





Application to Natural Resources Wales By The Bevis Trust and Wildlife Trusts Wales for a licence under Section 16(4) of the Wildlife and Countryside Act 1981 (as amended), to release Eurasian beaver *Castor fiber* for a reintroduction in Carmarthenshire, Wales



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Executive Summary

This is an application to Natural Resources Wales (NRW) by The Bevis Trust and Wildlife Trusts Wales for a licence under section 16(4) of the Wildlife and Countryside Act 1981 (as amended), to release Eurasian beaver *Castor fiber* for a pilot reintroduction in Afon Cywyn and Nant Cynnen in west Carmarthenshire, Wales.

The Eurasian beaver is native to Britain including Wales and there are records of beavers in Wales dating back to the 12th century. Giraldus Cambrensis in 1188 describes the River Teifi as the last river in Wales to have a population of beavers. It is thought that beavers became extinct in Wales after the Middle Ages due to unsustainable hunting by humans.

In 2005 the Wildlife Trusts in Wales started the Welsh Beaver Assessment Initiative (now known as the Welsh Beaver Project) to investigate the feasibility of reintroducing beavers to Wales. This work is in line with the requirements of the UK Government under article 22 of the Council Directive 92/43/EEC 'Habitats Directive' that puts an obligation onto member states of the European Union to study the desirability of reintroducing extinct indigenous species, such as beavers. The feasibility studies conducted in Wales (Halley *et al.* 2009 and Jones *et al.* 2012) have shown that the landscape can support Eurasian beavers and research from other parts of Britain and Europe has demonstrated that the presence of beavers within the landscape will benefit other wildlife and humans.

In 2009 Scottish Natural Heritage (SNH) granted a licence for the reintroduction of beavers to Knapdale, Argyll and in 2015 Natural England (NE) granted a licence for a trial of beavers on the River Otter in Devon. Wales is the last EU Beaver Range State to implement a plan for the species.

The Welsh Beaver Assessment Initiative report contains a suite of information regarding the scientific plausibility and desirability of conducting a reintroduction. The literature-based study in this report suggests the general public response to the restoration of the Eurasian beaver would be positive and have a majority support. There have been consultations with key stakeholders, meetings with Welsh Government, local landowners, educational visits to schools and universities and open days at events.

A good quality site has been identified at Afon Cywyn and Nant Cynnen in west Carmarthenshire. A ground survey of the Afon Cywyn and Nant Cynnen catchment identified the habitat in the upper reaches as suitable for beavers. The catchment is self-contained and drains directly into the Taf estuary, which will limit the dispersal of beavers from the catchment. A satisfactory level of support has been received during consultations with stakeholders, landowners and members of the public. Suitable donor populations have been identified within captive Eurasian beaver populations within Great Britain including those already at The Bevis Trust as well as those at the Derek Gow Consultancy and Wildwood Trust. Quarantine will not be required for these individuals, although health and welfare of each animal will be thoroughly assessed in accordance with the detailed protocol.

The proposal is to release up to ten pairs of genetically healthy, disease free, captive bred Eurasian beaver in spring 2017. The beavers will be collected from captive donor sites located within the UK and released at prime sites along Afon Cywyn and Nant Cynnen with land owners' permission. The beavers and their effects on the landscape will be monitored and an interim report of the project will be produced annually.

The Principle Applicants request that Natural Resources Wales grants a licence for the release of Eurasian beaver into the wild in Wales in the catchment of Cywyn under Section 16(4) of the Wildlife and Countryside Act 1981 (as amended).

1. Introduction

There is a wealth of archaeological evidence supporting the presence of Eurasian beaver across Britain (Coles, 2006). Written records provide further evidence for the presence of beavers in Wales. The Welsh for beaver is *afanc* or *llost lydan*, which can be found in folk stories and place names around Wales, such as Llyn-yr-Afanc (Beaver Pool) in North Wales. The earliest reference to beavers in Wales is in *The Laws of Hwel Dda* in 940 A.D and in 1188 Girauldus Cambrensis, describes them on the River Teifi in a *Journey Through Wales*. In his writings Girauldus accurately describes the natural history of beavers through his own observations and encounters with hunters (Kitchener, 2001). George Owen (*The Description of Pembrokeshire*) noted the presence of beavers in the rivers of South Pembrokeshire in 1603. It seems that the wooded catchments of south-west Wales were one of the last strongholds of British beavers. There is a record of a bounty payment for the head of a beaver in Yorkshire in 1789, and in 1884 Richard Jeffries in Wiltshire wrote in *The Life of the Fields* 'Beavers, too, have been induced to resume possession of their ancient streams under careful supervision.'

Beavers were exterminated in Britain, not because they were a pest, but because they were prized for their fur, meat and castoreum glands. In Medieval Britain beaver pelts fetched a far greater price compared with otter and pine marten pelts. In 940 A.D., a beaver pelt was worth 120 pence compared with otter pelts at 12 pence or pine marten pelts at 24 pence (Kitchener, 2001). Their castoreum glands were used for medicinal purposes and the value of the glands could pay a hunter's wages for the year (D. Gow & G. Schwab. 2016. pers comms). The Catholic Church also permitted beaver meat to be eaten on abstinence days as they considered beavers to be a fish due to their semi-aquatic lifestyle and having scales on their tails (Kitchener, 2001). The decline of beavers in Wales was echoed across the rest of Britain and the majority of Europe. At the end of the 19th century the distribution of beavers in Europe were reduced to four isolated populations consisting of less than 1,200 individuals. The population of beavers in Telemark, Norway consisted of 100 individuals, on the Elbe in Germany less than 200 individuals, on the Rhône in France 30 individuals and in the Pripet Marshes, Belarus less than 400 individuals (Halley & Rosell, 2002). Since the 1920s this decline in beaver populations has halted and their population has now increased. This has been achieved through successful translocations, reintroductions and greater legal protection. To date there have been over 150 successful beaver reintroductions to over 24 European countries. The only western European states that have not restored beavers are Britain (apart from Scotland and the reintroduction trial in Devon), Italy, Lichtenstein, Montenegro and Portugal.

