Biodiversity Assessment

This document provides additional information relating to the construction of a Micro Hydro Scheme on the Nant Ffynnon-wen.

TGVHydro

TGVHydro are a not-for-profit Social Enterprise. The Green Valleys Community Interest Company, a community-owned social enterprise that helps communities across Wales reduce their carbon emissions, solely owns TGVHydro Ltd.

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Biodiversity Assessment for Proposed Micro-Hydro Scheme on Nant Ffynnon-wen

Table of Contents:

1. Overview:

TGVHydro is proposing on behalf of the applicant (Mr Rodney Dukes and Ms Anita Ruhmer) for all appropriate licences to construct and run a small scale high head micro hydro scheme on the Nant Ffynnon-wen, within land belonging to the client and within third party landownership, within land belonging to BBNPA. TGVHydro is committed to environmental protection and will attempt to minimise significant detrimental effects that the micro-hydro scheme will have on local biodiversity. As well as provide a summary of the proposed development this document describes how TGVHydro have identified features of ecological interest and the measures they will take to conserve habitats and species of recognised value, this document should be read alongside the submitted 'Pant Y Turnor Ecology Report'. Additional details of further general measures will be employed to minimise the risk of potential environmental impacts during the construction phase of this development.

2. Overview of Development

The micro hydro development is comprised of six key features: intake (x2) and separate forebay tank; pipeline or penstock, turbine house with discharge pipe and grid connection.

2.1 Intake

The intake site will be made up of two main components:

1. Both intake tanks will be prefabricated from stainless steel and bolted to a concrete back wall (dam) which will be built on top of a concrete base slab and off an existing bedrock fall. The open top of the intake box will be covered with a screen consisting of drilled steel holes (maximum hole diameter of 3mm). The screen will be manufactured with 'no sharps' to prevent any injury to aquatic fauna that is washed over the intake).
2. The forebay tank will be separate from the intake structures, one tank will serve both intakes. The forebay tank will allow bubbles to dissipate thus avoiding the possibility of air being drawn into the system. It will provide a buffer reserve of water to enable a level sensor (pressure) to automatically vary turbine water flow rates to balance with the available stream flow (in accordance with the NRW guidelines).

A 180mm (external) diameter Penstock will be trenched from the feeding intake to the main intake.

2.2 Pipeline

The pipeline or penstock 225mm (external) diameter will leave the main intake and will be trenched to the forebay tank, the pipe (225mm external diameter polyethylene (PE)) will leave the forebay tank and will run for 650 metres between the forebay tank and the turbine house. The pipe will consist of both trenched and surface laid sections throughout its route, depending on the topography and ecological features of the site.

The pipes will be delivered to site on 6m fixed-bed lorries. They will be off loaded into a storage area within close proximity to the site. Pipes will then be moved to the areas where they are to be joined. The majority of the PE pipe will be joined using butt fusion of 6m. These pipes will be joined together on the surface into longer lengths. The longer lengths will then be moved into their final positions (see below for more details) before being joined together using electrofusion couplings.

Running adjacent to the pipe along its full length will be a small diameter (<5mm) 24v SWA cable linking the level sensor in the intake box to the control gear in the turbine house. This will either be buried in the trench or laid on the surface under the pipe.

2.3 Turbine House

The small (3m x 3.5m x 1.8m) turbine house is located in the lower corner of a broken wooded dingle, adjacent to an access track. An area of about 3.5m x 4.0m will be cleared to accommodate the turbine house.

The ground will be excavated to a depth of about 200mm below the existing bank height to enable the concrete base slab to be cast. Excavated material will be mounded around the turbine house, and this includes a mound of fill to support the weight of the pipe leading into the turbine house. There is no risk of excavated material falling into the watercourse. Due to the fact that the concrete slab will be poured into the excavated depression, there is no risk of concrete falling into the watercourse.

2.4 Discharge point

A drain sump will be incorporated into the slab directly beneath the turbine unit. This sump will discharge the water passing through the turbine unit to the stream through 1 x 450mm diameter plastic Agripipe. The end of the pipe will be screened with a 10mm s/s mesh and the pipes will be surrounded by a combination of loose stones and boulders. The pipe will stop short of the stream and discharge onto a stone lined cascade into the watercourse.

2.5 Access and Storage

Good general access is accessible for all elements of the scheme utilising existing access tracks where possible.

Site delivery: The proposed development will have no impact on the road hierarchy other than on the few occasions in which materials will be delivered during the construction phase.

