



BRYMBO HERITAGE AREA

PRELIMINARY ECOLOGICAL APPRAISAL

DATE	ECOLOGIST	APPROVED	VERSION	COMMENTS
03/11/2017	Lucy Boyett	Rhian Hughes	V1	
25/06/2018	Lucy Boyett	Rhian Hughes	V2	Addition of Fossil Forest Area and amendment to drainage pit area.
18/07/2022	Richard Cutts	Dr Katy Read CEcol MCIEEM CEnv	V3	Updated following 2022 survey.

Enfys Report Ref: EE/373/LB

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Executive Summary

Site	Brymbo Heritage Area, Blast Road, Brymbo LL11 5BY	OS Grid Reference:	SJ 29423 53506
Surveyor(s)	Lucy Boyett; Tim Yardley; Richard Cutts	Survey Dates:	12/10/2017; 6/6/2018; 14/7/2022
Type of Survey	Preliminary Ecological Appraisal (PEA)		
Summary of Proposed work	Installation of a narrow-gauge railway with associated buildings. Construction of a building over the Fossil Forest area.		
Habitats affected	Semi-natural broad-leaved woodland, semi-improved grassland, tall ruderal, dense/continuous scrub, bare ground and hardstanding.		
Designated sites affected	The part of the site includes the Brymbo Fossil Forest Site of Special Scientific Interest (SSSI), which will be affected by the proposed construction of a building in this area. There are two other designated sites within 1km, however the nature of the intended works will have no impact on them.		
Main results of survey	Phase 1 habitats within the survey area included semi-natural broad-leaved woodland, semi-improved grassland, tall ruderal, dense/continuous scrub, standing water, bare ground and hardstanding. Great crested newt (GCN) are present in part of the site, and badger have been observed in the woodland. The site has potential for other protected species including reptiles, bats and nesting birds.		
Survey conclusions	Proposed development schemes should be designed in accordance with the ecological mitigation hierarchy (avoid/mitigate/compensate/enhance); in this case, the proposed works associated with the railway will cause unavoidable disturbance/damage to GCN habitat and therefore a mitigation license will be required for great crested newts. The proposed construction in the Fossil Forest will cause loss of reptile habitat. The proposed works will result in the loss of habitat which should be compensated for in line with Planning Policy Wales and result in net gain of biodiversity.		
Further Surveys Required	Reptile surveys are required in the Fossil Forest area for planning, and recommended across the site for management. Badger surveys are recommended in the woodland, due to the proximity of the proposed works to a sett recorded as active in 2018. Bat surveys/inspections required for any trees to be felled. Ongoing GCN monitoring.		
GCN mitigation	A GCN mitigation licence from NRW will be required before works start; this can only be applied for after planning permission has been granted. Recommended mitigation measures include no destruction/disturbance during winter, and supervised manual clearance of vegetation.		

Reasonable Avoidance Measures	Reasonable avoidance measures (RAMs) have been recommended for mammals, bats and nesting birds. Additional RAMs include lighting recommendations, pre-works checks and general measures if animals are found within the works area.
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1.0 Introduction

- 1.1 Enfys Ecology Limited were commissioned by Brymbo Heritage Trust to undertake a Preliminary Ecological Appraisal (PEA) of an area of Brymbo Heritage Area at Brymbo Iron and Steel Works, Wrexham.
- 1.2 Brymbo steelworks closed in 1990, and during the late 1990s, plans were agreed to reclaim and redevelop approximately 85% of its surface area for housing, a new school, retail, employment and a health centre, known as 'the commercial development site'. The remaining 15% was identified as being of significant heritage value and was earmarked for longer term restoration and re-use as a visitor attraction, known as Brymbo Heritage Area (BHA) (Figure 1.1). BHA includes the Brymbo Fossil Forest, Brymbo Ironworks, remains of the 19th century blast colliery and several 20th century steelworks buildings. The colliery area was designated as an informal ecology area.
- 1.3 In 2004, a Welsh Government great crested newt (GCN) derogation licence was obtained and GCN were translocated from the commercial development site to enable open cast coal recovery before its subsequent making good and reclamation for future built development. Permanent newt fencing was erected in the colliery ecology area and mitigation ponds created for the newts. Unfortunately, no detailed results from the translocation are available, however, it is thought that approx. 5000 individuals (including eggs) were translocated.
- 1.4 Planning permission is to be sought for the installation of a narrow-gauge railway with associated buildings. The proposed works include laying a 2ft gauge railway across the site, along existing pathways through an area of semi-natural broad-leaved woodland, which will require some vegetation clearance and some excavation works to level the ground.
- 1.5 Planning permission will also be sought to construct a building over the fossil forest area to preserve the geological features and allow a 5-8 year excavation programme.
- 1.6 This survey covered the proposed area for the narrow-gauge railway and associated buildings and the fossil forest area, to gain baseline ecological data on the species and habitats present on the site, identify any possible ecological constraints to the works arising from the site or surrounding area, and recommend suitable general mitigation and/or compensation strategies as appropriate.
- 1.6 The PEA included an extended Phase 1 Habitat survey and protected species survey of the site, in addition to a desk study examining species records for the site provided by Cofnod, the local environmental record centre for North Wales.



FIGURE 1.1. PROPOSED LONG TERM PLANS FOR BRYMBO HERITAGE AREA.

2.0 Site Description

2.1 *Survey Area*

- 2.1.1 The BHA is shown by the blue boundary line in Figure 2.1 and 2.2, with the area surveyed ('the site') shown by the red boundary line.
- 2.1.2 The linear site ran east to west along a steep slope, with the hill top to the south and Blast Road at the bottom to the north. Along the southern half of the site were open areas of semi-improved grassland with scattered scrub dominated by young birch, and a small area of dense, birch-dominated woodland. The northern half of the site comprised semi-natural broad-leaved woodland dominated by birch, sycamore and ash and a sparse understorey. To the north east of the site was an area of semi-improved grassland with a large number of birch saplings, scattered scrub and three ponds, one of which was noted to be dry during the survey. There were also a number of derelict and degrading brick and stone buildings and walls scattered throughout the site along with small piles of brick and rubble.

2.2 *Surrounding Habitats and Features*

The site was located in a rural area on the southern outskirts of Brymbo village. To the south and west of the site was a large area of agricultural fields bounded by scattered trees and hedges with a large linear area of woodland approx. 970m to the north west. Approximately 150m to the east of the site was the area of the former steelworks, which had partly been developed with housing to the south, and an area of grassland to the north, nearest to the site.

Running along the eastern side of the former steel works area was a linear area of broad-leaved woodland.

There were a number of ponds to the north west of the site with the nearest 'Brymbo pool' approx. 370m away.



FIGURE 2.1. BRYMBO HERITAGE AREA SHOWN IN BLUE AND SURVEY AREA SHOWN IN RED (© GOOGLE 2022).



FIGURE 2.2. BRYMBO HERITAGE AREA SHOWN IN BLUE AND SURVEY AREA SHOWN IN RED WITH SURROUNDING AREA (© GOOGLE 2022).

3.0 Methodology

3.1 *Desk Study*

A desk study was undertaken using records from Cofnod, the local environmental record centre for North Wales; this was updated in July 2022. These records were used to determine the presence of statutory and non-statutory sites for nature conservation and protected or notable species and habitats within a 1km radius of the site.

The records were used to inform the survey and recommendations, and to provide context for evaluating the species and habitats found during the survey.

3.2 *Extended Phase 1 Habitat Survey*

A survey of the site was conducted by an experienced ecologist walking over the site. The habitats present were classified into a series of categories according to the Phase 1 Habitat standard methodology (JNCC, 2010). Notes were taken on the habitats and their suitability for protected species. A list of floral species was recorded, and where relevant a measure of frequency and abundance of such species was given using the DAFOR scale. The DAFOR scale works on % cover. Dominant (D) = >75%, Abundant (A) = 75 - 51%, Frequent (F) = 50 - 26%, Occasional (O) = 25 - 11% and Rare (R) 10 - 1 %.

