

Afon Las Hydro Scheme

Ecology Report

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1. SUMMARY

- A micro hydro scheme is proposed for the Afon Las, close to Llanfachreth, Meirionnydd. Consultation had taken place with Snowdonia National Park Authority (SNPA). At the time of survey, no response was received from the SNPA ecologist. However, in line with previous experience, an extended Phase I vegetation survey of the site was carried out, as well as protected species assessments. These latter addressed the potential for otter, badger, amphibians and reptiles and breeding birds. Protected species surveys also addressed the potential for bats, if any mature or semi-mature trees were to be affected. In order to pre-empt any requirement for a lower plants survey, a bryophyte survey was carried out on the day. In addition, an appraisal of the site for sensitive lichen species was carried out (i.e. not a full survey but an assessment of the potential of the site to support sensitive lichens).
- Extended Phase 1 vegetation survey concentrated primarily on the penstock route and the proposed locations of infrastructure (intake, powerhouse, outfall) (since these were the areas that were most likely to be directly impacted). Woodland areas on both sides of the Afon Las were also categorised in terms of their Phase I categories. Phase I habitat survey revealed that all vegetation communities likely to be impacted were widespread upland communities of mid and north Wales. In terms of sensitivity, the route and infrastructure avoids all vegetation/habitats of value. The penstock route does however, run through semi-natural broadleaved woodland for approximately the first 200m. Care will need to be taken to avoid impacts on mature and semi-mature trees and large rocks in this area. The remainder of the route runs through poor quality habitats and no impacts are anticipated.
- Survey and assessment for protected species did not reveal any otter holts or resting places (including close to the intake and outfall points), and it is considered that the proposed works will have a negligible impact on this species. There was no evidence of active badger setts along any of the proposed penstock route or close to any proposed infrastructure. A small number of trees were considered suitable as bat roosts. However, these will all be avoided by the proposed infrastructure. The woodland is not considered suitable for dormouse (lack of understorey). In addition, water vole are not considered to be present.
- The breeding bird assemblage of the proposed route and infrastructure areas was also taken into consideration during the survey. This was assessed to be entirely typical for the locality and unlikely to support any species protected under Schedule 1 of the Wildlife and Countryside Act.
- A bryophyte survey was carried out which focused particularly on humidity-demanding species, representative of the Section 7

(Environment (Wales) Act 2016) oceanic ravine community. The site was also assessed for the presence of 'old forest' lichens and any indicators of important areas for riparian lichens. The lower plants assemblage was found to be good, though did not qualify as an oceanic ravine community under Section 7. 'Old forest' lichens were also sparsely present, though will be avoided by infrastructure.

- The overall conclusion of the ecology surveys was that the proposed penstock route, intake point and powerhouse will have little ecological impact, and certainly not a significant impact on any protected species or important ecological receptor.
- Formal mitigation and protection measures are outlined for the potential presence of bat roosts. No measures are stipulated for otter, dormouse or water vole, as it is considered that these species are not present (apart from otter which is likely to be sporadically present along this watercourse).

2. INTRODUCTION

2.1. Background and Survey Objectives

A hydro scheme is proposed on the Afon Las, Llanfachreth, Meirionnydd.

Chris F. Brown MCIEEM surveyed the site to establish if there were any ecological constraints or likely impacts on, or of, the proposed development.

The survey consisted of the following elements:

- A habitat survey of the route and infrastructure areas to a Phase 1 level;
- A site survey that identified the potential for protected species on the proposed route and infrastructure locations;
- A bryophyte survey of the proposed penstock route and associated with the stream itself (to ascertain the presence and sensitivity of humidity-demanding species);
- A desk study comprising recorded ecological interests within 2km of the proposed development. Information relating to the location of key sites and species of nature conservation interest within the search area was obtained from cofnod (north Wales environmental information service).
- This report, which details the results of the above together with species protection measures and suggestions for ecological enhancement.

2.2. Site Description

The proposed penstock route is close to the Afon Las, which forms a narrow upland stream, with wooded banks for much of its length. Photo 1 (Appendix 3) shows the intake location. The area surrounding the intake and downstream of here (Photo 2, Appendix 3) comprises open semi-natural broadleaved woodland.