The Bevis Trust (TBT) is a charity organisation based in South-West Wales. It is the 'charitable wing' of International Wildlife Consultants, which has worked internationally on conservation for 25 years and has hosted three families of captive beavers on the farm since 2014. The Bevis Trust is a farmer-led organisation and the main aim of TBT is to restore the balance between farming and wildlife. The Bevis Trust is well-placed to discuss the reintroduction of beavers to Wales with the local farming community.

Wildlife Trusts Wales (WTW) is a registered charity and works on behalf of the six Wildlife Trusts in Wales; North Wales, Montgomeryshire, Radnorshire, Brecknock, Gwent, and South and West Wales. Through this network Wildlife Trusts Wales is the largest voluntary organisation in Wales dedicated to protecting wildlife and wild places. The six Wildlife Trusts manage 216 nature reserves covering

more than 8,000 hectares, and are supported by 25,000 members. The aim of Wildlife Trusts Wales is *"to create an environment rich in wildlife for everyone."*

The Wildlife Trusts in Wales are involved with many projects including 'Living Landscapes' schemes, which are part of the Wildlife Trusts' recovery programme for the countryside, restoring, recreating and reconnecting key habitats both inside and outside nature reserves. This has been achieved by working closely with local communities, landowners, and businesses to put wildlife back on the map. Beavers as a keystone species and ecosystem engineers are part of this Living Landscape strategy.

2. Statutory and Strategic Framework

Article 22 of the European Community Directive on the Conservation of Natural Habitats and of Wild Flora and Fauna (Council Directive 92/43/EEC, the 'Habitats Directive') declares that Member States shall:

'study the desirability of re-introducing species in Annex IV that are native to their territory where this might contribute to their conservation, provided that an investigation, also taking into account experience in other Member States or elsewhere, has established that such re-introductions contribute effectively to re-establishing these species at a favourable conservation status and that it takes place only after proper consultation of the public concerned.'

The aim of the Habitats Directive is to achieve Favourable Conservation Status for certain threatened habitats and species listed in its annexes, where beavers are included in Annex II and IV. The Habitat Directive also requires that a public consultation is undertaken prior to a reintroduction. The Welsh Beaver Project has consulted with key stakeholders and has engaged with members of the public, schools and universities. However, the Habitat Directive requires that a 'proper consultation of the public concerned' is undertaken prior to any restoration. Therefore, a further consultation will be undertaken in order to gather more recent views on the reintroduction of beavers to Wales. This consultation will be conducted by NRW and the results will help advise NRW on their decision.

The Welsh Beaver Assessment Initiative (Jones *et al.* 2012) concluded that there is a strong case for the reintroduction of beavers to Wales. A reintroduction would be ecologically feasible with the substantial benefits for biodiversity, conservation, ecosystem services and the economy outweighing any management costs, which will be a relatively low financial cost.

Other reports have also provided evidence to support the reintroduction of beavers. In 2008 Natural England and the Peoples Trust for Endangered Species published their report, *'The feasibility and acceptability of reintroducing the European beaver to England*.' The report outlined the conservation benefits of beavers and the increased understanding that a pilot reintroduction to England would bring.

Following the end of the Scottish Beaver Trial in 2014, Scottish Natural Heritage published their final report in 2015, '*Beavers in Scotland, A Report to the Scottish Government*,' which collates all the information that was gathered during the trial period and outlines future scenarios for beavers in Scotland.

In 2000 Countryside Council for Wales (CCW) now Natural Resources Wales published a State of the Environment Report, which mentions restoration initiatives for landscapes and 'wildlife which has been lost from it.' More recently in October 2016 NRW launched their first State of Natural Resources Report (SoNaRR). This report states that, '*Natural resources and ecosystems can help us to*

reduce flooding, improve air quality......They also provide a home for a variety of wildlife, and give us iconic landscapes to enjoy, which also boosts the economy through tourism.' The report highlights the risks associated with the unsustainable management of our natural resources; water, soil, woodlands, which can negatively effect carbon storage, water quality, water flow and ecology. These risks can be mitigated against using nature-based solutions to build a resilient ecosystem, 'when managing land-use change and habitat change it is essential to explore the opportunities that nature-based solutions can offer. Nature-based solutions can provide sustainable, cost-effective, multi-purpose and flexible alternatives..... They can maximise benefits for well-being and maintain and enhance resilience of ecosystems.'

The Welsh Government has developed a number of plans to restore and manage the natural resources in Wales.

- Natural Environment Framework (NEF) for Wales, which aims to take an integrated approach to sustainable land management and adopt an ecosystem approach to the management of the environment.
- **The Environment (Wales) Act 2016**, a biodiversity duty to plan and mange Wales' natural resources in a more proactive, sustainable and joined-up way.
- The Wellbeing of Future Generations (Wales) Act 2015, which includes the goal of 'A Resilient Wales' measured by a 'biodiverse natural environment with healthy functioning ecosystems that support social, economic and ecological resilience and the capacity to adapt to change.'
- The Nature Recovery Plan for Wales, which aims to reverse the decline of biodiversity using an integrated approach to natural resource management, fulfilling Wales' commitments under the Convention on Biological Diversity.
- **The Woodland for Wales Strategy**, a 50 year plan to increase woodland cover and diversify the species mix of trees.
- Wales Rural Development Programme (CAP Pillar 2), which includes elements on the environment and the community.

