

**PRELIMINARY ECOLOGICAL APPRAISAL
OF
LAND AT CYFARTHFA CASTLE, MERTHYR TYDFIL**



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The material and data in this report were prepared under the supervision and direction of the undersigned.

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VALIDITY

Due to the dynamic nature of ecological conditions the results of the survey(s) and related conclusions and recommendations as contained within this report should only be considered valid for up to 12 months from the date the last survey was undertaken.

Any alterations to the site proposals may invalidate the recommendations contained within this report.

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Non-Technical Summary

Abricon Ltd. was commissioned by Merthyr Tydfil Council to undertake a Preliminary Ecological Appraisal in order to establish the likely impacts of the proposed development at “the site” at Cyfarthfa Castle Park, Brecon Road, Merthyr Tydfil, CF47 8RE.

A Preliminary Ecological Appraisal of the land was undertaken in October 2024. The appraisal included a habitat assessment, protected species scoping survey, Habitat Suitability Index Assessment for great crested newts, building inspections, ground level tree assessments for roosting bats and birds, and a desk study of any nearby statutory and non-statutory sites for nature conservation, as well as an examination of local species records.

It is understood that the proposed plans for the site comprise the installation of new drainage runs and attenuation tanks, to accommodate development plans for the Cyfarthfa Castle itself. The installation of these pipes may require a trench up to 2m wide, depending on the depth of the pipe or manhole. Part of the existing drainage route is now covered by mature oak trees. A new route has been proposed that avoids these trees but requires the removal of less significant trees. The channel construction will require the removal of trees, hedgerows, grassland and areas of scrub.

The results of the PEA show that the development may result in adverse impacts to bats, birds, great crested newts and reptiles that have a likelihood of being present on site.

The works require the removal of trees with features associated with bat roosting. Their assessment of suitability for bat roosting was not high enough to necessitate further surveys. Trees with features associated with bat roosting should be undertaken in the off-season when bats are likely to be hibernating elsewhere (between November and March) under a precautionary approach. Further details will be included within Construction Ecological Management Plan (CEMP).

The site was considered to have minor suitable reptile and amphibian habitat towards the east of the site. Due to the amount of suitable habitat and its connectivity to wider landscape (which contains suitable reptile habitat), no reptile surveys are considered necessary. Risk of killing, harm of injury can be addressed within the recommended CEMP document.

Out of 6 identified waterbodies in proximity to the site, 3 were assessed as ‘good’ suitability for great crested newts. Furthermore, the woodland within the Castle Park grounds offers suitable habitat for dormice. However, no further surveys are considered necessary due to a lack of connected records for both species, and the amount and quality of suitable habitat that will be affected by the proposed new drainage works. Residual risk of killing, harm of injury can be addressed within the recommended CEMP document.

As hedgerows are priority habitats, it is recommended that rather than removal, translocation (to elsewhere within the Castle Park grounds) of the hedgerows is undertaken where possible.

Additionally, without mitigation, other notable / section 41 species of principal importance such as nesting birds, amphibians, and hedgehogs have the potential to be accidentally trapped, killed or injured during the construction. Risks can be addressed within the recommended CEMP document.

The results of this assessment have highlighted the requirement for further actions, which are summarised in the table below:

Species/Groups	Phase	Action(s) Required
Habitats, Badgers, Dormice, Great Crested Newts, Hedgehogs, Reptiles and other small animals	Prior to Commencement of Works on Site and During Construction	Preparation of a Construction Environmental Management Plan (CEMP). Protocols will be put in place to ensure that any pits or excavations that are left open overnight are suitably prepared to stop animals from becoming trapped.
Habitats	During Construction	All retained hedgerows and trees and other habitats on site are to be protected using fencing during construction works.

		As most hedgerows on site are priority habitats, it is recommended that rather than removal, translocation of the hedgerows is undertaken where possible. Details and methodology can be included within CEMP. Prevention of spread of Schedule 9 invasive species found on site (avoidance of areas or treatment/removal prior to works)
Bats	During Clearance/ Construction	Removal of trees rated PRF-I (see Appendix I) should be undertaken in the off-season when bats are likely to be hibernating elsewhere (between November and March) under a precautionary approach.
Birds	Demolition and Clearance	Clearance of woody vegetation on site should be undertaken outside of nesting bird season (typically March – August inclusive). If this is not possible, nesting bird checks completed by an ecologist will be required prior to demolition works commencing.
Ecological Enhancements	Design and Construction	Ecological enhancements should be included within new developments. Preparation of Enhancement Plan is recommended.

1 Introduction

1.1 Survey Background, Aims & Objectives

- 1.1.1 Abricon Ltd. was commissioned by Merthyr Tydfil Council to undertake a Preliminary Ecological Appraisal in order to establish the likely impacts of the proposed development at “the site” Cyfarthfa Castle Park, Brecon Road, Merthyr Tydfil, CF47 8RE.
- 1.1.2 The aim of this assessment was to identify any features, habitats and rare or protected species which would constitute potential constraints to the development taking place, and assess the ecological value of the survey area, in order to make recommendations for any further actions which may be required.
- 1.1.3 Bat surveys have been undertaken on the Cyfarthfa Castle Park, and castle itself (BSG Ecology, 2022., Abricon, 2024) to inform various applications/proposals.

1.2 Site Location & Description

- 1.2.1 The site is located at Cyfarthfa Castle Park, Brecon Road, Merthyr Tydfil, at National Grid Reference: SO 04143 07362.
- 1.2.2 The site is an area of ~2.3 hectares (ha) within the Cyfarthfa Park, and consists of mixed parkland habitat, formal gardens close to the Castle and a mixture of lawned areas. The full park is ~65ha and contains Cyfarthfa Park Lake, ~230 metres west of the site, and woodland which is located north, east and west of the castle.
- 1.2.3 The castle itself is a multi-roomed 19th century castle structure with pitched slate tiled roofs, flat roofs, towers and a basement/tunnel system.
- 1.2.4 Within the wider landscape, the site is surrounded by residential areas of Merthyr Tydfil and open fields (agricultural or grazing) with the Brecon Beacons National Park to the north of the site.

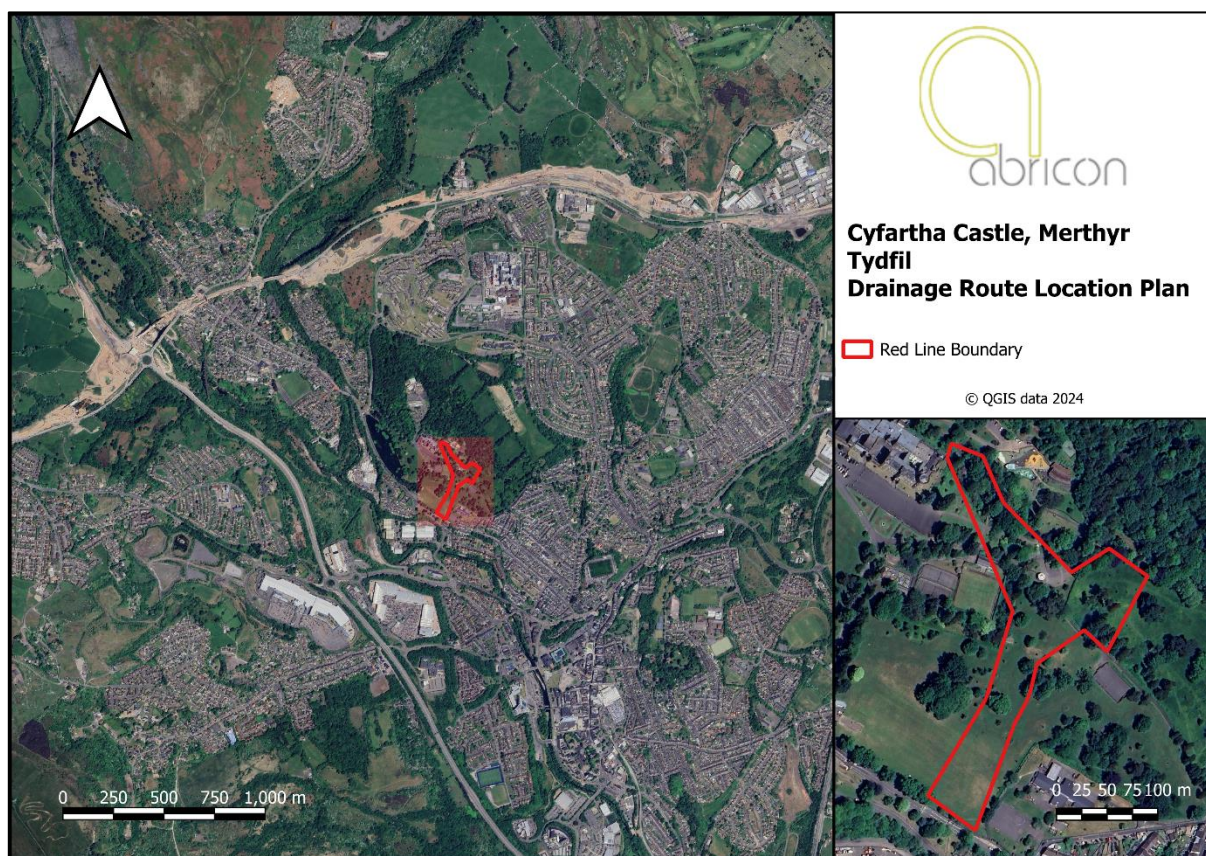


Figure 1 – Site Location (highlighted red) – accessed 03/12/2024

Imagery, map data: Google, Getmapping plc, Infoterra Ltd & Bluesky, Maxar Technologies