Heading south-west from the intake, the penstock route runs through similar open semi-natural broadleaved woodland, for approximately 200m. The penstock route leaves the broadleaved wooded area and crosses two fields of semi-improved neutral grassland (Photo 3, Appendix 3). It then crosses a minor road, before entering further open woodland and bracken (Photo 4, Appendix 3). Finally, it meets the proposed powerhouse location and outfall point, which is situated in poor quality acid grassland. The cable route lies in poor quality marshy grassland for a short length (Photo 5, Appendix 3) and semi-improved acid grassland for the majority of its 75m length.

2.3. Proposed Works

The project involves the construction of an intake weir across the full width of the watercourses, a building to house the turbine and generator (power house), and a pipe (penstock) from the intake to the power house which will be over-grounded for the sections in woodland and buried for the remainder. A cable route will run from the power house for approximately 75m before connecting to an existing electricity pole.

A screen will be used on the intake weirs and the screen size (2mm) has been stipulated by the Environment Agency to eliminate the risk of fish being drawn into the penstock. Where the water is discharged back into the watercourse, the tailrace pipe will be above the water level preventing fish from entering the turbine even during flood levels.

The trench depth required for the penstock will be a minimum of 1000mm to provide at least 500mm of cover over the pipe. The trench width will be approximately 350mm wide. The working width required for the pipe installation, including the temporary pile of spoil, will be about 3,500mm.

2.4. Correspondence with consultees

Greenearth hydro, working on behalf of the developer, approached SNPA to discuss any concerns they may have with the proposal in relation to ecology (as well as other aspects of the scheme). No reply was received in relation to ecology. However, in line with previous submissions, we have assumed that SNPA will require that protected species are assessed, including otter, reptiles and amphibians, badger and, where relevant, bats. SNPA also usually request that an extended Phase 1 vegetation survey should be conducted. To this end, protected species assessments and a Phase 1 habitat survey were carried out.

3. METHODOLOGY

3.1. Vegetation Survey and Assessment

A vegetation survey and assessment was carried out to a Phase 1 habitat survey level, in line with previous guidance from SNPA. The penstock route (including the power house and intake weir sections), was surveyed in terms of its vegetation communities, and these were categorized according to Phase I habitat categories. Brief species lists were compiled for these areas. Habitat survey was based on the procedures in JNCC (2010).

The site was surveyed on 6th October 2018. The weather was bright, with no rain. There was a slight westerly (F. 1/2) breeze. Chris F. Brown, a qualified ecologist, ornithologist and bryologist, carried out the survey. He has carried out many similar surveys previously and is highly familiar with their aims and requirements.

3.2. Protected Species Surveys

Surveys for protected species were undertaken on the same date as the vegetation survey. The presence or potential presence of protected species was noted on a survey field map.

3.1.1. Otter

A standard otter *Lutra lutra* survey was undertaken, following the methodology detailed by Chanin (2003). The stream was searched for signs of otter at suitable locations and in particular at the intake location, the outfall and the power house. Otter signs include spraints (faeces), tracks, paths, food remains and shelters (holts and couches). This last (i.e. the presence of holts and/or couches) is a particularly important survey requirement, in that breeding sites and resting places are specifically mentioned in the European legislation covering this species. They are also highlighted by Natural Resources Wales (NRW) and SNPA as an important survey requirement.

3.1.2. Bats

The potential for bats was assessed through the identification of suitable habitat and roost structures. This included assessing any large trees close to the pipeline route, intake points and powerhouse location. Guidance was taken from the Bat Conservation Trust guidelines (Collins, 2016). In particular, large trees with split limbs, dense epicormic growth, covering of ivy and/or woodpecker and other holes were noted. Potential signs of bat use were also noted, including droppings, feeding remains, urine splats, bat carcasses, grease staining and polishing suggestive of bat entry.