In all of these cases beavers fall into the category of lost species and adopt an ecosystem approach for the management of the environment.

During the last century there has been a steady loss of biodiversity and habitat quantity and quality in Carmarthenshire. Some of this is probably irreversible owing to the pressures of modern farming. But there is scope to revive some of the habitats and recover some of the species. Some of the most important and sensitive habitats are wetlands, many of which are threatened by excessive scrub encroachment. Management by hand is labour-intensive and by machine often impractical or impossible and highly costly. When beavers were an abundant and natural component of Welsh ecosystems most, if not all freshwater wetlands would have been managed naturally by beavers, but since then mismanagement, neglect and draining has resulted in the loss or significant degradation of most wetlands. This project proposes to bring beavers back to Wales as a breeding species so that they can resume their rightful role in managing wetland ecosystems and thus benefit a whole cascade of dependent species, as well as fulfilling Welsh Government obligations under the EU Habitats Directive.

2.1 Legal Position

The Eurasian beaver has now been recognised as a native species by the Scottish Government, following the five year Scottish Beaver Trial (2009-2014) in Knapdale, Argyll. This decision permits

that the beavers in Knapdale and the beaver population on the River Tay can remain in Scotland and form part of the native population. However, further translocations and releases of beavers in Scotland will require a licence. In England, beavers are currently present on the River Otter in Devon as part of the Devon Wildlife Trust's licenced beaver reintroduction trial. Current domestic legislation requires that any animal listed under Schedule 9 of the Wildlife and Countryside Act 1981 (as amended) can only be released into the wild under licence.

The Eurasian beaver is currently listed and protected under Annex II (animals and plant species of Community interest whose conservation requires the designation of Special Protection Areas) and Annex IV (animal species of Community interest in need of strict protection) of the Habitats Directive. This grants protection for Eurasian beavers that are resident on the Continent, but it does not provide protection for beavers in Britain as they have not been transposed on the Conservation of Habitat and Species Regulations 2010. However, now that a decision has been made by the Scottish Government on the status of Eurasian beavers in Scotland, the process has begun to grant beavers legal protection. It is probable that beavers will now be added to Schedule 2 of the Conservation of Habitats and Species Regulations 2010 and be listed as a European Protected Species in the UK. This will afford them with the same legal protection as bats, dormice, great crested newts, otters and pine martens within the UK. In England beavers will also be added to Schedule to Schedule 6 of the Wildlife and Countryside Act 1981 (as amended) in 2016. A licence will therefore be required to trap beavers in the wild and Schedule 6 will also prohibit the killing of beavers in the wild. It is not yet clear if this amendment to Schedule 6 in England will automatically transpose to the Wildlife and Countryside 1981 (as amended) in Wales.

Consideration will need to be taken for the long-term status of beavers in Wales. It may be appropriate for the species to be added to Schedule 5 of the Wildlife and Countryside Act 1981 (as amended) and the Conservation of Habitat and Species Regulations 2010.

The proposal presented by TBT and WTW is for the release of a small number of Eurasian beavers as a pilot reintroduction to the Afon Cywyn and Nant Cynnen in west Carmarthenshire with the longer term aim of restoring the beaver as a native species throughout Wales.

2.2 IUCN Guidelines

The International Union for the Conservation of Nature (IUCN) approved guidelines for species reintroductions in 1995. The Joint Nature Conservation Committee (JNCC) have used these guidelines to develop a process for evaluating and undertaking species translocations for conservation purposes. A beaver reintroduction in Wales will follow these guidelines (Appendix I).

2.2.1 Aims

Studies have been commissioned in Scotland, England and Wales to investigate the feasibility of beaver reintroductions. The reports all conclude that it would be feasible to reintroduce beavers into the current cultural landscape of Britain (Gaywood *et al.* 2015, Gurnell *et al.* 2008 and Jones *et al.* 2012). These recommendations have either been put forward to the statutory bodies; Scottish Natural Heritage, Natural England and Natural Resources Wales or directly to government; as is the case in Scotland.

2.2.2 Objectives

The objectives of this application are:

- 1. To initiate the return of the Eurasian Beaver to Wales in a pro-active organised manner towards meeting Wales' obligations under the Habitats Directive Article 22. The proposed licence for which we are applying is shown in Appendix II.
- 2. To establish a pioneer foothold for the species in Wales, by creating at least a minimum viable population based on a small, discrete river catchment, the Cywyn in Carmarthenshire. The release would consist of up to ten pairs of disease-free, captive-bred Eurasian beavers some of which may have dependent young with them.
- 3. To develop a pragmatic management system catering for the needs both of the beavers and of the stakeholders, and to create a Project Management Group with expertise capable of undertaking management as needed.
- 4. To increase the general awareness and knowledge of the natural history of the beaver and their potential impacts on riparian habitats within the local community, stakeholders and the wider public.

These objectives are in full compliance with the revised IUCN Guidelines on Reintroductions.

