

**Magnox Ltd**

## Trawsfynydd filling works

### Preliminary Ecological Appraisal (PEA)

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© Photo of the scrub and hardstanding on site near Trawsfynydd, taken by Arup surveyors

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Job number 283552-00

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# 1. Introduction

## 1.1 Scope of the Report

Ove Arup and Partners Limited (Arup) have been commissioned by Magnox Ltd to undertake a Preliminary Ecological Appraisal (PEA) for proposed filling works at the north end of the Trawsfynydd Decommissioning Site, which Magnox Ltd commenced decommissioning during 1991. The proposed filling work is aimed at providing on-site disposal of crushed concrete arising from demolition of buildings on the site and essentially involves the enlargement of an existing plateau.

The purpose of this report is to quantify and evaluate the potential effects of the development on habitats, species and ecosystems. This involves an assessment of the habitats present within the site, an assessment of protected nature conservation sites within and surrounding the site and the potential for the site and surrounding and connected habitats to support any legally protected or notable species. Following this site appraisal, the report will then detail the need for any further surveys and make recommendations for general avoidance, mitigation and enhancement measures to be incorporated into the project design where appropriate. These recommendations will need to be reviewed as design develops for the scheme. This PEA has been written in accordance with the Guidelines for Preliminary Ecological Appraisal 2nd Edition<sup>1</sup>.

The objectives of this PEA are:

- To establish baseline ecological conditions at the site and within 30m, including its potential to support important habitats, notable / protected and invasive species;
- To identify key ecological opportunities associated with the proposed works;
- To inform project design to allow significant ecological effects to be avoided or minimised wherever possible, and advise on mitigation/compensation measures where they may be required, in accordance with Planning Policy and legislation;
- To recommend further ecological surveys required ; and
- To recommend enhancement measures which provide Net Benefit for Biodiversity and Ecosystem Resilience, in accordance with Planning Policy and legislation.

This PEA has been updated and re-issued following development of design during October/November 2023.

## 1.2 Description of the Site

The site is situated in Trawsfynydd (National Grid Field Number: SH 68903 38394) in Gwynedd, Wales. The site is located within Snowdonia National Park, adjacent to Llyn Trawsfynydd. The site is comprised predominantly of woodland, scrub and gravel/hardstanding within a fenced area on the backlot of the former nuclear power station site, managed by Magnox Ltd. The site location plan is shown in Figure 1.

## 1.3 Proposed Works

This report will inform the design for filling works. The extent of the areas of filling have been identified along the north and eastern extents of the hardstanding, within the scrub and areas of woodland. This report will provide an ecological baseline of the site and surrounding habitats to inform the design. Therefore, for the purpose of this report, the “site” references the areas within the red-line boundary (Figure 1).

Construction methods include placing of filling materials, which involves sorting, crushing and grading operations. Plant expected to be used for operations will be backacters, excavators, along with dozer and roller for compaction. The works will be undertaken intermittently over the course of 18 months, with material placed from the top down over a maximum of two weeks. Works will be undertaken during daylight hours.

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<sup>1</sup> Chartered Institute of Ecology and Environmental Management (CIEEM) (2017). Guidelines for Preliminary Ecological Appraisal. Second Edition. Available online at: <https://cieem.net/resource/guidance-on-preliminary-ecological-appraisal-gpea/> (accessed 20/07/23).

## 2. Legislative and Policy Context

### 2.1 Legislation and National Policy

A list and brief overview of the key legislation that has been taken into account for the purpose of this appraisal is detailed below. A full list of relevant legislation and policy is provided in Appendix A.

- The Conservation of Habitats and Species Regulations 2017 - as amended by the Conservation of Habitats and Species (Amendment) (EU Exit) Regulations 2019;
- Wildlife and Countryside Act 1981 (as amended);
- The Environment (Wales) Act 2016;
- The Water Environment (Water Framework Directive) (England and Wales) Regulations 2017;
- National Park and Access to the Countryside Act 1949 (as amended);
- Countryside and Rights of Way Act 2000 (CRoW);
- The Hedgerow Regulations 1997;
- Protection of Badgers Act 1992;
- Wild Mammals (Protection) Act 1996;
- The Salmon and Freshwater Fisheries Act 1975;
- The Eels (England and Wales) Regulations 2009; and
- The Invasive Alien Species (Enforcement and Permitting) Order 2019.

The Conservation of Habitats and Species Regulations (CHSR) 2017 (as amended) sets out protection for habitats and species listed within its annexes. This includes legislation covering European Protected Species (EPS) and the National Site Network<sup>2</sup> (NSN).

The Wildlife and Countryside Act (WCA) 1981 (as amended) is an Act of Parliament in the United Kingdom implemented to comply with CHSR. In short, the act gives protection to native species (especially those at threat), controls the release of non-native species, enhances the protection of Sites of Special Scientific Interest (SSSI) and builds upon the rights of way rules in the National Parks and Access to the Countryside Act 1949. The Act is split into 4 parts covering 74 sections; it also includes 17 schedules. Together the CHSR and WCA form the precedent for species and habitat protection in England and Wales, which are further supplemented by legislation noted above. This legislation must be considered as part of any development proposals regardless of whether planning permission is required.

Further consideration to the sustainable management of natural resources (SMNR), under the Environment (Wales) Act has been detailed under the Natural Resources Policy<sup>3</sup> (Welsh Government, 2017). This includes:

- Using resources sustainably to support move towards a more circular economy and accelerating green growth through increasing renewable energy and resource efficiency;
- Improving ecosystem health and resilience to tackle climate change and the decline in biological diversity through the delivery of nature-based solutions for mitigation and adaptation; and
- Taking a place-based approach to deliver better results at a local level by enabling collaboration at the right scale (e.g. site, regional catchment, landscape or ecosystem) and at the right locations to tackle issues and maximise benefits. Area statements (under Section 11 of the Environment (Wales) Act) will play a key role in identifying these local opportunities.

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<sup>2</sup> Formerly known as 'Natura 2000 sites' or 'European sites'.

<sup>3</sup> <https://gov.wales/sites/default/files/publications/2019-06/natural-resources-policy.pdf>

## 2.1 National Policy

### 2.1.0 Planning Policy Wales (PPW)<sup>4</sup>

Planning Policy Wales sets the national policies in relation to development control through the Town and Country Planning Act 1990. This is supported by a series of Technical Advice Notes (TAN), including Technical Advice Note 5 (WG, 2009), which sets out the consideration of nature conservation in the determination of planning applications. When assessing planning applications, Planning Policy Wales (PPW) instructs planning authorities to take account of and promote the resilience of ecosystems.

Chapter 6 of the Planning Policy Wales has been updated with immediate effect as of 18th October 2023. The changes apply to all planning applications regardless of size and scale. All schemes applying for planning permission must achieve a Net Benefit for Biodiversity.

- A Green Infrastructure Statement will be required with all planning applications to demonstrate the stepwise approach (stepwise approach is defined as any adverse environmental effects are firstly avoided, then minimised, mitigated, and as a last resort compensated for) and compliance with biodiversity net benefit and ecosystem resilience.
- There is an emphasis on avoidance of development within SSSIs, afforded statutory protection, or those not within but likely to damage, as a matter of principle. Development in a SSSI which is not necessary for the management of the site must be avoided. This has been conveyed to ensure that these sites can continue to fulfil their role at the heart of resilient ecological networks.
- In relation to non-statutory designated sites (such as Sites Important for Nature Conservation (SINCs) there is additional need for a written opinion from the authority Ecologist. However, development is not presumed unacceptable in SINCs, only that 'Where harm is unavoidable it should be minimised by mitigation measures and offset as far as possible by compensation measures designed to ensure there is no reduction in the overall conservation value of the area or feature, and a net benefit for biodiversity secured'.
- The policy places emphasis on the retention of trees and hedgerows, both urban and rural, with a minimum ratio of at least 3 trees of a similar type and compensatory size planted for every 1 lost. Further, the policy brings attention to the identification of managed wetland and riparian buffer zones to improve water quality as a key output of green infrastructure assessments as they would provide positive benefits to both reduction in diffuse pollution and, through securing a net benefit for biodiversity, improving the attributes of ecosystem resilience.

Snowdonia National Park Authority will advise developers that they must comply with any statutory species protection requirement as referred to in PPW and the TAN 5. The plan's policies will further seek to restore networks of natural habitats including wildlife corridors, green spaces including a network of open spaces designated in the local development plan (see 2.2).

This means that development should not cause any significant loss of habitats or populations of species, locally or nationally and must provide a net benefit for biodiversity<sup>5</sup>. Where biodiversity enhancement is not proposed as part of an application and unless other significant material considerations indicate otherwise to comply with updated requirements of Chapter 6 PPW, it will be necessary to refuse permission.

#### 2.1.1 DECCA Framework

The Environment (Wales) Act, the Well-Being of Future Generations Act and the Chief Planner's letter frames biodiversity with respect to its contribution to achieving ecosystem resilience<sup>6</sup>.

Natural Resources Wales (NRW) has developed a framework for evaluating ecosystem resilience based on five attributes and properties specified in the Environment (Wales) Act. This is referred to as DECCA:

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<sup>4</sup> Welsh Government Planning Policy Wales Edition 11. February 2021. [Planning Policy Wales - Edition 11 \(gov.wales\)](#) [Accessed 13/11/2023].

<sup>5</sup> This policy and subsequent policies in Chapter 6 of PPW respond to the Section 6 Duty of the Environment (Wales) Act 2016 (updated October 2023).

<sup>6</sup> [Net-Benefits-briefing.pdf \(cieem.net\)](#) [Accessed 25/07/2023].



Diversity, Extent, Condition, Connectivity and Aspects of ecosystem resilience. The attributes provide a framework for considering the state of ecosystem resilience in Wales and can be applied across different habitats and land uses and for a range of different scales.

When assessing planning applications, Planning Policy Wales instructs planning authorities to take account of and promote the resilience of ecosystems. The DECCA attributes are explained further in NRW's Terrestrial and freshwater Resilient Ecological Networks: a guide for practitioners in Wales<sup>7</sup>, but as a broad summary, the definitions are as follows:

- **Diversity:** maintaining and enhancing diversity at every scale, including genetic, structural, habitat and between-habitat levels.
- **Extent:** incorporating measures which maintain and increase the area of semi-natural habitat/features and linkages between habitats.
- **Condition:** The condition of an ecosystem affected by both direct and wider impacts should be considered, for example avoiding or mitigating pressures such as climate change, pollution, invasive species, land management neglect etc.
- **Connectivity:** Developments should take opportunities to develop functional habitat and ecological networks within and between ecosystems, building on existing connectivity.
- **Aspects of ecosystem resilience (adaptability, recovery, and resistance):** Adaptability, recovery and resistance to/from a disturbance are defining features of ecosystem resilience.

### 2.1.2 Area Statements

Area statements have been produced by NRW detailing the key challenges that are faced in different localities across Wales.

Area statements have been produced detailing the key challenges that are faced in different localities across Wales. The North-West Wales Area Statement<sup>8</sup> covers an extensive landscape of settlements, lowland and coastal areas, as well as upland areas (including Snowdonia National Park). The key challenge stakeholders identified in North-West Wales is the climate and environment emergency with impacts of rising sea levels highlighted as a threat to vulnerable communities along the coast and severe droughts and increased frequency of wild fires causing additional stress of native wildlife and natural habitats. Further key themes identified relating to biodiversity included reconnecting people with nature, encouraging a sustainable economy, supporting sustainable land management and opportunities for resilient ecosystems.

As part of the Area Statements opportunities for biodiversity relating to the key challenges identified have included:

- Using nature-based solutions to tackle climate change, reducing emissions and preserving carbon stores such as improving management of forests and peatlands to increase greater storage of carbon and water.
- Greater opportunity for tree planting to reduce carbon emissions and increase greater green space
- Ensuring that space is left for biodiversity to adapt to climate change as the number and range of invasive non-native species is likely to increase.

## 2.2 Local policy

At the local level planning policies are set out within the Eryri Local Development Plan (2016-2031)<sup>9</sup>, with specific reference to nature conservation and biodiversity contained within Supplementary Planning

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<sup>7</sup> <https://cdn.cyfoethnaturiol.cymru/media/693356/resilient-ecological-networks-practitioner-guide.pdf?mode=pad&rnd=132612537907570000> (Accessed 23/11/23).

<sup>8</sup> <https://naturalresources.wales/about-us/area-statements/north-west-wales-area-statement/?lang=en> (Accessed 25/07/23)

<sup>9</sup> <https://www.snowdonia.gov.wales/planning/planning-policy/local-development-plan-ldp>

Guidance 6 (2016)<sup>10</sup>. This includes further commitments to protection of statutory and non-statutory designated sites, provision to retain important wildlife corridors with designated ‘green wedges’ (policy T5) and highlights the importance of woodlands that play a key role in these issues; increasing the cover of woodland, along with protecting existing woodlands and notably, Ancient Semi-Natural woodlands. A set of general principles for conserving biodiversity is to be adopted by developers including the following:

- Anticipating all potential impacts of a development proposal at the earliest stage of the planning process.
- Affording designated sites the level of protection appropriate to their status.
- Ensuring development does not lead to a net loss in biodiversity and geodiversity.
- Identifying opportunities for new development and redevelopment to contribute towards a net gain in biodiversity.
- Reversing habitat fragmentation and species isolation.
- Taking account of indirect and cumulative impacts in assessing the potential effects of a development.
- Recognising that many landscape features are crucial for the migration, dispersal and genetic exchange of wild species. These important “stepping stones” and corridors should be protected and managed sympathetically and extended wherever possible. These are especially important with the threat of climate change, allowing species to move in response.

### 2.2.0 Local Development Plan

Snowdonia National Park Authority (SNPA) published the Eryri Local Development Plan (LDP) 2016-2031<sup>9</sup> a document which sets out the 15-year land use planning framework for Snowdonia National Park.

