ testing are included at the rear of this report, as well as the current calibration certificate for the hammer used: N value (uncorrected values) to Depth analysis and Average N value to Depth analysis are also included.

Samples taken from the Trial Pits and the Water Sample Points were subject to laboratory testing. Sampling was conducted in accordance with standard industry guidance and comprised of:

Soil: Suite of samples at each location and depth as:

2 Glass Jars (60ml + 258ml)

1 Plastic Tub (825ml)

Total number taken = 42

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Soil and Leachate: Suite of samples at each location and depth as:

2 Glass Jars (60ml + 258ml)
2 Plastic Tubs (825ml)
Total number taken = 4

Water (Surface Water): Suite of samples at each location as:

2 Glass 1000ml bottles
1 Plastic 500ml bottle
1 Glass 40ml Vial
1 Plastic 100ml HNO₃ Vial
1 Plastic 100ml H₂SO₄ Vial
1 Plastic 100ml NaOH Vial
Total number taken = 3.

The nature of the material encountered and the scope of this Stage 1 Site Investigation have precluded geotechnical laboratory testing at this preliminary stage of the development. Detailed geotechnical testing will be required at subsequent “detailed investigation” stage(s) as the project develops.

12.2 The Findings of the Site Investigation: Shallow Mine Workings

The review of mining records at Section 5, above, identified that shallow old workings at the western end of the Site are beyond the Palleg Fault and do not encroach onto the Site. Otherwise there are no recorded or ‘probable’ shallow mine workings underlying the Site (see Figures 3 and 4).

12.3 The Findings of the Site Investigation: Mine Entries

A number of recorded adits lie to the west of the Site and are at elevations above the proposed housing area, most of them at significantly higher elevations. The adits are shown green on the *Plan of Recorded Disused Mine Entries*, drawing no. BC/MN/10.17.03.08; the adits are 277209-054, 277209-055, 277209-056, 277209-048, 277209-051, 277209-048, 277209-044, 277209-043, 277209-004, 277209-034 and 277209-070. If any one of these adits was to collapse it would not affect the proposed

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development. Underground drivages extending from these adits would all be westwards and away from the Site and if any of the roadways was to collapse it would not affect the Site.

The shaft 277209-050 is located on land at a much higher elevation than the proposed development and is 50m from its boundary. A collapse of this shaft would not affect the development site.

Adit 277209-003 lies a short distance beyond the western boundary of the proposed development area on land that is at a slightly higher elevation and heavily wooded (see Figure 5). Underground roadways extending from the adit would be westwards into the steep slope. A collapse of this adit or a roadway associated with it would not affect the proposed development area.

Figure 5
Steep Wooded Slope Around Location of Adit 277209-003



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Records held by The Coal Authority hold no information on what measures, if any, have been carried out to seal up the mouth of adit 277209-002, the former Tirbach Colliery Intake. Records show that a hole in the brick portal of this adit was made good to secure the mine entry; the date of the work is not stated. The same description of repairs to the brick portal is attached to adit 277209-057. We have spoken with the son of the person who occupied the land when the repairs to the blockwork were undertaken after the occupier notified The Coal Authority of the defect. The son recalls the repairs being carried out. The repairs were carried out on the side of the brick ventilation tunnel that runs from the Return Adit (277209-058) to the fan house located immediately adjacent to adit 277209-058 and not on adits 277209-002 and 277209-057 as stated in The Coal Authority's records.

Figure 6
Brick Ventilation Tunnel Adjacent to Adit 277209-057



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Figure 7
Brick Ventilation Tunnel Adjacent to Adit 277209-058



Figure 8
Brick Ventilation Tunnel Adjacent to Adit 277209-058



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The position of adit 277209-060 has been identified on site at the side of a steep, heavily vegetated slope (see Figure 9). There is no evidence at the location of the adit itself. However, it is known that at various times since Tirbach Colliery closed the land at that location has been the subject of both demolition and construction work and the land immediately above the slope is now concrete surfaced.

The location of Adit 227209-057 appears to be beneath the mounded soils shown in Figure 10. This location is where the tunnel extending from adit 227209-060 is shown on abandonment plans to intersect adit 227009-057 (see *Extract from Tirbach Colliery, Lower Vein, Abandonment Plan, drawing no. BC/MB/10.17.03.19*). There is now no tunnel on the surface running from adit 227009-057 to adit 227009-002 and no evidence of the latter adit.

Figure 9
Steep Vegetated Slope at Location of Adit 277209-060



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Figure 10
Convergence of Brick Tunnel from Adit 277209-060
with Adit 277209-057



Figure 11
The Location of Adit 277209-002



/Cont....

The abandonment plans show a roadway extending westwards from adit 227209-002 where it would be evident in Figure 11. The abandonment plans show no adit at the position of adit 227009-057. The most reasonable interpretation is that a brick tunnel similar to others on the site previously ran on the surface from the location of adit 227009-002 to the point where it entered the hillside, which is at the position of adit 227009-057. The brick tunnel, including its mouth at adit 227009-002 has been demolished back to the hillside at adit 227009-057 and removed.

Records held by The Coal Authority show that the Tirbach Colliery Return Adit, adit 227209-058, was sealed to an unknown specification approximately 5 metres inbye of the entrance. In 2001 the adit portal was secured with blockwork by Wardell Armstrong acting on behalf of the Coal Authority (see Figure 12).

Figure 12
The Blocked Up Entrance of Adit 277209-058



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12.4 The Findings of the Site Investigation: Geotechnical

In the cable tool percussive boreholes and the trial pits **Made Ground** was encountered at all sampling locations and was proved to a maximum depth of 15.50 metres below ground level; it is heterogeneous in nature, as can be seen in the geotechnical logs contained in Annex D to this report.

Superficial Deposits underlying the Made Ground and are “Gravels”, and “Gravels and Cobbles” with variable clay content. SPT/CPT results appear to give inconsistent N values in comparison to the observed materials and drilling records, where a great deal of difficulty in boring penetration as well as advancement of the 200mm diameter casing was encountered. Overall, the results may be suggestive of much bigger cobbles being present and partly broken up and pushed sideways by the drilling method. The lower than expected SPT/CPT results are likely to be due to penetration between the gravel and cobble.

Bedrock underlying the superficial deposits was not proven as a result of the difficulty in penetration through the superficial deposits.

12.5 The Findings of the Site Investigation: Environmental Risk to Human Health

In order to determine whether or not a contaminant is present at concentrations that may pose a risk of harm to human health, the results of the laboratory testing carried out on the soils are compared against guideline values, either directly or following statistical analysis. The screening values used were the CLEA Soil Guideline Values (SGV) published by the Environment Agency and the Soil Screening Values (SSV) published by the Atkins Group.

The end-use scenario deemed most appropriate for this development is that of ‘residential with home-grown produce’.

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The Tier 1 (Desk Study) Risk Assessment identified several sources of potential contamination that might have been present on the Site, all of which were associated with the use of the Site as a colliery surface/coal washery/brickworks/tin-plate works: these included features such as rail/tram lines and colliery spoil. The material found within the trial pits is consistent with the former uses of the Site. Groundwater was encountered in Trial Pit 3 at 1.7m depth and in Boreholes 2, 3 and 4.

Table 1
Metal/Inorganic Laboratory Soil Testing Results

	Arsenic	Cadmium	Chromium (Hex)	Copper	Lead	Mercury	Nickel	Selenium	Zinc
Min (Concentration.)	<1	<0.5	<1	10	18	<0.1	12	<1	33
-	-	-	-	-	-	-	-	-	-
Max (Concentration.)	28	5.5	<1	766	148	0.9	111	6	1080
Guideline Value	32	10	14.7	4,020	168	1	130	350	17,200
Guideline Value Source	CLEA	CLEA	SSV	SSV	SSV	CLEA	CLEA	CLEA	SSV

All values shown are in mg/kg unless otherwise stated.

Given the industrial history of the Site it is to be expected that the soils are heavily contaminated, however the laboratory results from the soil testing show this not to be the case. Three number of the trial pits proved concentrations of chemicals that do not breach any of the relative guideline values (TP6, TP7 and TP8). Furthermore, the levels of contaminants leaching from the soils within TP6 (forced leachate tests) are generally so low as to be undetectable by the laboratory instruments, and of those that were detectable, all levels fall below the acceptable limits for drinking water. For the most part, all of the soil samples proved levels of inorganic/metal contaminants in the soil that are relatively low and so do not breach any of the guideline values. The exceptions to this are:

/Cont....

4 hot spots of *arsenic* (TP3 @ 0.7m, TP5 @ 0.7m, TP10 @ 0.5m, TP11 @ 0.1m),

1 hot spot of *mercury* (TP12 @ 0.1m)

7 hot spots of *lead* (TP3 @ 0.7m, TP5 @ 0.4 & 0.7m, TP9 @ 0.4m, TP11 @ 0.1m, TP12 @ 0.1m, TP15 @ 0.4m).

Table 1, above, does not include the hotspots.

With regards to organic chemicals in the soil, all Aromatic/aliphatic/BTEX compounds are at levels that are either undetectable by the laboratory instruments, or are present at levels that do not breach any of the relative guideline values.

Except for three of the trial pits, some Polycyclic Aromatic Hydrocarbons (PAHs) are present in quantities that everywhere breach the relative guideline values. The individual PAHs that breach the relative guideline values are:

Benzo(a)pyrene (TP3 @ 0.4m & 0.7m, TP4 @ 0.4m, TP5 @ 0.1m, 0.4m & 0.7m, TP11 @ 0.1m, TP12 @ 0.1m & 0.3m, TP13 @ 0.1m & 0.3m, TP15 @ 0.4m & 0.6m, TP16 @ 0.1m, 0.3m & 0.5m,

Benzo(b)fluoranthene (TP15 @ 0.4m),

Benzo(ghi)perylene (TP3 @ 0.1m, 0.4m & 0.7m, TP4 @ 0.1m, 0.4m & 0.7m, TP5 @ 0.1m, 0.4m & 0.7m, TP10 @ 0.1m & 0.5m, TP11 @ 0.1m & 0.3m, TP12 @ 0.1m, 0.3m & 0.6m, TP13 @ 0.1m & 0.3m, TP14 @ 0.3m, TP15 @ 0.4m & 0.6m, TP16 @ 0.1m, 0.3m & 0.5m),

Chrysene (TP5 @ 0.1m & 0.7m),

Dibenzo(ah)anthracene (TP3 @ 0.4m & 0.7m, TP4 @ 0.1m, 0.4m & 0.7m, TP5 @ 0.1m, 0.4m & 0.7m, TP9 @ 0.6m, TP10 @ 0.1m & 0.5m, TP11 @ 0.1m & 0.3m, TP12 @ 0.1m, 0.3m & 0.6m, TP13 @ 0.1m & 0.3m, TP14 @ 0.3m, TP15 @ 0.4m & 0.6m, TP16 @ 0.1m, 0.3m & 0.5m),

Indeno(123-cd)pyrene (TP3 @ 0.4m & 0.7m, TP4 @ 0.1m & 0.4m, TP5 @ 0.1m, 0.4m & 0.7m, TP9 @ 0.6m, TP10 @ 0.1m & 0.5m, TP11 @ 0.1m, TP12 @ 0.1m & 0.6m, TP13 @ 0.1m, TP15 @ 0.4m & 0.6m, TP16 @ 0.1m, 0.3m & 0.5m),

Pyrene (TP15 @ 0.4m).

/Cont....

Table 2
TPH Laboratory Testing Results

	Aliphatic C ₅ – C ₆	Aliphatic C ₆ – C ₈	Aliphatic C ₈ – C ₁₀	Aliphatic C ₁₀ – C ₁₂	Aliphatic C ₁₂ – C ₁₆	Aliphatic C ₁₆ – C ₃₅	Aromatic C ₅ – C ₇	Aromatic C ₇ – C ₈	Aromatic C ₈ – C ₁₀	Aromatic C ₁₀ – C ₁₂	Aromatic C ₁₂ – C ₁₆	Aromatic C ₁₆ – C ₂₁	Aromatic C ₂₁ – C ₃₅
Min - Max	<0.05	<0.05	<0.05	<0.1	<0.1 - 19	<0.1 - 76.1	<0.05	<0.05	<0.05	<0.1 - 1.7	<0.1 - 10.6	<0.1 - 27.7	<0.1 - 98.1
Guideline Value	26.1	87.8	14.5	87.7	126	88200	0.33	610	23.7	132	452	804	1220
Guideline Value Source	Atkins Atrisk SSV												

All values shown are in mg/kg unless otherwise stated

The table above does not include the hotspots listed above.

12.6 Risk to Water Resources.

Groundwater was encountered only in Trial Pit 3 and not in any of the other trial pits on the Site. Soil samples from four of the trial pits closest to the river (TP3, 4, 5 & 6) were subject to forced leachate testing.

Whilst there is a small amount of leaching that could occur under forced circumstances, the concentrations of contaminants shown to be leaching from three of the four trial pits (TP3, TP4 and TP6) are at levels that would be acceptable for drinking water. Hotspots of lead and arsenic have been identified in TP5; this is reflected in the results of the forced leachate testing as both these contaminants are shown to leach at higher levels than in the other trial pits. The same is true for all hydrocarbon testing, as only low

/Cont....

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Table 3
Results of Laboratory Testing – PAHs Soil

	Acenaphthene	Anthracene	Benzo (a) anthracene	Benzo (a) pyrene	Benzo (b) Fluoranthene	Benzo (g,h,i) perylene	Benzo (k) Fluoranthene	Chrysene	Dibenzo (ah) anthracene	Fluoranthene	Fluorene	Indeno (1,2,3-cd) pyrene	Naphthalene	Pyrene
Min	<0.01	<0.02	0.04	<0.04	<0.05	<0.05	<0.07	<0.06	<0.04	<0.08	<0.01	<0.03	<0.03	<0.07
-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Max	1.26	3.25	5.10	0.87	4.30	0.11	1.20	2.29		6.33	2.37	0.91	6.77	9.13
Guideline Value	937	20.9	8.54	0.998	7.29	103	4.12	927	1	113	746	9.75	8.71	13.2
Guideline Value Source	Atkins Atrisk SSV													

All values shown are in mg/kg unless otherwise stated

/Cont....

levels of the heavier fractions are shown to be subject to forced leaching, and indeed many of the concentrations shown to be leaching are below the detectable level of the laboratory instruments. The concentrations of leachates are higher in the soil sample from TP5 than those from the other three trial pits where leachate testing was carried out.

Table 4
Metal/Inorganic Laboratory Soil Leachate Testing Results

	Arsenic	Antimony	Boron	Cadmium	Chromium	Copper	Lead	Mercury	Nickel
Min (Concentration.)	7	<1	21	<1	<1	<1	<1	<0.1	<1
-	-	-	-	-	-	-	-	-	-
Max (Concentration.)	7	14	70	<1	3	25	157	<0.1	21
Guideline Value	10	5	1000	5	50	2000	10	1	20
Guideline Value Source	Drinking Water Regulations								

All values shown are in µg/l unless otherwise stated.

Table 5
Metal/Inorganic Laboratory Water Testing Results

	Arsenic	Antimony	Boron	Cadmium	Chromium	Copper	Lead	Mercury	Nickel
Min (Concentration.)	<1	<1	23	<0.2	<1	<1	<1	<0.1	<1
-	-	-	-	-	-	-	-	-	-
Max (Concentration.)	2	1	30	<0.2	<1	6	<1	<0.1	<1
Guideline Value	10	5	1000	5	50	2000	10	1	20
Guideline Value Source	Drinking Water Regulations								

All values shown are in µg/l unless otherwise stated.

/Cont....

Samples of the water from the identified pond features were also collected as part of the designed site investigation and were also subject to laboratory analysis. The results from the analysis show that, for many of the determinands tested, most were below the detectable limit of the laboratory instruments. Where detection was possible, all metals/inorganic compounds are at levels that are acceptable for drinking water (see Table 5). Only small amounts of hydrocarbons were found to be present in the water.

When the above conclusions are considered along with the conceptual model and risk assessment; the risk to sensitive water resources is considered to be extremely low. The levels of leachate generated under forced laboratory conditions are generally very low, and when this is combined with the fact that there is no preferred pathway as the local strata is identified as a Minor Aquifer, nor does the Site lie within a Groundwater Source Protection Zone, nor does it lie within a designated Drinking Water Safeguard Zone, nor are there any Water Abstraction Licenses within influencing distance.

All of these factors lead to the conclusion that there is no significant risk of harm to any sensitive water receptor from the soils at the Site.

Conceptual Model Refined

Source	Pathway	Receptor	Probability & Consequence	Risk
Arsenic, lead, mercury, PAHs	Ingestion/ Dermal Contact	Future on-site users (commercial)	Likely/mild	Moderate
		Construction workers	Unlikely/ mild	Very Low (assumes the use of PPE)
		Maintenance workers		
		Adjacent commercial/ residential land users	Unlikely/ mild	Very Low
	Permeation	Subsurface plastic water pipes	Likely/medium	Moderate
	Vertical Groundwater Migration	Minor aquifer	Low likelihood/mild	Very Low

/Cont....

With regards to buried concrete, when the laboratory testing results are compared to Table C2 of the *BRE Special Digest 1:2005 Concrete in Aggressive Ground*, the appropriate classification for buried concrete is DS1, class AC1.

12.7 Ground Gases

There were no identified potential sources of ground gas from the Tier 1 Risk Assessment and no putrescible materials were encountered on the Site that would act as a source of landfill gas. It is therefore considered that there is no risk to any sensitive receptor from gas at the Site.

13 Discussion and Recommendations: Mining Risk

13.1 Past Mine Workings

Research of abandonment plans for the former Tirbach Colliery show that shallow mine workings near the western edge of the Site are to the west of the Palleg Fault and do not encroach onto the Site. There are no records of mine workings underlying the Site and The Coal Authority's interactive map shows no 'probable' shallow mine workings underlying the Site.

The Site has not been part of an opencast site and there are currently no mining operations in the locality that would affect the proposed development.

There is no risk to the proposed development from past old coal workings, underground or opencast.

13.2 Disused Mine Entries

There are records of a disused shaft and ten disused adits within the confines of the landholding with a further six disused adits within 20m of the boundary of the landholding. With the exception of five adits all are outside the western boundary of the landholding and are on higher ground such that a collapse of any of the features or roadways extending from them will not affect the proposed housing development.

/Cont....

Of the five adits that are within or immediately adjacent to the proposed housing area, adit 227209-003 is at a higher elevation such that a collapse associated with it would not affect the proposed housing area. There is no evidence of adit 227209-002 still being present on site and there is a level, concrete surfaced area at its indicated position. Two other adits, 2272009-057 and 227209-060, appear to have been associated with brick construction roadways running on the surface. The former brick construction ventilation tunnel from Tirbach Colliery Return Adit, 227209-058, to the fan house is still intact as is a very short length of the brick construction tunnel that is thought to have run between adits 227209-060 and 227209-057. The mouth of adit 227209-0057 appears to be buried beneath a soil mound and it is not clear if it has been safely stopped up. The mouth of adit 227209-0058 has been both stopped up and blocked up, but the specification of the stopping 5m inbye of the adit mouth is not known. Given the scale of the proposed housing development it would be prudent to open the mouth of the adit and inspect the stopping in order to record its details.

It is recommended that the remaining brick tunnels are demolished back to the point where they pass into the hillside and there safely stopped up. The mouth of adit 227209-057 should be excavated and uncovered and safely stopped up. There are no longer any physical remains of adit 227209-060 evident on the Site or of the greater part of the length of the tunnel that ran from it to adit 227209-057. The area around the location of adit 227209-060 should be excavated to confirm that the adit has been removed. Any mining feature that might be found to be present must be made safe.

A collapse of the underground tunnel extending from adit 227209-057 where it passes into the hillside would not affect the proposed development area. The precise location and condition of adit 227209-058 is uncertain but will become evident when the recommendation to excavate it out is carried out. The subsequent scheme of work to securely stop up the adit must also take into account any risk of a collapse of the first 35m or so of the adit inbye of its mouth that may be identified.

These remedial works must be carried out following a scheme of works to be agreed with The Coal Authority and will require a permit from The Coal Authority.

/Cont....

The previous mining operations on and around the Site are well documented and it is unlikely that any further, unrecorded, disused mine entries are present within the proposed development area. However, given the mining history of the area the risk of an unrecorded mine entry being present within the development area cannot be entirely ruled out. If any unusual features are observed during excavation work the excavation must be stopped immediately and advice sought from a Chartered Geologist or from The Coal Authority.

13.3 Mine Gases

There is a low risk from mine gases but it would be prudent to monitor any intrusive site investigation or remedial work to mining features for the presence of mine gases.

13.4 Colliery Spoil Heaps and Surface Mining Features

There remains on Site a few buildings and foundations that will need to be removed. There are spoil heaps on the Site that are not suitable for founding on and that may have local issues of slope stability. Detailed plans have not yet been prepared for the proposed development and these may include reshaping of the topography. A detailed consideration of local slope stability issues should be carried out at a more appropriate point in the development of the project when any reshaping of the topography is being discussed.

Whilst there is no historic plan evidence of slurry ponds within the Site (associated with the washery within the Site) there is the potential for these to have been present and unrecorded. If this is found to be the case then they will be unsuitable for founding on and will need to be explored in detail and remediated as informed by the investigation.

14 Discussion and Recommendations: Geotechnical Issues

The Made Ground encountered in all eighteen sampling points is unsuitable for founding upon. On the basis of available data a piled or soil improvement (stone column) foundation

/Cont...

solution is likely to be appropriate. When the project has developed to the stage where a detailed layout has been formulated further a more detailed ground investigation will be required to design the appropriate foundations. The detailed geotechnical site investigation required will include:

-  An assessment of the superficial and bedrock strata for foundation design (rotary percussive, cable tool percussive and laboratory testing).
-  Assessment of the sloped land adjacent to the Afon Twrch in order to assess the stability of the slope.
-  Investigation of soft clays, intrusive investigation in order to ascertain the extent of soft (lagoon/siltation ponds) within the Site.
-  In situ testing, CBR assessment for pavement design of the highway and any car parking areas.

15 Discussion and Recommendations: Contaminated Land

15.1 Hydrology and Hydrogeology

There are no drains crossing the Site. The Site is shown on published plans not to lie on an indicative fluvial flood plain, and there are only small areas of temporary standing water on the Site. The Site, itself, lies on ground which is classed as a minor aquifer which is overlain with a mixture of locally derived soils, River Alluvium and Made Ground comprised of colliery spoil. There are no Water Abstraction Licenses within close proximity to the Site, nor does the Site lie within a Groundwater Source Protection Zone, nor does it lie within a designated Drinking Water Safeguard Zone.

The laboratory testing carried out on the water samples collected and also the forced leachate tests on the four soil samples show that there is very little contamination present in the surface water itself. Furthermore, the laboratory tests show that very little contamination becomes free under forced leaching conditions.

/Cont....

When the results of the laboratory testing are considered with the hydrology/hydrogeology, it is concluded that there is no significant risk to any sensitive groundwater receptor from the soils at the Site.

15.2 Contaminated Soils

Most of the contaminants present in the soil are at concentrations that are considered not to pose a risk to human health. Some, however, are present at concentrations that are considered to pose a risk to human health, namely; arsenic, mercury, lead and several individual PAHs. Where there are soft landscaping/garden areas, these contaminants have the potential to come into contact with sensitive end-users at the Site (humans), therefore, it is recommended that a geotextile grid/membrane be placed on top of the existing soils and covered with a minimum of 600mm of clean topsoil. These measures will remove the 'pathway' between the source of the contamination and the receptor. It may be necessary to remove some of the existing soils for engineering/layout works; if this is the case then it must be done so in the correct manner, with the appropriate paperwork in place and supervised by a suitably qualified person. Any soils/materials to be brought to the Site should be certified as clean.

15.3 General

Soil materials removed from Site will be classified as 'waste' under environmental protection legislation and should be removed in keeping with all current relevant legislation.



David Blandford,
Environmental Consultant.



Dr Malcolm Blandford,
Chartered Geologist.

Report Date: 12th March 2018.

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References

BGS, 1973, Geological Sheet SN 70 NE, at 1:10,560 scale.

BGS Geindex www.bgs.ac.uk/geindex, British Geological Survey (2016).

BS EN 1997-1 : 2007 : Eurocode 7 - Geotechnical design - Part 1 General Details. British Standards Institution.

BS EN 1997-2 : 2007 : Eurocode 7 - Geotechnical design - Part 2 Ground investigation and testing. British Standards Institution.

BS 1377: 1990 : Methods of test for soils for civil engineering purposes. British Standards Institution.

BS 5930+A2 : 2010 : Code of practice for site investigations (Amendment 2). British Standards Institution.

BS 5930: 2015 : Code of practice for site investigations British Standards Institution.

BS EN ISO 14688-1:2002+A1: 2013 : Geotechnical investigation and testing - Identification and classification of soil - Part 1 Identification and description. British Standards Institution.

BS EN ISO 14688-2:2004+A1: 2013 : Geotechnical investigation and testing - Identification and classification of soil - Part 2 Principles for a classification. British Standards Institution.

BS 10175:2011+A2:2017 Investigation of potentially contaminated sites. Code of practice: Code of Practice. British Standards Institution.

Groundwater Vulnerability Map 35: West Glamorgan.

Lle Cymru Portal – Research Browser.

Archwillio – Welsh Historic Monuments Research Browser.

Megalithic.co.uk – Mesolithic & Palaeolithic Database research Browser.

Llywodreath Cymru / Welsh Government – APU Online – Welsh Air Photos.

Historic Wales – Research Browser.

PLANS



*The Enterprise Centre,
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Geologists Working With The Environment...

Study on Land at
Former Tirbach Washery Site, Ystalyfera.

General Location Plan.

Plan Scale: 1:50,000.

Key to Symbols:



Approximate Position of Site.

Note:

North is at top of plan.

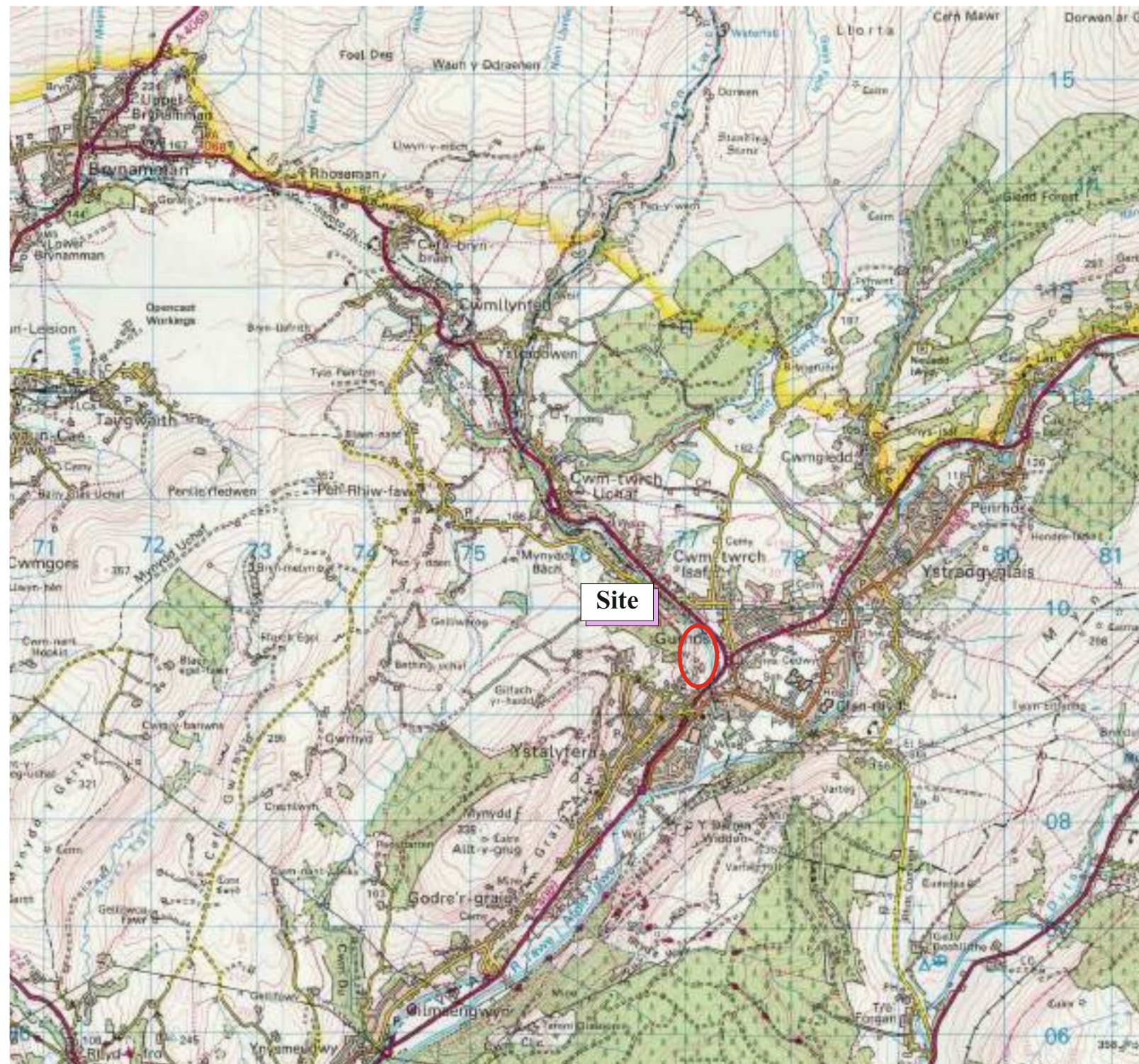
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Geology Plan.

Plan Scale: 1:10,560.