3.1.3. Dormouse

The potential for dormouse *Muscardinus avellanarius* was assessed through habitat appraisal. This included reviewing the site for the following features,

considered favourable for dormice (Natural England/Forestry Commission interim guidance, 2007):

- Woods that are connected to other areas of suitable woodland;
- Wide range of broadleaved species and ages present, in patches, scattered throughout, or around the edge;
- Shrub layer present, especially with hazel, honeysuckle or bramble;
- Species-rich scrub on woodland margins, ride sides or in patches;
- Canopy connections across tracks or thick, wide hedgerow connections to other nearby suitable habitat;
- Conifer/broadleaved mixtures or conifer plantations colonised by native broadleaves; and
- Fruiting hazel or sweet chestnut – ideally as managed coppice.

3.1.4. Badger

Badger *Meles meles* survey was undertaken through looking for signs such as setts, foraging signs, dung pits or tracks. Active setts in particular were searched for, as these may constrain the location of any development (i.e. no development within 30m of an active sett).

3.1.5. Birds

An assessment of the site for breeding birds was conducted whilst walking the route of the penstock. Particular attention was paid to species associated with the intake areas, the powerhouse and the Afon Las and surrounding woodland.

3.3. Lower Plants Survey and Assessment

Suitable micro-habitats were searched in detail for mosses and liverworts. These included steep damp rock faces, rock niches, woodland flushes and tree bases, trunks and branches. Drier areas of rock faces were also examined, as was the floor of the woodland and rocks/boulders within the stream and woodland. All species from the proposed site were identified. Wherever possible, material was identified on site using x10 and x20 hand lenses. In cases where identification was not possible with a hand lens, a sample of material was obtained and packaged, for microscopic identification later. The survey also encompassed 'old forest' lichen species i.e. lichens associated with long-established woodland conditions. This included a search for species typical of more humid woodland conditions e.g. species of *Sticta*, *Lobaria virens*, etc.

A number of lower plant species (in particular some of the bryophytes) are dependent on high levels of humidity. They are therefore principally associated with areas of fast-flowing water, often exacerbated by topographical features such as waterfalls, incised ravines and gorges. The importance of these ravine communities of bryophytes is underlined by their inclusion as an assemblage under Section 7 of the Environment (Wales) Act 2016 (i.e. of principal importance for conservation of biological diversity in Wales). The Section 7 'oceanic ravine community' list of species is reproduced in Appendix 2.

4. RESULTS

4.1. Desk Study

A relatively low number of species records (122) were returned from cofnod. None of these were within the footprint of the proposal. In addition, few were less than 1km distant from the proposal (centre point). Lesser horseshoe *Rhinolophus hipposideros* (bat) was recorded at 270m distance (south of the proposal). This species favours networks of hedgerows and walls, and roosts in old buildings. The site is therefore not conducive to lesser horseshoe. Other bat records were associated with old buildings at approximately 200m distance. These include brown long-eared *Plecotus auritus*, common pipistrelle *Pipistrellus pipistrellus* and soprano pipistrelle *P. pygmaeus*. Otter were recorded from locations approximately 240m and 290m distant from the proposal. It is possible that these records were made from the Afon Las, as no other watercourses appear to be present in the vicinity. Badger records were made from 360m and 390m distance. Few bird species records were evident. The closest was for cuckoo *Cuculus canorus*, 600m from the centre point of the proposal. A number of 'old forest' lichen species were recorded from two locations, approximately 850m and 950m distant. The majority of other records were over 1km distant from the proposal. In general, there was little ecological connection between the species that were recorded and the proposed hydro scheme. The exceptions to this are otter (which may use the Afon Las) and a number of the bat species (which may utilise roost sites in the woodland surrounding the penstock).

No statutory designated sites lie within 2km of the site.

4.2. Vegetation Survey and Assessment

4.2.1. Vegetation Descriptions

In terms of vegetation communities, the penstock route can be divided into five basic types:

- semi-improved grassland;
- marshy grassland;
- bracken;

- semi-natural broadleaved woodland;

These habitats are broken down further below, into their respective Phase I survey categories. A plan showing the location of these communities at the site is provided in Appendix 1.