Intake: Vehicle access for elements required for the construction of the intake will be brought to a designated storage area near to the intake locations. The intake areas are not suitable to accommodate vehicle access; therefore all of the works and preparatory works are to be undertaken by hand due to vehicle inaccessibility of the area.

Turbine House: Site access for the equipment and materials required for building the turbine house will access following the existing access tracks present on site.

Pipe Route: Vehicle access between the turbine house and the intake site following the pipeline route is not possible. The working route to within 10m of the intake locations will be suitable to accommodate vehicle access, via existing access tracks, leading from the clients landownership to within 3rd party landownership. Throughout this route vehicles will follow designated access tracks and will use the existing gate lines. If repeated vehicle access is required the access route will be suitably protected by geotextile membrane covered with a layer or straw.

Access points from the public highway will be marked with bi-lingual hazard signs.

3. Desk Based Assessment & Field Surveys

3.1 Consultations

Pre-application advice was sought from the Natural Resource Wales (NRW) during the preparation of this development proposal. The results of this consultation are presented below.

3.2 Field Surveys

A general habitat appraisal was completed in conjunction with initial site visits.

4.0 Results

4.1 Consultations

Natural Resource Wales

NRW were consulted during the pre-application stages, a number of concerns were raised, which have been addressed in this and the additional supporting documents.

Additional recommendations relating to the timing of works and fish screening.

4.2 Field Surveys

4.2.1 Habitats

As noted within the supporting Pant Y Turnor Ecology report, the penstock route can be divided into the following vegetation communities/habitats:

- acid grassland
- acid dry heath
- marshy grassland
- semi-natural broadleaved woodland

Watercourse

The stream progresses in a north westerly direction, navigating its route through open hill land and into broken scattered woodland supporting patches of thick bracken and brambles. This proposal seeks a peak abstraction of 22.0 l/s (equivalent to 51% of Qmean) and is proposing a HOF of Q95 and abstraction of 70% of the flows above HOF (a 70/30 split).

This small-scale hydropower scheme, with a depleted reach of 670m.The watercourse is dominated by bedrock, overlaid by a mixture of cobble sizes and large boulders. There are a number of natural falls within the depleted reach ranging from 0.5m to 3m. The depleted reach has a steep gradient of 8.7% and has resulted in very limited opportunities for natural in stream sedimentation or vegetation.

The watercourse has not been assessed under the provision of the Water Framework Directive – Wales River Basin Management Plan. The depleted reach is relatively natural. Given that the immediate surrounding watercourses have been classified as good and moderate, it is unlikely that the watercourse would be afforded more than a good quality status.

4.2.2 Species

White-clawed Crayfish

A crayfish survey has not been requested at this site.

Otter

No otter holts or resting places were recorded during the site visits (this is also further supported within the submitted Ecology Survey).

5. Impact Assessment

5.1 Habitats, woodland and trees

A full habitat appraisal has been undertaken and covered within the supporting Ecology Survey submitted as part of this application.

5.1.1 Watercourse

It is recognised that the construction of the intake points will have a localised impact on the banks and bed of the watercourse. In addition there is the risk of silts being liberated into the water as a result of this disturbance, which may cause short-term deterioration in water quality. It is similarly acknowledged that the installation of the discharge pipe and associated rock cascade will have a small scale direct impact on the affected bank. There is no risk of excavated material falling into the watercourse from the construction of the

turbine house, due to the fact that the concrete slab footing will be poured into an excavated depression.

The abstraction of water to power the hydro scheme will reduce the flow of water along a 'depleted' reach of 670 metres between the intake and discharge points. The reduction of water flows has the potential to have a localised impact on the aquatic environment and the identified features of local ecological interest associated with the watercourse.

5.2 Species

5.2.1 Fish

There is the potential during the construction of the intakes and the discharge outfall for localised small-scale releases of silt or other materials could be detrimental to the aquatic environment, which may support resident fish populations. It is recognised that reduced water flows in the depleted reach has the potential to impact on the movement of resident fish at certain periods of the year.

5.2.2 Bryophytes

During the pre-application stage of this scheme the consulted bodies raised concerns regarding bryophytes at this site, an ecology survey has been carried and has been submitted as part of this application.

5.2.3 Otters

No features likely to support otters will be directly impacted by the proposed development, however it is acknowledged that any construction activity within or in proximity to the watercourse does have the potential to disturb otters moving through this stream corridor.