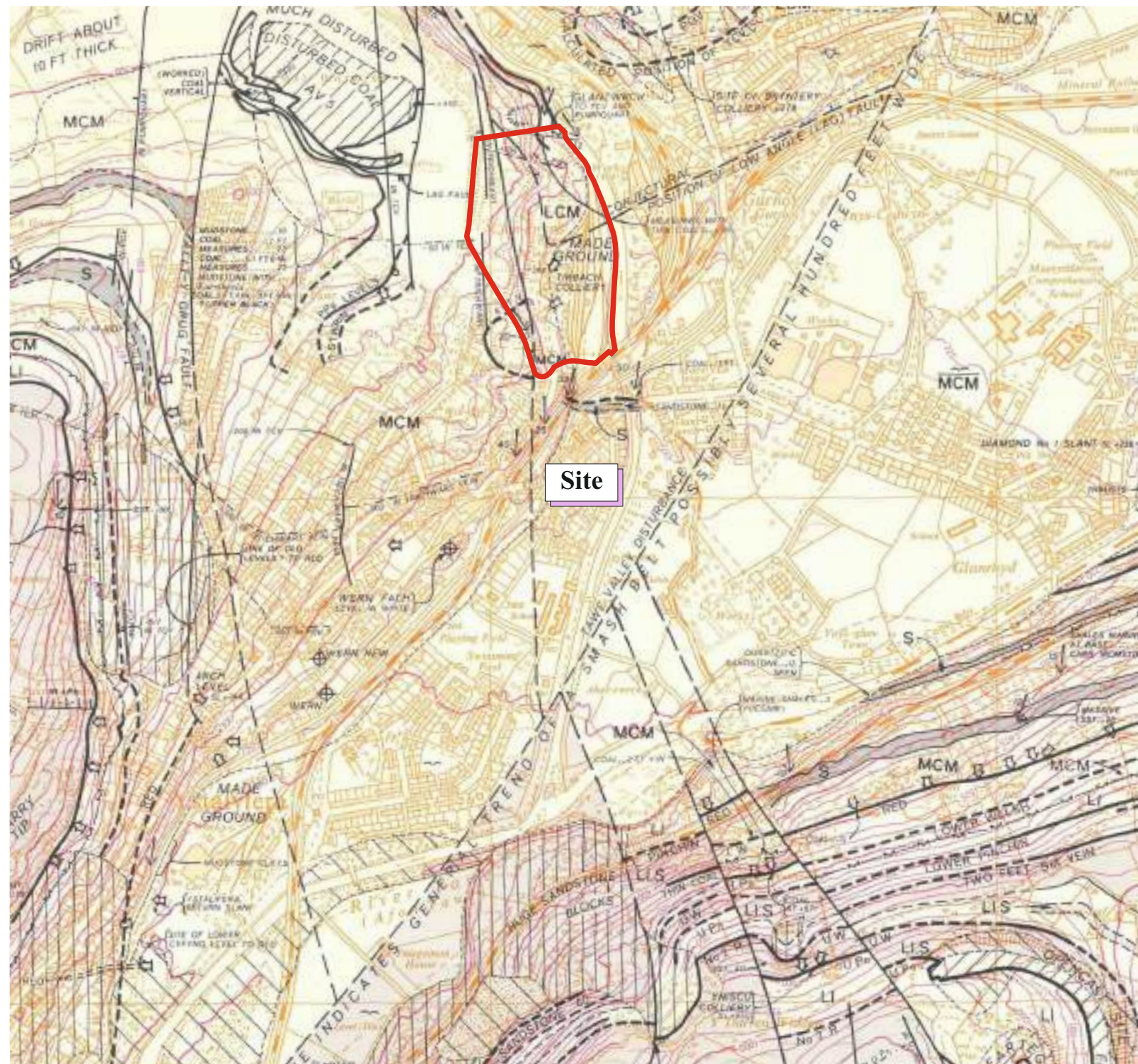
Key to Symbols:

— **Approximate Site Boundary.**

Note:

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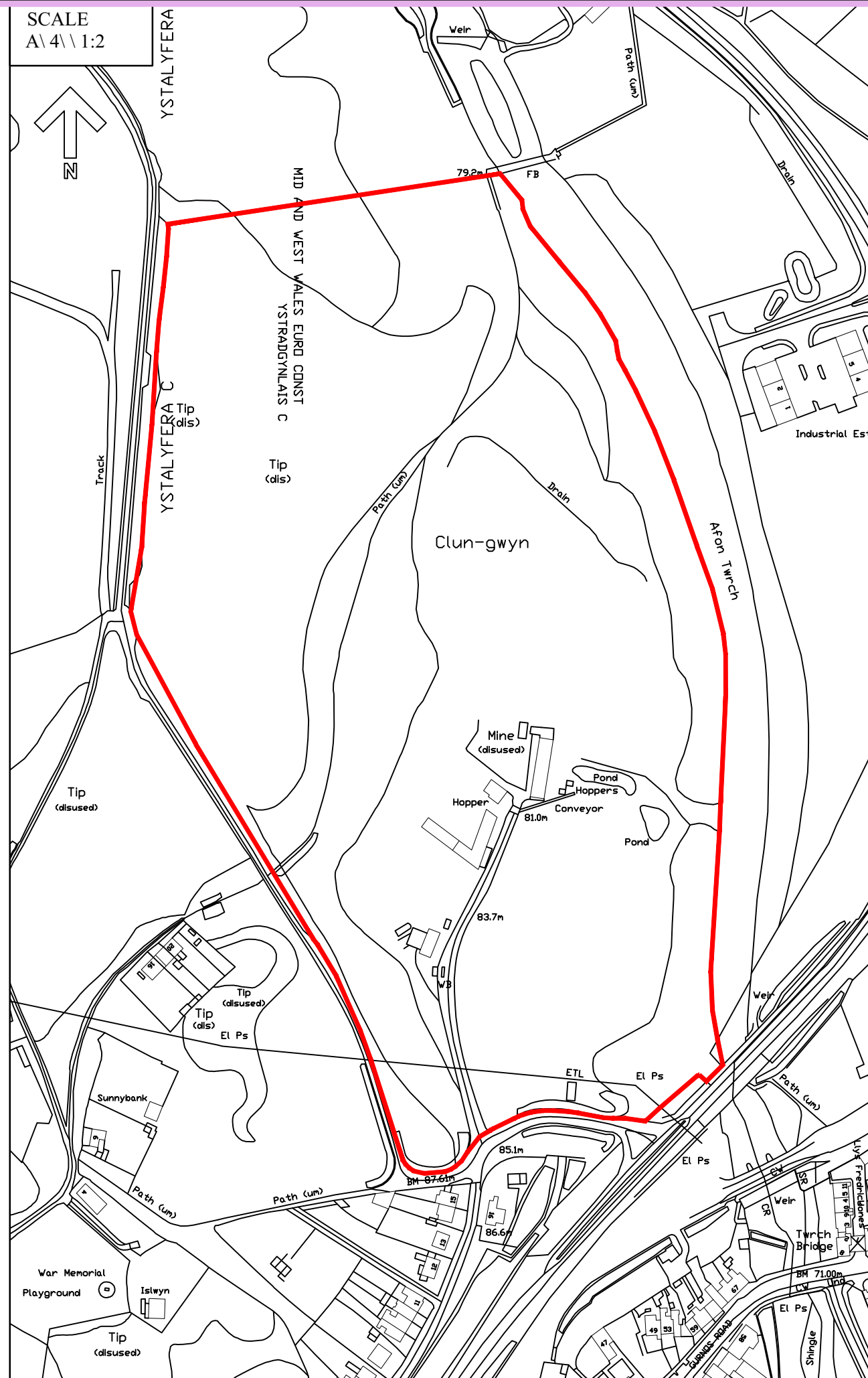
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Study on Land at
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Detailed Location Plan.

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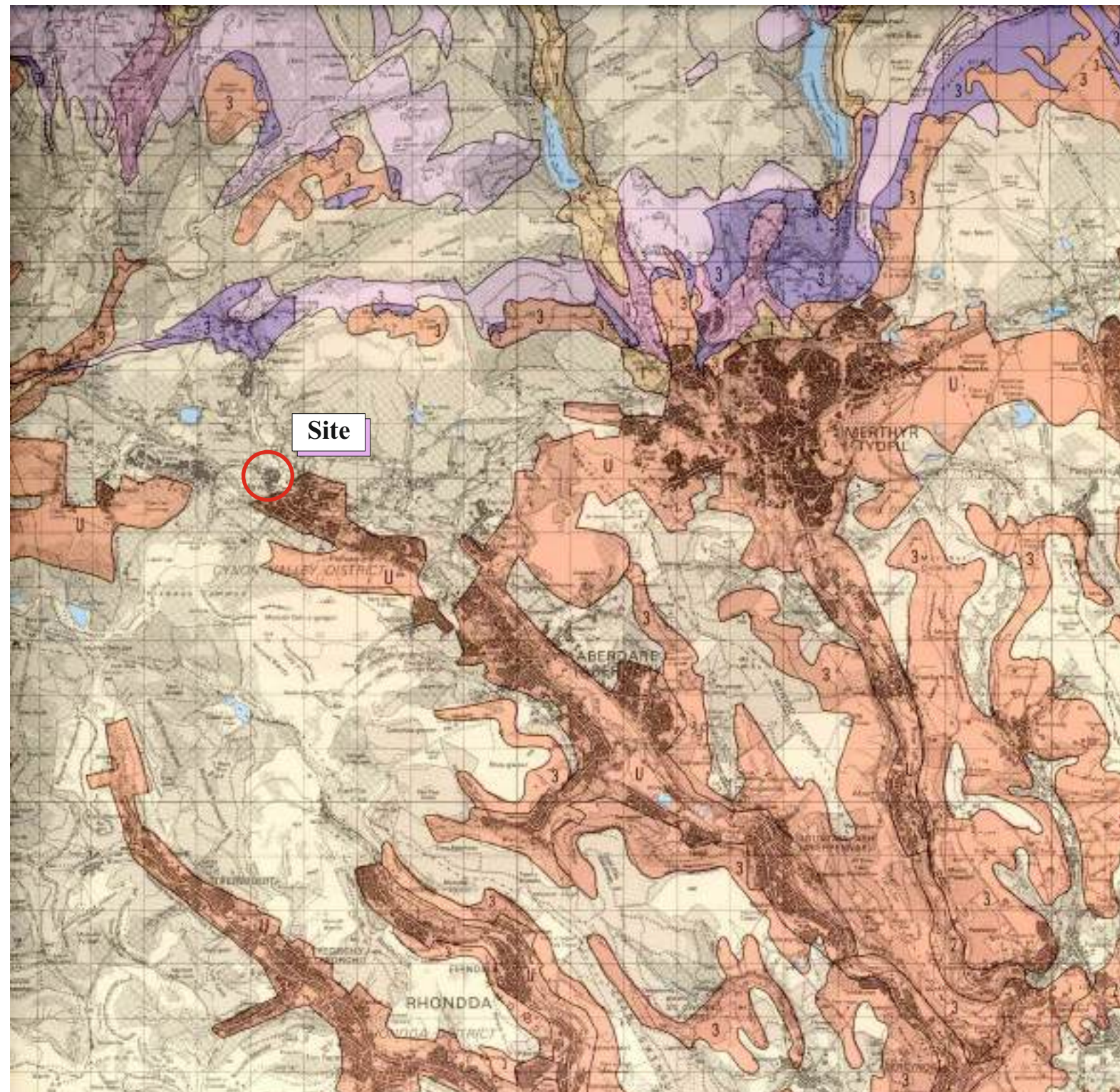
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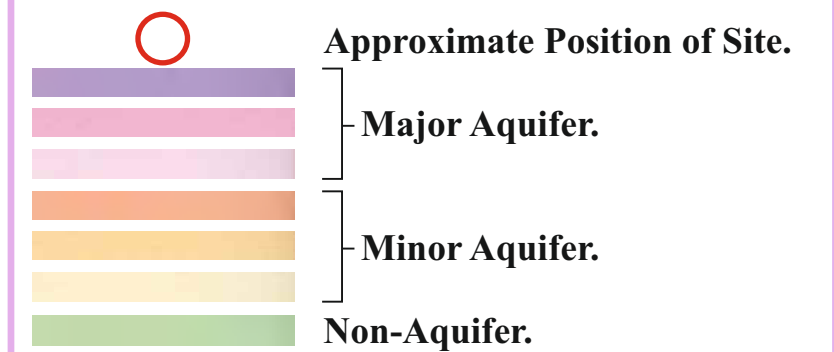
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Groundwater Vulnerability Map.

Plan Scale: 1:100,000.



Key to Symbols:

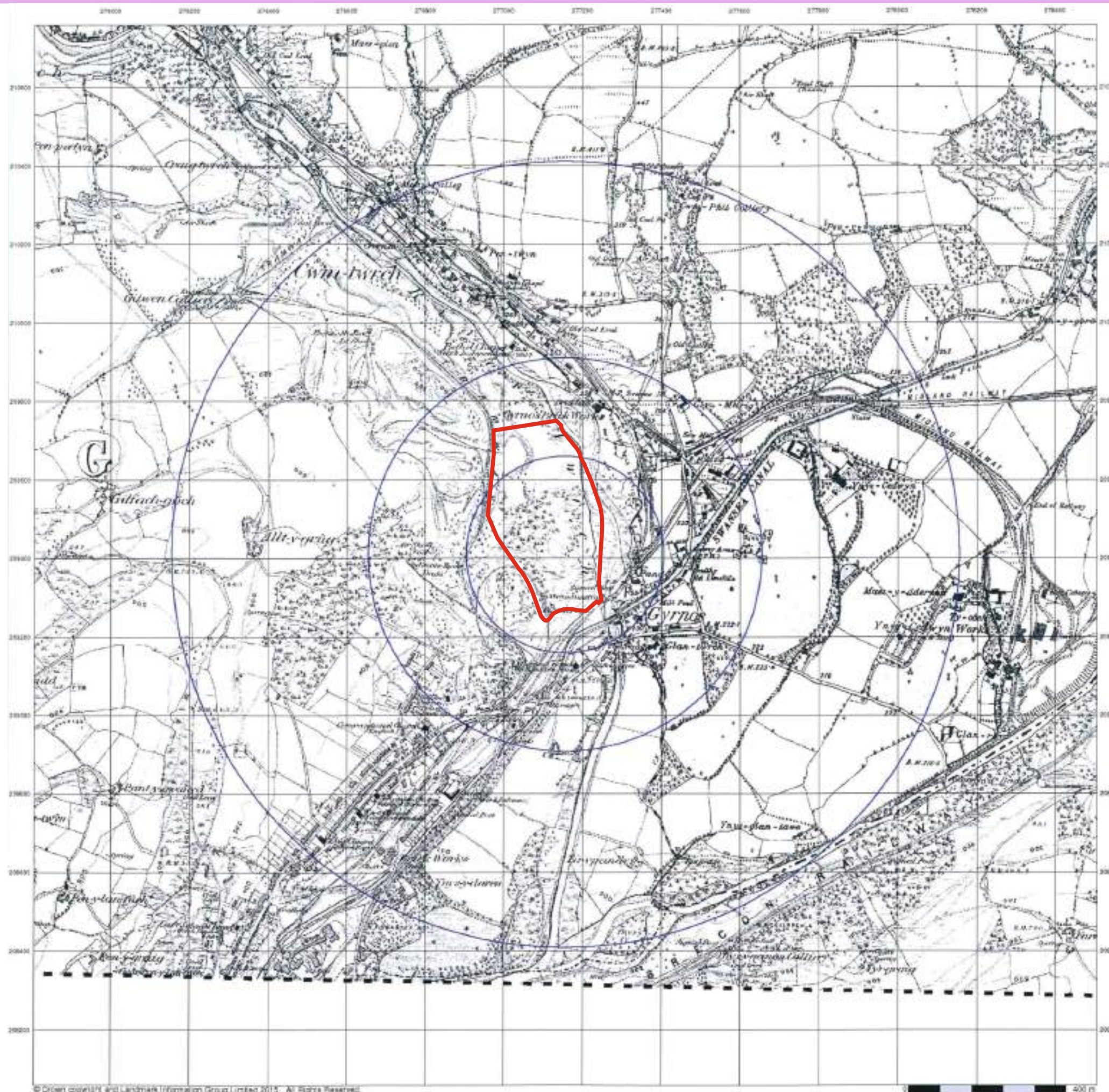


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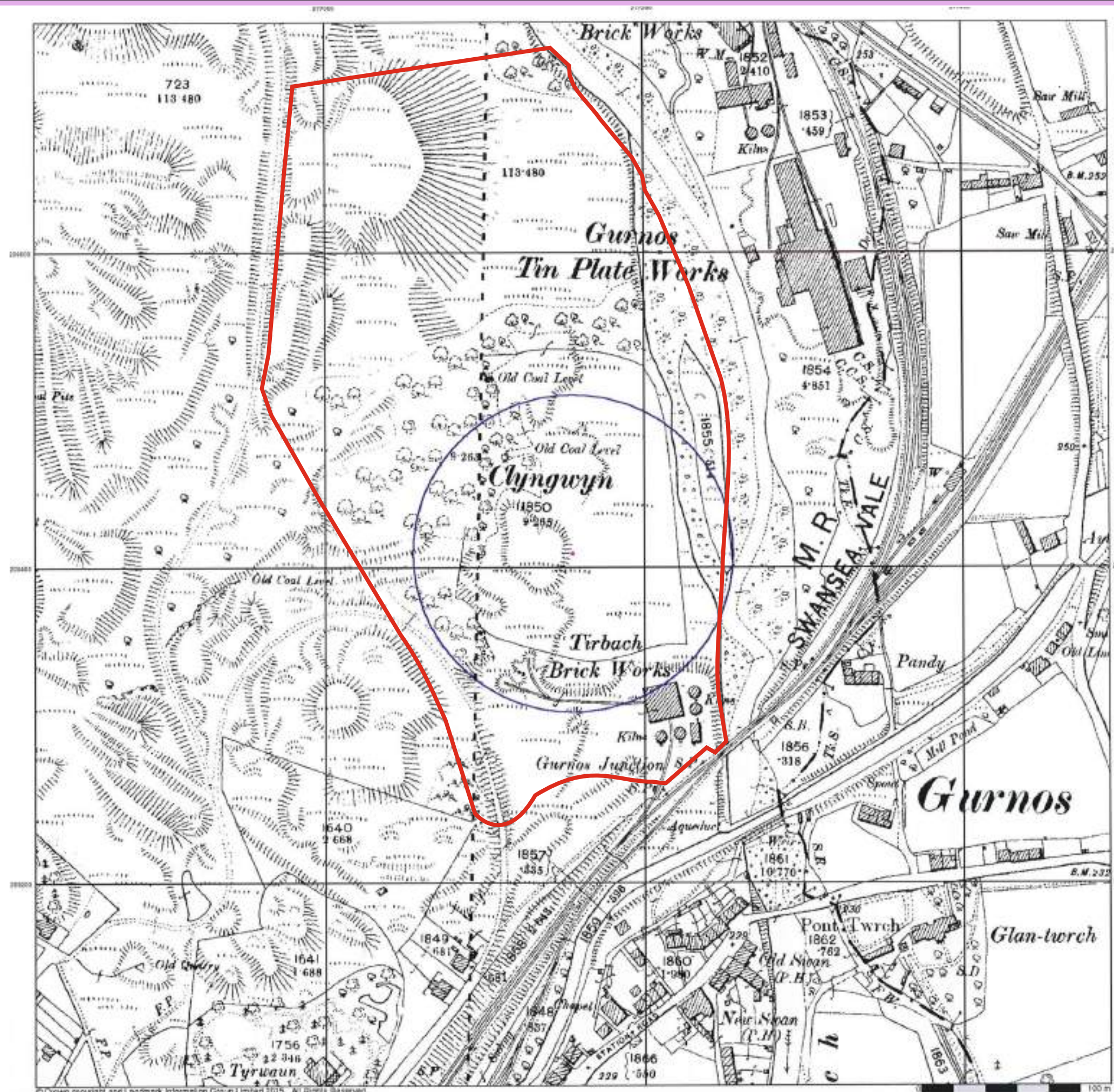
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Extract from Ordnance Survey Sheet 1899.

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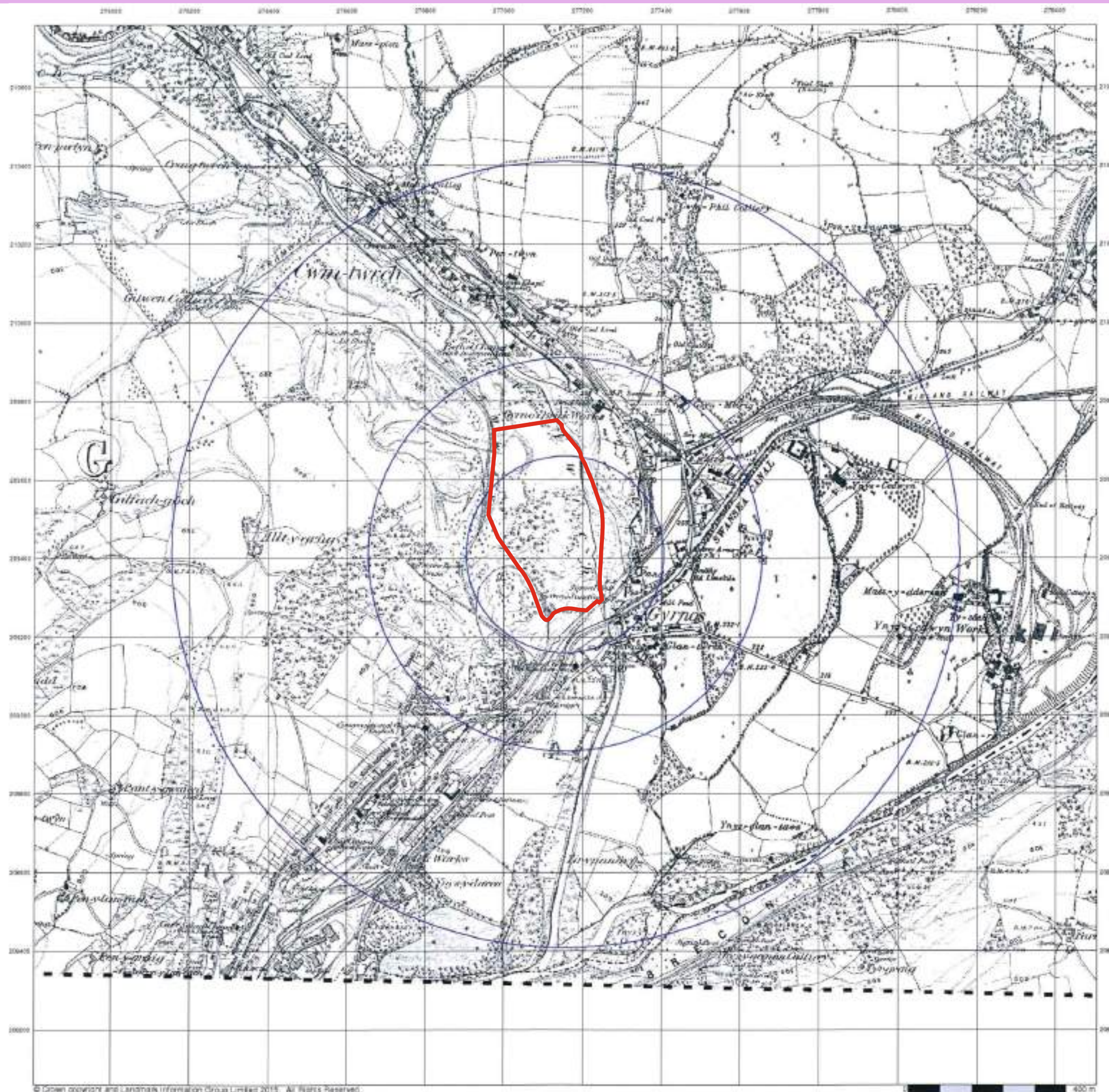
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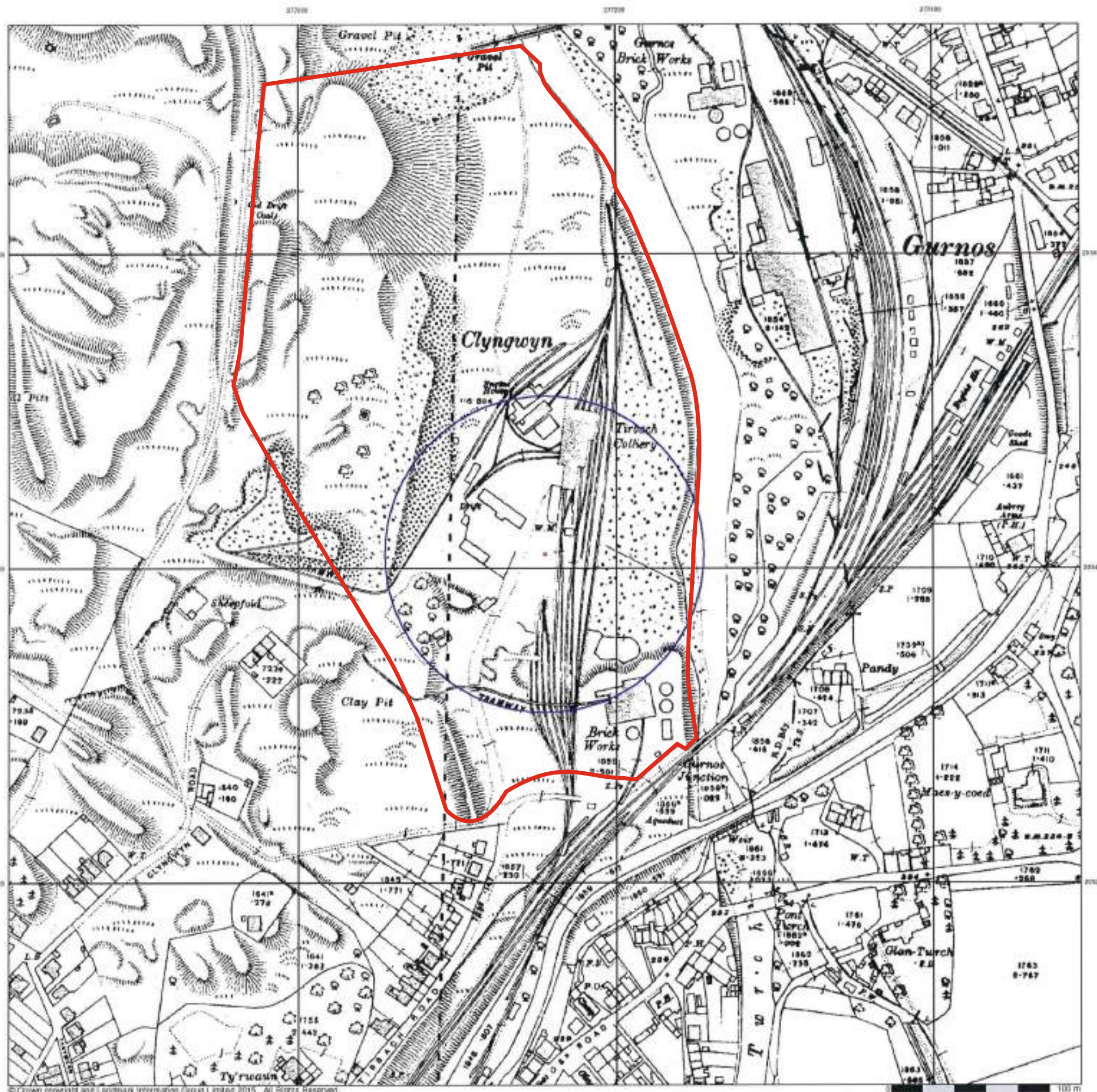
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Extract from Ordnance Survey Sheet 1918.

Plan Scale: 1:2,500.

Key to Symbols:

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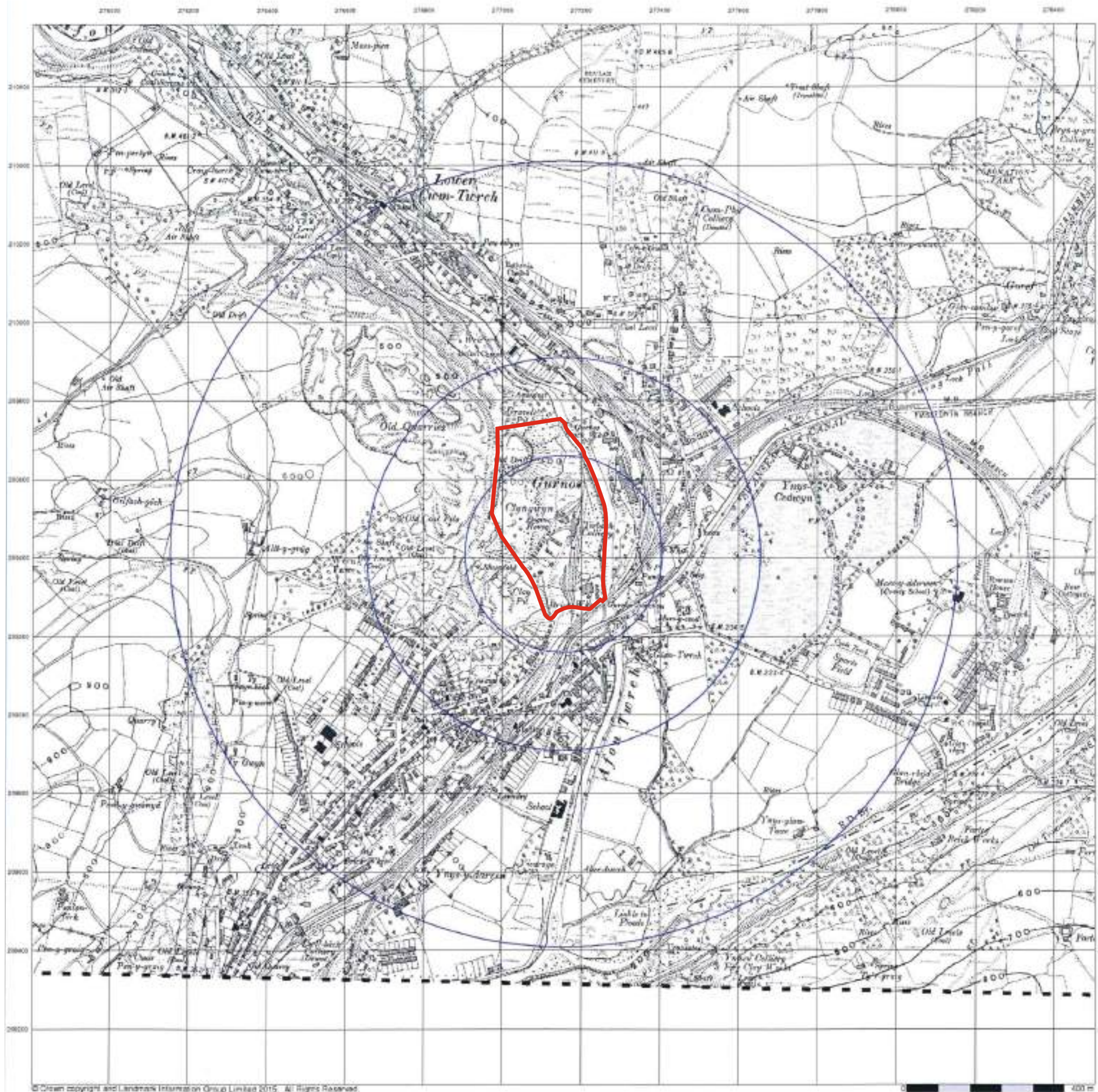
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Extract from Ordnance Survey Sheet 1921.