Semi-improved grassland

Semi-improved grassland is found along approximately half of the penstock route. The penstock route crosses two fields of semi-improved neutral grassland (after leaving the woodland area and before crossing the minor road). This grassland is rather species-poor and contains a high proportion of indicators of agricultural improvement (in particular perennial rye-grass *Lolium perenne*). Other species indicated less improved status. These included common bent *Agrostis capillaris*, common sorrel *Rumex acetosa* and yarrow *Achillea millefolium*. The semi-improved acid grassland at the site was largely found south of the minor road, and particularly in the powerhouse area (Photo 6, Appendix 3). This comprised common species such as common bent, sheep's-fescue *Festuca ovina* and occasional heath bedstraw *Galium saxatile*. Purple moor-grass *Molinia caerulea* was found sparsely in this grassland.

Marshy grassland

An area shortly to the south of the powerhouse location (approximately 15m) was dominated by purple moor-grass. This appeared to be species-poor with few associated plants. The area close to the cable route (and comprising the first section of cable route) also consisted of this same species-poor purple moor-grass (Photo 5, Appendix 3).

Bracken

Bracken *Pteridium aquilinum* is found in the area to the south of the minor road and shortly downstream. The example at the site is species-poor and supports few associated species (Photo 4, Appendix 3). It is found in association with open broadleaved woodland.

Semi-natural broadleaved woodland

The first 200m of the penstock route lies in semi-natural broadleaved woodland. This is open in character and rather overgrazed (Photo 2, Appendix 3). The main tree species are sessile oak *Quercus petraea* and, closer to the watercourse, ash *Fraxinus excelsior*. Hazel *Corylus avellana* is frequent in the 'shrub' layer. A damper area (away from the penstock route) supports frequent alder *Alnus glutinosa*. Small flushed areas close to the watercourse support meadowsweet *Filipendula ulmaria* and opposite-leaved golden-saxifrage *Chrysosplenium oppositifolium*. The field layer in the majority of the woodland is quite sparse. Open woodland (scattered trees) is also found to the south of the minor road, in an area with associated bracken.

No other vegetation communities were present.

4.2.2. Flora

All plant species recorded were widespread and typical of the habitats they were found in. No vascular (i.e. higher) plant species were found that are protected.

4.3. Lower Plants Survey and Assessment

All bryophytes recorded were common and widespread species. The commonest species within the woodland areas were *Rhytidiadelphus loreus*, *Thuidium tamariscinum* and *Mnium hornum*. More neutral smaller areas of woodland supported *Rhytidiadelphus triquetrus* and *Eurhynchium striatum*. The rocks in the watercourse supported typical species for the area and setting. Dominating these rocks were *Hyocomium armoricum*, *Racomitrium aciculare* and *Platyhypnidium riparioides*. *Thamnobryum alopecurum* was also frequent, as was *Dichodontium pellucidum*. Other typical waterside species were *Marsupella emarginata*, *Conocephalum conicum* and *Rhizomnium punctatum*. Tree bases and rocks within the open woodland areas supported frequent or abundant *Plagiochila spinulosa*, and occasional *Scapania gracilis* and *Saccogyna viticulosa*. Occasional, small flushed areas supported additional species such as *Hookeria lucens* and *Trichocolea tomentella*. Five species were recorded that are listed under the Section 7 community. These are *Hyocomium armoricum*, *Plagiochila spinulosa*, *Saccogyna viticulosa*, *Scapania gracilis* and *Lejeunea lamacerina*. These fall under criterion 4. The site therefore fails to qualify as one supporting the Section 7 oceanic ravine community. Four 'old forest' lichens were recorded. These were *Lobaria pulmonaria* (on an ash at the waterside, just before the penstock enters the open fields, at least 10m from the penstock route) and on a large oak at the woodland edge east of the watercourse. This same oak supported a large quantity of *Pannaria conoplea*. This tree was approximately 40m from the penstock route. Neither of these trees will be affected by the penstock construction. A photo showing the *Lobaria pulmonaria* on the ash is provided as photo 7 (Appendix 3). The third 'old forest' species was *Leptogium cyanescens*, which was found in small quantity on a riverside rock. The fourth species *Hypotrachyna taylorensis* was found on large rocks in the woodland. *Dermatocarpon luridum*, a generally aquatic lichen, was found growing on rocks in the stream.