With relation to protecting, enhancing and managing the natural environment, some of the objectives are included below:

- Ensure that all development is undertaken in a way that respects designated nature conservation sites and ensures the protection and enhancement of the diversity and abundance of wildlife habitats and protected species.
- Conserve and enhance the National Park’s natural resources including its geodiversity and water, soil and air quality.
- To manage the effects of climate change through mitigation and adaptation, including reductions in greenhouse gas emissions.
- Climate change; conserve the integrity of the wider natural environment and nature conservation interests of the National Park so as to facilitate adaptation by, and migration of, species. Watercourses, hedgerows and woodlands can all act as wildlife corridors between designated sites as well as being valuable habitats in their own right.
- Woodland also plays a key role in these issues; increasing the cover of woodland, along with protecting existing woodlands and Ancient Semi-Natural woodlands in particular, would have numerous benefits including improving ecological connectivity if carried out sympathetically.

In regard to lighting during works, in October 2016 the SNPA published Supplementary Planning Guidance on Obtrusive Lighting (Light Pollution)<sup>11</sup>. Whilst the whole of the National Park is designated a Dark Skies Reserve, there are a number of core areas, shown on the Proposals Map, where proposals for new lighting must be appropriate to the task and compliant with the requirements of the “Snowdonia Dark Sky Reserve External Lighting Masterplan” which is available on the Authority’s website.

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<sup>10</sup> [https://www.snowdonia.gov.wales/\\_\\_data/assets/pdf\\_file/0034/168469/nature-conservation.pdf](https://www.snowdonia.gov.wales/__data/assets/pdf_file/0034/168469/nature-conservation.pdf)

<sup>11</sup> <https://snowdonia.gov.wales/wp-content/uploads/2022/02/Supplementary-Planning-Guidance-14-%E2%80%93-Obtrusive-Lighting-Light-Pollution.pdf> (Accessed 25/07/23).



### 2.2.1 Local Biodiversity Action Plan

The Local Biodiversity Action Plan (LBAP) is set out in Supplementary Planning Guidance<sup>10</sup>, which identifies the most important habitats and species found in Snowdonia to be considered during the planning process. Habitats and Species Action Plans (HAPs /SAPs) contained in the document reinforce the importance of these areas and species, not only in terms of their national and international significance but also for their local importance. Bats are highlighted as Snowdonia is a stronghold for many species and is particularly important for species such as the lesser horseshoe bat (*Rhinolophus hipposideros*), along with controlling the impact of invasive species on biodiversity.

## 3. Methodology

### 3.1 Zone of influence

The current guidance on ecological assessments (Chartered Institute of Ecology and Environmental Management (CIEEM), 2018)<sup>12</sup> recommends that all ecological features that occur within a ‘Zone of Influence’ (ZoI) for a proposed development are investigated.

The ZoI includes:

- Areas directly within the land take for the proposed development and access;
- Areas which will be temporarily affected during construction;
- Areas likely to be impacted by hydrological disruption; and
- Areas where there is a risk of wider disbenefits including, but not limited to, any increase in air, water, or noise pollution; or visual or vibrational disturbance during construction and/or operation.

The ZoI is variable depending on the nature of the construction activities and the ecological receptors affected. For this appraisal the following zones have been defined (Table 1 Zone of Influence used for this Preliminary Ecological Appraisal).

**Table 1 Zone of Influence used for this Preliminary Ecological Appraisal**

Ecological features	Zone of Influence
Statutory Internationally Designated Sites	10km buffer around the site boundary for internationally designated sites.
Statutory Nationally Designated Sites	2km buffer (or hydrological connection) around the site boundary for nationally designated sites, extended to 10km for bat sites.
Non-statutory sites including Sites of Importance for Nature Conservation (SINCs) and Ancient Woodland. Habitats of Principal Importance	1km buffer around the site boundary.
Relevant species records (including protected and invasive species) <sup>13</sup> .	2km from site boundary for species records and 500m for standing waterbodies <sup>14</sup> .
Appraisal of habitats and potential for protected species	Site boundary as per feasibility study area, and habitats within 30m of the site boundary for relevant features, such as potential bat roosts.

### 3.2 Desk Study

A desk study was undertaken to identify any existing ecological information relating to the site and its surroundings, including the presence of designated sites, reviewed through the Multi-Agency Geographic

<sup>12</sup> Chartered Institute of Ecology and Environmental Management (CIEEM) (2018) Guidelines for Ecological Impact Assessment in the UK and Ireland Terrestrial, Freshwater, Coastal and Marine (September 2018).

<sup>13</sup> EU and UK legally protected species under the Conservation of Habitats and Species Regulations 2017 (as amended) and Wildlife and Countryside Act 1981 (as amended); and species present on the Species of Principal Importance in Wales list in response to Section 7 of the Environment (Wales) Act 2016 (known as Section 7 species).

<sup>14</sup> Included a search standing waterbodies within 500m of the site as per Langton, T.E.S., Beckett, C.L., and Foster, J.P. (2001), Great Crested Newt Conservation Handbook, Froglife, Halesworth. [Accessed 09/07/2023].

Information for the Countryside (MAGIC) website<sup>15</sup> and protected or notable species within the ZoI of the Site, as determined in Section 3.1, which were obtained from the local data centre (Cofnod). Local records have been curtailed to the last ten years to ensure validity.

The following sources have been consulted as part of the desk study:

- Designated sites: Multi-Agency Geographical Information for the Countryside (MAGIC) website<sup>16</sup> (<https://magic.defra.gov.uk/MagicMap.aspx>);
- Notable habitats, protected/notable species records, invasive species records, and non-statutory designated sites: Cofnod - North Wales Environmental Information Service (obtained 19/06/2023);
- National Biodiversity Network Atlas<sup>17</sup> (NBN Atlas; <https://nbnatlas.org/>)
- Designated sites citations: Natural Resources Wales website<sup>18</sup> and JNCC website<sup>19</sup>;
- Shapefiles for designated sites: Lle: A Geo-Portal for Wales<sup>20</sup>.
- Previous survey report: Cartmel Ecology Ltd (2021) Trawsfynydd Power Station Ecology Surveys 2021<sup>21</sup> (bird surveys, otter surveys, badger survey, bat surveys and reptile surveys at Trawsfynydd Power Station and the surrounding land (where appropriate) during 2021).

### 3.3 Extended Phase 1 Habitat Survey

The aim of the Extended Phase 1 Habitat survey was to identify the habitats present within the site that may be affected based on the scope of the works. The survey methodology followed the methodology set out in the JNCC's Handbook for Phase 1 Habitat Surveys<sup>22</sup>.

Extended Phase 1 habitat survey is a standard technique for rapidly obtaining baseline ecological information over a large area of land. It is primarily a mapping technique and uses a standard set of habitat definitions for classifying areas of land on the basis of the vegetation present. The extended survey also provides an appraisal of the potential for those habitats present to support legally protected species within and up to 30m from the site boundary.

Relevant species included all those protected by European or UK law, and notable species including those identified as being of principal importance in Wales, in response to Section 7 of the Environment (Wales) Act 2016, as follows:

- Assessing the potential of terrestrial and aquatic habitats, to support amphibians, both protected species and species of conservation concern<sup>23</sup>;
- Assessing the suitability of habitats to support badger and preliminary searches for signs of badger (*Meles meles*) activity including setts, tracks, foraging holes and latrines<sup>24</sup>;
- Assessing the suitability of habitats and watercourses to support otter and preliminary searches for signs of otter (*Lutra lutra*)<sup>25</sup>.
- Assessing the suitability of habitats for nesting birds (including any old nests);

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<sup>15</sup> [www.magic.gov.uk](http://www.magic.gov.uk) [Accessed: 11/07/2023]

<sup>16</sup> Magic Map website: <https://magic.defra.gov.uk/MagicMap.aspx> [accessed January 2023]

<sup>17</sup> Creative Commons Zero (CC0) and Creative Commons with Attribution (CC BY) data accessed.

<sup>18</sup> Natural Resources Wales website: <https://naturalresources.wales/guidance-and-advice/environmental-topics/wildlife-and-biodiversity> [accessed January 2023];

<sup>19</sup> JNCC website: UK Protected Areas | JNCC - Adviser to Government on Nature Conservation [accessed July 2023]

<sup>20</sup> Lle website: <https://lle.gov.wales/home> [accessed July 2023]

<sup>21</sup> Trawsfynydd Power Station Ecology Surveys 2021 by Cartmel Ecology Ltd 1/12/2021.

<sup>22</sup> JNCC (2016). Handbook for Phase 1 habitat Survey: technique for environmental audit.

<sup>23</sup> Odiham et al (2000) in ARG UK Advice Note 5: Great Crested Newt Habitat Suitability Index.

<sup>24</sup> Harris, S., Cresswell, P. and Jefferies, D., 1989. Surveying Badgers. Mammal Society.

<sup>25</sup> Chantin, P. (2003). Monitoring the Otter, *Lutra lutra*. Conserving Natura 2000 Rivers Monitoring Series No. 10., English Nature, Peterborough.

- Assessing the suitability of habitats for common species of reptiles; adder, (*Vipera berus*), grass snake (*Natrix helvetica*), slow worm (*Anguis fragilis*) and common lizard (*Zootoca vivipara*)<sup>26</sup>;
- Assessing the suitability of watercourses for water vole (*Arvicola amphibius*)<sup>27</sup> and white-clawed crayfish (*Austropotamobius pallipes*)<sup>28</sup>.
- Assessing the suitability of habitats to support hazel dormouse (*Muscardinus avellanarius*) and preliminary search for signs of hazel dormouse, such as gnawed nuts<sup>29</sup>;
- Assessing the suitability of habitats for assemblages of notable invertebrates;
- Searching for evidence of the presence of invasive plants listed on Schedule 9 of the Wildlife and Countryside Act 1981 (as amended), such as Japanese knotweed (*Reynoutria japonica*) and The Invasive Alien Species (Enforcement and Permitting) Order 2019, which are subject to strict legal control, such as Himalayan balsam (*Impatiens glandulifera*); and
- An overview appraisal for groups<sup>30</sup> of buildings or trees (from the ground only) for their suitability to support breeding, resting and hibernating bats using survey methods is included within the report, based on those outlined in the Bat Conservation Trust's Bat Surveys: Good Practice Guidelines Good Practice Guidelines<sup>31</sup>, however detailed assessments of individual trees and buildings were not undertaken as the extent of works and therefore impact of works has not been determined. Further assessments will be recommended.

### 3.4 Preliminary Ecological Appraisal (PEA)

PEAs provide a means to evaluate ecological features and scope for notable species or habitats. By doing so, the baseline ecological conditions and valuable, or potentially valuable, parts of a site can be identified at an early stage, enabling potential ecological opportunities to the proposals to be highlighted and incorporated into the design. PEAs also identify whether further, targeted surveys (such as for protected species) are necessary. In addition, it is possible to provide recommendations for design options to be made that avoid or minimise effects on important ecological features or ecologically sensitive areas<sup>32</sup> and increase opportunities to deliver beneficial outcomes.

This PEA has been produced in accordance with CIEEM guidelines<sup>1</sup>.

### 3.5 Field survey

An Extended Phase 1 Habitat Survey was undertaken by Arup ecologists Claire Pooley (MCIEEM, CEcol) and Rosie Seager-Jones (QCIEEM) on 26<sup>th</sup> June 2023. A walkover of all accessible areas of the site was carried out, and relevant habitat types classified according to their vegetation types.

All accessible areas of the site were walked and the relevant habitat types classified according to their vegetation types. The habitats present and Target Notes (TNs) were used to highlight any features or habitats of interest (including invasive non-native species), such as features that provide suitable habitat for protected species and were presented in standard format. All Target Notes are included in Figure 4 and photographs of the important features of the site are integrated within this report.

<sup>26</sup> Gent, T. & Gibson, S. (2003). Herpetofauna Workers Manual. Joint Nature Conservation Committee, Peterborough.

<sup>27</sup> Dean, M. et al. (2016). The Water Vole Mitigation Handbook (The Mammal Society Guidance Series). The Mammal Society, London.

<sup>28</sup> Peay, Stephanie (2002). Guidance on Habitat for White-clawed Crayfish and its restoration. Environment Agency.

<sup>29</sup> Bright, Paul, Morris, P, Mitchell Jones, T. (2006). The Dormouse Conservation Handbook 2nd ed. English Nature.

<sup>30</sup> Individual assessments required, as discussed in later sections.

<sup>31</sup> Collins, J. (ed.) (2023) Bat Surveys for Professional Ecologists: Good Practice Guidelines (4th edition). The Bat Conservation Trust, London.

<sup>32</sup> <https://cieem.net/wp-content/uploads/2019/02/Guidelines-for-Preliminary-Ecological-Appraisal-Jan2018-1.pdf> [Accessed 09/07/2023].

### 3.6 General survey limitations and specific constraints

The findings presented in this report represent those at the time of survey and reporting, and data collected from available sources. Ecological surveys can be limited by factors affecting the presence of plants and animals, such as the time of year, migration patterns and behaviour.

Whilst an Extended Phase 1 habitat survey is not a full protected species or botanical survey, it allows an experienced ecologist to obtain a sufficient understanding of the ecology of a site, in order to either confirm the conservation importance of the site and assess the potential for impacts on habitats and species likely to represent a material consideration in planning terms, or to ascertain that further surveys will be required before such confirmation can be made.

The absence of evidence of any particular species should not be taken as conclusive proof that the species is not present or that it will not be present in the future. The biological records informing the desk study may not reflect the absence of any particular species and a precautionary approach may need to be adopted for certain protected species, should records be absent yet suitable habitat present.

Recommendations and ecological opportunities may be subject to change should the final design be updated. However, this report provides an ecological baseline of the current site, which will inform future design changes.

This report is considered to deliver an adequate baseline appraisal of the ecological features for the management scheme. The limitations are not considered significant enough to skew the outcomes and further recommendations described in this report.

## 4. Results and Interpretations

### 4.1 Statutory Designated Sites

Six internationally designated sites were identified within 10km of the site, the closest being Coedydd Derw a Safleoedd Ystumod Meirion / Meirionnydd Oakwoods and Bat Sites SAC 1.3km west of the site.