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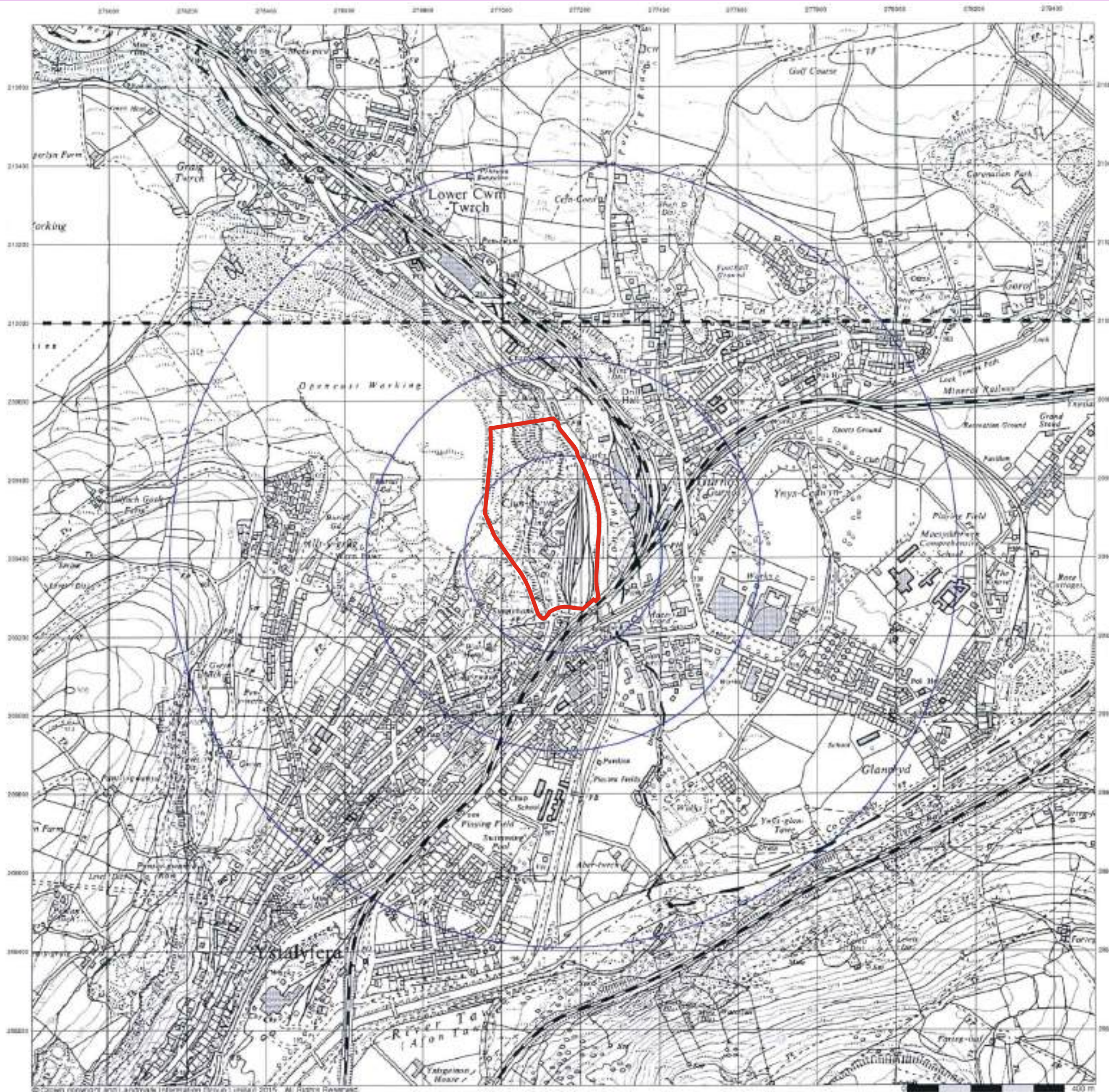
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Study on Land at
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Extract from Ordnance Survey Sheet 1965.

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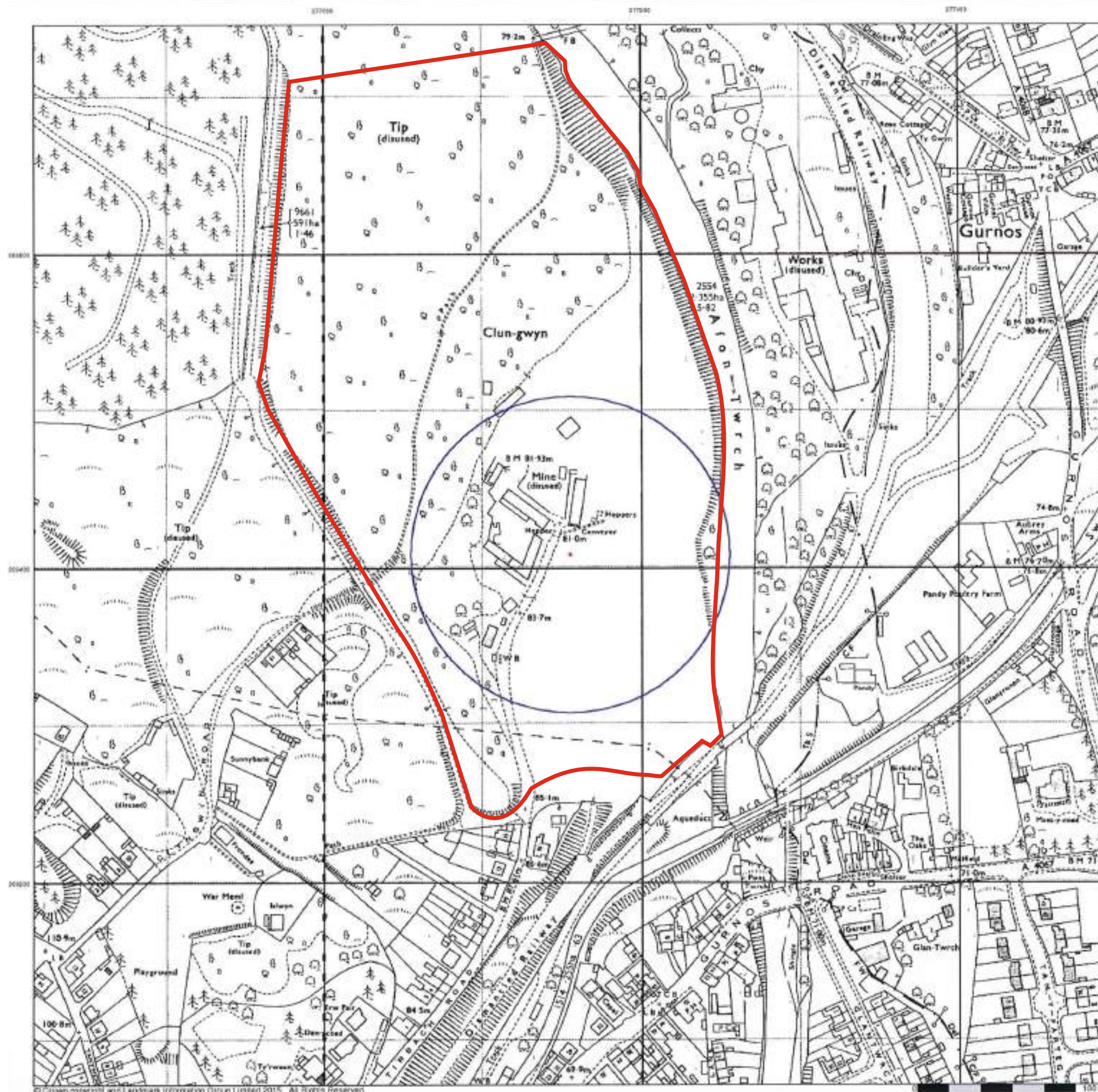
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Study on Land at
Former Tirbach Washery Site, Ystalyfera.

Extract from Ordnance Survey Sheet 1971.

Plan Scale: 1:2,500.

Key to Symbols:

— Approximate Site Boundary.

Note:

North is at top of plan.

Locations are approximate
and should not be scaled.

Data supplied by:



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Drawing No: BC/MB/10.17.03.13.

*Extract from Ordnance
Survey Sheet 1993.*

Key to Symbols:

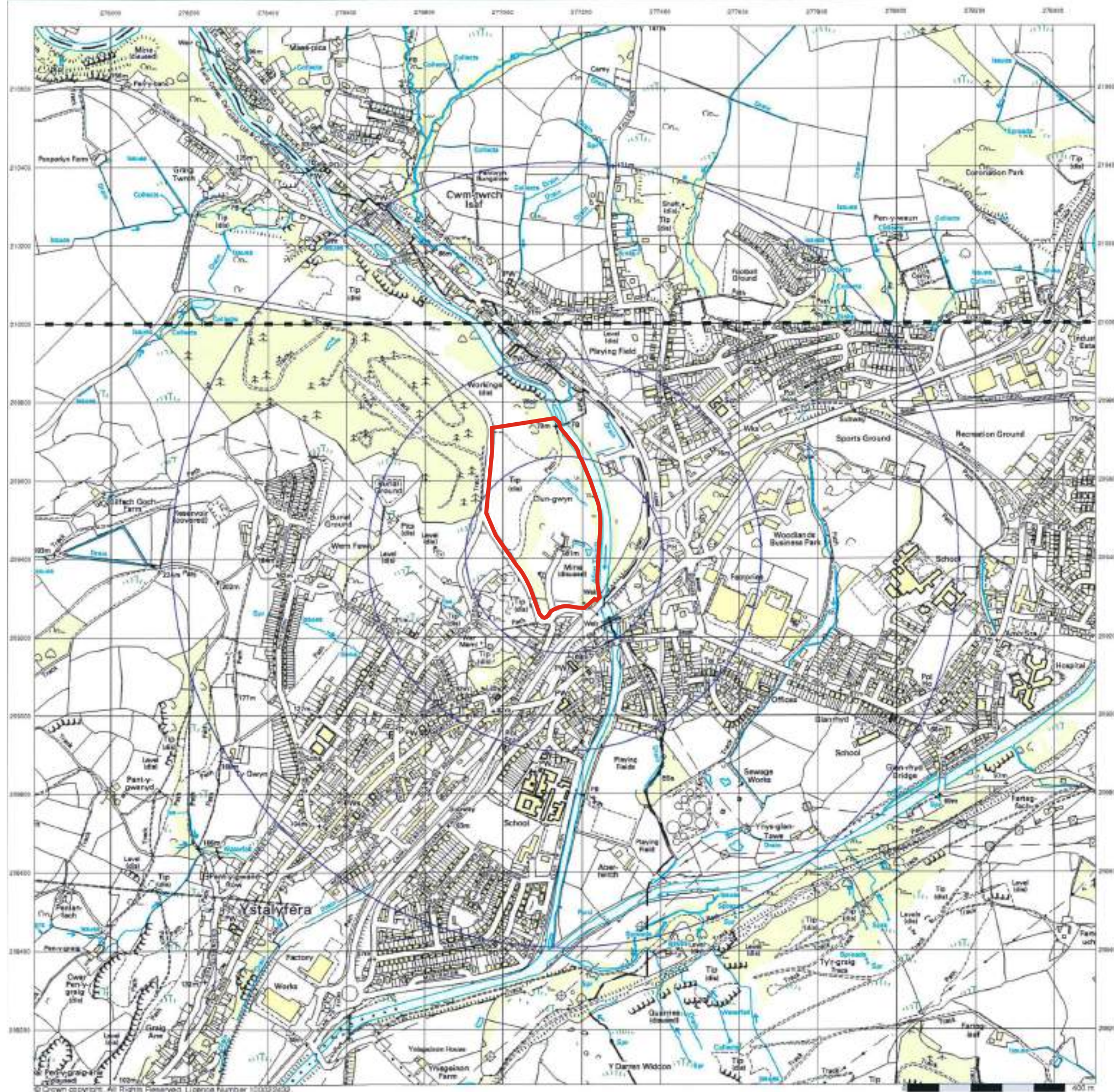
Note:

*Locations are approximate
and should not be scaled.*



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Geologists Working With The Environment.....



Study on Land at
Former Tirbach Washery Site, Ystalyfera.

Extract from Ordnance Survey Sheet 2000.

Plan Scale: 1:10,000.

Key to Symbols:

— Approximate Site Boundary.

Note:

North is at top of plan.

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Drawing No: BC/MB/10.17.03.15.

Study on Land at
Former Tirbach Washery Site, Ystalyfera.

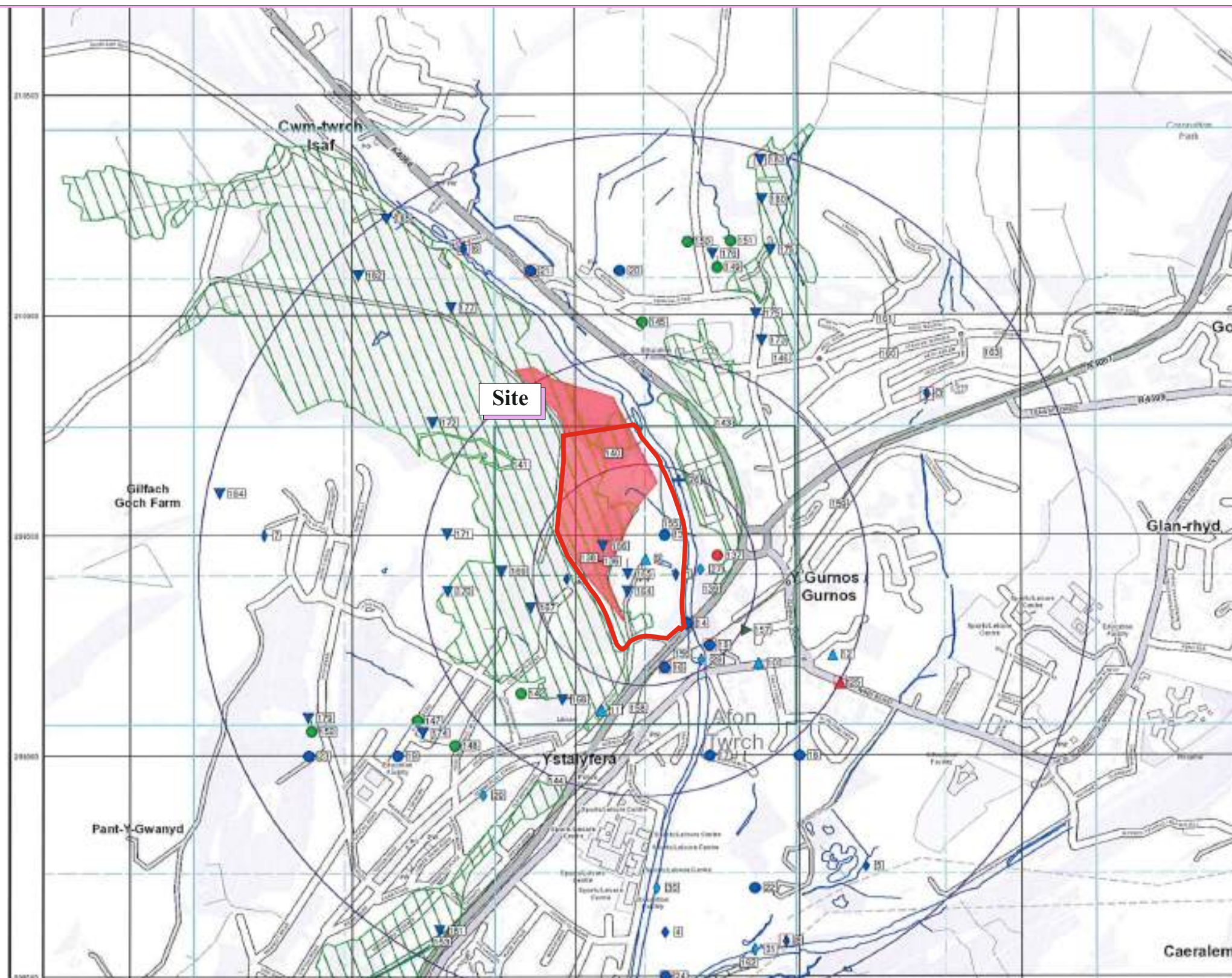
Environmental Review Plan.

Plan Scale: 1:10,000.

Key to Symbols:



Approximate Position of Site.



Note:

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and should not be scaled.

Data supplied by:



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Geologists Working With The Environment....

General

- Specified Site
- Bearing Reference Point
- Buffer (1000m)
- Reference Number
- Several of Type at Location

Waste

- Point Location of BGS Recorded Landfill Site
- BGS Recorded Landfill Site
- Integrated Pollution Control Registered Waste Site
- Licensed Waste Management Facilities (Landfill)
- Point Location of Local Authority Recorded Landfill Site
- Local Authority Recorded Landfill Site
- Registered Landfill Site
- Point Location of Registered Waste Transfer Site
- Registered Waste Transfer Site
- Point Location of Registered Waste Treatment or Disposal Site
- Registered Waste Treatment or Disposal Site

Agency and Hydrological

- Air Pollution Control
- Air Pollution Control Enforcement
- Point Location of Contaminated Land Register Entry or Notice
- Contaminated Land Register Entry or Notice
- Discharge Consent
- Enforcement Of Prohibition Notice
- Integrated Pollution Control
- Integrated Pollution Prevention Control
- Pollution Incident to Controlled Waters
- Prosecution Relating to Authorised Processes
- Prosecution Relating to Controlled Waters
- Red List Discharge Consent
- Registered Radioactive Substance
- Water Abstraction

Hazardous Substances

- COMAH Site
- Explosive Site
- NIHNS Site
- Planning Hazardous Substance Consent
- Planning Hazardous Substance Enforcement

Geological

- BGS Borehole
- BGS Recorded Mineral Site

Industrial Land Use

- Contemporary Trade Directory Entry
- Fuel Station Entry

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Drawing No: BC/MB/10.17.03.16.

Study on Land at
Former Tirbach Washery Site, Ystalyfera.

Plan of Recorded Disused Mine Entries.

Plan Scale: 1:2,500.

Key to Symbols:

- Approximate Development Boundary.
- Other Land in Client's Control.
- Approximate Extent of Buildable Area.
- ⊕ Approximate Position of Disused Shaft.
- ⇨ Approximate Position of Disused Adit that Could Affect the Development.
- ⇨ Approximate Position of Disused Adit Beyond the Development.

Notes:

North is at top of plan.

*Locations are approximate
and should not be scaled.*

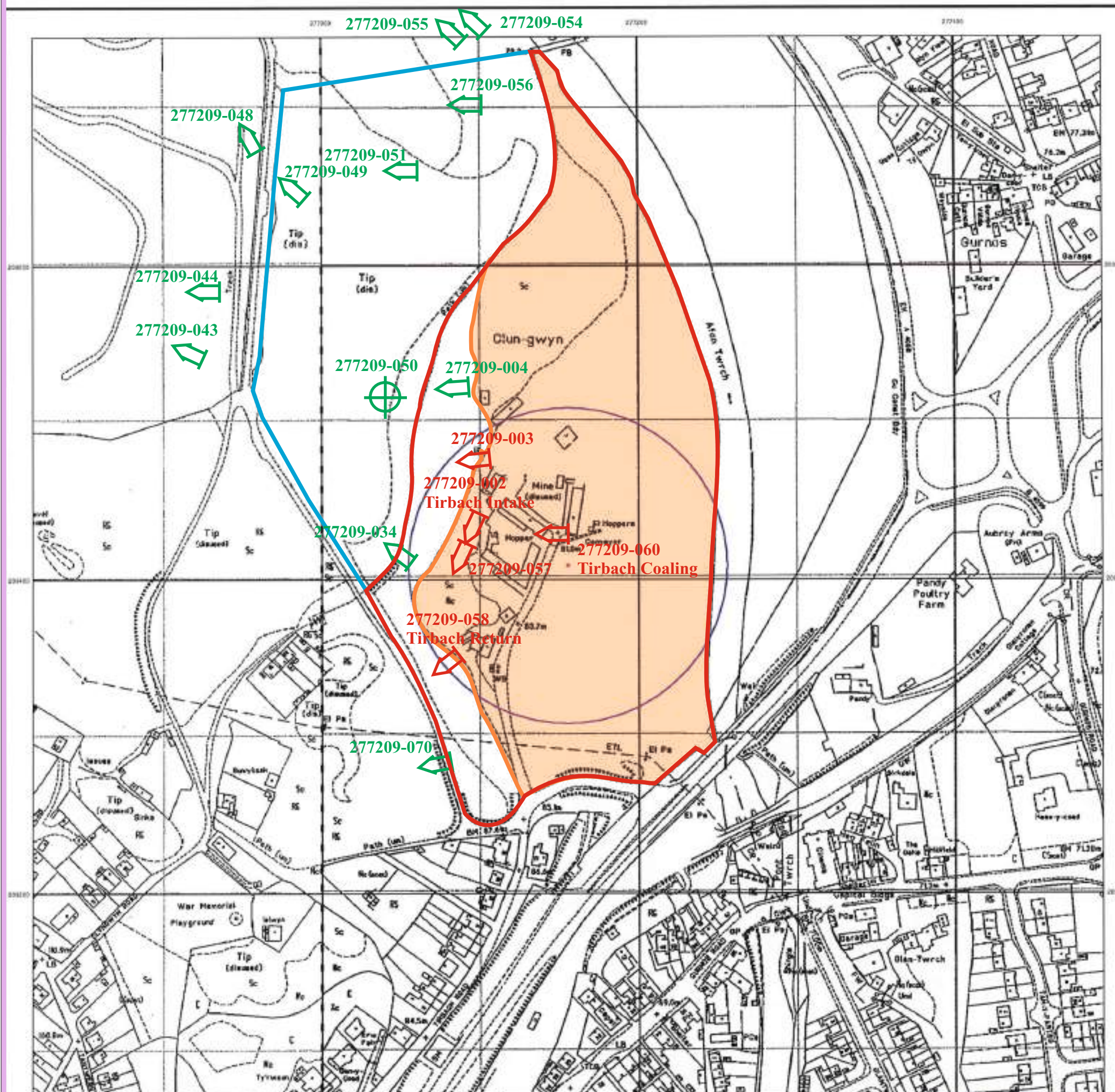
© Crown Copyright Reserved

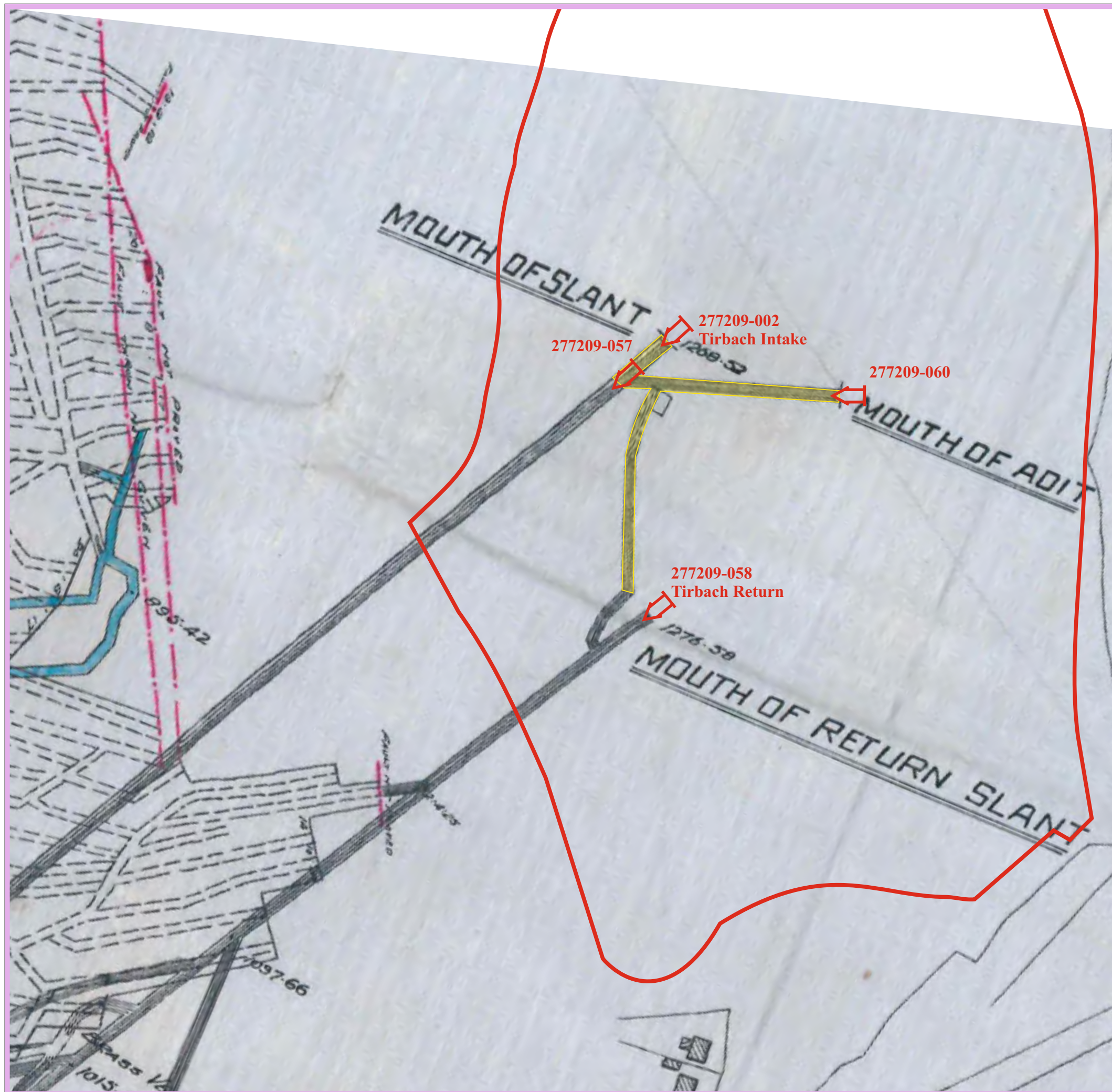


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Drawing No: BC/MB/10.17.03.18.





Study on Land at
Former Tirbach Washery Site, Ystalyfera.

Extract from Tirbach Colliery, Lower Vein, Abandonment Plan.

Plan Scale: 1:1,250.

Key to Symbols:

-  Approximate Development Site Boundary.
-  Approximate Position of Disused Adit.
-  Lengths of Drivages That Were or Are Above Ground.

Notes:

North is at top of plan.

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Drawing No: BC/MB/10.17.03.19.

Study on Land at
Former Tirbach Washery Site, Ystalyfera.

Site Investigation Plan.

Plan Scale: 1:2,500.

Key to Symbols:

- Site Investigation Boundary.
- Approximate Position of Cable Tool Borehole.
- Approximate Position of Trial Pit.
- Approximate Position of Water Sample.
- Approximate Buildable Area.
- Area affected by Japanese Knotweed.

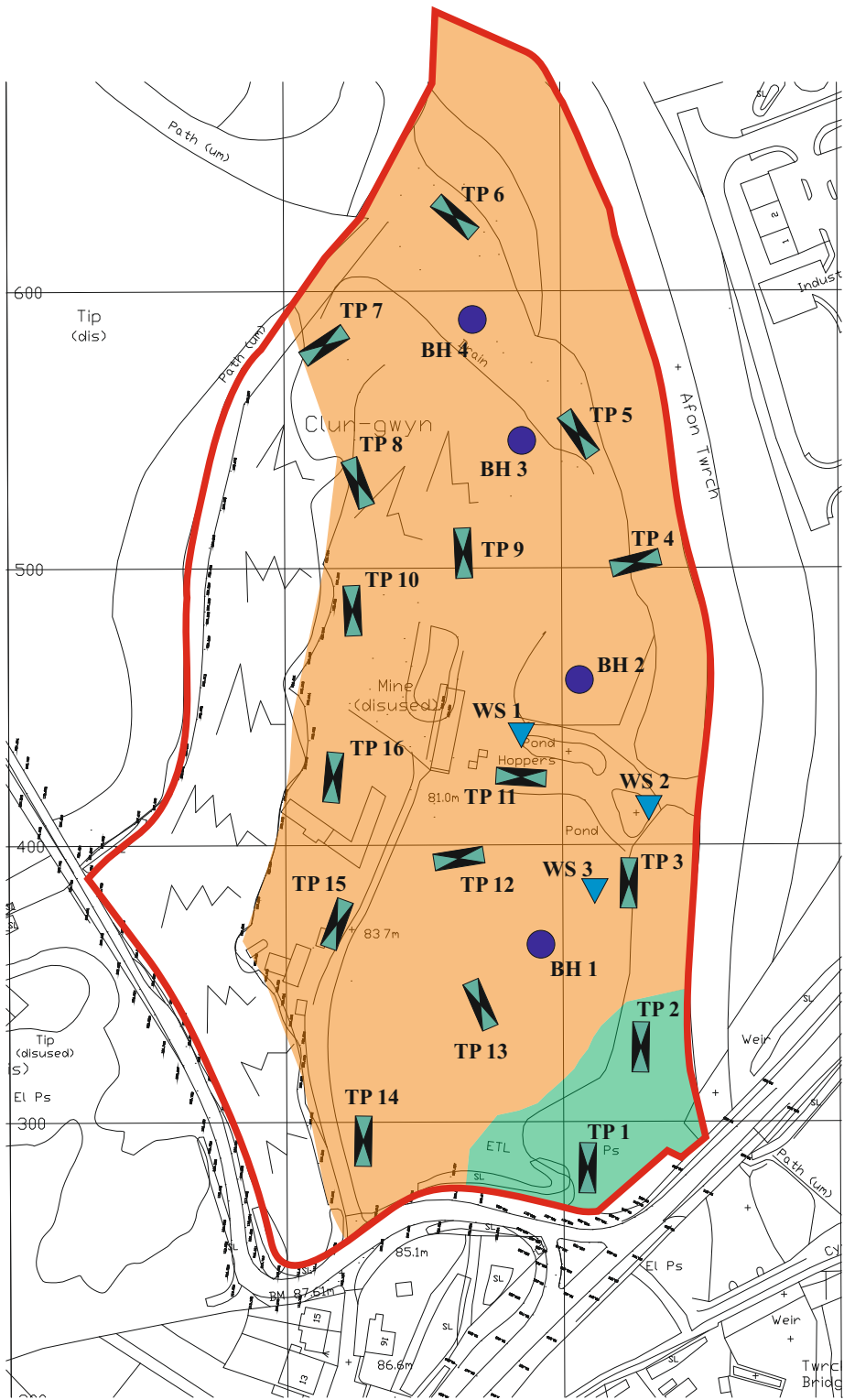
Note:
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APPENDIX I

**COPY OF COAL AUTHORITY'S
REPORT, REF NO:
51001696366001**



*The Enterprise Centre,
Merthyr Industrial Park,
Pentrebach,
Merthyr Tydfil,
South Wales,
CF48 4DR.*

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Geologists Working With The Environment...