4.4. Protected Species Surveys

4.4.1. Otter

No signs of otter were recorded. Otter undoubtedly use the Afon Las from time to time, but this section does not appear to be regularly used, as no spraints were found. It is likely that the water is largely poor for fish species (too base-poor). Otter are much more likely to use the lower stretches of the stream (closer to larger watercourses, more potential prey).

4.4.2. Bats

No buildings lay close to the proposed pipeline or infrastructure locations and therefore there was no potential for such structures to support bat roosts. A small number of trees were considered to have features potentially suitable for roosting bats. These were all at a sufficient distance from the penstock route and proposed infrastructure locations so that they will not be affected by the construction of the pipeline.

4.4.3. Dormouse

The woodland was wholly unsuitable for supporting dormouse. There was a lack of food plants for this species (food plant species such as honeysuckle were sparse) and there was no appreciable cover of hazel.

4.4.4. Badger

No badger setts were found on the proposed route. No evidence of badgers was found within the woodland. Much of the penstock route appeared rather too damp for badger setts.

4.4.5. Birds

Few birds were recorded on the site. A number of species are likely to be associated with the broadleaved woodland areas. These are likely to include redstart *Phoenicurus phoenicurus* (edges of woodland) and potentially pied flycatcher *Ficedula hypoleuca* and wood warbler *Phylloscopus sibilatrix*.

5. CONCLUSIONS AND RECOMMENDATIONS

5.1. Evaluation

This section provides an evaluation of the potential impact of the proposed development on habitats and species identified within the report above.

5.2. Possible Impacts of Proposed Works on Vegetation

The entire infrastructure (proposed intake point, power house and penstock route, cable route) is anticipated as having a negligible impact on its respective surrounding habitats. The only caveat to this is that care should be taken to avoid impacts on broadleaved woodland (and associated species of lower plants and bats) from the penstock route. Provided care is taken to avoid tree roots and bases, as well as large rocks in the woodland, there should be no detrimental impact on trees or any associated biodiversity.

5.3. Possible Impacts of Proposed works on Lower Plant Species

There will be negligible impact from the proposed works on lower plant species, provided trees and large rocks are avoided. The few 'old forest' lichens that were recorded are away from the penstock route and will not therefore be impacted. The site does not meet the criteria for the Section 7

‘oceanic ravine’ community in terms of its bryophytes. Furthermore, many of the locations for oceanic species recorded, were away from the watercourse, and are therefore not particularly dependent on high humidity levels

5.4. Possible Impacts of Proposed works on Protected Species

5.4.1. Bats

There will be no impact from the scheme on bats, as all suitable bat roost trees are at a sufficient distance from the proposed route and infrastructure so as not to be impacted. However, general mitigation and protection measures are outlined for this group.

5.4.2. Dormouse

There will be negligible impact from the scheme on dormouse as there is no suitable habitat for this species.

5.4.3. Badger

No signs of badger were recorded and no active setts will be impacted by the proposal. There will therefore be no impacts on this species and no mitigation measures are considered necessary.

5.4.4. Otter

No signs of otter were recorded, and usage of the Afon Las is likely to be low. No impacts are predicted for this species and no mitigation measures are considered necessary.

5.4.5. Birds

No impacts are predicted from the scheme on birds, subject to the mitigation and species protection measures outlined below.

5.5. Mitigation and Species Protection Measures

No mitigation measures are considered necessary for lower plants, dormouse, badger and otter.

5.5.1. Vegetation

Mitigation measures for vegetation are outlined above i.e. routing of the cable route carefully through the semi-natural woodland area. In addition, all dead wood should be left *in situ*. No other mitigation measures for vegetation are considered necessary, as the penstock route and other infrastructure will avoid all vegetation of ecological value (the penstock route largely runs through poor quality habitat).

5.5.2. Bats

Although it is not anticipated that any large trees with potential bat roosts are likely to be felled (based on the information and route provided), the developer

should notify the ecologist prior to the works commencing if it is likely that any large trees will be impacted. An initial roost assessment (in line with the BCT Guidelines) can then be carried out on the impacted tree, and from this, decisions can be made with regard to emergence surveys and further assessment. In general, felling should take place in the winter when roosts are least likely to be present. It is possible however that hibernation roosts may be present at this time of year, and the ecologist should be notified of any large trees that could potentially be felled.

