



HAFOD Y RHEDRWYDD HEP

ECOLOGICAL SURVEYS

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1.0 INTRODUCTION

Hafod y Rhedrwydd is a small isolated house at the northern edge of the Migneint at SH 766458 in the Snowdonia National Park (SNP). Situated at approximately 400 metres asl, the house has no mains water or electricity supply. It is surrounded by land owned and managed by the National Trust. The owner of the property wishes to build a small run-of-river hydroelectric (HEP) scheme which will both provide running water and electricity to the house. **Maps 1** and **2** show the layout of the scheme and the proposed penstock in the upper section. The scheme is modestly rated at 7.5-8 KW generation capacity and the penstock pipe will be only 110 mm in diameter. The electricity cable will be fed back up to the house from the Turbine House within the penstock trench.

The scheme requires an Abstraction Licence from Natural Resources Wales (NRW) and Planning permission from the SNP Authority. **Gritten Ecology** have been commissioned to undertake ecological surveys to accompany the applications for both Planning Permission and the Abstraction Licence.

In addition, the entire catchment for the scheme lies within both the Migneint-Arenig-Dduallt Special Area of Conservation (SAC) (**Map 3**) and the Special Protection Area (SPA) of the same name (**Map 4**). These sites are protected under the Habitats & Species Regulations 2017, the Wildlife and Countryside Act 1981 (as amended) and the Countryside and Rights of Way Act 2000. In order to inform the Habitat Regulations Assessment (HRA) process, ecological surveys have to be carried out so that the Appropriate Authority can determine whether there will be any impacts of the proposal on the features of the SAC and under-pinning SSSI. Accordingly, ecological surveys were also designed to provide enough information for the Appropriate Authority (the SNP Authority) to undertake a HRA.

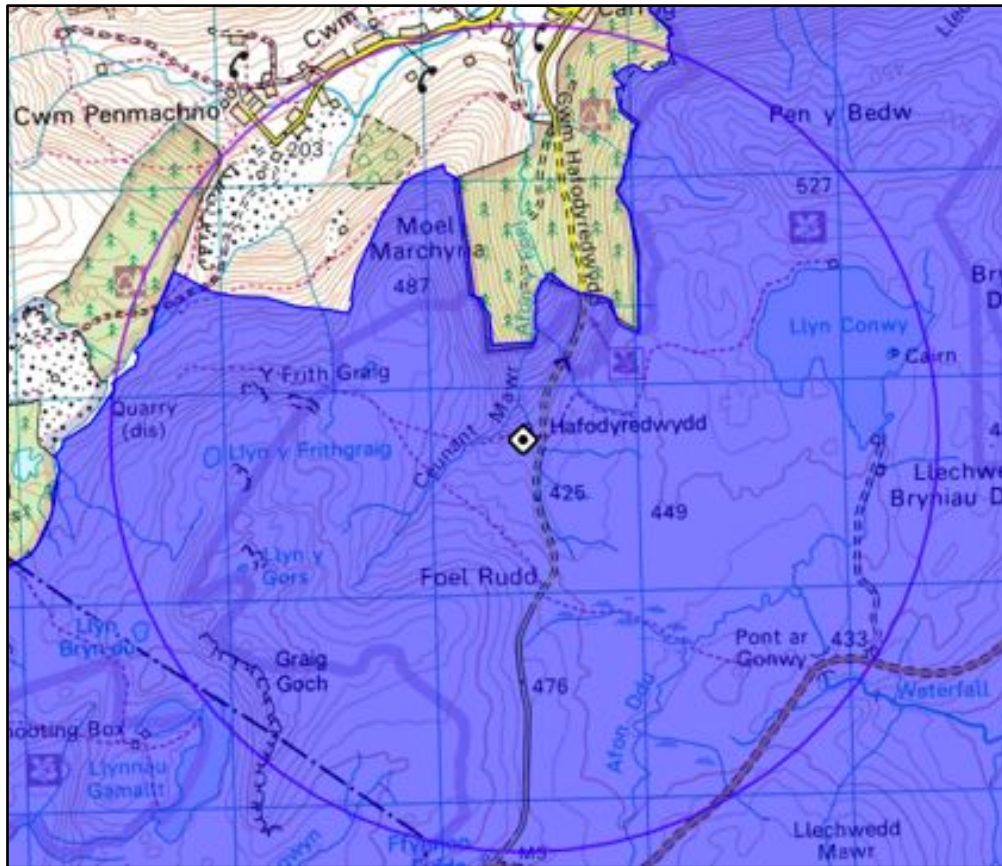
Surveys were carried out on 29th May during dry clear weather and covered vegetation to Phase 2 level and Protected Species along all temporary access tracks and works compounds and the penstock route. The depleted reach of the Afon y Foel was surveyed for its vegetation, including bryophytes and Protected Species. In the present context, Protected Species surveys were carried out for otters (*Lutra lutra*), water voles (*Arvicola amphibius*), badgers (*Meles meles*), bats and birds.



