

Earth Science Partnership

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Public Toilet and Car Park, Pontneddfechan Proposed Leisure Development Exploratory Investigation

Report Reference: ESP.8715.03.4351

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33 Cardiff Road, Taff's Well, CARDIFF, CF15 7RB ☎ 029 2081 3385
✉ enquiries@earthsciencepartnership.com www.earthsciencepartnership.com

Public Toilet and Car Park, Pontneddfechan Proposed Leisure Development Exploratory Investigation

Prepared for:
Andrew Scott Ltd
Scott House
Enterprise Park
Charter Ct
Llansamlet
Swansea
SA7 9DH



Report Reference: **ESP.8715.03.4351**

Revision	Status	Date	Written by	Checked by	Approved by
0	Final	May 2025	Tomos McCann BSc Hons FGS	Hywel Davies MESci CGeol FGS RoGEP Professional	Matthew Eynon BSc (Hons) MSc CGeol EurGeol FGS RoGEP Specialist
Signature:					
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General Notes

Executive Summary

Andrew Scott Ltd have been appointed Principal Contractor to redevelop the subject site by the demolition of existing toilet block and replacement of hardstanding with soft landscaping.

ESP have undertaken a geo-environmental assessment and the key potential land quality issues identified by the assessment are summarised below:

	Potential Hazard	Anticipated Risk	Discussion
Site Setting	Current Site Status. (Section 2.1)		The site is currently occupied by Toilet block with hardstanding and three car parking spaces.
	Identified Ground Conditions. (Section 5.1)		The investigation has encountered Made Ground across the site to depths of up to around 1m, with weathered bedrock or possible River Terrace Deposits identified at the base of the pits.
	Groundwater Conditions. (Section 5.2)		The site is underlain by superficial and bedrock Secondary A Aquifers. No groundwater was encountered to a depth of around 1m.
	Historical Land Use. (Section 2.2)		Tram sidings were indicated previously within the western portion. Buildings have also been demolished on-site.
Geo-environmental	Potential Contamination Sources (Section 3.1.2)	Low	The site has been previously developed with a tramway, a public lavatory and carpark.
	Chronic Risks to Human Health (Section 7.1)	Low	The risk to end users is considered low and no remedial action is warranted at this stage. A watching brief for unidentified contamination should be implemented during the demolition/construction works and any anomalous conditions should be subject to further investigation.
	Risks to Controlled Waters (Section 7.2)	Low	It is considered that the risk to controlled waters from the development of the site is likely to be low. Should contamination be encountered during the development phase, the above assessment should be reviewed and updated.
	Hazardous Ground Gas (Section 7.3)	Low	There is no obvious evidence of any significant potential on-site or nearby off-site sources of hazardous ground gas. Based on the CL:AIRE (2021) support tool, the site is in a negligible risk zone from mine gas. We understand the development on the study site will not include any enclosed spaces and therefore consideration of gas and radon risks is not required as no linkages exist. Should this change, an assessment in this regard should be undertaken.
	Other Hazards (Section 7.1)	Low	Whilst not anticipated considering its likely age of construction, an asbestos survey should be carried out prior to demolition of the existing toilet block.
Others	UXO	Low	A specialist preliminary assessment has concluded that "a detailed desk study, whilst always prudent, is not considered essential in this instance".
	Invasive Plants	Low	No invasive species have been identified as the site is covered with hardstanding.
	Further Investigation Required?	No	See Section 8.

1 Introduction

1.1 Background

Andrew Scott Ltd (hereafter known as the Client) have been appointed Principal Contractor to redevelop the subject site and neighbouring areas to the south for commercial and leisure purposes, the Waterfalls County Centre. Planning permission has been obtained for the proposed development, but the Local Planning Authority (LPA) have imposed ground related planning conditions as follows:

Condition 7: no development shall commence on site until a revised assessment of the nature and extent of contamination affecting the application whole site area has been submitted and approved in writing by the Local Planning Authority, including the northern section of the site that comprises the existing parking and toilet block.

Previous factual investigations have been undertaken by ESP to the south for the development and interpreted by another consultant to address the requirements of this planning condition, however they did not include the existing parking and toilet block.

To address this, the Earth Science Partnership Ltd (ESP), Consulting Engineers, Geologists and Environmental Scientists, were instructed by the Client to undertake a geo-environmental investigation and assessment to identify and evaluate potential ground hazards which could impact on the proposed development in the area of the existing park and toilet block only. No geotechnical assessment has been undertaken as part of this investigation. The site location is shown on Insert 2 in Section 2.1.

The proposed redevelopment in this area will comprise the demolition of the existing WC block and replacement of the existing hardstanding with a layby, pavements and soft landscaping. It is understood that there will be no significant changes to the current ground levels. The proposed development layout is presented as Insert 1.



Insert 1 - Insert 1: Proposed Development Layout. Ref: DLA-2228-L-02-RevP13 (2024)

It is understood that the proposed structures would be classified as Geotechnical Category 1 (BS5930:2020).

1.2 Objective and Scope of Works

The objective of the investigation was to obtain information on the geo-environmental properties of the ground beneath the site, potential risks posed by contamination, and to allow an assessment of these ground conditions with reference to the potential impact on the proposed development.

The scope of works for the investigation was mutually developed with the Client by ESP within an agreed budget and comprised a desk study review of available historical Ordnance Survey maps, environmental data, geological maps, memoirs and data, and further desk study information, a field reconnaissance visit, the supervision and sampling of hand excavated trial pits, geo-environmental laboratory testing, assessment and reporting.

The contract was awarded on the basis of a competitive tender quotation. The terms of reference for the assessment are as laid down in the Earth Science Partnership costing (ref.ESP.8715.02.Rev3 – Waterfalls Country Centre).

The investigation and assessment was undertaken in April and May 2025.

1.3 Report Format

This report includes the desk study and field reconnaissance reports (Section 2), and details of the investigation undertaken of BS5930:2020 (Section 4), along with the Preliminary Risk Assessment stage (Section 3) and Generic Quantitative Risk Assessment (Section 5) of the land contamination risk management (LCRM) guidelines. A preliminary evaluation of the resulting contamination risks and any remedial measures potentially required is included in Sections 6 and 7. It should be appreciated that this is a preliminary evaluation and will not generally meet the requirements of the LCRM guidelines.

The contamination assessment relative to the proposed end use has been undertaken using the guidance published by CIRIA (2001).

This report is issued as a digital version only.

1.4 Limitations of Report

This report represents the findings of the brief relating to the proposed end use and geotechnical category of structure(s) as detailed in Section 1.1 above. The brief did not require an assessment of the implications for any other end use or structures, nor is the report a comprehensive site characterisation and should not be construed as such. Should an alternative end use or structure be considered, the findings of the assessment should be re-examined relating to the new proposals.

Where preventative, ameliorative or remediation works are required, professional judgement will be used to make recommendations that satisfy the site-specific requirements in accordance with good practice guidance.

Consultation with regulatory authorities will be required with respect to proposed works as there may be overriding regional or policy requirements which demand additional work to be undertaken. It should be noted that both regulations and their interpretation by statutory authorities are continually changing.

This report represents the findings and opinions of experienced geo-environmental and geotechnical specialists. Earth Science Partnership does not provide legal advice and the advice of lawyers may also be required.

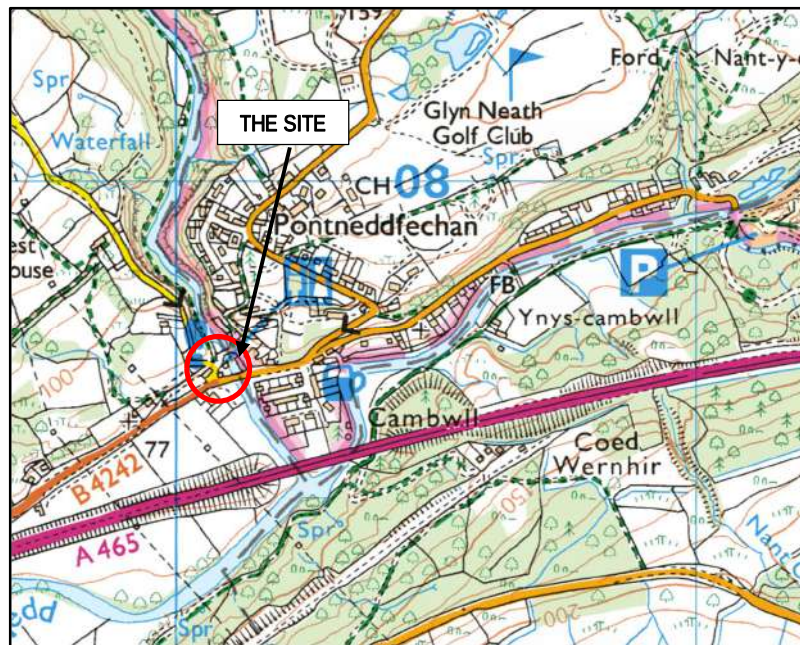
2 Desk Study and Field Reconnaissance Visit

The information in this section was obtained from desk-based research of sources detailed in the text, including historical maps and a combined environmental and geological data report. Further desk study reports/data/records are included as subsequent appendices as referenced in the text.

The site description is largely based on a field reconnaissance and site inspection visit made at the site on 23rd April 2025 during dry and sunny weather.

2.1 Site Location and Description

The site is located on the north side of Pontneathvaughan Road and east side of High Street, in the village of Pontneddfechan, Neath Port Talbot. The National Grid Reference of the centre of the site is (SN) 290093, 207628 and the nearest postcode is SA11 5NR. A Site Location Plan is presented as Insert 2 below.



Insert 2 - Site Location Plan from Ordnance Survey 1:25,000 scale map.
Reproduced with permission (OS License No.: AL100015788).

The site comprises a roughly triangular shaped parcel of land of around 15m length (north to south) and 20m width (east to west), occupying an area of around 0.3ha. It is presently occupied by a toilet bloke, slab hard standing and three tarmacadam parking bays immediately off High Street to the west.

It is bounded by:

- To the north: High street and a small parcel of land occupied by trees and grass.
- To the east: Trees and hedges along the river bank dropping towards the River Neath.
- To the south: Pontneathvaughan Road, with farmland beyond.
- To the west: High Street, and the Angel Inn beyond.

Vehicular access to the site is currently gained via High Street, coming north off of Pontneathvaughan Road. The boundaries generally comprise Masonry free standing walls, post and wire fences and roadside curbs.

ESP are not aware of a tree survey having been undertaken but have tentatively identified deciduous trees on the north and western boundaries.

The general topography in the area is relatively flat and level, but drops down steeply to the river Neath in the east. A topographic survey has been provided by the Client and indicates a general height of around 80mOD.

The Client has provided ESP with a third party GPR survey, carried out prior to siteworks, showing the locations of recorded underground services in the vicinity of the site. A copy of this survey is integrated with the Investigation Point Plan presented in Figure 1. Site observations, utility plans and the GPR survey indicate that the site is crossed by the following services:

- Underground low voltage electricity cable across extending west from a lamppost into the north side of the toilet block.
- Overhead telecom cables running east-west in the southern area.
- Foul sewerage running east-west across the southern margin.
- Unknown trace that enters the site in the northwest area from the Angel Inn, extends across the central sections towards the south boundary.

2.2 Site History

2.2.1 Published Historical Maps

The site history has been assessed from a review of available historical Ordnance Survey County Series and National Grid maps. Extracts from the historical maps are presented in Appendix B and the salient features are summarised in the table below.

Table 1: Review of Historical Maps

Date	On-Site	In Vicinity of Site
1877-1884	Trees and foliage indicated across the east half. Tramway sidings extend within the west boundary, trending roughly north to south. Two undefined buildings encroach on the south and north boundaries.	Tramway lines extend north and southwest of the site. The Angel Inn is around 10m west of boundary. River Neath, around 15m east flowing north to south. Some residential properties and possible farms north, south east and beyond the River Neath, 50m east.
1897-1904	No significant changes.	Smithy indicated around 60m southwest. Extensive quarrying indicated along the River Neath to the north (from around 50m). Increased development in the area.
1914-1921	Road immediately south, extending west to east along south boundary. Air valve in east portion of site.	Road infrastructure improve in the area with bridge over the River Neath. Sewage farm indicated 200m southeast.
1948 - 1961	Tramline no longer indicated	No significant changes.
1961-present	Lavatory/W.C Indicated in south portion. Car parking is indicated by 2003.	Road south indicated as Pontneathvaughan Road and High Street to the west. Smithy no longer indicated. Housing estate around 100m southeast and further residential development in the surround area. Farm expanded slightly 35m to the southwest. A465 is indicated 200m south. Info centre indicated 50m southwest.
Notes: 1. Historical maps presented in Appendix B. 2. Features may have been present on site before or between the dates of the mapping that may not have been identified.		

In the earliest mapping, the site appears to have been partly developed with two buildings encroaching onto the north and south site boundary, and a tramway and sidings extend along the west boundary/in the west portion. Pontneathvaughan road was constructed in the 1910s and the tram/railway line was dismantled and replaced with High Street in the 1940s.

In the 1960s a lavatory was constructed with the car parking and surrounding hardstanding evident by the early 2000s (it may have been present earlier).

2.2.2 Other Sources

Aerial imagery readily available online indicates that the public toilet and car park spaces were upgraded and modified between 2010 and 2013.

2.3 Previous Investigations and Assessments

ESP are not aware of any previous geotechnical or geo-environmental investigations or assessments at the site.

ESP have undertaken investigation in the fields to the south of the site; however the specific findings are not considered relevant to the study site.

2.4 Contact with Regulatory Bodies & Local Information Sources

At the time of issue of this report, ESP have not yet received a response from the consultees. Once received, any response will be forwarded under separate cover. It should be appreciated that their responses may contain salient information on the site which could not be taken into account during the preparation of this report.

2.5 Hydrology

2.5.1 Surface Water Features

The nearest major surface water feature to the site is the River Neath which flows from North to South approximately 15m to the east.

2.5.2 Surface Water Abstractions

The data report (Appendix C) indicates that there are no surface water abstractions within 250m of the site.

2.6 Geology

2.6.1 Published Geology

The data report and available geological mapping indicates the site to be underlain by River Terrace Deposits overlying bedrock of the South Wales Lower Coal Measures Formation.

Reference to geological mapping indicates the site is underlain by the lower most portion of the lower coal measures sequence and no notable coal seams are anticipated to underly the site.

The River Terrace superficial strata would be expected to be primarily coarse-grained in nature with possible lenses of clay and silt. The Coal Measures bedrock comprises an interbedded succession of sandstone, siltstone and mudstone, with coal seams and associated seat earths.

Bedrock is visible in the river channel to the east and northeast of the site.

Shallow coal seams are not anticipated beneath the site and faulting is also recorded in the area.

2.7 Hydrogeology

2.7.1 Aquifer Classification

The data report (Appendix B) indicates that both the superficial deposits (River Terrace Deposits) and the bedrock (Lower Coal Measures) are classed as Secondary A Aquifers.

Secondary A Aquifers generally correspond with the previously classified minor aquifers and comprise permeable layers capable of supporting water at a local, rather than strategic, scale and in some cases form an important base flow to rivers. Secondary A Aquifers are sensitive to pollution.

2.7.2 Anticipated Groundwater Bodies

It is considered that the shallowest main groundwater body is likely to be located within the bedrock strata. However, localised perched water bodies within any overlying superficial strata (including Made Ground) cannot be discounted.

2.7.3 Abstractions and Groundwater Vulnerability

The data report (Appendix B) indicates that there are no groundwater abstractions or Source Protection Zones within 2000m of the site.

2.7.4 Groundwater Movement

Groundwater movement within the River Terrace Deposits will be controlled by intergranular flow whilst, in the South Wales Lower Coal Measures Formation, fracture flow is likely to be dominant.

Given the site setting, it is considered that the groundwater within the bedrock Secondary A aquifer may be providing base flow to the River Neath, particularly upgradient of the site.

2.8 Environmental Setting

2.8.1 Summary of Environmental Data

The data report has been obtained for the site and is presented in Appendix B, and the relevant data therein is summarised in the table below. The report should be consulted for further detail.