A search for evidence of protected species was carried out, including amphibians, (including great crested newts) potential habitat for bats and reptiles. Evidence of badgers including setts, dung pits, hairs, footprints, and scratching posts or trees was searched for. Trees with suitable features for roosting bats, including knot holes and other crevices, hollow trunks and dense ivy coverage were identified. The extended Phase 1 Habitat survey was conducted on the 12th October 2017 by Lucy Boyett, with the fossil forest visited for a second time on 6th June 2018 by Tim Yardley. A further survey of the site was undertaken on 14th July 2022 by Richard Cutts.

3.3 *Limitations*

The initial survey took place in October (except for the fossil forest area, which was surveyed in June), which is outside of the optimal time of year for this type of survey. At this time most vegetation is not in flower and can be hard to identify, and some may have died back; however, it is considered that the survey still provides a valid assessment of the habitats present and the impact that the proposed works may have. The follow-up survey in 2022 was undertaken in July, within the optimal time of year for this type of survey.

The results of these surveys should therefore be assessed with these considerations in mind. If a species is not recorded during the survey, this does not confirm its absence from the site.

4.0 Desk Study

4.1 *Designated Nature Conservation Sites*

- 4.1.1 There is one statutory designated site within a 1km radius of the site boundary, which is Brymbo Fossil Forest Site of Special Scientific Interest (SSSI), located within the BHA site boundary. This site is designated for its geological interest.
- 4.1.2 There are two non-statutory designated sites within the 1km search area. Mount Zion Wildlife Site is located 325m to the west, designated for its semi-improved and marshy grassland and Brymbo Pony Fields Wildlife Site, located 360m to the north east, designated for its semi-improved grassland and dense/continuous scrub.

4.2 *Protected and Notable Species*

- 4.2.1 Recorded within the last 20 years, and within a 1km radius of the site, Cofnod held 71 records of 49 different protected, notable or invasive non-native species. These are discussed in Sections 4.3 and 4.4.

4.3 *Protected and Notable Fauna*

- 4.3.1 There were a number of records for great crested newts (GCNs) and smooth newts within the northern half of the survey area. GCNs were recorded in this area in 2001 (2x juveniles), 2004 (adult and juvenile) and 2007. Smooth newts were recorded in the same area in 2001.
- 4.3.2 No reptiles had been recorded with the survey area, however a common lizard was recorded approx. 205m to the north in 1998 and a grass snake recorded approx. 830m to the west in 2008 at Brymbo pool.
- 4.3.3 Mammal records with the 1km search radius included badger and hedgehog. A badger sett was recorded in 2001 with a 1km grid square, incorporating the survey area, farmland to the south west and the former steel works. Four badger setts were recorded in 2004, within the 1km grid square to the north, which would be at least 390m away from the site. A badger was also recorded 'dead on road' approx. 620m to the north east in 2017. A hedgehog was recorded in 2016, approx. 625m to the north.
- 4.3.4 There were a number of bird records from both within the survey area and within the 1km search area. Birds recorded within the survey area included black-headed gull, cuckoo, dunnoek, green woodpecker, house martin, house sparrow, kestrel, linnet, long-tailed tit, meadow pipit, skylark, song thrush, swallow and willow warbler. Records outside of the survey area but within the former steelworks area to the east included kestrel, grey partridge and lesser redpoll.

4.3.5 In 2001, a minutest diving beetle was recorded within a pond within the survey area, which was part of a relocation project from contaminated tanks. This is a Section 7 priority species under the Environment (Wales) Act 2016.

4.4 *Protected and Notable or Invasive Non-native Flora*

4.4.1 Notable plant species recorded within a 1km grid square with the site name 'Brymbo Steel Works', included the red data book species (vulnerable) and locally important strawberry clover, locally important willowherb *Epilobium parviflorum x montanum* = *E. x limosum*, grass vetchling described as 'many thousands of plants on the banks above the buildings', hawkweed oxtongue at the fossil forest and hairy violet. A planted black poplar was also recorded.

4.4.2 There were six records of invasive non-native species (six species), of which five were recorded in 2010, within a 1km grid square which included the survey area, with a site name of 'Brymbo Steelworks'. Wildlife and Countryside Act Schedule 9 species included Himalayan cotoneaster, Japanese knotweed described as 'widespread' and Japanese rose. Portugal laurel and white stone crop (non-native species) were also recorded within this grid square. New Zealand pigmyweed was recorded in 2015 approximately 963m to the west within Brymbo amenity fishing pool.

4.5 See Appendix B for the full desk study details (updated in 2022).

5.0 Habitat Survey

5.1 *Habitat Types*

5.1.1 A Phase 1 Habitat map of the site is provided in Figure 5.1 with details of target notes given in Table 5.1. A description of the habitats including some species are provided below. Photographs of the site are included within the text. Appendix A contains a list of plant species recorded including scientific names.

5.1.2 The following standard Phase 1 habitat and feature types were recorded within the site (with their alphanumeric codes):

- A1.1.1 – Semi-natural broad-leaved woodland
- A2.1 – Dense/continuous scrub
- A2.2 – Scattered scrub
- A3.1 – Semi-natural broad-leaved trees
- B5 – Marshy grassland
- B6 – Semi-improved grassland
- C1.1 - Bracken
- C3.1 – Tall ruderal
- G1 – Standing water
- J3.6 – Buildings
- J4 – Bare ground
- Hard standing

In addition, the non-standard phase 1 habitat type 'hard standing' has been used to show access roads and concreted areas, which have been artificially constructed.



FIGURE 5.1. PHASE 1 HABITAT MAP OF THE SURVEY AREA (TARGET NOTES DETAILS SHOWN IN TABLE 5.1).

TABLE 5.1 DETAILS OF TARGET NOTES AS SHOWN IN FIGURE 5.1

Target Note	
1	Three badger sett entrances adjacent to each other, half way up the steep bank within the semi-natural broad-leaved woodland. These were thought to be inactive as there were leaves within each of the entrances and ivy growing across the holes. At the time of the 2022 survey, this area was heavily overgrown and had many recently fallen trees, and the sett could not be relocated.
2	Log, earth and brash piles, where some clearance work had been undertaken. These were partially covered in birch scrub in 2022.
3	Depression where a pool of water had formed. Following works under GCN licence over winter 2017/18 this has now been levelled.
4	A number of snuffle holes thought to have been made by badgers were observed here in 2017.
5	Storage area for materials with a number of piles of rubble and bricks.
6	Fresh badger latrine along pathway through the semi-natural broad-leaved woodland.
7	One plant of cotoneaster, which was not identified to species level.
8	This area semi-improved grassland is in the process of succession from bare ground to grassland with a moderate species richness present. Grassland cover had increased in 2022, and scrub had started to encroach from the edges.
9	Small burrow seen at the base of the bank in 2022, possibly badger. Entrance becoming overgrown by ivy.
10	Dirt pile, sparsely covered by large grass tussocks. Patch of white stonecrop on hardstanding immediately to the west.

5.2 Habitat Descriptions

Species common names are used within the text, however a plant species list including Latin names can be found in Appendix A.

- 5.2.1 A gravel track ran along the southern boundary, climbing upwards towards the west (Photo 5.1). Along both sides of the track was a wide strip of semi-improved grassland (up to c.7m wide) with species such as bird's-foot-trefoil, cock's foot, crested-dog's-tail, hop trefoil, perennial rye grass, red clover, ribwort plantain, yarrow and Yorkshire fog. There were small areas of scattered scrub throughout this grassland, dominated by birch saplings but with also gorse, willow saplings and bramble. Orchids were seen here in 2022; these were most likely common spotted orchids although they have a tendency to hybridise. Scrub had continued to encroach on the grassland since 2017, in many places developing into small trees. At the southern end of the track, the scrub had become a dense stand of young woodland (Photo 5.2), with a strip of bracken at the top of the bank at its western end. Three rows of approximately six young apple trees were present to the north of the track, adjacent to a series of beehives and other planted species including broom (Photo 5.3).