2.3 Public Consultation

Assessments into the ecological feasibility for the reintroduction of beavers to Wales started in 2005 with a scoping survey undertaken by Anthwal et al. in 2005 for Countryside Council for Wales. The initial research consisted of a Geographic Information System (GIS) desk-based study to identify areas of suitable habitat across Wales. These were then followed up by in depth on the ground surveys undertaken by Dr Duncan Halley of the Norwegian Institute for Nature Research, 'The reintroduction of the Eurasian beaver Castor fiber to Wales: An ecological feasibility study.' Further surveys were also undertaken by Derek Gow in 2013. In 2012 Wildlife Trusts Wales produced the Welsh Beaver Assessment Initiative report, which investigated the feasibility of reintroducing beavers to Wales. The report not only looked at the habitat suitability within Wales, but also took into consideration the impacts on human activities and interests. A wide range of stakeholder organisations were consulted to gather information on opinions, concerns and ideas. This consultation was undertaken via meetings, telephone conservations or response by a list of questions. At the time of the consultation stakeholders were not asked if they supported a beaver reintroduction to Wales, as the aim of the report was to investigate the overall feasibility of a beaver reintroduction to Wales. Stakeholders also wished for further information before forming a decision on the reintroduction of beavers to Wales. This was the overall aim of the Welsh Beaver Assessment Initiative report.

In Scotland a national consultation was undertaken in 1998 by Scott Porter Research & Marketing Ltd with the proposal that a 'full' reintroduction of the Eurasian beaver takes place. Three types of survey were undertaken during the consultation:

- 1. In a 'passive public' opinion survey involving 2,141 interviews, 63% of the general public supported a reintroduction, 12% were against and 25% had no view.
- 2. A total of 1,944 written responses were received during a 'pro-active public' survey. Overall, 86% of this sample was in favour of the reintroduction. A smaller majority of land managers and those with interests in forestry supported reintroduction. However, there was a lack of support from those with interests in fishing and agriculture.
- 3. A total of 281 consultees were also approached of which 144 (51%) responded. Reactions were mixed. Conservation and academic sectors were the most supportive, fishing/angling interests the least supportive.

The results of this consultation demonstrated that a majority of the public were in favour of a beaver reintroduction, but there were concerns from certain interest groups.

A national consultation has not yet been undertaken in Wales as this will follow as part of the licensing procedure. However, The Bevis Trust have consulted with local farmers and riparian landowners in the Cywyn catchment and a majority are supportive of the reintroduction of beavers to the area (see Appendix III for the consultation survey). A study by Lang (2004) also investigated the opinions of key stakeholders at various potential release sites (the River Teifi, Conway and Gwendraeth were being considered at the time) in Wales. The results from these areas showed that 71.7% were in favour of the reintroduction of beavers to their local area.

The Welsh Beaver Project is led by the Wildlife Trusts Wales and managed by a steering group, consisting of the six individual Wildlife Trusts in Wales. Wildlife Trusts Wales is working in partnership with The Bevis Trust for the reintroduction of beavers to Wales. The project will be implemented through two different groups; A Project Steering Group and a wider Liaison Group

The role of the **Project Steering Group (PSG)** is to represent the principle stake-holders and manage the project. It will be the interface with the Welsh Government for the project. Its task will be to steer and manage the project to completion.

Project Steering Group (PSG)

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Nick Fox	International Wildlife Consultants	Director		
Drew Love-Jones	International Wildlife Consultants	Field Team Manager		
Jo Oliver	International Wildlife Consultants	General Manager		
Alicia Leow-Dyke	Wildlife Trusts Wales	Welsh Beaver Project Officer		
Adrian Lloyd Jones	North Wales Wildlife Trust	Conservation Officer		
Robert Parry	Wildlife Trusts of South and West Wales	Mammal Specialist		
Hilary Foster	Natural Resources Wales	Biodiversity Officer		
Liz Halliwell Natural Resources Wales Mammal		Mammal Ecologist		
Derek Gow Derek Gow Consultancy		Beaver Management Specialist		
Roisin Campbell-Palmer	Royal Zoological Society of Scotland	Conservation Projects		
Manager				
Mark Elliot	Devon Wildlife Trust	Devon Beaver Project Leader		
Charlie Burrell	Beaver Advisory Committee for England	Chairman		
Toby Aykroyd	Wild Europe Initiative	Coordinator of Wild Europe		
		Initiative		
Peter Smith	Wildwood Trust	Director		

The wider Liaison Group will consist of a range of different organisations and individuals with an interest in the project. This includes farming, forestry, fisheries and game management interests. A database will be kept of the wider Liaison Group and they will be informed of any updates as the project develops.

3. Location

3.1 Site Identification

Work to identify suitable sites have been undertaken by The Bevis Trust and The Welsh Beaver Project. The Cywyn catchment is a suitable site, because it conforms to the requirement criteria as outlined in the Welsh Beaver Project reports:

- Water channel gradient beavers favour slow flowing or still waters with a shallow gradient. However, areas with a steeper gradient can be used as a natural barrier where the population can be contained and controlled if required during the reintroduction.
- Suitable habitat beavers forage on a wide range of vegetation from herbaceous to wooded vegetation and they will require access to a wide dietary range for their seasonal dietary requirements. They will also require access to wooded material for construction purposes and areas suitable for constructing lodges.
- Proximity of habitat to water up to 98% of beaver activity occurs within 20 metres of the water's edge and suitable habitat will need to be within close proximity to the water's edge.

3.2 Site Description

The Afon Cywyn and Nant Cynnen are approximately 67km in length. They flow from north to south in west Carmarthenshire and enter the sea at the Taf estuary Site of Special Scientific Interest (SSSI) and Special Area of Conservation (SAC). There are no designations along the river, other than the Taf estuary and the catchment has good natural containment as the majority of the river is isolated from other catchments. There is no suitable habitat further downstream towards the Taf estuary due to limited riparian habitat and the tidal salt marshes within the estuary will be unsuitable for residential beavers as beavers will not colonise salt-water. This topography can be used to naturally contain beavers within the Cywyn catchment and any beavers can be captured or managed if they disperse from the catchment. There are many tributaries leading into the Afon Cywyn and Nant Cynnen, but these originate from springs and do not lead to other rivers. These tributaries vary in their habitat suitability as some of these have been converted into concrete culverts and others are located on steep gradients. The upper area of the catchment contains habitat suitable for residential and breeding beavers due to the availability of food resources and opportunities for constructing lodges.