1.3 Proposed Development

- 1.3.1 It is understood that the proposed plans for the site comprise the construction of a new underground drainage channel, as well as underground attenuation tank along the route. The drainage channel under current plans will be ~2m x 2m, and ~663m long within the red line boundary for the site. It will include a cut and fill exercise, in some areas to lower the track and in others to increase the levels to create appropriate gradient draining. The attenuation tank is planned to be 2m x 0.8m x 30m. The track construction will require the removal of hedgerows, trees, modified grassland, other neutral grassland and some scrub.
- 1.3.2 Site plans are provided in Appendix C and D at the end of this document.

2 Methodology

2.1 Desk Study

- 2.1.1 A desk study of existing ecological records for the site and surrounding land was conducted in September 2024.
- 2.1.2 Records of protected species and non-statutory sites for nature conservation were received from Merthyr Tydfil County Borough Council from within 2km of the site.
- 2.1.3 Only records from the past ten years (since 2014) were considered within this report, to ensure that the ecological baseline of the site and the surrounding area was established from up-to-date information. Statutory designated sites within 2km of the development site were obtained from the UK Governments Countryside Geographic Information Website (MAGIC). Data was used in conjunction with an assessment of site plans and aerial photographs. In addition, the UK Government Joint Nature Conservation Committee (JNCC) website was consulted in respect of priority habitats and species listed in the Natural Environment and Rural Communities (NERC) Act 2006.

Table 1 – Consultees for the Desk Study

Consultee	Information Provided
MAGIC Website	Statutory sites for nature conservation
Merthyr Tydfil County Borough Council	Local species records and non-statutory sites for nature conservation
Data Map Wales (Welsh Gov.)	National priority species and habitats

2.2 Field Survey

- 2.2.1 A preliminary ecological appraisal was conducted on 9th October 2024 by Yasmine Garland MSc and Jana Prapotnikova BSc.
- 2.2.2 The first stage of the assessment was to complete a UK Habitat Classification System Survey following the standard methodology (UKHab v2, 2023). UKHab is a standard technique for classifying and mapping British habitats, and the aim is to provide a record of habitats that are likely to be ecologically important.
- 2.2.3 Following this the sites and nearby surrounding land (where possible) were assessed for the presence of, or potential for, protected or notable species to be present and assess the likely impacts on such species. This survey on its own cannot always determine the presence/likely absence of a species, nor does it provide a conclusive list of botanical species. It is intended to inform the requirement for, as well as the details of, Phase 2 surveys for species and important features.
- 2.2.4 It was 16°C and sunny at the time of survey.

2.3 Bats - Ground Level Tree Assessment

- 2.3.1 The trees and hedgerows on site were subject to surveys from ground level by Yasmine Garland and Jana Prapotnikova on the 9th October 2024. Binoculars were used to inspect the canopy of the tree for evidence of bat roosting features listed below:
- Natural holes
 - Woodpecker holes
 - Cracks/splits in major limbs
 - Loose bark
 - Hollow/cavities
 - Dense epicormic growth
 - Bird and bat boxes

2.3.2 The trees were then assigned a value for each feature present in line with the Bat Conservation Trust's (BCT) Bat Surveys for Professional Ecologists: Good Practice Guidelines (2023).

Table 2 - Suitability of trees for use by roosting bats

(Category descriptions drawn from Collins, 2023)

Roost Potential	Description
NONE	Either no PRFs in the tree or highly unlikely to be any.
FAR	Further assessment required to establish if PRFs are present in the tree.
PRF-I	Suitable for individual or very small numbers of bats due to the type of feature or nature of surrounding habitats.
PRF-M	Suitable for multiple bats and possibly a maternity roost.

Nesting Birds

2.3.3 Signs of nesting birds looked for include:

- Birds (alive or dead)
- Nests (current or disused)
- Droppings
- Feeding signs
- Eggs

2.4 Great Crested Newts

Identification of Suitable Water Bodies

2.4.1 Water bodies occurring within 250m of the site and on the nearside of any substantial boundaries (i.e. major roads) were identified using OS maps and aerial photography. A 500m buffer is considered sufficient for the size of the site and scale of the proposal.

Habitat Suitability Index (HSI) Assessment

2.4.2 Waterbodies within 250m of the site were subject to an assessment to establish their suitability to support breeding great crested newts, utilising the Great Crested Newt Habitat Suitability Index (Oldham *et al.* 2000).

2.4.3 The habitat suitability index (HSI) provides a means of evaluating habitat quality by ascribing a numerical value to various environmental factors. These are location, pond area, frequency of drying out, water quality, shade, water-fowl impact, presence of fish, number of ponds within 1km, local terrestrial habitat, and macrophyte (aquatic plant) cover.

2.4.4 The HSI is a numerical index between 0 and 1, where lower values indicate that the waterbody is of poor suitability to support breeding great crested newts, and higher values indicate that the waterbody is of good/excellent suitability. The HSI categorical scale of pond suitability is provided in Table 3 below. Please note that the system is meant to be used as an aid in the initial assessment process and is not precise enough to allow the conclusion that a pond with a high score will support great crested newts, or that those with a low score will not.

Table 3 – Habitat Suitability Index Scoring Chart

HSI Score	Pond Suitability
<0.5	Poor
0.5 – 0.59	Below average
0.6 – 0.69	Average
0.7 – 0.79	Good
>0.8	Excellent

2.5 Personnel

- 2.5.1 Yasmine Garland has been working in environmental consultancy since 2021. She holds a BSc and MSc in related subjects. Her primary experience comprises Preliminary Ecological Appraisals, Preliminary Roost Inspections, report writing, protected species surveys and analysis of data collection.
- 2.5.2 Jana Prapotnikova has worked in consultancy sector since 2006 with a focus on mammalian ecology, particularly bats and badgers. Jana runs Abricon's Ecology Department as well as being involved in project delivery. She has managed various ecological projects and has expertise in a range of ecological survey techniques including Phase 1 habitat assessments and a variety of protected species surveys (e.g. the aforementioned mammal species as well as reptiles and great crested newts). Jana also devises ecological mitigation schemes for a variety of protected species. She is well versed in producing preliminary ecological appraisals, BREEAM/CSH Ecology Assessments, protected species licences, Ecological Impact Assessments (EclA), Construction Environmental Management plans, Biodiversity Enhancement Schemes and Ecological Design Strategies. Jana holds Natural England and Natural Resources Wales Class 2 licence for bats as well as Natural England Class and Natural Resources Wales Class 1 licence for great crested newts. She is also a Registered Consultant of the Bat Low Impact Class Licence (BLIC) and holds Natural England Bat Earned Recognition certification (Level 2). Jana is a full member of Chartered Institute of Ecology and Environmental Management (MCIEEM).
- 2.5.3 Max Alwyn BSc (Hons) is a Seasonal Assistant Ecologist with Abricon Ltd, with a background mainly in behavioural ecology. His experience with bats includes rescue and rehabilitation, radio tracking Greater Horseshoes, and surveys and analysis for ecological consultancy. Max has worked with Abricon for several seasons in between his work with bats in the UK and behavioural research abroad with primates in Gabon and Central America. With Abricon his role comprises primarily bat emergence/re-entry and activity surveys and undertaking sound and video analysis of survey data.

2.6 Limitations

General Ecological Constraints

- 2.6.1 This survey only offers a "snapshot" of the site conditions and takes no account of seasonal differences, or of any species which may take up residence subsequently.