PHOTO 5.1 AND 5.2. GRAVEL TRACK ALONG SOUTHERN BOUNDARY (2022).

- 5.2.2 On the north side of the track, beyond the strip of grassland, was a steep bank, on top of which was an area of planted broad-leaved woodland comprising birch trees with an understorey of bramble (Photo 5.3). This planted area led into an area of semi-natural broad-leaved woodland and scattered trees comprising sycamore, ash and oak with a bramble understory (Photo 5.4).



PHOTO 5.3 AND 5.4. WOODLAND EDGE TO THE NORTH OF THE SOUTHERN TRACK (2022).

- 5.2.3 Following the track along the southern boundary to the west of the site, there was a large open area of semi-improved grassland with a large number of birch and willow saplings scattered throughout (Photo 5.5). A narrow strip of the semi-improved grassland extended along the western edge of the site, in a damp depression that also included a line of bulrushes. There was an area of gravel hard standing and bare ground at the western edge of the site, which provided access from Blast Road through a large metal gateway (Photo 5.6). On this area of hard standing was a metal storage container surrounded by patches of tall ruderal and scrub vegetation including rosebay willowherb, nettles, broad-leaved dock, hedge bindweed, herb Robert and bramble. There were also some log, earth and brash piles where some clearance work had been undertaken (Target Note 2 in Figure 5.1 and Table 5.1). Works were undertaken on this section of the site under a GCN licence (77390:OTH:EPS:2017) for the site over winter 2017/2018 and supervised by a licenced

ecologist, this area has now been levelled and stoned, with exposed weed-control membrane present in places although in poor condition. The 2022 survey observed that these areas of open hard standing and gravel now had a varied but patchy cover of scrub, ruderal, and ephemeral/short plants, including creeping cinquefoil, bramble, sorrel, clematis, ragwort, willowherb, prickly sowthistle and great mullein (Photos 5.7 and 5.8).



PHOTO 5.5 AND 5.6. SEMI-IMPROVED GRASSLAND WITH SCATTERED SCRUB; HARD STANDING (2017).



PHOTO 5.7 AND 5.8. PATCHY COLONISATION OF OPEN AREAS OF HARD STANDING AND GRAVEL (2022).

- 5.2.4 There were three drainage pits, which at the time of the 2017 survey (October) were wet underfoot with small isolated areas of shallow standing water (Photo 5.9). The vegetation present within the pits included mosses, pendulous sedge, hard rush, willow saplings and some grasses, suggesting that there may not be standing water during most of the year. To the south of the drainage pits was a depression (possibly formed from excavating or from vehicular access) where a pool of water had formed. Works have also taken place in this area, with the drainage pit to the west filled in, as well the depression to the south. This was undertaken under a GCN licence (77390:OTH:EPS:2017) . Willow scrub has since encroached on the two remaining drainage pits, with only the eastern one retaining any open ground in 2022 (Photo 5.10).



PHOTO 5.9 AND 5.10. DRAINAGE PITS (2017) AND EASTERN PIT SURROUNDED BY WILLOW SCRUB (2022).

- 5.2.5 The northern half of the site was predominantly semi-natural broad-leaved woodland with mature trees including sycamore and ash with a ground flora comprising ivy, hart's tongue, male fern, ash saplings, sycamore saplings, rowan, nettle and bramble (Photo 5.11). There were a number of cleared pathways running through the woodland in 2017, which were generally overgrown by bramble and ruderal vegetation in 2022 (Photo 5.12).



PHOTO 5.11 AND PHOTO 5.12. SEMI-NATURAL BROAD-LEAVED WOODLAND.

- 5.2.6 The north eastern area of the site, to the west of the former steelworks buildings, comprised areas of semi-improved grassland, hard standing, birch saplings, woodland and scattered trees. Within this area were three ponds, each with standing water, which did not appear to be particularly deep. The eastern most pond had limited open water as it was dominated by pendulous sedge, hard rush, mosses and willow saplings (Photo 5.13). The other two ponds did have more open water with scattered bulrush, soft rush and water mint near the edge; however, surrounding scrub vegetation including birch, willow and ash saplings, gorse and buddleja were encroaching (Photo 5.14). Within this section of the site there were many areas with piles of rubble, bricks, earth, wood and brash which are from clearance works and storage of materials. In 2022, the easternmost pond had dried up, leaving a damp depression with no open water, still dominated by rushes, mosses and willow saplings (Photo 5.15). The other two ponds had remained open and water-filled, although with significant cover of duckweed (Photo 5.16).



PHOTO 5.13 AND 5.14. EASTERN MOST POND AND POND TO THE WEST (2017).



PHOTO 5.15 AND 5.16. EASTERN MOST POND AND POND TO THE WEST (2022).

- 5.2.7 There were two derelict buildings, one of brick construction shown in Figure 5.17, and one stone, which has recently been re-roofed. The proposed works will not affect either of the buildings however if works are proposed in the future bat surveys are likely to be needed. There were also a number of degrading stone walls running along the centre of the site.



PHOTO 5.17 DERELICT BUILDING

- 5.2.8 The fossil forest area at the eastern most end of the site, comprised scrub and semi-improved grassland around the margins with bare ground to the centre and out towards the eastern boundary (Photo 5.18 and 5.19). The scrub comprised birch saplings, willow, bramble, broom, buddleja, and gorse. The grassland was in the process of succession from bare ground to grassland with a moderate species richness present, including, Yorkshire fog, cock's foot, crested dog's-tail, common knapweed, creeping forget-me-not, scarlet pimpernel, meadow vetchling, oxeye daisy, goldenrod, kidney vetch, fox and cubs, germander speedwell and imperforate St. John's wort. There were some large pieces of metal sheeting present and areas of loose rock of various sizes scattered across this area. The succession from bare ground to grassland and scrub had continued between the 2108 and 2022 surveys, with further scrub encroachment and increased vegetation of the bare ground (Photos 5.20 and 5.21).



PHOTO 5.18 AND 5.19. FOSSIL FOREST BARE GROUND, SEMI-IMPROVED GRASSLAND AND SCRUB (2017).



PHOTO 5.20 AND 5.21. FOSSIL FOREST BARE GROUND, SEMI-IMPROVED GRASSLAND AND SCRUB (2022).

5.3 Fauna

5.3.1 Amphibians

The three ponds to the north east of the site are known breeding ponds for great crested newts created as mitigation habitat for the species. At the time of the 2017 survey, the eastern most pond was dominated by sedges, rushes and willow saplings and had limited open water for newt display and courtship behaviour. The vegetation present was not

optimal for egg laying. This pond was dry in 2022 and is no longer considered suitable for breeding.

The two further ponds were deeper with areas of open water. They also had floating and submerged vegetation such as water mint, which is suitable for egg laying. Both ponds have become quite overgrown, and now also have significant cover of duckweed.

The three drainage pits were approximately 85m to the south west of the three known breeding ponds, with good connectivity through scrub and semi-natural woodland between. There was almost no standing water present in 2017 and from local knowledge it is understood that they do not hold standing water at any point during the year. During the GCN surveys which were carried out on the site in spring 2018, the two remaining drainage pits did hold water for the first survey, however by the time of the second survey these ponds were dry with only very small areas of water remaining which were very shallow. Both of the remaining drainage pits are now dry, with the western one completely transformed into willow scrub.

The two remaining ponds had good connectivity with surrounding suitable terrestrial habitats. The areas of dense and scattered scrub, semi-natural woodland and semi-improved grassland provide areas for foraging and shelter and the piles of rubble, earth and brash and broken up stone walls, providing many places for shelter and hibernation (Photo 5.22).



PHOTO 5.22. RUBBLE PILE.