A ground survey of the river system was undertaken by The Bevis Trust in April 2015. The river system was surveyed from the mouth of Cywyn at the Taf estuary and upstream to Nant Hir. An aerial drone film of the river was undertaken in June 2015.

Figure 1. The Cywyn Catchment



Figure 2. The Nant Cynnen currently suffers from 'tunnelling' – heavy shading by over-hanging trees which means light levels are insufficient for aquatic growth.







3.3 Associated Land Use

The landscape of the Cywyn catchment is mainly used for cattle and sheep grazing. There is no significant arable cropping or silage production within the immediate vicinity of the water course. Any significant agricultural activity in the catchment is out of the normal foraging or flooding range of beavers. Further, in most of its length, the river does not immediately abut pastures. Riverine strips and woods line the river for 81% of its length and insulate beavers from farmland. The vast majority of beaver foraging occurs within 20 metres of the water's edge and in the intensely agricultural landscape of Bavaria, the majority of beaver-human conflicts occur within this 20 metres of water bodies.

There are no towns, industries, hydro dams, weirs, or water control utilities on this catchment. One main road, nine minor lanes and one railway line cross the river. A small forestry block exists below Talog, but impacts are unlikely as beavers favour deciduous trees. Prior to the release of beavers, a detailed risk assessment (Appendix IV) will evaluate any issues that are likely to arise and examine the solutions to mitigate against these issues.

3.4 Release Points

Ten beaver pairs/families will be released in the Cywyn catchment at suitable release points that are adequately far apart to provide each colony with sufficient riparian habitat in its territory. The territory sizes of wild living beaver colonies vary according to habitat availability and quality. Territory sizes can range between 1km to 7km, with territories as small as of 0.5km being occupied in optimal habitat (Campbell-Palmer *et al.* 2015).

Each pair/family will be released into established or created pools that are separated from any other adjacent release sites. Four sites have been prepared with at least two off-line deep ponds and lodges.

Two additional sites have been prepared with landowner's permission (Appendix V) and further sites have been identified for negotiations with landowners.

Sites along the rivers are selected for by the following criteria:

- 1. At least one pool or pond constantly >1.5 metres deep to provide a refuge.
- 2. At least one bankside lodge with an underwater access tunnel, dug and built from natural materials.
- 3. An exclusive quality foraging area exceeding two hectares (20,000m²) with all the area within 30 metres of water.
- 4. No neighbouring beavers within 350 metres or within the same pool.
- 5. No potential sources of problems such as culverts, busy roads etc.
- 6. Linked habitat corridors to allow for dispersal.

3.5 Population Expansion

The Afon Cywyn and Nant Cynnen have some major contiguous lengths of prime beaver habitat and are likely to be adequate for ten beaver pairs with scope for the expansion of the beaver population that could reach close to maximum densities.

Beaver densities are often estimated as the number of beaver families per kilometre of river, but this will vary between catchments due to habitat availability. In a riverine landscape the average territory length per beaver pair is approximately 3 km (Campbell-Palmer *et al.* 2015). However, this linear

estimate does not take into account non-linear landscapes. There will be some areas of these rivers that will be unsuitable for resident beavers due to steep sided streams, but other areas such as the various ponds and marshland with a high density of food plants that will be suitable for beavers. In Denmark there are records of one beaver family per 10 ha (Macdonald and Tattersall 1999) and in Devon two beaver pairs inhabit a 3 ha enclosure. An enclosed pair of adult beavers at The Bevis Trust have 100 linear metres of willow infested waterside banks, equating to approximately 2600 m² of food trees. Based on the study enclosure, an area of 100 x 100 metres in the Cywyn catchment could provide for a family of five beavers. Given that some of the swamps have multiple water courses and pools already, even if a beaver ventured no more than 20 metres from water, only 200 metres or so of river could feed a whole family indefinitely. Under these circumstances, territorial behaviour would probably be the primary spacing mechanism rather than food availability.

The Afon Cywyn and Nant Cynnen could hold a provisional estimate of 14 family groups totaling 90-100 individuals. This is based on the average territory size of one beaver family per 3 km and the average litter size for Eurasian beavers ranging from 1-4 kits per pair per year. Studies of wild beavers have shown that the average recruitment rate of beavers is 1.6 juveniles per pair per year. The population estimate of beavers in the wild will vary as there is likely to be mortality and any youngsters born in the wild will take a couple of years to reach sexuality maturity and successfully breed.

The project partners will monitor the viability of beaver population and will require the ability to manage the animals within the terms of this licence.

4. Business Case

The licence applicants anticipate funding the cost of the project by fundraising from a wide range of sources including; from a variety of foundations, trusts, private organisations and crowdfunding websites.

4.1 Economic Impact

Studies have shown the reintroduction of beavers can provide an economic benefit through ecotourism and as a deliverer of ecological services (Campbell *et al.* 2007, Gurnell 2008 & Jones *et al.* 2012, Puttock *et al.* 2017 (accessed 2016)).