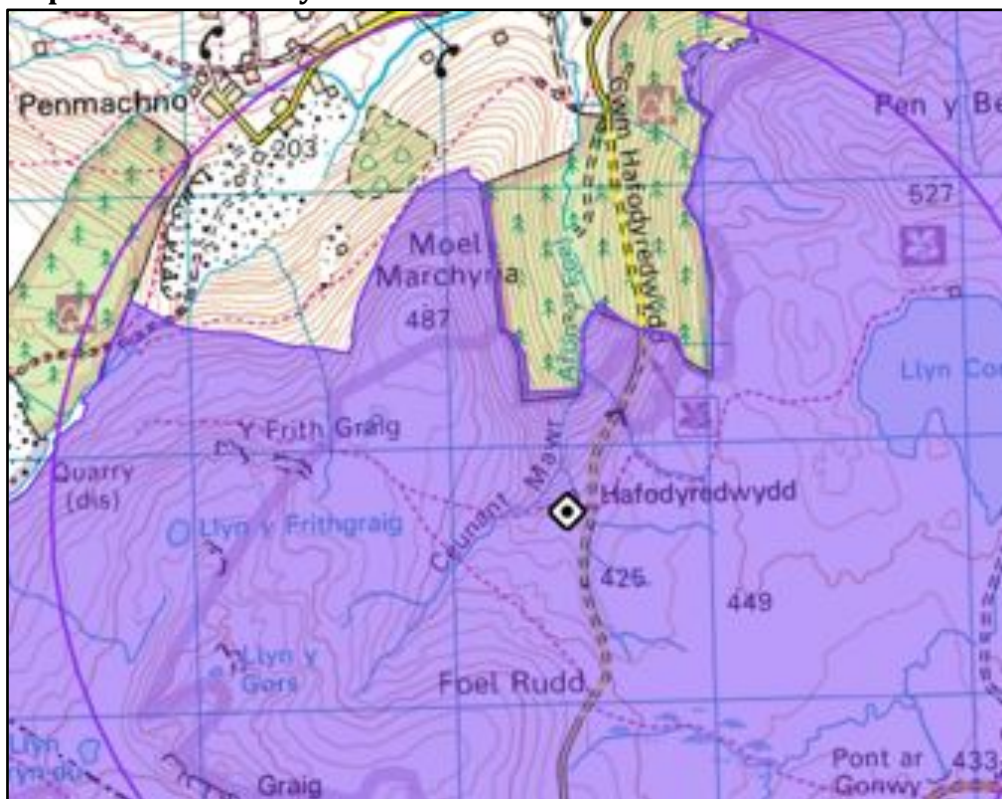
Map 1: The penstock is marked in black with the HEP catchment in brown.



Map 2: The upper section of the penstock to show the T-off for the water supply to the house (behind trees).



Map 3: The boundary of the SAC.



Map 4: The boundary of the SPA.

2.0 VEGETATION

2.1 Legislative Context

Under the Wildlife and Countryside Act 1981, it is an offence to intentionally pick, uproot or destroy any wild plant included in Schedule 8. Particular care must be taken if any plants (or habitats) listed under Section 42 of the NERC Act (2002) might be affected.

2.2 Results

2.2.1 The Penstock Route

The modest Intake Weir will be constructed, with its integral Coanda Screen at SH 761456 in a mosaic of heath and acid grassland (**Photo 1**).



Photo 1: The site of the Intake Weir will be on mudstone at a narrow part of the stream. The penstock will contour around the right bank before crossing the dense heather (*Calluna vulgaris*) beyond.

The heather element of the sward corresponds to **NVC: H12 *Calluna vulgaris-Vaccinium myrtillus*** heath with patches of **U5 *Nardus stricta-Galium saxatile*** grassland in between. The whole site is open to sheep-grazing but, judging by the height of the heather, this is light. Species noted here were *Calluna vulgaris*, *Vaccinium myrtillus*, *Empetrum nigrum*, *Juncus squarrosus*, *J. effusus*, *Festuca ovina*, *Anthoxanthum odoratum*, *Luzula multiflora*, *Galium saxatile*, *Agrostis capillaris*, *Dryopteris dilatata*, *Blechnum spicant*, *Sorbus aucuparia* (seedlings), *Deschampsia flexuosa*, *Carex pilulifera*, *Nardus stricta* with

the bryophytes *Polytrichum commune*, *Rhytidiadelphus squarrosus*, *R. loreus*, *Pleurozium schreberi*, *Hypnum jutlandicum*, *Racomitrium lanuginosum*, *R. fasciculare* and *Hylocomium splendens*. Where the drainage was slightly impeded, species such as *Eriophorum angustifolium* and *E. vaginatum* were noted together with *Sphagnum fallax*, *S. capillifolium*, *S. subnitens*, *S. affine*, *Racomitrium aquaticum*, *Pellia epiphylla* and *Diplophyllum albicans*.

The COFNOD Local Records Centre search (see **8.0** below) has a record for Lesser Twayblade (*Neottia (Listera) cordata*) found in the area. This is a diminutive Orchid which is known to be found throughout the Migneint where it is often hidden beneath dense heather. Despite careful search of the short section of heath through which the penstock passes, none was found.

The first 47 metres of the penstock where it leaves the Intake Weir will be laid on the ground surface beside the stream (**Photo 1**) since it will be impossible to bury it, as the bedrock is so close to the surface. The applicant intends to wrap the penstock in hessian to a) disguise it and b) to allow a vegetation layer to grow upon it.