Five nationally statutory designated sites, were identified within 2km of the site, including Eryri (Snowdonia) National Park on site. A further seven SSSIs designated for bats were returned within 10km from the site.

No LNRs have been returned within the search area.

Full details of these statutory designated sites, including details of the site's features can be found in the table below. Locations of the internationally designated sites can be viewed in Figure 2 and locations of nationally and non-statutory designated sites can be viewed in Figure 3.

**Table 2 International and nationally designated sites within zone of influence of the site.**

Site	Description	Approximate distance and direction from site (m)
<b>International designated sites</b>		
Coedydd Derw a Safleoedd Ystumod Meirion / Meirionnydd Oakwoods and Bat Sites SAC	<p>Annex I habitats that are a primary reason for selection of this site:</p> <ul style="list-style-type: none"> <li>91A0 Old sessile oak woods with <i>Ilex</i> and <i>Blechnum</i> in the British Isles</li> <li>91E0 Alluvial forests with <i>Alnus glutinosa</i> and <i>Fraxinus excelsior</i> (<i>Alno-Padion</i>, <i>Alnion incanae</i>, <i>Salicion albae</i>)</li> </ul> <p>Annex I habitats present as a qualifying feature, but not a primary reason for selection of this site</p> <ul style="list-style-type: none"> <li>3260 Water courses of plain to montane levels with the <i>Ranunculion fluitantis</i> and <i>Callitricho-Batrachion</i> vegetation</li> <li>4010 Northern Atlantic wet heaths with <i>Erica tetralix</i></li> <li>4030 European dry heaths</li> <li>9180 <i>Tilio-Acerion</i> forests of slopes, screes and ravines</li> <li>91D0 Bog woodland</li> </ul> <p>Annex II species that are a primary reason for selection of this site</p> <ul style="list-style-type: none"> <li>1303 Lesser horseshoe bat</li> </ul>	1380 west
Migneint-Arenig-Dduallt SAC	<p>Annex I habitats that are a primary reason for selection of this site:</p> <ul style="list-style-type: none"> <li>4030 European dry heaths</li> <li>7130 Blanket bogs (* if active bog)</li> </ul> <p>Annex I habitats present as a qualifying feature, but not a primary reason for selection of this site:</p> <ul style="list-style-type: none"> <li>3130 Oligotrophic to mesotrophic standing waters with vegetation of the <i>Littorelletea uniflorae</i> and/or of the <i>Isoëto-Nanojuncetea</i></li> <li>3160 Natural dystrophic lakes and ponds</li> <li>4010 Northern Atlantic wet heaths with <i>Erica tetralix</i></li> <li>91A0 Old sessile oak woods with <i>Ilex</i> and <i>Blechnum</i> in the British Isles</li> </ul>	1900 east
Migneint-Arenig-Dduallt	SPA qualifying features:	1900 east



Site	Description	Approximate distance and direction from site (m)
SPA	<ul style="list-style-type: none"> <li>• Hen harrier (<i>Circus cyaneus</i>)</li> <li>• Peregrine (<i>Falco peregrinus</i>)</li> <li>• Merlin (<i>Falco columbarius</i>)</li> </ul>	
Pen Llyn a'r Sarnau / Lleyn Peninsula and the Sarnau SAC	<p>Designated for a range of marine habitats including: coastal lagoons, Atlantic salt meadows <i>Glauco-Puccinellietalia maritima</i>, estuaries, large shallow inlets and bays, intertidal mudflats and sandflats, subtidal sandbanks, sea caves (including partially submerged), reefs, glasswort <i>Salicornia</i> and other annuals colonizing mud and sand, subtidal sandbanks, and sea caves.</p> <p>Species which are part of the designation include: otter, grey seal (<i>Halichoerus grypus</i>), and bottlenose dolphin (<i>Tursiops truncatus</i>).</p>	3330 north-west
Afon Eden - Cors Goch Trawsfynydd SAC	<p>Annex I habitats present as a qualifying feature, but not a primary reason for selection of this site:</p> <ul style="list-style-type: none"> <li>• 7110 Active raised bogs (Priority feature)</li> </ul> <p>Annex II species that are a primary reason for selection of this site:</p> <ul style="list-style-type: none"> <li>• 1029 Freshwater pearl mussel (<i>Margaritifera margaritifera</i>). This tributary of the Afon Mawddach lies within a little-modified catchment and supports the only population of freshwater pearl mussel in Wales that is regarded as viable.</li> <li>• 1831 Floating water-plantain (<i>Luronium natans</i>). Floating water-plantain is not especially abundant or strongly flowering in the Afon Eden but it does represent a rare and significant survival, and this population, scattered along ~100 m of meander pools, is an exceptional instance of the species' growth in naturally slow-flowing waters.</li> </ul> <p>Annex II species present as a qualifying feature, but not a primary reason for site selection</p> <ul style="list-style-type: none"> <li>• 1106 Atlantic salmon (<i>Salmo salar</i>)</li> <li>• 1355 Otter (<i>Lutra lutra</i>)</li> </ul>	3500 south
Rhinog SAC	<p>Annex I habitats that are a primary reason for selection of this site:</p> <ul style="list-style-type: none"> <li>• 4030 European dry heaths: Rhinog is representative of upland European dry heaths in Wales. On shady slopes, the site contains what is considered to be the best development of H21 <i>Calluna vulgaris</i> – <i>Vaccinium myrtillus</i> – <i>Sphagnum capillifolium</i> heath outside Scotland. Other NVC types represented include H8 <i>Calluna vulgaris</i> – <i>Ulex gallii</i>, H10 <i>Calluna vulgaris</i> – <i>Erica cinerea</i>, and H12 <i>Calluna vulgaris</i> – <i>Vaccinium myrtillus</i> heaths.</li> <li>• 91A0 Old sessile oak woods with <i>Ilex</i> and <i>Blechnum</i> in the British Isles. Rhinog in north Wales contains high-quality examples of old sessile oak woods. This woodland is continuous with that in the adjacent Coedydd Derw a Safleoedd Ystlumod Meirion/ Meirionnydd Oakwoods and Bat Sites.</li> </ul>	4470 south-west

Site	Description	Approximate distance and direction from site (m)
	<p>Annex I habitats present as a qualifying feature, but not a primary reason for selection of this site:</p> <ul style="list-style-type: none"> <li>3130 Oligotrophic to mesotrophic standing waters with vegetation of the <i>Littorelletea uniflorae</i> and/or of the <i>Isoëto-Nanojuncetea</i></li> <li>4010 Northern Atlantic wet heaths with <i>Erica tetralix</i></li> <li>4060 Alpine and Boreal heaths</li> <li>7130 Blanket bogs (* if active bog) * Priority feature</li> <li>7150 Depressions on peat substrates of the <i>Rhynchosporion</i></li> </ul> <p>Annex II species present as a qualifying feature, but not a primary reason for site selection:</p> <ul style="list-style-type: none"> <li>1831 Floating water-plantain</li> </ul>	
<b>National designated sites</b>		
Eryri (Snowdonia) National Park	Eryri is Wales' largest national park, covering 823 square miles. A third of Wales' peatlands are contained within Eryri <sup>33</sup> , rare and endemic species found within Eryri include the lesser horseshoe bat, freshwater pearl mussel ( <i>Margaritifera margaritifera</i> ), glutinous snail ( <i>Myxas glutinosa</i> ), y gwaniad fish ( <i>Coregonus pennantii</i> ), Snowdon beetle ( <i>Chrysolina cerealis</i> ) and Snowdon lily ( <i>Lloydia serotina</i> ) <sup>34</sup> .	On site
Coed y Rhygen SSSI and NNR	Designated as a <i>Teucrium scorodonia/Quercus/Betula</i> type woodland containing Atlantic bryophytes, of special interest, this site falls on the western shore of Llyn Trawsfynydd.	1380 south
Coedydd De Dyffryn Maentwrog SSSI	This site, consisting of four woodlands on the southern side of the Vale of Ffestiniog, is designated for its semi-natural broadleaved woodland, a rare moss, liverworts, slime moulds and a population of lesser horseshoe bats.	1558 west
Ceunant Llennyrch NNR	Ceunant Llennyrch NNR is one of several woodland reserves in the Vale of Ffestiniog in Gwynedd, Wales and runs from Llyn Trawsfynydd to the River Dwyryd, near the village of Maentwrog. There are over 200 species of liverwort, moss and lichen present in the woodland. Trees include sessile oaks, as well as beech, rowan and silver birch.	1600 west
Migneint-Arenig-Dduallt SSSI	This upland site is of special interest for both biological and geological features. Habitats of special interest within the SSSI are blanket bog, dry heath, montane heath, wet heath, flushes, lakes, woodland, and habitats comprising acid, neutral and calcareous grassland, rush pasture, bracken, ledge communities, swamp, running water and cliff and scree vegetation.	1963 east

<sup>33</sup> <https://snowdonia.gov.wales/>

<sup>34</sup> <https://www.biodiversitywales.org.uk/Snowdonia-National-Park>

Site	Description	Approximate distance and direction from site (m)
	Additionally, the site supports breeding populations of hen harrier, merlin and peregrine, as well as an assemblage of upland bird species, and several notable invertebrates.	
Coedydd Dyffryn Ffestiniog (Gogleddol) SSSI Bats	Special interest features of this site comprise semi-natural broadleaved woodland, woodland bird assemblage, moss, liverwort, lichen and slime mould assemblages and lesser horseshoe bats.	3318 north
Mwyngloddiau Llanfrothen SSSI Bats	The site comprises a number of mine shafts, adits and other disused mine workings and is of special interest for hibernating bats, particularly lesser horseshoe bats. The abandoned mines complement breeding roosts within the Glaslyn Valley. The mines are also used by other bat species, including Daubenton's bat ( <i>Myotis daubentonii</i> ). Areas of semi-natural vegetation including broadleaved woodland, dry heath, gorse and bracken exist within the site.	5960 north-west
Dolorgan Barn SSSI Bats	A breeding roost of the lesser horseshoe bat forms the special interest feature of Dolorgan Barn. The site is a 17 <sup>th</sup> Century barn which supports the breeding roost, and an adjoining area of mixed woodland, which is used as a feeding area and a flight path to other feeding habitats in the valley. The barn is used by bats to rear their young in the summer, and bats have returned annually to the site for many years. Over 100 bats have used the site annually since 1994.	7223 south-west
Glaslyn SSSI Bats	The site is of special interest for its floodplain grassland, riverine habitat, vascular plants, breeding bird assemblage, and broadleaved woodland (particularly alluvial wet woodland). In addition, the site supports a population of rare snail ( <i>Vertigo lilljeborgi</i> ) and nursery roosts for lesser horseshoe bats.	7912 north-west
Ysbyty Bron y Garth SSSI Bats	Designated for breeding and hibernating lesser horseshoe and brown long-eared bats ( <i>Plecotus auritus</i> ).	8452 west
Glyn Cywarch SSSI Bats	The site is of special interest for its breeding roost of the lesser horseshoe bat. Situated on the Glyn Estate, the site comprises a potting shed which supports the breeding roost and an adjacent wall which is used as a flight route to gain access to feeding habitat in the woodland of Coed y Glyn. The site is used during the summer by the bats to raise their young, and since 1993 the site has been used by over 100 bats annually.  In addition to lesser horseshoe bats, the site is used by small numbers of pipistrelle bats ( <i>Pipistrellus pipistrellus</i> ) and brown long-eared bats ( <i>Plecotus auritus</i> ) also roost in the shed.	8986 south-west
Coedydd Nanmor SSSI Bats	Special interest features of this site comprise semi-natural broadleaved woodland, assemblages of mosses, liverworts, lichens, a population of lesser horseshoe bats, a population of silver-studded blue butterflies ( <i>Plebejus argus</i> ), and the small red damselfly ( <i>Ceragrion tenellum</i> ). The site includes several blocks of oak woodland.	9407 north-west

## 4.2 Non-statutory Designated Sites

Twelve parcels of ancient woodland have been returned within 1km of the site, including eight parcels of ancient semi-natural woodland, one parcel of plantation on ancient woodland and three restored ancient woodland sites. The closest parcel adjacent to the site (10m west), comprising plantation on ancient woodland (see Figure 3).

No SINC's were returned within 1km of the site.

In addition to the above, Eryri is listed as an Important Invertebrate Area (IIA) by Buglife<sup>35</sup>, indicating that the national park is a significant area for the conservation of invertebrates and the habitats upon which they rely. A full IIA profile of Eryri has yet to be released.

## 4.3 Habitats

### 4.3.1 Desk study

Records of habitats of Principal Importance were returned within 1km of the site and included: *Lowland Dry Acid Grassland*, *Lowland Fens and Reedbeds*, *Lowland Heathland*, *Purple Moor Grass and Rush Pastures* and *Wood Pasture*.

The closest records are lowland dry acid grassland approximately 255m north of the site and lowland heathland 255m west of the site.

One standing waterbody has been identified within 500m of the site, Llyn Trawsfynydd, a large man-made reservoir situated south of the nuclear power plant, 380m south of the site, with a total surface area of 4.8 km<sup>2</sup>.

### 4.3.2 Field survey

Habitats within and adjacent to the site boundary are described below. These should be read in conjunction with the Extended Phase 1 Habitat Survey Plan and associated Target Notes (Figure 3). The habitats are listed in the order found in the JNCC's Phase 1 Handbook.