5.3.2 Reptiles

The areas of scrub, grassland and bare ground within the fossil forest area provided suitable habitat for reptiles, with a good variation in vegetation height and cover and patches of sunny areas. There were also metal sheets and scattered rubble in this area which would provide additional refugia. This suitable habitat area is moderately well connected to further areas of suitable habitat.

The remainder of the site did contain some small isolated areas which were suitable for reptiles. One of these was the area of hard standing and bare ground in the north western corner of the site. This had areas for basking adjacent to areas of scrub and woodland for shelter and to forage in, although it had started to be encroached by tall vegetation. There was also suitable habitat to the north east of the site, where there were areas of hard standing, piles of rubble and bricks and stone walls, which would be suitable for basking and shelter.

5.3.3 *Badger*

The whole site provided a variety of different habitats suitable for badgers. The areas of semi-natural broad-leaved woodland, scrub and semi-improved grassland provided good quality habitat for foraging and the steep banks of the woodland provide opportunities for sett building. There was also good connectivity to further suitable habitat outside of the survey area.

A badger sett with three entrances was identified in 2017 half way up the southern bank, within the woodland (SJ 29183 53587) (Photo 5.23). There were leaves within each of the entrances and ivy growing across two out of three of the holes. The sett was subsequently visited on 23rd April 2018 where freshly dug soil was observed in front of the middle sett entrance. A wildlife camera was then set up to monitor this sett entrance for two weeks from 15th to 29th May 2018. During this time a badger was seen on the camera investigating the entrance but did not enter, however, from this it is likely that the sett is used on occasion, therefore must be classed as an active badger sett. Due to dense vegetation growth and many fallen trees in this area, the sett could not be relocated in 2022.

A badger latrine was found on one of the paths running through the woodland (SJ 29298 53482) (Photo 5.24) and snuffle holes were also recorded in the north eastern section of the site (SJ 29400 53542) (see Figure 5.1 and Table 5.1). The 2022 survey found no obvious signs of badger activity, although a small and partially overgrown burrow – potentially another inactive badger sett - was identified at the bottom of the gully, on the opposite bank to the previously identified sett (Photo 5.25; also see Figure 5.1 and Table 5.1).



PHOTO 5.23 AND 5.24. INACTIVE SETT ENTRANCE AND BADGER SNUFFLE HOLES.



PHOTO 5.25. BURROW ENTRANCE.

5.3.4 Bats

The area of semi-natural broad-leaved woodland within the site formed part of a larger area of connected woodlands, extending to the north and south. This area is likely to be used by commuting and foraging bats.

The trees within the southern section of the site were mostly young birch trees, which did not have cracks and crevices to be used by roosting bats. The trees within the northern broad-leaved woodland were mature trees, with most being sycamore or ash, a large majority were ivy covered therefore it is possible that roosting features may have been present. An inspection of every tree was not carried out .

The derelict buildings and stone walls on site were not inspected for bat roosting potential, however it was noted that many of them had large cracks and crevices which could be used by roosting bats.

5.3.5 *Nesting birds*

The dense and scattered scrub, scattered trees and broad-leaved woodland were all suitable for nesting bird species.

5.3.6 *Other protected species*

No evidence of other protected species was found.

5.4 *Invasive Non-Native Species (INNS)*

One plant of cotoneaster was recorded towards the eastern end of the site (see Target Note 7 in Table 5.1). A small area of white stonecrop was present in the north-eastern part of the site (see Target Note 10 in Table 5.1); although this plant is not listed under Schedule 9 of the Wildlife and Countryside Act 1981, it is an introduced species with the potential to spread in the wild.

6.0 Discussion and Evaluation

6.1 Planning permission is to be sought for the installation of a narrow-gauge railway with associated buildings. The railway is to zig-zag across the site, along the semi-improved grassland area to the south, and through the woodland to the north. The tracks are to be laid along current track ways and so minimal clearance work will be required. Most of the proposed works will be undertaken using hand tools or small machinery if required.

6.2 Planning permission will also be sought to construct a building over the fossil forest area to preserve the geological features and allow a 5-8 year excavation programme. These works will involve ground clearance and the stripping back the ground following the bedding planes.

6.2 *Nature Conservation Sites*

6.2.1 There was one statutory designated site and two non-statutory sites within a 1km radius of the site boundary. The statutory designated site, Brymbo Fossil Forest SSSI, is within the site boundary and is designated for its geological interest. Mount Zion and Brymbo Pony Fields Wildlife sites are designated for their grassland habitats and will therefore not be affected by the proposed works.

6.3 *Habitats*

6.3.1 Ponds were the only habitat present within the surveyed area which are considered to be Habitats of Principal Biological Importance on Section 7 of the Environment (Wales) Act, 2016 and also Priority Habitats on the former national biodiversity Action Plan (UK BAP 2007).

6.4 *Flora*

6.4.1 The floral diversity was relatively good across the different habitats present. The species recorded during the survey were common within the region and were not protected by the Wildlife and Countryside Act 1981 (as amended) or considered rare nationally or locally.

No notable plant species returned in the data search, recorded within 'Brymbo Steel Works', were identified during the survey.

The data search returned five records of invasive non-native species within 'Brymbo Steelworks' including the WCA 1981 (as amended) Schedule 9 plants Himalayan cotoneaster, Japanese knotweed and Japanese rose. During the survey cotoneaster was recorded to the east of the site, which was not recorded to species level. None of the other Schedule 9 species were identified during the survey, it is possible that these may have been missed if present in low numbers, however it is thought that these species are present outside the survey boundary.

A biosecurity risk assessment was produced for the site in 2017, which sets out best practice measures to prevent the spread of invasive non-native species both on to and also off the site, and remains relevant. This includes ensuring that contractors, staff and volunteers know the identification features and what to do if certain species are found. Washdown facilities will also be provided. If any Schedule 9 species are found to be present within the site a schedule of treatment and eradication works must be produced. The biosecurity risk assessment has been included in this report as Appendix C.

6.5 *Fauna*

6.5.1 *Amphibians*

A large population of great crested newts (GCN) are known to have been present on site following the translocation of approximately 5000 individuals which were translocated there in 2004. A small number of records of GCN and smooth newts were also returned from the data search.

As part of ongoing monitoring of GCN at the site, Enfys Ecology carried out six surveys (torching and bottle trapping) of the three ponds and two drainage pits in 2018 and three monitoring surveys (torching and egg search) in 2019 and 2022. The latest survey (March 2022) confirmed that the presence of both adult male and female GCN in the western-most pond, with at least 20 individuals present. All results have been submitted to Cofnod as part of the Wales GCN monitoring programme.

The many piles of rubble, earth and brash and old stone walls across the whole site are highly likely to be used by GCN and other amphibians for refugia and hibernacula during the winter.

A now expired GCN licence application had been submitted for small scale works across the site, which did not require planning permission. If planning permission for the installation of the railway is granted, a new licence will be sought to include these works.

A detailed method statement for the works, with regards to GCN, will be included within the EPS licence application, however a summary is given below:

- Any pond improvement works will be carried out over winter under the supervision of a licenced ecologist.
- No destructive works will be carried out over winter.
- No potential hibernacula or refugia will be disturbed during winter (November – March).
- As the proposed railway is within the terrestrial habitats known to be used by GCN (i.e. within the newt fencing and in proximity to the breeding ponds), works will be permitted

under licence using reasonable avoidance measures and under the supervision of a licenced ecologist.

- As the site is a mitigation area for the development of the 'commercial development site' it will be formally monitored, with records uploaded to the Wales Online GCN Monitoring system.
- Vegetation which needs to be cleared will be strimmed to 15cm, followed by a fingertip search by a licenced ecologist, before further strimming to ground level.

The longer-term project will include enhancing and increasing the habitat suitability for GCN within this mitigation area, which include the creation of new ponds.