3 Summary of Ecological Constraints

3.1.1 See the following Appendices for additional information:

- Appendix E – UKHab Baseline Plan
- Appendix F – Waterbodies within 250m of site
- Appendix G – Baseline Tree Plan
- Appendix H – Target Notes
- Appendix I – Ground Level Tree Assessment Plan
- Appendix J – Habitat Suitability Index Table for Waterbodies

Feature	Summary of Results	Evaluation	Potential Impacts
Designated Sites			
Statutory Designated Sites	Cwm Taf Fechan Woodlands ~530m northeast.	Ancient broadleaved woodlands, calcareous grasslands, about 2.5 km of river with steep valley sides of Carboniferous limestone.	Due to the size of the site, and distance to statutory sites, and the nature of the proposals, it is anticipated that impacts from the works will be negligible.
	Cwm Glo a Glyndyrys ~1km south.	Extensive areas of marshy grassland, species-rich neutral grassland and acid grassland.	
Non-Statutory Designated Sites	Forty non-statutory ecologically designated sites were also identified within 2km of the development site, the closest being a 'Restored Ancient Woodland Site' which is located approximately 19m away, within the wider Cyfarthfa Castle Park. The Cyfarthfa Castle Park itself is a non-statutory designated site, containing another eight smaller sites, mainly woodland habitats.	Forty statutory sites were identified within 2km of the site.	Due to the distance from the nearest non-statutory site and the nature of the proposed works, it is anticipated that there will be no impacts from the proposed new drainage works.

Habitats (see UK Habs Habitat Plan in Appendix E and Target Notes in Appendix H)			
Modified Grassland g4	The southern extent of the site consisted predominantly of modified grassland (G1), with some individual trees stochastically. The other areas of modified grassland are small 'islands' between the asphalt paths, and patchworks of ornamental shrubs and woodland (G3 – G9). All the modified grassland habitats are managed to a short sward. Species present include: ryegrass <i>Lolium perenne</i>, white clover <i>Trifolium repens</i>, common dandelion <i>Taraxacum officinale</i>, creeping buttercup <i>Ranunculus repens</i>, common daisy <i>Bellis perennis</i>, ribwort plantain <i>Plantago lanceolata</i> and smooth meadow grass <i>Poa pratensis</i>.	This habitat is common and widespread within the local landscape and species diversity is low.	No major constraints, as this habitat is of low ecological value.
Other Neutral Grassland g3c	In the northeast extent of the site is an area of other neutral grassland (G2). Species present include: cats ear <i>Hypochaeris radicata</i>, dogs tail <i>Cynosurus cristatus</i>, black knapweed <i>Centaurea nigra</i>, cocksfoot <i>Dactylis glomerata</i>, creeping buttercup <i>Ranunculus repens</i>, Yorkshire fog <i>Holcus lanatus</i>, broad leaved dock <i>Rumex obtusifolius</i>, cow parsley <i>Anthriscus sylvestris</i>, great willow herb <i>Epilobium hirsutum</i>, common dandelion <i>Taraxacum officinale</i>, cranes-bill <i>Geranium</i> sp. and smooth meadow grass <i>Poa pratensis</i>. A small patch of Himalayan balsam (Schedule 9 species) is present in the northern corner.	The habitat represents Target note 3. Bordered by a blackthorn scrub in the southwest corner, species rich hedgerows, and connected to a larger wooded area. Although not a priority habitat, the biodiversity, unmanaged nature and connectivity of this habitat raises its value within the wider ecological community. All Schedule 9 species are non-native but present species, that pose a threat to native biodiversity and habitats. This area of Himalayan balsam is Target Note 4.	The proposed works within this habitat are significant, with 3 trenches meeting at a forked junction. The impacts entail the loss of high value habitat which will involve material consideration for planning. Mitigation to avoid the spread of any schedule nine species must be implemented, via specialist treatment/removal recommendations (i.e. repeated hand pulling ahead of flowering can be successful).

Blackthorn Scrub h3a	Area containing blackthorn scrub (S1) is located in the western corner of G2 and bordered by a species rich hedgerow H1.	This area is part of Target Note 5 , along with H1. This habitat is common and widespread within local landscape and considered to be of medium distinctiveness.	The current plans include a trench running directly through this habitat. No major constraints, as only small area of this habitat will require to be removed.
Other Woodland; Mixed w1h	Other Woodland; mixed were in small patches, and micro woodlands (W1 – W5), containing mixed parkland ornamental species. Species present in these habitats include sycamore <i>Acer pseudoplatanus</i> , cedar <i>Cedrus sp.</i> , Cypresses <i>Cupressus sp.</i> , spruce <i>Picea sp.</i> and oak (<i>Quercus sp.</i>) for example. Within W2, a strand of Japanese knotweed <i>Fallopia japonica</i> was noted to be present (Schedule 9 species).	The non-native and ornamental botanical communities of these small, wooded areas are considered high value habitats. All Schedule 9 species are non-native , that pose a threat to native biodiversity and habitats. For this reason, W2 includes Target Note 1 .	W1 and W2 have planned works directly through. No impacts expected on a habitat scale, as no tree removal is scheduled within those areas.
Developed Land; Sealed Surface u1b	Hardstanding paths for staff and public to use between the various areas within the Cyfarthfa Castle Park. Also includes a bandstand structure between G5 and G8.	This habitat is of low species diversity.	No major constraints, as this habitat is of low ecological value.

Non-Native and Ornamental Hedgerow h2b	The hedge around the edge of the sports court (H2) is a managed beech (<i>Fagus sylvatica</i>) hedge, ~1.8m height x 1.5m width.	This habitat is common and widespread within the local landscape and species diversity is low.	Section of this hedgerow (TN2) will be lost as a result of the proposed new drainage route installation. No major constraints, as this habitat is of low ecological value.
Species-rich Native Hedgerow with Trees h2a5 32	This hedgerow (H3) borders G2 and G5, connecting the northern woods to H1. Species and dimensions as H1 below, tree species present include predominantly lime trees <i>Tilia sp.</i>	This hedgerow is considered priority habitats under the NERC Act (2006).	Section of this hedgerow (TN4) and one tree (labelled as T1321) will be lost as a result of the proposed new drainage route installation. Also, the retained sections have the potential to be impacted during the construction phase of the development from vehicle movements, storage of materials and other construction activities.
Species rich native hedgerow h2a5	A species rich native hedgerow (H1) runs along the west and south border of G2, ~1.5m high x 2m wide. Species include dogwood <i>Cornus sanguinea</i> beech <i>Fagus sylvatica</i> , horse chestnut <i>Aesculus hippocastanum</i> , hornbeam <i>Carpinus betulus</i> , sycamore and hawthorn <i>Crataegus monogyna</i> .	This hedgerow is considered priority habitats under the NERC Act (2006).	Section of this hedgerow (TN5) will be lost as a result of the proposed new drainage route installation. Retained hedgerows have the potential to be impacted during the construction phase of the development from vehicle movements, storage of materials and other construction activities.
Tree Line	One treeline is present on site (TL1). TL1 lines the perimeter of the sports court and runs alongside the beech hedge (H2). Present species are English oak (<i>Quercus robur</i>), Cypress trees <i>Cupressus sp.</i> , sycamore (<i>Acer pseudoplatanus</i>) and spruce (<i>Picea gen.</i>).	Tree lines are considered priority habitats under the NERC Act (2006).	Section of tree line TL1 (including loss of trees labelled as T1800, T1802, T1803, T1804, T1805 and T1806) will be lost as a result of the proposed new drainage route installation. Retained sections of the tree line have the potential to be impacted during the construction phase of the development from vehicle movements, storage of materials and other construction activities.