5.2.3 Badgers

No badger sets were identified during the walk through survey (this is also further supported within the submitted Ecology Survey); the consulted body has not raised any concerns regarding badgers at this site during the pre-application stage of this scheme.

5.2.4 Other Species

Bats & Birds

The removal or coppicing of overhanging broadleaf branches to allow safe working access throughout the development site to the turbine house may impact on nesting birds. No trees with the potential to support roosting bats will be disturbed or removed as a consequence of the proposed development, nor will there be any direct impacts on their flight lines or foraging corridors.

White-clawed Crayfish

A crayfish survey has not been requested at this site.

6. Mitigation Proposals

This section details the specific measures proposed to mitigate those recognised impacts on habitats and species of identified ecological value. More general environmental protection will also be applied throughout the construction period, in accordance with the Construction Methodology document, which will provide an appropriate overall level of safeguard.

6.1.1 Watercourse

Protection of the watercourse habitat will be achieved through strict adherence to the environmental protection measures presented in Pollution Prevention Method Statement.

The discharge pipe outfall will be located and designed in accordance with good practice guidance to minimise the risk of scouring of the stream banks and bed.

6.1.2 Acid Grassland

No Specific mitigation measures are proposed during the installation of the pipeline through the acid grassland. Accepted good practice of soil separation and handling will be adopted in line with the Construction Methodology Statement to enable the retention of any stripped grass turf to reinstate any sections of trench. The duration of the pipe installation works will be minimised to avoid the risk of grass turf drying out.

6.1.3 Acid dry heath

No Specific mitigation measures are proposed during the installation of the pipeline through this habitat. Accepted good practice of soil separation and handling will be adopted in line with the Construction Methodology Statement to enable the retention of any stripped grass turf to reinstate any sections of trench. The duration of the pipe installation works will be minimised to avoid the risk of grass turf drying out.

6.1.4 Marshy grassland

Accepted good practice of soil separation and handling will be adopted in line with the Construction Methodology to enable the retention of any stripped soil and turf fragments to reinstate any sections of trench. The duration of the pipe installation works will be minimised to avoid the risk of grass turf fragments drying out. Completing the works swiftly and maximising the use of turf fragments to speed the re-vegetation of pipe trench will minimise the risk increased soft rush growth. Where necessary additional locally harvested grass seed will be used to speed the sward closure.

6.1.5 Semi-natural broadleaved woodland

The pipe route has been routed a suitable distance away from the broadleaved woodland as to not impact on this feature. Should any cutting back or removal of overhanging branches be required to facilitate the pipeline route this would be completed during the autumn or spring periods to accommodate where practicable any additional protected species constraints.

6.2 Species

6.2.1 Fish

The walkover survey found no obvious spawning grounds on the surveyed stretch of the watercourse. TGVHydro will ensure the implementation of the following measures to protect any local fisheries interests potentially present within the watercourse and elsewhere on the downstream river system:

- works in the watercourse will be completed outside the typical fish spawning period;
- screens will be fitted over the intake and discharge points of a maximum hole size of 3mm and 10mm respectively;
- Hands of Flow of Q95 (5.4 ls^{-1}) and a 70/30% abstraction split flow up to (22.0 l/s equivalent to 51% of Qmean), to ensure a greater variation in flow regime throughout the depleted reach;
- preventing accidental release of cement, oils or other substances used during the construction process; and
- preventing bankside erosion by avoiding loss of vegetation and trees.

6.2.2 Bryophytes

Almost all bryophytes recorded during the ecology survey were common and widespread. There is a small area of species-rich bryophytes (which is highlighted within the Ecology Survey) which will be avoided during the construction process, this area will be taped off during construction. Additionally, TGVHydro will still ensure that the final design which will include:

- Hands of Flow of Q95 (5.4 ls^{-1}) and a 70/30% abstraction split flow up to (22.0 l/s equivalent to 51% of Qmean), to ensure a greater variation in flow regime throughout the depleted reach;
- main pipework is installed well away from the watercourse to avoid any disturbance to existing habitats in and adjacent to the stream;
- wooded cover provided by trees and shrubs overhanging the stream channel shall be retained, and secondary hydrological features associated with the depleted section of watercourse including bank flushes, seepages and small stream inlets should be left undisturbed.