The Coal
Authority

Resolving the **impacts** of mining

CON29M Non-Residential Mining Report

TIRBACH ROAD
YSTALYFERA
NEATH PORT TALBOT
SA9 2HX

Date of enquiry: 15 November 2017
Date enquiry received: 15 November 2017
Issue date: 15 November 2017

Our reference: 51001696366001
Your reference: BC/MB/10.17.03



CON29M Non-Residential Mining Report

This report is based on, and limited to, the records held by the Coal Authority and the Cheshire Brine Subsidence Compensation Board's records, at the time we answer the search.

Client name

Blandford Consulting

Enquiry address

TIRBACH ROAD, YSTALYFERA, NEATH PORT
TALBOT, SA9 2HX

How to contact us

0345 762 6848 (UK)
+44 (0)1623 637 000 (International)

200 Lichfield Lane
Mansfield
Nottinghamshire
NG18 4RG

www.groundstability.com

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 /coalauthority



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	Yes
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	Yes
12	Withdrawal of support	No
13	Working facilities order	No
14	Payments to owners of former copyhold land	No
15	Information from the Cheshire Brine Subsidence Compensation Board	No

Further recommended reports
Mine entry interpretive report
Mine entry plan and data sheets
Surface hazard incident report

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 5 seams of coal at shallow to 140m depth, and last worked in 1939.

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 plans to grant a licence to remove coal using 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

Within, or within 20 metres of, the boundary of the property there are 17 mine entries, the approximate positions of which are shown on the enquiry boundary plot.

Our records disclose the following information:

276209-048. No treatment details.

277209-051. No treatment details.

277209-002. Hole in the brick portal was made good with blockwork to secure the mine entry. These works were carried out by consultants acting on behalf of the Coal Authority..

277209-003. The portal entrance to this adit has been sealed by stowing with approximately 32 tonnes clean stone and 16 tonnes clay.

277209-060. No treatment details.

277209-070. No treatment details.

277209-056. No treatment details.

277209-049. No treatment details.

277209-034. No treatment details.

276209-044. No treatment details.

277209-050. No treatment details.

276209-043. No treatment details.

277209-057. Hole in the brick portal was made good with blockwork to secure the mine entry. These works were carried out by consultants acting on behalf of the Coal Authority..

277209-004. No treatment details.

277209-055. This adit was infilled to an unknown specification in May 1978.

277209-058. This adit has been sealed to an unknown specification approximately 5 metres inbye of the entrance. In 2001 the adit portal was secured with blockwork by Wardell Armstrong acting on behalf of the Coal Authority.

277209-054. This adit is assumed to be sealed to an unknown specification approximately 5 metres inbye of the entrance which was filled with rubble in October 1977.

There may however be mine entries/additional mine entries in the local area which the Coal Authority has no knowledge of.

For an additional fee, the Coal Authority can provide a Mine Entry Interpretive Report. The report will provide a separate assessment for the mine entry/entries referred to in this report. It gives an opinion on the likelihood of mining subsidence damage caused from ground movement as a consequence of the mine entry/entries. It also gives details of the remedies available for subsidence damage where the mine entry was sunk in connection with coal mining.

Please note that it may not be possible to produce a report if the main building to the property cannot be identified from Coal Authority plans (ie for development sites and new build).

For further advice on how to order this additional information please visit www.groundstability.com.

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 31st 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 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.

15. Information from the Cheshire Brine Subsidence Compensation Board

The property lies outside the Cheshire Brine Compensation District.

Comments on the Coal Authority information

The Coal Authority own the copyright in this report and the information used is protected by our database right.

The boundary plot shows the approximate location of the disused mine entry/entries referred to in this report. For reasons of clarity, mine entry symbols may not be drawn to the same scale as the plan.

Property owners have the benefit of statutory protection (under the Coal Mining Subsidence Act 1991*). This contains provision for the making good, to the reasonable satisfaction of the owner, of physical damage from disused coal mine workings including disused coal mine entries. A leaflet setting out the rights and obligations of either the Coal Authority or other responsible persons under the 1991 Act can be obtained by visiting www.groundstability.com.

If you wish to discuss the relevance of any of the information contained in this report, you should seek the advice of a qualified mining engineer or surveyor. If you or your advisor wish to examine the source plans from which the information has been taken, these are available to view, free of charge, at our Head Office in Mansfield. To book an appointment please ring 01623 637225. Should you or your advisor wish to carry out a physical investigation that may enter, disturb or interfere with any disused mine entry, prior permission of the owner must be sought. For coal mine entries, the owner will normally be the Coal Authority.

The Coal Authority, regardless of responsibility and in conjunction with other public bodies, provide an emergency call out facility in coalfield areas to assess the public safety implications of mining features (including disused mine entries). Our emergency telephone number is 01623 646333.

*Note, this Act does not apply where coal was worked or gotten by virtue of the grant of a gale in the Forest of Dean, or any other part of the Hundred of St. Briavels in the county of Gloucester.

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

Information provided by the Coal Authority in this report is compiled in response to the Law Society's Con29M Coal Mining and Brine Subsidence Claim enquiries. The said enquiries are protected by copyright owned by the Law Society of 113 Chancery Lane, London WC2A 1PL. Please note that Brine Subsidence Claim enquiries are only relevant for England and Wales. This report is prepared in accordance with the Law Society's Guidance Notes 2006, the User Guide 2006 and the Coal Authority and Cheshire Brine Board's Terms and Conditions applicable at the time the report was produced.

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Alternative formats

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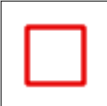
Enquiry boundary

Key

Approximate position of enquiry boundary shown

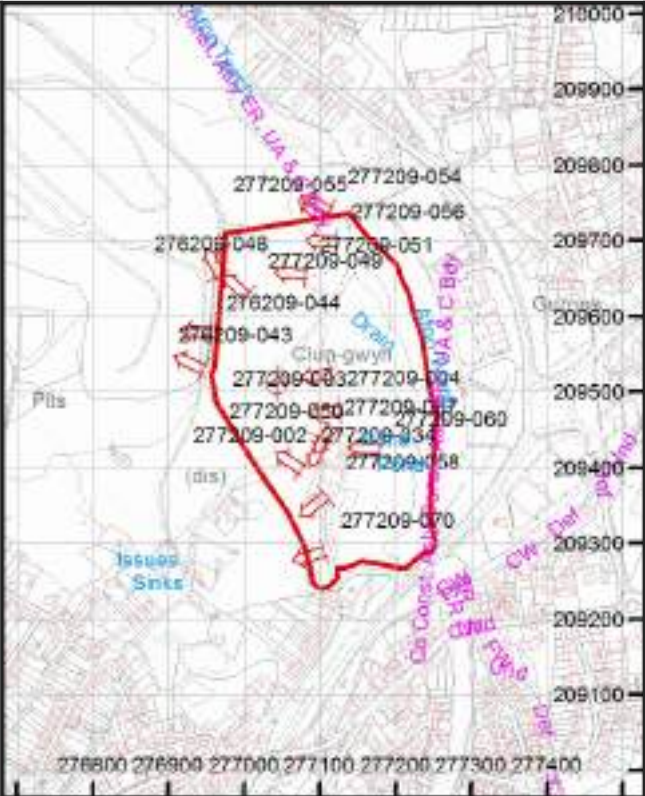
Disused adit

Disused mineshaft









How to contact us

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Issued by	The Coal Authority 200 Lichfield Lane Mansfield Nottinghamshire NG18 4RG
Tax point date	15 November 2017
Issued to	BLANDFORD CONSULTING MERTHYR TYDFIL INDUSTRIAL PARK PENTREBACH MERTHYR TYDFIL MID GLAMORGAN CF48 4DR
Property search for	TIRBACH ROAD YSTALYFERA NEATH PORT TALBOT SA9 2HX
Reference number	51001696366001
Date of issue	15 November 2017
Cost	£78.30
VAT @ 20%	£15.66
Total received	£93.96
VAT registration	598 5850 68

APPENDIX II

GEOTECHNICAL TRIAL PIT LOGS, TRIAL PITS 3 - 16



*The Enterprise Centre,
Merthyr Industrial Park,
Pentrebach,
Merthyr Tydfil,
South Wales,
CF48 4DR.*

BLANDFORD CONSULTING

Geologists Working With The Environment...

PROJECT: Former Tir Bach Washery

CLIENT: HANSAK Ltd

Trial Pit: 3

Equipment Used: JCB 3CX



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Geologists Working With The Environment....

Depth	Description	Legend	Backfill/ Installations
1 1.30m	MADE GROUND Moderately compact dark grey and mottled, black sandy angular to sub-angular, fine to coarse GRAVEL and COBBLE of shale and isolated brick, with isolated timber and cable/wire. Sand is fine. Inconsistent and irregular clay bind noted.		1.30m
1.70m	MADE GROUND Loose, dark grey, angular to sub-angular, fine to coarse GRAVEL and COBBLE of shale, brick and concrete with isolated timber and cable/wire.		0.40m
2 3	MADE GROUND Very soft to soft, silty, sandy CLAY . Sand is fine (coal).		>1.80m
4	Trial Pit terminated at 3.50m.		

Stability: No shoring installed. Stable below 1.30m

Dimensions: Length 0.90m, width 3.50m, depth 3.50m

Samples Collected: Tub, jar, vial
@ 0.10m, 0.40m & 0.70m

Groundwater: Moderate at 1.70m

Comments:

Orientation:

Date: 25th January 2018

Engineer: Dr Malcolm Blandford

Report No: BC/MB/10.17.03.

Photographic Plate: Trial Pit 3



Geologists Working With The Environment...

Report No. BC/MB/10.07.03

Study on Land at
Former Tir Bach Washery.



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PROJECT: Former Tir Bach Washery

CLIENT: HANSAK Ltd

Trial Pit: 4

Equipment Used: JCB 3CX



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SOUTH WALES,
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Geologists Working With The Environment....

Depth	Description	Legend	Backfill/ Installations
1 1.30m	MADE GROUND Moderately compact darkish grey and grey clayey, silty sandy, sub-angular, fine to coarse (occasionally tabular and elongate) GRAVEL of shale/mudstone with isolated brick with some cobble content. Sand is fine to coarse. Cobbles are angular of mudstone, shale and occasional brick.		1.30m
2	MADE GROUND Loose darkish grey and grey clayey, silty, sandy sub-angular fine to coarse (occasionally tabular and elongate) GRAVEL of shale/mudstone with isolated brick with some cobble content and much soft clay bind. Sand is fine to coarse. Cobbles are angular of mudstone/shale and occasional brick. Fragments of steel, timber, wire and clay pipe present. Isolate fabric also present.		1.40m
3 4	Trial Pit terminated at 2.70m.		

Stability: No shoring installed

Dimensions: Length 1.00m, width 2.00m, depth 2.70m

Samples Collected: Tub, jar, vial
@ 0.10m, 0.40m & 0.70m

Groundwater: None encountered

Comments:

Orientation:

Date: 26th January 2018

Engineer: Dr Malcolm Blandford

Report No: BC/MB/10.17.03.

Photographic Plate: Trial Pit 4



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Report No. BC/MB/10.07.03

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PROJECT: Former Tir Bach Washery

CLIENT: HANSAK Ltd

Trial Pit: 5

Equipment Used: JCB 3CX



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Geologists Working With The Environment....

Depth	Description	Legend	Backfill/ Installations
1 2 3 4	MADE GROUND Moderately compact grey mottled, orangish brown clayey, sandy, angular to sub angular (occasionally tabular and elongate) fine to coarse GRAVEL of shale/mudstone and brick with much cobble content. Sand is fine to coarse. Cobbles are angular of mudstone, shale and concrete. Irregular pipe, plastic and steel fragments.		

Stability: No shoring installed

Dimensions: Length 1.00m, width 3.00m, depth 3.30m

Samples Collected: Tub, jar, vial
@ 0.10m, 0.40m & 0.70m

Groundwater: None encountered

Comments:

Orientation:

Date: 26th January 2018

Engineer: Dr Malcolm Blandford

Report No: BC/MB/10.17.03.

Photographic Plate: Trial Pit 5



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Report No. BC/MB/10.07.03

Study on Land at
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BLANDFORD CONSULTING

PROJECT: Former Tir Bach Washery

CLIENT: HANSAK Ltd

Trial Pit: 6

Equipment Used: JCB 3CX



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Geologists Working With The Environment....

Depth	Description	Legend	Backfill/ Installations
1	MADE GROUND Moderately compact darkish grey and grey mottled orangish, brown, silty, clayey, gravelly CLAY with much cobble content. Gravel is angular to sub angular (occasionally tabular and elongate) fine to coarse of shale/mudstone and coal. Cobbles are angular of mudstone and shale.		
2			
3	Trial Pit terminated at 2.90m.		
4			

Stability: No shoring installed

Dimensions: Length 1.00m, width 2.80m, depth 2.90m

Samples Collected: Tub, jar, vial
@ 0.10m, 0.40m & 0.70m

Groundwater: None encountered

Comments:

Orientation:

Date: 26th January 2018

Engineer: Dr Malcolm Blandford

Report No: BC/MB/10.17.03.

Photographic Plate: Trial Pit 6



Geologists Working With The Environment...

Report No. BC/MB/10.07.03

Study on Land at
Former Tir Bach Washery.



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MERTHYR TYDFIL,
SOUTH WALES,
CF48 4DR.

BLANDFORD CONSULTING

PROJECT: Former Tir Bach Washery

CLIENT: HANSAK Ltd

Trial Pit: 7

Equipment Used: JCB 3CX



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MERTHYR TYDFIL,
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Geologists Working With The Environment....

Depth	Description	Legend	Backfill/ Installations
1	MADE GROUND Moderately compact darkish grey and grey silty, clayey, sandy, gravelly CLAY with much cobble content. Gravel is angular to sub-angular (occasionally tabular and elongate) fine to coarse of shale/mudstone, coal and brick with much cobble content. Sand is fine to coarse. Cobbles are angular of mudstone, shale and concrete. Irregular pipe, plastic and steel fragments.		
2			
3			
4	Trial Pit terminated at 3.50m.	>3.50m	

Stability: No shoring installed

Dimensions: Length 1.10m, width 2.90m, depth 3.50m

Samples Collected: Tub, jar, vial
@ 0.10m, 0.40m & 0.60m

Groundwater: None encountered

Comments:

Orientation:

Date: 26th January 2018

Engineer: Dr Malcolm Blandford

Report No: BC/MB/10.17.03.

Photographic Plate: Trial Pit 7



Geologists Working With The Environment...

Report No. BC/MB/10.07.03

Study on Land at
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PROJECT: Former Tir Bach Washery

CLIENT: HANSAK Ltd

Trial Pit: 8

Equipment Used: JCB 3CX



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SOUTH WALES,
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Geologists Working With The Environment....

Depth	Description	Legend	Backfill/ Installations
1 1.20m	MADE GROUND Moderately compact darkish grey and grey silty, clayey, sandy, gravelly CLAY with much cobble content. Gravel is angular to sub-angular (occasionally tabular and elongate) fine to coarse of shale/mudstone and brick with much cobble content. Sand is fine to coarse. Cobbles are angular of mudstone, shale and concrete.		1.20m
2	MADE GROUND Moderately compact becoming loose, darkish grey and grey occasional mottled yellowish brown, angular to sub-angular (regularly tabular and elongate) fine to coarse GRAVEL of shale/mudstone with some coal and with some (occasionally much) cobble content. Cobbles are sub-angular of mudstone/shale. Isolate boulder of shale/mudstone.		>1.70m
3 4	Trial Pit terminated at 2.90m.		

Stability: No shoring installed

Dimensions: Length 1.00m, width 3.00m, depth 2.90m

Samples Collected: Tub, jar, vial
@ 0.10m, 0.40m & 0.60m

Groundwater: None encountered

Comments:

Orientation:

Date: 26th January 2018

Engineer: Dr Malcolm Blandford

Report No: BC/MB/10.17.03.

Photographic Plate: Trial Pit 8



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Study on Land at
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PROJECT: Former Tir Bach Washery

CLIENT: HANSAK Ltd

Trial Pit: 9

Equipment Used: JCB 3CX



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Depth	Description	Legend	Backfill/ Installations
1	MADE GROUND Very compact darkish grey, clayey, sandy angular to sub-angular, fine to coarse (occasionally tabular and elongate) GRAVEL and COBBLE of shale/mudstone, sandstone and concrete with timber, steel, wire, cable, rubber, fabric and plastic. Sand is fine to coarse.		
2			
2.30		2.30m	
	MADE GROUND Moderately compact darkish grey, clayey, sandy CLAY . Sand is fine to medium (predominantly medium) of coal.		
2.90		0.60m	
3	MADE GROUND Black fine to medium SAND of coal.		
		>0.30m	
	Trial Pit terminated at 3.20m.		
4			

Stability: No shoring installed

Dimensions: Length 1.00m, width 3.00m, depth 3.20m

Samples Collected: Tub, jar, vial
@ 0.10m, 0.40m & 0.60m

Groundwater: None encountered

Comments:

Orientation:

Date: 26th January 2018

Engineer: Dr Malcolm Blandford

Report No: BC/MB/10.17.03.

Photographic Plate: Trial Pit 9



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PROJECT: Former Tir Bach Washery

CLIENT: HANSAK Ltd

Trial Pit: 10

Equipment Used: JCB 3CX



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Depth	Description	Legend	Backfill/ Installations			
0.40m	MADE GROUND Loose reddish brown and orange sandy, angular fine to coarse GRAVEL and COBBLE of brick. Sand is fine to coarse.		0.40m			
0.70m	MADE GROUND Moderately to very compact darkish grey, black, darkish orange with yellowish mottling sandy angular to sub-angular fine to coarse GRAVEL of shale/mudstone with bands of clay bind. Sand is fine to coarse.		0.30m			
1	MADE GROUND Loose to moderately to very compact darkish grey, sandy, angular (regularly tabular, intermittently elongate) fine to coarse GRAVEL of shale/mudstone with bands of grey mottled yellowish brown clay bind. Sand is fine to coarse. Bind reduces with depth becoming a grey clay smear.					
2						
			>2.00m			
3	Trial Pit terminated at 2.70m.					
4						

Stability: No shoring installed

Dimensions: Length 1.10m, width 2.50m, depth 2.70m

Samples Collected: Tub, jar, vial
@ 0.10m, 0.50m & 0.60m

Groundwater: None encountered

Comments:

Orientation:

Date: 26th January 2018

Engineer: Dr Malcolm Blandford

Report No: BC/MB/10.17.03.

Photographic Plate: Trial Pit 10



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PROJECT: Former Tir Bach Washery

CLIENT: HANSAK Ltd

Trial Pit: 11

Equipment Used: JCB 3CX



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Depth	Description	Legend	Backfill/ Installations
1	MADE GROUND Very compact to moderately compact, dark grey to mid-grey clayey, silty, sub-angular (regularly tabular, occasionally elongate) fine to coarse (Predominantly medium to coarse) GRAVEL of shale, concrete and little coal (fine occasionally medium) with much cobble and boulder content. Cobbles are angular of brick, concrete and shale/mudstone. Boulders are of concrete with occasional timber, wire, steel and tile.		
2			
3	Trial Pit terminated at 2.00m.		
4			

Stability: No shoring installed

Dimensions: Length 1.10m, width 3.00m, depth 2.00m

Samples Collected: Tub, jar, vial
@ 0.10m, 0.30m & 0.60m

Groundwater: None encountered

Comments:

Orientation:

Date: 25th January 2018

Engineer: Dr Malcolm Blandford

Report No: BC/MB/10.17.03.

Photographic Plate: Trial Pit 11



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PROJECT: Former Tir Bach Washery

CLIENT: HANSAK Ltd

Trial Pit: 12

Equipment Used: JCB 3CX



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Depth	Description	Legend	Backfill/ Installations
1	MADE GROUND Moderately compact dark grey, silty, very gravelly CLAY with much cobble content. Gravel is sub-angular (regularly tabular) fine to coarse of shale, concrete and brick with occasional tile. Cobbles are angular of concrete and isolated brick. Steel cable, steel bar, wire and fabric present.		
2			
3			
4	Trial Pit terminated at 3.30m.	>3.30m	

Stability: No shoring installed

Dimensions: Length 0.90m, width 3.60m, depth 3.30m

Samples Collected: Tub, jar, vial
@ 0.10m, 0.40m & 0.60m

Groundwater: None encountered

Comments:

Orientation:

Date: 25th January 2018

Engineer: Dr Malcolm Blandford

Report No: BC/MB/10.17.03.

Photographic Plate: Trial Pit 12



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PROJECT: Former Tir Bach Washery

CLIENT: HANSAK Ltd

Trial Pit: 13

Equipment Used: JCB 3CX



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Depth	Description	Legend	Backfill/ Installations
1	MADE GROUND Moderately compact dark grey, silty, very gravelly CLAY with much cobble content. Gravel is sub-angular (regularly tabular) fine to coarse of shale, concrete and brick with occasional tile. Cobbles are angular of concrete and isolated brick.		
2			
3			
		>3.50m	
4	Trial Pit terminated at 3.50m.		

Stability: No shoring installed

Dimensions: Length 0.90m, width 3.50m, depth 3.50m

Samples Collected: Tub, jar, vial
@ 0.10m, 0.40m & 0.60m

Groundwater: None encountered

Comments:

Orientation:

Date: 25th January 2018

Engineer: Dr Malcolm Blandford

Report No: BC/MB/10.17.03.

Photographic Plate: Trial Pit 13



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PROJECT: Former Tir Bach Washery

CLIENT: HANSAK Ltd

Trial Pit: 14

Equipment Used: JCB 3CX



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Depth	Description	Legend	Backfill/ Installations
1 1.20m	MADE GROUND Moderately compact dark grey and grey, silty, very gravelly CLAY with much cobble content. Gravel is sub-angular (regularly tabular) fine to coarse of shale and isolated brick and coal (fine). Cobbles are angular of shale and isolated brick.	 0.70m	
2	MADE GROUND Loose dark grey and grey, clayey, silty, angular to sub-angular (regularly tabular) fine to coarse (predominantly medium to coarse) GRAVEL and COBBLE of shale and isolated brick and coal (fine).		
3			
4	Trial Pit terminated at 3.00m.		

Stability: No shoring installed

Dimensions: Length 0.90m, width 3.60m, depth 3.00m

Samples Collected: Tub, jar, vial
@ 0.10m, 0.30m & 0.60m

Groundwater: None encountered

Comments:

Orientation:

Date: 25th January 2018

Engineer: Dr Malcolm Blandford

Report No: BC/MB/10.17.03.

Photographic Plate: Trial Pit 14



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PROJECT: Former Tir Bach Washery

CLIENT: HANSAK Ltd

Trial Pit: 15

Equipment Used: JCB 3CX



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Depth	Description	Legend	Backfill/ Installations			
0.80m	MADE GROUND Moderately compact dark grey, clayey, silty, sub-angular (regularly tabular, occasionally elongate), fine to coarse GRAVEL of shale and isolated brick and coal (fine) with much cobble content. Cobbles are angular of shale and brick.		0.70m			
1	MADE GROUND Loose dark grey, clayey, silty, sub-angular (regularly tabular, occasionally elongate) fine to coarse GRAVEL of shale/mudstone with much cobble content and occasional boulder. Cobbles are angular to sub-angular of shale/mudstone. Boulders are angular of shale/mudstone.					
2						
3	Trial Pit terminated at 2.60m.					
4						

Stability: No shoring installed

Dimensions: Length 1.10m, width 3.00m, depth 2.60m

Samples Collected: Tub, jar, vial
@ 0.10m, 0.40m & 0.60m

Groundwater: None encountered

Comments:

Orientation:

Date: 25th January 2018

Engineer: Dr Malcolm Blandford

Report No: BC/MB/10.17.03.

Photographic Plate: Trial Pit 15



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PROJECT: Former Tir Bach Washery

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Trial Pit: 16

Equipment Used: JCB 3CX



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Depth	Description	Legend	Backfill/ Installations
1 2 2.00m	MADE GROUND Very compact dark grey, occasionally patchy, dark, orangish, brown, clayey, silty, angular to sub-angular (regularly tabular, occasionally elongate), fine to coarse GRAVEL and COBBLE of shale/mudstone, brick, concrete and a little coal (fine, occasionally medium) with much cobble and boulder content.		
2.50m	MADE GROUND Compact brown and dark grey, mottled, grey, very gravelly CLAY with much cobble content. Gravel is angular to sub-angular (regularly tabular, occasionally elongate) fine to coarse of shale/mudstone with some brick and concrete and a little coal (fine occasionally medium). Cobbles are angular (regularly tabular) of shale/mudstone.		
3 4	Trial Pit terminated at 2.50m.		

Stability: No shoring installed

Dimensions: Length 1.10m, width 2.30m, depth 2.50m

Samples Collected: Tub, jar, vial
@ 0.10m, 0.30m & 0.50m

Groundwater: None encountered

Comments:

Orientation:

Date: 25th January 2018

Engineer: Dr Malcolm Blandford

Report No: BC/MB/10.17.03.

Photographic Plate: Trial Pit 16



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APPENDIX III

GEOTECHNICAL LOGS OF CABLE TOOL PERCUSSIVE BOREHOLES 1 - 4



*The Enterprise Centre,
Merthyr Industrial Park,
Pentrebach,
Merthyr Tydfil,
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PROJECT: Former Tirbach Washery

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B.H: 1 Sheet 1 of 2

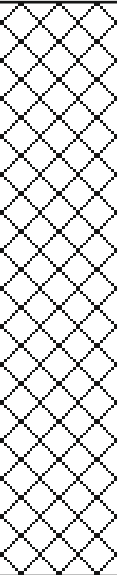
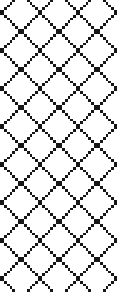
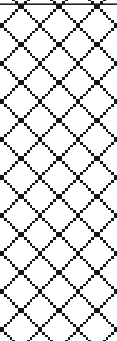
Final Depth: 12.8m **Hole Diameter:** 200mm



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Depth		Casing Depth	Water Depth	Samples/Tests					Horizon Depth	Legend	Date Commenced: 24/01/18		Date Completed: 29/01/18
				Depth(m)		No	Type	N Value			Geological Description		
				From	To								
1				0.00	1.00	1	B			MADE GROUND Moderately compact dark grey silty very gravelly CLAY with much cobble content. Gravel is sub-angular (regularly tabular) fine to coarse of shale, concrete and brick with occasional tile. Cobbles are angular of concrete and isolated brick.			
				1.00	1.45	2	SPT	15					
2				1.00	2.00	3	B						
				2.00	2.45	4	SPT	7					
3				2.00	3.00	5	B						
				3.00	3.45	6	SPT	8	3.80				
4				3.00	4.00	7	B						
				4.00	4.45	8	SPT	9	5.00				
5				4.00	5.00	9	B						
				5.00	5.30	10	SPT	5		MADE GROUND Very soft to soft silty sandy CLAY. Sand is fine (coal).			
6		5.40m, AM 25/01/18	5.00	6.50	11	B							
			6.50	6.95	12	SPT	34						
7			6.00	7.00	13	B							
			7.00	7.45	14	CPT	35	7.00					
8			7.50	8.00	15	B							
		7.80m, PM 26/01/18	8.00	8.45	16	CPT	3		MADE GROUND Black fine to medium SAND of coal with some to much gravel. Gravel is sub-angular medium to coarse of shale/mudstone.				
9			8.00	8.50	17	B							
			8.50	8.90	18	CPT	11						
10			8.50	9.50	19	B				9.30			
			9.50	9.95	20	SPT	9						
			9.50	10.50	21	B			MADE GROUND Dark grey mottled black silty, sandy, very gravelly CLAY with some (probably much) cobble content. Sand is fine. Gravel is sub-angular fine of shale/mudstone. Cobbles are sub-angular of shale/mudstone.				

Remarks: <i>Chiselling:</i>			<i>Groundwater Strikes:</i>			<i>Other:</i>		
1hr 12.50m to 12.80m			See above.			Dando Cable Tool drilling rig. Water added to assist.		
Engineers: Dr M. Blandford and A Jones			Contractor: Apex Drilling			Report No: BC/MB/10.17.03.		