#### A1.1.1 Semi-natural broadleaved woodland

A large area of semi-natural broadleaved woodland (see Photographs 1) was present covering the northern sections of the site, edging up the slope and thinning out into scrub containing younger planted trees (TN6, Figure 4). Species included mature to semi-mature beech (*Fagus sylvatica*) dominating followed by oak (*Quercus sp.*), with younger willow (*Salix spp*) and hazel (*Corylus avellana*). The understory was dominated by large boulders covered in bryophytes, with occasional species such as honeysuckle (*Lonicera sp.*), locally dominant patches of wood sorrel (*Oxalis acetosella*) and bramble (*Rubus fruticosus*). The understory in the open areas were dominated by ferns, bramble, ivy (*Hedera helix*), bryophytes, some planted holly (*Ilex aquifolium*), common nettle (*Urtica dioica*) and locally dominant patches of rosebay willowherb (*Chamaenerion angustifolium*). Tutsan (*Hypericum androsaemum*), an ancient woodland indicator (along with wood sorrel recorded on site) was also present scattered across the woodland to the west of the hardstanding and along the slope. This habitat could be recognised as a habitat of principal importance<sup>14</sup>. A stone wall approximately 1.5m wide and extending through the woodlands (running east along the northern extent of the site) and log/brush piles were present scattered throughout the woodland (TN1, Figure 4). A stream (TN8, Figure 4) was recorded outside the north-eastern extent of the site, however, the area was not accessed due to fencing.

The broadleaved treeline of predominantly beech along the road is made up of semi-mature and younger trees of approximate heights between 5m-15m. A bat box was recorded within the woodland (TN7, Figure 4).

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<sup>35</sup> <https://www.buglife.org.uk/our-work/important-invertebrate-areas/>





**Photographs 1a and 1b: Example of broadleaved woodland showing stone wall and planted young trees**

### A2.1 Dense scrub

There was a patch of dense scrub on site along the top of the bank from the hardstanding and progressing into woodland further down the bank (see Photograph 2: Example of dense scrub. The dense scrub was dominated by young downy birch (*Betula pubescens*), young silver birch (*Betula pendula*), ash (*Fraxinus excelsior*), willow and sycamore tree saplings, buddleia (*Buddleja davidii*), with occasional bramble,). The understory (see Photograph 3) was dominated by wild strawberry (*Fragaria vesca*), common birds-foot trefoil (*Lotus corniculatus*), bryophytes, fungi species, tutsan, ivy and English stonecrop (*Sedum anglicum*).

The margins of the grassland, edging into the scrub were more diverse, with nettle, cleavers (*Galium aparine*), ragwort (*Senecio jacobea*), germander speedwell (*Veronica chamaedrys*) and herb Robert (*Geranium robertianum*).



**Photograph 2: Example of dense scrub on site**



**Photograph 3: Example of understory of scrub on site**

### J3.6 Buildings and structures

Temporary structures (shipping containers) associated with the wider site were located on site. The structures on site did not undergo a full assessment of the potential roosting features for bats, however, an overall appraisal of the structures are detailed in Table 3.

### J5 Gravel/ hard standing

The hard standing across the site comprised the pavements and road surfaces across site, including the gravel sections adjacent to a temporary spoil heap (TN9, Figure 4) and the gravel path along the northern border of the woodland.

## 4.4 Protected/Notable species

### Desk Study and Field Study Results

The findings of the desk study and field study in relation to protected/notable species and INNS, are detailed within the table below.

**Table 3 Protected and notable species; Desk Study and Field Study Results**

Species/ Taxon	Desk study		Field survey
	Status <sup>36</sup>	Summary of records	
Birds	Sch 1 WCA, INNS	The data search returned 160 records of birds since and including 2014, within 2km of the site. These include the following WCA 1981 Schedule 1 species: little gull ( <i>Hydrocoloeus minutus</i> ), red kite ( <i>Milvus milvus</i> ),	No birds were found nesting on any of the structures on site. The site remains active daily, including the use of machinery, increasing disturbance levels on site. However, the woodland and

<sup>36</sup> Abbreviations: 'S7' = Environment (Wales) Act 2016 Section 7 species; Wildlife and Countryside Act (WCA) 1981 (as amended); 'INNS' = Invasive non-native species; Sch1 = Schedule 1 Birds of the WCA, "CHSR" = Conservation of Habitats and Species Regulations 2017.



Species/ Taxon	Desk study		Field survey
	Status <sup>36</sup>	Summary of records	
		<p>crossbill (<i>Loxia curvirostra</i>), osprey (<i>Pandion haliaetus</i>), peregrine (<i>Falco peregrinus</i>), garganey (<i>Spatula querquedula</i>) and fieldfare (<i>Turdus pilaris</i>).</p> <p>The results of two winter bird surveys, six breeding bird surveys and four raptor surveys undertaken on site during 2021 by Cartmel Ecology were reviewed. The woodland on site was deemed to provide good shelter for winter migratory thrushes (fieldfare and redwings). The buildings may hold suitability for overwintering gulls roosting sites. Regular bird deterrent (hand reared falcon) has been reported to be used to deter roosting and nesting birds on buildings. Swallows (<i>Hirundo rustica</i>) have been recorded nesting in a workshop on site and ringed plovers (<i>Charadrius hiaticula</i>) nesting on gravel on site in previous years. Peregrine, sparrowhawk (<i>Accipiter nisus</i>) and buzzard (<i>Buteo buteo</i>) were recorded site, with peregrine recorded perching on the reactor buildings.</p> <p>Llyn Trawsfynydd to the south of the site offers a good site for many water birds. Ospreys were recorded feeding on Llyn Trawsfynydd during the spring. Ringed plover were also observed during surveys.</p> <p>Graig Gyfynys is a small hill just west of the power station and is covered in heather. Nightjar (<i>Caprimulgus europaeus</i>) were heard during the summer bat surveys and were deemed likely to be nesting there.</p>	<p>scrub bordering the woodlands was not subject to high disturbance levels and was deemed suitable for a range of breeding bird species. Several bird species were recorded within the woodland and scrub, including song thrush (<i>Turdus philomelos</i>), buzzard, blackbird (<i>Turdus merula</i>), wren (<i>Troglodytes troglodytes</i>), chaffinch (<i>Fringella coelebs</i>) and grey wagtail (<i>Motacilla cinerea</i>).</p> <p>Red kite were not observed during the site visit but are likely to be nesting within 5 km of the site, as noted during previous survey report.</p> <p>Habitats within the site may have limited suitability to support breeding bird species associated with designated sites nearby. However, it is possible that the occasional species could fly overhead or use the woodland for foraging.</p>
Bats	WCA, S7 <sup>37</sup> , CHSR	<p>41 recent records of bat were returned by the data search, within 2km of the site. This includes one record of an unknown bat <i>Chiroptera</i> species, one record of unknown Myotis bat species, three records of Daubenton's bat, three records of whiskered bat (<i>Myotis mystacinus</i>), one record of noctule bat (<i>Nyctalus</i></p>	<p>A detailed assessment of suitable features for bats were not undertaken during the survey as the extent of works and therefore impact of works on potential roost features on site could not be determined. However, some</p>

<sup>37</sup> Common pipistrelle, soprano pipistrelle, brown long-eared bat, noctule and lesser horseshoe bat are S7 species.

Species/ Taxon	Desk study		Field survey
	Status <sup>36</sup>	Summary of records	
		<p><i>noctule</i>), one record of an unknown pipistrelle species, nine records of common pipistrelle (<i>Pipistrellus pipistrellus</i>), 16 records of soprano pipistrelle (<i>Pipistrellus pygmaeus</i>), one record of brown long-eared bat (<i>Plecotus auratus</i>), and two records of lesser horseshoe bat (<i>Rhinolophus hipposideros</i>).</p> <p>Of these species recorded, the following are listed under the Eryri National Park Authority Local Biodiversity Action Plan (LBAP): noctule bat, common pipistrelle, soprano pipistrelle, brown long-eared bat, and lesser horseshoe bat.</p> <p>The closest recorded to site was a noctule approximately 490m from site.</p> <p>The results of one bat transect and static surveys undertaken during 2021 by Cartmel Ecology recorded <i>Myotis sp</i> in high numbers to the northern extent of the site, with lesser horseshoes also recorded in lower densities in the north. Common pipistrelle, soprano pipistrelle, Daubenton's bat, noctule and recordings of Nathusius's pipistrelle (<i>Pipistrellus nathusii</i>) were recorded on site.</p> <p>An inspection of all the buildings in the wider site took place on the 27th May 2021 by Cartmel Ecology. The buildings were inspected from the exterior if there was no apparent access internally for bats or other wildlife. Internal inspection took place of some buildings (including the south reactor building), looking for evidence of bats and potential roosting sites for bats. No bats or evidence of bats were recorded on the day of inspection.</p> <p>Emergence surveys recorded a maximum of 149 soprano pipistrelles emerging from the Pump House (Building number B65, located at SH 69168 37859), approximately 530m from site, during the surveys, a maximum of 12 soprano pipistrelles and at least one <i>Myotis</i> species were recorded emerging from the front elevation of the conference centre (Building number B61, located at SH</p>	<p>visible holes in the trunks and branches in trees throughout the woodland show the woodland on site to have potential to support roosting bats. The structures (shipping containers) on site are deemed unlikely to support roosting bats due to sealed gaps within structures, preventing bats from entering and likely regular use of the containers.</p> <p>A bat box was recorded within the woodland on site (TN7, Figure 4).</p> <p>All buildings and structures with high suitability for bat roosts, recorded by Cartmel Ecology (the pump house and conference centre, approximately 530m and 490m from site, respectively) are outside the current site boundary and were not visually assessed during the recent survey. The good connectivity of the site to the wider landscape, together with suitable habitats and waterbodies, provide suitable foraging and commuting opportunity. In accordance with BCT guidance<sup>31</sup>, the site holds high potential for commuting and foraging bats.</p>

Species/ Taxon	Desk study		Field survey
	Status <sup>36</sup>	Summary of records	
		69527 38249), approximately 500m from site. No other buildings were recorded with bat roosts.	
Eurasian Badger	Protection of Badgers Act 1992	<p>One recent record of badger (<i>Meles meles</i>) was returned, 641m northeast of the site. This record was a road fatality during 2015.</p> <p>The results of one badger survey undertaken during 2021 by Cartmel Ecology showed no evidence of badger using the power station site. A badger latrine was found in the woodland near to the entrance to the site (off the main road) at: SH 69720 38606, along with a badger latrine also found on Graig Gyfynys, the hill to the west of the site, but no setts were recorded.</p>	<p>No signs of badger were recorded during the survey. Holes suitable for mammals were present between the boulders within the woodland and slope, however, the larger holes did not connect to tunnels or burrows underground. Additionally, no mammal paths were recorded on site.</p> <p>Overall, the site is considered to have low potential to support badgers, however, there is suitable habitat across site for foraging.</p>
Otter And Water vole	<p>WCA, S7, LBAP, CHSR (Otter)</p> <p>WCA, S7 (water vole)</p>	<p>Four recent records of otter (<i>Lutra lutra</i>) were returned by the data search. The majority of records are of spraints. The closest record was 1388m north of the site.</p> <p>No records of water vole (<i>Arvicola amphibius</i>) were returned by the data search.</p> <p>Otters were recorded as present and active on the north shore of Llyn Trawsfynydd during the 2021 surveys undertaken by Cartmel Ecology<sup>21</sup>, where otter spraints were recorded.</p>	<p>Although mammal holes (TN4, Figure 4) are present in the woodland, it is considered unlikely for otters to create resting sites on the site itself due to the distance between the site and waterbodies. However, a stream (TN8, Figure 4) was recorded outside the site (north-eastern extent) which may hold suitability to support riparian mammals and was not accessed as part of this study.</p> <p>Llyn Trawsfynydd holds suitable aquatic and terrestrial habitat in the surrounding area, along with foraging opportunities for otter.</p> <p>The evidence of otters nearby (recorded from previous surveys by Cartmel Ecology) and the unknown potential of the stream to the north-east of the site determine that the presence or absence of this species cannot be ruled out at the current stage.</p> <p>No suitable habitat has been recorded within the site for water vole. Although there is potential riparian habitat to the north east of the site, no records have been</p>

Species/ Taxon	Desk study		Field survey
	Status <sup>36</sup>	Summary of records	
			returned in the area and it is deemed unlikely that water vole would be subject to significant disturbance from the proposed works. As such, water vole can be descoped from the remainder of this report.
Dormouse	WCA, S7, CHSR	No records of dormouse were returned within the search area.  Dormice have been shown to be present in the county <sup>38</sup> .	No evidence of dormice was recorded on site during the field survey. Some suitable woodland and scrub habitat is present on and adjacent to the site with connectivity to the wider landscape. Due to the absence of records in the wider area, the likely presence of this species is considered to be low although cannot be ruled out without further surveys.
Other mammals	WCA, S7	One record of weasel ( <i>Mustela nivalis</i> ), two records of polecat ( <i>Mustela putorius</i> ), and one record of hedgehog ( <i>Erinaceus europaeus</i> ) were returned by the data search. All records were recorded over 1km from the site. Polecat is listed as an Eryri National Park Authority LBAP.	No mammals were recorded on site during the field survey, however, small and medium sized mammal holes (TN4, Figure 4) were present within the boulders and in the woodland. The woodland is likely to support mammal species, including polecat.
Reptiles & Amphibians	WCA, S7, CHSR, LBAP <sup>39</sup> (Great crested newt) All common reptiles (S7, WCA)	One record of an amphibian was returned by the data search, within 2km of the site. This is of a juvenile common frog ( <i>Rana temporaria</i> ), 961m east of the site.  No records of great crested newt (GCN) were returned within the search area.  Six recent records of reptiles were returned by the data search, within 2km of the Site. This includes two records of slow worm ( <i>Anguis fragilis</i> ), one record of adder ( <i>Vipera berus</i> ), one record of common lizard ( <i>Zootoca vivipara</i> ), and two records of grass snake ( <i>Natrix helvetica</i> ). The nearest records are of	A common frog was recorded on site in the woodland (TN5, Figure 4). The mossy understory holds moisture on the ground creating suitable habitat for common amphibians.  The stone wall (TN3, Figure 4) present in the woodland and the log/brush piles (TN1, Figure 4) scattered throughout the woodland edges provides suitable refugia and hibernacula for a range of reptiles and amphibians. Habitats within the site hold suitability for reptiles.

<sup>38</sup> <https://ptes.org/house-a-dormouse/dormice-in-decline/current-dormouse-distribution-map/>

<sup>39</sup> Common toad, great crested newt and slow-worm are S7 species.