Table 2 - Summary of Environmental Data

Feature	On the Site	In the Immediate Vicinity
Potentially Contaminative Land Use	Tram Way Sidings and Railway Building	4no. recorded within 250m of the site, including a Smithy, some 50m to the SW, unspecified heap and ground workings 120m NW, burial grounds 160m SW and a sewage farm 200m SE.
Historical Tanks, PFS, Garages, Energy Facilities	None identified.	1 recorded electrical substation 140m E.
Waste and Landfill	None identified.	None recorded within 500m of the site.
Current Industrial/Commercial Sites	None identified.	6no. recorded within 250m of site, including a garage some 60m NE, pylons 135m S and 160m W, Electricity substation 140m E, and sewage pumping stations 230m SE.
Contaminated Land under Part 2A EPA 1990.	None identified.	None recorded within 500m of the site.
Licensed Industrial Activities/Pollutant Release (IPC, Part A (1), Part A (2)/B)	None identified.	None recorded within 500m of the site.
Radioactive Substance Sites	None identified.	None recorded within 500m of the site.
Discharge Consents	None identified.	8 sewage discharges recorded within 500m of site, and one unspecified. See Section 2.8.2.
List 1 and 2 Dangerous Substances Sites	None identified.	1no. List 2 discharge 218m SE of site.
Pollution Incidents	None identified.	12 pollution incidents recorded withing 500m of site, all within 50m, with water, land and air impacts ranging from no impact to minor impact. See Section 2.8.2.
Environmentally Sensitive Sites ^{2,3}	None identified.	2 SSSIs and SACs recorded within 250m of site, including wet heathland 10m N and 200m E.
Notes: 1. Full details of features presented in the data report (Appendix C). 2. Sensitive land uses include Sites of Special Scientific Interest, Nature Reserves, National Parks, Special Areas of Conservation, Special Protection Areas, Ramsar sites, World Heritage sites and Ancient Woodland. 3. Nitrate vulnerable areas relate to the agricultural use of fertilizers and are not considered further in this assessment.		

2.8.2 Further Discussion on Salient Environmental Features

Discharge Consents:

Eight are recorded within 500m of the site, the closest being some 214m to the east and related to a sewage works.

Pollution Incidents:

The 12 pollution incidents within 500m were a maximum Category 3 (minor incident), the closest being some 15m to the north-east where sewage was released to a watercourse in September 2001, which had a category 3 impact on water and a category 4 (no impact) on land and air.

2.8.3 On-Site Bulk Liquid Storage

The historical maps and field reconnaissance visit have provided no evidence of any past or recent above ground or underground bulk liquid (e.g. fuels/oils) storage on site.

2.8.4 On-Site Bulk Materials and Waste Storage

The field reconnaissance visit indicated no evidence of recent materials or waste storage on the site.

2.9 Radon Hazard

The data report (Appendix B) indicates that the site does not lie in a radon affected area as defined by the Health Protection Agency.

The risk from radon is considered **Low**

3 Preliminary Geo-Environmental Risk Assessment

3.1 Phase One Conceptual Site Model

3.1.1 Background

The Phase One Conceptual Site Model lists the potential sources of geo-environmental risk (both contamination and hazardous gas), the receptors at risk (both human and non-human), and any feasible pathways between the two (BS EN ISO 21365, 2020). These are discussed in the following sections.

3.1.2 Potential Soil Contamination Sources

The site has been previously developed as a tram/railway siding, a public lavatory and carpark. It is anticipated that there could be a covering of Made Ground, which could contain elevated levels of soil contaminants. This could include leaked oils/fuels from parked cars.

An air valve is historically indicated on site. However, this is not anticipated to be a significant contamination source.

3.1.3 Potential Contaminants Present

The potential contaminants associated with the above potential sources have been identified from various guidelines published by DEFRA, the Environment Agency and others. The particular guidance referenced includes the Industry Profile for Railway Land (DoE, 1995).

Based on this guidance and our experience, the following contaminants could be present on the site:

- heavy metals and semi-metals (arsenic, beryllium, cadmium, chromium, copper, lead, mercury, nickel, selenium, vanadium, zinc);
- cyanide, sulphate, sulphide;
- polyaromatic hydrocarbon (PAH) compounds;
- petroleum hydrocarbons (TPH) inc. BTEX;
- phenols; and
- asbestos.

No evidence has been identified from the desk study to suggest that radioactive substances may be present on the site. The potential presence of radon is discussed in Section 2.9.

3.1.4 Potential Sources of Hazardous Ground Gas

This section considers the potential sources of hazardous gases such as methane, carbon dioxide and hydrocarbon vapours. The potential for radon was discussed in Section 2.9.

There is no obvious evidence of any significant potential on-site or nearby off-site sources of hazardous ground gas. General thin Made Ground or locally hydrocarbon impacted soils from sporadic leaks associated with car parking are considered to have a very low to low source potential.

Based on the CL:AIRE (2021) support tool, the site is in a negligible risk zone from mine gas.

We understand the development on the study site will not include any enclosed spaces and therefore consideration of gas and radon risks is not required as no linkages exist. Should this change, an assessment in this regard should be undertaken.

3.1.5 Potential Receptors

The most vulnerable receptors with regards to any contamination or hazardous ground gas present are likely to be as follows.

- Site users – Public using the new soft landscaping, critical receptors being children playing on the soft landscaped areas.
- Construction and maintenance workers.
- No building or structures proposed, therefore sulphate attack on buried concrete does not require consideration.
- The water quality in the River Neath located 15m to the east.
- Secondary A superficial and bedrock aquifers.

3.1.6 Potential Migration Pathways

Based on the Conceptual Site Model the following are considered the most likely migration pathways for any contamination or hazardous ground gas present beneath the site.

Site Users:

- Ingestion of soils and inhalation of dust in landscaping areas.
- Dermal contact with contaminated soils.
- Exposure to asbestos containing materials within the shallow soils.

Construction and Maintenance Workers:

- Exposure to asbestos containing materials within the existing buildings. Unlikely as we believe the toilets were constructed between 2010 and 2013.
- Exposure to asbestos containing materials within the shallow soils.
- Ingestion of soils and inhalation of dust across site.
- Dermal contact with contaminated soils.

Groundwater:

- Leaching of mobile contaminants into the water-bearing strata within the superficial deposits and bedrock.

River Neath:

- Leaching of mobile contaminants to the groundwater beneath the site, and then on to the nearby surface water course.
- Surface run-off of contaminated leachate to adjacent stream/river.

Buildings:

- No building or structures proposed, therefore gas/radon risks and sulphate attack on buried concrete do not require further consideration.

3.2 Preliminary Risk Evaluation & Plausible Pollutant Linkages

The land use history of the site and surrounding area, as established from the desk study and walkover, has identified potential contamination linkages due to ground conditions or former operations either on, adjacent to, or in the vicinity of the site. Note that these potential linkages will need to be later assessed and re-established using actual site data obtained from an exploratory investigation.

3.2.1 Introduction to Risk Evaluation Methodology

The general methodology set out in CIRIA C552 Contaminated Land Risk Assessment – A Guide to Good Practice (Rudland et al, 2001), has been used to assess whether or not risks are acceptable, and to determine the need for collating further information or remedial action.

Whilst at a later stage, this methodology may be informed by quantitative data (such as laboratory test results) the assessment is a qualitative method of interpreting findings to date and evaluating risk. The methodology requires the classification of:

- The magnitude of the potential consequence (severity) of risk occurring (Table A1 in Appendix A):
- The magnitude of the probability (likelihood) of risk occurring (Table A2 in Appendix A).

The classifications defined above are then compared to indicate the risk presented by each pollutant linkage, allowing evaluation of a risk category (Tables A3 and A4 in Appendix A). These tables have been revised slightly by ESP from those presented in CIRIA C552, to allow for the circumstances where no plausible linkage has been identified and, therefore, no risk would exist.

The methodology described above has been used to establish Plausible Pollutant Linkages (PPL) based on the Conceptual Site Model generated for the site and proposed development, and to evaluate the risks posed by those linkages, using information known about the site, at this desk study stage. This is presented as Table in Section 3.2.2 below.

3.2.2 Tabulated Preliminary Risk Evaluation & Plausible Pollutant Linkages

Table 3: Preliminary Risk Evaluation & Plausible Pollutant Linkages (PPL)

Source	Pathway	Receptor	Classification of Consequence	Classification of Probability	Risk Category	Further Investigation or Remedial Action to be Taken
Potential contaminants in shallow soils	Direct contact/ inhalation/ ingestion of contaminated soil or dust	Site Users	Medium – potential for chronic levels	Low likelihood ²	Moderate/ Low Risk	Sampling of near-surface soils to confirm levels of total contamination present.
	Direct contact/ inhalation/ ingestion of contaminated soil or dust	Construction/ Maintenance Workers	Minor – standard PPE likely to be sufficient	Likely ²	Low Risk	
	Leaching of soil contaminants	Impact on Groundwater	Medium – Secondary A Aquifers	Low likelihood ²	Moderate/ Low Risk	
	Leaching of soil contaminants	Impact on River Neath	Medium – site lies adjacent to river	Low likelihood ²	Moderate/ Low Risk	
Asbestos in existing buildings	Inhalation of fibres	Demolition Workers/ Ground Workers	Medium – potential for chronic levels	Unlikely ³	Low Risk	Asbestos survey of building
Asbestos in shallow soils	Inhalation of fibres	Site End Users	Medium – potential for chronic levels	Low Likelihood ³	Moderate/Low Risk	Sampling of shallow soils for asbestos.
		Construction/ Maintenance Workers		Low Likelihood ³	Moderate/ Low Risk	
Notes: 1. Methodology and details of risk consequence, probability and category based on CIRIA C552 (2001) and presented in Section 3.2.1. 2. Although Made Ground is anticipated, the presence of contamination has yet to be confirmed on site. See Section 3.1. 3. No asbestos containing materials are anticipated due to the age of the existing buildings construction. Potential asbestos could be present in the shallow soils. 4. Preliminary assessment of risks from sulphate and ground gas/radon are not included as there are no pollutant linkages.						

4 Exploratory Investigation

4.1 Investigation Points

4.1.1 Introduction

The intrusive investigation was undertaken on 24th April 2025 in accordance with BS5930:2020 and BS10175:2017 and was designed to investigate geo-environmental hazards. It comprised hand-excavation.

The investigation points were supervised and logged by an engineering geologist in general accordance with BS5930:2020, BS EN ISO 14688-1:2002, BS EN ISO 14688-2:2018, and BS EN ISO 14689:2018.

The investigation point positions are shown on Figure 1.

The ground levels and coordinates of the investigation points were surveyed by ESP on completion and are shown on the various hole records.

4.1.2 Investigation Strategy

The investigation points were selected to maximise the information obtained on the identified hazards, as well as obtaining a general overview of the general ground conditions present.

The locations of investigation points were restricted due to existing services (Figure 1), an active carpark and the existing toilet block.

4.1.3 Hand Pits

4no. hand pits (HP201 to HP204) were excavated across the site on 24th April 2025. The trial pits were excavated to depths of between 0.7 and 1.05m. The trial pits were not progressed further due to the presence of natural ground and possible weathered bedrock, which created difficult ground conditions that could not be excavated by hand.

Where required, the concrete paving surface was broken out prior to the excavation of the pits using a hydraulic breaker. The trial pit records are presented as Appendix F, and their positions are shown on Figure 1.

Environmental samples were collected from the trial pits for laboratory testing as shown on the trial pit records.

On completion, the trial pits were backfilled with arisings in layers compacted with a tamper bar, and the concrete paving reinstated at the surface.

4.2 Sampling Strategy

4.2.1 Soil Sampling

A non-targeted, random stratified sampling strategy was used to obtain representative information on soil contamination in the various strata encountered across the site as a whole.

Environmental samples (denoted as ES on the investigation points records) were collected for possible geo-environmental laboratory testing and generally comprised a plastic tub, an amber glass

jar and an amber glass vial. The sample containers provided clean by the testing laboratory appropriate for the proposed testing to be scheduled. Immediately after collection the samples were placed in sealed cool boxes with ice packs where they remained during storage and transport to the laboratory.

4.3 Evidence of Site Contamination Found During Site Works

No obvious visual/olfactory evidence of contamination was identified in the investigation points.

Made Ground was present across the site which can contain elevated levels of contaminants such as metals and polyaromatic hydrocarbon (PAH) compounds.

4.4 Geo-environmental Laboratory Testing

Laboratory testing has been undertaken to identify the levels of selected contaminants within samples of soil recovered during the investigation.

The geo-environmental analyses were carried out by a UKAS accredited testing laboratory with detection limits being generally compatible with the relevant guideline values adopted in the assessment (see Sections 5.3).

To allow an assessment of the potential chronic risks posed to human health, a total of five selected samples of the Made Ground have been analysed for the contaminants identified in Section 3.1.3, plus other determinands typically present on brownfield sites in the UK (see Table 3).

Table 3 - Geo-environmental Soil Laboratory Testing

Sample No.	Hole Reference	Depth	Testing Suite (see Notes)
MADE GROUND			
1	HP201	0.2	1 and 2
2	HP201	0.5	1 and 2
3	HP202	0.2	1 and 2
4	HP203	0.6	1 and 2
5	HP204	0.6	1 and 2
Notes - Testing Suites: 1. Arsenic, beryllium, boron, cadmium, total chromium, chromium VI, copper, lead, mercury, nickel, selenium, vanadium, zinc, US EPA 16 polyaromatic hydrocarbon (PAH) compounds, total monohydric phenols, Total cyanide, asbestos qualitative screen, soil organic content, pH value. 2. TPH CWG inc. BTEX.			

The geo-environmental soil test results are presented in Appendix F.

5 Development of the Revised Conceptual Model

5.1 Conceptual Ground Model - Geology

The investigation points have identified the site to be generally underlain by Made Ground and South Wales Lower Coal Measures bedrock. These strata are discussed in more detail in the following sections.

Concrete Paving Slabs and Concrete: encountered to maximum depths of 0.2m in HP202 – HP204.

Made Ground (Probable Sub-base): encountered to depths between 0.15m – 0.2m and 0.4m – 0.5m in HP202 – HP204 as a medium dense, grey, sandy fine to coarse, sub-angular to angular gravel of mudstone, with low to high cobble content.



Insert 3 – Probable Sub-base encountered in HP202 to HP204 beneath the paving slabs

Made Ground: encountered to a maximum depth of 0.4m in HP201 as a soft black gravelly SILT with rare coal fragments and occasional brick and concrete.



Insert 4 - Made Ground encountered in HP201

Encountered in all pits (including beneath the sub-base) to depths of 1m as a loose to medium dense, dark grey to black silty sandy sub-angular to very angular gravel of mudstone, brick and concrete, with occasional ceramic fragments, and low to medium cobble content.



Insert 5 - Made Ground encountered in all hand pits

Possible River Terrace Deposits: encountered in HP203 between 0.75m – 0.85m as very stiff, brown mottled dark brown gravelly clay. It cannot be discounted that this consists of re-worked natural soils.



Insert 6 - Possible River Terrace Deposits encountered in HP203

Possible Weathered bedrock: encountered in HP201 and HP202, at depths of between 0.85m – 1.0m and 0.9m – 1.05m respectively, recovered as very dense gravel and cobbles of very angular sandstone/mudstone. We cannot discount that these strata could represent re-worked natural soils.



Insert 7 - Possible weathered bedrock encountered in HP201 and HP202. (Note: ground conditions within this stratum were too difficult to extract samples via hand excavation)

5.2 Conceptual Ground Model - Hydrogeology

The investigation did not identify any groundwater to a depth of 1.05m. However, it is possible that groundwater may be present within the depth of investigation, but there was insufficient time for it to be recorded.

5.3 Chronic Risks to Human Health – Generic Quantitative Risk Assessment (GQRA)

The assessment criteria used as part of this GQRA are presented on the tables in the following section(s).

The proposed development comprises soft landscaping, paving and a new layby. There is currently no GAC published for such an end use. For the purposes of this assessment, the published GAC for public open space around residential properties use has been adopted, however, as the critical receptor and exposure frequency/duration are different for this use, using these GAC is considered a conservative approach and an exceedance does not necessarily indicate an unacceptable risk.

The GAC for most organic compounds are dependent on the organic content of the soil. Analysis has shown that the soil organic content in the soils analysed ranged from 0.3 to 4.5%. For the purposes of this assessment, GAC for a soil organic content of 1% has been adopted. This again is considered a conservative approach.

5.3.1 Generic Quantitative Risk Assessment

The samples analysed for soil contaminants comprised five samples of Made Ground. All samples have been considered across the site as one averaging area. The risks from asbestos are considered further in Section 5.3.2.

The results of the GQRA for the proposed development are presented in the table below. It should be appreciated that if the development were to change, the following assessment should be reviewed and, if necessary, updated.