6.5.2 *Reptiles*

The areas of scrub, grassland and bare ground within the fossil forest area provided suitable habitat for reptiles and there has been a recent incidental record of a common lizard within that area. The remainder of the site did contain small areas of suitable habitat for reptiles and the data search returned a common lizard record 205m to the north.

It is therefore likely that there is a low population of reptiles present within the site, particularly within the fossil forest area. Reptile surveys will be required to inform the proposed works in the fossil forest area, as there will be loss of reptile habitat and potential disturbance of animals. Surveys are also recommended across the rest of the Brymbo Heritage Area in order to inform the future management of the site.

For the proposed works, reasonable avoidance measures will also be implemented during the works to avoid harming any reptiles that may be present within suitable areas of habitat. Note that these are general measures based on the current information from the site, and are subject to change pending the results of reptile surveys.

- Any large piles of material such as bricks, earth or rubble should be dismantled by hand or with hand tools prior to removal. Any turf which is to be removed during the works should be stripped carefully at this point.
- Prior to any ground clearance within the fossil forest area, vegetation will be strimmed to 15cm at least 24 hours before works are commenced, before strimming to ground level under the supervision of a suitably qualified ecologist. Following this, vegetation within the area of works will be kept short until the works are complete.
- Strimming and other vegetation clearance must be carried out in a directional manner, working from one side to the other towards an area of suitable habitat.

- Strimming and other destructive works should only be carried out when daytime temperatures rise to 15°C at the time of works, and there has been a period of at least 5 consecutive nights above 5°C prior to the works.
- Destructive works must not occur during the hibernation period (November to March inclusive), and only when the temperature has raised above 15°C.
- Any reptiles encountered during works should be moved well away from the working area by site staff wearing gloves. Work must stop immediately in that area and Enfys Ecology contacted.

6.5.3 *Badger*

Evidence of badgers using the site was identified, with sett entrances, a fresh latrine and snuffle holes recorded within the woodland in 2017. There is a known main sett close to the site but outside of the ownership of Brymbo heritage.

A badger was recorded investigating the sett entrance identified in Target Note 1 in 2018, but was not seen to enter it. As freshly dug material was present, it is possible that badgers use – or were using - this sett on an occasional basis. No evidence of badger activity was observed during the 2022 survey, and there is the possibility that the sett has become disused, although this could not be confirmed.

As a badger was been seen investigating the sett in 2018 it must be classed as being active at the time; no works with machinery can be undertaken within 30m of an active sett. If works with machinery is needed within 30m of an active sett, a licence from NRW will be required. Under licence, works within 30m of a badger sett can only take place between July – November.

The proposed route of the railway comes close to the known sett, although not within the 30m buffer. However, it is close to 30m from the potential outlier sett found on the 2022 survey (Target Note 9), and within habitat suitable for sett building. Further surveys of this area are recommended to determine if badgers are currently active in the area and whether active setts are present.

6.5.4 *Bats*

It is highly likely that bats use the woodland and different habitats across the site for foraging and commuting. Bats were observed by Enfys Ecology during surveys of the buildings in the north-eastern section of Brymbo Heritage Site; the results of these surveys are detailed in a separate report (Boyett, 2022). Bats also may use trees in the woodland for roosting; the majority of the mature trees had ivy on so roosting features may have been present but were not visible.

The proposed works are to follow existing tracks within the woodland and so it is not thought that any mature trees will need to be felled. If this is the case, the works will have no detrimental effect on bats.

If any mature trees are to be felled as part of the works, then they should be inspected by a suitable bat ecologist prior to felling, due to the ivy presence a tree climbing survey and/or an emergence survey will need to be carried out prior to felling.

It is not thought that the railway will be illuminated, therefore post-development lighting will not have an impact on bats using the area. To reduce the potential impact of any light spillage on commuting bats, the following recommendations should be followed:

- There must be no lights focused on the woodland and hedgerows during or after the works.
- Construction should start at least one hour after dawn and finish at least hour before dusk during the summer months (May to August) to prevent light and noise levels disturbing the bats using the site.

6.5.5 *Nesting Birds*

No nesting birds were seen during the surveys. A variety of bird species are likely to breed within the woodland and scrub vegetation throughout the site.

As the site provides nesting habitat for birds, any tree or shrub removal should ideally take place outside the bird breeding season, (March to September inclusive), if this is not possible, a survey for nesting birds should be conducted prior to works commencing; if any nests are found or the area cannot be adequately searched, then all activity must stop until the birds have fledged or the nesting period has ended.

6.5.6 *Invertebrates*

The data search returned a record of a minutest diving beetle from 2001, which had been translocated to one of the ponds within the site. This species of diving beetle is normally found with lower parts of rivers, where it is often associated with fine gravel or sand banks. The ponds are currently unsuitable for this species, therefore, it is unlikely that it is still present. An invertebrate survey of the ponds was not undertaken and so the current status of this species within the ponds is not known.

A diving beetle survey of the two remaining ponds is recommended in the spring or summer.

6.6 *Summary of Further Survey Recommendations*

Bats

- If any mature trees with ivy present or with potential for roosting bat species need to be felled for the works these should be inspected by a suitable bat ecologist prior to felling. If there are suitable features for bats then tree climbing survey or/and an emergence survey will need to be carried out immediately prior to felling. Any works to other buildings on site outside the works for the railway will require bat surveys.

Badgers

- Further surveys of the woodland are recommended to understand fully how badgers are using this area, and to determine whether active setts will be impacted by the works.

Birds

- Nesting bird surveys should be conducted by a suitably experienced ecologist in the event that vegetation clearance must take place in the bird breeding season (March-September inclusive).

Great crested newts

- A new GCN EPS licence for the site will be required as the previous licence has expired. This new licence application will need to include the proposed works for the railway. All works to be carried out as stated in the licence method statement. Monitoring of GCN will continue each year.

Reptiles

- Reptile surveys of the fossil forest area will be required for proposed works, in order to inform the planning and the necessary mitigation for loss of reptile habitat. Additional reptile surveys of the wider Brymbo Heritage Site area are recommended to inform on the future management of the site. These should take place in the spring/summer by the placement of artificial reptile refugia, which are checked seven times over a period of several weeks.

6.7 *Management Plan*

Following surveys of the wider Brymbo Heritage Area a Management Plan for the site was produced for the site by Enfys Ecology in 2018 (Yardley, 2018). No significant changes have taken place on the site since the production of this report and the management plan is considered to still be valid, although the timescale for the works is now out of date. It is therefore recommended that this plan is reviewed and updated accordingly once revised commencement dates for the proposed works have been decided.

6.8 *General Reasonable Avoidance Measures*

In addition to the Reasonable Avoidance Measures (RAMs) detailed above for specific fauna, and the working methods described in the management plan, the following measures should be implemented at all times during the works:

- Working areas should be kept to the minimum required.
- Storage of fuel must be properly banded and machinery provided with drip trays, especially when refuelling. Refuelling and storage of potential pollutants should be restricted to site compounds and hardstanding areas, well away from any ditches and field drains, so that runoff can be prevented from entering watercourses.
- Trenches should be covered at night. Should it be necessary to have any excavation left open overnight, a suitable ramp (such as a plank or branch) must be provided to allow animals to escape the pit. Ramps could be created by grading the slope at the edges or using scaffold boards.
- At the end of works each day, the site should be inspected by a responsible individual to ensure that the above protocols are being complied with.
- Any terrestrial mammals seen must be allowed to leave the area on their own. If this is not possible, e.g. if the animal is injured or trapped, then an ecologist must be called.

7.0 Legislation

7.1 *Bats*

The Wildlife and Countryside Act 1981 (as amended) forms the key legislation protecting habitats and species in the UK. All UK bat species are fully protected under the 1981 Act through inclusion on Schedule 5. All bats are also listed under Schedule 2 of the Conservation of Habitats and Species Regulations (2017) which transcribes the EC Habitats Directive into UK law. In combination, this legislation makes it an offence to:

- Deliberately or recklessly take, injure or kill a bat;
- Deliberately or recklessly damage or destroy a place or structure used by bats for shelter or protection;
- Deliberately or recklessly obstruct access to a bat roost; or
- Deliberately or recklessly disturb bats while occupying a roost.