5.5.3. Otter

Whilst no impacts are predicted for otter, it would be prudent to carry out a pre-construction survey immediately prior to construction to ascertain whether there is more evidence of otter (and to check for any newly established holts or couches).

5.5.4. Badger

Whilst no impacts are predicted for badger, it would be prudent to carry out a pre-construction survey immediately prior to construction to ascertain whether there is more evidence of badger (and to check for any newly established setts).

5.5.5. Birds

A number of species of bird may be breeding close to the penstock route, intake points or power house area. It is recommended that a pre-construction survey take place for any active nests that may be disturbed by construction. This would take the form of a check immediately ahead of the works for the presence of nesting or nest-building birds. If found, then they should be left undisturbed with at least 5m of cover around the nest, until the young have fledged and the nest is no longer in use.

5.6. Recommendations and Ecological Enhancement Measures

The lack of predicted impacts from the scheme means that few mitigation and species protection measures are considered necessary (as above). No other ecological enhancement measures are considered necessary.

6. REFERENCES

Chanin (2003). Ecology of the European otter *Lutra lutra*. Conserving Natura 2000 Rivers Ecology Series No 10. English Nature. Peterborough, UK.

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Rodwell (1991). Rodwell, J.S. *et seq.*, (1992). British Plant Communities Vols 1-5. Cambridge University Press: Cambridge.

Appendix 1: Phase I habitat map of site (see next page)

Key:

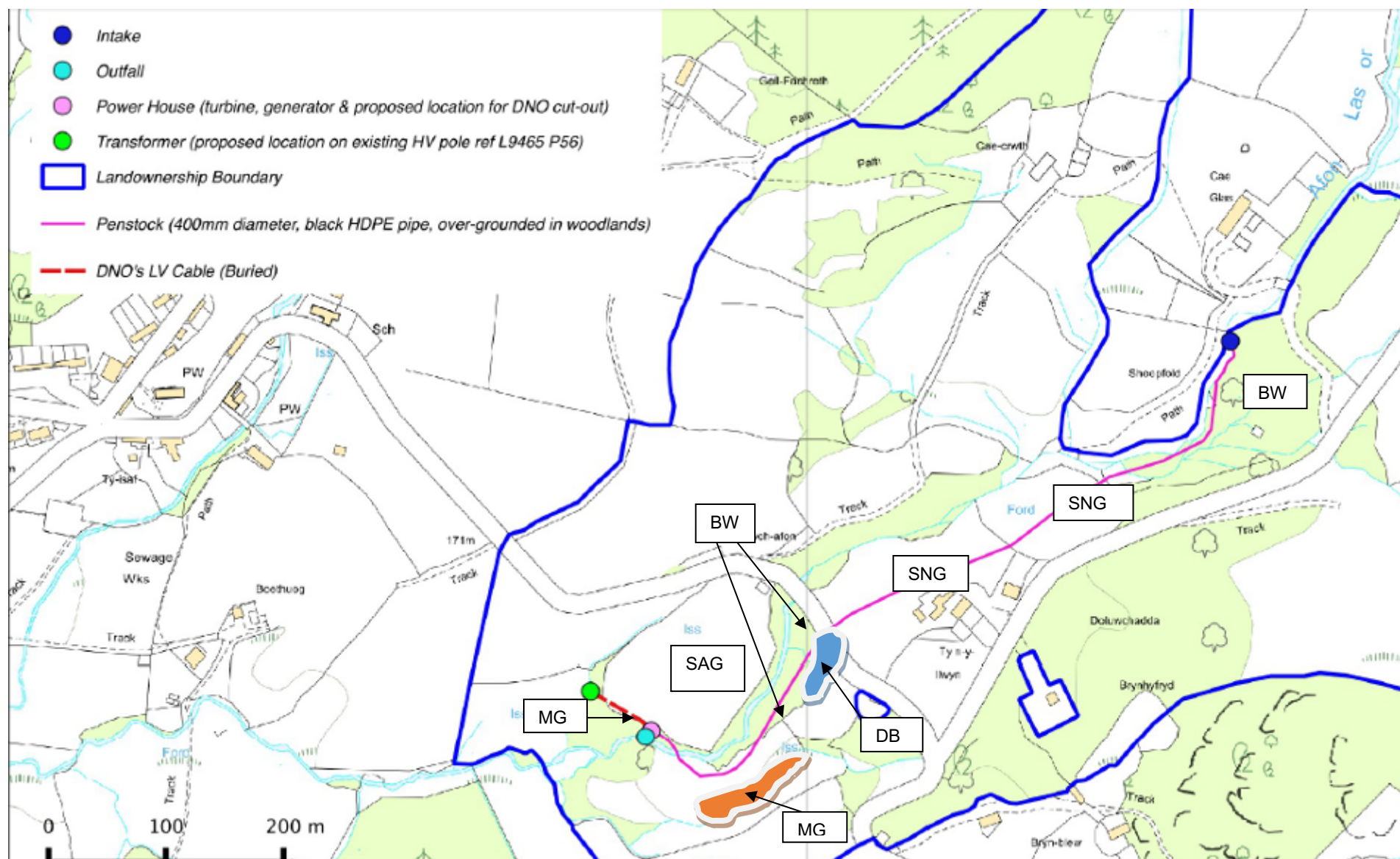
SNG Semi-improved neutral grassland

SAG Semi-improved acid grassland

MG Marshy grassland

DB Dense bracken

BW Semi-natural broadleaved woodland



Appendix 2: Section 42 Oceanic Ravine Bryophytes.

Bryophytes included under Section 42 of the Natural Environment and Rural Communities (NERC) Act 2006 have recently been revised and now include 52 species plus an assemblage named 'Oceanic Ravine Bryophytes'.

Important sites for the latter are identified by the following indicator species:

1. Presence of any one of the following species: *Aphanolejeunea microscopica*, *Campylopus setifolius*, *Daltonia splachnoides*, *Drepanolejeunea hamatifolia*, *Hageniella micans*, *Harpalejeunea molleri*, *Leptoscyphus cuneifolius*, *Metzgeria leptoneura*, *Paraleptodontium recurvifolium*, *Plagiochila exigua*, *Plagiochila heterophylla*, *Radula voluta* or *Sematophyllum demissum*; OR
2. Presence of three or more of the following species: *Adelanthus decipiens*, *Andreaea megistospora*, *Dicranum scottianum*, *Fissidens polyphyllus*, *Jubula hutchinsiae*, *Lepidozia cupressina*, *Lepidozia pearsonii* or *Radula aquilegia*; OR
3. Presence of five or more of the following species: *Anastrepta orcadensis*, *Colura calyptrifolia*, *Douinia ovata*, *Heterocladium wulfsbergii*, *Hygrobiella laxifolia*, *Hygrohypnum eugyrium*, *Isothecium holtii*, *Marchesinia mackaii*, *Plagiochila bifaria*, *Plagiochila punctata*, *Platyhypnidium lusitanicum*, *Porella pinnata*, *Rhabdoweisia crenulata* or *Sphenolobopsis pearsonii*; OR
4. Presence of eight or more of the following species: *Bazzania trilobata*, *Fissidens bryoides* var. *caespitans*, *Hyocomium armoricum*, *Lejeunea lamacerina*, *Lejeunea patens*, *Lophocolea fragrans*, *Plagiochila spinulosa*, *Saccogyna viticulosa*, *Scapania gracilis*, *Solenostoma paroicum* or *Sphagnum quinquefarium*.

Appendix 3: Photographs



Photo 1: Intake location



Photo 2: Open semi-natural broadleaved woodland close to intake point (downstream). Photo also shows potential bat roost tree and dead wood.



Photo 3: Semi-improved neutral grassland



Photo 4: Open woodland area with bracken (south of minor road)



Photo 5: Cable route



Photo 6: Powerhouse location; semi-improved acid grassland and marshy grassland



Photo 7: *Lobaria pulmonaria* (lungwort); healthy specimen on ash