Table 4 -Generic Assessment of Human Health Risks (Public Open Space around Residential Development)

Determinand	Minimum Recorded (mg/kg)	Maximum Recorded (mg/kg)	GAC (mg/kg)	Source of GAC	Exceedances
Metals and Semi-metals					
Arsenic	3.0	28	79	C4SL ²	None
Beryllium	<0.2	0.4	2.2	S4UL ⁴	None
Boron	0.2	0.9	21,000	S4UL ⁴	None
Cadmium	0.1	0.7	220	C4SL ²	None
Chromium (total) ⁵	3.8	10	1,500	S4UL ⁴	None
Chromium (hexavalent)	<1.0	<1.0	21	C4SL ²	None
Copper	9.7	37	12,000	S4UL ⁴	None
Lead	6.5	86	630	C4SL ²	None
Mercury ⁶	<0.05	0.2	120	S4UL ⁴	None
Nickel	2.5	15	230	S4UL ⁴	None
Selenium	<0.5	<0.5	1,100	S4UL ⁴	None
Vanadium	6.5	16	2,000	S4UL ⁴	None
Zinc	13	150	81,000	S4UL ⁴	None
Polyaromatic Hydrocarbons (PAH)					
Acenaphthene	<0.03	0.05	15,000	S4UL ^{4,7}	None
Acenaphthylene	<0.03	0.04	15,000	S4UL ^{4,7}	None
Anthracene	<0.03	0.11	74,000	S4UL ^{4,7}	None
Benzo(a)anthracene	<0.03	0.63	29	S4UL ^{4,7}	None
Benzo(a)pyrene	<0.03	0.54	10	C4SL ^{2,7}	None
Benzo(b)fluoranthene	<0.03	0.91	7.1	S4UL ^{4,7}	None
Benzo(ghi)perylene	<0.03	0.32	640	S4UL ^{4,7}	None
Benzo(k)fluoranthene	<0.03	0.29	190	S4UL ^{4,7}	None
Chrysene	<0.03	0.62	57	S4UL ^{4,7}	None
Dibenzo(a,h)anthracene	<0.03	0.1	0.57	S4UL ^{4,7}	None
Fluoranthene	<0.03	1.4	3,100	S4UL ^{4,7}	None
Fluorene	<0.03	0.05	9,900	S4UL ^{4,7}	None
Indeno(123-cd)pyrene	<0.03	0.31	82	S4UL ^{4,7}	None
Naphthalene	<0.03	0.03	11,000*	C4SL ^{2,7}	None
Phenanthrene	<0.03	0.54	3,100	S4UL ^{4,7}	None
Pyrene	<0.03	1.1	7,400	S4UL ^{4,7}	None
BTEX Compounds					
Benzene	<0.1	<0.1	140	C4SL ^{2,7}	None
Toluene	<0.1	<0.1	56,000	S4UL ^{4,7}	None
Ethyl benzene	<0.1	<0.1	24,000	S4UL ^{4,7}	None
Xylene ⁸	<0.1	<0.1	41,000	S4UL ^{4,7}	None
Aliphatic Petroleum Hydrocarbons (Equivalent Carbon Number)					
Ali EC 5-6	<0.1	<0.1	570,000*	S4UL ^{4,7}	None
Ali EC 6-8	<0.1	<0.1	600,000		None
Ali EC 8-10	<0.1	<0.1	13,000		None
Ali EC 10-12	<1.5	<1.5	13,000		None
Ali EC 12-16	<1.2	<1.2	13,000		None
Ali EC 16-35	<4.9	<1.5	250,000		None
Aromatic Petroleum Hydrocarbons (Equivalent Carbon Number)					
Aro EC 5-7	<0.1	<0.1	56,000	S4UL ^{4,7}	None
Aro EC 7-8	<0.1	<0.1	56,000		None
Aro EC 8-10	<0.1	<0.1	5,000		None
Aro EC 10-12	<0.9	<0.9	5,000		None
Aro EC 12-16	<0.5	<0.5	5,100		None
Aro EC 16-21	0.94	4.73	3,800		None
Aro EC 21-35	<1.40	21.88	3,800		None

Continued on next page...

Table 4 (continued) -Generic Assessment of Human Health Risks (Public Open Space around Residential Development)

Determinand	Minimum Recorded (mg/kg)	Maximum Recorded (mg/kg)	GAC (mg/kg)	Source of GAC	Exceedances
Other Organic Compounds					
Phenol	<0.3	2.5	760	S4UL ^{4,7}	None
Notes: 1. Assessment for public open space around a residential land use. 2. C4SL: Category 4 Screening Level, published by CL:AIRE. 3. SGV: Soil Guideline Value published by Environment Agency. 4. S4ULs Suitable 4 Use Levels. Copyright Land Quality Management Limited, reproduced with permission; Publication No. S4UL3156. All Rights Reserved. 5. In the absence of Chromium VI, all chromium present likely to be Chromium III. GAC for Chromium III adopted. 6. GAC for inorganic mercury adopted. 7. GAC for organic compounds based on 1% soil organic content. 8. GAC for xylene based on p-xylene (lowest S4UL). 9. Exceedances highlighted in red and bold. 10. Laboratory results presented in Appendix G. * GAC exceeds solubility or vapour saturation limit.					

All the determinands analysed were below their respective GAC. No further statistical analysis is warranted.

5.3.2 Asbestos

No evidence of asbestos was identified in the samples analysed.

6 Phase Two Geo-Environmental Risk Assessment

6.1 Discussion on Occurrence of Contamination and Distribution

A review of the history of development area has identified the site to be a parcel of land formerly occupied by tramway sidings in the west and two encroaching buildings in the north and south boundaries prior to the construction of a lavatory and hardstanding/car parking.

Made Ground was encountered within the hand-pits up to 1.0m bgl, which included fragments of building materials and rubble, and material of anthropogenic origin, e.g. fragments of ceramic within the soils.

Whilst Made Ground is present, no obvious sources of significant contamination have been identified, no obvious visual or olfactory evidence of contamination was noted, and no exceedances of tested determinands were recorded.

Investigation was not possible in some areas due to restrictions (e.g. active car parking, toilet block and utilities).

6.2 Revised Risk Evaluation & Relevant Pollutant Linkages

As discussed in Section 3.2.1, the methodology set out in CIRIA C552 (2001) has been used to assess whether or not risks are acceptable, and to determine the need for collating further information or remedial action.

The risks evaluated at the desk study stage of this report (3, Section 3.2.2) have been updated and revised in Table 6 following information learned from the exploratory works and results of laboratory testing.

Table 5 - Revised Risk Evaluation & Relevant Pollutant Linkages (RPL)

Source	Pathway	Receptor	Classification of Consequence	Classification of Probability	Risk Category	Further Investigation or Remedial Action to be Taken
Potential contaminants in shallow soils	Direct contact/ inhalation/ ingestion of contaminated soil or dust	Site Users	Medium – potential for chronic levels	Unlikely ²	Low Risk	See Section 7.1 for further discussion.
	Direct contact/ inhalation/ ingestion of contaminated soil or dust	Construction/ Maintenance Workers	Minor – standard PPE likely to be sufficient	Likely ²	Low Risk	
	Leaching of soil contaminants	Impact on Groundwater /Potable Water	Medium – Secondary A Aquifers	Unlikely ²	Low Risk	
	Leaching of soil contaminants	Impact on River Neath	Medium – site lies adjacent to river	Unlikely ²	Low Risk	
Asbestos in existing buildings/stockpile	Inhalation of fibres	Demolition Workers/ Ground Workers	Medium – potential for chronic levels	Unlikely ³	Low Risk	See Section 7.1.1 for further discussion.
Asbestos in shallow soils	Inhalation of fibres	Site End Users	Medium – potential for chronic levels	Unlikely ³	Low Risk	See Section 7.1.1 for further discussion.
		Construction/ Maintenance Workers	Medium – potential for chronic levels	Low Likelihood ³	Moderate/ Low Risk	
Notes: 1. This table updates Table 3 in Section 3.2.2 using results of the investigation. Methodology and details of risk consequence, probability and category presented in Appendix A. 2. Although Made Ground has been encountered, contamination levels are low and no exceedances of tested determinands have been observed (Section 5.3.1) 3. No obvious asbestos materials have been observed in the Made Ground soil or found by the laboratory within tested samples. 4. Assessment of risks from sulphate and ground gas/radon are not included as there are no pollutant linkages.						

7 Remedial Strategy for Contamination Risks

The following recommendations are based on interpretations made from the relatively limited site investigation data obtained to-date, and do not form the full Options Appraisal stage of the Land contamination risk management (LCRM) guidelines. If at any stage of the construction works, contamination or a potential for such contamination is identified that is different to that presented within this report, all of the following should be reviewed, and the advice of ESP should be sought.

7.1 Risks to Health

7.1.1 Asbestos

No evidence of asbestos was detected in the samples of Made Ground tested. However, the site has been previously developed with buildings which were demolished prior to 1999, which could have potentially contained asbestos containing materials (ACM), so the presence of asbestos in the shallow Made Ground cannot be totally discounted.

If any suspected asbestos containing materials (ACM) are identified during development, the advice of a suitably qualified specialist should be sought immediately. Any identified ACM would need to be removed from site by a licensed specialist contractor.

Prior to the demolition of the Toilet block on site, an asbestos survey should be undertaken and any asbestos materials found removed by a licensed contractor.

The following sections presume that any risks from asbestos materials at the site are mitigated.

7.1.2 Site End Users

Based on the end use of soft landscaping, paving and a layby, the identified levels of soil contamination at the site are not considered to pose a risk to future site users. Therefore, no specific remedial measures are considered necessary for the development.

Notwithstanding the above, due to restrictions of investigation points beneath the existing toilet bloc, carpark and around existing services, it cannot be discounted that the shallow soils within these areas could potentially contain contaminated materials. If any evidence of contamination is identified during development, further advice should be sought by ESP.

7.1.3 Risk to Construction and Maintenance Workers

Short term (acute) risks to construction and maintenance workers are generally poorly understood within the industry, certainly when compared to the volume of research undertaken on long term risks. However, it is anticipated that the levels of contamination at the site are not likely to pose a severe acute risk to construction workers or future maintenance workers. Ground workers would need to undertake their own assessment of the risks to their workers.

It is recommended that construction workers adopt careful handling of the potential contaminants and good standards of personal hygiene should be adopted to reduce the risk of possible ingestion and skin contact should any hotspots be encountered. The contractor should comply with the appropriate current Health and Safety at work legislation.

7.1.4 General Public/Neighbouring Properties

Significant risks to the general public from the development of the site are not anticipated. However, careful dust control measures should be adopted during construction to minimise the risk (and nuisance) to the general public and neighbouring residents.

7.2 Risks to Controlled Waters

No specific assessment of the risks to controlled waters has been undertaken to date. However, the following points are considered salient.

- Potentially contaminative historical land use has been identified at the site (tram sidings, buildings, carpark).
- Made Ground has been identified on the site.
- The levels of soil contaminants are low.
- The bedrock and superficial deposits beneath the site is classified as a Secondary A aquifer.
- The River Neath lies some 15m to the east.
- Soakaway drainage is not intended in the development area.

Given the above, it is considered that the overall risk to controlled waters from the development of the site is likely to be low and no further assessment is warranted.

Should contamination be encountered during the development phase, the above assessment should be reviewed and updated.

7.3 Risks from Ground Gas and Radon

7.3.1 Ground Gas Risk to the Development

No obvious ground gas sources were identified in the Made Ground during the investigation.

There is no obvious evidence of any significant potential on-site or nearby off-site sources of hazardous ground gas. General thin Made Ground or locally hydrocarbon impacted soils from sporadic leaks associated with car parking are considered to have a very low to low source potential.

Based on the CL:AIRE (2021) support tool, the site is in a negligible risk zone from mine gas.

We understand the development on the study site will not include any enclosed spaces and therefore consideration of gas and radon risks is not required as no linkages exist. Should this change, an assessment in this regard should be undertaken.

7.3.2 Risk to Construction and Maintenance Workers

It is not considered there is a particular risk to construction and maintenance workers, and there is no requirement to define shallow excavations as confined spaces. However, good site practice is recommended, and all excavations should be considered potentially confined spaces.

Carbon dioxide is a particular risk in Made Ground materials as it is commonly present and as it is heavier than air, it can displace it at the base of excavations, which can then lead to workers being at risk from asphyxiation. If during construction any organic materials are encountered, they should be excavated and replaced.

7.4 Risks to Property

7.4.1 Spontaneous Combustion

No evidence of combustible materials has been identified in the shallow soils. Therefore, the risk from spontaneous combustion is considered to be low.

7.5 Re-Use of Materials/Disposal of Excess Arisings

7.5.1 General Comments on Re-use/Disposal

All soils or other materials excavated from site are generally classified as waste under the Waste Framework Directive (European Union, 2008) and their re-use is controlled by this legislation.

If the soils are to be re-used on site (e.g. within the red-line planning boundary), provided that they are 'uncontaminated' or other naturally occurring deposits and they are certain to be used for the purposes of construction in their natural state on the site from which they are excavated, they may be excluded from waste regulation (Duckworth, 2011). A Materials Management Plan (MMP) may be required, which may also enable the re-use of materials classed as waste on excavation (e.g. Made Ground or re-worked soils) if in accordance with the CL:AIRE Definition of Waste, Development Industry Code of Practice (DoWCoP). If excavated soils or materials are contaminated, their re-use potential on-site may be limited.

If the soils are to be removed from site, they are automatically classified as waste, and they may only be:

- Disposed at a licensed landfill;
- Disposed at a licensed, permitted soil treatment centre; or
- Removed to a Receiver Site for beneficial re-use.

Prior to removal from site, the excavated arisings would need to be classified as either 'hazardous' or 'non-hazardous' waste based on a WM3 assessment. Waste Acceptability Criteria (WAC) testing would be required to determine the type of landfill in which the arisings could be disposed.

Re-use of soils on a receiver site could be undertaken via an Environmental Permit or Exemption, however, these can take time and are costly to arrange. In certain circumstances, it is permissible to use the protocols laid down in the CL:AIRE DoWCoP (Duckworth, 2011) which is generally more efficient (in terms of time and cost) to implement.

Further guidance on the legislative requirements of the re-use/disposal of materials generated by the development can be provided by ESP once the development proposals have been finalised.

7.5.2 Imported Materials

Any soils or materials to be imported to site (including Topsoil) should be certified clean and inert, and suitable for use. An appropriate number of samples (depending on the volume of soils imported) should be analysed for an appropriate suite of contaminants, and verification certificates should be provided. Further guidance can be provided by this office if required.

8 Recommendations

It is considered that the following further investigation and assessment would be required or prudent prior to development:

Required Further Actions:

- Asbestos survey of existing building (Section 7.1.1);
- If any suspected asbestos containing materials (ACM) are identified during development, the advice of a suitably qualified specialist should be sought immediately
- A watching brief should be maintained during demolition/construction and if any evidence of contamination is identified during development, further advice should be sought by ESP.
- If during construction any organic materials are encountered, they should be excavated and replaced.

Recommended Further Actions:

- Verification testing of any soils imported to site;
- WM3 assessment of soils to be disposed of off-site followed by WAC testing if disposal to landfill.

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LEGEND:

- Site Boundary
- Hand Excavated Pits

Abbreviations and Symbols	
EOT - End of trace	BD - Back drop
UTT - Unable to trace	CL - Cover level
PT - Poor trace	CRL - Crown level
(E) - Empty duct	IL - Invert level
(R) - Taken from records	SL - Silt level
(AR) - Assumed route	SuL - Surcharge level
(VI) - Verbal Information	WL - Water level
UTL - Unable to lift	BL - Base level
Ø - Diameter	UTR - Unable to rod
Wd - Depth to water	UTS - Unable to survey
Sd - Depth to surcharge	FW - Foul water sewer
d - Electronically derived depth	CW - Combined water sewer
Cd - Depth to crown	SW - Surface water sewer
Id - Depth to invert	GPR - Ground penetrating Radar
Sd - Depth to silt	NFI - No further information
TV	Cable TV
HV	High Voltage
LV	Low Voltage
N	Electric Cable
CCTV	Security Cable
COM	Comms
F	Fuel Line
D	Empty Duct
TL	Traffic Light Cable
G	Gas
P	Oil Pipe
:	British Telecom
U	Unknown Trace
W	Water
	Foul Water Sewer
	Combined Water Sewer
	Surface Water Sewer
	Utility Survey Extents
	Other
	Chamber Extents
	End of Trace

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PROJECT NAME:	WATERFALLS COUNTRY CENTRE - TOILET BLOCK
REPORT REF:	4351
CLIENT:	Andrew Scott Ltd
FIGURE TITLE:	Investigation Point Plan
FIGURE NO: 01	REV.: 01
DATE: 22/05/2025	SCALE: 1: 150
DRAWN BY: TM	CHECKED BY: TM



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33 Cardiff Road, Taff's Well,
Cardiff CF15 7RB Tel: 029 2081 3385
enquiries@earthsciencepartnership.com

Appendix A Risk Evaluation Methodology

APPENDIX A

RISK EVALUATION METHODOLOGY

The methodology set out in CIRIA C552 (2001), *Contaminated Land Risk Assessment – A Guide to Good Practice*, has been used to assess whether or not risks are acceptable, and to determine the need for collating further information or remedial action. The following tables have been used to classify the risk for each pathway. Tables A2 to A4 have been revised to include for circumstances where no plausible risk has been identified.