Once through this short section, the penstock will be buried in an area of deep **H12** heather (**Photo 2**) before soon breaking out into a large area of mixed vegetation which is effectively a mosaic of **NVC: U5** and **M23 *Juncus effusus/acutiflorus-Galium palustre*** rush-pasture (**Photo 3**). Species noted here were *Juncus effusus*, *J. squarrosus*, *Anthoxanthum odoratum*, *Nardus stricta*, *Festuca ovina*, *Agrostis capillaris*, *Luzula multiflora*, *L. sylvatica*, *Potentilla erecta*, *Galium saxatile*, *Vaccinium myrtillus*, *Rumex acetosella*, *Carex pilulifera*, *C. binervis*, *Digitalis purpurea* with the bryophytes *Hylocomium splendens*, *Rhytidiadelphus squarrosus*, *R. loreus*, *Polytrichum strictum*, *P. commune*, *Sphagnum girgensohnii* and *S. fallax*. Compared with the earlier heath, this rush-pasture is not of significant floristic interest.

The penstock will be buried through this rush-pasture and beneath a small stream (*Racomitrium aciculare*, *R. aquaticum*, *Scapania undulata*, *Platyhypnidium alopecuroides*). It will pass below a stand of *Ulex europaeus* (**Photo 3**) before reaching Hafod y Rhedrwydd itself where the penstock will divide, part to provide water for the house and part to continue downhill to the Turbine House.

The rush-pasture sward around the house where the ground is less steep has been regularly topped by the tenant farmer in previous years in order to control the rushes (*Juncus effusus*). The ground here is probably a little more fertile and the vegetation corresponds more closely to **NVC: U4 *Festuca ovina-Agrostis capillaris-Galium saxatile*** acid grassland with similarities to **NVC: MG10 *Holcus-Juncetum effusi*** rush-pasture (**Photo 4**). Whilst superficially similar in appearance to the swards already described, a number of additional species were noted, namely, *Rumex acetosa*, *Urtica dioica*, *Ficaria verna*, *Deschampsia cespitosa*, *Cerastium fontanum* and *Holcus lanatus*.



Photo 2: The penstock will pass through an area of deep heather...



Photo 3: ... and into an area of acid grassland passing just below and left of the stand of Gorse.



Photo 4: From the acid grassland, the penstock will be buried towards the house passing through more fertile ground.

From Hafod y Rhedrwydd, the penstock passes downhill through the grassland/rush-pasture mosaic dominated by *Juncus effusus* (**Photo 5**) and will then be buried beneath another small stream (**Photo 6**). Species noted in and either side of this stream were *Racomitrium aciculare*, *Atrichum crispum*, *Polytrichum commune*, *Scapania undulata*, *Hygrohypnum ochraceum*, *Andreaea rupestris* and *A. rothii*. Once past the stream, the vegetation becomes even more dominated by *J. effusus* (**Photo 7**) and is best described as **M23** rush-pasture since there is little acid grassland in between the stands of rushes. However, there are a number of other species present, namely, *Rumex acetosa*, *R. acetosella*, *Cardamine pratensis*, *C. flexuosa*, *Digitalis purpurea*, *Agrostis capillaris*, *Stellaria alsine*, *Galium palustre*, *G. saxatile*, *J. acutiflorus*, *Cirsium palustre*, *Chrysosplenium oppositifolium*, *Luzula multiflora*, *Carex hostiana*, *Athyrium filix-femina*, *Veronica serpyllifolia*, *Ranunculus acris* with the bryophytes *Rhytidiadelphus squarrosus*, *Lophocolea bidentata*, *Plagiomnium undulatum*, *Calliergonella cuspidata*, *Sphagnum fallax*, *Pseudoscleropodium purum*, *Hylocomium splendens* and *Thuidium delicatulum*.



Photo 5: From the house, the penstock passes through rush-pasture...



Photo 6: ... and beneath another small stream...



Photo 7: ... and continues downhill through dense *J. effusus*.

As the penstock burial progresses downhill, the slope becomes steeper and more flushed and conditions become a little less acidic. The stands of *J. effusus* progressively give way to swards more dominated by *J. acutiflorus* (see **Photo 8**). Other species become more prevalent such as *Galium palustre*, *Rumex acetosa*, *Epilobium palustre*, *Potentilla erecta*, *Deschampsia cespitosa*, *Carex nigra* with the bryophytes *Aneura pinguis*, *Atrichum crispum* and *Philonotis fontana*. As such, these flushed areas could be considered as the precursors to the **M32 *Philonoto-Saxifragetum stellaris*** springs which become relatively common along the riparian zone of the river itself, described in the next section. However, *Saxifraga stellaris* was not found within these flushes on this slope.