Species/ Taxon	Desk study		Field survey
	Status <sup>36</sup>	Summary of records	
		<p>adder, slow worm, and grass snake, 227m south east of the site. All species recorded are listed under the Eryri National Park Authority LBAP and Schedule 5 of the WCA 1981.</p> <p>The 2021 reptile surveys undertaken by Cartmel Ecology<sup>21</sup>, did not record any reptiles, but did record a juvenile palmate newt. These surveys were undertaken during sub-optimal timings in September, therefore the presence/absence of reptile/amphibian species may have been missed.</p>	<p>The reservoir and stream adjacent to the north of the site may provide suitable habitat for breeding amphibians and habitat for reptiles. No further standing waterbodies (ponds) have been identified within the search area.</p> <p>GCN are considered highly unlikely due to the lack of records or suitable habitat in the region<sup>40</sup> (north-west Wales) and lack of suitable habitat present on site to support this species and will be excluded from the remainder of this report.</p>
Protected Invertebrates	S7, S5 (Marsh fritillary and white-clawed crayfish)	<p>A total of 32 records of invertebrates were returned within the search area.</p> <p>The closest species recorded were small heath (<i>Coenonympha pamphilus</i>), <i>Campsicnemus pusillus</i> and <i>Tachytrechus consobrinus</i> within 500m of the site.</p> <p>No records of white-clawed crayfish (<i>Austropotamobius pallipes</i>) or the invasive non-native American crayfish (<i>Pacifastacus leniusculus</i>), were recorded within the search area.</p> <p>Eryri (Snowdonia) is listed as an Important Invertebrate Area (IIA) by Buglife<sup>35</sup>, the national park is a significant area for the conservation of invertebrates and the habitats upon which they rely.</p>	<p>The tree line, woodland, grassland, scrub, stone walls, marginal vegetation and the river on or adjacent to the site are considered suitable habitat to support a range of invertebrate species. Notable species or significant populations of invertebrates are considered unlikely to be present within the site itself.</p> <p>The site is not suitable to support white-clawed crayfish, as there are no suitable watercourses on site. No suitable habitat or host plants for marsh fritillary were recorded on site. Further, no desk study records were returned for these species, as such, crayfish and marsh fritillary are not further considered within this report.</p>
Fish		<p>No recent records of fish were returned. Historic records (1979) of fish in Llyn Trawsfynydd comprised brown trout (<i>Salmo trutta</i>), grass carp (<i>Ctenopharyngodon idella</i>), perch (<i>Perca fluviatilis</i>), rainbow trout (<i>Oncorhynchus mykiss</i>) and rudd (<i>Scardinius erythrophthalmus</i>).</p>	<p>The site is not hydrologically connected to aquatic habitats, therefore, is considered unlikely to impact fish. Fish will not be considered throughout the remainder of this report.</p>

<sup>40</sup> [https://datamap.gov.wales/maps/new?layer=geonode:GWC21\\_Great\\_Crested\\_Newts#/](https://datamap.gov.wales/maps/new?layer=geonode:GWC21_Great_Crested_Newts#/) (Accessed 27/07/23)

Species/ Taxon	Desk study		Field survey
	Status <sup>36</sup>	Summary of records	
Vascular Plants, Fungi, Bryophytes and lichens	S7 and S8 WCA	<p>16 recent records of lichen were returned by the data search, within 2km of the Site. Species recorded include <i>Parmelinopsis horrescens</i>, <i>Anisomeridium robustum</i>, <i>Dimerella lutea</i>, <i>Graphis ruiziana</i>, <i>Hypotrachyna afrorevoluta</i>, <i>Hypotrachyna sinuosa</i>, <i>Hypotrachyna taylorensis</i>, <i>Lithocalla ecorticata</i>, <i>Menegazzia subsimilis</i>, <i>Sticta fuliginosa s. lat.</i>, <i>Thelotrema lepadinum</i>, <i>Parmelinopsis horrescens</i>, <i>Arthothelium ruanum</i>, and <i>Sticta fuliginosa s. lat.</i></p> <p>The nearest records are 978m southwest of the site.</p> <p>Other notable species of lichens, bryophytes and vascular plants have been recorded within designated sites within 2km of the site (see 4.1)</p> <p>No records of fungi were returned within the search area.</p>	<p>The site supports a range of bryophyte and lichen species, recorded in abundance the understory of the woodland on the trees, boulders, ground and stone wall, along with an unidentified species of slime mould.</p> <p>No fungi species were recorded on site, there is potential for notable fungi to be present on site as the damp understory of the woodland may provide habitat for a range of fungi species.</p> <p>The margins of the woodland, the trees and transitional areas of vegetation, scrub and more recently disturbed areas towards the top of the slope support diverse plant, moss and lichen communities.</p> <p>Tutsan, an ancient woodland indicator was scattered throughout the woodland.</p> <p>No other notable vascular plant species were recorded on site; however, a detailed botanical survey was not undertaken.</p>
Invasive Non-Native Species (INNS) - Plants	INNS	<p>The data search returned 119 records of invasive non-native species (INNS), comprising one species of bird (Canada goose (<i>Branta canadensis</i>), 5 records), two species of fish (grass carp (<i>Ctenopharyngodon Idella</i>), one record, and rainbow trout (<i>Oncorhynchus mykiss</i>), one record), one terrestrial mammal species (American mink (<i>Neovison vison</i>), four records), one mollusc species (trumpet ramshorn (<i>Menetus Dilatata dilatatus</i>), one record), and 107 records of flowering plants.</p> <p>Flowering plant species recorded include the following species listed</p>	<p>One young rhododendron was recorded on the north-western edge of the site (TN2).</p> <p>No other INNS plant species were recorded within the areas of the site covered within this survey.</p>



Species/ Taxon	Desk study		Field survey
	Status <sup>36</sup>	Summary of records	
		under Schedule 9 of the WCA 1981: common rhododendron ( <i>Rhododendron ponticum</i> ) (61 records), Japanese knotweed ( <i>Reynoutria japonica</i> ) (28 records), Nuttall's Waterweed ( <i>Elodea nuttallii</i> ) (one record), montbretia ( <i>Crocasmia pottsii</i> x <i>aurea</i> = <i>C. x crocosmiiflora</i> ) (five records), and New Zealand Pigmyweed ( <i>Crassula helmsii</i> ) (four records).	

## 5. Discussion and Recommendations

### 5.1 General Mitigation During Construction

Recommendations for further consultation, further species surveys or general best practice mitigation to minimise impacts of the proposed works on designated sites, habitats and species are stated below, in line with PEA guidance.

In general, the following best-practice measures should be considered when designing the construction phase of the works (subject to further surveys being undertaken)<sup>41</sup>. Listed below are some of these general mitigation considerations, this is not an exhaustive list and should be reviewed and updated when further surveys, consultations and designs are known.

- Prior to works, a toolbox talk should be given to all contractors working within the site by a Suitably Qualified Ecologist (SQE) prior to works, detailing the presence of important habitats and protected/notable species within the site, the working methods to be employed and the procedure to follow should any species be identified. A record of attendance should be kept onsite, which contractors should sign to indicate they have understood the toolbox talk.
- A Construction Environmental Management Plan (CEMP) should be produced and should be maintained by the contractor during the construction phase. This will include site-specific methods to ensure that all site activities, especially those in proximity to watercourses/waterbodies, are controlled and are in accordance with relevant legislation and undertaken in compliance with the relevant Guidelines for Pollution Prevention (GPP/PPG<sup>42</sup>) and industry best practice (GPP5<sup>43</sup>, CIRIA<sup>44</sup>).
- If any protected species are encountered during the works, all work in the vicinity should stop immediately and a SQE contacted for advice on how to proceed.
- Sensitive lighting plans to be detailed in the CEMP, determined by bat lighting recommendations (detailed in 5.4.1) with further consideration to the dark sky reserve lighting guidance<sup>11</sup>.

### 5.2 Designated sites

Adverse effects to Internationally designated sites within proximity to the site, are not expected. The works are expected to be undertaken within a maximum of two weeks and spaced across 18 months during daytime hours. Nearby qualifying habitats are not expected to be adversely affected through changes in air and or water quality. Habitats within the site are not considered to provide supporting habitat for mobile qualifying species of these designated sites including otter, fish species and birds (merlin, hen harrier and peregrine). Although the woodland may provide suitable foraging/commuting habitat for lesser horseshoe, works will be limited to daytime hours. Additionally, the extent of vegetation clearance has been minimised and is limited to the peripheral scrub/tree line with the mature woodland to the north and east will be retained and protected. Further advice should be sought from NRW and SNP regarding requirements for an HRA. .

The site lies within Snowdonia National Park, and as such, early consultation with the Snowdonia National Park Authority is also recommended with regards to the proposed works. Significant disturbance to SSSIs and their designating features is considered unlikely at the time of writing and therefore a SSSI assent for the works is not considered likely to be required.

Ancient woodland parcels adjacent to the site should be afforded protection from development which would result in their loss or deterioration; this protection should prevent potentially damaging operations and their

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<sup>41</sup> Further to additional surveys, it may be necessary to change the recommendations provided below for during clearance and construction and provide additional recommendations for mitigation based on the presence of protected species or notable habitats.

<sup>42</sup> <http://www.netregs.org.uk/environmental-topics/pollution-prevention-guidelines-pgps-and-replacement-series/guidance-for-pollution-prevention-gpps-full-list/> (accessed 09/07/23).

<sup>43</sup> Natural Resources Wales (NRW), the Northern Ireland Environment Agency (NIEA), Scottish Environment Protection Agency (SEPA) (2018). Guidance for Pollution Prevention – Works or maintenance in or near water: GPP5 v1.2 Feb 2018. <http://www.netregs.org.uk/media/1418/gpp-5-works-and-maintenance-in-or-near-water.pdf> (accessed 09/07/23).

<sup>44</sup> CIRIA (2018) CIRIA <http://www.ciria.org> (accessed 09/07/23).

unnecessary loss. Ancient woodland and semi-natural woodlands and individual ancient, veteran and heritage trees are irreplaceable natural resources, and have significant landscape, biodiversity and cultural value. No works are to be undertaken within Ancient woodland, however, as the site has areas recorded on the Ancient Woodland Inventory within 15m of the site, works should consider the advice of NRW regarding disturbance to ancient woodland including noise, vegetation clearance, light pollution and trampling<sup>45</sup>.

The proposed works should seek to avoid impacts to the habitats, species and landscapes associated with the designated sites and the National Park. Where this is not possible, any loss or damage of valuable habitats should be minimised. Any loss of habitat will need to be adequately mitigated or compensated in order to comply with local policies.

### **5.3 Habitats, vascular plants, lichens and bryophytes**

The proposed works have the potential to cause damage to, or loss of, habitats on site, primarily the clearance of scrub and woodland on site. The woodland on site is likely to be considered a habitat of principal importance for the conservation of biodiversity as listed on Section 7 of the Environment (Wales) Act 2016 (Semi-natural broadleaved woodland).

Arboricultural surveys are recommended to help identify significant trees and woodland features, ensuring they are preserved and protected during development and to determine root protection zones, to recommend measures to avoid damage to roots and soil during construction activities. These surveys assess the health and structural stability of individual trees within and around the woodlands and the extensive root systems that contribute to the stability of the woodland ecosystem. A specialist contractor should be sought to undertake these surveys.

The design has been minimised where possible to limit impact on existing woodland on site.

Design developments should continue to seek to avoid impacting the woodland and the mature/ semi-mature trees on site by restricting works to the scrub areas around the top of the slope and the transitional scrub to woodland habitat where young trees dominate. Works should not be undertaken within 5m of the woodland or trees, where possible, as significant effects to woodland, trees and their root protection zones cannot be ruled out. Any effects to woodland and trees are to be identified, minimised and avoided in accordance with PPW. Retained trees on site should be protected in line with BS 5837:2012.

Any loss of valuable habitat including woodland and scrub must be adequately compensated for in order to comply with national and local planning policy. The updated Chapter 6 of PPW places emphasis on the retention of trees and woodland, both urban and rural, with a minimum ratio of at least 3 trees of a similar type and compensatory size planted for every 1 lost. Where undertaken, the results of further species surveys should be used to inform mitigation design for unavoidable losses of valuable habitats.

### **5.4 Protected and Notable Species**

#### **5.4.1 Bats**

Bats are protected under the WCA and the CHSR. They are protected from disturbance, capture, injury and killing and their roosts are protected from obstruction, damage or destruction.

The habitats on and surrounding the site are of value to foraging bats. The design is seeking to avoid disturbance to trees where possible. Measures to protect these habitats are to be considered within developments of the detailed design with potential important foraging and commuting features retained.

As works are to be undertaken within the woodland, there is potential to cause disturbance of bats, which may be roosting within trees. As such, a preliminary inspection of all trees within and adjacent (up to 30m) to the works area should be undertaken to confirm presence/likely absence of roosting bats in line with the

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<sup>45</sup> <https://www.woodlandtrust.org.uk/media/43619/impacts-of-nearby-development-on-the-ecology-of-ancient-woodland-addendum.pdf> (Accessed 27/07/23)

Bat Conservation Trust's Bat Surveys: Good Practice Guidelines<sup>31</sup>. These may comprise climbing surveys (for trees) if deemed necessary.

- Bat roosts and important foraging and commuting features are to be retained alongside development where possible. Where the loss or disturbance of bat roosts is unavoidable, an appropriate bat mitigation strategy will be required, to include replacement roost provision. A Protected Species Licence from NRW would need to be sought once planning permission is granted (if applicable), in order to authorise the damage or loss of bat roosts, which would otherwise be illegal. No work which has the potential to affect bat roost locations can commence until such time as a licence has been issued.

Works should be restricted to daylight hours to avoid disturbance to bats. Additional consideration should be given to the following incorporation of measures should night time or security lighting be required:

- If temporary construction lighting is required during the bat activity season, at compound areas for example, or for health and safety requirements, this would consist of directional lighting designed to ensure no light spill over 0.5 Lux on to any potential commuting and foraging areas (e.g. woodland edges). Details of a sensitive lighting plan will need to be included within the CEMP for any night-time / dusk working, with consideration to the dark sky reserve lighting guidance<sup>11</sup>. The lighting design will need to follow best practice guidance by the Bat Conservation Trust and the Institution of Lighting Professionals<sup>46</sup>.