Bat roosts are protected under these laws whether the animals are present at the time of survey or not. Under both laws the Welsh Government and D.E.F.R.A. are empowered to issue licences to carry out work to bat roosts for reasons of overriding public interest. It is not illegal to tend to a disabled bat pending recovery.

7.2 *Badgers*

The Protection of Badgers Act 1992 fully protects badgers and their setts. Offences include:

- Killing, injuring and taking (or attempting these)
- Possession of a dead badger (or derivative)
- Cruelly ill-treating a badger
- Damaging a badger sett or any part of it
- Destroying a badger sett
- Obstructing access to / entrance of a badger sett
- Causing a dog to enter a badger sett
- Disturbing a badger whilst occupying a sett

Badgers are also listed on Schedule 6 of the Wildlife and Countryside Act 1981, which prohibits certain methods of killing and capture.

7.3 *Birds*

Under the Wildlife and Countryside Act 1981 (as amended) and the Countryside and Rights of Way 2000, all wild birds, their nests and eggs are protected during the breeding season (typically March to August inclusive). This makes it an offence to:

- Intentionally kill, injury or take any wild bird.
- Take, damage or destroy the nest of a wild bird included in Schedule ZA1.
- Take, damage or destroy the nest of any wild bird while that nest is in use or being built.
- Take or destroy an egg of any wild bird.

7.4 *Great Crested Newts*

GCN are protected under the Conservation of Habitats and Species Regulations 2017, known as the 'Habitats Regulations', because they have declined throughout Europe in recent decades.

Under the Habitats Regulations, it is an offence to:

- Deliberately capture, injure or kill any wild animal of an EPS;
- Deliberately disturb wild animals of any such species;
- Deliberately take or destroy the eggs of such an animal; or
- Damage or destroy a breeding site or resting place of such an animal.

Disturbance includes, but is not limited to, any disturbance which is likely:

- To impair their ability to survive, to breed or reproduce, or to rear or nurture their young, or (in the case of animals of a hibernating or migratory species) to hibernate or migrate; or
- To affect significantly the local distribution or abundance of the species to which they belong.

Under the Wildlife and Countryside Act 1981(as amended) it is illegal to:

- Intentionally or recklessly disturb any great crested newt while it is occupying a structure or place which it uses for shelter or protection, 9(4)(b).
- Intentionally or recklessly obstructs access to any structure or place used by a great crested newt for shelter or protection, 9(4)(c).
- Sell, offer or expose for sale any great crested newt, 9(5).

It is, however, legal for you to tend a disabled GCN with the intention of releasing it, or to kill a GCN that cannot recover, as long as the injury was not a result of your unlawful act (Habitat Regulations 44(2); W&CA 10(3)(a)(b)).

7.5 *Otter*

Otters are protected under the Conservation of Habitats and Species Regulations 2017, known as the 'Habitats Regulations', because they have declined throughout Europe in recent decades.

Under the Habitats Regulations, it is an offence if you:

- Deliberately capture, injure or kill any wild animal of an EPS;
- Deliberately disturb wild animals of any such species; or
- Damage or destroy a breeding site or resting place of such an animal.

Disturbance includes, but is not limited to, any disturbance which is likely:

- To impair their ability to survive, to breed or reproduce, or to rear or nurture their young, or (in the case of animals of a hibernating or migratory species) to hibernate or migrate; or
- To affect significantly the local distribution or abundance of the species to which they belong.

Under the Wildlife and Countryside Act 1981(as amended) it is illegal to:

- Intentionally or recklessly disturb any otter while it is occupying a structure or place which it uses for shelter or protection, 9(4)(b).
- Intentionally or recklessly obstructs access to any structure or place used by an otter for shelter or protection, 9(4)(c).
- Sell, offer or expose for sale any otter, 9(5).

It is, however, legal for you to tend a disabled otter with the intention of releasing it, or to kill an otter that cannot recover, as long as the injury was not a result of your unlawful act (Habitat Regulations 44(2); W&CA 10(3)(a)(b)). It is not necessary to obtain a licence to collect a dead otter (eg a road casualty) for the purpose of submitting it for post mortem as part of the Cardiff University Otter Project.

7.6 Reptiles

All British reptiles are protected from intentional killing, injuring and sale under Schedule 5 of the Wildlife and Countryside Act 1981 (as amended). These are as follows:

- Adder, *Vipera berus*
- Grass snake, *Natrix natrix*
- Slow worm, *Anguis fragilis*
- Common lizard, *Zootoca vivipara*

This legislation aims to protect them from persecution and also from exploitation in the pet trade, and for which the following are offences:

- Intentional killing, injuring or taking.
- Intentionally or recklessly damaging/destroying a place of shelter/protection

- Intentionally or recklessly disturbing an animal in its place of shelter/protection
- Intentionally or recklessly obstructing access to its place of shelter/protection
- Possession (live or dead, including derivatives), sale and offering for sale.

7.7 *Water Vole*

The water vole is listed on Schedule 5 of the Wildlife and Countryside Act 1981 (as amended), for which the following are offences:

- Intentional killing, injuring or taking.
- Intentionally or recklessly damaging/destroying a place of shelter/protection.
- Intentionally or recklessly disturbing an animal in its place of shelter/protection.
- Intentionally or recklessly obstructing access to its place of shelter/protection.
- Possession (live or dead, including derivatives), sale and offering for sale.

7.8 *Invasive non-native species*

Invasive non-native species are listed on Schedule 9 of the Wildlife and Countryside Act 1981 (as amended), for which the following are offences:

- Release into the wild, or to allow the escape of, any animal which is not ordinarily resident, or a regular visitor to, Great Britain in a wild state, or which is included in Part 1 of Schedule 9.
- Plant in the wild, or otherwise cause to grow there, any plant included in Part 2 of Schedule 9.

8.0 References and Useful Information Sources

Boyett, L., 2022. *Brymbo Heritage Site: Machine Shop, Pattern Shop and Foundry area. Preliminary Roost Assessment, emergence surveys and bird survey*. Report Ref EE.672b.LB.

Institute of Ecology and Environmental Management, 2006. *Guidelines for Ecological Impact Assessment*. IEEM.

JNCC, 2010. *Handbook for Phase 1 Habitat Survey: a technique for environmental audit*. JNCC, Peterborough.

UK BAP, 2007. Available: <http://jncc.defra.gov.uk/default.aspx?page=5705>

Yardley, T., 2018. *Brymbo Steelworks Heritage Area: Ecological Management*. Report Ref EE.472.18.TY.

9.0 Appendices

APPENDIX A – PLANT SPECIES LIST (UPDATED TO INCLUDE RESULTS OF 2022 SURVEY)