Lower down, the ground once more becomes drier and the vegetation changes to reflect this. Stunted trees (*Crataegus monogyna*, *Salix aurita*) are dotted throughout and Bracken (*Pteridium aquilinum*) becomes abundant in places (**Photo 9**). As such, the sward is probably best described as the **NVC: U20 *Pteridium aquilinum-Galium saxatile*** community but it is more a complex mosaic of **U4** acid grassland, developing heath and flushes. Species noted here were *Holcus lanatus*, *Digitalis purpurea*, *Galium saxatile*, *Potentilla erecta*, *Anthoxanthum odoratum*, *Deschampsia cespitosa*, *Agrostis capillaris*, *Luzula campestris*, *Oxalis acetosella*, *Hyacinthoides non-scripta*, *Cerastium fontanum*, *Rumex acetosella*, *Nardus stricta*, *Carex binervis*, *C. caryophylla*, *Ficaria verna*, *Blechnum spicant*, *Vaccinium myrtillus*, *Conopodium majus*, *Veronica officinalis*, *Oreopteris limbosperma*, *Plantago lanceolata*, *Viola riviniana*, *Polygala serpyllifolia*, *Calluna vulgaris* with *Thuidium tamariscinum*, *Polytrichum*



Photo 8: The *J. effusus* swards give way to *J. acutiflorus* where the ground becomes more flushed.



Photo 9: Conditions once more become drier with trees and Bracken.

juniperinum, *Racomitrium fasciculare*, *R. lanuginosum*, *Andeaea rupestris*, *Rhytidiadelphus squarrosus*, *Isoetecium myosuroides* and *Dicranum scoparium*.

Within this drier landscape, here too are flushes which continue down to the edge of the Afon y Foel where the small Turbine House will be located (**Photo 10**). These flushed mires correspond to **NVC: M6 *Carex echinata-Sphagnum recurvum (fallax)/auriculatum (denticulatum)*** mires. Species noted here were *Cirsium palustre*, *Carex echinata*, *C. panicea*, *Viola palustris*, *Trichophorum germanicum*, *Pedicularis sylvatica*, *Dactylorhiza maculata*, *Eriophorum angustifolium*, *Juncus articulatus*, *Potentilla erecta*, *Festuca ovina*, *Anthoxanthum odoratum*, *Agrostis capillaris*, *Holcus lanatus*, *Galium palustre* and the bryophytes *Diplophyllum albicans*, *Sphagnum denticulatum*, *S. capillifolium*, *S. subnitens*, *S. palustre*, *S. compactum*, *S. fallax* and *Polytrichum commune*.

As far as possible, the penstock burial down this slope to the area of the Turbine House will keep to the drier ground and avoid the flushes.



Photo 10: Looking upstream, the small Turbine House will be built at the toe of an M6 flush to the left of the river.

2.2.2 The river and its riparian zone

The Afon y Foel along the depleted reach is essentially completely open in character. At the lower end where it borders the forestry plantation (**Photo 11**), a number of scattered trees line the river, namely, *Salix aurita*, *Betula pubescens*, *Corylus avellana*, *Sorbus aucuparia* and *Picea sitchensis*. *Hedera helix* is also present. The river is stepped all the way upstream to the Intake Weir site punctuated by several attractive waterfalls (**Photo 12**). One characteristic of this river is the dominance of a few bryophyte species which form extensive lawns at the sides of these falls and where water seeps over adjacent bedrock exposures (**Photo 12**).

Also of interest is the vegetation that has developed alongside the river where flushes from the hillsides either side drain into it. These correspond clearly to the **M32 *Philonoto-Saxifragetum stellaris*** springs mentioned in the previous section (**Photo 13**). *Saxifraga stellaris* is a particularly attractive component of this vegetation with *Viola palustris*, *Ficaria verna*, *Phegopteris connectilis*, *Chrysosplenium oppositifolium*, *Valeriana officinalis*, *Dactylorhiza maculata* and the bryophytes *Bryum pseudotriquetrum*, *Pellia endiviifolia*, *Philonotis fontana* and *Atrichum crispum*.



Photo 11: Scattered trees are found along the lower section of the depleted reach of the Afon y Foel.



Photo 12: One of the falls on the Afon y Foel. The darker mosses in the seepages either side are *Hygrohypnum ochraceum* and the lighter ones *Scapania undulata*.



Photo 13: An NVC: M32 spring with abundant *Saxifraga stellaris*.

Where water flushes over bedrock besides the river *Sphagnum denticulatum* flourishes with *Pinguicula vulgaris* in flower.

Bryophytes noted in the depleted reach are shown in **Table 1** below.

Species	Abundance	Locality
<i>Scapania undulata</i>	3	In-stream and seepages
<i>Fontinalis squamosa</i>	1	In-stream
<i>Racomitrium aciculare</i>	2	In-stream
<i>R. fasciculare</i>	2	Riparian boulders
<i>Atrichum crispum</i>	2	Lateral flushes
<i>Jungermannia paroica</i>	3	Waterfalls
<i>Polytrichum commune</i>	2	Riparian flushes
<i>Andreaea rothii</i>	2	In-stream and seepages
<i>Pellia epiphylla</i>	3	Riparian banks
<i>P. neesiana</i>	2	Riparian banks
<i>P. endiviifolia</i>	1	M32 springs
<i>Isoetecium holtii</i>	1	Riparian banks
<i>Sphagnum denticulatum</i>	2	Riparian seepages
<i>S. girgensohnii</i>	2	Riparian flushes
<i>S. fallax</i>	3	Riparian flushes
<i>S. palustre</i>	2	Riparian flushes
<i>S. subnitens</i>	1	Riparian flushes
<i>S. capillifolium</i>	2	Riparian flushes
<i>Mnium hornum</i>	1	Riparian banks
<i>Brachythecium plumosum</i>	2	Riparian seepages
<i>Bryum pseudotriquetrum</i>	1	M32 springs
<i>Philonotis fontana</i>	1	M32 springs
<i>Hygrohypnum ochraceum</i>	3	In-stream and seepages
<i>Campylopus atrovirens</i>	1	Riparian boulders
<i>Hyocomium amoricum</i>	1	Riparian banks
<i>Diplophyllum albicans</i>	2	Riparian seepages
<i>Breutelia chrysocoma</i>	1	Riparian flushes
<i>Aneura pinguis</i>	1	Riparian flushes
<i>Nardia compressa</i>	3	In-stream and seepages
<i>Rhizomnium punctatum</i>	1	Riparian flushes
<i>Lepidozia reptans</i>	1	Riparian banks
<i>Calliergonella cuspidata</i>	1	Riparian flushes
<i>Marsupella emarginata</i>	1	In-stream and seepages
<i>Pogonatum aloides</i>	1	Riparian banks
<i>Amphidium mougeotii</i>	1	Riparian cliff seepage