#### 5.4.2 Riparian mammals

Otters are protected under the WCA and CHSR. Under this legislation, they are protected from disturbance, capture and injury/killing. Their breeding sites and resting places are also protected from damage and destruction. If otter resting places and/or holts, a protected Species Licence for otters may be required from NRW.

Otters were deemed to be present and active on the north shore of Llyn Trawsfynydd during the 2021 surveys undertaken by Cartmel Ecology<sup>21</sup>, where otter spraints were recorded.

Otter resting sites are unlikely to be present on site itself, however, otter use the habitats adjacent to the site for foraging/commuting, as such, a pre-works check 10 weeks prior to the commencement of works is recommended and measures should be included in the CEMP to protect otter, including covering excavations and capping off piping at night.

#### 5.4.3 Dormice

Dormice are protected under the WCA and CHSR. Under this legislation, they are protected from disturbance, capture and injury/killing. Their breeding sites and resting places are also protected from damage and destruction. Although no records were return for this protected species, the woodland and scrub within the site, particularly those connected to the wider landscape may present opportunities for dormice. Furthermore, dormice have been shown to be present in the county<sup>38</sup>. As such, following best practice guidelines<sup>47</sup> measures including timing of vegetation clearance, a pre-works check for dormice immediately prior to works and the need for two-stage clearance, supervised by a SQE would be required for the scrub clearance on site.

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<sup>46</sup> <https://cdn.bats.org.uk/uploads/pdf/Resources/ilp-guidance-note-8-bats-and-artificial-lighting-compressed.pdf?v=1542109349>

<sup>47</sup> Bright, P., Morris, P., & Mitchell-Jones, T., (2006), Natural England: Dormouse Conservation Handbook, 2nd edn.

#### 5.4.4 Badgers

Badgers are protected under the Protection of Badgers Act 1992. They are protected from disturbance (while in their setts), injury and killing. Setts are also protected from obstruction, damage or destruction.

No evidence of badger was found on site, however, previous surveys undertaken during 2021<sup>21</sup> recorded badger evidence (latrines and digging) to the entrance of the wider site and on Graig Gyfynys to the west of the site. The security fencing has gaps suitable for badger to enter the site. The site is considered suitable for foraging badgers.

Badgers can move into an area and establish setts quickly and as such it is recommended that a pre-construction survey is undertaken up to 10 weeks prior to the commencement of works to check for any additional evidence of badger use across the site.

Should works occur near a badger sett identified on site, consideration would need to be given to obtaining a licence from NRW in order to authorise the damage or loss of badger setts, which would otherwise be illegal.

General measures also should be included in the CEMP to avoid entrapment or harm to badgers. Excavations should be covered when works are not taking place, especially overnight. Where deep excavations are made, a mammal ladder, or cut access, should be installed to allow badgers a means of escape from the trench. Any temporarily exposed open pipes should be capped to ensure that badgers cannot enter them.

#### 5.4.5 Other mammals

Any action that intentionally inflicts unnecessary suffering on any wild animal is an offence under the Wild Mammals (Protection) Act 1996. Should wild mammals be encountered during vegetation clearance and ground breaking works, the mammals will need to be moved to safe place by a suitably qualified ecologist.

There are suitable habitats within the site for hedgehog and polecat including scrub, log/brush piles and woodland edge. The retention of existing habitats and the design of new habitat corridors within the site should consider habitat requirements of hedgehog and polecat, with a focus on maintaining permeability across the site for these species.

#### 5.4.6 Birds

The habitats within the site are deemed highly suitable for breeding birds, notably in the wooded areas. All wild birds, their young and nests are protected under the WCA from taking, injury and killing. Birds under Schedule 1 of the WCA are also protected against disturbance while nesting. Significant impacts to breeding bird populations are unlikely and as such, detailed surveys are likely not required.

Any vegetation clearance required (year-round noting potential for earlier-nesting species) should be subject to a toolbox talk and supervised by an ecologist (or checked by an ecologist no more than 24 hours prior to clearance). If a nest is identified within or close to vegetation to be removed then it must be left in-situ and protected from the works, with no further works in the area until the young birds have fledged from the nest. The suitable buffer of works to prevent disturbance and length of time for birds to fledge is dependent upon species identified.

#### 5.4.7 Reptiles and common amphibians

Reptiles are protected from reckless or intentional harm under the WCA. Vegetation clearance has the potential to cause disturbance/killing/injury of reptiles and habitat loss and should be avoided where possible. Any required vegetation clearance should be undertaken between April and the end of October, where possible, when reptiles and amphibians are active and using a reptile sensitive methodology to include two-stage strimming under an ecological watching brief, first to 150 mm then to ground level. Vegetation clearance should be undertaken in a directional manner towards suitable retained and enhanced habitat. Suitable hibernation features (e.g. stone wall and log piles) (e.g. TN1, Figure 4) should be inspected by an ecologist before being dismantled/removed by hand or by hand tools under ecological supervision. The features that are dismantled should be reinstated within a suitable location outside of the works area or removed from site. If a large population of reptiles are found and habitat manipulation techniques as



described above are not suitable, a translocation of reptiles to a pre-agreed and surveyed off site receptor site may need to be considered.

A toolbox talk should be provided to all those working on site. If evidence of reptiles or amphibians is found that had not previously been accounted for, work should cease until advice has been obtained from a SQE.

#### 5.4.8 Invertebrates

The habitats on site may support a range of invertebrates, however, the site itself is unlikely to support a significant assemblage of notable invertebrates.

#### 5.4.9 Invasive non-native species

Schedule 9 of the WCA and The Invasive Alien Species (Enforcement and Permitting) Order 2019 makes facilitating the spread of listed invasive species an offence. One rhododendron plant, an INNS plant species was recorded on site. Works, including access routes, should be avoided within 7m of the identified INNS where possible. It is recommended that an INNS specialist is consulted to provide a treatment plan to remove the INNS on site to prevent and minimise the biosecurity risk of the INNS spreading.

### 5.5 Enhancement Measures

The enhancement of the site will likely adopt a site-wide approach, further details will be confirmed by the client once the enhancement measures are determined. Consideration should be given to the following measures which would enhance the biodiversity within the surrounding area, which provide Net Benefit for Biodiversity and Ecosystem Resilience, in accordance with Planning Policy and legislation<sup>48</sup>.

Enhancements should be reviewed by a SQE following further surveys and final scope of works, opportunities may include:

- The retention of existing reptile and amphibian hibernacula and inclusion of further logs/brush piles to encourage invertebrates and also act as a refuge for reptiles, amphibians and small mammals.
- Habitat restoration and enhancement of the woodland in surrounding areas, including habitats of principal importance, with habitat connectivity accounted for in the design. Creation of opportunities to enhance habitats for formal compensatory measures (in support of National Site Network), Nature Network outcomes, extension of current ancient woodland/broadleaved woodland extents and targeted alluvial woodland creation.
- The planting of native fruiting species within compensation areas to provide a food source for invertebrates and mammals. Fruit trees also age quickly and would in the long term have potential to provide roosting features for bats.
- The installation of appropriate bird and bat boxes on retained trees within the site. Specific models of boxes can be recommended following further surveys to ensure the relevant boxes for target species are provided.

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<sup>48</sup> Development should not cause any significant loss of habitats or populations of species, locally or nationally and must provide a net benefit for biodiversity. Where biodiversity enhancement is not proposed as part of an application and unless other significant material considerations indicate otherwise to comply with updated requirements of Chapter 6 PPW, the planning authority may refuse permission.

## 6. Summary and Conclusions

There are six internationally designated wildlife sites within 10km of the Site, with one designated for their populations of lesser horseshoe bats, Coedydd Derw a Safleoedd Ystumod Meirion / Meirionnydd Oakwoods and Bat Sites, located 1.3km west of the site. A Habitats Regulations Assessment is unlikely to be required at the time of writing although advice should be sought from SNPA and NRW regarding this. Five nationally statutory designated sites, were identified within 2km of the site, including Eryri (Snowdonia) National Park on site. A further seven SSSIs designated for bats were returned within 10km from the site. SSSI assent is unlikely to be required from NRW as the current scope of works are not expected to cause adverse to any SSSIs within the surrounding area.

Habitat assessed during the field survey included: semi-natural broadleaved woodland, scrub, gravel/hard standing (including a target noted spoil heap) and structures. A mitigation/compensation strategy will need to be designed which considers impacts on scrub and woodland habitat. This strategy will need to consider the PPW requirement of replacing every 1 tree lost with 3 trees.

The site has the potential to support badger, otter, dormouse, foraging and roosting bats, reptiles, amphibians, invertebrates and other Section 7 species, including notable and localised vascular plant, lichen and bryophyte species. INNS listed on Schedule 9 of the WCA were identified within the site, one rhododendron plant. Surveys and mitigation measures have been recommended in relation to the construction works. The surveys recommended, subject to change based on the scope of works are summarised in the table below:

**Table 4 Recommended survey effort and timings, depending on the scope of works**

Recommended assessments	Further survey work
Habitats	<ul style="list-style-type: none"> <li>Arboricultural surveys recommended</li> </ul>
Bat	<p>Preliminary inspection of trees within 30m of works or bat to determine presence/absence of PRFs and whether further survey effort is required, and or a Protected Species Licence is required from NRW to permit the works. The preliminary assessment of trees for PRF may include:</p> <ul style="list-style-type: none"> <li>Ground level preliminary assessment of PRF (year round, winter preferred).</li> <li>Climbing surveys (for trees); inspection of PRF (year round, winter preferred)..</li> </ul> <p>Further surveys that may be required subject to outcome of the preliminary assessment:</p> <p>Emergence surveys (May-September).</p> <p>Further Climbing surveys and endoscope inspections of any PRF.</p>
Breeding birds	Pre-works checks for any works disturbing breeding bird habitat; any vegetation clearance to be supervised by a SQE.
Riparian mammals	Pre-works checks; otter survey up to 10 weeks prior to works.
Badger	Pre-works checks; badger survey up to 10 weeks prior to works.
Dormouse	Pre-works checks immediately prior to works and during vegetation clearance. Any vegetation clearance to be supervised by a SQE.

Reptiles	Pre-works checks immediately prior to works and during vegetation clearance. Any vegetation/hibernacula clearance to be supervised by a suitably qualified ecologist (SQE).
INNS	Removal or avoidance of INNS present in site has been recommended. Any vegetation clearance to be supervised by a SQE.

As the scheme develops, opportunities for mitigation/compensation and enhancements should be considered which support national and local policy, including habitat creation, restoration and enhancement on and off site. Any mitigation/compensation and enhancement strategy will need to provide Net Benefit for Biodiversity and ecosystem resilience, as guided by the DECCA framework.

This report is the result of survey work undertaken in June 2023. This report refers, within the limitations stated, to the condition or proposed development of the site at the time of the inspections. Changes in legislation, guidance, best practice, etc. may necessitate a re-assessment/survey. It is also advised that if there is a delay of over two years in undertaking the works, an updated walkover survey is undertaken to ensure the baseline conditions have not changed. No warranty is given as to the possibility of future changes in the condition of the site.

This report is produced solely for the benefit of Magnox Ltd and no liability is accepted for any reliance placed on it by any other party. This report is prepared for the proposed uses stated in the report and should not be used in a different context.

# Figures

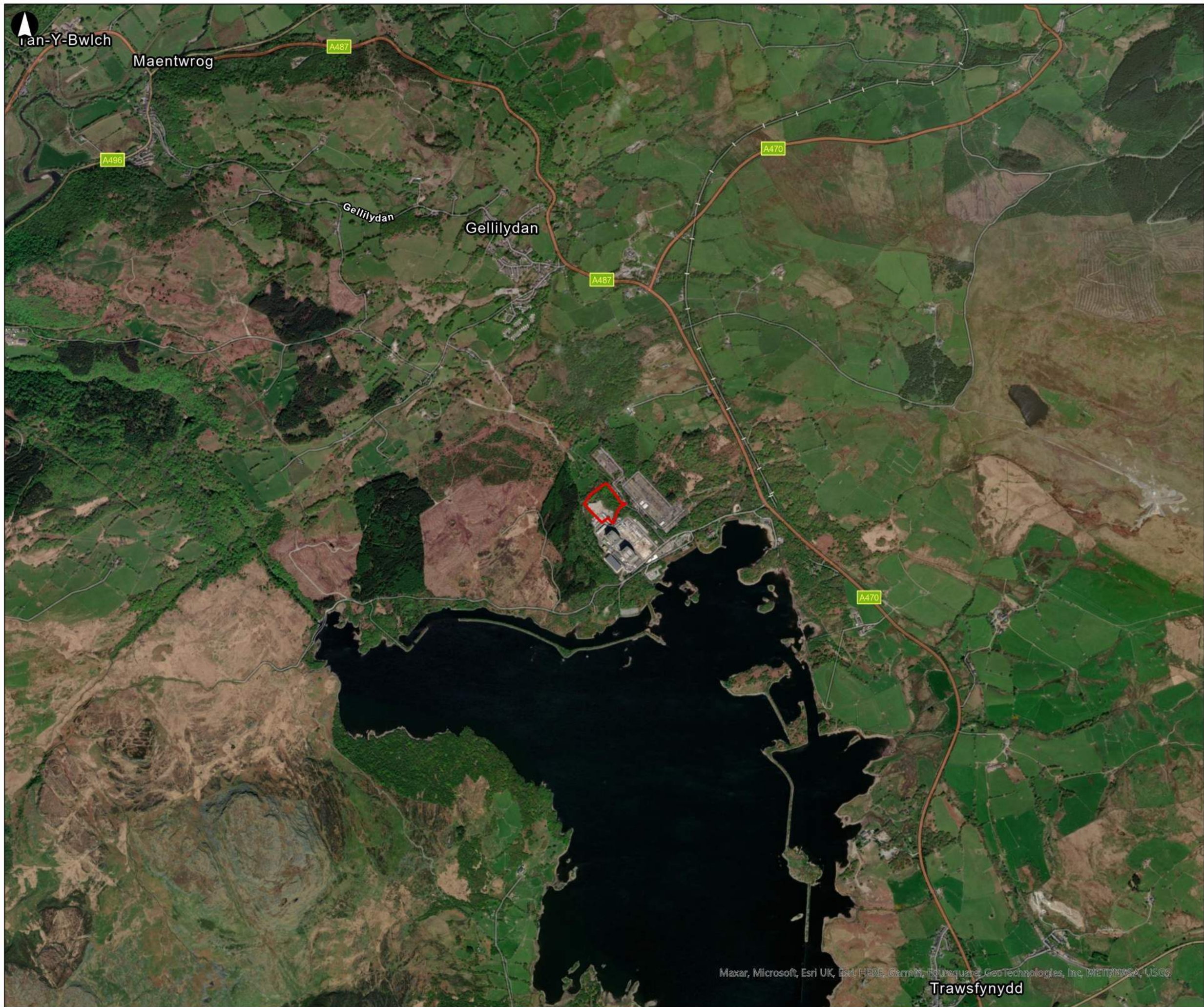
**Figure 1 Site Location Plan**

**Figure 2 Designated sites; internationally designated sites and SSSI bat designated sites**

**Figure 3 Designated sites; national and non-statutory designated sites**

**Figure 4 Extended Phase 1 Habitat Survey Results**

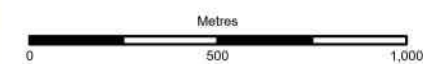




 Red Line Boundary

A3

Coordinate System: British National Grid



P01	27/07/23	RSJ	CP	PC	
Rev	Date	By	Chkd	Appd	Authd

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Project Name  
**Trawsfynydd filling works**