PROJECT: Former Tirbach Washery

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B.H: 1 Sheet 2 of 2

Final Depth: 12.8m **Hole Diameter:** 200mm



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Depth	Casing Depth	Water Depth	Samples/Tests						Horizon Depth	Legend	Date Commenced: 24/01/18 Date Completed: 29/01/18	
			Depth(m)		No	Type	N Value	Geological Description				
			From	To								
11			10.50	10.95	22	CPT	11	10.5		Brown sandy sub-rounded (occasionally sub-angular) fine to coarse GRAVEL of mudstone with much cobble content. Cobbles are sub-angular to sub-rounded of mudstone.		
			10.50	11.80	23	B						
			11.80	12.25	24	CPT	31					
			12.50		25	B						
12												
13								12.8				
			<i>Borehole Terminated at 12.8m: failed to penetrate bedrock.</i>									
14												
15												
16												
17												
18												
19												
20												

Remarks: <i>Chiselling:</i> 1hr 12.50m to 12.80m			<i>Groundwater Strikes:</i> See above.			<i>Other:</i> Dando Cable Tool drilling rig. Water added to assist.		
Engineers: Dr M. Blandford and A Jones			Contractor: Apex Drilling			Report No: BC/MB/10.17.03		

PROJECT: Former Tirbach Washery

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B.H: 2 Sheet 1 of 1

Final Depth: 9.8m **Hole Diameter:** 200mm



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Depth	Casing Depth	Water Depth	Samples/Tests					Horizon Depth	Legend	Date Commenced: 29/01/18 Date Completed: 30/01/18	
			Depth(m)		No	Type	N Value			Geological Description	
			From	To							
1			0.00	1.00	1	B					MADE GROUND Moderately compact dark grey silty very gravelly CLAY with much cobble content. Gravel is sub-angular (regularly tabular) fine to coarse of shale concrete and brick with occasional tile. Cobbles are angular of concrete and isolated brick.
			1.00	1.45	2	CPT	7				
2			1.00	2.00	3	B					
			2.00	2.45	4	CPT	10				
3			2.00	3.00	5	B					
			3.00	3.45	6	CPT	13				
4			3.00	4.00	7	B		4.00			
			4.00	4.45	8	CPT	8				
5			4.00	5.00	9	B		5.00		MADE GROUND Firm occasionally stiff dark grey silty, sandy CLAY. Sand is fine of coal.	
			5.00	5.30	10	SPT	3				
6		6.30m standing 07.50 31/01/18	5.00	6.50	11	B				MADE GROUND Grey sub-angular fine to coarse GRAVEL of mudstone with much cobble content. Cobbles are sub-angular of mudstone.	
			6.50	6.95	12	SPT	12				
7		6.40m, 08.00 31/01/18	6.00	7.00	13	B		6.80		Brown sandy sub-angular to sub-rounded fine to coarse GRAVEL and COBBLE of mudstone and sandstone. Sand is fine to coarse.	
			7.00	7.45	14	CPT	36				
8		7.50m, Moderate	7.00	7.00	15	B					
			7.50	7.95	16	CPT	50				
9			7.50	8.60	17						
			8.60	9.05	18	CPT	50				
10			8.60	9.00	19						
			9.00	9.45	20	CPT	50				
			9.00	9.30	21						
			9.30	9.75	22	CPT	50/20				
			9.30	9.50	23						
			9.50	9.95	24	CPT	50				
			9.30	9.80	25	CPT	50	9.80		Borehole Terminated at 9.8m: failed to penetrate bedrock	

Remarks: <i>Chiselling:</i>			<i>Groundwater Strikes:</i>			<i>Other:</i>		
0.50hr 1.70m to 1.90m 0.50hr 7.60m to 9.80m			See above.			Dando Cable Tool drilling rig. Water added to assist.		
Engineers: Dr M. Blandford and A Jones			Contractor: Apex Drilling			Report No: BC/MB/10.17.03.		

PROJECT: Former Tirbach Washery

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B.H: 3 Sheet 1 of 2

Final Depth: 16.5m **Hole Diameter:** 200mm



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Depth	Casing Depth	Water Depth	Samples/Tests					Horizon Depth	Legend	Date Commenced: 01/02/18 Date Completed: 02/02/18	
			Depth(m)		No	Type	N Value			Geological Description	
			From	To							
1			0.00	1.00	1	B					MADE GROUND - Dark grey, silty, very gravelly CLAY with much cobble content. Gravel is angular to sub-angular (increasingly tabular with depth) fine to coarse of shale/mudstone. Cobbles are angular of mudstone..
			1.00	1.45	2	SPT	7				
2			1.00	2.00	3	B					
			2.00	2.45	4	SPT	15				
3			2.00	3.00	5	B					
			3.00	3.45	6	SPT	7				
4			3.00	4.00	7	B					
			4.00	4.45	8	SPT	7				
5			4.00	5.00	9	B					
			5.00	5.30	10	SPT	9				
6		5.20m, 07.50 01/02/18	5.00	6.50	11	B					
			6.50	6.95	12	SPT	6				
7			6.00	7.00	13	B		6.50		MADE GROUND - Dark grey and brown silty, very gravelly CLAY with much cobble content. Gravel is angular to sub-angular (increasingly tabular with depth) fine to coarse of shale/mudstone.Cobbles are angular of mudstone.	
			7.00	7.95	14	CPT	34				
8		7.50m, Moderate	7.50	9.00	15						
9											
			9.00	9.40	16	SPT					24
10			9.00	10.50	17	B					Blackish brown mottled orangish brown, silty, sandy, very gravelly CLAY with some (probably much) cobble content. Sand is fine. Gravel is sub-angular to sub-rounded fine to coarse of shale/mudstone. Cobbles are sub-angular to sub-rounded of mudstone. <i>(continued on page 2.)</i> <i>(Blackish colour indicates some transitional contamination from Made Ground above).</i>

Remarks: <i>Chiselling:</i> 1hr 15.4m to 15.70m			<i>Groundwater Strikes:</i> See above.			<i>Other:</i> Dando Cable Tool drilling rig. Water added to assist.		
Engineers: Dr M. Blandford and A Jones			Contractor: Apex Drilling			Report No: BC/MB/10.17.03.		

PROJECT: Former Tirbach Washery

CLIENT: HANSAK Ltd

B.H: 3 Sheet 2 of 2

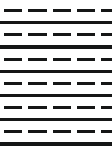
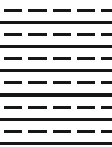
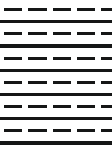
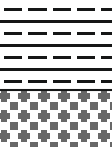
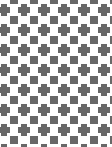
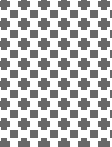
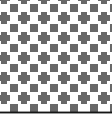
Final Depth: 16.5m **Hole Diameter:** 200mm



THE ENTERPRISE CENTRE,
MERTHYR INDUSTRIAL PARK,
PENTREBACH,
MERTHYR TYDFIL,
SOUTH WALES,
CF48 4DR.

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Geologists Working With The Environment....

Depth	Casing Depth	Water Depth	Samples/Tests					Horizon Depth	Legend	Date Commenced: 24/01/18 Date Completed: 29/01/18	
			Depth(m)		No	Type	N Value			Geological Description	
			From	To							
11			10.50	10.95	18	SPT	23				Brown mottled orangish brown, occasionally blackish sandy sub-angular to sub-rounded fine to coarse GRAVEL and COBBLE of shale/mudstone. Sand is fine to coarse.
12			11.00	12.00	19	J					
13			12.00	12.45	20	SPT	21				
			12.00	13.50	21	B					
			13.50	13.95	22	SPT	22	13.5			
14			13.50	15.00	23	B					
15		14.20m, Standing, 15.30 02/02/18									
			15.00	15.45	24	SPT	50/35				
			15.00	15.40	25	B					
16		15.50m, Moderate	15.40	15.85	26	CPT	50/100				
			15.80	16.25	27	CPT	50/150				
								16.5			
17										<i>Borehole Terminated at 16.50m, very little progress in very dense gravel and cobble.</i>	
18											
19											
20											

Remarks: <i>Chiselling:</i>			<i>Groundwater Strikes:</i>			<i>Other:</i>		
1.5hr 15.40m to 15.70m 1 hr 15.80-NP			See above.			Dando Cable Tool drilling rig. Water added to assist.		
Engineers: Dr M. Blandford and A Jones			Contractor: Apex Drilling			Report No: BC/MB/10.17.03.		

PROJECT: Former Tirbach Washery

CLIENT: HANSAK Ltd

B.H: 4 Sheet 1 of 2

Final Depth: 16.50m **Hole Diameter:** 200mm



THE ENTERPRISE CENTRE,
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SOUTH WALES,
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Geologists Working With The Environment....

Depth	Casing Depth	Water Depth	Samples/Tests					Horizon	Depth	Legend	Date Commenced: 05/02/18 Date Completed: 08/02/18	
			Depth(m)		No	Type	N Value				Geological Description	
			From	To								
1			0.00	1.00	1	B				MADE GROUND - Dark grey, silty, very gravelly CLAY with much cobble content. Gravel is angular to sub-angular (increasingly tabular with depth), fine to coarse of shale /mudstone. Cobbles are angular of mudstone.		
			1.00	1.45	2	CPT	8					
2			1.00	2.00	3	B						
			2.00	2.45	4	CPT	13					
3			2.00	3.00	5	B						
			3.00	3.45	6	CPT	16					
4			3.00	4.00	7	B		4.00				
			4.00	4.45	8	SPT	11					
5			4.00	5.00	9	B					MADE GROUND - Soft dark grey occasionally dark brown, silty, gravelly CLAY with much cobble content. Gravel is angular to sub-angular (occasionally tabular) fine to coarse of shale/mudstone. Cobbles are angular to sub-angular of mudstone.	
			5.00	5.30	10	CPT	17					
6			5.00	6.50	11	B						
			6.50	6.95	12	CPT	6					
7			6.50	7.00	13	B		6.50				
8		8.20m, Standing 09.50 8.20m, PM 05/02/18										
			8.00	8.45	14	CPT	50/243					
9		8.50m, PM 06/02/18	8.00	9.50	15							
			9.50	9.95	16							
10		9.50m, Moderate	9.50	9.95	16	CPT	12					
			9.50	10.50	17							

Continued on page 2:

Continued on page 2:

Remarks: <i>Chiselling:</i>			Groundwater Strikes:			Other:		
			See above.			Dando Cable Tool drilling rig. Water added to assist.		
Engineers: Dr M. Blandford and A Jones			Contractor: Apex Drilling			Report No: BC/MB/10.17.03.		

PROJECT: Former Tirbach Washery

CLIENT: HANSAK Ltd

B.H: 4 Sheet 2 of 2

Final Depth: 16.50m **Hole Diameter:** 200mm



THE ENTERPRISE CENTRE,
MERTHYR INDUSTRIAL PARK,
PENTREBACH,
MERTHYR TYDFIL,
SOUTH WALES,
CF48 4DR.

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Depth	Casing Depth	Water Depth	Samples/Tests					Horizon Depth	Legend	Date Commenced: 05/02/18 Date Completed: 08/02/18	
			Depth(m)		No	Type	N Value			Geological Description	
			From	To							
11			10.50	10.95	18	CPT	50/90	10.5		MADE GROUND- Dark grey angular to sub-angular (regularly tabular and elongate)fine to coarse GRAVEL of shale/mudstone.	
			10.50	12.00	19	B					
12			12.50	12.45	20	CPT	22	13.5			
			10.50	10.50	21	B					
13			13.50	13.95	22	CPT		13.5			
			13.50	14.50	23	B					
14	14.20m, P.M. Standing 15.50 02/02/18		14.50	14.95	CPT	24	50	14.5		MADE GROUND- Soft dark grey occasionally dark brown silty, gravelly CLAY with much cobble content. Gravel is angular to sub-angular (occasionally tabular) fine to coarse of shale/mudstone. Cobbles are angular to sub-angular of mudstone.	
			14.50	16.00	B	25					
15								15.5		MADE GROUND- Dark grey angular to sub-angular (regularly tabular and elongate)fine to coarse GRAVEL of shale/mudstone.	
16	15.50m, Moderate		16.00	16.45	CPT	26	50			Brown sandy sub-angular to sub-rounded (regularly tabular and elongate) fine to coarse GRAVEL of shale/mudstone with some (probably much) cobble content. Sand is medium to coarse (probably fine to coarse). Cobbles are sub-angular to sub-rounded of mudstone.	
			16.00	16.50	B	27					
17			16.50	16.95	CPT	28	49				
18											
19											
20											

Cable Percussive Borehole Terminated at 16.50m, little progress in very dense Gravel/Gravel Cobble.

Remarks: <i>Chiselling:</i> 0.50hr 10.60m to 11.10m <i>Groundwater Strikes:</i> See above. <i>Other:</i> Dando Cable Tool drilling rig. Water added to assist.		
Engineers: Dr M. Blandford and A Jones	Contractor: Apex Drilling	Report No: BC/MB/10.17.03

APPENDIX IV

SPT CALIBRATION REPORT



*The Enterprise Centre,
Merthyr Industrial Park,
Pentrebach,
Merthyr Tydfil,
South Wales,
CF48 4DR.*

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SPT Calibration Report



www.equipgroup.com

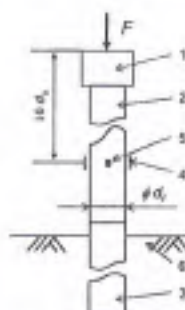
Hammer Energy Measurement Report

Type of Hammer SPT HAMMER
Client APEX DRILLING
Test No EQU1790

Test Depth (m) 8.40
Mass of the hammer $m = 63.5\text{kg}$
Falling height $h = 0.76\text{m}$
 $E_{\text{theor}} = m \times g \times h = 473\text{J}$

Characteristics of the instrumented rod

Diameter $d_r = 0.052\text{m}$
Length of instrumented rod 0.558 m
Area $A = 11.61\text{cm}^2$
Modulus $E_s = 206843\text{MPa}$



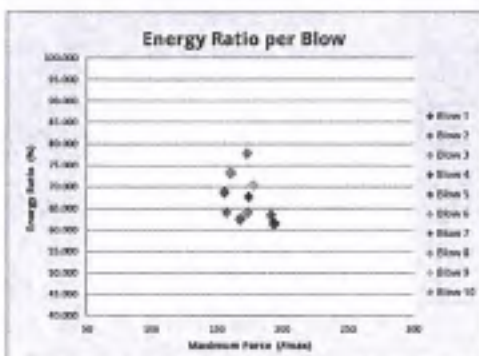
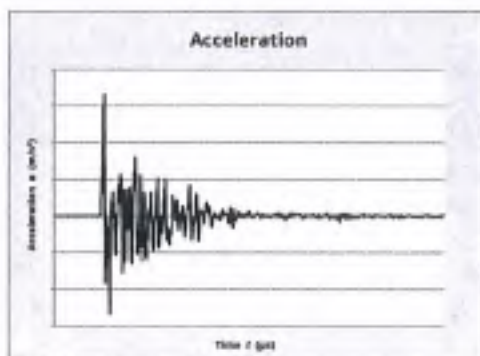
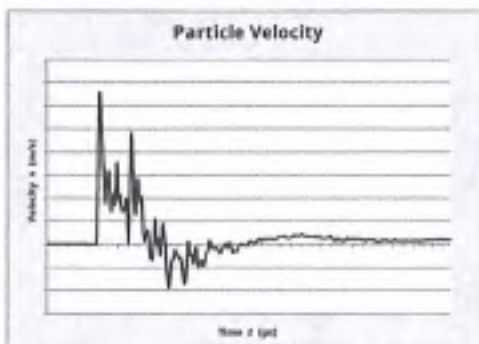
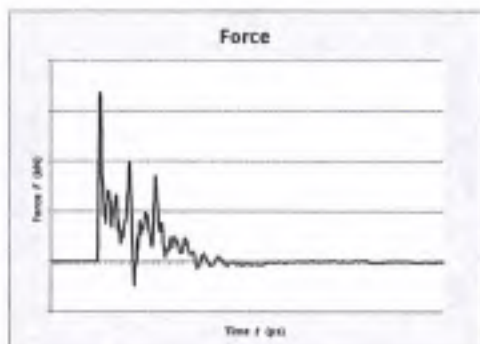
Key
1 Anvil
2 Part of instrumented rod
3 Drive Rod
4 Strain Gauge
5 Accelerometer
6 Ground

F Force
 d_r Diameter of rod

Fig. 8.1 and 8.2
BS EN ISO 22376-5:2003 + A1:2011

DATE OF TEST VALID UNTIL HAMMER ID

07 April 2017 07 April 2018 AX3



Observations:

1.

$E_{\text{meas}} = 0.317\text{ kN-m}$

$E_{\text{theor}} = 0.473\text{ kN-m}$

Energy Ratio = $\frac{E_{\text{meas}}}{E_{\text{theor}}} = 67.11\%$

Equip SPT Analyzer Operators: CS

Prepared by:

Checked by:

Date: 11/04/2017

APPENDIX V

SPT/CPT PROFILES



*The Enterprise Centre,
Merthyr Industrial Park,
Pentrebach,
Merthyr Tydfil,
South Wales,
CF48 4DR.*

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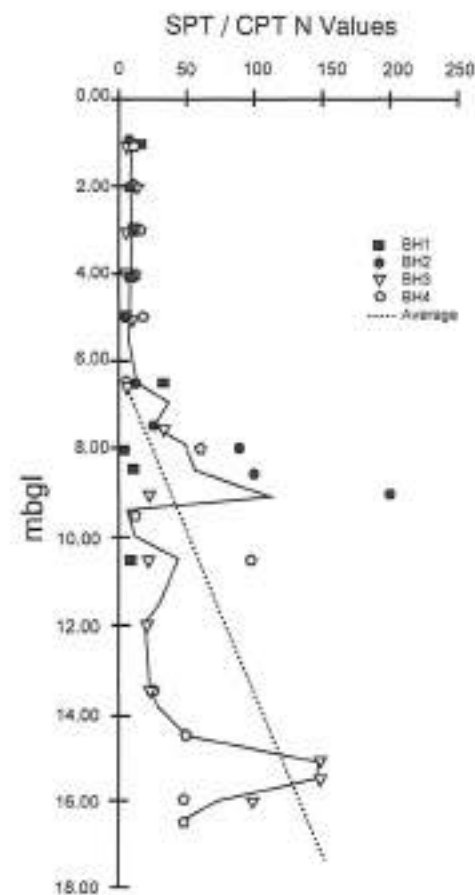


Fig. 100.1: SPT / CPT N Values by BH

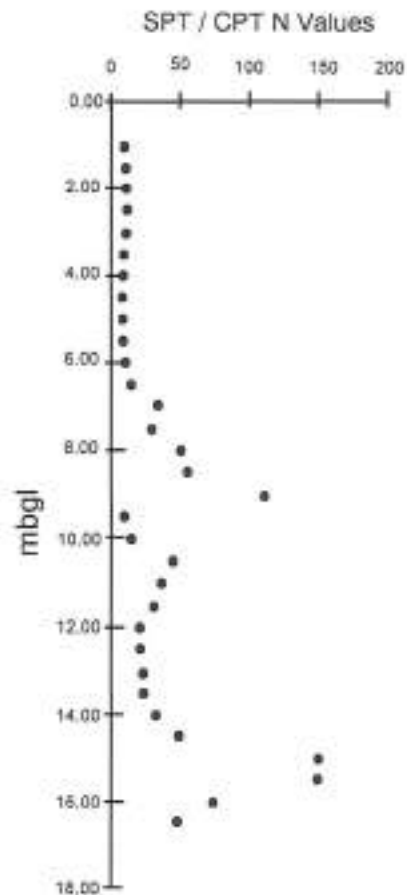


Fig. 100.2: SPT / CPT N Values Average

ymgynhori **hdac** consulting

1992 - 2017



T: 029 20754189

M: 07971 853633

hdac.consult@dsl.pipex.com

Project Title:

Tirbach Washery Preliminary Investigation

Project No:

909-180104

Figure Title:

SPT Analysis

Figure No:

909-180104-FIG-001

Revision No:

Revision A

Date:

15/02/2018

Drawn By:

AHJ

APPENDIX VI

LABORATORY TESTING RESULTS



*The Enterprise Centre,
Merthyr Industrial Park,
Pentrebach,
Merthyr Tydfil,
South Wales,
CF48 4DR.*

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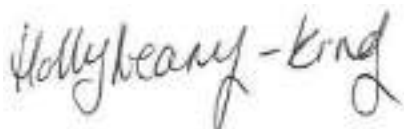
FINAL ANALYTICAL TEST REPORT

Envirolab Job Number: 18/00676
Issue Number: 1
Date: 12 February, 2018

Client: Blandford Consulting
The Enterprise Centre
Merthyr Industrial Park
Pentrebach
CF48 4DR

Project Manager: David Blandford
Project Name: Tir-Bach Washery
Project Ref: Not specified
Order No: N/A
Date Samples Received: 30/01/18
Date Instructions Received: 30/01/18
Date Analysis Completed: 12/02/18

Prepared by:



Holly Neary-King
Administrative Assistant

Approved by:



Georgia King
Admin & Client Services Supervisor

Envirolab Job Number: 18/00676

Client Project Name: Tir-Bach Washery

Client Project Ref: Not specified

Lab Sample ID	18/00676/1	18/00676/2	18/00676/3	18/00676/4	18/00676/5	18/00676/6	18/00676/7	18/00676/8	Units	Method ref
Client Sample No										
Client Sample ID	TP3	TP3	TP3	TP11	TP11	TP11	TP12	TP12		
Depth to Top	0.10	0.40	0.70	0.10	0.30	0.60	0.10	0.30		
Depth To Bottom										
Date Sampled	18-Jan-18	18-Jan-18	18-Jan-18	18-Jan-18	18-Jan-18	18-Jan-18	18-Jan-18	18-Jan-18		
Sample Type	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil		
Sample Matrix Code	4A	4A	4A	6AE	4A	4A	4A	4A		
% Stones >10mm _A	31.0	27.0	12.7	32.8	14.2	20.0	17.5	15.0		
pH _D	8.38	8.28	8.10	7.93	7.88	7.65	8.07	8.14	pH	A-T-031s
Sulphate (water sol 2:1) _D ^{M#}	<0.01	<0.01	0.03	0.02	0.20	0.92	0.04	0.03	g/l	A-T-026s
Sulphate (acid soluble) _D ^{M#}	490	640	580	500	1400	4900	740	790	mg/kg	A-T-028s
Sulphur (total) _D	426	580	647	499	950	2100	617	518	mg/kg	A-T-024s
Cyanide (free) _A ^{M#}	<1	<1	<1	<1	<1	<1	<1	<1	mg/kg	A-T-042sFCN
Cyanide (total) _A ^{M#}	<1	2	<1	<1	<1	<1	<1	<1	mg/kg	A-T-042sTCN
Thiocyanate _A	<5	<5	<5	<5	<5	<5	<5	<5	mg/kg	A-T-041s
Phenols - Total by HPLC _A	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	mg/kg	A-T-050s
Sulphide _A	<5	<5	<5	<5	<5	<5	<5	<5	mg/kg	A-T-S2-s
Arsenic _D ^{M#}	17	16	319	35	12	10	7	7	mg/kg	A-T-024s
Boron (water soluble) _D ^{M#}	<1.0	<1.0	1.4	<1.0	<1.0	<1.0	<1.0	<1.0	mg/kg	A-T-027s
Cadmium _D ^{M#}	1.0	1.1	5.5	1.3	1.3	1.0	1.7	1.6	mg/kg	A-T-024s
Copper _D ^{M#}	110	122	766	529	170	85	120	109	mg/kg	A-T-024s
Chromium _D ^{M#}	12	17	13	15	30	55	14	12	mg/kg	A-T-024s
Chromium (hexavalent) _D	<1	<1	<1	<1	<1	<1	<1	<1	mg/kg	A-T-040s
Lead _D ^{M#}	126	141	375	177	147	74	172	148	mg/kg	A-T-024s
Mercury _D	0.38	0.60	0.36	0.28	0.22	<0.17	1.54	0.90	mg/kg	A-T-024s
Nickel _D ^{M#}	12	15	37	24	28	23	28	24	mg/kg	A-T-024s
Selenium _D ^{M#}	<1	<1	<1	1	2	2	2	<1	mg/kg	A-T-024s
Zinc _D ^{M#}	282	495	1080	296	209	109	252	208	mg/kg	A-T-024s
Ali >C5-C6 _A [#]	<0.01	<0.01	<0.01	<0.05	<0.05	<0.05	<0.05	<0.05	mg/kg	A-T-022s
Ali >C6-C8 _A [#]	<0.01	<0.01	<0.01	<0.05	<0.05	<0.05	<0.05	<0.05	mg/kg	A-T-022s
Ali >C8-C10 _A [#]	<0.01	<0.01	<0.01	<0.05	<0.05	<0.05	<0.05	<0.05	mg/kg	A-T-022s
Ali >C10-C12 _A [#]	<0.1	<0.1	<0.1	<0.1	<0.1	0.6	<0.1	<0.1	mg/kg	A-T-023s
Ali >C12-C16 _A [#]	<0.1	<0.1	<0.1	<0.1	2.7	19.0	<0.1	<0.1	mg/kg	A-T-023s
Ali >C16-C21 _A [#]	<0.1	<0.1	<0.1	<0.1	5.8	33.6	<0.1	<0.1	mg/kg	A-T-023s
Ali >C21-C35 _A [#]	<0.1	12.2	12.0	<0.1	0.4	4.1	<0.1	<0.1	mg/kg	A-T-023s
Total Aliphatics _A	<0.1	12.2	12.0	<0.1	8.8	57.3	<0.1	<0.1	mg/kg	A-T-023s
Aro >C5-C7 _A [#]	<0.01	<0.01	<0.01	<0.05	<0.05	<0.05	<0.05	<0.05	mg/kg	A-T-022s
Aro >C7-C8 _A [#]	<0.01	<0.01	<0.01	<0.05	<0.05	<0.05	<0.05	<0.05	mg/kg	A-T-022s
Aro >C8-C9 _A [#]	<0.01	<0.01	<0.01	<0.05	<0.05	<0.05	<0.05	<0.05	mg/kg	A-T-022s
Aro >C9-C10 _A [#]	<0.01	<0.01	<0.01	<0.05	<0.05	<0.05	<0.05	<0.05	mg/kg	A-T-022s

Envirolab Job Number: 18/00676

Client Project Name: Tir-Bach Washery

Client Project Ref: Not specified

Lab Sample ID	18/00676/1	18/00676/2	18/00676/3	18/00676/4	18/00676/5	18/00676/6	18/00676/7	18/00676/8	Units	Method ref
Client Sample No										
Client Sample ID	TP3	TP3	TP3	TP11	TP11	TP11	TP12	TP12		
Depth to Top	0.10	0.40	0.70	0.10	0.30	0.60	0.10	0.30		
Depth To Bottom										
Date Sampled	18-Jan-18	18-Jan-18	18-Jan-18	18-Jan-18	18-Jan-18	18-Jan-18	18-Jan-18	18-Jan-18		
Sample Type	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil		
Sample Matrix Code	4A	4A	4A	6AE	4A	4A	4A	4A		
Aro >C10-C12 _A [#]	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	0.4	0.6	mg/kg	A-T-023s
Aro >C12-C16 _A [#]	0.4	0.4	8.4	<0.1	5.2	9.6	1.7	6.9	mg/kg	A-T-023s
Aro >C16-C21 _A [#]	4.2	2.3	21.1	0.3	8.9	26.3	5.3	16.0	mg/kg	A-T-023s
Aro >C21-C35 _A [#]	11.6	72.3	58.5	0.2	6.3	4.4	7.9	24.1	mg/kg	A-T-023s
Total Aromatics _A	16.1	74.9	88.0	0.4	20.4	40.2	15.3	47.6	mg/kg	A-T-023s
TPH (Ali & Aro) _A	16.1	87.2	100	0.4	29.3	97.5	15.3	47.6	mg/kg	A-T-023s
BTEX - Benzene _A [#]	<0.01	<0.01	<0.01	<0.05	<0.05	<0.05	<0.05	<0.05	mg/kg	A-T-022s
BTEX - Toluene _A [#]	<0.01	<0.01	<0.01	<0.05	<0.05	<0.05	<0.05	<0.05	mg/kg	A-T-022s
BTEX - Ethyl Benzene _A [#]	<0.01	<0.01	<0.01	<0.05	<0.05	<0.05	<0.05	<0.05	mg/kg	A-T-022s
BTEX - m & p Xylene _A [#]	<0.01	<0.01	<0.01	<0.05	<0.05	<0.05	<0.05	<0.05	mg/kg	A-T-022s
BTEX - o Xylene _A [#]	<0.01	<0.01	<0.01	<0.05	<0.05	<0.05	<0.05	<0.05	mg/kg	A-T-022s
MTBE _A [#]	<0.01	<0.01	<0.01	<0.05	<0.05	<0.05	<0.05	<0.05	mg/kg	A-T-022s
Leachate Prep BS EN 12457-1 (2:1) (2 no) _A	-	-	*	-	-	-	-	-		A-T-001
pH (leachable) _A [#]	-	-	7.69	-	-	-	-	-	pH	A-T-031w
Sulphate (leachable) _A [#]	-	-	20.13	-	-	-	-	-	mg/l	A-T-026w
Cyanide (free) (leachable) _A	-	-	<0.005	-	-	-	-	-	mg/l	A-T-042wFCN
Cyanide (total) (leachable) _A	-	-	<0.005	-	-	-	-	-	mg/l	A-T-042wTCN
Thiocyanate (leachable) _A	-	-	0.3	-	-	-	-	-	mg/l	A-T-041w
Phenols (total by HPLC) (leachable) _A	-	-	<0.01	-	-	-	-	-	mg/l	A-T-050w
Sulphide (leachable) _A	-	-	<0.1	-	-	-	-	-	mg/l	A-T-S2-w
Antimony (leachable) _A [#]	-	-	14	-	-	-	-	-	µg/l	A-T-025w
Arsenic (leachable) _A [#]	-	-	7	-	-	-	-	-	µg/l	A-T-025w
Boron (leachable) _A [#]	-	-	70	-	-	-	-	-	µg/l	A-T-025w
Cadmium (leachable) _A [#]	-	-	<1	-	-	-	-	-	µg/l	A-T-025w
Copper (leachable) _A [#]	-	-	25	-	-	-	-	-	µg/l	A-T-025w
Chromium (leachable) _A [#]	-	-	<1	-	-	-	-	-	µg/l	A-T-025w
Lead (leachable) _A [#]	-	-	<1	-	-	-	-	-	µg/l	A-T-025w
Mercury (leachable) _A [#]	-	-	<0.1	-	-	-	-	-	µg/l	A-T-025w
Nickel (leachable) _A [#]	-	-	2	-	-	-	-	-	µg/l	A-T-025w
Sulphur, Total (leachable) _A	-	-	7	-	-	-	-	-	mg/l	A-T-025w
Zinc (leachable) _A [#]	-	-	7	-	-	-	-	-	µg/l	A-T-025w