Table 1: Bryophytes found in-stream and along the riparian zone of the depleted reach of the Afon y Foel. (Abundance: 1 = infrequent, 3 = common).

The Afon y Foel along the depleted reach is open in aspect and is, therefore, quite unlike other ceunant-type rivers in the locality. As such, the hygrophilous bryophyte flora found here must depend on either more-or-less

permanent inundation, seepages of water across riparian rocks or flushed water in the riparian zone. Desiccation-sensitive *Microlejeuneaceae* that flourish in high humidity gorges appear to be absent from this locality. However, they, and other species may be found in some of the shadier cliff faces beside the river but there was a lack of time to search these areas thoroughly. In any event, water abstraction from the depleted reach would not affect these species in this habitat.

Thus, the strictly aquatic flora of this river seems to be confined to a few very abundant and showy species such as *Scapania undulata*, *Hygrohypnum ochraceum*, *Jungermannia paroica* and *Nardia compressa*. It is considered unlikely these species would be negatively impacted upon by this proposal, especially considering the low abstraction volumes proposed. In addition, the size of the river at the Intake Weir compared with below at the Turbine House shows just how much additional water is coming into the depleted reach from side streams along its length.

One must also take into account the location of this proposed scheme. Despite weeks without rain before the survey was undertaken, the river appeared to be flowing strongly. **Map 1** shows that the catchment above the Intake Weir is comparatively large. It is underlined by often very deep peat. (The Migneint is important for its blanket and raised bog communities). The presence of this extensive peat will create the so-called sponge effect, releasing stored water over long periods of time even in the absence of rainfall.

2.2.3 Discussion

No Section 42 or Schedule 8 species of bryophytes or other plants were found, either associated with the river nor along the penstock route. Indeed, a recent list compiled by Natural Resources Wales (NRW) suggests a simple ranking system for determining the bryophyte interest within Welsh ravines (Bosanquet & Dines, 2011)*.

An 'Oceanic Ravine Bryophyte Assemblage' has been identified using combinations of species and it is useful to compare the bryophyte assemblage of the Afon y Foel and its riparian zone with this list. According to Bosanquet and Dines (2011), an Oceanic Ravine Bryophyte Habitat is "likely to be present" if a site supports any one of a number of listed species (in this case none), any three of a number of listed species (in this case none), any five of a number of listed species (in this case only *Isothecium holtii*) or any eight of a number of listed species (here only *Hyocomium amoricum*). The presence of so few of these indicator species would not place this stream into the context of an 'Oceanic Ravine Bryophyte Assemblage'.

It is considered the impact of water abstraction on this river will be negligible as far as its bryophyte flora is concerned.

*Bosanquet & Dines (2011) *Changes to the published Section 42 Bryophyte List*. Plantlink Cymru paper for Wales Biodiversity Partnership.

3.0 OTTERS (*Lutra lutra*)

3.1 Legislative Context

The European Otter is fully protected in England and Wales under Sections 9.1 and 9.5 of Schedule 5 of the Wildlife and Countryside Act 1981 under which it is an offence to kill, injure or take an otter without a licence; to intentionally damage, destroy or obstruct a holt; or to disturb an otter in its resting place.

In addition, it is protected under the European Habitats & etc. Directive (92/43/EEC) since it falls under Annex 2a and 4a of the Bern Convention (Appendix III). Otters are, therefore, 'European Protected Species'. They also receive worldwide protection under CITES (Convention on International Trade of Endangered Species). Licences are required for checking known holts or for carrying out work that may disturb otters such as the management of trees that are known to be used as resting (lie-up) sites. In Wales, the licensing authority is NRW.

3.2 Survey Methodology

Otters are very largely nocturnal animals and in practice are rarely seen during surveys. Instead, surveyors have to rely on characteristic field signs. The most common of these are their droppings, known as spraints. These have a very distinctive smell and appearance and are used to mark otter territories. They are, therefore, often deposited on prominent riparian features such as rocks, beneath bridges or on large tufts of tussocky vegetation. Careful examination of these spraints can often reveal the recent diet of these illusive animals since fish bones, scales etc. pass through the otter's gut relatively unaffected by digestive enzymes. The texture and appearance of spraints can also be used to determine how recently they were deposited. The frequency of their distribution can also inform surveyors of the relative otter activity within a catchment. The characteristic smell of fresh spraints can often be detected some time before the spraints themselves are seen.