Beavers are a keystone species and through their habitat modifications they are often described as ecosystem engineers. Extensive research has shown that they can benefit many different species including humans. They manage riparian and wetland sites, create wildlife refuges, increase biodiversity and modify flow hydraulics. The 'ecosystem services' that they provide can be difficult to value, but studies have shown that beaver habitats and dams can act as silt traps, help slow and dissipate the impact of flood events (Nyssen *et al.* 2011) and assist with water flow in times of drought (Coles, 2006). Beaver dams can also assist with reducing pollutant loads within river systems and the plant growth associated with these beaver-induced habitats can absorb significant levels of nitrates leaching from agricultural land (R. Brazier. 2016. pers comms, Puttock *et al.* 2017 (accessed 2016)).

Organisations such as the Environment Agency have started to investigate the use of nature-based solutions, for example the installation of 'leaky dams' to mitigate the impacts of major flood events. Whilst these might be successful in the short-term, they are entirely dependent on human intervention and not sustainable. These systems have a life span of approximately five years (D.

Gow. 2016. per comms). Beavers can offer a sustainable solution with the additional benefit of habitat improvements for biodiversity.

There is the potential for some negative impacts to occur where the activity of beavers conflict with the human activities. The intention of the reintroduction of beavers to Wales is to avoid any negative impacts, but it is possible that some unpredictable events may occur. For example, a beaver may find itself on private property or impact land-use activities. Each case will be dealt with by a Beaver Management network as outlined in the recently published, 'The Eurasian Beaver Handbook: Ecology and Management of *Castor* fiber' (Campbell-Palmer, R. *et al.* 2016). Costs may be involved with any negative impacts, but a study by the WildCRU consultancy calculated that the costs of dealing with the negative impacts associated with beavers could be outweighed by the benefits as much as 100 times (Campbell *et al.* 2007).

4.1.1 Water Quality

The Cywyn and Cynnen have been listed by Dŵr Cymru Welsh Water as not meeting Water Framework Directive quality standards owing to agricultural practices, (mainly through diffuse agricultural pollution). NRW reports ongoing issues with slurry pollution in these catchments. In these two catchments, agriculture is the primary factor influencing water quality, whereas in some other parts of Wales old mining work is an issue. The Cywyn has been closed to fishing due to pollution episodes. Run-off during heavy rain after slurry spreading is the main issue, but there are also episodes involving leaking or over-flowing slurry pits. Although point-source pollution is more readily detectable, diffuse pollution is more insidious. A large number of farms in low-lying areas of Pembrokeshire and west Carmarthenshire have been considered for listing as Nitrate Vulnerable Zones. Dairying is in decline at the moment, but beavers have the ability to mitigate agricultural run-off and improve water quality by filtering water through their dams. A recent study from Exeter University has shown that beaver dams can significantly reduce the amount of pollutants entering further downstream (Puttock *et al.* 2017 (accessed 2016)). Incidents of farm animal carcasses being dumped into the Cywyn were recorded in 2013 and 2016.

4.1.2 Flood Control

Flooding is not a major issue in this catchment, because it is small. However, on the adjacent Towy catchment, flooding is a real issue, as it is with many other similar Welsh rivers. In some of the canalised streams in the Welsh Valleys, such as the Rhondda, heavy machinery is currently being used to create log dams to impede the spate water. Lessons can be learned on the Cywyn and Cynnen, which could equally apply to the upper tributaries of the bigger catchments, where smoothing river flows is now an issue. South West Water, in their document 'Upstream Thinking', concluded that beavers in the upper catchments have the capacity to increase water retention by 500-3000%. To achieve this by mechanical means entails huge costs to the tax-payer. Beavers seldom dam streams more than about 3 metres wide primarily, because rivers that wide normally contain pools deep enough for beavers' needs, and because dams would not hold against these larger rivers. It is unlikely that any dams will be built below the confluence at Rickett's Mill. Dams are more likely in the small tributaries and side streams where there are no pools >1metre deep.

4.1.3 Fisheries

The Cywyn catchment is too small to be a significant fishing river, especially upstream of Bancyfelin and the Cywyn itself has never been a salmon river. Sea trout used to run, until about 1975, but frequent episodes of farm slurry seem to have eradicated them since then, and very few now reach the upper catchment. The Cywyn below Bancyfelin is fished by the St Clears Angling Club and upstream to Pont Bren is fished by the Carmarthen Amateur Anglers Association. The Cywyn is seldom fished nowadays, because of lack of fish (E. Williams. pers. comms). Sewin have crashed dramatically over the past 5 years, while salmon have had a longer, steady decline. The decline in migratory fish has been attributed to semi-commercial fishing in the estuaries and Carmarthen Bay (E. Williams. pers. comms). However, the resident brown trout have also declined. It has been suggested that slurry pollution has damaged the rivers on a frequent basis, killing off most of the fish and invertebrate life.

The majority of the upper catchment is now too overgrown to be fished, and the brown trout do not achieve a catchable size. The shading by trees has also inhibited the growth of aquatic weeds (M. Heckler pers. comms). With some opening up of the river, enabling more light, it is expected that both plant and animal species will benefit, thus increasing viability for hatchling parr. Increased interest in the river as valuable habitat has the potential to recover it as a spawning ground. The Carmarthen Amateur Anglers Association have been trying to improve one of the tributaries of the Cothi by removing some of the shading trees, but it was an 'almost impossible task' (E.Williams. pers. comms).

It is likely that the beavers would build some dams on the upper reaches of the river to ensure that they have access to water at least 1 metre deep. These dams are likely to be overflowed frequently especially during the winter months when the river can easily rise a metre in an hour or two of heavy rain on sodden ground. Salmonid research undertaken in Scotland by Southampton University have noted tagged fish migrating over beaver dams. Detailed scientific literature reviews investigating the impacts of beavers on fish have also been undertaken with the most recent review published by Kemp *et al.* 2012.