Table A1 - Classification of Consequence

Classification	Definition	Examples
Severe	- Short-term (acute) risk to human health likely to result in <i>Significant Harm</i>. - Short-term risk of pollution to a sensitive water resource. - Catastrophic damage to buildings/property. - Short-term risk to ecosystem, or organism forming part of that ecosystem.	- High concentrations of Cyanide at surface of informal recreation area. - Major spillage of contaminants from site into controlled water. - Explosion causing building collapse.
Medium	- Chronic damage to human health. - Pollution of sensitive water resource. - A significant change to ecosystem, or organism forming part of that ecosystem.	- Contaminant concentrations exceed assessment criteria. - Leaching of contaminants to Secondary A aquifer. - Death of species within nature reserve.
Mild	- Pollution of non-sensitive water resources. - Significant damage to crops, buildings, structures. - Damage to sensitive buildings, structures or the environment.	- Pollution of Secondary groundwater sources. - Damage to building rendering it unsafe to occupy.
Minor	- Harm, although not necessarily significant harm, which may result in financial loss, or expenditure to resolve. - Non permanent risks to human health (easily prevented by means of PPE). - Easily repairable effects of damage to buildings and structures.	- The presence of contaminants at such concentrations that PPE is required during site works. - The loss of plants in a landscaping scheme. - Discoloration of concrete.

Table A2: Classification of Probability

Classification	Definition
High Likelihood	There is a pollutant linkage and an event that either appears very likely in the short term and almost inevitable over the longer term. Or, there is already evidence at the receptor of harm or pollution.
Likely	There is a pollution linkage and all the elements are present and in the right place, which means that it is probable that an event will occur. Circumstances are such that an event is not inevitable, but possible in the short term and likely over the longer term.
Low Likelihood	There is a pollutant linkage and circumstances are possible under which an event could occur. However, it is by no means certain that even over a longer period such an event would take place, and is less likely in the shorter term.
Unlikely	There is a pollutant linkage, but circumstances are such that it is improbable that an event would occur, even in the very long term.
No Linkage	No plausible linkage has been established.

Table A3: Risk Categories – Comparison of consequence against probability

		Consequence			
		Severe	Medium	Mild	Minor
Probability	High Likelihood	Very High Risk	High Risk	Moderate Risk	Moderate / Low Risk
	Likely	High Risk	Moderate Risk	Moderate / Low Risk	Low Risk
	Low Likelihood	Moderate Risk	Moderate / Low Risk	Low Risk	Very Low Risk
	Unlikely	Moderate / Low Risk	Low Risk	Very Low Risk	Very Low Risk
	No Linkage	No Risk			

Table A4: Description of Risk Categories

Classification	Description
Very High Risk	- There is a probability that severe harm could arise to a designated receptor from an identified hazard. Or, there is evidence that severe harm to a designated receptor is currently happening. - The risk, if realised, is likely to result in a substantial liability. - Urgent investigation (if not already undertaken) and remedial action are likely to be required.
High Risk	- Harm is likely to arise to a designated receptor from an identified hazard. - Realisation of the risk is likely to present a substantial liability. - Urgent investigation (if not already undertaken) is required, and remedial action may be necessary in the short term and are likely over the longer term.
Moderate Risk	- It is possible that harm could arise to a designated receptor from an identified hazard. However, it is either relatively unlikely that any such harm would be severe, or if any harm were to occur, it is more likely that the harm would be mild. - Investigation (if not already undertaken) is normally required to clarify the risk and to determine potential liability. Some remedial action may be required in the longer term.
Low Risk	It is possible that harm could arise to a designated receptor from an identified hazard, but it is likely that this harm, if realised, would at worst normally be mild.
Very Low Risk	There is a very low possibility that harm could arise at a receptor. In the event of such harm being realised, it is not likely to be severe.
No Risk	No risk mitigation required.

Appendix B Extracts from Historical Maps

Site Details:

Waterfalls Country Centre

Client Ref: ESP.8715.03
Report Ref: GS-VBS-2YF-W5K-ERK
Grid Ref: 290090, 207632

Map Name: County Series

Map date: 1877

Scale: 1:2,500

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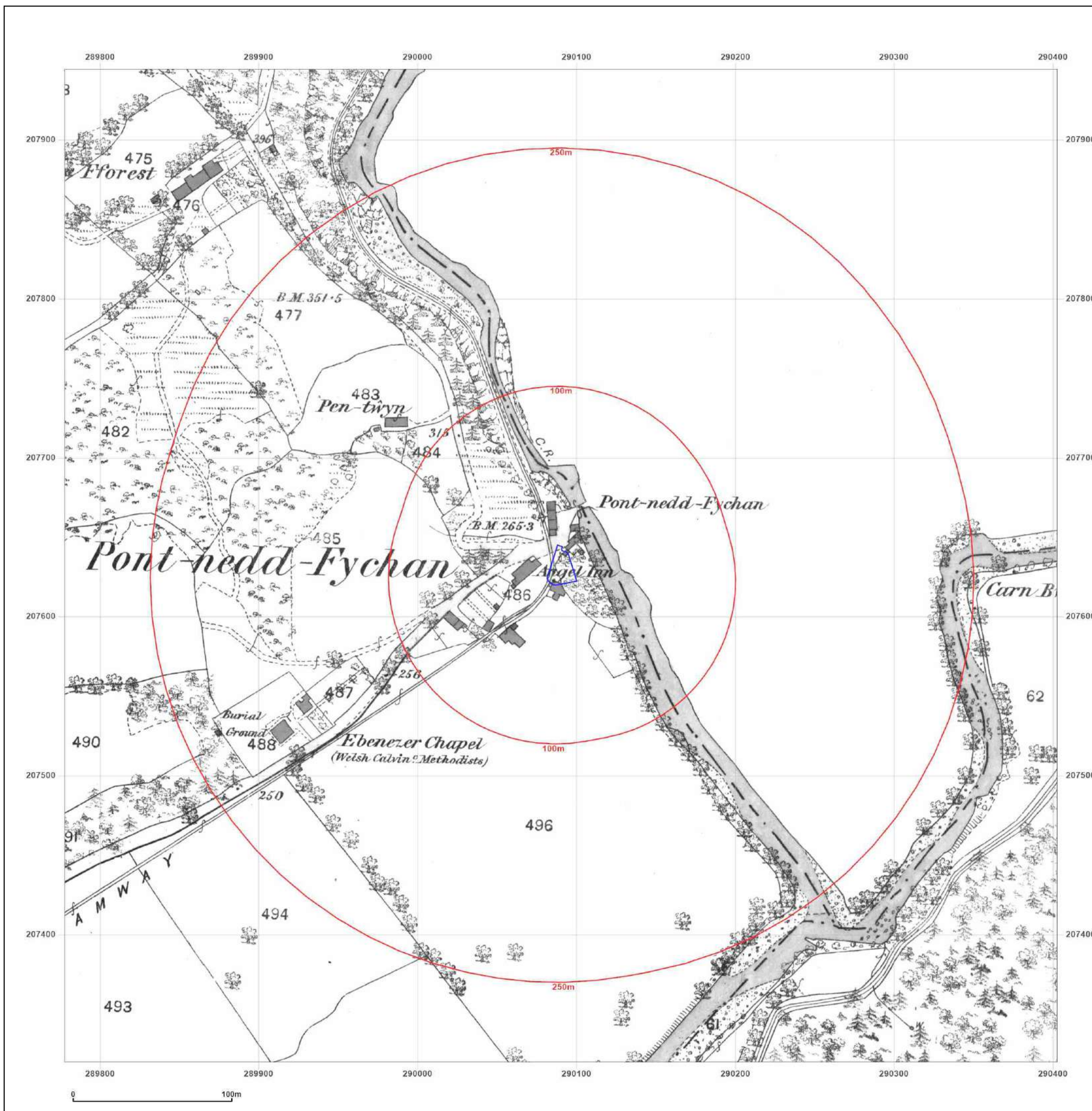


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Report Ref: GS-VBS-2YF-W5K-ERK
Grid Ref: 290090, 207632

Map Name: County Series

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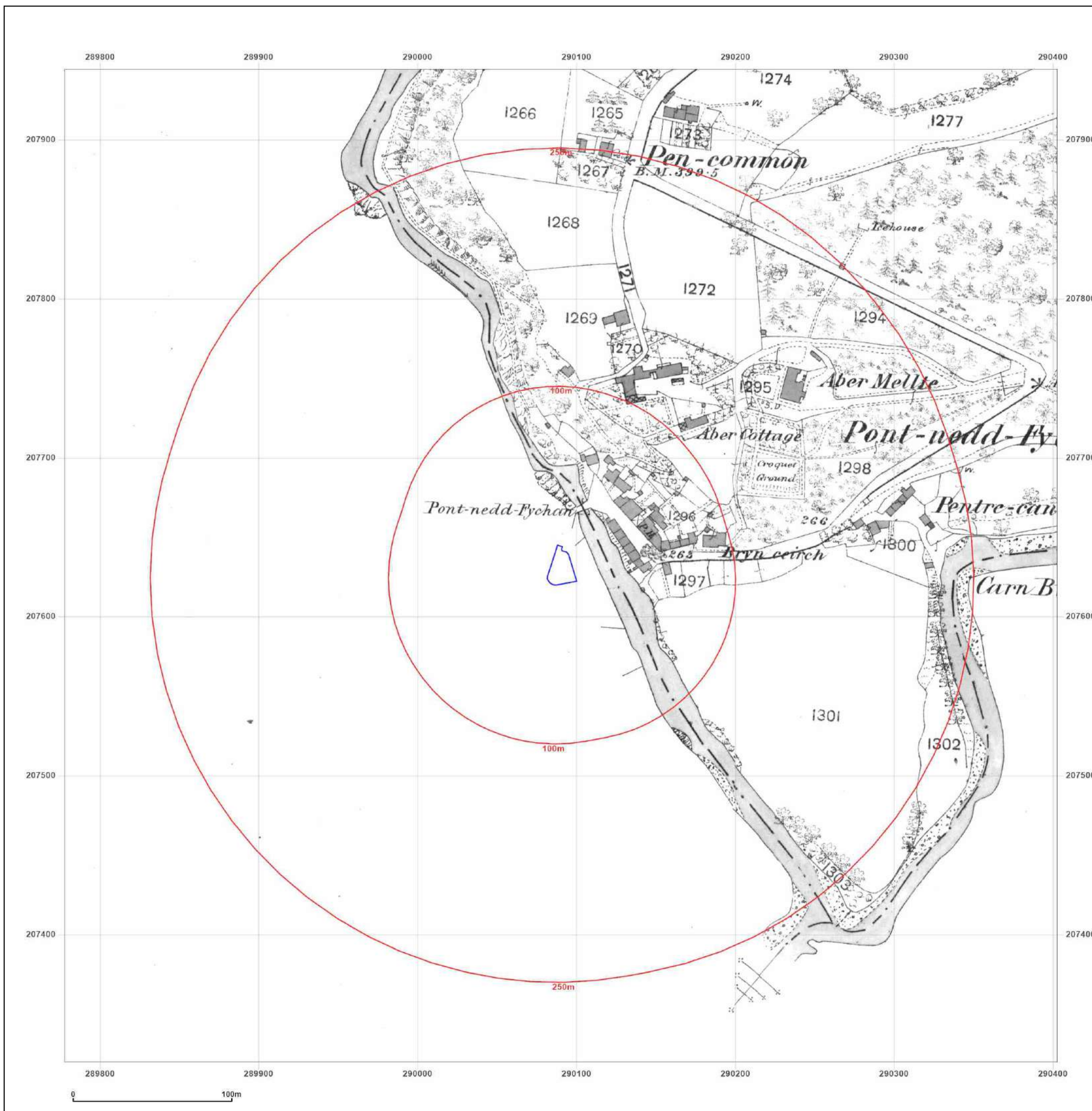


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Grid Ref: 290090, 207632

Map Name: County Series

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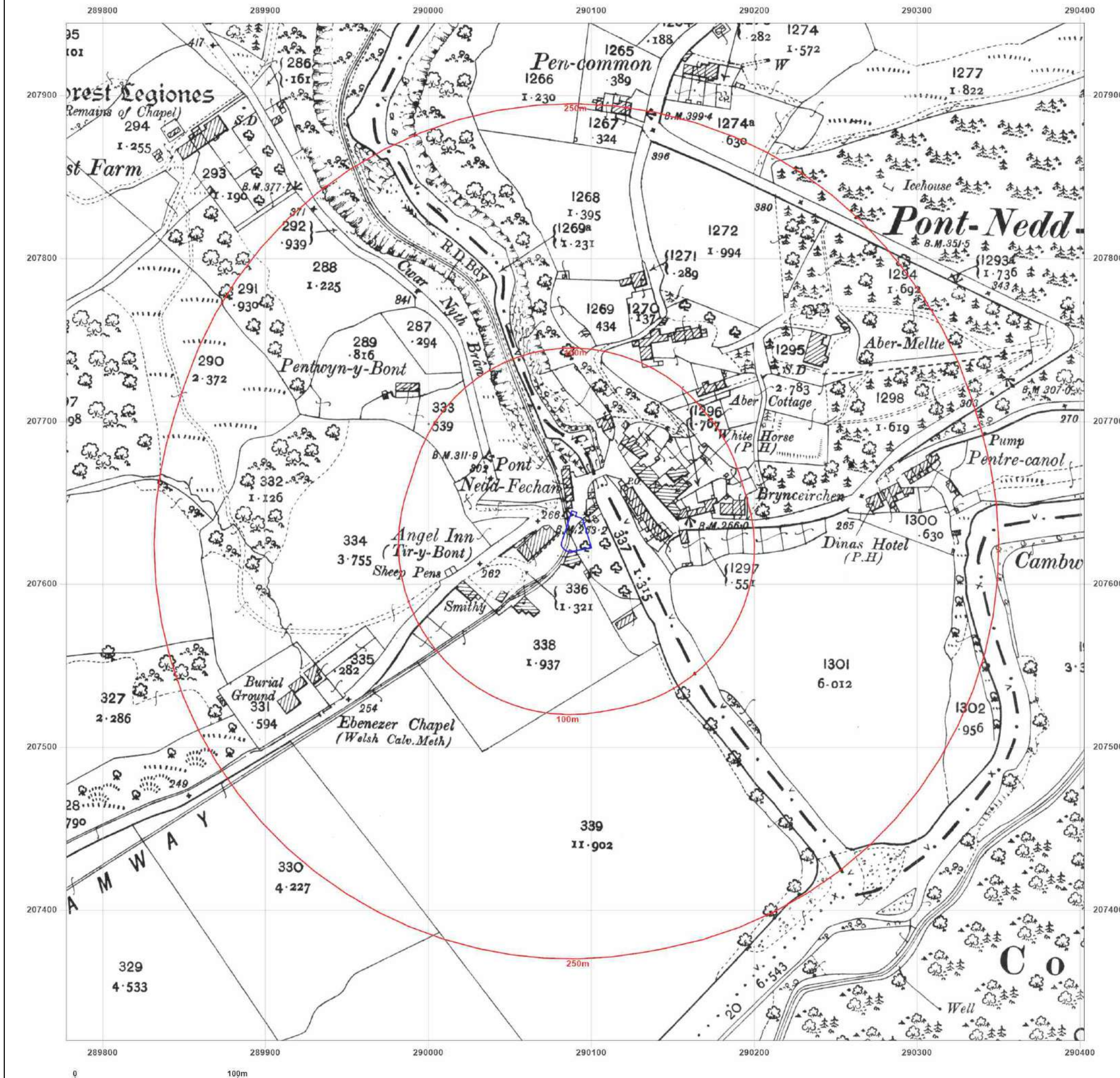