Other field signs are also important indicators of otter activity. These include prey remains, footprints and slides, holts and lie-up sites. Holts (breeding sites) and lie-up sites are usually marked by sprainting activity near their entrances.

In the context of the present survey, a careful search was made for, holts, lie-up sites and spraints and other otter signs along the penstock corridor where flushed ground occurred and the affected reach of the Afon y Foel and, in particular, all around the Intake Weir and Turbine House/outflow sites (see **Map 1**).

3.3 Results

Despite careful search, no signs of otters were noted anywhere within the survey area. It is entirely probable that otters use rivers such as the Afon y Foel for feeding and access into upland areas but no spraints were found. More significantly, no lie-up or holts sites were noted in the vicinity of the Intake Weir or the Turbine House/outfall.

3.4 Conclusion

It must be concluded that otters would mostly unlikely be affected during the running of the HEP scheme (water abstraction). However, there is a possibility that otters might be affected during the construction process even though there is no evidence of the presence of holts or lie-up sites within the principle construction zone areas. Therefore, the following Reasonable Avoidance Measures (RAMs) will be adopted during the construction period to minimise any impact on this species:

1. Any unnecessary works along the river's edge will be avoided. In particular, any vegetation developing along the depleted reach of the river will be retained wherever possible since otters will favour any cover within the riparian zone for concealed movement.
2. Otters are naturally inquisitive animals and are likely to investigate a construction site. Therefore, during the construction phase all machinery which could harm otters will be made safe, or cordoned off with temporary fencing at the end of the working day.
3. All works will be restricted to daylight hours so as to cause as little disturbance as possible to these largely nocturnal creatures. Night working that might require artificial lighting will be avoided.
4. Suitable ramps will be placed within any temporary or permanent deep excavations in case otters become trapped within them.

4.0 BADGERS (*Meles meles*)

4.1 Legislative Context

Badgers enjoy statutory protection under the Protection of Badgers Act 1992. Under this legislation, it is an offence to:

- willfully kill, injure, take, possess or cruelly ill-treat a badger, or to attempt to do so,
- or to intentionally or recklessly interfere with a sett.

Sett interference includes disturbing badgers whilst they are occupying a sett, as well as damaging or destroying a sett or obstructing access to it. Under this legislation, a sett is defined as "any structure or place which displays signs indicating current use by a badger". It is thus important to be able to distinguish between an old unoccupied sett and one in current usage.

In Wales, the Welsh Government (WG) provide licences for developments and construction activities which might disturb badgers but for developments

listed under S.55(1) of the Town and Country Planning Act 1990, such as HEP schemes, it is NRW who have the appropriate powers. Developments and construction activities include:

- the use of heavy machinery (generally defined as tracked vehicles) within 30 metres of any entrance to an active sett,
- the use of lighter machinery (generally defined as wheeled vehicles), particularly for any digging operations, within 20 metres,
- light work such as hand digging or scrub clearance within 10 metres.

In practice, construction activities that require blasting with explosives will need to be licensed if more than 30 metres from an active sett. Thus, the need for a licence (and mitigation) will depend on the precise location and extent of the proposed development in relation to an active sett. In any event, it is probably best to consult both NRW and WG if there is any reasonable doubt about the possibility of disturbance to a sett.

4.2 Survey Methodology

Badgers are nocturnal animals and are rarely seen during the day, generally emerging from their setts at dusk. Thus, survey techniques rely on being able to detect field signs of these surprisingly common animals. Setts are the most obvious feature and a surveyor will be able to determine whether setts are active or not and gain some understanding of the population size and its fecundity by the number of entrances being used and the nature of the spoil outside these sett entrances. Other field signs include latrines, runs and footprints, feeding scrapes and the presence of their characteristic hairs caught on barbed-wire fences and other obstructions. If runs were located, these were followed for some distance in an attempt to find the location of active setts.

In practice, a thirty metre corridor either side of the penstock route was surveyed in detail for signs of badger activity.

4.3 Results

No signs of badgers were noted anywhere within the study area.

4.4 Conclusion

Badgers will not be affected by the proposal.

5.0 WATER VOLES

5.1 Legislative Context

Water Voles are protected by law and are a conservation priority within the UK's Biodiversity Action Plan (BAP). Under the Wildlife and Countryside Act 1981 (as amended by Variation of Schedule 5) (England) Order 2008 it is an offence to intentionally or recklessly:

- damage, destroy or obstruct access to any structure or place that water voles use for protection or shelter,

- disturb a water vole whilst it occupies such a place.

This increased protection adds prohibitions against intentional killing, taking or injury, possession and sale. It should also be noted that Section 10 of the Act requires that “reasonable” steps are taken to avoid unnecessary damage to such structures or places.

Should it be considered that water voles might be disturbed by a development or construction activity, a licence will need to be obtained from NRW.