Envirolab Job Number: 18/00676

Client Project Name: Tir-Bach Washery

Client Project Ref: Not specified

Lab Sample ID	18/00676/1	18/00676/2	18/00676/3	18/00676/4	18/00676/5	18/00676/6	18/00676/7	18/00676/8	Units	Method ref
Client Sample No										
Client Sample ID	TP3	TP3	TP3	TP11	TP11	TP11	TP12	TP12		
Depth to Top	0.10	0.40	0.70	0.10	0.30	0.60	0.10	0.30		
Depth To Bottom										
Date Sampled	18-Jan-18	18-Jan-18	18-Jan-18	18-Jan-18	18-Jan-18	18-Jan-18	18-Jan-18	18-Jan-18		
Sample Type	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil		
Sample Matrix Code	4A	4A	4A	6AE	4A	4A	4A	4A		
PAH 16										
Acenaphthene _A ^{M#}	0.02	0.05	0.43	0.03	0.05	0.10	1.26	0.38	mg/kg	A-T-019s
Acenaphthylene _A ^{M#}	<0.01	0.05	0.02	0.13	0.07	0.06	1.01	0.32	mg/kg	A-T-019s
Anthracene _A ^{M#}	0.05	0.15	0.30	0.24	0.15	0.14	3.25	1.02	mg/kg	A-T-019s
Benzo(a)anthracene _A ^{M#}	0.20	0.54	1.96	1.50	0.59	0.20	5.10	2.31	mg/kg	A-T-019s
Benzo(a)pyrene _A ^{M#}	0.20	1.02	2.17	1.19	0.51	0.11	3.29	1.65	mg/kg	A-T-019s
Benzo(b)fluoranthene _A ^{M#}	0.33	1.17	3.42	2.03	0.92	0.20	4.30	2.37	mg/kg	A-T-019s
Benzo(ghi)perylene _A ^{M#}	0.13	1.74	0.96	0.56	0.25	0.05	1.29	0.70	mg/kg	A-T-019s
Benzo(k)fluoranthene _A ^{M#}	0.10	0.40	0.99	0.62	0.27	<0.07	1.54	0.75	mg/kg	A-T-019s
Chrysene _A ^{M#}	0.25	0.71	2.20	1.65	0.73	0.24	4.84	2.29	mg/kg	A-T-019s
Dibenzo(ah)anthracene _A ^{M#}	<0.04	0.27	0.38	0.23	0.09	<0.04	0.40	0.22	mg/kg	A-T-019s
Fluoranthene _A ^{M#}	0.33	0.84	2.74	1.76	0.79	0.45	11.5	4.94	mg/kg	A-T-019s
Fluorene _A ^{M#}	<0.01	0.05	0.24	0.04	0.05	0.12	2.37	0.51	mg/kg	A-T-019s
Indeno(123-cd)pyrene _A ^{M#}	0.15	1.36	1.28	0.76	0.29	0.05	1.68	0.91	mg/kg	A-T-019s
Naphthalene _A ^{M#}	<0.03	0.03	0.10	0.05	0.13	0.23	6.77	0.96	mg/kg	A-T-019s
Phenanthrene _A ^{M#}	0.16	0.45	0.80	0.47	0.50	0.58	13	4.14	mg/kg	A-T-019s
Pyrene _A ^{M#}	0.29	0.75	2.17	1.59	0.70	0.40	9.13	3.99	mg/kg	A-T-019s
PAH (total 16) _A ^{M#}	2.23	9.56	20.2	12.9	6.07	2.92	70.8	27.4	mg/kg	A-T-019s

Envirolab Job Number: 18/00676

Client Project Name: Tir-Bach Washery

Client Project Ref: Not specified

Lab Sample ID	18/00676/1	18/00676/2	18/00676/3	18/00676/4	18/00676/5	18/00676/6	18/00676/7	18/00676/8	Units	Method ref
Client Sample No										
Client Sample ID	TP3	TP3	TP3	TP11	TP11	TP11	TP12	TP12		
Depth to Top	0.10	0.40	0.70	0.10	0.30	0.60	0.10	0.30		
Depth To Bottom										
Date Sampled	18-Jan-18	18-Jan-18	18-Jan-18	18-Jan-18	18-Jan-18	18-Jan-18	18-Jan-18	18-Jan-18		
Sample Type	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil		
Sample Matrix Code	4A	4A	4A	6AE	4A	4A	4A	4A		
PAH 16MS (leachable)										
Acenaphthene (leachable) _A	-	-	0.24	-	-	-	-	-	µg/l	A-T-019w
Acenaphthylene (leachable) _A	-	-	<0.02	-	-	-	-	-	µg/l	A-T-019w
Anthracene (leachable) _A	-	-	<0.02	-	-	-	-	-	µg/l	A-T-019w
Benzo(a)anthracene (leachable) _A	-	-	0.02	-	-	-	-	-	µg/l	A-T-019w
Benzo(a)pyrene (leachable) _A	-	-	0.03	-	-	-	-	-	µg/l	A-T-019w
Benzo(b)fluoranthene (leachable) _A	-	-	0.04	-	-	-	-	-	µg/l	A-T-019w
Benzo(ghi)perylene (leachable) _A	-	-	0.02	-	-	-	-	-	µg/l	A-T-019w
Benzo(k)fluoranthene (leachable) _A	-	-	<0.02	-	-	-	-	-	µg/l	A-T-019w
Chrysene (leachable) _A	-	-	0.03	-	-	-	-	-	µg/l	A-T-019w
Dibenzo(ah)anthracene (leachable) _A	-	-	<0.02	-	-	-	-	-	µg/l	A-T-019w
Fluoranthene (leachable) _A	-	-	0.04	-	-	-	-	-	µg/l	A-T-019w
Fluorene (leachable) _A	-	-	<0.02	-	-	-	-	-	µg/l	A-T-019w
Indeno(123-cd)pyrene (leachable) _A	-	-	0.03	-	-	-	-	-	µg/l	A-T-019w
Naphthalene (leachable) _A	-	-	0.70	-	-	-	-	-	µg/l	A-T-019w
Phenanthrene (leachable) _A	-	-	<0.02	-	-	-	-	-	µg/l	A-T-019w
Pyrene (leachable) _A	-	-	0.03	-	-	-	-	-	µg/l	A-T-019w
PAH (total 16) (leachable) _A	-	-	1.18	-	-	-	-	-	µg/l	A-T-019w

Envirolab Job Number: 18/00676

Client Project Name: Tir-Bach Washery

Client Project Ref: Not specified

Lab Sample ID	18/00676/1	18/00676/2	18/00676/3	18/00676/4	18/00676/5	18/00676/6	18/00676/7	18/00676/8	Units	Method ref
Client Sample No										
Client Sample ID	TP3	TP3	TP3	TP11	TP11	TP11	TP12	TP12		
Depth to Top	0.10	0.40	0.70	0.10	0.30	0.60	0.10	0.30		
Depth To Bottom										
Date Sampled	18-Jan-18	18-Jan-18	18-Jan-18	18-Jan-18	18-Jan-18	18-Jan-18	18-Jan-18	18-Jan-18		
Sample Type	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil		
Sample Matrix Code	4A	4A	4A	6AE	4A	4A	4A	4A		
TPH CWG (leachable)										
Ali >C5-C6 (leachable) _A	-	-	<1	-	-	-	-	-	µg/l	A-T-022w
Ali >C6-C8 (leachable) _A	-	-	<1	-	-	-	-	-	µg/l	A-T-022w
Ali >C8-C10 (leachable) _A	-	-	<1	-	-	-	-	-	µg/l	A-T-022w
Ali >C10-C12 (leachable) _A	-	-	<10	-	-	-	-	-	µg/l	A-T-023w
Ali >C12-C16 (leachable) _A	-	-	<10	-	-	-	-	-	µg/l	A-T-023w
Ali >C16-C21 (leachable) _A	-	-	43	-	-	-	-	-	µg/l	A-T-023w
Ali >C21-C35 (leachable) _A	-	-	72	-	-	-	-	-	µg/l	A-T-023w
Total Aliphatics (leachable) _A	-	-	115	-	-	-	-	-	µg/l	A-T-023w
Aro >C5-C7 (leachable) _A	-	-	<1	-	-	-	-	-	µg/l	A-T-022w
Aro >C7-C8 (leachable) _A	-	-	<1	-	-	-	-	-	µg/l	A-T-022w
Aro >C8-C9 (leachable) _A	-	-	<1	-	-	-	-	-	µg/l	A-T-022w
Aro >C9-C10 (leachable) _A	-	-	<1	-	-	-	-	-	µg/l	A-T-022w
Aro >C10-C12 (leachable) _A	-	-	<10	-	-	-	-	-	µg/l	A-T-023w
Aro >C12-C16 (leachable) _A	-	-	<10	-	-	-	-	-	µg/l	A-T-023w
Aro >C16-C21 (leachable) _A	-	-	<10	-	-	-	-	-	µg/l	A-T-023w
Aro >C21-C35 (leachable) _A	-	-	<10	-	-	-	-	-	µg/l	A-T-023w
Total Aromatics (leachable) _A	-	-	<10	-	-	-	-	-	µg/l	A-T-023w
TPH (Ali & Aro) (leachable) _A	-	-	115	-	-	-	-	-	µg/l	A-T-023w
BTEX - Benzene (leachable) _A	-	-	<1	-	-	-	-	-	µg/l	A-T-022w
BTEX - Toluene (leachable) _A	-	-	<1	-	-	-	-	-	µg/l	A-T-022w
BTEX - Ethyl Benzene (leachable) _A	-	-	<1	-	-	-	-	-	µg/l	A-T-022w
BTEX - o Xylene (leachable) _A	-	-	<1	-	-	-	-	-	µg/l	A-T-022w
BTEX - m & p Xylene (leachable) _A	-	-	<1	-	-	-	-	-	µg/l	A-T-022w
MTBE (leachable) _A	-	-	<1	-	-	-	-	-	µg/l	A-T-022w

Envirolab Job Number: 18/00676

Client Project Name: Tir-Bach Washery

Client Project Ref: Not specified

Lab Sample ID	18/00676/9	18/00676/10	18/00676/11	18/00676/12	18/00676/13	18/00676/14	18/00676/15	18/00676/16	Units	Method ref
Client Sample No										
Client Sample ID	TP12	TP13	TP13	TP13	TP14	TP14	TP14	TP15		
Depth to Top	0.60	0.10	0.30	0.60	0.10	0.30	0.60	0.10		
Depth To Bottom										
Date Sampled	18-Jan-18	18-Jan-18	18-Jan-18	18-Jan-18	18-Jan-18	18-Jan-18	18-Jan-18	18-Jan-18		
Sample Type	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil		
Sample Matrix Code	6A	4A	4A	6A	4A	6A	4A	4A		
% Stones >10mm _A	10.8	16.7	16.1	23.8	53.9	17.8	22.6	10.2	% w/w	A-T-044
pH _D	7.95	8.08	8.00	8.00	8.23	7.92	8.51	8.52	pH	A-T-031s
Sulphate (water sol 2:1) _D ^{M#}	0.17	0.03	0.23	0.29	<0.01	0.02	0.02	<0.01	g/l	A-T-026s
Sulphate (acid soluble) _D ^{M#}	1600	580	1100	1100	<200	530	<200	<200	mg/kg	A-T-028s
Sulphur (total) _D	1380	1290	666	766	258	421	201	381	mg/kg	A-T-024s
Cyanide (free) _A ^{M#}	<1	<1	<1	<1	<1	<1	<1	<1	mg/kg	A-T-042sFCN
Cyanide (total) _A ^{M#}	<1	<1	<1	<1	<1	<1	<1	<1	mg/kg	A-T-042sTCN
Thiocyanate _A	<5	<5	<5	<5	<5	<5	<5	<5	mg/kg	A-T-041s
Phenols - Total by HPLC _A	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	mg/kg	A-T-050s
Sulphide _A	<5	<5	<5	<5	<5	<5	<5	<5	mg/kg	A-T-S2-s
Arsenic _D ^{M#}	6	10	<1	<1	<1	11	<1	<1	mg/kg	A-T-024s
Boron (water soluble) _D ^{M#}	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	mg/kg	A-T-027s
Cadmium _D ^{M#}	1.2	0.9	0.8	0.7	0.7	1.2	<0.5	1.1	mg/kg	A-T-024s
Copper _D ^{M#}	57	57	47	46	10	51	36	15	mg/kg	A-T-024s
Chromium _D ^{M#}	10	18	11	24	7	16	6	14	mg/kg	A-T-024s
Chromium (hexavalent) _D	<1	<1	<1	<1	<1	<1	<1	<1	mg/kg	A-T-040s
Lead _D ^{M#}	82	69	46	44	18	64	22	23	mg/kg	A-T-024s
Mercury _D	0.32	0.42	0.20	0.34	<0.17	<0.17	<0.17	<0.17	mg/kg	A-T-024s
Nickel _D ^{M#}	35	28	34	32	24	26	31	48	mg/kg	A-T-024s
Selenium _D ^{M#}	2	2	<1	2	<1	2	2	2	mg/kg	A-T-024s
Zinc _D ^{M#}	148	176	100	92	51	161	74	84	mg/kg	A-T-024s
Ali >C5-C6 _A [#]	<0.05	<0.05	<0.10	<0.05	<0.05	<0.05	<0.05	<0.05	mg/kg	A-T-022s
Ali >C6-C8 _A [#]	<0.05	<0.05	<0.10	<0.05	<0.05	<0.05	<0.05	<0.05	mg/kg	A-T-022s
Ali >C8-C10 _A [#]	<0.05	<0.05	<0.10	<0.05	<0.05	<0.05	<0.05	<0.05	mg/kg	A-T-022s
Ali >C10-C12 _A [#]	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	mg/kg	A-T-023s
Ali >C12-C16 _A [#]	5.8	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	2.6	mg/kg	A-T-023s
Ali >C16-C21 _A [#]	7.7	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	1.8	mg/kg	A-T-023s
Ali >C21-C35 _A [#]	0.6	22.2	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	mg/kg	A-T-023s
Total Aliphatics _A	14.1	22.2	<0.1	<0.1	<0.1	<0.1	<0.1	4.4	mg/kg	A-T-023s
Aro >C5-C7 _A [#]	<0.05	<0.05	<0.10	<0.05	<0.05	<0.05	<0.05	<0.05	mg/kg	A-T-022s
Aro >C7-C8 _A [#]	<0.05	<0.05	<0.10	<0.05	<0.05	<0.05	<0.05	<0.05	mg/kg	A-T-022s
Aro >C8-C9 _A [#]	<0.05	<0.05	<0.10	<0.05	<0.05	<0.05	<0.05	<0.05	mg/kg	A-T-022s
Aro >C9-C10 _A [#]	<0.05	<0.05	<0.10	<0.05	<0.05	<0.05	<0.05	<0.05	mg/kg	A-T-022s

Envirolab Job Number: 18/00676

Client Project Name: Tir-Bach Washery

Client Project Ref: Not specified

Lab Sample ID	18/00676/9	18/00676/10	18/00676/11	18/00676/12	18/00676/13	18/00676/14	18/00676/15	18/00676/16	Units	Method ref
Client Sample No										
Client Sample ID	TP12	TP13	TP13	TP13	TP14	TP14	TP14	TP15		
Depth to Top	0.60	0.10	0.30	0.60	0.10	0.30	0.60	0.10		
Depth To Bottom										
Date Sampled	18-Jan-18	18-Jan-18	18-Jan-18	18-Jan-18	18-Jan-18	18-Jan-18	18-Jan-18	18-Jan-18		
Sample Type	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil		
Sample Matrix Code	6A	4A	4A	6A	4A	6A	4A	4A		
Aro >C10-C12 _A [#]	0.4	1.2	<0.1	<0.1	<0.1	<0.1	<0.1	0.5	mg/kg	A-T-023s
Aro >C12-C16 _A [#]	10.6	5.8	<0.1	0.7	<0.1	<0.1	<0.1	4.2	mg/kg	A-T-023s
Aro >C16-C21 _A [#]	17.2	20.1	<0.1	2.4	<0.1	<0.1	<0.1	4.6	mg/kg	A-T-023s
Aro >C21-C35 _A [#]	23.2	19.0	<0.1	5.3	<0.1	<0.1	<0.1	4.7	mg/kg	A-T-023s
Total Aromatics _A	51.3	46.1	<0.1	8.3	<0.1	<0.1	<0.1	14.1	mg/kg	A-T-023s
TPH (Ali & Aro) _A	65.4	68.3	<0.1	8.3	<0.1	<0.1	<0.1	18.5	mg/kg	A-T-023s
BTEX - Benzene _A [#]	<0.05	<0.05	<0.10	<0.05	<0.05	<0.05	<0.05	<0.05	mg/kg	A-T-022s
BTEX - Toluene _A [#]	<0.05	<0.05	<0.10	<0.05	<0.05	<0.05	<0.05	<0.05	mg/kg	A-T-022s
BTEX - Ethyl Benzene _A [#]	<0.05	<0.05	<0.10	<0.05	<0.05	<0.05	<0.05	<0.05	mg/kg	A-T-022s
BTEX - m & p Xylene _A [#]	<0.05	<0.05	<0.10	<0.05	<0.05	<0.05	<0.05	<0.05	mg/kg	A-T-022s
BTEX - o Xylene _A [#]	<0.05	<0.05	<0.10	<0.05	<0.05	<0.05	<0.05	<0.05	mg/kg	A-T-022s
MTBE _A [#]	<0.05	<0.05	<0.10	<0.05	<0.05	<0.05	<0.05	<0.05	mg/kg	A-T-022s

Envirolab Job Number: 18/00676

Client Project Name: Tir-Bach Washery

Client Project Ref: Not specified

Lab Sample ID	18/00676/9	18/00676/10	18/00676/11	18/00676/12	18/00676/13	18/00676/14	18/00676/15	18/00676/16	Units	Method ref
Client Sample No										
Client Sample ID	TP12	TP13	TP13	TP13	TP14	TP14	TP14	TP15		
Depth to Top	0.60	0.10	0.30	0.60	0.10	0.30	0.60	0.10		
Depth To Bottom										
Date Sampled	18-Jan-18	18-Jan-18	18-Jan-18	18-Jan-18	18-Jan-18	18-Jan-18	18-Jan-18	18-Jan-18		
Sample Type	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil		
Sample Matrix Code	6A	4A	4A	6A	4A	6A	4A	4A		
PAH 16										
Acenaphthene _A ^{M#}	0.09	0.15	0.05	0.03	0.08	0.02	<0.01	<0.03	mg/kg	A-T-019s
Acenaphthylene _A ^{M#}	0.09	0.06	0.05	<0.01	<0.01	<0.01	<0.01	<0.01	mg/kg	A-T-019s
Anthracene _A ^{M#}	0.29	0.27	0.10	0.05	0.10	0.05	<0.02	0.06	mg/kg	A-T-019s
Benzo(a)anthracene _A ^{M#}	0.83	1.17	0.43	0.13	0.32	0.30	0.04	0.19	mg/kg	A-T-019s
Benzo(a)pyrene _A ^{M#}	0.65	0.87	0.31	0.09	0.17	0.26	<0.04	0.14	mg/kg	A-T-019s
Benzo(b)fluoranthene _A ^{M#}	0.92	1.28	0.54	0.14	0.26	0.46	0.07	0.28	mg/kg	A-T-019s
Benzo(ghi)perylene _A ^{M#}	0.30	0.43	0.16	<0.05	0.06	0.16	<0.05	0.08	mg/kg	A-T-019s
Benzo(k)fluoranthene _A ^{M#}	0.31	0.41	0.18	<0.07	0.09	0.14	<0.07	0.10	mg/kg	A-T-019s
Chrysene _A ^{M#}	0.84	1.26	0.53	0.16	0.31	0.37	0.07	0.26	mg/kg	A-T-019s
Dibenzo(ah)anthracene _A ^{M#}	0.09	0.13	0.05	<0.04	<0.04	0.05	<0.04	<0.04	mg/kg	A-T-019s
Fluoranthene _A ^{M#}	1.67	1.96	0.79	0.25	0.62	0.45	<0.08	0.24	mg/kg	A-T-019s
Fluorene _A ^{M#}	0.13	0.12	0.04	0.03	0.06	0.02	<0.01	0.05	mg/kg	A-T-019s
Indeno(123-cd)pyrene _A ^{M#}	0.37	0.53	0.19	0.05	0.08	0.19	<0.03	0.08	mg/kg	A-T-019s
Naphthalene _A ^{M#}	0.13	0.14	0.09	0.06	<0.03	<0.03	<0.03	0.06	mg/kg	A-T-019s
Phenanthrene _A ^{M#}	1.18	0.96	0.35	0.19	0.36	0.20	0.06	0.25	mg/kg	A-T-019s
Pyrene _A ^{M#}	1.40	1.70	0.68	0.22	0.52	0.36	<0.07	0.24	mg/kg	A-T-019s
PAH (total 16) _A ^{M#}	9.28	11.4	4.52	1.41	3.07	3.03	0.30	2.02	mg/kg	A-T-019s

Envirolab Job Number: 18/00676

Client Project Name: Tir-Bach Washery

Client Project Ref: Not specified

Lab Sample ID	18/00676/17	18/00676/18	18/00676/19	18/00676/20	18/00676/21	18/00676/22	18/00676/23	18/00676/24	Units	Method ref
Client Sample No										
Client Sample ID	TP15	TP15	TP16	TP16	TP16	TP4	TP4	TP4		
Depth to Top	0.40	0.60	0.10	0.30	0.50	0.10	0.40	0.70		
Depth To Bottom										
Date Sampled	18-Jan-18	18-Jan-18	18-Jan-18	18-Jan-18	18-Jan-18	19-Jan-18	19-Jan-18	19-Jan-18		
Sample Type	Soil	Soil	Solid	Soil	Soil	Soil	Soil	Solid		
Sample Matrix Code	4A	4A	7	6A	6A	6A	6A	7		
% Stones >10mm _A	<0.1	30.4	14.9	37.9	22.9	32.9	24.7	24.2	% w/w	A-T-044
pH _D	8.04	8.19	9.25	8.76	8.32	8.18	7.75	7.78	pH	A-T-031s
Sulphate (water sol 2:1) _D ^{M#}	0.01	<0.01	0.11	0.04	0.08	<0.01	<0.01	0.03	g/l	A-T-026s
Sulphate (acid soluble) _D ^{M#}	500	<200	1000	390	810	550	560	570	mg/kg	A-T-028s
Sulphur (total) _D	423	149	921	560	691	331	535	465	mg/kg	A-T-024s
Cyanide (free) _A ^{M#}	<1	<1	<1	<1	<1	<1	<1	<1	mg/kg	A-T-042sFCN
Cyanide (total) _A ^{M#}	<1	<1	<1	<1	<1	<1	<1	<1	mg/kg	A-T-042sTCN
Thiocyanate _A	<5	<5	<5	<5	<5	<5	<5	<5	mg/kg	A-T-041s
Phenols - Total by HPLC _A	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	mg/kg	A-T-050s
Sulphide _A	<5	<5	<5	<5	<5	<5	<5	<5	mg/kg	A-T-S2-s
Arsenic _D ^{M#}	2	2	23	<1	8	26	18	22	mg/kg	A-T-024s
Boron (water soluble) _D ^{M#}	<1.0	<1.0	1.0	<1.0	<1.0	<1.0	<1.0	<1.0	mg/kg	A-T-027s
Cadmium _D ^{M#}	2.8	0.9	0.5	<0.5	0.9	1.5	1.4	1.2	mg/kg	A-T-024s
Copper _D ^{M#}	75	36	31	24	96	183	150	153	mg/kg	A-T-024s
Chromium _D ^{M#}	13	5	11	11	16	7	13	11	mg/kg	A-T-024s
Chromium (hexavalent) _D	<1	<1	<1	<1	<1	<1	<1	<1	mg/kg	A-T-040s
Lead _D ^{M#}	185	56	41	50	43	131	136	129	mg/kg	A-T-024s
Mercury _D	0.89	0.26	0.46	0.31	0.35	0.40	0.25	0.32	mg/kg	A-T-024s
Nickel _D ^{M#}	57	32	16	12	28	16	29	17	mg/kg	A-T-024s
Selenium _D ^{M#}	2	<1	<1	<1	2	1	2	<1	mg/kg	A-T-024s
Zinc _D ^{M#}	317	113	153	123	153	294	285	237	mg/kg	A-T-024s
Ali >C5-C6 _A [#]	<0.05	<0.05	<0.01	<0.05	<0.05	<0.05	<0.05	<0.05	mg/kg	A-T-022s
Ali >C6-C8 _A [#]	<0.05	<0.05	<0.01	<0.05	<0.05	<0.05	<0.05	<0.05	mg/kg	A-T-022s
Ali >C8-C10 _A [#]	<0.05	<0.05	<0.01	<0.05	<0.05	<0.05	<0.05	<0.05	mg/kg	A-T-022s
Ali >C10-C12 _A [#]	<0.1	<0.1	<0.1	0.2	<0.1	<0.1	<0.1	<0.1	mg/kg	A-T-023s
Ali >C12-C16 _A [#]	<0.1	<0.1	5.3	2.1	3.3	<0.1	<0.1	<0.1	mg/kg	A-T-023s
Ali >C16-C21 _A [#]	<0.1	<0.1	16.6	6.0	9.0	0.5	<0.1	<0.1	mg/kg	A-T-023s
Ali >C21-C35 _A [#]	<0.1	<0.1	131	45.8	37.8	8.0	<0.1	<0.1	mg/kg	A-T-023s
Total Aliphatics _A	<0.1	<0.1	152	54.0	50.1	8.6	<0.1	<0.1	mg/kg	A-T-023s
Aro >C5-C7 _A [#]	<0.05	<0.05	<0.01	<0.05	<0.05	<0.05	<0.05	<0.05	mg/kg	A-T-022s
Aro >C7-C8 _A [#]	<0.05	<0.05	<0.01	<0.05	<0.05	<0.05	<0.05	<0.05	mg/kg	A-T-022s
Aro >C8-C9 _A [#]	<0.05	<0.05	<0.01	<0.05	<0.05	<0.05	<0.05	<0.05	mg/kg	A-T-022s
Aro >C9-C10 _A [#]	<0.05	<0.05	<0.01	<0.05	<0.05	<0.05	<0.05	<0.05	mg/kg	A-T-022s

Envirolab Job Number: 18/00676

Client Project Name: Tir-Bach Washery

Client Project Ref: Not specified

Lab Sample ID	18/00676/17	18/00676/18	18/00676/19	18/00676/20	18/00676/21	18/00676/22	18/00676/23	18/00676/24	Units	Method ref
Client Sample No										
Client Sample ID	TP15	TP15	TP16	TP16	TP16	TP4	TP4	TP4		
Depth to Top	0.40	0.60	0.10	0.30	0.50	0.10	0.40	0.70		
Depth To Bottom										
Date Sampled	18-Jan-18	18-Jan-18	18-Jan-18	18-Jan-18	18-Jan-18	19-Jan-18	19-Jan-18	19-Jan-18		
Sample Type	Soil	Soil	Solid	Soil	Soil	Soil	Soil	Solid		
Sample Matrix Code	4A	4A	7	6A	6A	6A	6A	7		
Aro >C10-C12 _A [#]	0.4	0.1	<0.1	<0.1	<0.1	<0.1	1.6	0.6	mg/kg	A-T-023s
Aro >C12-C16 _A [#]	1.3	2.8	3.1	1.6	1.7	2.0	2.5	0.8	mg/kg	A-T-023s
Aro >C16-C21 _A [#]	11.7	8.3	10.5	7.0	7.3	7.3	5.3	3.4	mg/kg	A-T-023s
Aro >C21-C35 _A [#]	28.9	13.9	98.1	41.0	23.6	9.8	10.6	4.3	mg/kg	A-T-023s
Total Aromatics _A	42.1	25.3	112	49.7	32.5	19.0	20.0	9.1	mg/kg	A-T-023s
TPH (Ali & Aro) _A	42.1	25.3	264	104	82.7	27.6	20.0	9.1	mg/kg	A-T-023s
BTEX - Benzene _A [#]	<0.05	<0.05	<0.01	<0.05	<0.05	<0.05	<0.05	<0.05	mg/kg	A-T-022s
BTEX - Toluene _A [#]	<0.05	<0.05	<0.01	<0.05	<0.05	<0.05	<0.05	<0.05	mg/kg	A-T-022s
BTEX - Ethyl Benzene _A [#]	<0.05	<0.05	<0.01	<0.05	<0.05	<0.05	<0.05	<0.05	mg/kg	A-T-022s
BTEX - m & p Xylene _A [#]	<0.05	<0.05	<0.01	<0.05	<0.05	<0.05	<0.05	<0.05	mg/kg	A-T-022s
BTEX - o Xylene _A [#]	<0.05	<0.05	<0.01	<0.05	<0.05	<0.05	<0.05	<0.05	mg/kg	A-T-022s
MTBE _A [#]	<0.05	<0.05	<0.01	<0.05	<0.05	<0.05	<0.05	<0.05	mg/kg	A-T-022s
Leachate Prep BS EN 12457-1 (2:1) (2 no) _A	-	-	-	-	-	-	-	*		A-T-001
pH (leachable) _A [#]	-	-	-	-	-	-	-	7.64	pH	A-T-031w
Sulphate (leachable) _A [#]	-	-	-	-	-	-	-	17.25	mg/l	A-T-026w
Cyanide (free) (leachable) _A	-	-	-	-	-	-	-	<0.005	mg/l	A-T-042wFCN
Cyanide (total) (leachable) _A	-	-	-	-	-	-	-	<0.005	mg/l	A-T-042wTCN
Thiocyanate (leachable) _A	-	-	-	-	-	-	-	0.3	mg/l	A-T-041w
Phenols (total by HPLC) (leachable) _A	-	-	-	-	-	-	-	<0.01	mg/l	A-T-050w
Sulphide (leachable) _A	-	-	-	-	-	-	-	<0.1	mg/l	A-T-S2-w
Antimony (leachable) _A [#]	-	-	-	-	-	-	-	2	µg/l	A-T-025w
Arsenic (leachable) _A [#]	-	-	-	-	-	-	-	7	µg/l	A-T-025w
Boron (leachable) _A [#]	-	-	-	-	-	-	-	49	µg/l	A-T-025w
Cadmium (leachable) _A [#]	-	-	-	-	-	-	-	<1	µg/l	A-T-025w
Copper (leachable) _A [#]	-	-	-	-	-	-	-	12	µg/l	A-T-025w
Chromium (leachable) _A [#]	-	-	-	-	-	-	-	1	µg/l	A-T-025w
Lead (leachable) _A [#]	-	-	-	-	-	-	-	5	µg/l	A-T-025w
Mercury (leachable) _A [#]	-	-	-	-	-	-	-	<0.1	µg/l	A-T-025w
Nickel (leachable) _A [#]	-	-	-	-	-	-	-	1	µg/l	A-T-025w
Sulphur, Total (leachable) _A	-	-	-	-	-	-	-	6	mg/l	A-T-025w
Zinc (leachable) _A [#]	-	-	-	-	-	-	-	14	µg/l	A-T-025w