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Map Name: County Series

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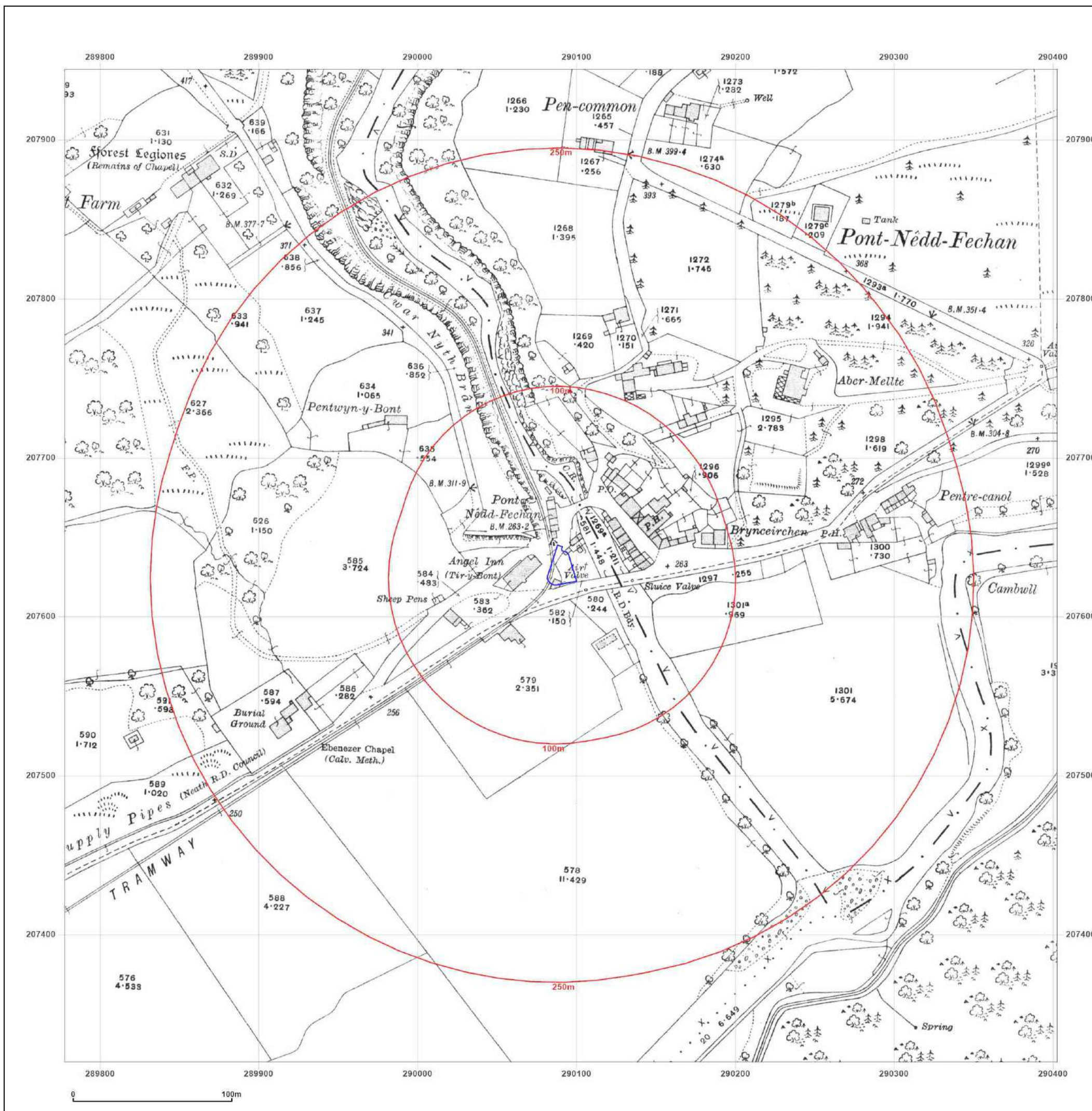


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Map Name: National Grid

Map date: 1964

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Grid Ref: 290090, 207632

Map Name: National Grid

Map date: 1964

Scale: 1:2,500

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Map Name: National Grid

Map date: 1977-1980

Scale: 1:2,500

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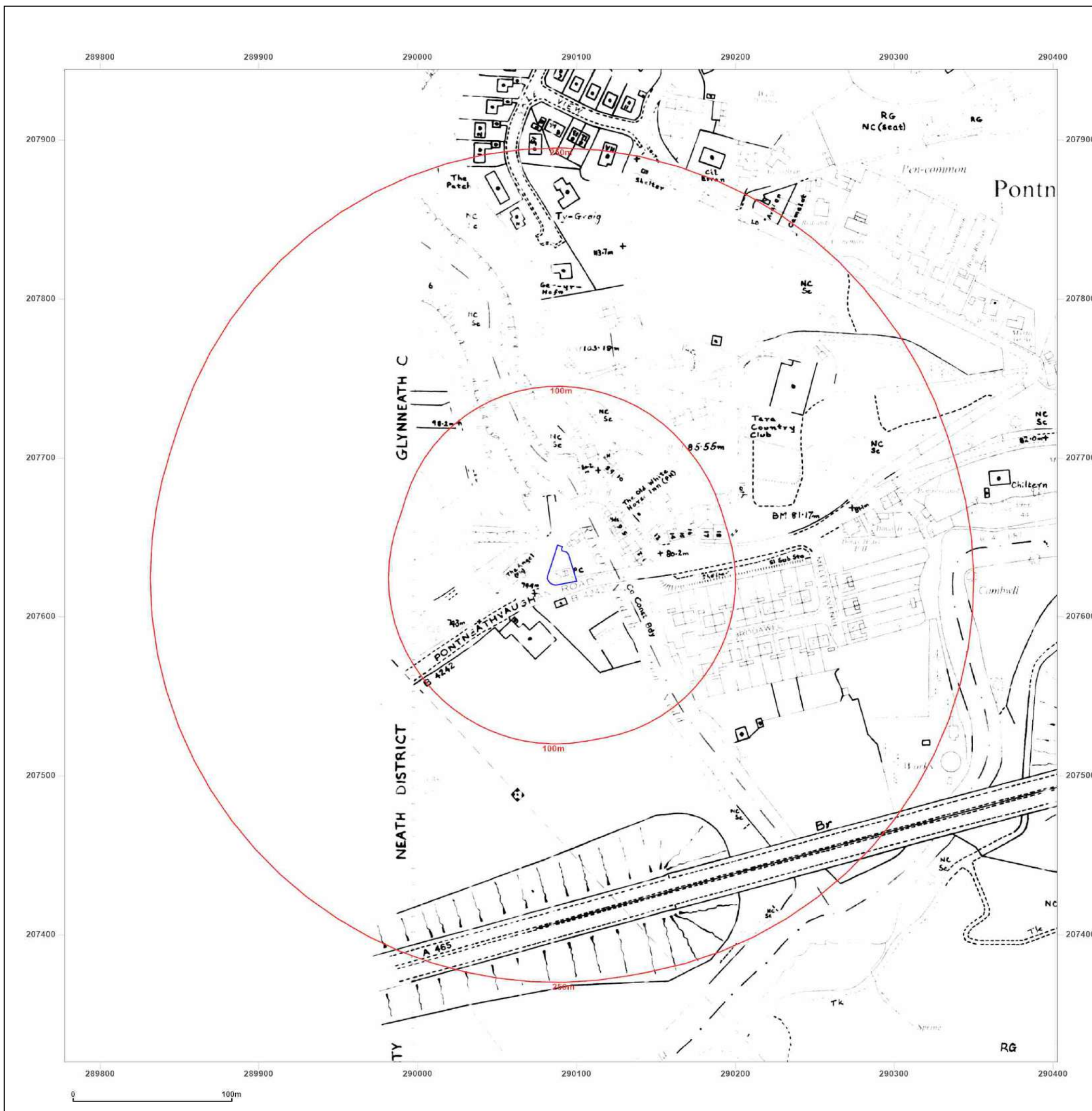


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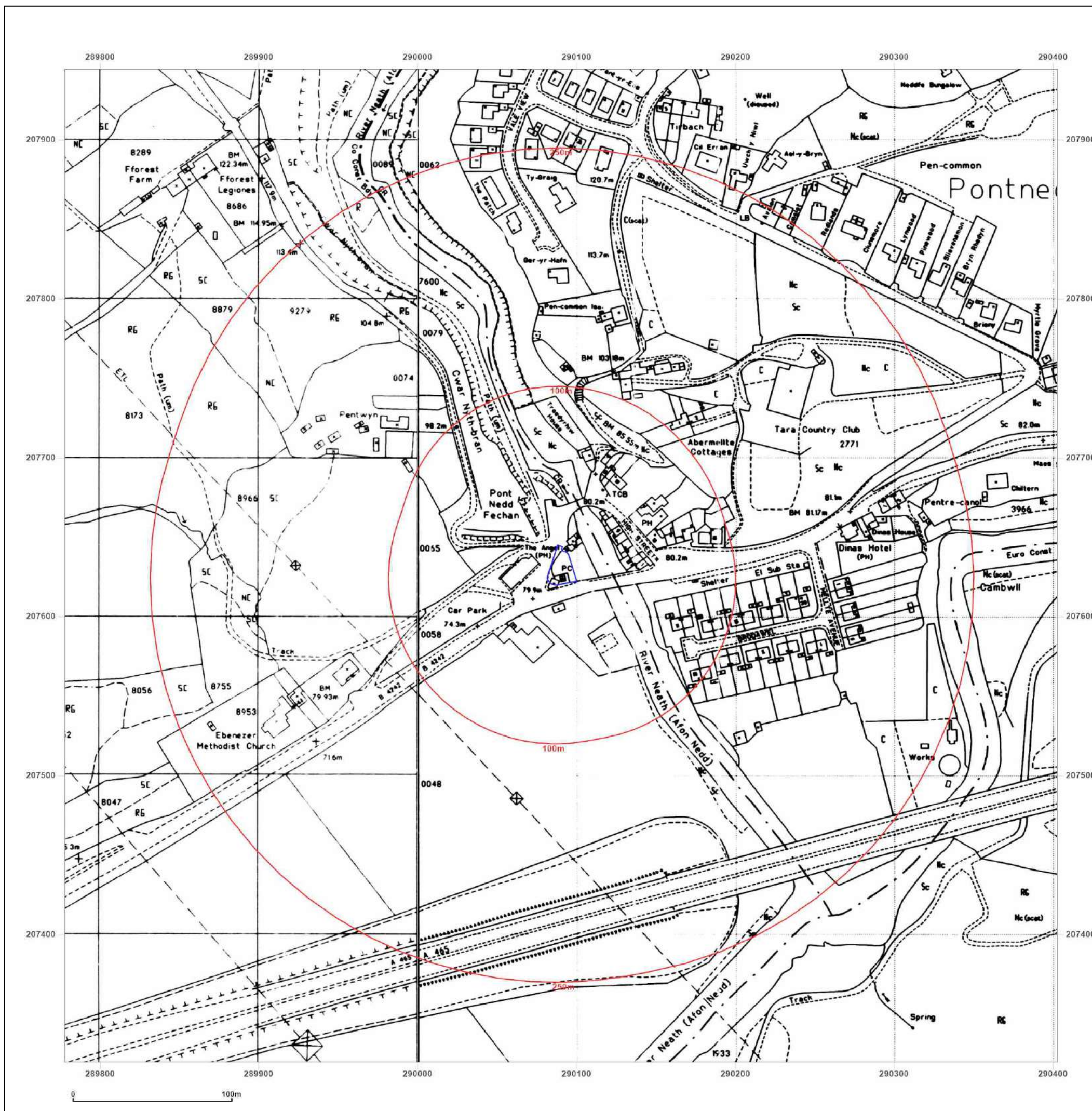


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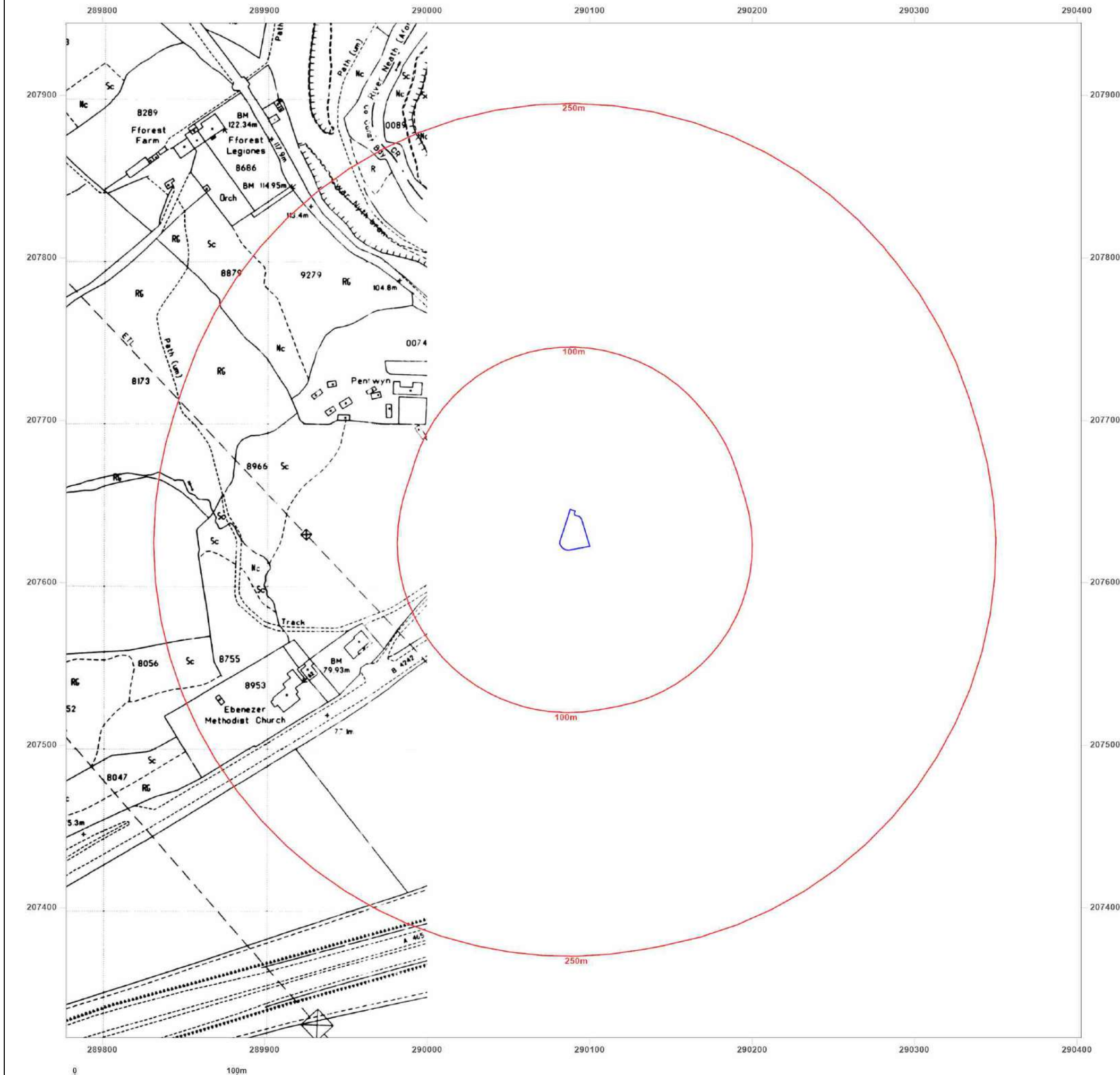