5.2 Survey Methodology

It is understood that water voles have declined by as much as 90% in the UK over the past few decades. Up to the 1950s and early '60s, it was common to see water voles in daylight plopping into watercourses and swimming across the ditches, slow-moving streams, ponds and lakes that was their commonest habitat. Because of extensive land-drainage and the predation effects of American Mink (*Neovison vison*), particularly in lowland areas, it is now extremely uncommon to see water voles. Thus, this species is now more common in upland areas. As a result, surveying for the presence of water voles has to be based on field signs rather than hoping to see the animals themselves. This involves a careful and detailed examination of the riparian and wetland habitats where they live and looking for the following signs: burrows, latrines, runs and larders.

A careful search was made of the riparian zone of the affected reach of the river, particularly in the vicinity of the Intake Weir and Turbine House/outflow. Careful search for water vole signs was also made within the flushed areas which the penstock crosses.

5.3 Results

No signs of water voles were noted anywhere within the survey area.

5.4 Conclusion

Water voles will not be affected by the proposed HEP scheme.

6.0 BATS

6.1 Legislative Context

All species of bats have been listed on Annex IV of the EC Habitats & etc. Species Directive (1994). Bats are, therefore, ‘European Protected Species’. The domestic UK legislation which underpins this Directive ensures that individual bats and their breeding sites (maternity roosts), nursery roosts and resting places (roosts) are protected. Before undertaking any works that might either directly affect bats or their roosts, surveys have to be carried out to ascertain the degree, if any, of usage by bats. Should any signs of bats be found, a licence from

NRW has to be applied for before works commence. Developers starting such works will be breaking the law if a licence has not been granted before works commence.

6.2 Survey Methodology

Bats are nocturnal and remain well-hidden during the day. They are generally inactive in the winter when they are hibernating. Different species prefer different roosting sites. In the present context it was considered adequate to confine bat surveys to looking for potential roosting sites in cavities or under loose bark of trees where they might be vulnerable to felling or pruning during construction works.

6.3 Results

There are hardly any trees or other structures within the study area that might provide suitable roost sites for bats. In any event, no trees will be felled during the construction of the scheme.

6.4 Conclusion

Bats will not be affected by the proposal.

7.0 BIRDS

7.1 Legislative Context

Under the UK Wildlife and Countryside Act (1981), it is an offence to take, damage or destroy the nest of any wild bird while that nest is in use or being built, or to take or destroy an egg of any wild bird. Under the same legislation, it is an offence to intentionally or recklessly disturb any bird included in Schedule 1 while it is building a nest or is in, on or near a nest containing eggs or young, or disturb dependent young of such a bird. Should there be a possibility that any bird nests be damaged during the construction of the HEP scheme, works would have to stop until the young had flown and there was no possibility of a second or subsequent brood being raised in the same nest.

7.2 Survey Methodology

A careful search was made along the proposed penstock route and the depleted reach of the river for nests and birds. Binoculars were used to facilitate identification. As well as current signs of breeding bird activity, a very detailed search was undertaken for previous years' nests along the pipeline route, particularly of ground-nesting birds. Ideally, breeding bird surveys involve searching for signs of birds which may then lead surveyors to the site of nests. Finding nests themselves, especially in dense ground vegetation is, in practice, quite rare unless an observer can spot them by inadvertently 'flushing' the birds.

7.3 Results

Surprisingly, no signs of previous birds' nests were noted within the study area. However, a number of different species were heard and seen and these are shown in **Table 2** below. No Schedule 1 species were seen though it is

known that Hen Harrier (*Circus cyaneus*) frequent the area (see 8.0 below) and nest on the ground in mature heather. It is considered unlikely this species will nest so close to a building or road however little frequented.

Species	Species	Location
Pied Wagtail	<i>Motacilla alba</i>	Near outflow
Cuckoo	<i>Cuculus canorus</i>	Heard in heathland above
Chaffinch	<i>Fringilla coelebs</i>	Woodland near outflow
Wren	<i>Troglodytes troglodytes</i>	Throughout
Buzzard	<i>Buteo buteo</i>	Flying overhead
Pied Flycatcher	<i>Ficedula hypoleuca</i>	Heard in woodland below
Stonechat	<i>Saxicola torquata</i>	Upland areas
Raven	<i>Corvus corax</i>	Upland areas
Grey Wagtail	<i>Motacilla cinerea</i>	River
Meadow Pipit	<i>Anthus pratensis</i>	Throughout

Table 2: Birds seen and heard during the survey.

7.4 Conclusion

It is now generally accepted that birds will not be affected by water abstraction during the running of an HEP scheme. In order to avoid any impact on breeding birds, the penstock route (3 metres wide) will be strimmed before works start to deter birds from breeding here, provided this is outside of the breeding season (April to August). Strimmed arisings will be disposed of either side of the penstock route so as to create as much bare ground as possible. If works are likely to start during the breeding season and strimming has not been undertaken, a further detailed bird survey will be carried out to ensure breeding birds are not impacted upon.

8.0 COFNOD Local Records Centre search

There are a number of important upland breeding bird records for the area. These include Hen harrier (*Circus cyaneus*) spotted 141 metres from Hafod y Rhedrwydd itself in 2005, then 361 metres away in 2015. Red Grouse (*Lagopus lagopus*) were seen in 2005 about 900 metres to the east of the site but may well have disappeared since then. A Merlin (*Falco columbarius*) was observed 255 metres away in 2012. It is unlikely any of these species will be impacted upon by the proposal.