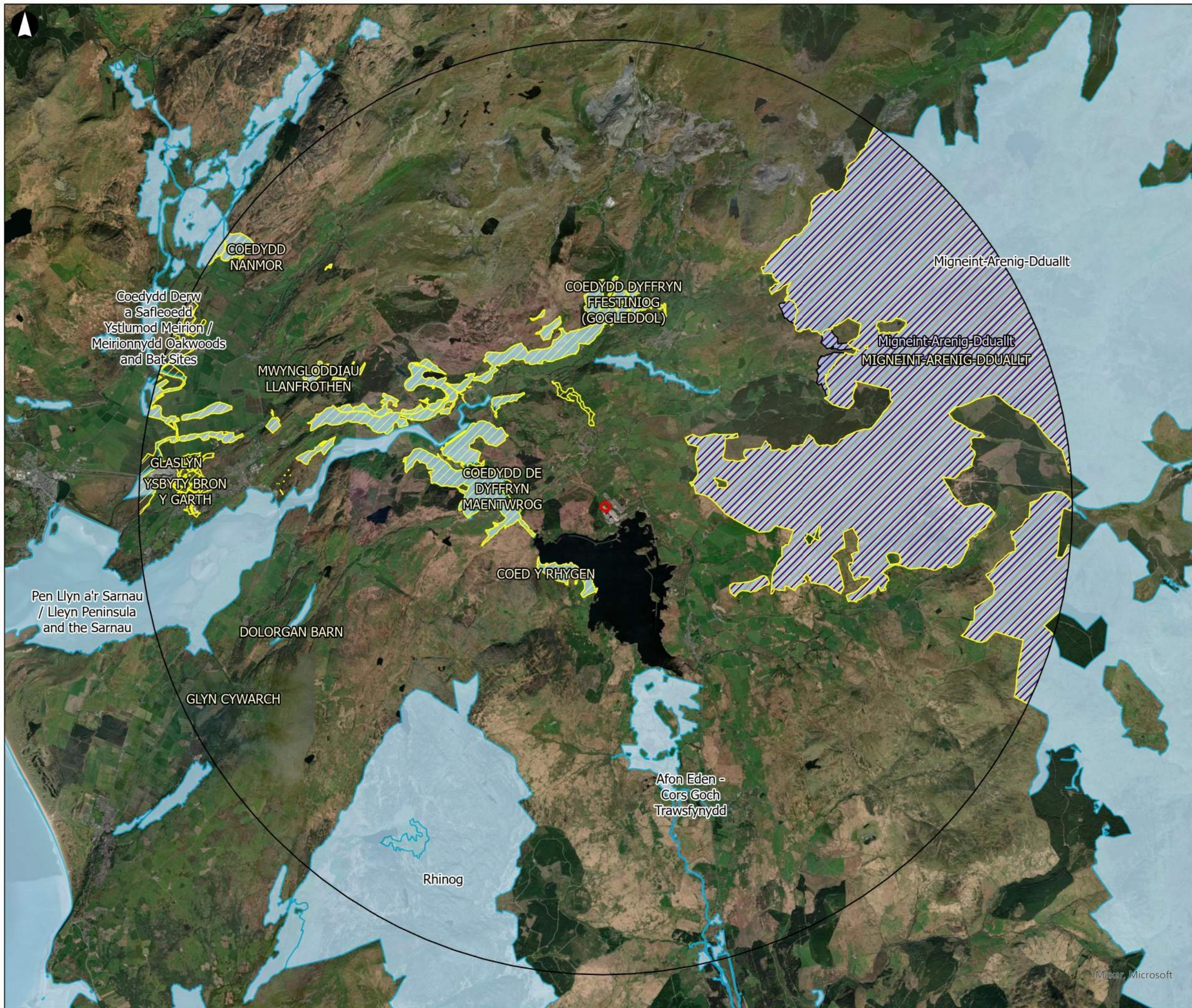
Drawing Title  
**Site Location Plan**

Scale at A3  
**1:20,000**  
Role

Suitability <b>S4</b>	Rev
Project Number <b>283552-00</b>	<b>P01</b>
Drawing Number <b>Figure 1</b>	

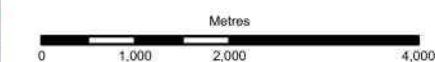
Maxar, Microsoft, Esri UK, Esri, HERE, Garmin, FourSquare, GeoTechnologies, Inc, METI/NASA, USGS  
**Trawsfynydd**





- Red Line Boundary
- 10km buffer
- Site of Special Scientific Interest (SSSI)
- Special Protection Area (SPA)
- Special Area of Conservation (SAC)

Coordinate System: British National Grid



P01	28/07/23	RSJ	CP	PC	--
Rev	Date	By	Chkd	Appd	Authd

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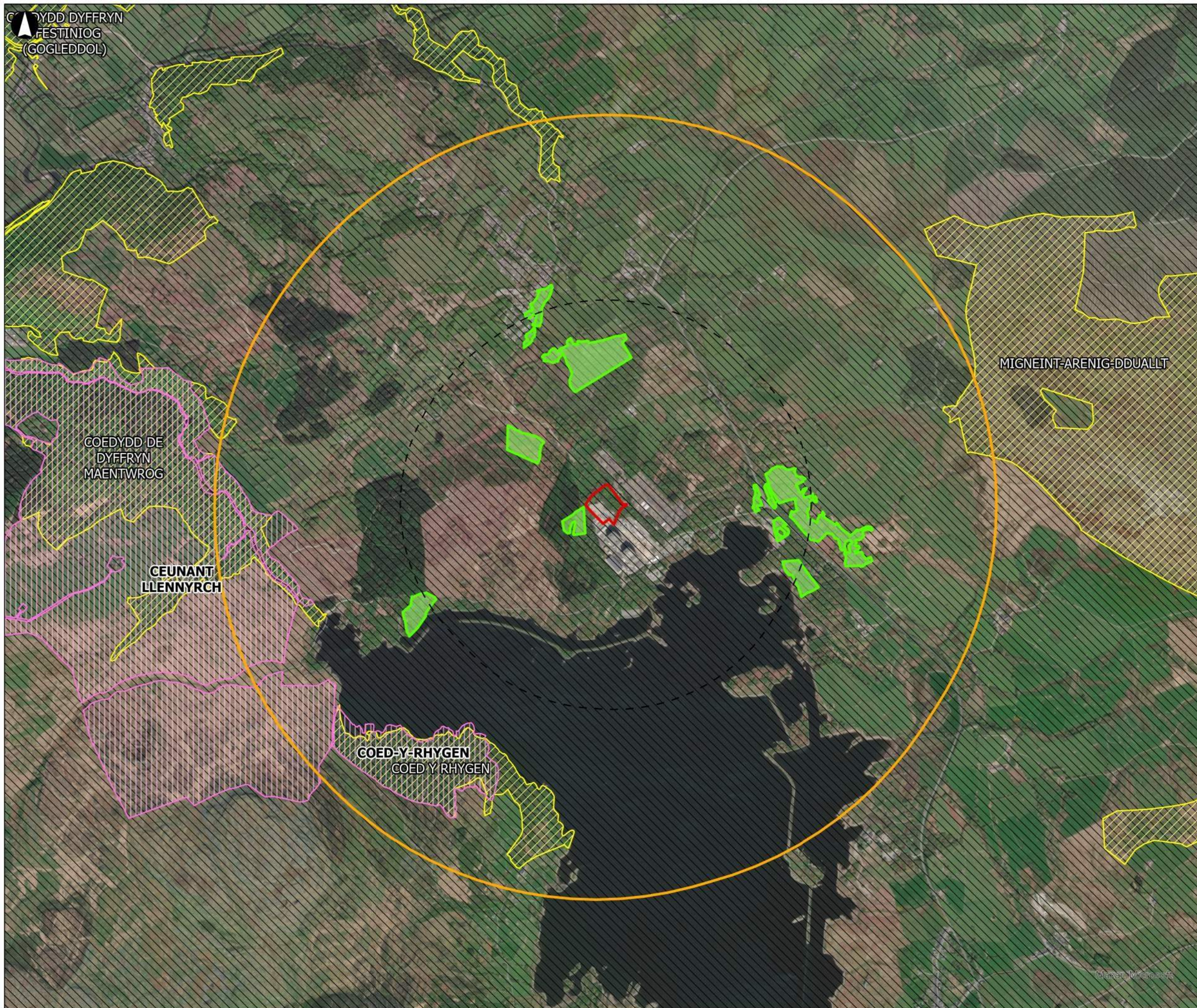
Project Name  
**Trawsfynydd filling works**

Drawing Title  
**Internationally designated sites and  
SSSI bat designated sites**

Scale at A3  
**1:80,000**  
Role

Suitability  
**S4**  
Project Number  
**283552-00**  
Drawing Number  
**Figure 2**  
Rev  
**P01**





- Red Line Boundary
- 1km buffer
- 2km buffer
- National Nature Reserve (NNR)
- Ancient Woodland
- Site of Special Scientific Interest (SSSI)
- National Park

Coordinate System: British National Grid

Metres

0 260 520 1,040

P01	28/07/23	RSJ	CP	PC	--
Rev	Date	By	Chkd	Appd	Authd

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Project Name  
**Trawsfynydd filling works**

Drawing Title  
**Nationally designated sites and non-statutory sites**

Scale at A3  
**1:20,000**

Role

Suitability  
**S4**

Project Number <b>283552-00</b>	Rev <b>P01</b>
Drawing Number <b>Figure 3</b>	





Target notes  
TN1: Log/brush piles  
TN2: Rhododendron  
TN3: Old stone wall  
TN4: Mammal holes between boulders  
TN5: Common frog  
TN6: Young planted trees  
TN7: Bat box  
TN8: Stream  
TN9: Spoil heap

Target Notes

A1.1.1 - Broadleaved woodland - semi-natural

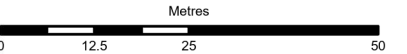
A2.1 - Scrub - dense/continuous

J5 - Gravel/hard standing

J3.6 - Structures

Red line boundary

Coordinate System: British National Grid



P01	31/07/23	RSJ	CP	PC	--
Rev	Date	By	Chkd	Appd	Authd

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Project Name  
**Trawsfynydd filling works**

Drawing Title  
**Phase 1 Extended Habitat Survey Results**

Scale at A3  
**1:1000**  
Role

Suitability <b>S4</b>	Rev
Project Number <b>283552-00</b>	<b>P01</b>
Drawing Number <b>Figure 4</b>	



# Appendix A

## Legislation and Policy

### A.1 Legislative Context

A framework of international, European, national and local legislation and planning policy guidance exists to protect and conserve wildlife and habitats. This is described in the following sections. The reader will refer to the original legislation for the definitive interpretation.

### A.2 Designated Sites

A network of nationally designated sites has been established through the designation of Sites of Species Scientific Interest (SSSI) under the Wildlife and Countryside Act 1981 (as amended). The protection afforded by the Act means it is an offence to carry out or permit to be carried out any operation listed within the notification without the consent of the Statutory Nature Conservation Organisation<sup>49</sup> (Natural England).

The protection afforded to SSSIs is used to underpin the designation of areas at a European Level. European Sites comprise:

- Special Areas of Conservation (SAC) designated under the Conservation of Habitats and Species Regulations 2019 (Amendment) (EU Exit) (known as the Habitats Regulations);
- Special Protection Areas (SPA) designated under the Wildlife and Countryside Act.

Wetlands of International Importance (Ramsar sites) declared under the Convention on Wetlands of International Importance especially as Waterfowl Habitat 1971 are normally also notified as SSSIs but are only considered European Sites as a matter of UK and Local Government Policy.

The Habitats Regulations transpose the requirements of Council Directive 92/43/EEC on the Conservation of Natural Habitats and of Wild Fauna and Flora (the Habitats Directive) into law within England and Wales, while the Wildlife and Countryside Act transposes Directive 79/409/EEC on the Conservation of Wild Birds (the Birds Directive) in the law within England and Wales. Equivalent legislation exists to transpose these directives in the law within Scotland and Northern Ireland.