Habitat	Common Name	Scientific Name	Abundance (DAFOR)
Semi Improved Grassland (excluding Fossil Forest)	Ash (sapling)	<i>Fraxinus excelsior</i>	O
	Birch (saplings)	<i>Betula</i> sp.	F
	Bird's-foot-trefoil	<i>Lotus corniculatus</i>	R
	Black medick	<i>Medicago lupulina</i>	O
	Broad-leaved dock	<i>Rumex obtusifolius</i>	O
	Buddleja	<i>Buddleja davidii</i>	R
	Bulrush	<i>Typha</i> sp.	O
	Centuary	<i>Centaureum</i> sp.	R
	Cock's-foot	<i>Dactylis glomerata</i>	O
	Common knapweed	<i>Centaurea nigra</i>	O
	Common ragwort	<i>Senecio jacobaea</i>	O
	Crested dog's-tail	<i>Cynosurus cristatus</i>	O
	Dandelion	<i>Taraxacum officinale agg</i>	O
	Dove's-foot crane's-bill	<i>Geranium molle</i>	R
	Gorse	<i>Ulex europaeus</i>	F
	Haircap moss	<i>Polytrichum</i> sp.	R
	Hop trefoil	<i>Trifolium campestre</i>	O
	Horsetail	<i>Equisetum arvense</i>	R
	Kidney vetch	<i>Anthyllis vulneraria</i>	O
	Oak (saplings)	<i>Quercus</i> sp.	R
	Orchid	<i>Dactylorhiza</i> sp.	O
	Oxeye daisy	<i>Leucanthemum vulgare</i>	R
	Pendulous sedge	<i>Carex pendula</i>	R
	Perennial rye-grass	<i>Lolium perenne</i>	O
	Perforate St. John's wort	<i>Hypericum perforatum</i>	O
	Prickly sow-thistle	<i>Sonchus asper</i>	R
	Red clover	<i>Trifolium pratense</i>	F
	Red valarian	<i>Centranthus ruber</i>	R
	Ribwort plantain	<i>Plantago lanceolata</i>	O
	Thistle	<i>Cirsium</i> sp.	O
	White stonecrop	<i>Sedum album</i>	R
	Willowherb	<i>Epilobium</i> sp.	O
	Willow (saplings)	<i>Salix</i> sp.	F
	Yarrow	<i>Achillea millefolium</i>	O
	Yorkshire-fog	<i>Holcus lanatus</i>	O

Semi-natural Broad-leaved Woodland	Ash	<i>Fraxinus excelsior</i>	A
	Ash (saplings)	<i>Fraxinus excelsior</i>	A
	Birch	<i>Betula</i> sp.	LD
	Bramble	<i>Rubus fruticosus</i> agg	O
	Common male fern	<i>Dryopteris filix-mas</i>	O
	Common reed	<i>Phragmites australis</i>	R
	Elder	<i>Sambucus nigra</i>	O
	Hart's-tongue fern	<i>Phyllitis scolopendrium</i>	F
	Ivy	<i>Hedera helix</i>	A
	Nettle	<i>Urtica dioica</i>	F
	Oak	<i>Quercus</i> sp.	F
	Oak (saplings)	<i>Quercus</i> sp.	F
	Rowen	<i>Sorbus aucuparia</i>	O
	Sycamore	<i>Acer pseudoplatanus</i>	A
	Sycamore (Saplings)	<i>Acer pseudoplatanus</i>	A
	Willow	<i>Salix</i> sp.	F
Drainage Pits and Dry Pond	Creeping buttercup	<i>Ranunculus repens</i>	F
	Common spike-rush	<i>Eleocharis palustris</i>	O
	Jointed rush	<i>Juncus articulatus</i>	F
	Pendulous sedge	<i>Carex pendula</i>	D
	Rushes	<i>Juncus</i> sp.	D
	Soft rush	<i>Juncus effusus</i>	F
	Sphagnum sp	<i>Sphagnum</i> sp.	O
	Willowherb	<i>Epilobium</i> sp.	O
	Bryophytes	<i>Bryophytes</i> Bryophyta sp.	A
Ponds	Common bulrush	<i>Typha latifolia</i>	F
	Duckweed	<i>Lemnoideae</i> sp.	A
	Hard rush	<i>Juncus inflexus</i>	A
	Pendula sedge	<i>Carex pendula</i>	A
	Pondweed	<i>Potamogetonaceae</i>	F
	Water mint	<i>Mentha aquatica</i>	O
	Willow saplings	<i>Salix</i> sp. <i>Salix</i>	F
Tall ruderal	Cleavers	<i>Galium aparine</i>	A
	Clover	<i>Trifolium</i> sp.	O
	Colt's-foot	<i>Tussilago farfara</i>	R
	Creeping buttercup	<i>Ranunculus repens</i>	O
	Creeping cinquefoil	<i>Potentilla reptans</i>	R
	Hairy willowherb	<i>Epilobium hirsutum</i>	A
	Hogweed	<i>Heracleum sphondylium</i>	O
	Herb-Robert	<i>Geranium robertianum</i>	O
	Nettle	<i>Urtica dioica</i>	D
	Perforate St. John's wort	<i>Hypericum perforatum</i>	R

	Rosebay willowherb	<i>Chamaenerion angustifolium</i>	D
	Self-heal	<i>Prunella vulgaris</i>	O
	Soft rush	<i>Juncus effusus</i>	F
	Sorrel	<i>Rumex acetosa</i>	O
	Spear thistle	<i>Cirsium vulgare</i>	O
	Wood avens	<i>Geum urbanum</i>	O
	Yellow loosestrife	<i>Lysimachia vulgaris</i>	R
	Annual meadow grass	<i>Poa annua</i>	A
Semi-improved grassland (Fossil Forest)	Common knapweed	<i>Centaurea nigra</i>	F
	Bramble	<i>Rubus fruticosus</i> agg.	D
	Broad-leaved willowherb	<i>Epilobium montanum</i>	A
	Bush vetch	<i>Vicia sepium</i>	A
	Cock's-foot	<i>Dactylis glomerata</i>	A
	Common birds-foot-trefoil	<i>Lotus corniculatus</i>	F
	Creeping forget-me-not	<i>Myosotis secunda</i>	O
	Crested dog's-tail	<i>Cynosurus cristatus</i>	F
	Curled Dock	<i>Rumex crispus</i>	O
	Dandelion	<i>Taraxacum officinale</i> agg.	A
	Fox and Cubs	<i>Pilosella aurantiaca</i>	R
	Germander speedwell	<i>Veronica chamaedrys</i>	F
	Goldenrod	<i>Solidago</i> sp.	R
	Grass vetchling	<i>Lathyrus nissolia</i>	F
	Great willowherb	<i>Epilobium hirsutum</i>	O
	Groundsel	<i>Senecio vulgaris</i>	F
	Hard rush	<i>Juncus inflexus</i>	R
	Hedgerow crane's-bill	<i>Geranium pyrenaicum</i>	R
	Hop trefoil	<i>Trifolium campestre</i>	F
	Horsetail	<i>Equisetum</i> sp.	F
	Imperforate St. John's wort	<i>Hypericum maculatum</i>	R
	Kidney vetch	<i>Anthyllis vulneraria</i>	F
	Meadow vetchling	<i>Lathyrus pratensis</i>	F
	Scentless mayweed	<i>Tripleurospermum inodorum</i>	R
	Oxeye daisy	<i>Leucanthemum vulgare</i>	R
	Perennial ryegrass	<i>Lolium perenne</i>	A
	Red Clover	<i>Trifolium pratense</i>	A
	Red valerian	<i>Centranthus ruber</i>	F
	Ribwort plantain	<i>Plantago lanceolata</i>	A
	Rosebay willowherb	<i>Chamaenerion angustifolium</i>	F
	Scarlet pimpernel	<i>Anagallis arvensis</i>	O
	Yarrow	<i>Achillea millefolium</i>	O
	Yorkshire fog	<i>Holcus lanatus</i>	A
	Willow	<i>Salix</i> sp.	D