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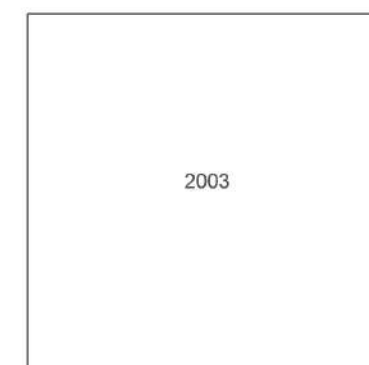
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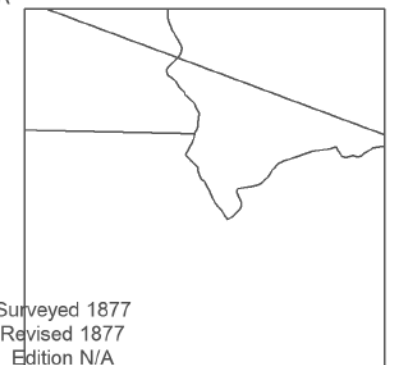
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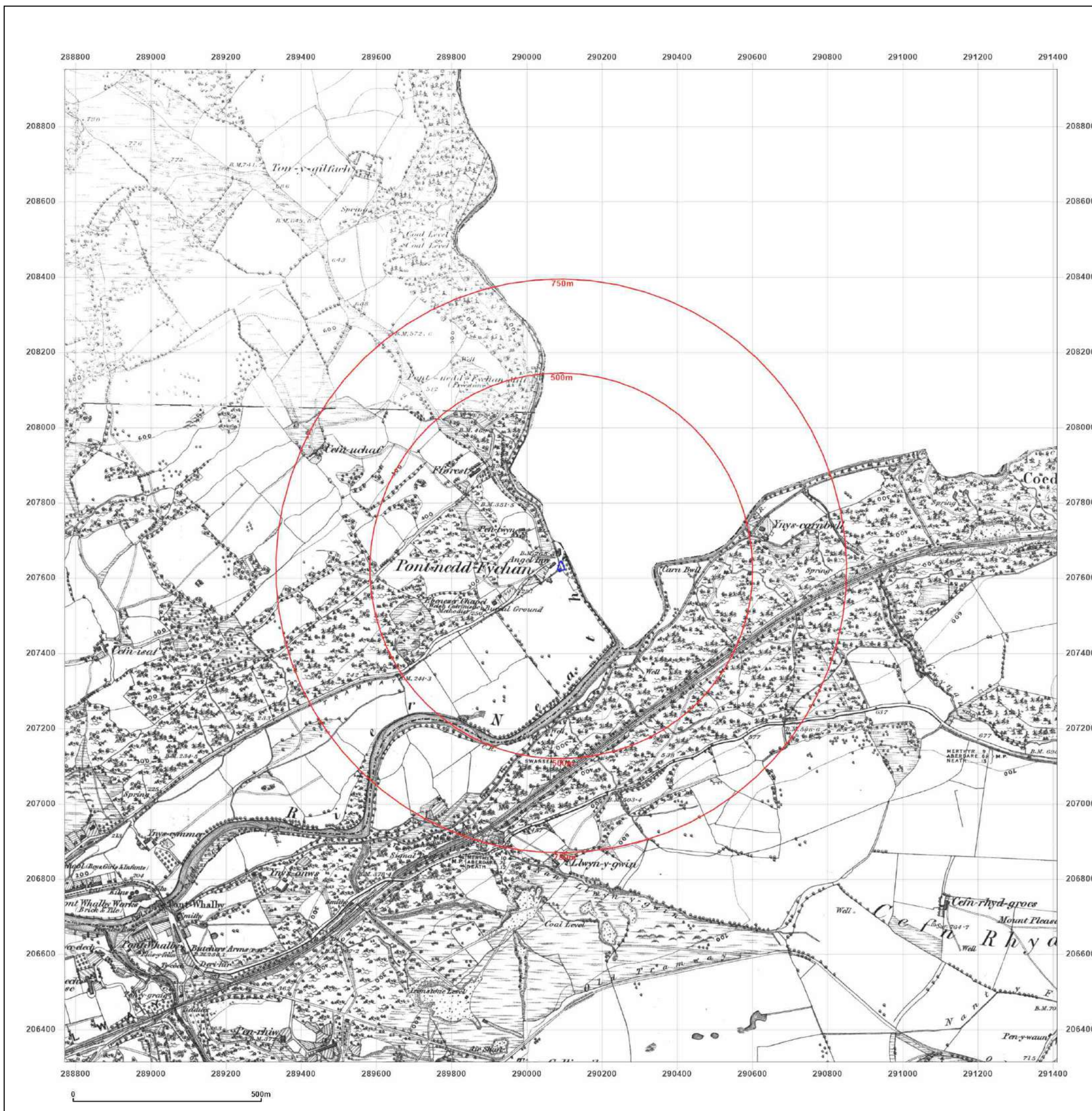


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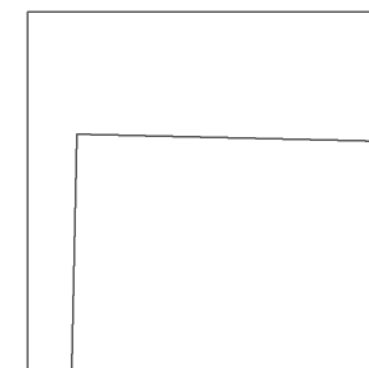
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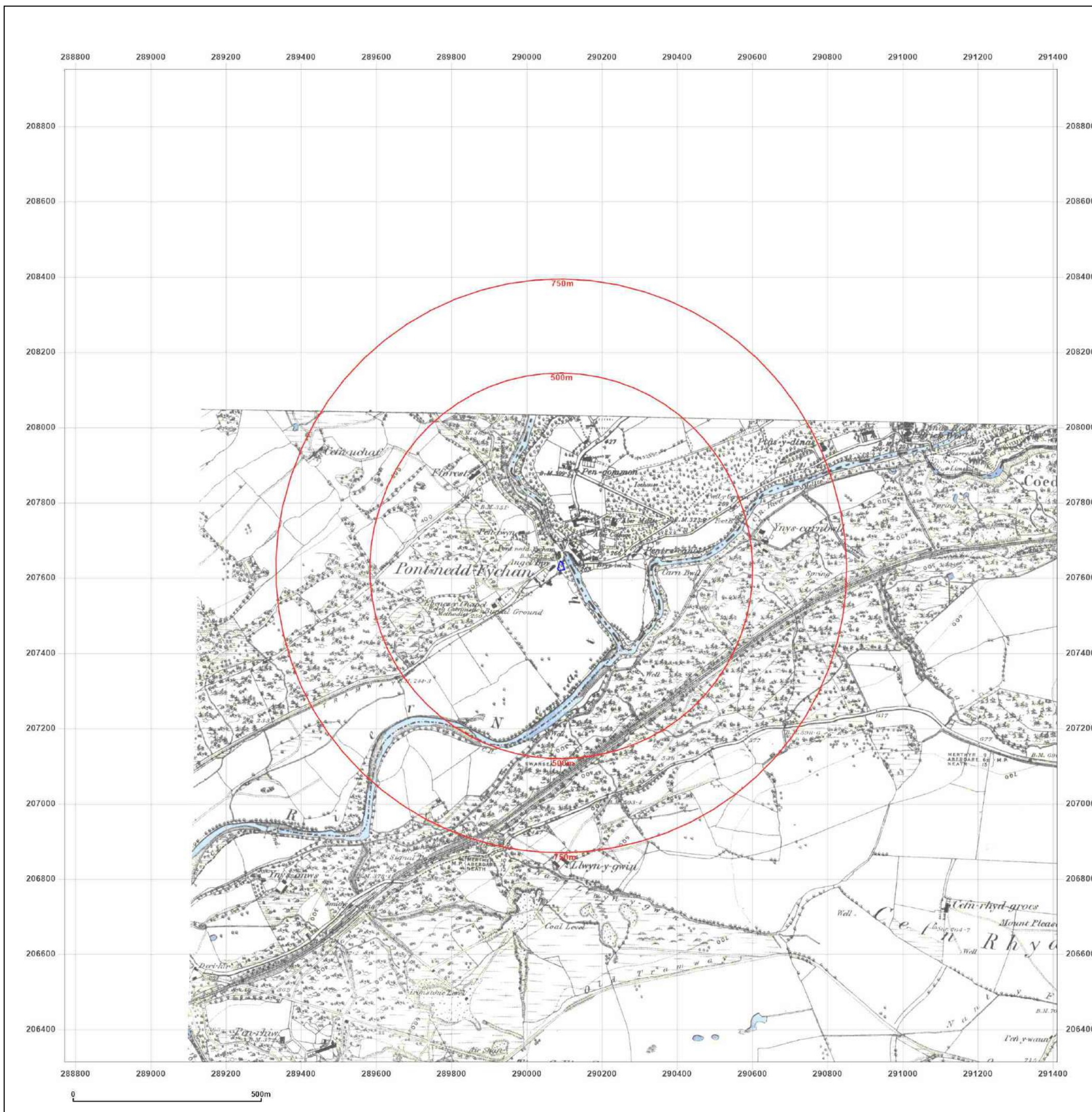


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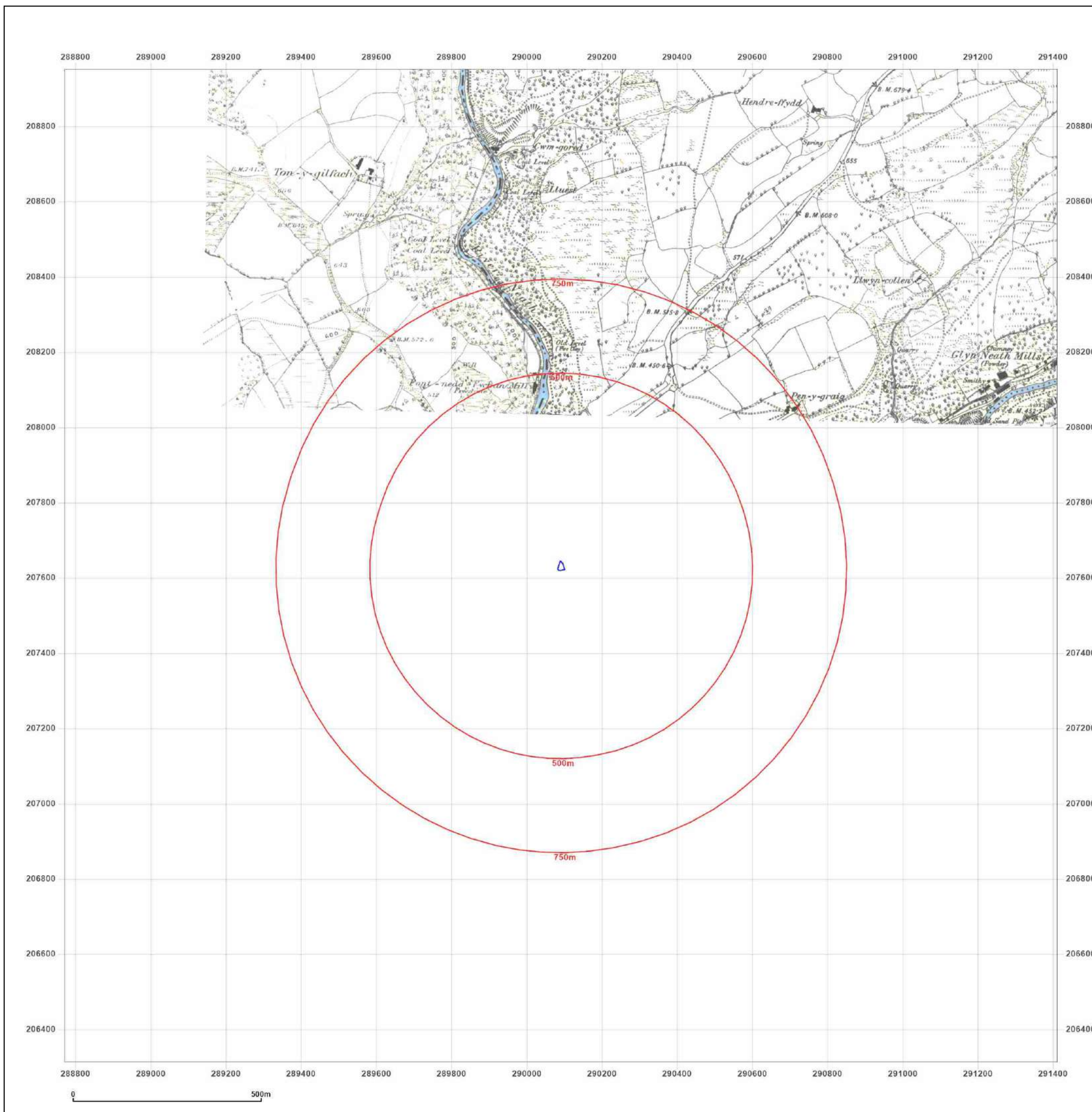


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Map Name: County Series

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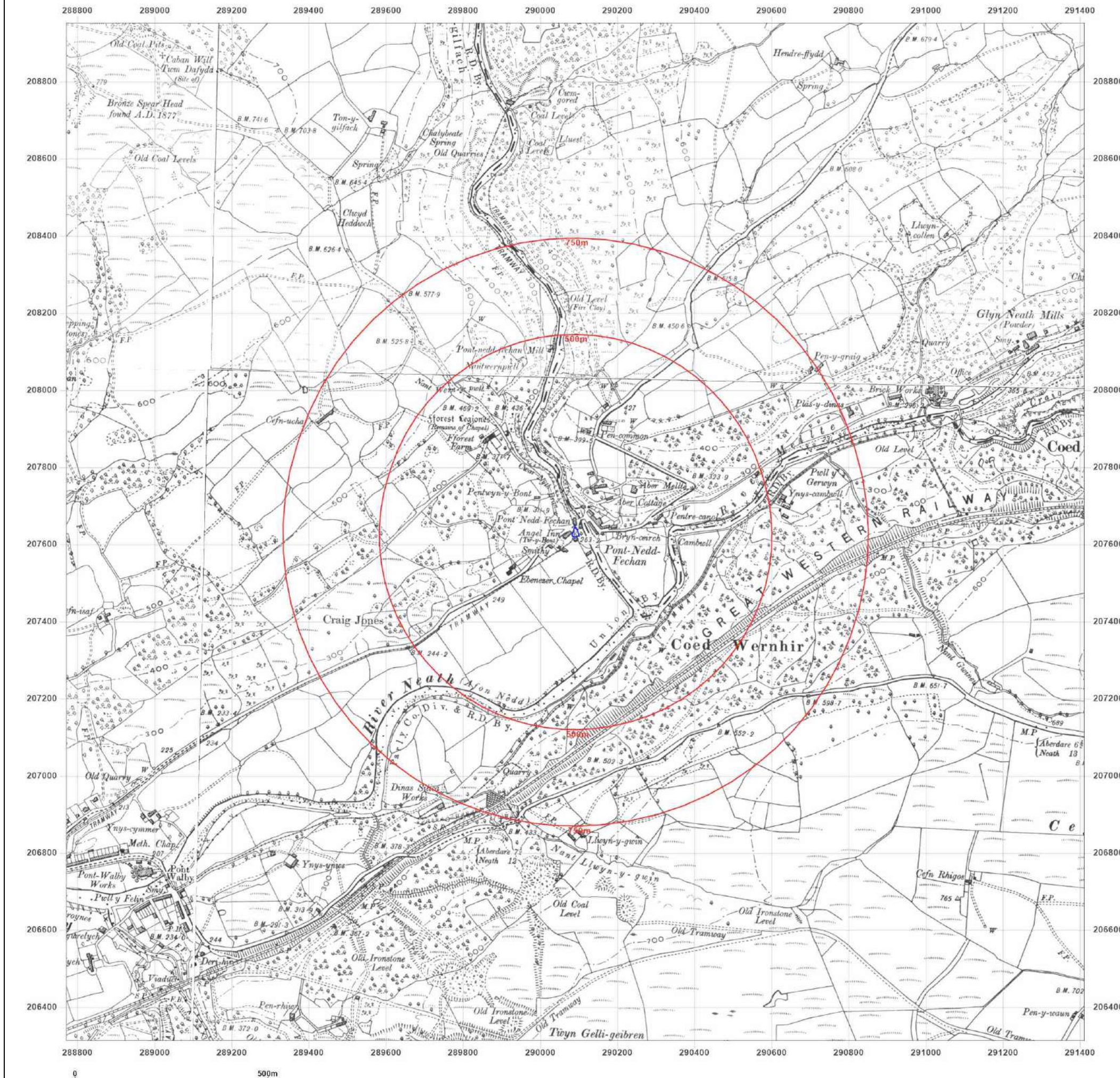