Envirolab Job Number: 18/00676

Client Project Name: Tir-Bach Washery

Client Project Ref: Not specified

Lab Sample ID	18/00676/17	18/00676/18	18/00676/19	18/00676/20	18/00676/21	18/00676/22	18/00676/23	18/00676/24	Units	Method ref
Client Sample No										
Client Sample ID	TP15	TP15	TP16	TP16	TP16	TP4	TP4	TP4		
Depth to Top	0.40	0.60	0.10	0.30	0.50	0.10	0.40	0.70		
Depth To Bottom										
Date Sampled	18-Jan-18	18-Jan-18	18-Jan-18	18-Jan-18	18-Jan-18	19-Jan-18	19-Jan-18	19-Jan-18		
Sample Type	Soil	Soil	Solid	Soil	Soil	Soil	Soil	Solid		
Sample Matrix Code	4A	4A	7	6A	6A	6A	6A	7		
PAH 16										
Acenaphthene _A ^{M#}	0.25	0.02	0.42	0.20	0.58	0.31	0.36	0.05	mg/kg	A-T-019s
Acenaphthylene _A ^{M#}	0.51	0.10	0.04	0.04	0.05	0.05	0.06	0.03	mg/kg	A-T-019s
Anthracene _A ^{M#}	1.86	0.64	0.45	0.30	0.70	0.33	0.39	0.20	mg/kg	A-T-019s
Benzo(a)anthracene _A ^{M#}	12.2	2.19	2.09	1.22	1.76	1.02	1.29	0.48	mg/kg	A-T-019s
Benzo(a)pyrene _A ^{M#}	9.27	1.60	1.60	1.13	1.29	0.87	1.11	0.41	mg/kg	A-T-019s
Benzo(b)fluoranthene _A ^{M#}	12.6	2.11	2.13	1.70	2.11	1.35	1.68	0.54	mg/kg	A-T-019s
Benzo(ghi)perylene _A ^{M#}	4.42	0.63	0.86	0.56	0.61	0.45	0.54	0.21	mg/kg	A-T-019s
Benzo(k)fluoranthene _A ^{M#}	4.44	0.76	0.71	0.57	0.71	0.47	0.63	0.21	mg/kg	A-T-019s
Chrysene _A ^{M#}	11.2	1.91	2.12	1.44	1.97	1.20	1.34	0.53	mg/kg	A-T-019s
Dibenzo(ah)anthracene _A ^{M#}	1.46	0.22	0.26	0.18	0.21	0.17	0.18	0.06	mg/kg	A-T-019s
Fluoranthene _A ^{M#}	17.9	3.18	3.58	1.82	3.08	1.45	2.10	0.84	mg/kg	A-T-019s
Fluorene _A ^{M#}	0.30	0.07	0.25	0.17	0.53	0.23	0.26	0.05	mg/kg	A-T-019s
Indeno(123-cd)pyrene _A ^{M#}	6.22	0.87	1.07	0.68	0.84	0.58	0.69	0.22	mg/kg	A-T-019s
Naphthalene _A ^{M#}	0.41	0.11	0.18	0.11	0.17	0.11	0.11	0.03	mg/kg	A-T-019s
Phenanthrene _A ^{M#}	4.74	0.94	1.21	0.87	2.48	1.25	1.52	0.51	mg/kg	A-T-019s
Pyrene _A ^{M#}	15.5	2.49	3.86	1.63	2.14	1.13	1.63	0.73	mg/kg	A-T-019s
PAH (total 16) _A ^{M#}	103	17.9	20.8	12.6	19.2	10.9	13.9	5.12	mg/kg	A-T-019s

Envirolab Job Number: 18/00676

Client Project Name: Tir-Bach Washery

Client Project Ref: Not specified

Lab Sample ID	18/00676/17	18/00676/18	18/00676/19	18/00676/20	18/00676/21	18/00676/22	18/00676/23	18/00676/24	Units	Method ref
Client Sample No										
Client Sample ID	TP15	TP15	TP16	TP16	TP16	TP4	TP4	TP4		
Depth to Top	0.40	0.60	0.10	0.30	0.50	0.10	0.40	0.70		
Depth To Bottom										
Date Sampled	18-Jan-18	18-Jan-18	18-Jan-18	18-Jan-18	18-Jan-18	19-Jan-18	19-Jan-18	19-Jan-18		
Sample Type	Soil	Soil	Solid	Soil	Soil	Soil	Soil	Solid		
Sample Matrix Code	4A	4A	7	6A	6A	6A	6A	7		
PAH 16MS (leachable)										
Acenaphthene (leachable) _A	-	-	-	-	-	-	-	<0.02	µg/l	A-T-019w
Acenaphthylene (leachable) _A	-	-	-	-	-	-	-	<0.02	µg/l	A-T-019w
Anthracene (leachable) _A	-	-	-	-	-	-	-	<0.02	µg/l	A-T-019w
Benzo(a)anthracene (leachable) _A	-	-	-	-	-	-	-	<0.02	µg/l	A-T-019w
Benzo(a)pyrene (leachable) _A	-	-	-	-	-	-	-	<0.02	µg/l	A-T-019w
Benzo(b)fluoranthene (leachable) _A	-	-	-	-	-	-	-	<0.02	µg/l	A-T-019w
Benzo(ghi)perylene (leachable) _A	-	-	-	-	-	-	-	<0.02	µg/l	A-T-019w
Benzo(k)fluoranthene (leachable) _A	-	-	-	-	-	-	-	<0.02	µg/l	A-T-019w
Chrysene (leachable) _A	-	-	-	-	-	-	-	<0.02	µg/l	A-T-019w
Dibenzo(ah)anthracene (leachable) _A	-	-	-	-	-	-	-	<0.02	µg/l	A-T-019w
Fluoranthene (leachable) _A	-	-	-	-	-	-	-	0.03	µg/l	A-T-019w
Fluorene (leachable) _A	-	-	-	-	-	-	-	<0.02	µg/l	A-T-019w
Indeno(123-cd)pyrene (leachable) _A	-	-	-	-	-	-	-	<0.02	µg/l	A-T-019w
Naphthalene (leachable) _A	-	-	-	-	-	-	-	0.09	µg/l	A-T-019w
Phenanthrene (leachable) _A	-	-	-	-	-	-	-	<0.02	µg/l	A-T-019w
Pyrene (leachable) _A	-	-	-	-	-	-	-	0.02	µg/l	A-T-019w
PAH (total 16) (leachable) _A	-	-	-	-	-	-	-	0.14	µg/l	A-T-019w

Envirolab Job Number: 18/00676

Client Project Name: Tir-Bach Washery

Client Project Ref: Not specified

Lab Sample ID	18/00676/17	18/00676/18	18/00676/19	18/00676/20	18/00676/21	18/00676/22	18/00676/23	18/00676/24	Units	Method ref
Client Sample No										
Client Sample ID	TP15	TP15	TP16	TP16	TP16	TP4	TP4	TP4		
Depth to Top	0.40	0.60	0.10	0.30	0.50	0.10	0.40	0.70		
Depth To Bottom										
Date Sampled	18-Jan-18	18-Jan-18	18-Jan-18	18-Jan-18	18-Jan-18	19-Jan-18	19-Jan-18	19-Jan-18		
Sample Type	Soil	Soil	Solid	Soil	Soil	Soil	Soil	Solid		
Sample Matrix Code	4A	4A	7	6A	6A	6A	6A	7		
TPH CWG (leachable)										
Ali >C5-C6 (leachable) _A	-	-	-	-	-	-	-	1	µg/l	A-T-022w
Ali >C6-C8 (leachable) _A	-	-	-	-	-	-	-	<1	µg/l	A-T-022w
Ali >C8-C10 (leachable) _A	-	-	-	-	-	-	-	<1	µg/l	A-T-022w
Ali >C10-C12 (leachable) _A	-	-	-	-	-	-	-	<10	µg/l	A-T-023w
Ali >C12-C16 (leachable) _A	-	-	-	-	-	-	-	<10	µg/l	A-T-023w
Ali >C16-C21 (leachable) _A	-	-	-	-	-	-	-	<10	µg/l	A-T-023w
Ali >C21-C35 (leachable) _A	-	-	-	-	-	-	-	<10	µg/l	A-T-023w
Total Aliphatics (leachable) _A	-	-	-	-	-	-	-	<10	µg/l	A-T-023w
Aro >C5-C7 (leachable) _A	-	-	-	-	-	-	-	<1	µg/l	A-T-022w
Aro >C7-C8 (leachable) _A	-	-	-	-	-	-	-	<1	µg/l	A-T-022w
Aro >C8-C9 (leachable) _A	-	-	-	-	-	-	-	<1	µg/l	A-T-022w
Aro >C9-C10 (leachable) _A	-	-	-	-	-	-	-	<1	µg/l	A-T-022w
Aro >C10-C12 (leachable) _A	-	-	-	-	-	-	-	<10	µg/l	A-T-023w
Aro >C12-C16 (leachable) _A	-	-	-	-	-	-	-	<10	µg/l	A-T-023w
Aro >C16-C21 (leachable) _A	-	-	-	-	-	-	-	<10	µg/l	A-T-023w
Aro >C21-C35 (leachable) _A	-	-	-	-	-	-	-	<10	µg/l	A-T-023w
Total Aromatics (leachable) _A	-	-	-	-	-	-	-	<10	µg/l	A-T-023w
TPH (Ali & Aro) (leachable) _A	-	-	-	-	-	-	-	<10	µg/l	A-T-023w
BTEX - Benzene (leachable) _A	-	-	-	-	-	-	-	<1	µg/l	A-T-022w
BTEX - Toluene (leachable) _A	-	-	-	-	-	-	-	<1	µg/l	A-T-022w
BTEX - Ethyl Benzene (leachable) _A	-	-	-	-	-	-	-	<1	µg/l	A-T-022w
BTEX - o Xylene (leachable) _A	-	-	-	-	-	-	-	<1	µg/l	A-T-022w
BTEX - m & p Xylene (leachable) _A	-	-	-	-	-	-	-	<1	µg/l	A-T-022w
MTBE (leachable) _A	-	-	-	-	-	-	-	1	µg/l	A-T-022w

Envirolab Job Number: 18/00676

Client Project Name: Tir-Bach Washery

Client Project Ref: Not specified

Lab Sample ID	18/00676/25	18/00676/26	18/00676/27	18/00676/28	18/00676/29	18/00676/30	18/00676/31	18/00676/32	Units	Method ref
Client Sample No										
Client Sample ID	TP5	TP5	TP5	TP6	TP6	TP6	TP7	TP7		
Depth to Top	0.10	0.40	0.70	0.10	0.40	0.70	0.10	0.40		
Depth To Bottom										
Date Sampled	19-Jan-18	19-Jan-18	19-Jan-18	19-Jan-18	19-Jan-18	19-Jan-18	19-Jan-18	19-Jan-18		
Sample Type	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil		
Sample Matrix Code	4A	4A	6A	6A	3A	6A	6A	6A		
% Stones >10mm _A	<0.1	34.1	30.7	18.3	24.5	11.4	14.9	29.8	% w/w	A-T-044
pH _D	9.21	8.41	8.53	8.26	8.01	8.08	7.89	8.00	pH	A-T-031s
Sulphate (water sol 2:1) _D ^{M#}	0.08	<0.01	0.02	0.02	0.04	0.07	0.04	0.04	g/l	A-T-026s
Sulphate (acid soluble) _D ^{M#}	1000	680	880	450	500	810	300	<200	mg/kg	A-T-028s
Sulphur (total) _D	882	349	425	289	1040	531	180	145	mg/kg	A-T-024s
Cyanide (free) _A ^{M#}	<1	<1	<1	<1	<1	<1	<1	<1	mg/kg	A-T-042sFCN
Cyanide (total) _A ^{M#}	<1	<1	<1	<1	<1	<1	<1	4	mg/kg	A-T-042sTCN
Thiocyanate _A	<5	<5	<5	<5	<5	<5	<5	<5	mg/kg	A-T-041s
Phenols - Total by HPLC _A	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	mg/kg	A-T-050s
Sulphide _A	<5	<5	<5	<5	<5	<5	8	6	mg/kg	A-T-S2-s
Arsenic _D ^{M#}	6	14	67	<1	<1	<1	<1	<1	mg/kg	A-T-024s
Boron (water soluble) _D ^{M#}	1.2	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	mg/kg	A-T-027s
Cadmium _D ^{M#}	1.1	1.2	2.3	1.0	0.8	1.1	0.9	0.6	mg/kg	A-T-024s
Copper _D ^{M#}	92	79	93	42	42	57	32	28	mg/kg	A-T-024s
Chromium _D ^{M#}	12	11	10	9	8	11	7	9	mg/kg	A-T-024s
Chromium (hexavalent) _D	<1	<1	<1	<1	<1	<1	<1	<1	mg/kg	A-T-040s
Lead _D ^{M#}	85	189	575	42	44	67	24	18	mg/kg	A-T-024s
Mercury _D	0.73	0.30	0.27	<0.17	<0.17	<0.17	<0.17	<0.17	mg/kg	A-T-024s
Nickel _D ^{M#}	20	16	17	30	28	37	36	32	mg/kg	A-T-024s
Selenium _D ^{M#}	<1	1	1	2	2	3	2	1	mg/kg	A-T-024s
Zinc _D ^{M#}	165	326	1000	99	96	123	84	62	mg/kg	A-T-024s
Ali >C5-C6 _A [#]	<0.01	<0.01	<0.01	<0.05	<0.05	<0.05	<0.05	<0.05	mg/kg	A-T-022s
Ali >C6-C8 _A [#]	<0.01	<0.01	<0.01	<0.05	<0.05	<0.05	<0.05	<0.05	mg/kg	A-T-022s
Ali >C8-C10 _A [#]	<0.01	<0.01	<0.01	<0.05	<0.05	<0.05	<0.05	<0.05	mg/kg	A-T-022s
Ali >C10-C12 _A [#]	<0.1	0.2	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	mg/kg	A-T-023s
Ali >C12-C16 _A [#]	2.1	3.1	<0.1	<0.1	1.6	<0.1	0.5	<0.1	mg/kg	A-T-023s
Ali >C16-C21 _A [#]	6.2	9.6	0.2	0.4	4.1	<0.1	4.1	<0.1	mg/kg	A-T-023s
Ali >C21-C35 _A [#]	26.9	76.1	12.6	12.9	13.4	<0.1	12.3	<0.1	mg/kg	A-T-023s
Total Aliphatics _A	35.4	89.1	12.7	13.3	19.0	<0.1	16.9	<0.1	mg/kg	A-T-023s
Aro >C5-C7 _A [#]	<0.01	<0.01	<0.01	<0.05	<0.05	<0.05	<0.05	<0.05	mg/kg	A-T-022s
Aro >C7-C8 _A [#]	<0.01	<0.01	<0.01	<0.05	<0.05	<0.05	<0.05	<0.05	mg/kg	A-T-022s
Aro >C8-C9 _A [#]	<0.01	<0.01	<0.01	<0.05	<0.05	<0.05	<0.05	<0.05	mg/kg	A-T-022s
Aro >C9-C10 _A [#]	<0.01	<0.01	<0.01	<0.05	<0.05	<0.05	<0.05	<0.05	mg/kg	A-T-022s

Envirolab Job Number: 18/00676

Client Project Name: Tir-Bach Washery

Client Project Ref: Not specified

Lab Sample ID	18/00676/25	18/00676/26	18/00676/27	18/00676/28	18/00676/29	18/00676/30	18/00676/31	18/00676/32	Units	Method ref
Client Sample No										
Client Sample ID	TP5	TP5	TP5	TP6	TP6	TP6	TP7	TP7		
Depth to Top	0.10	0.40	0.70	0.10	0.40	0.70	0.10	0.40		
Depth To Bottom										
Date Sampled	19-Jan-18	19-Jan-18	19-Jan-18	19-Jan-18	19-Jan-18	19-Jan-18	19-Jan-18	19-Jan-18		
Sample Type	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil		
Sample Matrix Code	4A	4A	6A	6A	3A	6A	6A	6A		
Aro >C10-C12 _A [#]	1.7	0.1	0.2	<0.1	0.2	<0.1	<0.1	<0.1	mg/kg	A-T-023s
Aro >C12-C16 _A [#]	3.5	1.1	1.1	0.5	0.7	0.2	<0.1	<0.1	mg/kg	A-T-023s
Aro >C16-C21 _A [#]	27.7	9.8	5.5	3.6	3.5	1.4	<0.1	<0.1	mg/kg	A-T-023s
Aro >C21-C35 _A [#]	79.2	57.9	16.1	4.4	2.5	2.4	<0.1	<0.1	mg/kg	A-T-023s
Total Aromatics _A	112	68.9	22.9	8.4	6.9	4.0	<0.1	<0.1	mg/kg	A-T-023s
TPH (Ali & Aro) _A	147	158	35.7	21.7	25.8	4.0	16.9	<0.1	mg/kg	A-T-023s
BTEX - Benzene _A [#]	<0.01	<0.01	<0.01	<0.05	<0.05	<0.05	<0.05	<0.05	mg/kg	A-T-022s
BTEX - Toluene _A [#]	<0.01	<0.01	<0.01	<0.05	<0.05	<0.05	<0.05	<0.05	mg/kg	A-T-022s
BTEX - Ethyl Benzene _A [#]	<0.01	<0.01	<0.01	<0.05	<0.05	<0.05	<0.05	<0.05	mg/kg	A-T-022s
BTEX - m & p Xylene _A [#]	<0.01	<0.01	<0.01	<0.05	<0.05	<0.05	<0.05	<0.05	mg/kg	A-T-022s
BTEX - o Xylene _A [#]	<0.01	<0.01	<0.01	<0.05	<0.05	<0.05	<0.05	<0.05	mg/kg	A-T-022s
MTBE _A [#]	<0.01	<0.01	<0.01	<0.05	<0.05	<0.05	<0.05	<0.05	mg/kg	A-T-022s
Leachate Prep BS EN 12457-1 (2:1) (2 no) _A	-	-	*	-	-	*	-	-		A-T-001
pH (leachable) _A [#]	-	-	8.42	-	-	7.83	-	-	pH	A-T-031w
Sulphate (leachable) _A [#]	-	-	18.08	-	-	25.57	-	-	mg/l	A-T-026w
Cyanide (free) (leachable) _A	-	-	<0.005	-	-	<0.005	-	-	mg/l	A-T-042wFCN
Cyanide (total) (leachable) _A	-	-	<0.005	-	-	<0.005	-	-	mg/l	A-T-042wTCN
Thiocyanate (leachable) _A	-	-	<0.1	-	-	<0.1	-	-	mg/l	A-T-041w
Phenols (total by HPLC) (leachable) _A	-	-	<0.01	-	-	<0.01	-	-	mg/l	A-T-050w
Sulphide (leachable) _A	-	-	<0.1	-	-	<0.1	-	-	mg/l	A-T-S2-w
Antimony (leachable) _A [#]	-	-	1	-	-	<1	-	-	µg/l	A-T-025w
Arsenic (leachable) _A [#]	-	-	47	-	-	<1	-	-	µg/l	A-T-025w
Boron (leachable) _A [#]	-	-	50	-	-	21	-	-	µg/l	A-T-025w
Cadmium (leachable) _A [#]	-	-	<1	-	-	<1	-	-	µg/l	A-T-025w
Copper (leachable) _A [#]	-	-	23	-	-	<1	-	-	µg/l	A-T-025w
Chromium (leachable) _A [#]	-	-	3	-	-	<1	-	-	µg/l	A-T-025w
Lead (leachable) _A [#]	-	-	157	-	-	<1	-	-	µg/l	A-T-025w
Mercury (leachable) _A [#]	-	-	<0.1	-	-	<0.1	-	-	µg/l	A-T-025w
Nickel (leachable) _A [#]	-	-	2	-	-	<1	-	-	µg/l	A-T-025w
Sulphur, Total (leachable) _A	-	-	6	-	-	9	-	-	mg/l	A-T-025w
Zinc (leachable) _A [#]	-	-	50	-	-	10	-	-	µg/l	A-T-025w

Envirolab Job Number: 18/00676

Client Project Name: Tir-Bach Washery

Client Project Ref: Not specified

Lab Sample ID	18/00676/25	18/00676/26	18/00676/27	18/00676/28	18/00676/29	18/00676/30	18/00676/31	18/00676/32	Units	Method ref
Client Sample No										
Client Sample ID	TP5	TP5	TP5	TP6	TP6	TP6	TP7	TP7		
Depth to Top	0.10	0.40	0.70	0.10	0.40	0.70	0.10	0.40		
Depth To Bottom										
Date Sampled	19-Jan-18	19-Jan-18	19-Jan-18	19-Jan-18	19-Jan-18	19-Jan-18	19-Jan-18	19-Jan-18		
Sample Type	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil		
Sample Matrix Code	4A	4A	6A	6A	3A	6A	6A	6A		
PAH 16										
Acenaphthene _A ^{M#}	0.76	0.29	1.00	0.02	0.03	0.01	<0.01	<0.01	mg/kg	A-T-019s
Acenaphthylene _A ^{M#}	0.06	0.05	0.04	<0.01	<0.01	0.01	<0.01	<0.01	mg/kg	A-T-019s
Anthracene _A ^{M#}	0.75	0.36	1.08	0.05	0.06	0.06	<0.02	<0.02	mg/kg	A-T-019s
Benzo(a)anthracene _A ^{M#}	3.24	1.84	3.08	0.16	0.22	0.20	<0.04	<0.04	mg/kg	A-T-019s
Benzo(a)pyrene _A ^{M#}	2.33	1.30	1.80	0.13	0.13	0.16	<0.04	<0.04	mg/kg	A-T-019s
Benzo(b)fluoranthene _A ^{M#}	3.22	1.80	2.45	0.22	0.25	0.26	<0.05	<0.05	mg/kg	A-T-019s
Benzo(ghi)perylene _A ^{M#}	1.11	0.59	0.65	0.07	<0.05	0.08	<0.05	<0.05	mg/kg	A-T-019s
Benzo(k)fluoranthene _A ^{M#}	1.20	0.71	0.91	0.07	0.10	0.11	<0.07	<0.07	mg/kg	A-T-019s
Chrysene _A ^{M#}	3.31	1.85	2.88	0.22	0.31	0.27	<0.06	<0.06	mg/kg	A-T-019s
Dibenzo(ah)anthracene _A ^{M#}	0.32	0.18	0.22	<0.04	<0.04	<0.04	<0.04	<0.04	mg/kg	A-T-019s
Fluoranthene _A ^{M#}	5.68	3.87	6.33	0.23	0.57	0.36	<0.08	<0.08	mg/kg	A-T-019s
Fluorene _A ^{M#}	0.35	0.17	0.71	0.02	0.03	0.02	<0.01	<0.01	mg/kg	A-T-019s
Indeno(123-cd)pyrene _A ^{M#}	1.36	0.77	0.92	0.09	0.05	0.09	<0.03	<0.03	mg/kg	A-T-019s
Naphthalene _A ^{M#}	0.17	0.06	4.40	0.04	0.06	<0.03	<0.03	<0.03	mg/kg	A-T-019s
Phenanthrene _A ^{M#}	2.90	1.32	4.40	0.18	0.29	0.25	0.04	<0.03	mg/kg	A-T-019s
Pyrene _A ^{M#}	4.73	3.27	5.09	0.20	0.38	0.25	<0.07	<0.07	mg/kg	A-T-019s
PAH (total 16) _A ^{M#}	31.5	18.4	36	1.71	2.52	2.15	<0.08	<0.08	mg/kg	A-T-019s

Envirolab Job Number: 18/00676

Client Project Name: Tir-Bach Washery

Client Project Ref: Not specified

Lab Sample ID	18/00676/25	18/00676/26	18/00676/27	18/00676/28	18/00676/29	18/00676/30	18/00676/31	18/00676/32	Units	Method ref
Client Sample No										
Client Sample ID	TP5	TP5	TP5	TP6	TP6	TP6	TP7	TP7		
Depth to Top	0.10	0.40	0.70	0.10	0.40	0.70	0.10	0.40		
Depth To Bottom										
Date Sampled	19-Jan-18	19-Jan-18	19-Jan-18	19-Jan-18	19-Jan-18	19-Jan-18	19-Jan-18	19-Jan-18		
Sample Type	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil		
Sample Matrix Code	4A	4A	6A	6A	3A	6A	6A	6A		
PAH 16MS (leachable)										
Acenaphthene (leachable) _A	-	-	0.04	-	-	<0.02	-	-	µg/l	A-T-019w
Acenaphthylene (leachable) _A	-	-	<0.02	-	-	<0.02	-	-	µg/l	A-T-019w
Anthracene (leachable) _A	-	-	0.20	-	-	<0.02	-	-	µg/l	A-T-019w
Benzo(a)anthracene (leachable) _A	-	-	0.06	-	-	<0.02	-	-	µg/l	A-T-019w
Benzo(a)pyrene (leachable) _A	-	-	0.03	-	-	<0.02	-	-	µg/l	A-T-019w
Benzo(b)fluoranthene (leachable) _A	-	-	0.04	-	-	<0.02	-	-	µg/l	A-T-019w
Benzo(ghi)perylene (leachable) _A	-	-	<0.02	-	-	<0.02	-	-	µg/l	A-T-019w
Benzo(k)fluoranthene (leachable) _A	-	-	<0.02	-	-	<0.02	-	-	µg/l	A-T-019w
Chrysene (leachable) _A	-	-	0.07	-	-	<0.02	-	-	µg/l	A-T-019w
Dibenzo(ah)anthracene (leachable) _A	-	-	<0.02	-	-	<0.02	-	-	µg/l	A-T-019w
Fluoranthene (leachable) _A	-	-	0.14	-	-	0.03	-	-	µg/l	A-T-019w
Fluorene (leachable) _A	-	-	0.08	-	-	<0.02	-	-	µg/l	A-T-019w
Indeno(123-cd)pyrene (leachable) _A	-	-	<0.02	-	-	<0.02	-	-	µg/l	A-T-019w
Naphthalene (leachable) _A	-	-	0.07	-	-	0.09	-	-	µg/l	A-T-019w
Phenanthrene (leachable) _A	-	-	0.46	-	-	<0.02	-	-	µg/l	A-T-019w
Pyrene (leachable) _A	-	-	0.13	-	-	0.02	-	-	µg/l	A-T-019w
PAH (total 16) (leachable) _A	-	-	1.32	-	-	0.14	-	-	µg/l	A-T-019w

Envirolab Job Number: 18/00676

Client Project Name: Tir-Bach Washery

Client Project Ref: Not specified

Lab Sample ID	18/00676/25	18/00676/26	18/00676/27	18/00676/28	18/00676/29	18/00676/30	18/00676/31	18/00676/32	Units	Method ref
Client Sample No										
Client Sample ID	TP5	TP5	TP5	TP6	TP6	TP6	TP7	TP7		
Depth to Top	0.10	0.40	0.70	0.10	0.40	0.70	0.10	0.40		
Depth To Bottom										
Date Sampled	19-Jan-18	19-Jan-18	19-Jan-18	19-Jan-18	19-Jan-18	19-Jan-18	19-Jan-18	19-Jan-18		
Sample Type	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil		
Sample Matrix Code	4A	4A	6A	6A	3A	6A	6A	6A		
TPH CWG (leachable)										
Ali >C5-C6 (leachable) _A	-	-	6	-	-	<1	-	-	µg/l	A-T-022w
Ali >C6-C8 (leachable) _A	-	-	2	-	-	<1	-	-	µg/l	A-T-022w
Ali >C8-C10 (leachable) _A	-	-	<1	-	-	<1	-	-	µg/l	A-T-022w
Ali >C10-C12 (leachable) _A	-	-	<10	-	-	<10	-	-	µg/l	A-T-023w
Ali >C12-C16 (leachable) _A	-	-	96	-	-	<10	-	-	µg/l	A-T-023w
Ali >C16-C21 (leachable) _A	-	-	1542	-	-	<10	-	-	µg/l	A-T-023w
Ali >C21-C35 (leachable) _A	-	-	1225	-	-	<10	-	-	µg/l	A-T-023w
Total Aliphatics (leachable) _A	-	-	2870	-	-	<10	-	-	µg/l	A-T-023w
Aro >C5-C7 (leachable) _A	-	-	<1	-	-	<1	-	-	µg/l	A-T-022w
Aro >C7-C8 (leachable) _A	-	-	<1	-	-	<1	-	-	µg/l	A-T-022w
Aro >C8-C9 (leachable) _A	-	-	<1	-	-	<1	-	-	µg/l	A-T-022w
Aro >C9-C10 (leachable) _A	-	-	<1	-	-	<1	-	-	µg/l	A-T-022w
Aro >C10-C12 (leachable) _A	-	-	<10	-	-	<10	-	-	µg/l	A-T-023w
Aro >C12-C16 (leachable) _A	-	-	<10	-	-	<10	-	-	µg/l	A-T-023w
Aro >C16-C21 (leachable) _A	-	-	251	-	-	<10	-	-	µg/l	A-T-023w
Aro >C21-C35 (leachable) _A	-	-	265	-	-	<10	-	-	µg/l	A-T-023w
Total Aromatics (leachable) _A	-	-	516	-	-	<10	-	-	µg/l	A-T-023w
TPH (Ali & Aro) (leachable) _A	-	-	3386	-	-	<10	-	-	µg/l	A-T-023w
BTEX - Benzene (leachable) _A	-	-	<1	-	-	<1	-	-	µg/l	A-T-022w
BTEX - Toluene (leachable) _A	-	-	<1	-	-	<1	-	-	µg/l	A-T-022w
BTEX - Ethyl Benzene (leachable) _A	-	-	<1	-	-	<1	-	-	µg/l	A-T-022w
BTEX - o Xylene (leachable) _A	-	-	<1	-	-	<1	-	-	µg/l	A-T-022w
BTEX - m & p Xylene (leachable) _A	-	-	<1	-	-	<1	-	-	µg/l	A-T-022w
MTBE (leachable) _A	-	-	2	-	-	<1	-	-	µg/l	A-T-022w