Protected and Notable Species				
Badgers (<i>Meles meles</i>)		No evidence or signs of badgers was found during the site visit. The dense area of blackthorn scrub (S1) couldn't be fully searched, although no obvious mammal tracks or run were noted leading towards the scrub. There are 3 records of badgers within 3km. The closest record is off site, and outside of the Cyfarthfa Castle Park boundary, at 850m. The record states this is a very active sett.	No setts found present within red line boundary, however the site provides suitable foraging opportunities for badgers in connection with the open greenspace.	Badgers have the potential to become trapped in trenches or other excavations whilst traversing the site during the construction phase. However, with mitigation (CEMP), the residual impacts can be addressed.
Bats	Species Records	There are 1,362 records of bats within 2km. Common pipistrelles (<i>Pipistrellus pipistrellus</i>) have 746 records, the closest record at ~162m, and the closest roost ~150m from within the castle itself. Soprano pipistrelles (<i>Pipistrellus pygmaeus</i>), have 69 records, the closest at ~222m, and the closest roost at ~539m. Noctule and Leisler's bat (<i>Nyctalus</i>) have 97 records, with the closest at ~209m. No roost record within 2km. Myotis (<i>Myotis sp.</i>) bats have 239 records, with the closest at ~209m from the site. No roost record within 2km. Serotine bats (<i>Eptesicus serotinus</i>) have five records, with the closest at ~209m. No roost record within 2km.	The Wider Cyfarthfa Castle Park contains many habitats of value for bats. From the woodland areas, open grasslands, and large bodies of water. Hedgerows and tree lines on site likely valuable for commuting and foraging bats.	See ' Roosting Bats – Trees ' and ' Foraging/Commuting Bats ' for details.

		Long eared species (<i>Plecotus sp.</i>) have 102 records, with the closest at ~184m, and the closest roost ~150m from within the castle itself. Lesser Horseshoe bats (<i>Rhinolophus hipposideros</i>) have 93 records, the closest of which is ~209m, and the closest roost at ~949m. Greater Horseshoe bats (<i>Rhinolophus ferrumequinum</i>) have 11 records, with the closest at ~316m, and the closest roost outside 2km at ~2.5km.		
	Roosting Bats – Trees	Ground Level Tree Assessment was carried out on TL1 and W5 as these areas were marked as requiring tree removal but other trees within the red line where PRFs were noted were also recorded. There were 14 trees assessed PRF-I for roost suitability (see Appendix I). This was mainly due to ivy cover both simultaneously providing a feature for roosting bats, but also impeding the ability to see other features of value.	Trees within TL1 proposed for removal labelled as T1800, T1802, T1803, T1804, T1805 and T1806 are all assessed as PRF-I (mostly due to ivy growth). These features are considered unsuitable for hibernating bats. Tree within H3 proposed to be removed, labelled as T1321 was found to contain no obvious roosting features.	Without mitigation, the removal of T1800, T1802, T1803, T1804, T1805 and T1806 within TL1 could have the potential to kill/injure roosting bats (if present). However, with mitigation (CEMP), the residual impacts can be addressed. All other trees are proposed to be retained or don't contain suitable roosting features.
	Foraging/Commuting Bats	Hedgerow 1 and 3 (H1 and H3) provide good foraging and commuting opportunities. They have good species richness, and connectivity between woodland and open grasslands. Hedgerow 2 (H2) is ornamental beech hedge, encircling the sports court. It provides minor foraging opportunities, and connectivity to other habitats of value.	The habitats on site were considered to offer moderate quality commuting and foraging habitat for bats. These habitats also connect the site to the wider environs.	The development will result in minor temporary loss of foraging opportunities for bats. Because only a small section of the hedgerows and tree line are proposed to be removed as part of the development, the linear connectivity of the area will be largely retained, and impact on commuting behaviour of bats is considered very minor.

		The wider environment of the site includes areas of woodland towards the northeast extent of the wider park, open grassland, a lake, and five stream-fed ponds. These habitats offer high-quality foraging and commuting habitat for bats. A majority of the site is subject to low levels of artificial lighting with minimal streetlight impacts. The southern section of the site where it connects to the A303 was subject to higher light levels and the north adjacent to the grain store.		Replacement tree and hedgerow planting is proposed elsewhere within the wider park grounds and habitat re-instatement is proposed following works (where appropriate/possible) No new artificial lighting is proposed as part of this proposal.
Nesting Birds		No nests were identified on trees earmarked for removal. Artificial bird boxes was seen on three trees (T2, T1366 and T1675). Site provides nesting and foraging opportunities for birds within the hedgerows and trees. The grasslands were largely managed with only one area (G2) providing patches of longer grassland.	The trees, scrub and hedgerows on site are suitable for nesting birds. However, the wider environs especially within the area of woodland to the northeast of the wider Cyfarthfa Castle Park area likely provide higher quality suitable nesting and foraging habitat for birds. The site was considered to have negligible suitability for ground nesting birds due to ground management practices and disturbance associated with public access.	None of the trees containing artificial bird boxes are proposed to be removed. The development includes the loss of sections of scrub, hedgerows and trees, therefore without mitigation, the development could have the potential to result in the damage/destruction of nests and eggs, and the killing/injury of individual birds, should they be present. However, with mitigation (CEMP), the residual impacts can be addressed.
Dormouse		There are no records of dormice within 2km of the site. No evidence or signs of dormice was found during the daytime walkover survey.	The hedgerows onsite were considered of low suitability for dormice due to management regime, public access disturbance and species composition.	No evidence of dormice was found on site. The habitats on site are considered of low value to the species and there is a residual risk that commuting individuals could be present and disturbed, killed or injured during works. However, with mitigation (CEMP), the residual impacts can be addressed.

	Although the hedgerow towards the north of the site (H1 and H3) was species rich, and connected to woodland, it does not contain species favoured by dormice, such as hazel, are managed, and the park receives high volume of visitors and dog walkers which would reduce their suitability or likelihood of this species presence.		
Great Crested Newt	All records of great crested newts are outside 2km from the site, with the closest record at ~2.1km – all these records are from far side of major A roads which would act as barrier to dispersal. Observation of OS maps and aerial photography identified six waterbodies within 250m of the site (see Appendix E). A large lake in the southwest extent (W5), four medium stream-fed ponds ~150m north of the site (W1, W2, W3, and W6), and a small overflow pond (W4) ~35m to the west of these. For full results of the Habitat Suitability Index (HSI) for great crested newts, see Appendix J.	W1, W2, and W3 were all assessed as having good suitability for great crested newts. With no records contained within for great crested newts, and the wider park area surrounded by residential development (separating the closest records for great crested newts. The remaining waterbodies were rated as either below average or poor. The terrestrial habitats present on site are largely suboptimal due to managed nature and short sward height. Although the hedgerow, tree and scrub basis and the unmanaged other neutral grassland within G2 provide some suitability for these species.	Although the site areas is approximately 2.3ha in size, less than 0.5ha of suitable great crested newt habitat is proposed to be lost or damaged during the works. There is a residual risk that individuals might be present on site and disturbed, killed or injured during works. However, with mitigation (CEMP), the residual impacts can be addressed.
Reptiles	There are 76 records of reptiles within 2km. The closest record is ~334m within the wider Cyfarthfa Castle Park area. No evidence or signs of reptiles were identified during the site visit. Majority of the site is considered to offer suboptimal suitability for reptiles due to short sward height. Small areas of suitable habitats are present onsite including in and around unmanaged grassland G2 and bases of scrub and hedgerows.	The hedgerow and bases and less managed grassland (G2) and trees provide some suitable habitat for reptiles.	As the proposed development involves removing some suitable habitat for reptiles, therefore potential injury/death of reptiles could occur during the clearance and construction phase. However, with mitigation (CEMP), impacts to reptiles can be avoided.

Hedgehog	There was a total of 25 hedgehog records, none of which were on site, or within the wider Cyfarthfa Castle Park area. The closest record is ~268m. No evidence of hedgehog was identified during the field survey. However, the dense hedgerows, scrub and grasslands and adjacent off-site woodland likely offers suitable foraging and sheltering opportunities for this species.	The site may support populations of hedgehogs in combination with the local landscape.	The removal of suitable habitat for hedgehogs could lead to potential death/injury of this species during the clearance and construction works. In addition, during the construction phase, this species has the potential to become trapped in trenches or other excavations whilst traversing the site. However, with mitigation (CEMP), the residual impacts can be addressed.
Other Protected or Notable Species	N/A	N/A	There were no indications during the visit that other protected or notable species will be present or will be affected by the planned works.
Other Considerations			
Invasive Species	Schedule 9 species were found to be present on site including Himalayan balsam within G2 and Japanese knotweed within W2.	N/A	The proposed new drainage route works could cause spread of invasive species in the wild. With mitigation, though specialist treatment/removal ahead of works, the risks can be avoided.

4 Recommendations

- 4.1.1 The results of this ecological impact assessment highlight the requirement for further actions with regards to some species. Table 3 below provides a summary of the works required.