An “exceptional assemblage of rare upland spiders “ (NRW Pre-application response 3.10.17) were recorded from 800 metres away in 1971 then in 2003 in blanket bog. These species included *Clubiona norvegica*, *Maro lepidus*, *Hilaira pervicax* and *Erigone welchi*. The latter species is one of an assemblage that is typically found in saturated *Sphagnum* lawns which are associated with blanket and raised bogs. The present proposal has been specifically designed to avoid such habitats and, apart from the very top part of the penstock route, generally follows acid grassland/rush-pasture mosaics. In any event, the impact of such a scheme, utilising small-gauge pipes with minimal

burial by small plant will have little impact on invertebrate communities and none in the long-term.

Otters have been recorded well downstream of the Turbine House which confirms that this species uses the Afon y Foel. For reasons explained in 3.0 – 3.4 above, otters will not be affected by the proposal.

A bryophyte survey conducted of Ceunant Mawr, the top section of the Afon y Foel, revealed *Schistidium rivulare* and *Leiocolea alpestris*, the latter found growing over *Amphidium mougeotii*. Whilst the latter species was found in small cushions growing on an undercut cliff next to one of the waterfalls, neither of the two species were noted during the survey.

9.0 INVASIVE NON-NATIVE SPECIES (INNS)

None was recorded during the present surveys although there are records of Japanese Knotweed (*Fallopia japonica*) down the valley from the Turbine House location (COFNOD). It is not considered that the presence of INNS so far from the proposal will be an issue.

10.0 HRA

10.1 The SAC

The Joint Nature Conservancy Council (JNCC) lists the following features for the Migneint-Arenig-Dduallt SAC:

Annex I habitats that are a primary reason for selection of this site

4030 [European dry heaths](#)

Upland **European dry heath** at Migneint–Arenig–Dduallt is predominantly referable to NVC type H12 *Calluna vulgaris* – *Vaccinium myrtillus* heath. Locally at higher altitudes this shows the effects of wind-pruning, and is lichen-rich in places. Other forms of heath present include H18 *Vaccinium myrtillus* – *Deschampsia flexuosa* heath, H21 *Calluna vulgaris* – *Vaccinium myrtillus* – *Sphagnum capillifolium* heath on damp north- to north-east facing cliffs, and H8 *Calluna vulgaris* – *Ulex gallii* heath at lower altitudes. The *Calluna* – *Vaccinium* – *Sphagnum* heath supports the Red Data Book liverwort *Gymnocolea acutiloba*.

7130 [Blanket bogs \(* if active bog\)](#) * Priority feature

Migneint and Dduallt mark the limits of a large upland block located along the eastern fringe of Snowdonia National Park. The site supports the largest area of blanket bog in north Wales after Berwyn and is particularly significant for the extent and quality of comparatively *Sphagnum*-rich M19 *Calluna vulgaris* – *Eriophorum vaginatum* blanket mire. M18 *Erica tetralix* – *Sphagnum papillosum* blanket mire is also widespread, with localised representation of the bog-moss *Sphagnum magellanicum* and, rarely, *S. imbricatum* ssp. *affine*. Other notable species found at the site include lesser twayblade *Listera cordata*, tall bog-sedge *Carex magellanica* and few-flowered sedge *C. pauciflora*, here approaching the southern limit of its British distribution. The significant representation

of more degraded vegetation types, including M20 *Eriophorum vaginatum* blanket mire, attests to a long history of anthropogenic modification including burning, grazing and moor-gripping – significant parts of the site were formerly managed as grouse moor. Large areas of dry and wet heath are also present, while soligenous mire communities feature as widespread and extensive components of the blanket mire.

Annex I habitats present as a qualifying feature, but not a primary reason for selection of this site

3130 [Oligotrophic to mesotrophic standing waters with vegetation of the Littorelletea uniflorae and/or of the Isoëto-Nanojuncetea](#)

3160 [Natural dystrophic lakes and ponds](#)

4010 [Northern Atlantic wet heaths with *Erica tetralix*](#)

91A0 [Old sessile oak woods with *Ilex* and *Blechnum* in the British Isles](#)

The only habitat that will be directly affected by the proposal is a short section of dry heath (**H12**) at the top end of the scheme. This impact will be short-lived since penstock burial will create very little disturbance and that only in the very short term. A small digger will be used to bury the pipeline and cable and will create a working corridor of no more than two metres wide at the most. Thus, an area of dry heath of approximately 160 m² will be temporarily affected.

The penstock route has been carefully selected so as to avoid all blanket and raised bogs.

10.2 The SPA

The JNCC lists the following Annex II (Directive 92/43/EEC) species for the Migneint-Arenig-Dduallt SPA:

Peregrine Falcon (*Falco peregrinus*)

Hen Harrier (*Circus cyaneus*)

Merlin (*Falco columbarius*)

Whilst none of these species was seen during the survey, COFNOD records show them still to be present in the region. It is unlikely any of them nest directly within the study area and the construction of this small scheme is unlikely to have any impact on them. The running of the HEP scheme will have no impact on bird species generally, let alone Schedule 1 (SPA) birds.