Envirolab Job Number: 18/00676

Client Project Name: Tir-Bach Washery

Client Project Ref: Not specified

Lab Sample ID	18/00676/33	18/00676/34	18/00676/35	18/00676/36	18/00676/37	18/00676/38	18/00676/39	18/00676/40	Units	Method ref
Client Sample No										
Client Sample ID	TP7	TP8	TP8	TP8	TP9	TP9	TP9	TP10		
Depth to Top	0.60	0.10	0.40	0.60	0.10	0.40	0.60	0.10		
Depth To Bottom										
Date Sampled	19-Jan-18	19-Jan-18	19-Jan-18	19-Jan-18	19-Jan-18	19-Jan-18	19-Jan-18	19-Jan-18		
Sample Type	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil		
Sample Matrix Code	6A	6A	6A	6A	6A	4A	4A	4A		
% Stones >10mm _A	27.2	14.2	16.6	23.1	8.2	10.7	14.5	8.2	% w/w	A-T-044
pH _D	7.99	8.21	8.25	8.28	8.21	8.08	7.90	8.21	pH	A-T-031s
Sulphate (water sol 2:1) _D ^{M#}	0.01	0.02	0.04	0.02	0.07	0.17	0.40	<0.01	g/l	A-T-026s
Sulphate (acid soluble) _D ^{M#}	<200	440	390	430	770	1200	2000	500	mg/kg	A-T-028s
Sulphur (total) _D	110	646	814	345	532	883	1280	419	mg/kg	A-T-024s
Cyanide (free) _A ^{M#}	<1	<1	<1	<1	<1	<1	<1	<1	mg/kg	A-T-042sFCN
Cyanide (total) _A ^{M#}	<1	<1	<1	<1	<1	<1	<1	<1	mg/kg	A-T-042sTCN
Thiocyanate _A	<5	<5	<5	<5	<5	<5	<5	<5	mg/kg	A-T-041s
Phenols - Total by HPLC _A	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	mg/kg	A-T-050s
Sulphide _A	<5	<5	<5	<5	<5	<5	<5	<5	mg/kg	A-T-S2-s
Arsenic _D ^{M#}	<1	2	<1	<1	<1	6	2	<1	mg/kg	A-T-024s
Boron (water soluble) _D ^{M#}	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	mg/kg	A-T-027s
Cadmium _D ^{M#}	0.7	0.9	0.8	0.7	1.0	1.6	0.9	1.3	mg/kg	A-T-024s
Copper _D ^{M#}	30	45	36	37	56	111	78	53	mg/kg	A-T-024s
Chromium _D ^{M#}	5	9	8	6	11	18	12	10	mg/kg	A-T-024s
Chromium (hexavalent) _D	<1	<1	<1	<1	<1	<1	<1	<1	mg/kg	A-T-040s
Lead _D ^{M#}	22	59	29	36	99	240	65	31	mg/kg	A-T-024s
Mercury _D	<0.17	<0.17	<0.17	<0.17	<0.17	0.26	0.20	0.18	mg/kg	A-T-024s
Nickel _D ^{M#}	31	31	31	27	28	35	33	27	mg/kg	A-T-024s
Selenium _D ^{M#}	2	2	2	2	2	3	2	3	mg/kg	A-T-024s
Zinc _D ^{M#}	87	130	83	98	136	319	129	175	mg/kg	A-T-024s
Ali >C5-C6 _A [#]	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	mg/kg	A-T-022s
Ali >C6-C8 _A [#]	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	mg/kg	A-T-022s
Ali >C8-C10 _A [#]	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	mg/kg	A-T-022s
Ali >C10-C12 _A [#]	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	0.3	<0.1	mg/kg	A-T-023s
Ali >C12-C16 _A [#]	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	1.4	<0.1	mg/kg	A-T-023s
Ali >C16-C21 _A [#]	<0.1	<0.1	<0.1	<0.1	<0.1	0.4	1.6	<0.1	mg/kg	A-T-023s
Ali >C21-C35 _A [#]	<0.1	<0.1	<0.1	<0.1	<0.1	17.5	<0.1	<0.1	mg/kg	A-T-023s
Total Aliphatics _A	<0.1	<0.1	<0.1	<0.1	<0.1	17.9	3.4	<0.1	mg/kg	A-T-023s
Aro >C5-C7 _A [#]	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	mg/kg	A-T-022s
Aro >C7-C8 _A [#]	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	mg/kg	A-T-022s
Aro >C8-C9 _A [#]	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	mg/kg	A-T-022s
Aro >C9-C10 _A [#]	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	mg/kg	A-T-022s

Envirolab Job Number: 18/00676

Client Project Name: Tir-Bach Washery

Client Project Ref: Not specified

Lab Sample ID	18/00676/33	18/00676/34	18/00676/35	18/00676/36	18/00676/37	18/00676/38	18/00676/39	18/00676/40	Units	Method ref
Client Sample No										
Client Sample ID	TP7	TP8	TP8	TP8	TP9	TP9	TP9	TP10		
Depth to Top	0.60	0.10	0.40	0.60	0.10	0.40	0.60	0.10		
Depth To Bottom										
Date Sampled	19-Jan-18	19-Jan-18	19-Jan-18	19-Jan-18	19-Jan-18	19-Jan-18	19-Jan-18	19-Jan-18		
Sample Type	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil		
Sample Matrix Code	6A	6A	6A	6A	6A	4A	4A	4A		
Aro >C10-C12 _A [#]	<0.1	<0.1	<0.1	<0.1	<0.1	0.4	1.4	0.4	mg/kg	A-T-023s
Aro >C12-C16 _A [#]	<0.1	0.3	<0.1	0.3	0.4	2.2	2.3	1.4	mg/kg	A-T-023s
Aro >C16-C21 _A [#]	<0.1	3.3	<0.1	1.9	2.2	7.8	7.2	5.8	mg/kg	A-T-023s
Aro >C21-C35 _A [#]	<0.1	3.1	<0.1	2.4	2.5	14.0	27.5	17.3	mg/kg	A-T-023s
Total Aromatics _A	<0.1	6.7	<0.1	4.5	5.2	24.4	38.4	24.9	mg/kg	A-T-023s
TPH (Ali & Aro) _A	<0.1	6.7	<0.1	4.5	5.2	42.3	41.8	24.9	mg/kg	A-T-023s
BTEX - Benzene _A [#]	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	mg/kg	A-T-022s
BTEX - Toluene _A [#]	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	mg/kg	A-T-022s
BTEX - Ethyl Benzene _A [#]	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	mg/kg	A-T-022s
BTEX - m & p Xylene _A [#]	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	mg/kg	A-T-022s
BTEX - o Xylene _A [#]	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	mg/kg	A-T-022s
MTBE _A [#]	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	mg/kg	A-T-022s

Envirolab Job Number: 18/00676

Client Project Name: Tir-Bach Washery

Client Project Ref: Not specified

Lab Sample ID	18/00676/33	18/00676/34	18/00676/35	18/00676/36	18/00676/37	18/00676/38	18/00676/39	18/00676/40	Units	Method ref
Client Sample No										
Client Sample ID	TP7	TP8	TP8	TP8	TP9	TP9	TP9	TP10		
Depth to Top	0.60	0.10	0.40	0.60	0.10	0.40	0.60	0.10		
Depth To Bottom										
Date Sampled	19-Jan-18	19-Jan-18	19-Jan-18	19-Jan-18	19-Jan-18	19-Jan-18	19-Jan-18	19-Jan-18		
Sample Type	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil		
Sample Matrix Code	6A	6A	6A	6A	6A	4A	4A	4A		
PAH 16										
Acenaphthene _A ^{M#}	<0.01	0.03	0.03	0.08	0.04	0.09	0.03	0.02	mg/kg	A-T-019s
Acenaphthylene _A ^{M#}	<0.01	<0.01	<0.01	<0.01	0.01	0.03	<0.01	0.03	mg/kg	A-T-019s
Anthracene _A ^{M#}	<0.02	0.05	0.05	0.08	0.06	0.18	0.04	0.07	mg/kg	A-T-019s
Benzo(a)anthracene _A ^{M#}	<0.04	0.17	0.16	0.24	0.25	0.45	0.16	0.76	mg/kg	A-T-019s
Benzo(a)pyrene _A ^{M#}	<0.04	0.13	0.12	0.18	0.20	0.32	0.17	0.72	mg/kg	A-T-019s
Benzo(b)fluoranthene _A ^{M#}	<0.05	0.24	0.21	0.29	0.33	0.59	0.22	0.87	mg/kg	A-T-019s
Benzo(ghi)perylene _A ^{M#}	<0.05	0.07	<0.05	0.07	0.08	0.11	0.09	0.63	mg/kg	A-T-019s
Benzo(k)fluoranthene _A ^{M#}	<0.07	0.10	0.08	0.13	0.15	0.23	0.07	0.33	mg/kg	A-T-019s
Chrysene _A ^{M#}	<0.06	0.26	0.22	0.31	0.37	0.64	0.25	0.89	mg/kg	A-T-019s
Dibenzo(ah)anthracene _A ^{M#}	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	0.05	0.22	mg/kg	A-T-019s
Fluoranthene _A ^{M#}	<0.08	0.29	0.32	0.44	0.53	0.91	0.24	1.09	mg/kg	A-T-019s
Fluorene _A ^{M#}	<0.01	0.02	0.02	0.05	0.03	0.11	0.04	0.02	mg/kg	A-T-019s
Indeno(123-cd)pyrene _A ^{M#}	<0.03	0.07	0.05	0.07	0.10	0.13	0.12	0.79	mg/kg	A-T-019s
Naphthalene _A ^{M#}	<0.03	0.04	0.04	0.04	0.04	0.16	0.09	0.06	mg/kg	A-T-019s
Phenanthrene _A ^{M#}	<0.03	0.18	0.17	0.28	0.34	0.59	0.26	0.36	mg/kg	A-T-019s
Pyrene _A ^{M#}	<0.07	0.25	0.31	0.39	0.42	0.69	0.20	0.94	mg/kg	A-T-019s
PAH (total 16) _A ^{M#}	<0.08	1.89	1.83	2.64	2.98	5.26	2.05	7.80	mg/kg	A-T-019s

Envirolab Job Number: 18/00676

Client Project Name: Tir-Bach Washery

Client Project Ref: Not specified

Lab Sample ID	18/00676/41	18/00676/42							Units	Method ref
Client Sample No										
Client Sample ID	TP10	TP10								
Depth to Top	0.50	0.60								
Depth To Bottom										
Date Sampled	19-Jan-18	19-Jan-18								
Sample Type	Soil	Soil								
Sample Matrix Code	4A	4A								
% Stones >10mm _A	4.4	27.8							% w/w	A-T-044
pH _D	7.98	7.06							pH	A-T-031s
Sulphate (water sol 2:1) _D ^{M#}	0.16	0.12							g/l	A-T-026s
Sulphate (acid soluble) _D ^{M#}	21000	14000							mg/kg	A-T-028s
Sulphur (total) _D	7350	4550							mg/kg	A-T-024s
Cyanide (free) _A ^{M#}	<1	<1							mg/kg	A-T-042sFCN
Cyanide (total) _A ^{M#}	<1	<1							mg/kg	A-T-042sTCN
Thiocyanate _A	<5	<5							mg/kg	A-T-041s
Phenols - Total by HPLC _A	<0.2	<0.2							mg/kg	A-T-050s
Sulphide _A	<5	<5							mg/kg	A-T-S2-s
Arsenic _D ^{M#}	163	28							mg/kg	A-T-024s
Boron (water soluble) _D ^{M#}	<1.0	<1.0							mg/kg	A-T-027s
Cadmium _D ^{M#}	3.7	0.9							mg/kg	A-T-024s
Copper _D ^{M#}	117	35							mg/kg	A-T-024s
Chromium _D ^{M#}	12	4							mg/kg	A-T-024s
Chromium (hexavalent) _D	<1	<1							mg/kg	A-T-040s
Lead _D ^{M#}	95	40							mg/kg	A-T-024s
Mercury _D	<0.17	<0.17							mg/kg	A-T-024s
Nickel _D ^{M#}	111	17							mg/kg	A-T-024s
Selenium _D ^{M#}	6	1							mg/kg	A-T-024s
Zinc _D ^{M#}	445	33							mg/kg	A-T-024s
Ali >C5-C6 _A [#]	<0.05	<0.05							mg/kg	A-T-022s
Ali >C6-C8 _A [#]	<0.05	<0.05							mg/kg	A-T-022s
Ali >C8-C10 _A [#]	<0.05	<0.05							mg/kg	A-T-022s
Ali >C10-C12 _A [#]	<0.1	<0.1							mg/kg	A-T-023s
Ali >C12-C16 _A [#]	<0.1	<0.1							mg/kg	A-T-023s
Ali >C16-C21 _A [#]	<0.1	<0.1							mg/kg	A-T-023s
Ali >C21-C35 _A [#]	57.6	<0.1							mg/kg	A-T-023s
Total Aliphatics _A	57.6	<0.1							mg/kg	A-T-023s
Aro >C5-C7 _A [#]	<0.05	<0.05							mg/kg	A-T-022s
Aro >C7-C8 _A [#]	<0.05	<0.05							mg/kg	A-T-022s
Aro >C8-C9 _A [#]	<0.05	<0.05							mg/kg	A-T-022s
Aro >C9-C10 _A [#]	<0.05	<0.05							mg/kg	A-T-022s

Envirolab Job Number: 18/00676

Client Project Name: Tir-Bach Washery

Client Project Ref: Not specified

Lab Sample ID	18/00676/41	18/00676/42							Units	Method ref
Client Sample No										
Client Sample ID	TP10	TP10								
Depth to Top	0.50	0.60								
Depth To Bottom										
Date Sampled	19-Jan-18	19-Jan-18								
Sample Type	Soil	Soil								
Sample Matrix Code	4A	4A								
Aro >C10-C12 _A [#]	0.1	<0.1							mg/kg	A-T-023s
Aro >C12-C16 _A [#]	0.5	<0.1							mg/kg	A-T-023s
Aro >C16-C21 _A [#]	5.7	<0.1							mg/kg	A-T-023s
Aro >C21-C35 _A [#]	74.4	<0.1							mg/kg	A-T-023s
Total Aromatics _A	80.7	<0.1							mg/kg	A-T-023s
TPH (Ali & Aro) _A	138	<0.1							mg/kg	A-T-023s
BTEX - Benzene _A [#]	<0.05	<0.05							mg/kg	A-T-022s
BTEX - Toluene _A [#]	<0.05	<0.05							mg/kg	A-T-022s
BTEX - Ethyl Benzene _A [#]	<0.05	<0.05							mg/kg	A-T-022s
BTEX - m & p Xylene _A [#]	<0.05	<0.05							mg/kg	A-T-022s
BTEX - o Xylene _A [#]	<0.05	<0.05							mg/kg	A-T-022s
MTBE _A [#]	<0.05	<0.05							mg/kg	A-T-022s

Envirolab Job Number: 18/00676

Client Project Name: Tir-Bach Washery

Client Project Ref: Not specified

Lab Sample ID	18/00676/41	18/00676/42							Units	Method ref
Client Sample No										
Client Sample ID	TP10	TP10								
Depth to Top	0.50	0.60								
Depth To Bottom										
Date Sampled	19-Jan-18	19-Jan-18								
Sample Type	Soil	Soil								
Sample Matrix Code	4A	4A								
PAH 16										
Acenaphthene _A ^{M#}	0.06	<0.01							mg/kg	A-T-019s
Acenaphthylene _A ^{M#}	0.01	<0.01							mg/kg	A-T-019s
Anthracene _A ^{M#}	0.06	<0.02							mg/kg	A-T-019s
Benzo(a)anthracene _A ^{M#}	0.23	<0.04							mg/kg	A-T-019s
Benzo(a)pyrene _A ^{M#}	0.62	<0.04							mg/kg	A-T-019s
Benzo(b)fluoranthene _A ^{M#}	0.62	<0.05							mg/kg	A-T-019s
Benzo(ghi)perylene _A ^{M#}	0.86	<0.05							mg/kg	A-T-019s
Benzo(k)fluoranthene _A ^{M#}	0.29	<0.07							mg/kg	A-T-019s
Chrysene _A ^{M#}	0.49	<0.06							mg/kg	A-T-019s
Dibenzo(ah)anthracene _A ^{M#}	0.24	<0.04							mg/kg	A-T-019s
Fluoranthene _A ^{M#}	0.31	<0.08							mg/kg	A-T-019s
Fluorene _A ^{M#}	0.03	<0.01							mg/kg	A-T-019s
Indeno(123-cd)pyrene _A ^{M#}	0.90	<0.03							mg/kg	A-T-019s
Naphthalene _A ^{M#}	0.03	<0.03							mg/kg	A-T-019s
Phenanthrene _A ^{M#}	0.19	<0.03							mg/kg	A-T-019s
Pyrene _A ^{M#}	0.29	<0.07							mg/kg	A-T-019s
PAH (total 16) _A ^{M#}	5.25	<0.08							mg/kg	A-T-019s

REPORT NOTES

General:

This report shall not be reproduced, except in full, without written approval from Envirolab.

All samples contained within this report, and any received with the same delivery, will be disposed of one month after the date of this report.

Analytical results reflect the quality of the sample at the time of analysis only.

Opinions and interpretations expressed are outside the scope of our accreditation.

If results are in italic font they are associated with an AQC failure and there is insufficient sample to repeat the analysis. These are not accredited and are unreliable.

A deviating samples report is appended and will indicate if samples or tests have been found to be deviating. Any test results affected may not be an accurate record of the concentration at the time of sampling and, as a result, may be invalid.

Soil chemical analysis:

All results are reported as dry weight (<40°C).

For samples with Matrix Codes 1 - 6 natural stones, brick and concrete fragments >10mm and any extraneous material (visible glass, metal or twigs) are removed and excluded from the sample prior to analysis and reported results corrected to a whole sample basis. This is reported as '% stones >10mm'.

For samples with Matrix Code 7 the whole sample is dried and crushed prior to analysis and this supersedes any "A" subscripts

All analysis is performed on the sample as received for soil samples which are positive for asbestos or the client has informed asbestos may be present and/or if they are from outside the European Union and this supersedes any "D" subscripts.

TPH analysis of water by method A-T-007:

Free and visible oils are excluded from the sample used for analysis so that the reported result represents the dissolved phase only.

Electrical Conductivity of water by Method A-T-037:

Results greater than 12900µS/cm @ 25°C / 11550µS/cm @ 20°C fall outside the calibration range and as such are unaccredited.

Asbestos:

Asbestos in soil analysis is performed on a dried aliquot of the submitted sample and cannot guarantee to identify asbestos if only present in small numbers as discrete fibres/fragments in the original sample.

Stones etc. are not removed from the sample prior to analysis.

Quantification of asbestos is a 3 stage process including visual identification, hand picking and weighing and fibre counting by sedimentation/phase contrast optical microscopy if required. If asbestos is identified as being present but is not in a form that is suitable for analysis by hand picking and weighing (normally if the asbestos is present as free fibres) quantification by sedimentation is performed. Where ACMs are found a percentage asbestos is assigned to each with reference to 'HSG264, Asbestos: The survey guide' and the calculated asbestos content is expressed as a percentage of the dried soil sample aliquot used.

Predominant Matrix Codes:

1 = SAND, 2 = LOAM, 3 = CLAY, 4 = LOAM/SAND, 5 = SAND/CLAY, 6 = CLAY/LOAM, 7 = OTHER, 8 = Asbestos bulk ID sample.

Samples with Matrix Code 7 & 8 are not predominantly a SAND/LOAM/CLAY mix and are not covered by our BSEN 17025 or MCERTS accreditations, with the exception of bulk asbestos which are BSEN 17025 accredited.

Secondary Matrix Codes:

A = contains stones, B = contains construction rubble, C = contains visible hydrocarbons, D = contains glass/metal,

E = contains roots/twigs.

Key:

IS indicates Insufficient Sample for analysis.

US indicates Unsuitable Sample for analysis.

NDP indicates No Determination Possible.

NAD indicates No Asbestos Detected.

N/A indicates Not Applicable.

Superscript # indicates method accredited to ISO 17025.

Superscript "M" indicates method accredited to MCERTS.

Subscript "A" indicates analysis performed on the sample as received.

Subscript "D" indicates analysis performed on the dried sample, crushed to pass a 2mm sieve

Please contact us if you need any further information.

FINAL ANALYTICAL TEST REPORT

Envirolab Job Number: 18/00736
Issue Number: 1
Date: 13 February, 2018

Client: Blandford Consulting
The Enterprise Centre
Merthyr Industrial Park
Pentrebach
CF48 4DR

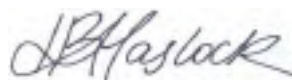
Project Manager: David Blandford
Project Name: Tir Bach Washery
Project Ref: Not specified
Order No: N/A
Date Samples Received: 01/02/18
Date Instructions Received: 01/02/18
Date Analysis Completed: 09/02/18

Prepared by:



Melanie Marshall
Laboratory Coordinator

Approved by:



Iain Haslock
Analytical Consultant

Envirolab Job Number: 18/00736

Client Project Name: Tir Bach Washery

Client Project Ref: Not specified

Lab Sample ID	18/00736/1	18/00736/2	18/00736/3						Units	Method ref
Client Sample No										
Client Sample ID	WS1	WS2	WS3							
Depth to Top										
Depth To Bottom										
Date Sampled										
Sample Type	Water - EW	Water - EW	Water - EW							
Sample Matrix Code	N/A	N/A	N/A							
pH (w) _A [#]	7.91	7.89	7.84						pH	A-T-031w
Sulphate (w) _A [#]	30	36	9						mg/l	A-T-026w
Cyanide (free) (w) _A [#]	<0.005	<0.005	<0.005						mg/l	A-T-042wFCN
Cyanide (total) (w) _A [#]	<0.005	<0.005	<0.005						mg/l	A-T-042wTCN
Thiocyanate (w) _A	<0.1	<0.1	<0.1						mg/l	A-T-041w
Phenols - Total by HPLC (w) _A	<0.01	<0.01	<0.01						mg/l	A-T-050w
Sulphide (w) _A	<0.1	<0.1	<0.1						mg/l	A-T-S2-w
Antimony (dissolved) _A [#]	<1	<1	1						µg/l	A-T-025w
Arsenic (dissolved) _A [#]	<1	<1	2						µg/l	A-T-025w
Boron (dissolved) _A [#]	23	24	30						µg/l	A-T-025w
Cadmium (dissolved) _A [#]	<0.2	<0.2	<0.2						µg/l	A-T-025w
Copper (dissolved) _A [#]	<1	<1	6						µg/l	A-T-025w
Chromium (dissolved) _A [#]	<1	<1	<1						µg/l	A-T-025w
Lead (dissolved) _A [#]	<1	<1	<1						µg/l	A-T-025w
Mercury (dissolved) _A [#]	<0.1	<0.1	<0.1						µg/l	A-T-025w
Nickel (dissolved) _A [#]	<1	<1	<1						µg/l	A-T-025w
Sulphur, Total (dissolved) _A	10	12	3						mg/l	A-T-025w
Zinc (dissolved) _A [#]	5	5	2						µg/l	A-T-025w

Envirolab Job Number: 18/00736

Client Project Name: Tir Bach Washery

Client Project Ref: Not specified

Lab Sample ID	18/00736/1	18/00736/2	18/00736/3						Units	Method ref
Client Sample No										
Client Sample ID	WS1	WS2	WS3							
Depth to Top										
Depth To Bottom										
Date Sampled										
Sample Type	Water - EW	Water - EW	Water - EW							
Sample Matrix Code	N/A	N/A	N/A							
PAH 16MS (w)										
Acenaphthene (w) _A [#]	<0.01	<0.01	0.04						µg/l	A-T-019w
Acenaphthylene (w) _A [#]	<0.01	<0.01	<0.01						µg/l	A-T-019w
Anthracene (w) _A [#]	<0.01	<0.01	0.02						µg/l	A-T-019w
Benzo(a)anthracene (w) _A [#]	0.03	<0.01	0.06						µg/l	A-T-019w
Benzo(a)pyrene (w) _A [#]	0.03	<0.01	0.05						µg/l	A-T-019w
Benzo(b)fluoranthene (w) _A [#]	0.04	<0.01	0.06						µg/l	A-T-019w
Benzo(ghi)perylene (w) _A [#]	0.01	<0.01	0.03						µg/l	A-T-019w
Benzo(k)fluoranthene (w) _A [#]	0.01	<0.01	0.03						µg/l	A-T-019w
Chrysene (w) _A [#]	0.04	<0.01	0.07						µg/l	A-T-019w
Dibenzo(ah)anthracene (w) _A [#]	<0.01	<0.01	<0.01						µg/l	A-T-019w
Fluoranthene (w) _A [#]	0.04	0.01	0.08						µg/l	A-T-019w
Fluorene (w) _A [#]	<0.01	<0.01	0.02						µg/l	A-T-019w
Indeno(123-cd)pyrene (w) _A [#]	0.02	<0.01	0.04						µg/l	A-T-019w
Naphthalene (w) _A [#]	<0.01	<0.01	<0.01						µg/l	A-T-019w
Phenanthrene (w) _A [#]	0.03	<0.01	0.07						µg/l	A-T-019w
Pyrene (w) _A [#]	0.04	0.01	0.07						µg/l	A-T-019w
PAH (total 16) (w) _A [#]	0.29	0.02	0.64						µg/l	A-T-019w

Envirolab Job Number: 18/00736

Client Project Name: Tir Bach Washery

Client Project Ref: Not specified

Lab Sample ID	18/00736/1	18/00736/2	18/00736/3						Units	Method ref
Client Sample No										
Client Sample ID	WS1	WS2	WS3							
Depth to Top										
Depth To Bottom										
Date Sampled										
Sample Type	Water - EW	Water - EW	Water - EW							
Sample Matrix Code	N/A	N/A	N/A							
TPH CWG										
Ali >C5-C6 (w) _A [#]	<1	<1	<1						µg/l	A-T-022w
Ali >C6-C8 (w) _A [#]	<1	<1	<1						µg/l	A-T-022w
Ali >C8-C10 (w) _A [#]	<1	<1	<1						µg/l	A-T-022w
Ali >C10-C12 (w) _A [#]	<5	<5	<5						µg/l	A-T-023w
Ali >C12-C16 (w) _A [#]	<5	<5	<5						µg/l	A-T-023w
Ali >C16-C21 (w) _A [#]	<5	<5	<5						µg/l	A-T-023w
Ali >C21-C35 (w) _A [#]	82	68	48						µg/l	A-T-023w
Total Aliphatics (w) _A	82	68	48						µg/l	A-T-022+23w
Aro >C5-C7 (w) _A [#]	<1	<1	<1						µg/l	A-T-022w
Aro >C7-C8 (w) _A [#]	<1	<1	<1						µg/l	A-T-022w
Aro >C8-C9 (w) _A [#]	<1	<1	<1						µg/l	A-T-022w
Aro >C9-C10 (w) _A [#]	<1	<1	<1						µg/l	A-T-022w
Aro >C10-C12 (w) _A [#]	<5	<5	<5						µg/l	A-T-023w
Aro >C12-C16 (w) _A [#]	<5	<5	<5						µg/l	A-T-023w
Aro >C16-C21 (w) _A [#]	<5	7	<5						µg/l	A-T-023w
Aro >C21-C35 (w) _A [#]	<5	64	<5						µg/l	A-T-023w
Total Aromatics (w) _A	<5	71	<5						µg/l	A-T-022+23w
TPH (Ali & Aro) (w) _A	82	139	48						µg/l	A-T-022+23w
BTEX - Benzene (w) _A [#]	<1	<1	<1						µg/l	A-T-022w
BTEX - Toluene (w) _A [#]	<1	<1	<1						µg/l	A-T-022w
BTEX - Ethyl Benzene (w) _A [#]	<1	<1	<1						µg/l	A-T-022w
BTEX - m & p Xylene (w) _A [#]	<1	<1	<1						µg/l	A-T-022w
BTEX - o Xylene (w) _A [#]	<1	<1	<1						µg/l	A-T-022w
MTBE (w) _A [#]	<1	<1	<1						µg/l	A-T-022w

REPORT NOTES

General:

This report shall not be reproduced, except in full, without written approval from Envirolab.

All samples contained within this report, and any received with the same delivery, will be disposed of one month after the date of this report.

Analytical results reflect the quality of the sample at the time of analysis only.

Opinions and interpretations expressed are outside the scope of our accreditation.

If results are in italic font they are associated with an AQC failure and there is insufficient sample to repeat the analysis. These are not accredited and are unreliable.

A deviating samples report is appended and will indicate if samples or tests have been found to be deviating. Any test results affected may not be an accurate record of the concentration at the time of sampling and, as a result, may be invalid.

Soil chemical analysis:

All results are reported as dry weight (<40°C).

For samples with Matrix Codes 1 - 6 natural stones, brick and concrete fragments >10mm and any extraneous material (visible glass, metal or twigs) are removed and excluded from the sample prior to analysis and reported results corrected to a whole sample basis. This is reported as '% stones >10mm'.

For samples with Matrix Code 7 the whole sample is dried and crushed prior to analysis and this supersedes any "A" subscripts

All analysis is performed on the sample as received for soil samples which are positive for asbestos or the client has informed asbestos may be present and/or if they are from outside the European Union and this supersedes any "D" subscripts.

TPH analysis of water by method A-T-007:

Free and visible oils are excluded from the sample used for analysis so that the reported result represents the dissolved phase only.

Electrical Conductivity of water by Method A-T-037:

Results greater than 12900µS/cm @ 25°C / 11550µS/cm @ 20°C fall outside the calibration range and as such are unaccredited.

Asbestos:

Asbestos in soil analysis is performed on a dried aliquot of the submitted sample and cannot guarantee to identify asbestos if only present in small numbers as discrete fibres/fragments in the original sample.

Stones etc. are not removed from the sample prior to analysis.

Quantification of asbestos is a 3 stage process including visual identification, hand picking and weighing and fibre counting by sedimentation/phase contrast optical microscopy if required. If asbestos is identified as being present but is not in a form that is suitable for analysis by hand picking and weighing (normally if the asbestos is present as free fibres) quantification by sedimentation is performed. Where ACMs are found a percentage asbestos is assigned to each with reference to 'HSG264, Asbestos: The survey guide' and the calculated asbestos content is expressed as a percentage of the dried soil sample aliquot used.

Predominant Matrix Codes:

1 = SAND, 2 = LOAM, 3 = CLAY, 4 = LOAM/SAND, 5 = SAND/CLAY, 6 = CLAY/LOAM, 7 = OTHER, 8 = Asbestos bulk ID sample.

Samples with Matrix Code 7 & 8 are not predominantly a SAND/LOAM/CLAY mix and are not covered by our BSEN 17025 or MCERTS accreditations, with the exception of bulk asbestos which are BSEN 17025 accredited.

Secondary Matrix Codes:

A = contains stones, B = contains construction rubble, C = contains visible hydrocarbons, D = contains glass/metal,

E = contains roots/twigs.

Key:

IS indicates Insufficient Sample for analysis.

US indicates Unsuitable Sample for analysis.

NDP indicates No Determination Possible.

NAD indicates No Asbestos Detected.

N/A indicates Not Applicable.

Superscript # indicates method accredited to ISO 17025.

Superscript "M" indicates method accredited to MCERTS.

Subscript "A" indicates analysis performed on the sample as received.

Subscript "D" indicates analysis performed on the dried sample, crushed to pass a 2mm sieve

Please contact us if you need any further information.