6.2.3 Otters

No evidence of otter was noted during the course of the various site visits. However, despite the lack of recorded evidence it is accepted that this protected species is still likely to utilise the watercourse TGVHydro will:

- ensure that working hours to commence one hour after sunrise and finish one hour before dusk to minimise the potential risk of disturbance to otters;
- and ensure the intake point, pipeline route and turbine house will avoid areas of dense vegetation, scrub, brash (wood) piles, or tree roots which are habitats that could be used by otter.
- any temporarily exposed open pipes will be capped in such a way as to prevent otters gaining access.
- if sections of trench are left open overnight, planks of wood will be placed at regular intervals to ensure otters or similarly any nocturnal mammals that may enter the trench can easily navigate their way out.
- the site will be cleared and all material stored appropriately on a daily basis as loose metal, plastic and food stuffs left on site can constitute a hazard.
- will ensure that the site is investigated for the presence of otters immediately before work to construct the turbine house and discharge pipe begins each day and before work re-commences to make sure that otters will not be disturbed. If otters are found on site work will cease and TGVHydro will seek the advice of the NRW.

6.2.4 Badgers

No badger or other signs of badger were identified during the walk through survey (this is also further supported within the submitted Ecology Survey) nor has the consulted body raised any concerns regarding badgers at this site during the pre-application stage of this scheme.

However in the event that badgers may be present on site TGVHydro will ensure that the following practices are carried out:

- All site users will be notified of site access routes for both vehicle and foot access to all elements of the build and storage areas.
- As storage areas are to be visited frequently throughout the construction, these will be kept securely closed at all time when not in use
- Any temporarily exposed open pipes will be capped in such a way as to prevent badgers gaining access.

6.2.5 Other Species

Bats

The development site does not affect any trees or riparian treelines that may be a suitable location for roosting bats or a local bat flight line. TGVHydro will:

- ensure all construction will take place during daylight working hours (commencing no sooner than 1 hour after sunrise and ceasing one hour prior to sunset) to mitigate any residual effect of the proposed development.
- will place a minimum of 3 bat boxes (all to be of the Kent style bat box), spaced evenly throughout wooded corridor (within and adjacent to the pipe length) to mitigate any effect on these animals and provide commensurate enhancement opportunities. These

boxes will be screwed into suitable trees at a suitable height (2-3m), with some positioned towards the stream and other positioned towards the forestry to support varying flight-paths. The approximate positions of these boxes are marked on the map found in the appendix of this document (Figure 1: Approximate Location of Biodiversity Enhancements).

Birds

Under the Wildlife and Countryside Act 1981 it is illegal to disturb nesting birds. To ensure compliance with this legislation, TGVHydro will:

- ensure that any tree and shrub felling that the development phase may have will take place outside the bird breeding period (March - September).
- Following the recommendations made within the Ecology Survey "A number of species of bird may be breeding close to the penstock route, intake point or power house area (e.g. open moorland nesting species such as meadow pipit *Anthus pratensis* and skylark *Aluuda arvensis)*. A pre-construction survey will take place for any active nests that may be disturbed by construction (if construction is to be carried out during the breeding season (March to August inclusive)). Survey would take the form of a check immediately ahead of the works for the presence of nesting or nest-building birds (including ground nests). 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.
- will place a minimum of 3 bird boxes (the nest boxes will consist of a mixture of varying size holes and open fronted boxes), spaced evenly throughout the wooded corridor to mitigate any effect on these animals and provide commensurate enhancement opportunities. These boxes will be screwed into suitable trees at a suitable height (2-3m). The approximate positions of these boxes are marked on the map found in the appendix of this document (Figure 1: Approximate Location of Biodiversity Enhancements).

White-clawed Crayfish

No crayfish were identified during the consultations process, nor was any survey required and the Species Walkover Report notes that the scheme is considered too acidic for white-clawed crayfish, however TGVHydro will still ensure that the final design which will include:

- Hands of Flow of Q95 (5.4 ls^{-1}) and a 70/30% abstraction split flow up to (22.0 l/s equivalent to 51% of Qmean), to ensure a greater variation in flow regime throughout the depleted reach.

7. Enhancements

TGVHydro recognise the duties placed on public bodies to seek to halt the decline in biodiversity and the role of the Environment (Wales) Act 2016 and the TAN5 guidance in encouraging developers to generate a net biodiversity gain as a consequence of their development proposals. TGVHydro unilaterally offer to provide the following biodiversity enhancements as part of this proposed hydro scheme.

TGVHydro proposes that a number of bat boxes (minimum of 3), will be spaced through the wooded corridor to provide commensurate biodiversity enhancement opportunities. These boxes will be screwed into suitable trees at a suitable height (2-3m), with some facing the stream corridor and other facing towards the directions of the forestry supporting flight paths.