Table 3 – Table of Further Actions

Species/Groups	Phase	Action(s) Required
Habitats, Badgers, Dormice, Great Crested Newts, Hedgehogs, Reptiles and other small animals	Prior to Commencement of Works on Site and During Construction	Preparation of a Construction Environmental Management Plan (CEMP). Protocols will be put in place to ensure that any pits or excavations that are left open overnight are suitably prepared to stop animals from becoming trapped.
Habitats	During Construction	All retained hedgerows and trees and other habitats on site are to be protected using fencing during construction works. As most hedgerows on site are priority habitats, it is recommended that rather than removal, translocation of the hedgerows is undertaken where possible. Details and methodology can be included within CEMP. Prevention of spread of Schedule 9 invasive species found on site (avoidance of areas or treatment/removal prior to works)
Bats	During Clearance/ Construction	Removal of trees rated PRF-I (see Appendix I) should be undertaken in the off-season when bats are likely to be hibernating elsewhere (between November and March) under a precautionary approach.
Birds	Demolition and Clearance	Clearance of woody vegetation on site should be undertaken outside of nesting bird season (typically March – August inclusive). If this is not possible, nesting bird checks completed by an ecologist will be required prior to demolition works commencing.
Ecological Enhancements	Design and Construction	Ecological enhancements should be included within new developments. Preparation of Enhancement Plan is recommended.

4.2 Habitats, Badgers, Dormice, Great Crested Newts, Hedgehogs, Nesting Birds and Reptiles

- 4.2.1 A Construction Environmental Management Plan (CEMP) will be prepared to detail how the habitats within and surrounding the site should be protected during the construction phase. The CEMP will include details of appropriate fencing to restrict access into key ecological areas, information on any timing restrictions and measures to prevent damage to sensitive ecological habitats, hedgerow translocation methodology, sensitive methods and timing for site clearance ahead of works commencing and other protective measures during construction. Typically, the preparation of a CEMP will be a conditional requirement of the planning permission. This document covers the construction phase for the project.

4.3 Habitats

- 4.3.1 It is recommended that rather than removal, translocation of the hedgerows is undertaken where possible, especially the species rich H1 and H3.

- 4.3.2 Any lost trees are recommended to be replaced elsewhere within the wider Cyfarthfa Castle Park grounds as per local tree replacement policy.
- 4.3.3 Any other habitat lost to development must be replaced on a like-for-like basis as a minimum or assign an existing area of lower value habitat to be enhanced for wildlife.
- 4.3.4 Any newly created hedgerows should be allowed 2m on site width to allow the hedgerow to mature with time. The hedgerows will be allowed to grow and then maintained at a minimum height of 3m. It should contain native mixed species (minimum of 7 native species throughout in order to achieve the species rich status), including fruiting species. Minimum heavy standard tree stock should be planted approximately every 20m along hedgerow length.
- 4.3.5 A native flowering hedgerow species should be included within the new hedgerow areas, including evening flowering hedgerow species such as honeysuckle *Lonicera periclymenum*, to attract moth species to the area, increasing the site's foraging appeal to rarer bats like horseshoes.
- 4.3.6 A list of nectar plant species for attracting moths is available from the Butterfly Conservation website; <https://butterfly-conservation.org/files/mothnectar.pdf>
- 4.3.7 A list of food plant species for attracting moths is available from the Butterfly Conservation website; <https://butterfly-conservation.org/files/moth-foodplant.pdf>
- 4.3.8 Hedgerow and new mature tree (within hedgerows) planting species suggestions:
- Field maple *Acer campestre*
 - English oak *Quercus robur*
 - Silver birch *Betula pendula*
 - Hazel *Corylus avellane*
 - Crab apple *Malus sylvestris*
 - Hawthorn *Crataegus monogyna*
 - Blackthorn *Prunus spinosa*
 - Damson *Prunus domestica subsp. insititia*
 - Wild cherry *Prunus avium*
 - Hornbeam *Carpinus betulus*
 - Spindle *Euonymus europaea*
 - Guelder rose *Viburnum opulus*
- 4.3.9 For grassland area within G2, appropriate species rich neutral grassland seed mix should be selected. Suggested seed mix for G2 area include Emorsgate EM2 Standard General Purpose Meadow Mixture or Emorsgate EM10 Tussock Meadow Mixture.

4.4 Badger and Hedgehogs

- 4.4.1 No further surveys are considered necessary.
- 4.4.2 Although no badger setts will be directly affected by the proposed development, the following precautionary measures will be adopted during the construction phase of the scheme to prevent harming badgers, otters and/or hedgehogs and other small animals that may forage/commute through the site:
- Any trenches or excavations over 1m in depth will be covered overnight to prevent badgers (and other mammals e.g. otter and hedgehogs) from becoming trapped. Alternatively, a piece of wood or similar will be placed within each uncovered trench/excavation at a shallow angle to provide any trapped animals a means of escape.
 - Any temporarily exposed open pipe system larger than 100mm in diameter should be capped overnight to prevent badgers and other mammals gaining access when contractors are off-site.

4.5 Bats

Trees

- 4.5.1 Following the BCT guidelines, no further surveys of the trees are considered necessary as the affected trees were graded NONE and PRF-I (Collins, 2023).
- 4.5.2 However, all PRF-I rated trees (see **Appendix I**) should be removed using a soft felling approach under the supervision of a bat-licensed ecologist. Furthermore, removal of these trees should be undertaken in the off-season when bats are likely to be hibernating elsewhere (between November and March).

4.6 Birds

- 4.6.1 Due to the size of the site and the scale of the development, further surveys for birds are not considered necessary.
- 4.6.2 The woody vegetation clearance and felling of trees should be carried out outside of the breeding bird season. The breeding season is influenced by the climatic conditions of a given year but is generally taken to be between March and August. Please note, some species such as wood pigeons can nest throughout the year, although the peak season is March to July.
- 4.6.3 If the works are required to take place between March and August (inclusive), affected areas should be checked by an ecologist before works can take place, and if birds are found to be nesting, a buffer of suitable size for the species should be installed and remain in place until the chicks have fledged.

4.7 Enhancements and Planning Policy

- 4.7.1 Enhancement features for wildlife should be included in new developments to meet the recommendations contained within the National Planning Policy Framework 2023.
- 4.7.2 Details on ecological enhancements to be incorporated on site will be provided within Enhancement Plan (EP). Typically, the preparation of EP will be a conditional requirement of the planning permission. These are likely to include initiatives such as the installation of artificial bat and bird boxes.

References

- Abricon Ltd. (2024). *Bat Survey Report – Merthyr Tydfil*.
- Amphibian & Reptile Group (2010) *Great Crested Newt Habitat Suitability Index*. ARG UK Advice Note 5. ARG.
- Bright, P., Morris, P. & Mitchell-Jones, T. (2006). *The Dormouse Conservation Handbook*. 2nd Edition. English Nature, Peterborough
- BSG Ecology (2022). *Cyfarthfa Park Merthyr Bat Survey 2022*.
- Collins, J. (ed.) (2023). *Bat Surveys for Professional Ecologists: Good Practice Guidelines* 4th edition. The Bat Conservation Trust, London.
- Edgar, P, Foster, J & Baker, J (2011) *Reptile Habitat Management Handbook*. Amphibian Reptile Conservation and Natural England. Peterborough.
- English Nature (2001). *Great crested newt mitigation guidelines*. English nature. Peterborough
- Harris, S, Cresswell, P & Jefferies, D J (1988) *Surveying Badgers*. Mammal Society Occasional Publication 9.
- Langton, T.E.S., Beckett, C.L., and Foster, J.P. (2001). *Great Crested Newt Conservation Handbook*. Froglife, Halesworth.
- Morris P (2004) *Dormice*. Whittet Books.
- Natural England (2016) *Great Crested Newts: Surveys and Mitigation for Development Projects – Standing Advice*. Online at:(Accessed December 2021).
- Oldham R. S., Keeble J., Swan M. J. S & Jeffcote M. (2000). Evaluating the suitability of habitat for the Great Crested Newt (*Triturus cristatus*). *Herpetological Journal* 10 (4), 143-155.
- Reason, P.F. and Wray, S. (2023). *UK Bat Mitigation Guidelines: a guide to impact assessment, mitigation and compensation for developments affecting bats*. Chartered Institute of Ecology and Environmental Management, Ampfield.
- UK Governments Countryside Geographic Information website: www.magic.gov.uk
- UKHab Ltd (2023). UK Habitat Classification Version 2.0 (at <https://www.ukhab.org>)

Appendix A – Wildlife Legislation & Policy

The Conservation of Habitats and Species (Amendment) (EU Exit) Regulations 2019

Certain species are known as European Protected Species (EPS) and these are fully protected under The Conservation of Habitats and Species (Amendment) (EU Exit) Regulations (2019). The Conservation of Habitats and Species Regulations (2017) is the transposition of the European Habitats Directive (1992) to UK legislation, amended in 2019 in accordance with Schedule 7 to the European Union (Withdrawal) Act 2018. Species protected under this legislation include (but is not limited to) bats, dormice *Muscardinus avellanarius*, great crested newts *Triturus cristatus*, otter *Lutra lutra*, sand lizard *Lacerta agilis*, and smooth snake *Coronella austriaca*.