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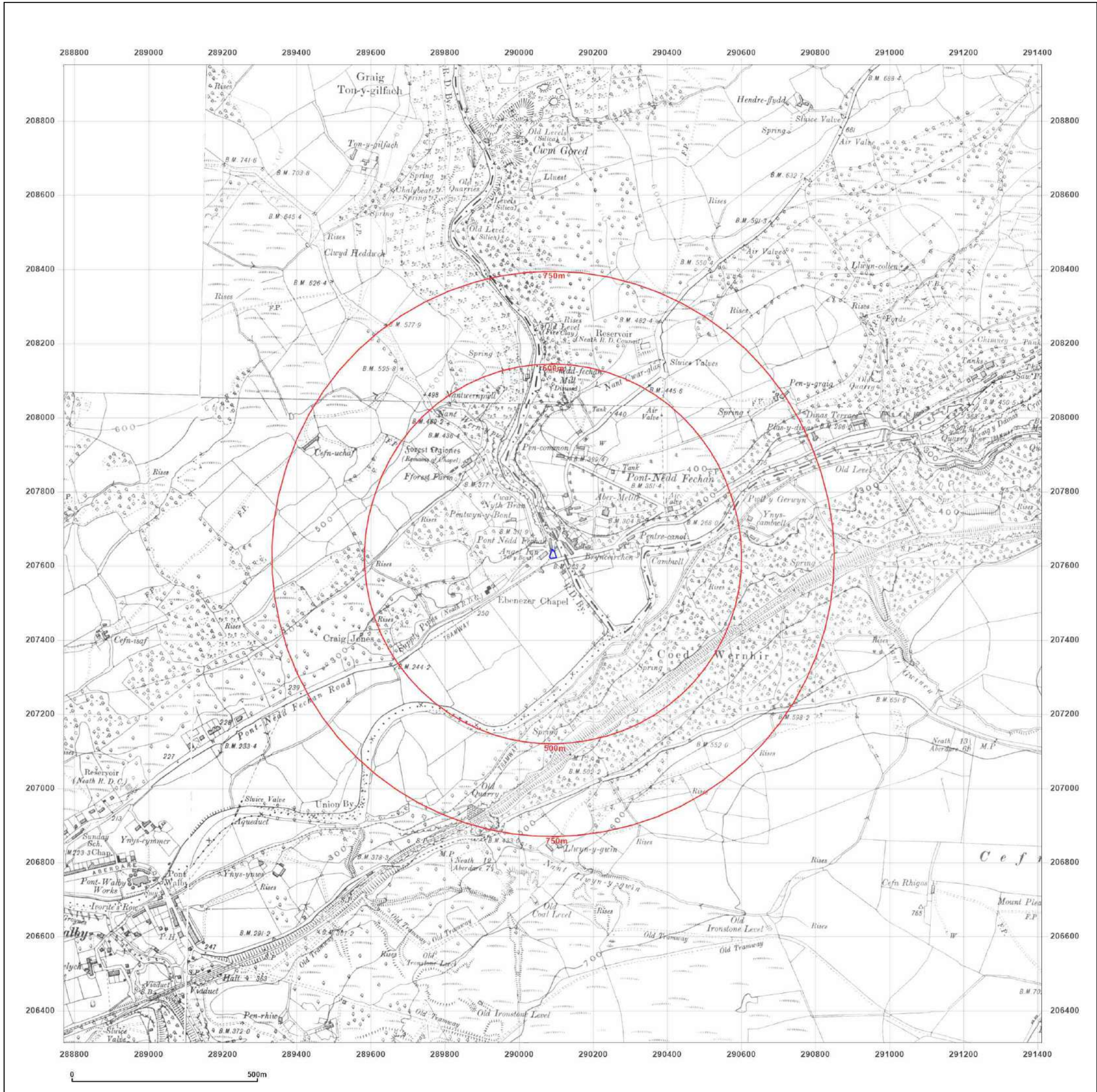
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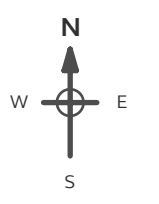
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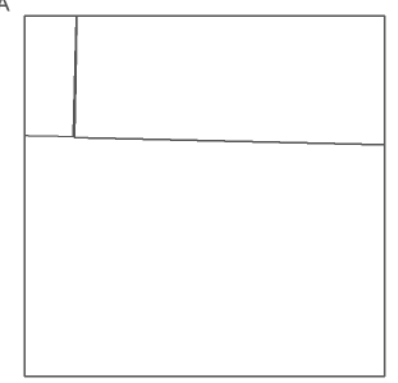
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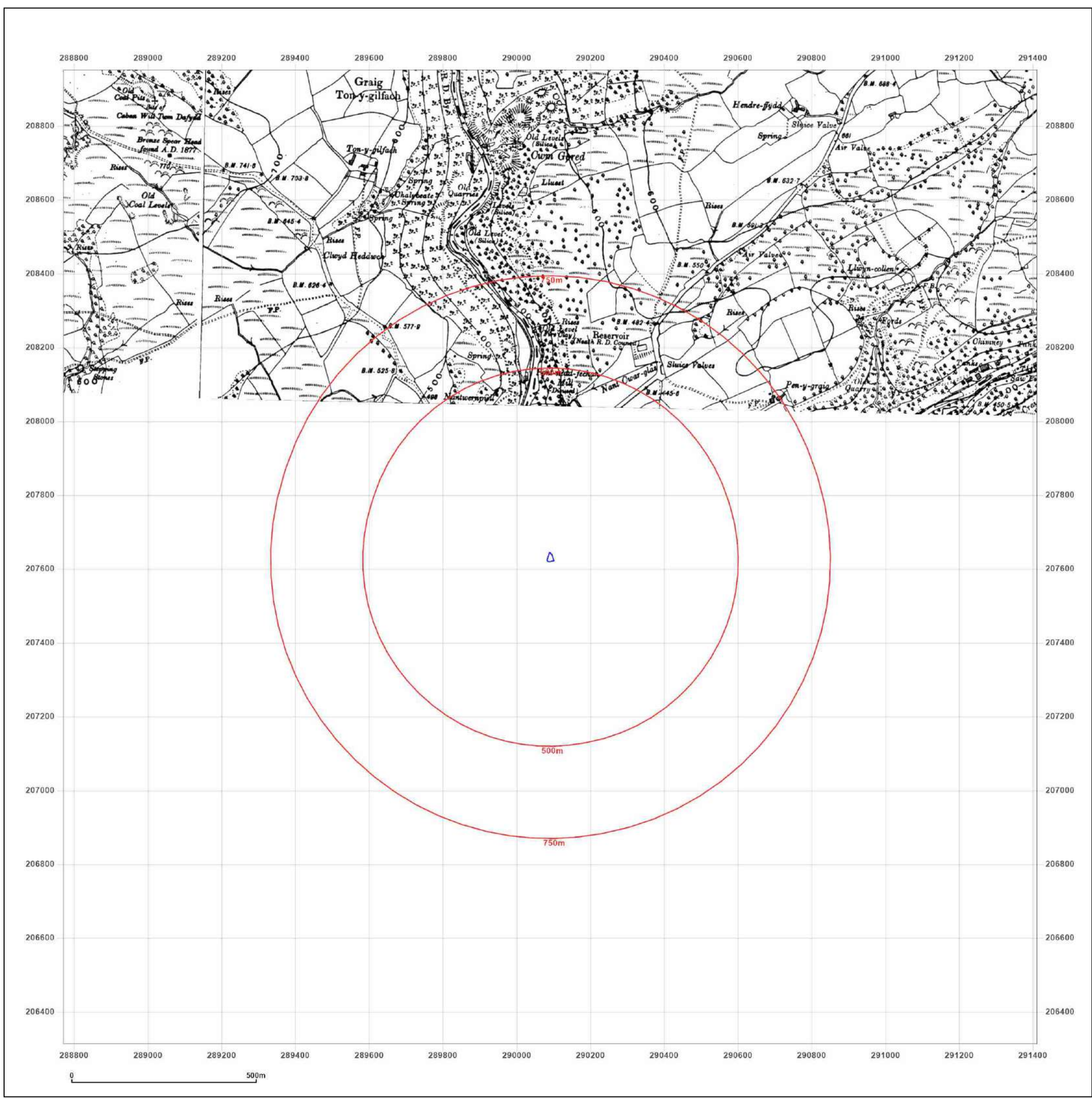


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Production date: 20 May 2025

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Site Details:

Waterfalls Country Centre

Client Ref: ESP.8715.03
Report Ref: GS-VBS-2YF-W5K-ERK
Grid Ref: 290090, 207632

Map Name: County Series

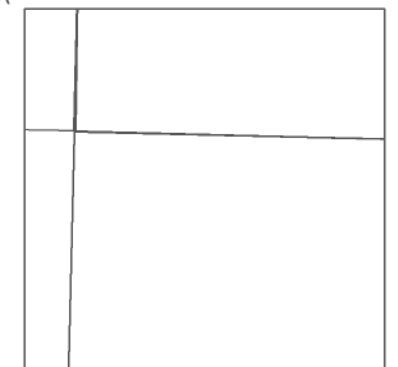
Map date: 1921

Scale: 1:10,560

Printed at: 1:10,560



Surveyed 1921
Revised N/A
Edition N/A
Copyright N/A
Levelled N/A



Surveyed 1921
Revised N/A
Edition N/A
Copyright N/A
Levelled N/A

Surveyed 1876
Revised 1921
Edition 1921
Copyright N/A
Levelled N/A

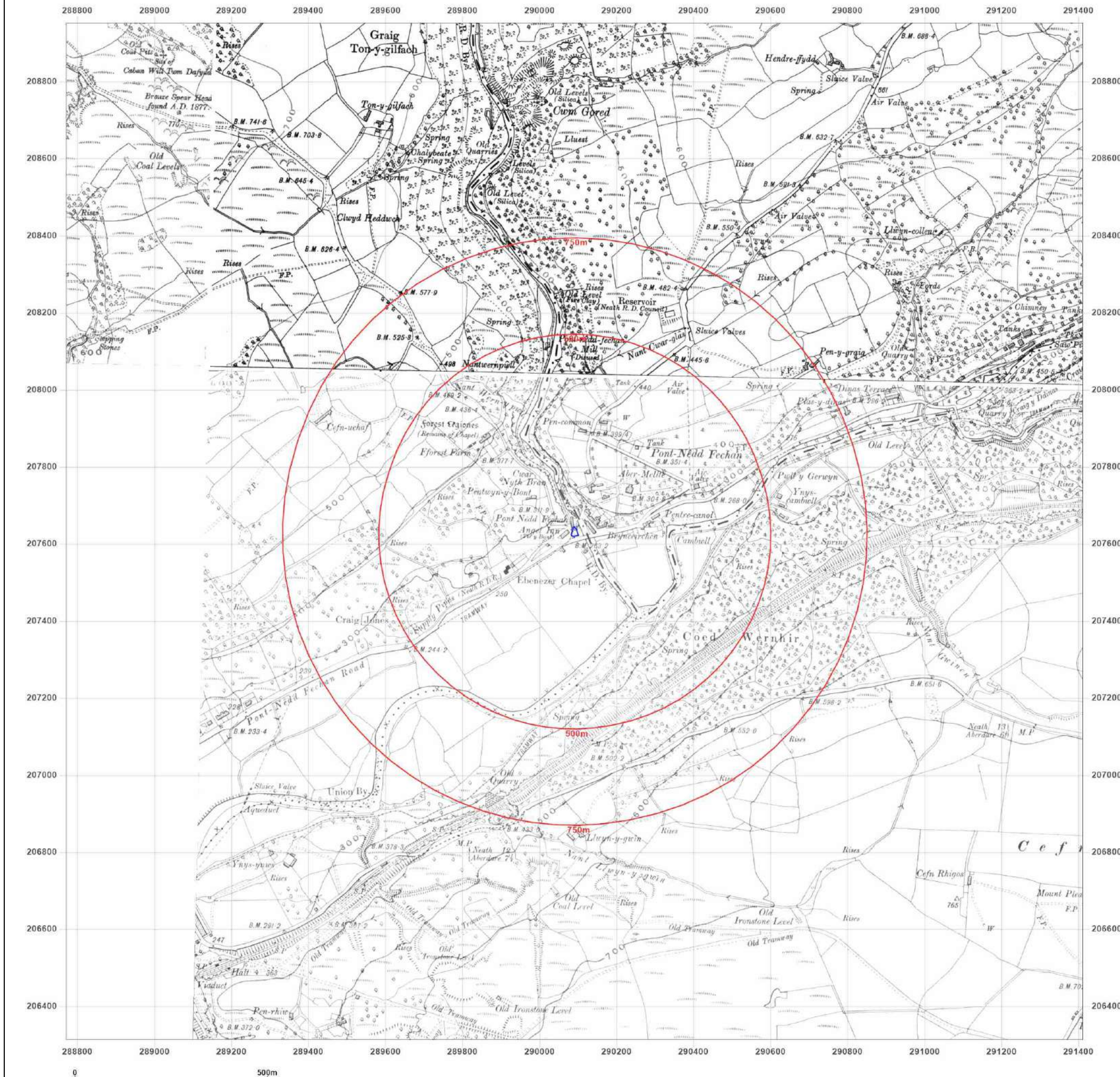


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Site Details:

Waterfalls Country Centre

Client Ref: ESP.8715.03
Report Ref: GS-VBS-2YF-W5K-ERK
Grid Ref: 290090, 207632

Map Name: County Series

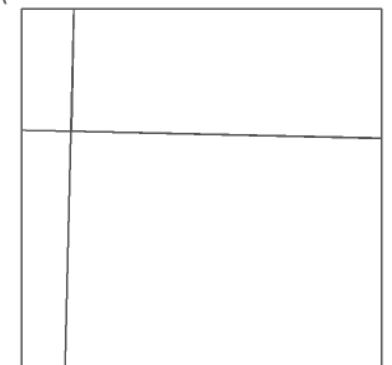
Map date: 1921

Scale: 1:10,560

Printed at: 1:10,560



Surveyed 1876
Revised 1921
Edition 1921
Copyright N/A
Levelled N/A



Surveyed 1883
Revised 1921
Edition 1921
Copyright N/A
Levelled N/A

Surveyed N/A
Revised N/A
Edition N/A
Copyright N/A
Levelled N/A

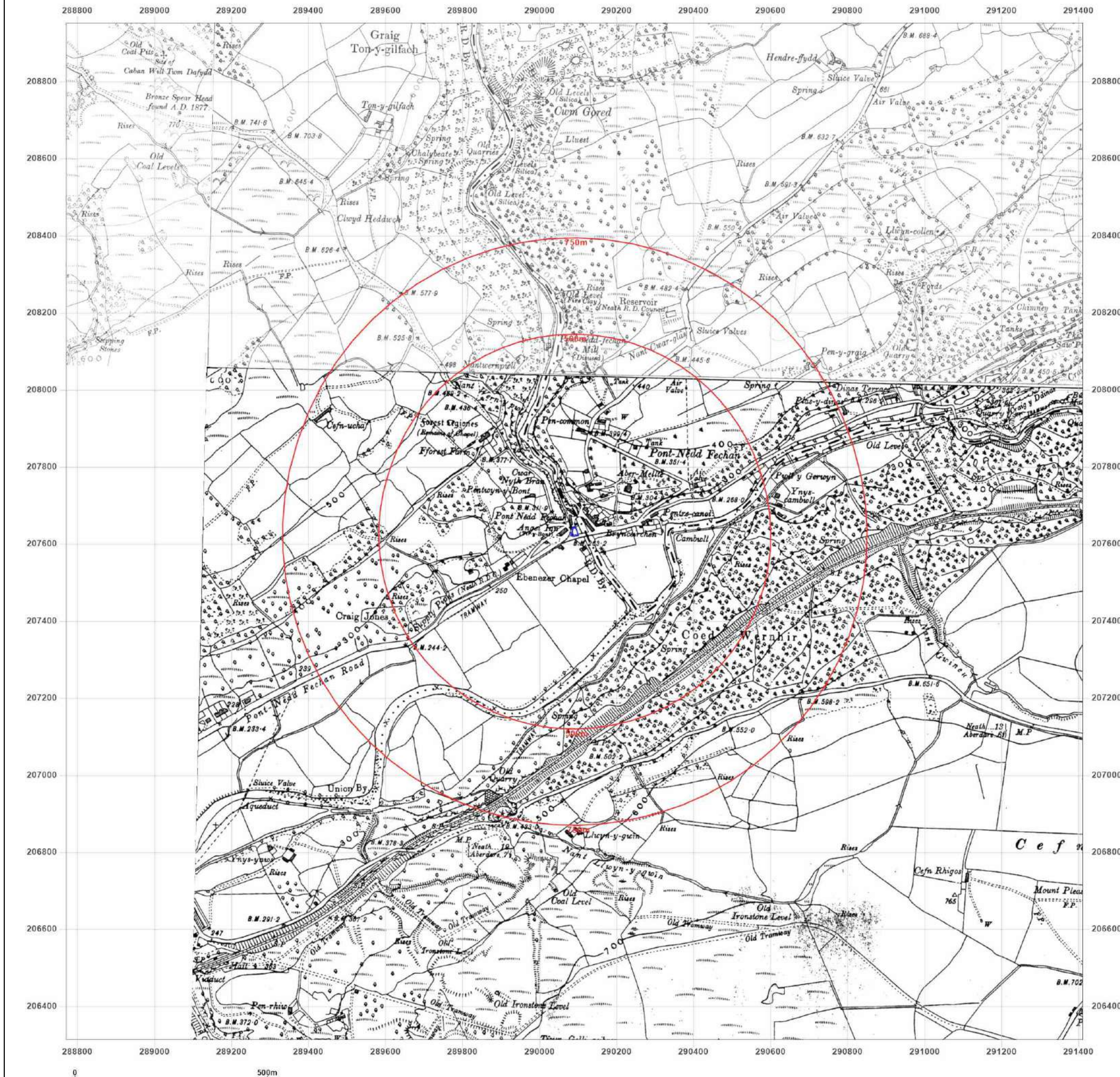


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Site Details:

Waterfalls Country Centre

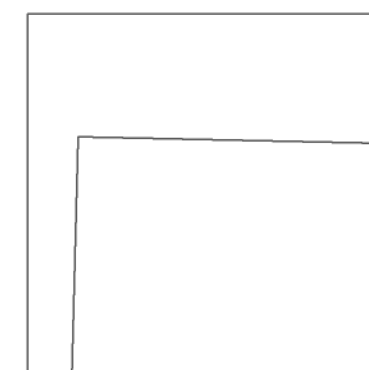
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Report Ref: GS-VBS-2YF-W5K-ERK
Grid Ref: 290090, 207632