The Habitats Regulations require that consideration is given to the implications of plans and projects (developments) on European Sites are considered. Specifically, Regulation 61(1) states:

*“A competent authority, before deciding to undertake, or give any consent, permission or other authorisation for, a plan or project which –*

*(a) is likely to have a significant effect on a European site or European marine site (either alone or in combination with other plans or projects), and*

---

<sup>49</sup> Section 28 of the Wildlife and Countryside Act 1981 (as substituted by Schedule 9 of the Countryside and Rights of Way Act 2000).

*(b) is not directly connected with or necessary to the management of that site, must make an appropriate assessment of the implications for that site in view of that site's conservation objectives."*

The formal consideration of effects on European Sites is therefore undertaken by the determining authority such as the Local Planning Authority.

Local Nature Reserves can be given protection against damaging operations through powers within the National Parks and Access to the Countryside Act 1949 (as amended). However, this protection is usually conveyed through inclusion of protection within local planning policy relating to these sites and other non-statutory sites such as sites of Importance for Nature Conservation.

These sites are protected by the relevant legislation regardless of whether planning permission is required. Where planning consent is required, they will also be protected by Planning Policy.

Country Parks, Local Wildlife Sites (LWS) including Sites of Importance for Nature Conservation (SINC), and Ancient Woodlands are protected by Planning Policy, which will apply to schemes which require planning consent.

## A.3 Protected and Notable Species

### A.3.1 European Protected Species

The Habitats Regulations convey special protection to a number of species which are listed in schedule 2 of the Regulations and are referred to as European Protected Species (EPS):

- All UK resident bat species;
- All whale and dolphin species;
- Large blue butterfly (*Maculinea arion*);
- Hazel dormouse (*Muscardinus avellanarius*);
- Pool frog (*Rana lessonae*);
- Sand lizard (*Lacerta agilis*);
- Fisher's estuarine moth (*Gortyna borelii lunata*);
- Great crested newt (*Triturus cristatus*);
- European otter (*Lutra lutra*);
- Wild cat (*Felis silvestris*);
- Lesser Whirlpool Ram's-horn Snail (*Anisus vorticulus*);
- Smooth snake (*Coronella austriaca*);
- Sturgeon (*Acipenser sturio*);
- Natterjack toad (*Bufo calamita*); and
- All marine turtles.

Regulation 41 makes it an offence to:



- a) Deliberately capture, injure or kill any wild animal of a EPS;
- b) Deliberately disturb wild animals of such a species;
- c) Deliberately takes or destroys the eggs of such a species;
- d) Damages or destroys a breeding site or resting place of such an animal.

Disturbance in the context of the offences above is disturbance which is likely to impair the ability of the animals to survive, to breed or reproduce, to nurture their young, to hibernate, to migrate; or to affect significantly the local distribution of the species.

Licences can be granted by the relevant SNCO for developments (sometime referred to as EPS Licences or Derogation Licences) providing the purposes of the licence is for “*preserving public health or public safety or other imperative reasons of overriding public interest including those of a social or economic nature and beneficial consequences of primary importance for the environment*”.

### **A.3.2 UK Protected Species**

#### **A.3.2.1 Wildlife and Countryside Act 1981**

The Wildlife and Countryside Act 1981 provide protection to both EPS and other species including wild birds, water voles and reptiles.

All wild birds, their nests and eggs are protected with some rare species afforded extra protection from disturbance during the breeding season (these species are listed in Schedule 1 of the Act). It is illegal to take any wild bird or damage or destroy the nests and eggs of breeding birds. There are certain exceptions to this in respect of wildfowl, game birds and certain species that may cause damage.

In England and Wales water voles are listed on Schedule 5 of the Wildlife and Countryside Act 1981, receiving full protection since 2008. The Wildlife and Countryside Act 1981 together with amending legislation, lists the following offences:

- Intentionally killing, injuring or taking a water vole by any method;
- Intentionally or recklessly damaging or destroying a water vole place of shelter or protection;
- Intentionally or recklessly damaging disturbing a water vole whilst it is occupying such a structure or place it uses for shelter or protection;
- Intentionally or recklessly obstructing access to a water vole’s place of shelter or protection;
- Selling, offering for sale, or possessing or transporting for the purposes of sale, any live or dead water vole, or any part or derivative, or advertising any of these for buying or selling.

All native reptile species in the UK are subject to partial protection from intentional or reckless killing or injury only.

#### **A.3.2.2 The Protection of Badgers Act 1992**

Badger and their setts are protected under the Protection of Badgers Act 1992 which makes it an offence to kill, injure or take a badger, or interfere with a sett.

#### **A.3.2.3 Eels (England and Wales) Regulations 2009 and Salmon and Freshwater Fisheries Act 1975**

The Salmon and Freshwater Fisheries Act 1975 and The Eels (England and Wales) Regulations 2009 list provisions such as maintaining fish passes where rivers may be obstructed by dams or weirs and the provision of screens on outlets to avoid entrapment of fish.

### A.3.3 Other Legislation Relating to Species

Public authorities listed in the Environment (Wales) Act 2016, including LPAs “must seek to maintain and enhance biodiversity in the exercise of functions in relation to Wales, and in doing so promote the resilience of ecosystems, so far as consistent with the proper exercise of those functions”.

Ecosystem resilience is defined as the capacity for ecosystems to adapt, and comprises the key characteristics:

- Diversity between and within ecosystems;
- The connections between and within ecosystems;
- The scale of ecosystems; and
- The condition of ecosystems (including their structure and functioning).

In complying with the Biodiversity and Resilience of Ecosystems Duty, it is necessary to have regard to:

- The list published under Section 7;
- The State of Natural Resources Report (SoNARR) published under Section 8<sup>50</sup>; and
- Any area statement published under Section 11 for an area that includes all or part of an area in relation to which the authority exercises functions.

Section 7 lists species and habitats which are ‘of principal importance for the purpose of maintaining and enhancing biodiversity in relation to Wales’ (as decided by WG in consultation with Natural Resources Wales (NRW)).

Locally Protected Species which may be identified within County Local Biodiversity Action Plans (LBAP), the Royal Society for the Protection of Birds (RSPB) ‘Birds of Conservation Concern’ or Red Data books for example.

### A.3.4 Invasive Species

Schedule 9 of the Wildlife & Countryside Act 1981 (as amended) lists certain plants and animals that are not native to Great Britain and could pose a threat to our native species and habitats.

Under this legislation it is an offence to plant or otherwise causes to grow in the wild any plant which is included in Part II of Schedule 9. It is also an offence to sell or to release into the wild any plants or animals on the Schedule.

The Invasive Alien Species (Enforcement and Permitting) Order 2019 allows for the enforcement of the EU Invasive Alien Species Regulation 1143/2014 on the prevention and management of invasive alien plant and animal species in England and Wales, including the relevant licenses, permits and rules for keeping invasive alien species. Species on this list are no longer listed on Schedule 9 of the Wildlife & Countryside Act 1981 (as amended).

People undertaking works in proximity to invasive non-native plant species should take all reasonable steps and exercise all due diligence to avoid committing an offence.

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<sup>50</sup> <https://naturalresources.wales/evidence-and-data/research-and-reports/the-state-of-natural-resources-report-assessment-of-the-sustainable-management-of-natural-resources/?lang=en>

## A.4 Hedgerow Regulations 1997

The Hedgerow Regulations 1997 set out a framework for the protection of hedgerows against removal where they are deemed to be important either due to their age, ecological or archaeological features. Approval is required from the local authority prior to the removal of hedgerows deemed Important under the Hedgerows Regulations.

## A.5 The Well-being of Future Generations

The Well-being of Future Generations Act 2015<sup>51</sup> places a duty on public bodies to carry out sustainable development. In this Act “sustainable development” means the process of improving the economic, social, environmental and cultural well-being of Wales by taking action, in accordance with the sustainable development principle, aimed at achieving the well-being goals.

The action a public body takes in carrying out sustainable development must include:

- (a) setting and publishing objectives (“well-being objectives”) that are designed to maximise its contribution to achieving each of the well-being goals, and
- (b) taking all reasonable steps (in exercising its functions) to meet those objectives.

The seven well-being goals include: a resilient Wales, a prosperous Wales, a healthier Wales, a more equal Wales, more cohesive communities, a Wales of vibrant culture and thriving Welsh language and a globally responsible Wales.

Of most relevance is 'A resilient Wales', which seeks to maintain and enhance a biodiverse natural environment with healthy functioning ecosystems that support social, economic and ecological resilience and the capacity to adapt to change (for example climate change).

## A.6 Planning Policy

### A.6.1 Planning Policy Wales (PPW)

At national level, Planning Policy Wales<sup>52</sup> sets the national policies in relation to development control through the Town and Country Planning Act 1990. This is supported by a series of Technical Advice Notes, with Technical Advice Note (TAN) 5<sup>53</sup> being of particular relevance as it sets out the consideration of nature conservation in the determination of planning applications. This policy and TAN 5 require Local Authorities to take measures to:

- Promote the conservation of landscape and biodiversity, in particular the conservation of native wildlife and habitats;
- Ensure that action in Wales contributes to meeting international responsibilities and obligations for the natural environment;

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<sup>51</sup> Acts of the National Assembly for Wales. The Well-being of Future Generations (Wales) Act 2015.  
<https://www.legislation.gov.uk/anaw/2015/2/contents/enacted>

<sup>52</sup> Welsh Government (2018). Planning Policy Wales, Edition 11, February 2021.

<sup>53</sup> Welsh Assembly Government (2009) Technical Advice Note 5: Nature Conservation and Planning.

- Ensure that statutorily designated sites are properly protected and managed;
- Safeguard protected species; and
- Promote the functions and benefits of soils, and in particular their function as a carbon store.

Developers must ensure that they comply with the above legislation by fully assessing the potential impacts on protected species and habitats from the proposed development. Where planning permission is required, this assessment must be finalised prior to and included with the submission of the planning application. The Planning Authority can then ensure that the necessary protected species and habitats information has been provided to inform an assessment and that proposals are in full accordance with relevant legislation and planning policy.

WG has produced a Nature Recovery Plan which is aimed at addressing the underlying causes of biodiversity loss by putting nature at the heart of its decision-making, by increasing the resilience of Wales' natural systems (ecosystems), and by taking specific action for habitats and species. It sets out how Wales will deliver the commitments of the EU Biodiversity Strategy and the UN Convention on Biological Diversity to halt the decline in our biodiversity by 2020 and then reverse that decline. The Nature Recovery Action Plan links to and complements The Well-being of Future Generations (Wales) Act 2015 and the Environment Act (Wales) 2016. Developments should seek to complement this, in order to meet objectives, set out in the Environment Act and Well-being Act.

Statutorily designated sites must be protected from damage and deterioration, with their important features conserved and enhanced by appropriate management.

Although non-statutory designations carry less weight than statutory designations, they can make a vital contribution to delivering an ecological network for biodiversity and resilient ecosystems, and they should be given adequate protection in development plans and the development management process.

Planning authorities must follow a step-wise approach to maintain and enhance biodiversity and build resilient ecological networks by ensuring that any adverse environmental effects are firstly avoided, then minimized, mitigated, and as a last resort compensated for; enhancement must be secured wherever possible

The presence of a species protected under European or UK legislation, or under Section 7 of the Environment (Wales) Act 2016 is a material consideration when a planning authority is considering a development proposal which, if carried out, would be likely to result in disturbance or harm to the species or its habitat and to ensure that the range and population of the species is sustained.

Planning authorities should protect trees, hedgerows, groups of trees and areas of woodland where they have ecological value, contribute to the character or amenity of a particular locality, or perform a beneficial and identified green infrastructure function. Planning authorities should consider the importance of native woodland and valued trees, and should have regard, where appropriate, to local authority tree strategies or SPG. Permanent removal of woodland should only be permitted where it would achieve significant and clearly defined public benefits. Where woodland or trees are removed as part of a proposed scheme, developers will be expected to provide compensatory planting.

Ancient woodland and semi-natural woodlands and individual ancient, veteran and heritage trees are irreplaceable natural resources, and have significant landscape, biodiversity and cultural value. Such trees and woodlands should be afforded protection from development which would result in their loss or deterioration unless there are significant and clearly defined public benefits; this protection should prevent potentially damaging operations and their unnecessary loss. In the case of a site recorded on the Ancient Woodland Inventory, authorities should consider the advice of NRW.

Nature based solutions should be the first consideration given the opportunity to deliver other multiple benefits, including habitat creation, biodiversity enhancement and water quality improvements. Overall, green infrastructure opportunities can benefit ecosystem resilience and provide opportunities for leisure facilities or renewable energy generation.

## Chapter 6 updates; PPW

Chapter 6 of the Planning Policy Wales has been updated with immediate effect as of 18th October 2023. The changes apply to all planning applications regardless of size and scale. A Green Infrastructure Statement is now required with planning applications. All schemes applying for planning permission must achieve a Net Benefit for Biodiversity.

A Green Infrastructure Statement will be required with all planning applications to demonstrate the stepwise approach (stepwise approach is defined as any adverse environmental effects are firstly avoided, then minimised, mitigated, and as a last resort compensated for) and compliance with biodiversity net benefit and ecosystem resilience.

There is an emphasis on avoidance of development within statutory designated sites, or those not within but likely to damage, as a matter of principle. In relation to Non-statutory Designated Sites (such as SINC)s there is additional need for a written opinion from the authority Ecologist. However, development is not presumed unacceptable in SINC)s, only that 'Where harm is unavoidable it should be minimised by mitigation measures and offset as far as possible by compensation measures designed to ensure there is no reduction in the overall conservation value of the area or feature, and a net benefit for biodiversity secured'.

The policy places emphasis on the retention of trees and hedgerows, both urban and rural, with a minimum ratio of at least three trees of a similar type and compensatory size planted for every one lost.

The policy also places importance of the identification of managed wetland and riparian buffer zones to improve water quality were identified as a key output of green infrastructure assessments as they will have a positive benefit in both reducing diffuse pollution and as part of securing a net benefit for biodiversity and improving the attributes of ecosystem resilience.