4.2 Socio-Economic Impact

Wildlife tourism is becoming increasingly popular and the reintroduction of beavers could have a significant social and economic benefit, especially in rural locations. In Scotland the reintroduction of white-tailed eagles to Mull generates an income of £1.8 million per annum for the local economy, the Red Kite Feeding Centre in Wales attracted 33,350 visitors in 2004 at a charge of £2.50 per adult and wildlife tourists to Wales spend approximately £13.8 million per annum (Campbell *et al.* 2007). In the recent State of Natural Resources Report the combined value of wildlife and outdoor activity tourism is estimated to be worth £6.2 billion in Wales (NRW 2016).

It is well documented that beavers in Europe are a major attraction for wildlife watchers. In Denmark beavers were reintroduced in 1999 and tourists can visit the beavers through organised tours, attracting over 2000 visitors per year (Jones *et al.* 2012). Beavers were reintroduced to Belgium during the late 1990s and similar beaver watching tours are organised every year and advertised worldwide (Jones *et al.* 2012). The Scottish Beaver Trial in Knapdale attracted many visitors to the area, which has had a significant impact on the local hospitality businesses. One hotel near Knapdale increased its profits by £25,000 with guests staying just to see the beavers (R. Palmer-Campbell. 2016. pers comms). Aigas Field Centre based near Inverness, which offers wildlife courses and is the site of a beaver demonstration project have calculated that the presence of beavers has helped generate an income of over £3 million over eight years, with approximately 400 adults and 1,500 school children visiting the beavers and beaver habitat every year (J. Lister-Kaye. 2016. pers comms).

Tourism is a major industry with the importance of wildlife tourism being recognised by Visit Wales. There will be many opportunities to develop tourism in Wales and as beavers are active at dawn and dusk, this will result in visitors staying overnight, which will benefit hotels, guest houses, campsites, restaurants, shops, etc. The study by WildCRU Consultancy (2007) estimated that a beaver release site could bring in an estimate of approximately $\pm 3/4$ million to over ± 2 million per year.

4.3 Environmental Education

A beaver reintroduction to Wales provides a unique opportunity for developing an environmental education programme. The six Wildlife Trusts in Wales have a team of staff dedicated to providing formal and informal environmental education to help children engage, experience and learn about nature. This is achieved by delivering outreach programmes to schools all over the country or through schools visiting Wildlife Trust nature reserves and visitor centres. The junior branch of the Wildlife Trusts, *Wildlife Watch* also enables further engagement with more than 150,000 members across the UK. In August 2016 the first ever Welsh version of the Wildlife Watch magazine, *Gwyllt* was launched.

The Bevis Trust also has a dedicated Education Officer and extensive experience with delivering environmental education within Wales and abroad. The Bevis Trust run a School Links Programme, which links 40 schools in Mongolia, UK, USA and the Middle East via the internet with a primary focus on falcon conservation. This can be extended to schools in beaver range states.

The Bevis Trust and Wildlife Trusts Wales resources will allow the Welsh Beaver Project to connect with a younger audience where the story of beavers in Wales can be used to further promote the outdoors and link with other wildlife and educational opportunities. In due course we intend to develop an environmental education programme similar to the 'Bring Beavers Back' module that was developed by The Royal Zoological Society of Scotland (RZSS) for the Scottish Beaver Trial. This was aimed at schools with links to the national curriculum. There will also be scope for Wildlife Trust visitor centres and The Bevis Trust to interpret the beavers at Wildlife Trust visitor centres in and near Carmarthenshire and at the release site. This offers a platform for local interpretation and public engagement.

5. Biodiversity

Wales has reinforced its commitment to protecting the natural environment through the Environment (Wales) Act 2016, which aims to maintain and enhance biodiversity. The Nature Recovery Plan in Wales also sets out to address the underlying causes of biodiversity loss and aims to deliver on the commitments of the UN Convention on Biological Diversity and the EU Biodiversity Strategy to halt the decline in biodiversity by 2020. The recent publication of the State of Nature Report 2016 has highlighted that 56% of species studied have declined over recent decades, but targeted conservation efforts have helped halt the decline of some species.

There has been extensive research undertaken across Europe and in the UK that demonstrate the benefits beaver have on biodiversity. It has been shown that their activities as ecosystem engineers provides measurable benefits for other species, from the creations of pools, linking up habitats, creating deadwood to generating coppice. This creates foraging and nesting opportunities for many different species as well as assisting with reducing downstream flooding, preventing the siltation of rivers, improving water quality. Therefore, the reintroduction of beavers will have a beneficial effect on the wider biodiversity of Wales.

Further information can be found in the following reports:

Gaywood, M., Stringer, A., Blake, D., Hall, J., Hennessy, M., Treem A, Genney, D., Macdonald, I., Tonhasca, A., Bean, C., McKinnell, J., Cohen, S., Raynir, R., Watkinson, P., Bale, D., Taylor, K., Scott, J. & Blyth, S. (2015). Beavers in Scotland: A report to the Scottish Government. Scottish Natural Heritage, Inverness.

Gurnell, J., Gurnell A.M., Demeritt, D., Lurz P.W., Shirley M.D.F., Rushton S.P., Faulkes C.G., Nobert S. & Hare E.J. (2008). The Feasibility and Acceptability of Reintroducing the European Beaver to England. Sheffield, UK, Natural England/People's Trust for Endangered Species, Sheffield, UK.

Jones, A.C.L., Halley, D.J., Gow, D., Branscombe, J. & Aykroyd, T. (2012). Welsh Beaver Assessment Initiative Report: An Investigation into the feasibility of reintroducing European Beaver (*Castor fiber*) to Wales. Wildlife Trusts Wales.