Map Name: County Series

Map date: 1921

Scale: 1:10,560

Printed at: 1:10,560



Surveyed 1921
Revised N/A
Edition N/A
Copyright N/A
Levelled N/A

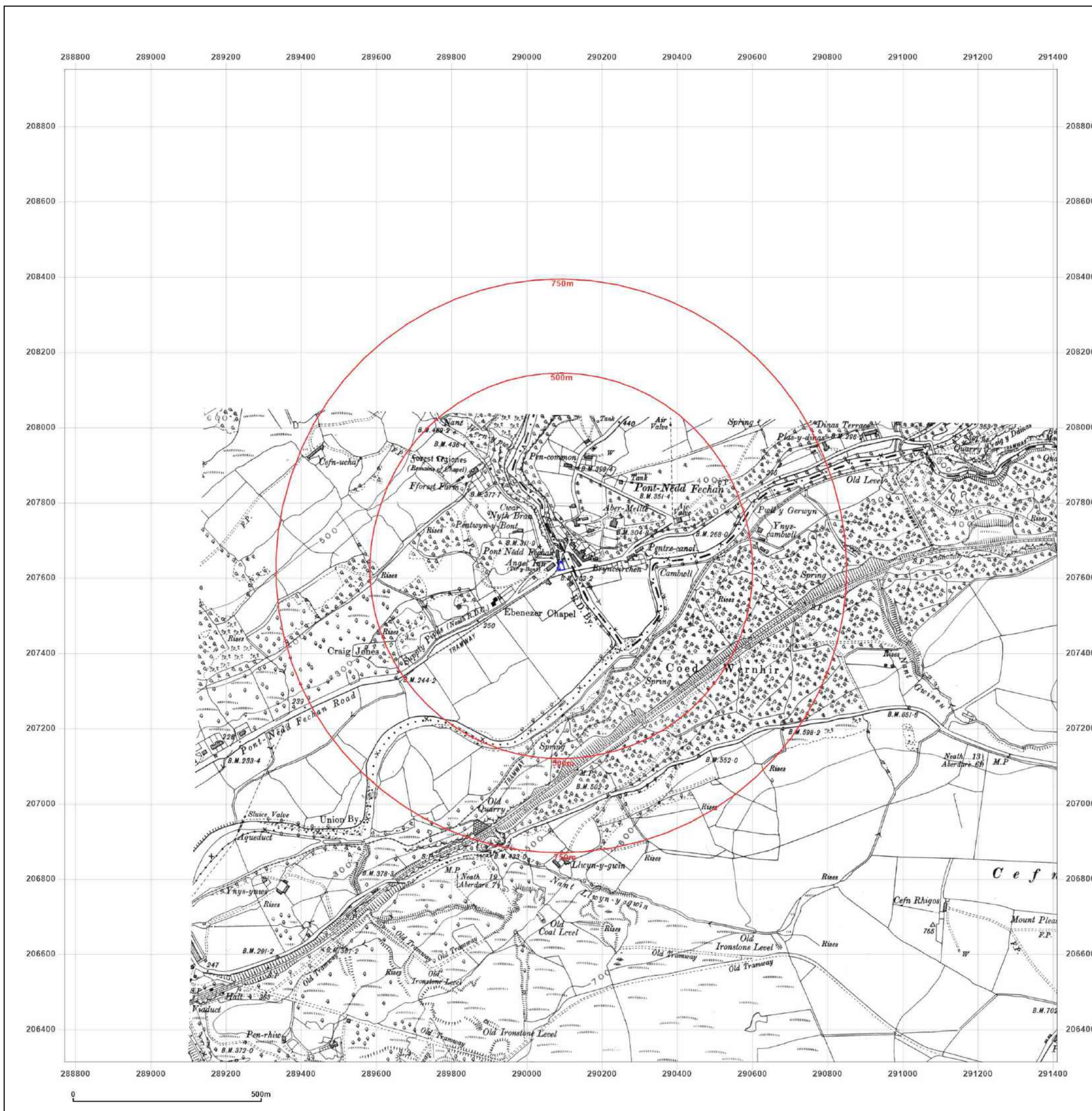


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Site Details:

Waterfalls Country Centre

Client Ref: ESP.8715.03

Report Ref: GS-VBS-2YF-W5K-ERK

Grid Ref: 290090, 207632

Map Name: County Series

Map date: 1948

Scale: 1:10,560

Printed at: 1:10,560

Surveyed 1876

Revised 1948

Edition N/A

Copyright N/A

Levelled N/A

Surveyed 1883

Revised 1948

Edition N/A

Copyright N/A

Levelled N/A

Surveyed 1876

Revised 1948

Edition N/A

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Surveyed 1876

Revised 1948

Edition N/A

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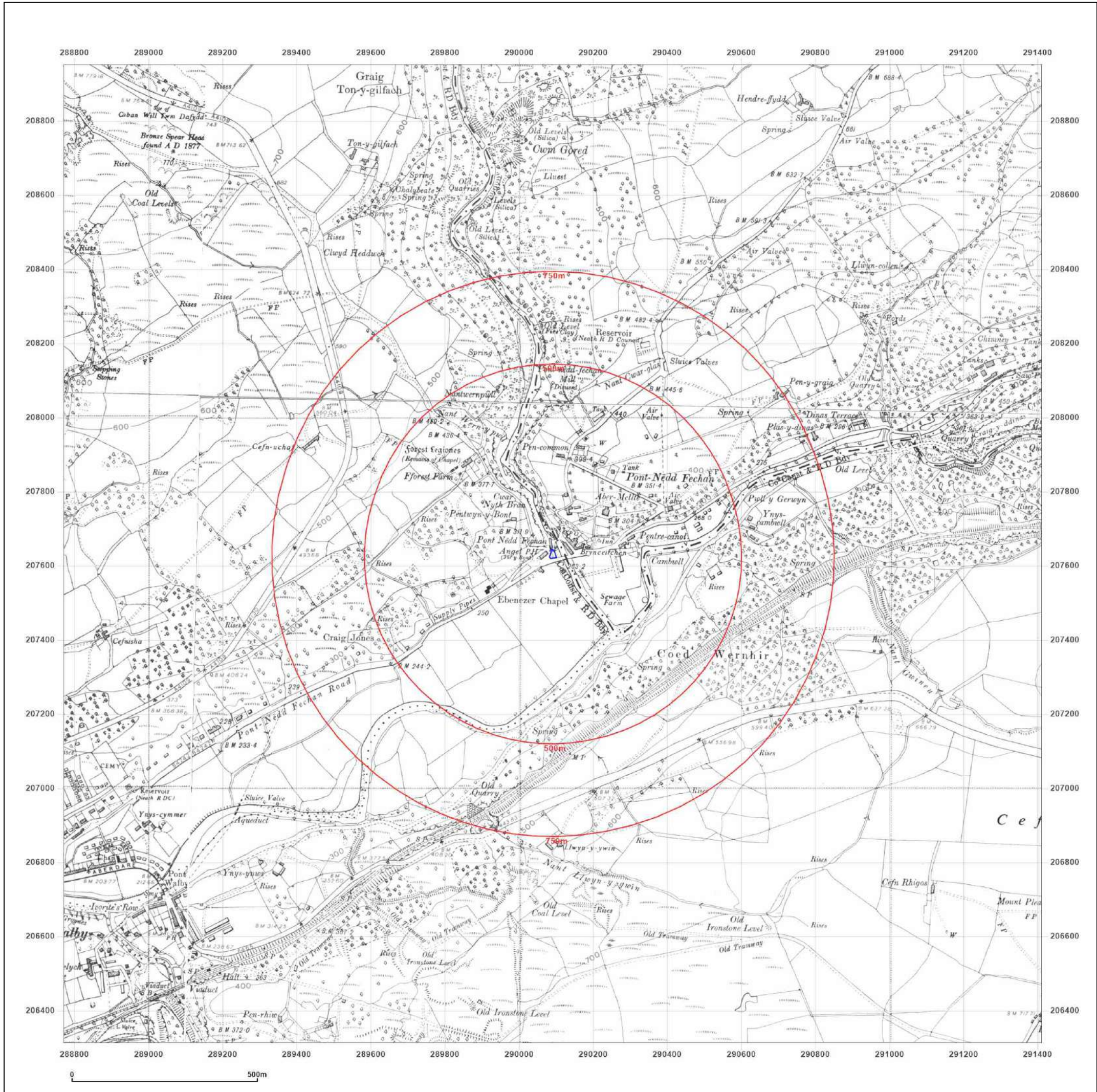
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Site Details:

Waterfalls Country Centre

Client Ref:

ESP.8715.03

Report Ref:

GS-VBS-2YF-W5K-ERK

Grid Ref:

290090, 207632

Map Name:

Provisional

Map date:

1961-1964

Scale:

1:10,560

Printed at:

1:10,560



Surveyed 1964
Revised 1964
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Levelled N/A

Surveyed 1961
Revised 1961
Edition N/A
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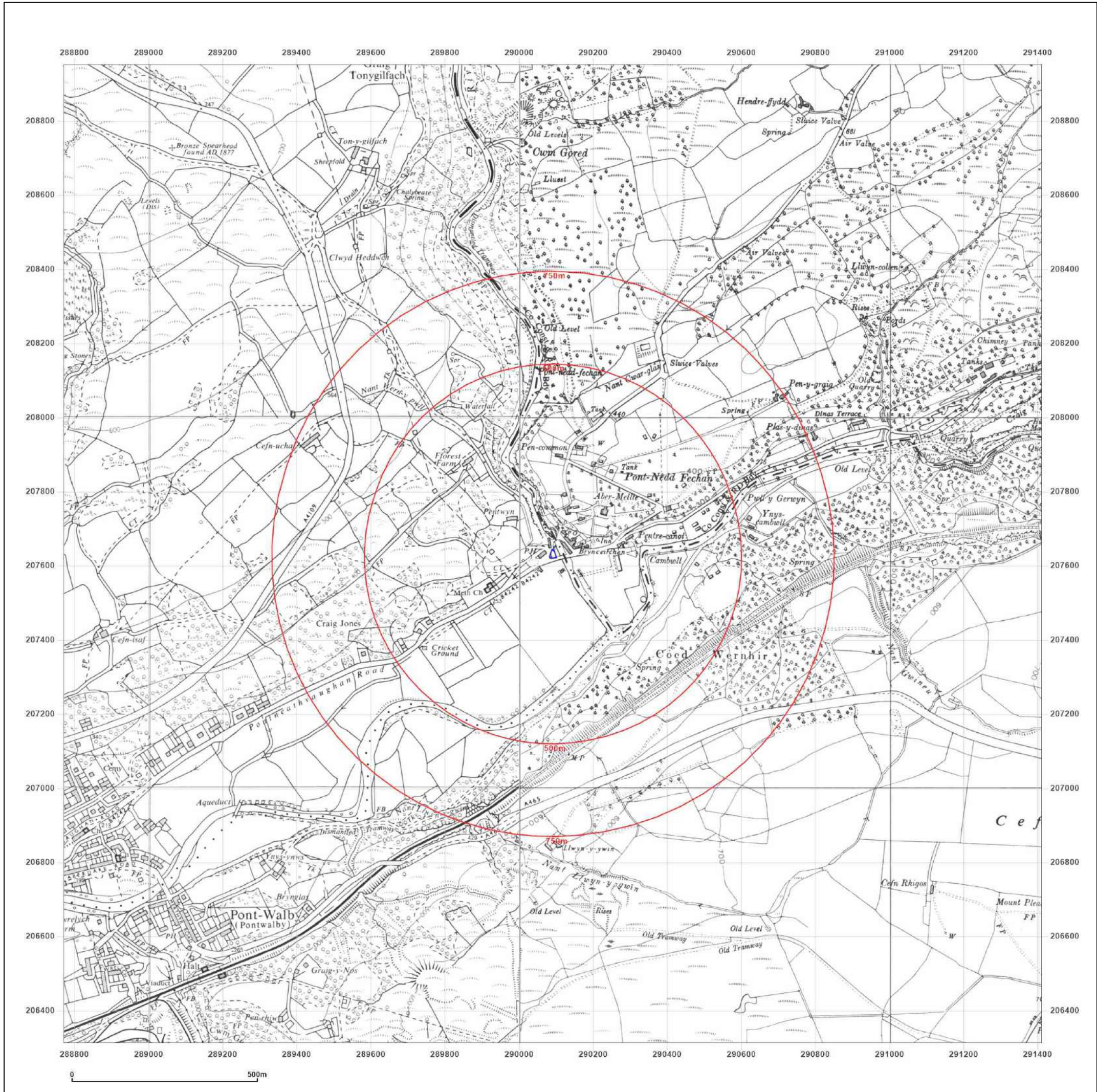
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Site Details:

Waterfalls Country Centre

Client Ref:

ESP.8715.03

Report Ref:

GS-VBS-2YF-W5K-ERK

Grid Ref:

290090, 207632

Map Name:

Provisional

Map date:

1969

Scale:

1:10,560

Printed at:

1:10,560

N

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S

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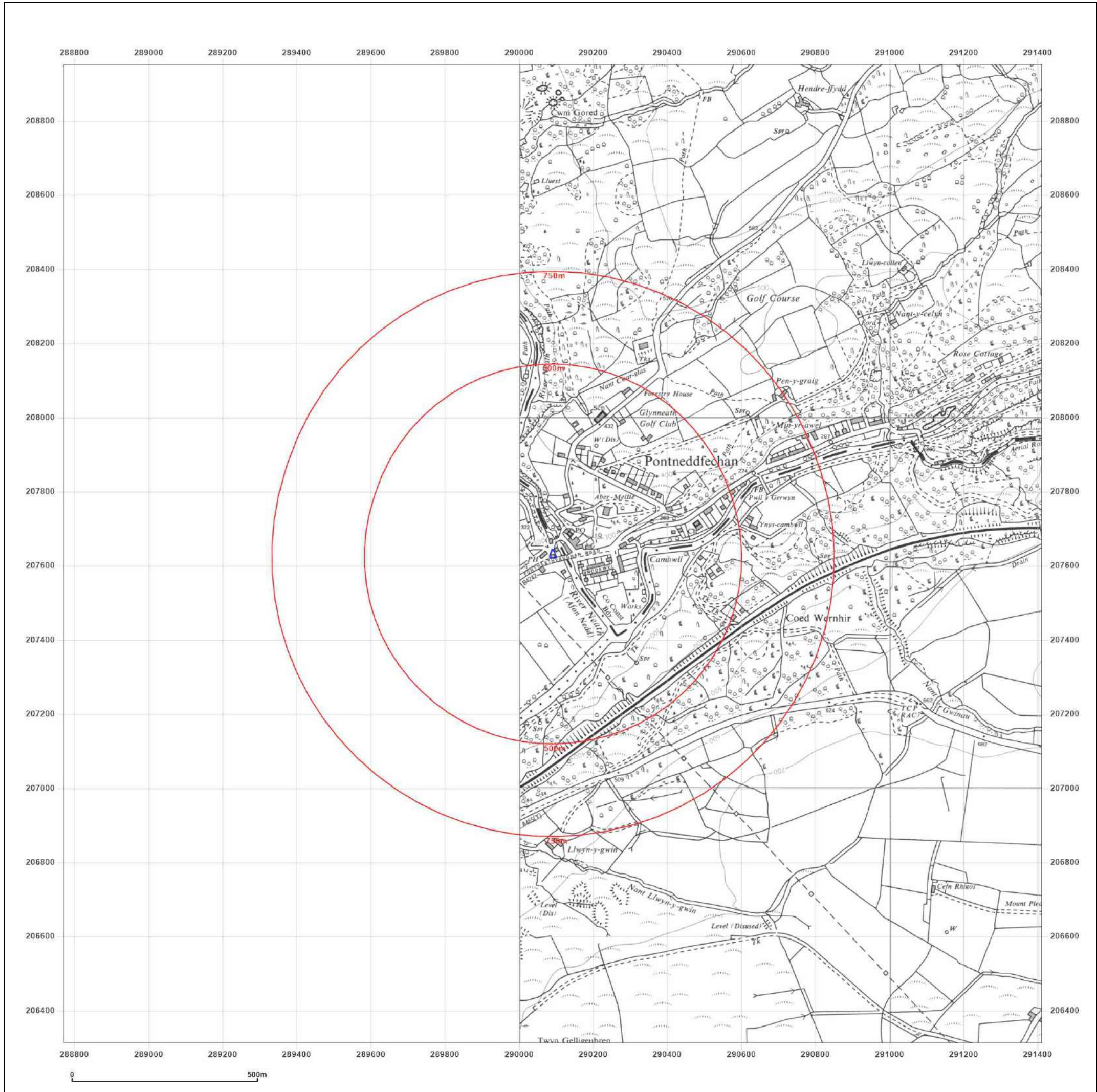
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Site Details:

Waterfalls Country Centre

Client Ref: ESP.8715.03
Report Ref: GS-VBS-2YF-W5K-ERK
Grid Ref: 290090, 207632

Map Name: Provisional

Map date: 1980

Scale: 1:10,560

Printed at: 1:10,560



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Revised 1980
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