For European Protected Species, it is a criminal offence to:

- Deliberately capture, injure or kill any such species.
- Deliberately disturb wild animals of any such animal.
- Deliberately take or destroy their eggs.
- Damage, destroy, or obstruct access to a breeding site or resting place, whether the animal is present or not.
- Keep, transport, sell or exchange, or offer for sale or exchange, any live or dead wild animal of a European Protected Species, or any part of, or anything derived from, such an animal.

Operations which will affect European Protected Species may require a development licence from the relevant national statutory body for nature conservation, which provides a derogation for an otherwise unlawful activity.

Wildlife and Countryside Act 1981 (as amended)

The Wildlife and Countryside Act 1981 (as amended) makes it a criminal offence to:

- Kill, injure, or take any wild bird (with exceptions to species listed in Schedule 2).
- Take, damage or destroy the nest of any wild bird while in use or being built.
- Take or destroy an egg of any wild bird.
- Intentionally kill, injure or take any wild animal listed on Schedule 5.
- Interfere with places used for shelter or protection, or intentionally disturbing animals occupying such places.
- Pick or sell any plants listed under Schedule 8 (such as bluebells)
- Plant or allow to spread in the wild any species listed under Schedule 9.

Protected Sites

Within the UK, certain sites are afforded protection measures based on their level of importance to wildlife. They fall into two categories; statutorily designated sites and non-statutorily designated sites.

Statutorily designated sites are typically of national or international importance and as such are afforded the greatest levels of protection under various pieces of legislation. Statutory sites include Special Areas of Conservation (SAC), Special Protection Areas (SPA), National Nature Reserves (NNR), Sites of Special Scientific Interest (SSSI) and RAMSAR sites.

Non-statutorily designated sites are normally designated by local authorities or nature organisations and are typically of local or county wide importance for their conservation interest. Non-statutory sites include Listed Wildlife Sites (LWS), Local Nature Conservation Sites (LNCS), Sites of Importance for Nature Conservation (SINC), Sites of Nature Conservation Importance (SNCI).

Properties of non-governmental organisations such as Wildlife Trusts may also be managed for their importance to biodiversity. These areas often have no statutory basis, but often comprise part of a designated site.

Environment Act (2021)

The Environment Act operates as the UK's new framework of environmental protection. Given that the UK has left the EU, new laws that relate to nature protection, water quality, clean air, as well as

additional environmental protections that originally came from Brussels, needed to be established. The Environment Act allows the UK to enshrine some environmental protection into law. It offers new powers to set new binding targets, including for air quality, water, biodiversity, and waste reduction.

The Act includes provisions to strengthen and improve the duty on public bodies to conserve and enhance biodiversity, including mandating a net gain biodiversity through the planning system.

Under the Environment Act 2021, all planning permissions granted in England (with a few exemptions) will have to deliver at least 10% biodiversity net gain. This requirement becomes mandatory from January 2024. BNG will be measured using Defra's biodiversity metric and habitats will need to be secured for at least 30 years.

Environmental (Wales) Act 2016

The Environment (Wales) Act 2016 requires that all public authorities, when carrying out their functions in Wales, must seek to “maintain and enhance biodiversity” within the normal delivery of their functions and they must also seek to “promote the resilience of ecosystems”.

This should ensure that maintaining and enhancing biodiversity is an integral part of the decisions that public authorities take in relation to Wales. It also links biodiversity with the long-term health and function of Welsh ecosystems, therefore helping to align the biodiversity duty with the framework for sustainable natural resource management provided in the Act. This is an Act, i.e. domestic legislation – so is not subject to the EU (Withdrawal) Bill/Act.

Protection of Badgers Act 1992

It is an offence to:

- Wilfully kill, injure or take a badger (or attempt to do so)
- Cruelly ill-treat a badger
- Dig for a badger
- Intentionally or recklessly damage, destroy or obstruct access to a badger sett
- Cause a dog to enter a badger sett
- Disturb a badger when it is occupying a sett

Appendix B – Site Photographs



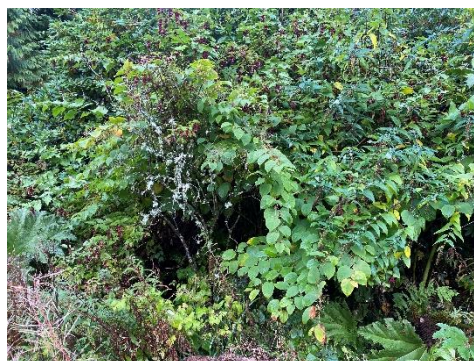
Photograph 1: Pond W2 – one of the off-site ponds



Photograph 2: Pond W4 – off-site



Photograph 3: Wooded areas W4 near the Castle



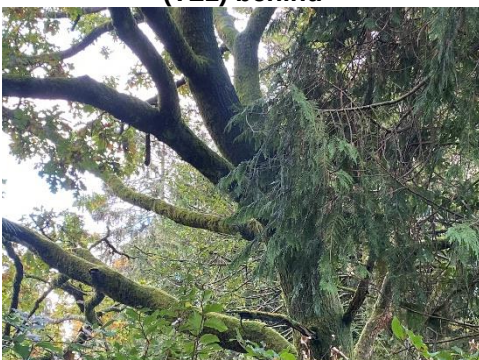
Photograph 4: Japanese Knotweed within W4 (TN1)



Photograph 5: Beech hedge (H2) and tree line (TL1) behind



Photograph 6: One of the coniferous trees within TL1 (T1802) with ivy on trunk PRF



Photograph 7: Oak tree (T1804) within TL1 with minor shallow PRFs due to oak dieback