TGVHydro proposes that a number of bird boxes (minimum of 3), will be spaced through the wooded corridor to provide commensurate biodiversity enhancement opportunities. These boxes will be screwed into suitable trees at a suitable height (2-3m), with some facing the stream corridor and other facing towards the directions of the forestry supporting flight paths.

Appendices

Appendix 1: Approximate Location of Biodiversity Enhancements

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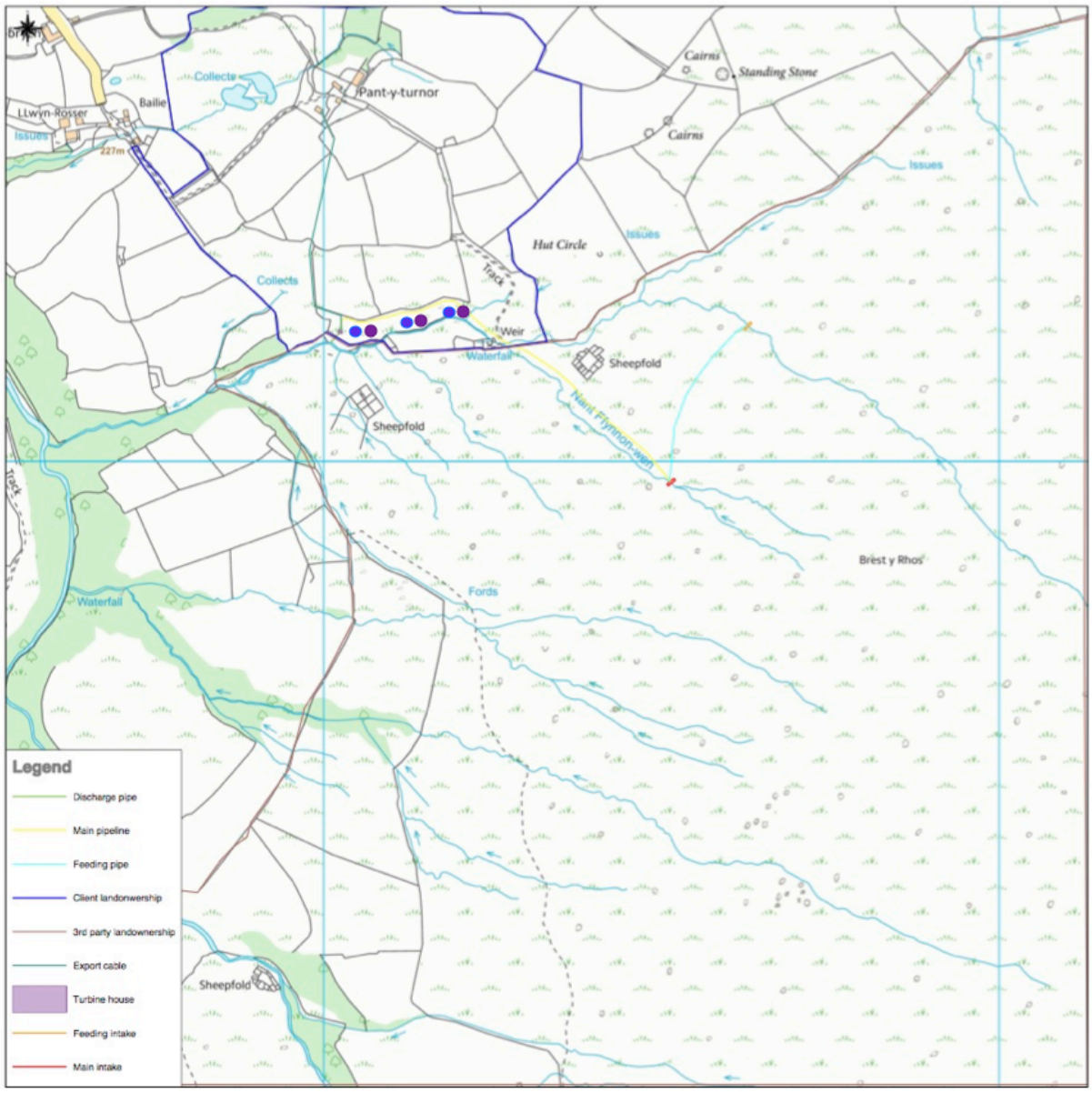

Key

Bird box Bat box