Scrub (Fossil Forest)	Bramble	<i>Rubus fruticosus agg.</i>	D
	Broom	<i>Cytisus scoparius</i>	O
	Buddleja	<i>Buddleja davidii</i>	A
	Dog rose	<i>Rosa canina</i>	R
	Gorse	<i>Ulex sp.</i>	O
	Guelder rose	<i>Viburnum opulus</i>	O
	Buddleja	<i>Buddleja davidii</i>	O
Bare ground (Fossil Forest)	Hawk's-beard	<i>Crepis sp.</i>	O
	Kidney vetch	<i>Anthyllis vulneraria</i>	D
	Perennial ryegrass	<i>Lolium perenne</i>	O
	Sorrel	<i>Rumex acetosa</i>	R
	Ash (saplings)	<i>Fraxinus excelsior</i>	R
Ephemeral/short perennial	Black medic	<i>Medicago lupulina</i>	O
	Bramble	<i>Rubus fruticosus agg.</i>	A
	Clematis	<i>Clematis sp.</i>	O
	Colt's-foot	<i>Tussilago farfara</i>	R
	Creeping buttercup	<i>Ranunculus repens</i>	F
	Dandelion	<i>Taraxacum officinale agg.</i>	F
	Foxglove	<i>Digitalis sp.</i>	O
	Hawk's-beard	<i>Crepis sp.</i>	D
	Kidney vetch	<i>Anthyllis vulneraria</i>	O
	Knapweed	<i>Centaurea sp.</i>	R
	Perennial rye-grass	<i>Lolium perenne</i>	O
	Ragwort	<i>Senecio jacobaea</i>	A
	Rowen (saplings)	<i>Sorbus aucuparia</i>	R
	Sorrel	<i>Rumex acetosa</i>	O
	St. John's wort	<i>Hypericum perforatum</i>	R
	Wood sage	<i>Teucrium scorodonia</i>	R
	Yarrow	<i>Achillea millefolium</i>	O
	Yorkshire-fog	<i>Holcus lanatus</i>	O
	Birch (saplings)	<i>Betula sp.</i>	R
Hardstanding/bare ground	Bramble	<i>Rubus fruticosus agg.</i>	A
	Clematis	<i>Clematis sp.</i>	O
	Creeping cinquefoil	<i>Potentilla reptans</i>	F
	Great mullein	<i>Verbascum thapsus</i>	LF
	Hawk's-beard	<i>Crepis sp.</i>	R
	Hogweed	<i>Heracleum sphondylium</i>	R
	Prickly sowthistle	<i>Sonchus asper</i>	O
	Ragwort	<i>Senecio jacobaea</i>	R
	Sorrel	<i>Rumex acetosa</i>	F
	Willowherb	<i>Epilobium sp.</i>	O
Bracken	Bracken	<i>Pteridium aquilinum</i>	D

APPENDIX B – DESK STUDY DATA (UPDATED FOR 2022)

PROVIDED AS A SEPARATE DOCUMENT. PLEASE SEE ATTACHED.

APPENDIX C – BIOSECURITY RISK ASSESSMENT FOR BRYMBO HERITAGE SITE

Brymbo Heritage Group have been successful in obtaining funding and will be carrying out long term management of the Brymbo Heritage Site (the former iron and steel works site). During the desk study and consultation with NRW a 5km data search was carried out to identify invasive species in close proximity of the site. The following were recorded within 5 km, with the species in red within 1km of the sitw. The majority of these are classed as non-native species rather than invasive non-native species.

- Japanese Knotweed
- Himalayan Balsam
- Canadian Waterweed
- Cherry Laurel
- Floating Pennywort
- Giant Hogweed
- Himalayan Cotoneaster
- Hybrid Monkeyflower
- Japanese Rose
- Least Duckweed
- Monkeyflower
- New Zealand Pigmyweed (963m)
- New Zealand Willowherb
- Nuttall's Waterweed
- Parrot's-feather
- Portugal Laurel
- *Rhododendron ponticum*
- Three-cornered Garlic
- Wall cotoneaster
- Water fern
- White Stonecrop

This document tabulates those species that have been identified as having the potential to be imported on to the site. The likely pathways and Operational mitigation have also been identified.

Species	Potential contamination route	Likelihood of risk	Operational Procedure
Himalayan balsam	Spread of species via construction machinery/ movement of soil.	Low. Himalayan Balsam is not known to be present on site.	Ensure contractors, staff and volunteers know what Himalayan Balsam looks like. If any plants are identified these should be

Species	Potential contamination route	Likelihood of risk	Operational Procedure
	Introduction of seeds via contaminated soil.	Low. There are no requirements to import soil.	pulled up and left to dry before the seeds set (July/ August).
Japanese knotweed	Spread of species via construction machinery/ movement of soil. Introduction of seeds via contaminated soil.	Low. Japanese knotweed is not known to be present on site. Low. There are no requirements to import soil.	Ensure contractors, staff and volunteers know what Japanese knotweed looks like. If it is identified on site, refer to the Environment Agency's Japanese knotweed Code of Practice.
Giant Hogweed	Seed being carried from site to site	Medium.	Ensure all boots, tools, tyres, plant and machinery are thoroughly cleaned before coming on site.
INN plants	Planting	Medium	All new planting stock be to grown in an environment free from INN plants.
<i>Chytrid</i>	Transport of spores on boots or field equipment from one water body to another. Machinery used to excavate new ponds as part of the mitigation package.	Low. No contact by personnel with other amphibian sites.	Ensure all staff, ecologists and volunteers working in proximity to the ponds clean their footwear and survey equipment between sites. If amphibians are handled disposable vinyl gloves should be worn.
<i>Crassula helmsii</i> – Stonecrop, Australian swamp	Spread of species on footwear or machinery.	Medium. <i>Crassula</i> is known to be present in north Wales but not found on site.	Ensure all ecologists, staff and volunteers clean their footwear between sites. Ensure contractors know what it looks like and all machinery is cleaned prior to arriving on site. If it is found on site it must be treated using glyphosphate.
Other non-native aquatic plant species	Spread of species on footwear of machinery	Medium	Ensure all staff, volunteers and ecologists clean their footwear between sites.

Species	Potential contamination route	Likelihood of risk	Operational Procedure
Water fern, Parrot's feather, Floating Pennywort, Waterweed, least duckweed, New Zealand pigmy weed			Ensure contractors know what it looks like and all machinery is cleaned prior to arriving on site
<i>Phytophthora ramorum</i> – Sudden oak death	Via spores which can be dispersed by wind, rain and watercourses. Pathogen may be transmitted in debris e.g. leaves, needles, bark and soil on machinery. Introduction via new tree planting	Low. if no contact has been made with infected area Low	All equipment (machinery and footwear) thoroughly cleaned before entering site. All boots should be cleaned using the Propellor disinfectant. All stock to come from supplier free of infection.
<i>Chalara</i> Ash die back	Via spores but the main threat is introduction via imported nursery stock.	Medium	No new ash to be planted as part of the planting scheme.
White nose syndrome	Fungus isolated from a bat in the UK in 2013 and 2014 but no cases in the UK. Contamination is through international bat workers.	Low	Site specific equipment for handling bats

Disinfect boots and machinery that would be in contact with amphibians or pond water. Note that when making up bleach or Virkon solutions, pond water can be used so long as it contains little or no organic matter (as this reduces disinfectant effectiveness).

Follow this procedure:

- Use a brush to scrub off any debris, plant fragments, mud etc.
- Rinse with water.

Disinfect using one of the following methods:

- Soak in a bleach solution (1 measure of household bleach to 9 measures water) for 15 minutes; OR
- Virkon (10 mg/ml, as per suppliers' instructions) for 1 minute; OR
- Fabrics including those worn while doing amphibian fieldwork can be washed on a 40oC cycle (with detergent, ensuring sufficient rinsing).
- Nets should be boiled for 10 minutes or if the fabric allows disinfected with spray bleach in a well-ventilated area.
- Rinse with clean water and if possible allow to dry for before next use.
- Keep field gear (traps, net frames etc) inside plastic bags during transit and storage to reduce the chance of transmitting Chytridiomycosis.
- Ideally all used disinfectant solutions should be poured directly into a sink/drain and flushed with clean water. In the field, pour onto an area of hard-standing, or similar un-vegetated area well away from the pond. Used gloves can be disposed of as domestic rubbish

Biosecurity washdown stations

Washdown facilities should be provided on site, preferable wherever it is likely that machinery will enter site, one at the main buildings and a mobile washdown station.

These should provide areas here staff, volunteers and contractors are able to wash footwear before entering and prior to leaving site and the stationary ones should have access to hot water where possible.

A selection of the following should be incorporated into the washdown area (muddybootz.com):



Slide through shoe cleaner (0480E)



Water slide through shoe cleaner (0488C)