Photograph 8: Modified grassland within G1



Photograph 9: Wooded area W5 and with species rich H1 in front



Photograph 10: Blackthorn scrub S1

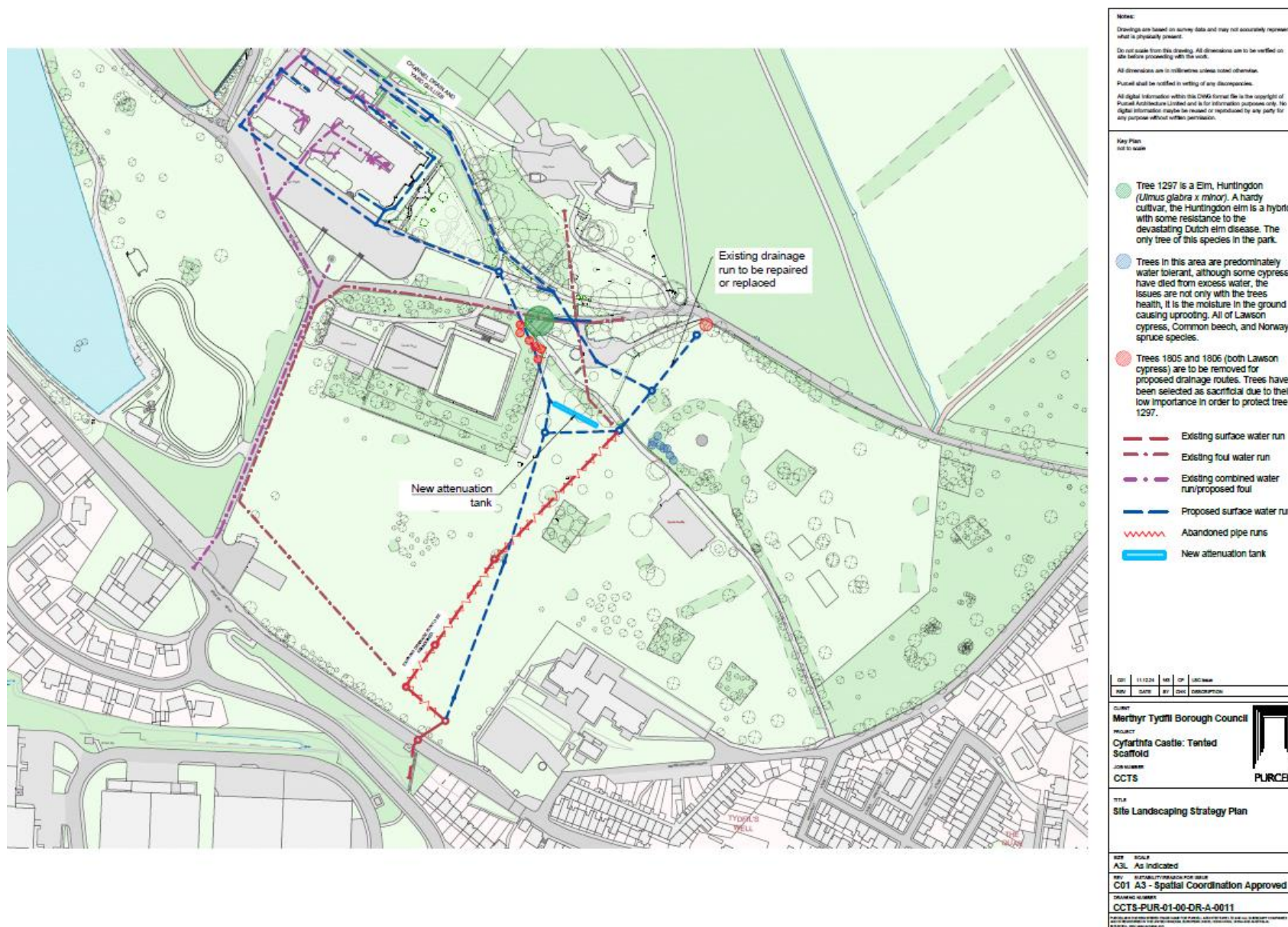


Photograph 11: Other natural grassland within G2



Photograph 12: Himalayan blazon within G2 (TN4)

Appendix C – Proposed Plan



Notes:

Drawings are based on survey data and may not accurately represent what is physically present.

Do not scale from this drawing. All dimensions are to be verified on site before proceeding with the work.

All dimensions are in millimetres unless noted otherwise.

Pursuit shall be notified in writing of any discrepancies.

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Key Plan
not to scale

Tree 1297 is a Elm, *Huntingdon* (*Ulmus glabra* x *minor*). A hardy cultivar, the *Huntingdon* elm is a hybrid with some resistance to the devastating Dutch elm disease. The only tree of this species in the park.

 Trees are to be removed for proposed drainage routes.

Trees 1800-1805 have been selected as sacrificial due to their low importance in order to protect tree 1297.

-  Existing foul water run
-  Proposed surface water run
-  Abandoned pipe runs
-  New attenuation tank

QTY	DATE	BY	CHK	DESCRIPTION
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CLIENT	Merthyr Tydfil Borough Council
PROJECT	Cyfarffa Castle: Tented Scaffold
JOB NUMBER	CCT5



TITLE
Site Landscaping Strategy Plan

NOTE	SCALE
A3L	As Indicated

C01 A3 - Spatial Coordination Approved

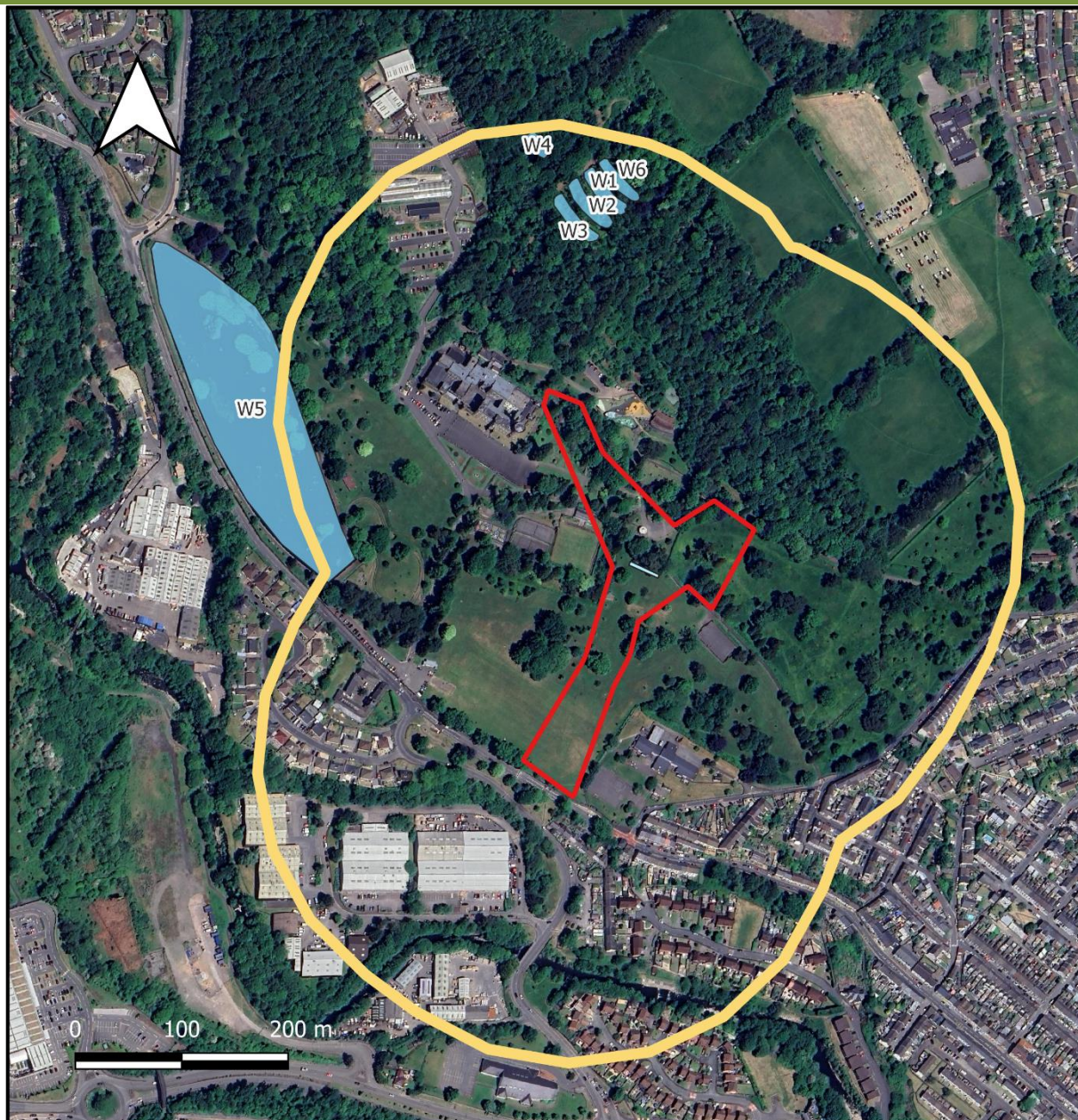
DRAWING NUMBER
CCTS-PUR-01-00-DR-A-0012

Products in the series have been used in public and private facilities to assist in disaster preparedness and recovery in the United States, Canada, Japan, Hong Kong, Korea and Taiwan.

Appendix E – UKHab Baseline Plan (No Trees)



Appendix F – Waterbodies within 250m of site



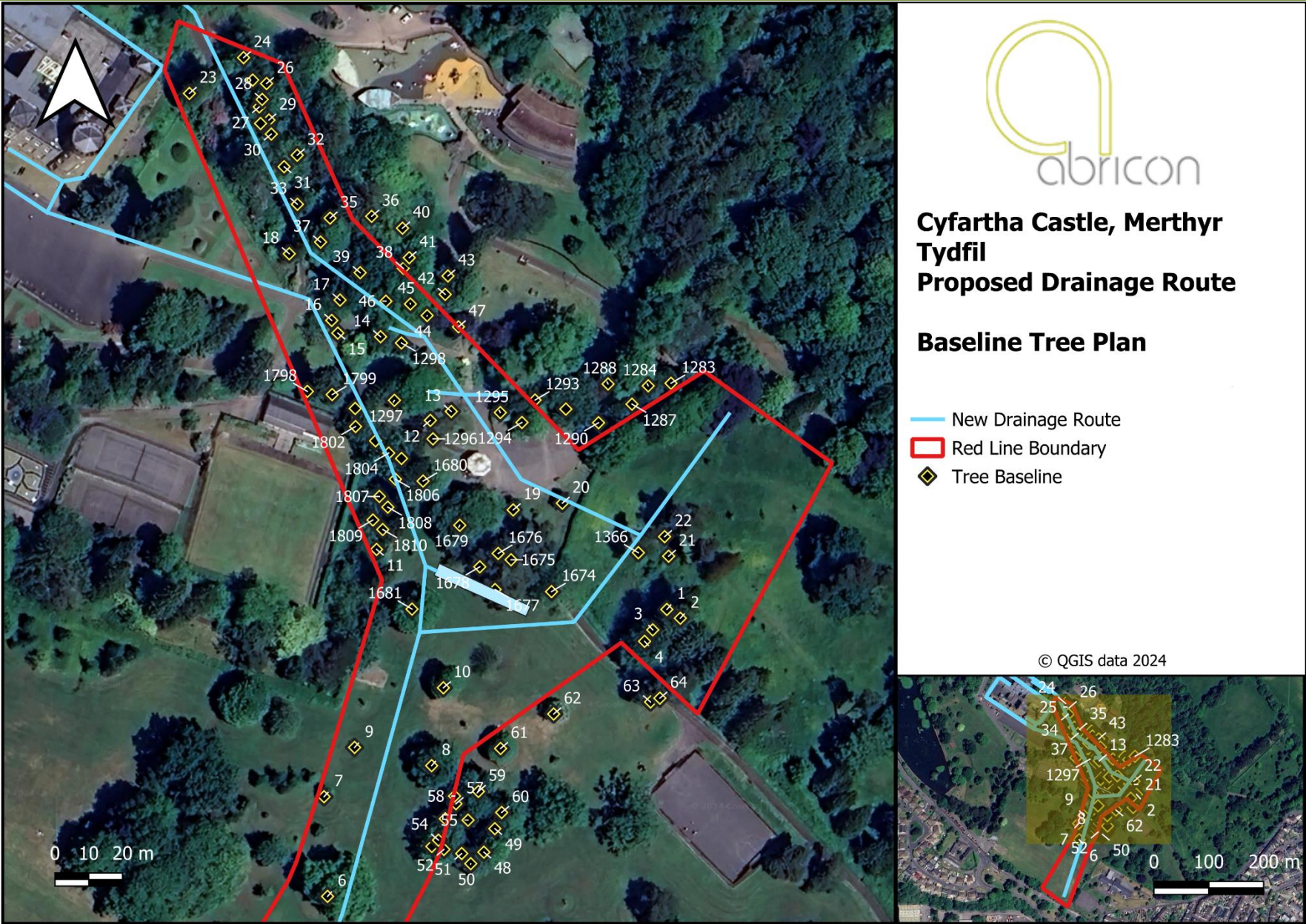
**Cyfarthfa Castle, Merthyr
Tydfil
Proposed Drainage Route**

Waterbodies Plan

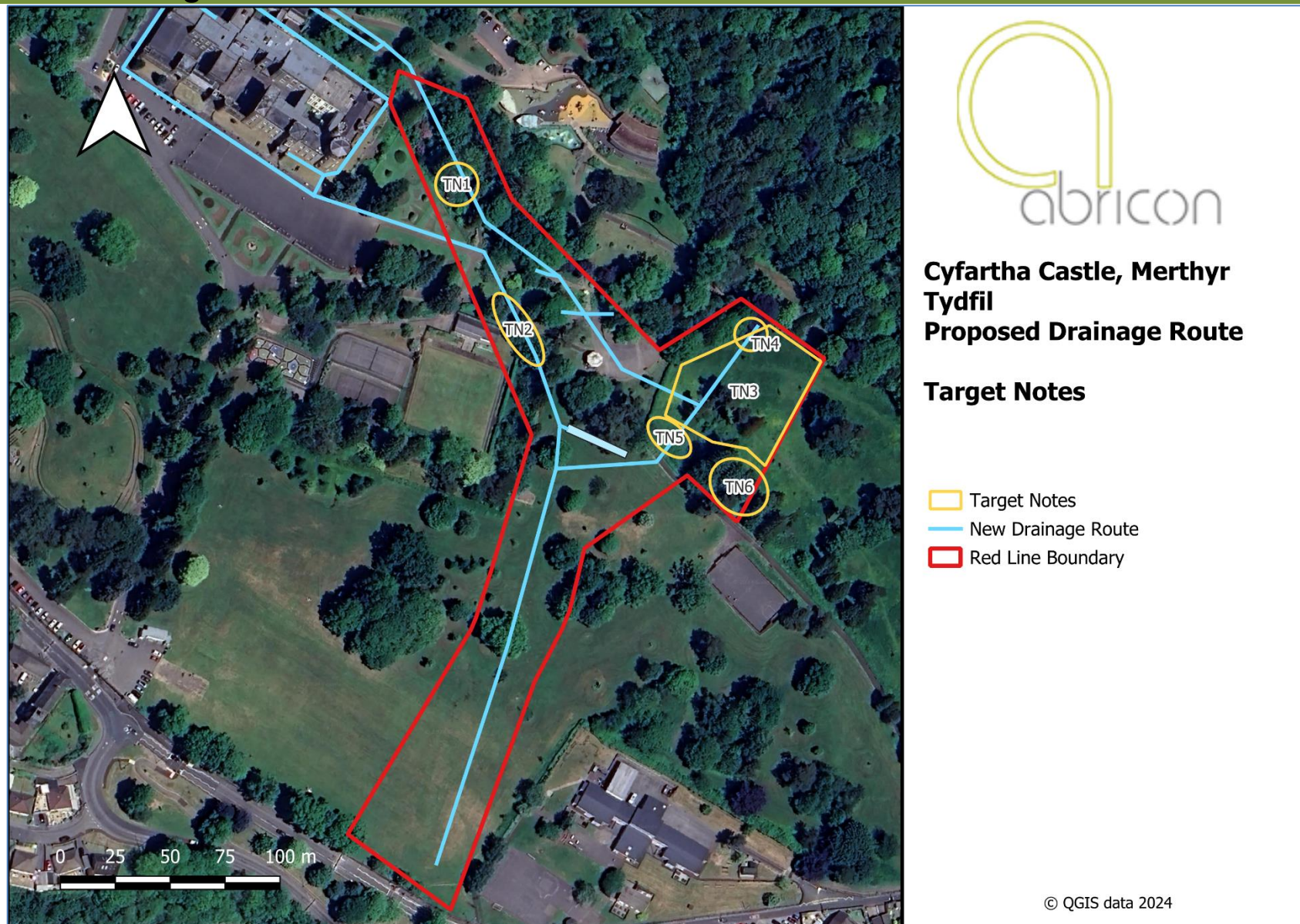
- Waterbodies
- Red Line Boundary
- 250m Buffer

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Appendix G – Baseline Tree Plan



Appendix H – Target Notes



This aerial map shows a study area outlined by a red boundary. Numerous yellow diamond markers, each labeled 'PRF-I', are distributed across the area, primarily within the boundary. Key landmarks and features include:

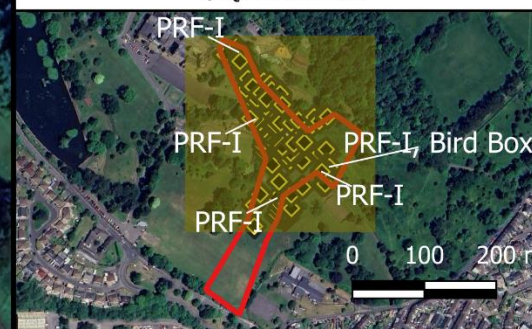
- Oak dieback:** A specific area labeled near the center-left.
- Bird Box:** Two locations labeled on the right side of the map.
- Scale and Orientation:** A north arrow is in the top left, and a scale bar (0, 10, 20 m) is in the bottom left.



Ground Tree Assessment Plan

-  Red Line Boundary
 Tree Baseline

© QGIS data 2024



Appendix J – Habitat Suitability Index Table for Waterbodies

Factor #	W1	W2	W3	W4	W5	W6
1	0.5	0.5	0.5	0.5	0.5	0.5
2	1	1	1	0.6	n/a	1
3	1	1	1	0.5	0.9	0.1
4	0.67	0.67	0.33	0.33	0.01	0.33
5	1	1	1	0.2	1	0.6
6	0.67	0.67	0.67	1	0.01	0.67
7	0.67	0.67	0.67	0.67	0.33	0.33
8	0.9	0.9	0.9	0.9	0.9	0.9
9	0.67	0.67	0.67	0.67	0.33	0.67
10	0.8	0.6	0.8	1	0.3	0.6
HSI score	0.77 (good)	0.75 (good)	0.72 (good)	0.58 (below average)	0.26 (poor)	0.49 (poor)