6. Public Health

A full Disease Risk Assessment (DRA) (Appendix VI) has been prepared by Roisin Campbell-Palmer (former Field Operation Manager, Scottish Beaver Trial and Conservation Projects Manager Royal Zoological Society of Scotland) and Dr Simon Girling BVMS (Hons) DZooMed DipECZM CBiol FRSB EurProBiol MRCVS, RCVS Recognised Specialist in Zoo & Wildlife Medicine, European Veterinary Specialist in Zoological Medicine (Zoo Health Management), Head of Veterinary Services, Royal Zoological Society of Scotland, Honorary Clinical Associate Professor, University of Glasgow. Dr Girling is a beaver specialist who also wrote the DRA for the Scottish Beaver Trial. The DRA has been accepted by the Chief Veterinary Officer, the Welsh Government.

The founder stock will be UK captive-bred beavers that have essentially been quarantined their entire lives against zoonoses, including the canid tapeworm *Echinococcus multilocularis*. The beavers will have standard health checks before arriving on site. The pre-release health screening protocol is covered in the DRA. It includes examination of the head (eyes, ears and teeth), skin, fur and tail (for ectoparasites and injuries), abdominal palpation, auscultation and cardiac evaluation. All animals will be tagged with an individual, subcutaneous microchip under the skin under the tail. The gender of each animal should be confirmed through palpation of the baculum (*os penis*) and/or the colour and viscosity of the anal gland secretions.

Once the beavers have been released, they will essentially be wild. They will not be trapped for further health checks or treatment. Debilitating illnesses and death are natural occurrences and an integral

part of the re-establishment of the population.

For further reading on health protocols see:

Campbell-Palmer, R. & Rosell, F. (2013). Captive Management Guidelines for Eurasian Beaver (*Castor fiber*). Published by Royal Zoological Society of Scotland, BookPrintingUK.com, Peterborough.

Campbell-Palmer, R., Del Pozo. J., Gottstein, B., Girling, S., Cracknell, J., Schwab, G., Rosell, F. & Pizzi, R. (2015). *Echinococcus multilocularis* Detection in Live Eurasian Beavers (*Castor fiber*) using a combination of Laparoscopy and Abdominal Ultrasound under Field Conditions. PLoS ONE 10(7):e0130842. doi:10.1371/journal.pone 0130842.

Goodman, G., Girling, S., Pizzi, R., Rosell, F. & Campbell-Palmer, R. (2012). Establishment of a health surveillance program for the reintroduction of the Eurasian beaver (*Castor fiber*) into Scotland. *Journal of Wildlife Disease*. **48(4)**: 971-8.

Osborn, D. J. (1955). Techniques of sexing beaver, *Castor canadensis*. Journal of Mammalogy **36**: 141 142.

Rosell, F. & Sun, L. (1999) Use of anal gland secretion to distinguish the two beaver species *Castor canadensis* and *C. fiber*. Wildlife Biology **5**: 119-123.

Woodford, M. H. (2001). Quarantine and health screening protocols for wildlife prior to translocation and release in to the wild. Joint publication O.I.E, Care for the Wild International, IUCN and EAZWV (XI-XII).

7. Project Plan

7.1 Source Population

The proposal is to assemble unrelated pairs of beavers from donor captive collections within Britain. The individual animals will be paired in captivity prior to release and health screened. The animals will be of Bavarian origin. These beavers will have either been bred by The Bevis Trust or obtained from other UK captive breeding collections. The Bevis Trust have a Memorandum of Understanding with the Wildwood Trust and Derek Gow, offering five beaver pairs/families and three beaver pairs/families, respectively. The Bevis Trust currently have three captive breeding pairs producing beavers for reintroduction requirements. Thus the capacity for 10 pairs of founder animals.

7.1.1 Environmental Factors

Beavers readily adapt to their environment and throughout Europe they can be found in modern, urban settings as well as in remote locations. The proposal is to release Eurasian beavers that have been bred in captivity within a British climate. These individuals will therefore be acclimatised and able to adapt to the British landscape.

7.1.2 Practical Issues

The Bevis Trust will undertake the management of the beaver stock and the procurement of further donor stock. This will ensure that unrelated individuals are obtained from British captive collections, paired, health screened and microchipped prior to release.

7.1.3 Procurement of Release Animals

Three captive beaver families are located within the vicinity of the release site with a view to release in the spring of 2017. Beaver pairs/families will be sourced with a view to release up to 10 pairs along the catchment in spring 2017.

7.1.4 Release

Before loading, the beavers will have been vet-checked and scored for condition, a micro-chip fitted, and a DNA sample taken. The beavers will be transported in suitable certified animal transport vehicles with air conditioning if necessary, in purpose-built individual beaver transport crates. Families will be kept together throughout and small kits will be transported with their mothers. The journeys will be timed to reach the release sites at dusk. The boxes will be placed at the water edge, with the doors left open. The beavers will be allowed to enter the water of their own accord. Food will be available in the form of willow branches and leaves grown in the water. Artificial lodges will be present within the release sites and can be accessed via an underwater entrance, which will lead to an unlined natural cavity. Pairs will be released together. The non-breeding beavers will be released in May or June when there is ample food available and plenty of ground cover. Families with kits will not be released until the kits are strong enough, in the autumn. If sufficient pairs of beavers are available, all will be released in the first season. If not, the late-comers will be released the following season outside the edges of the established territories.

7.2 Beaver Management

All elements of potential management issues arising from beavers are addressed in detail in the Risk Assessment (Appendix IV) and in the recently published 'The Eurasian Beaver Handbook: Ecology and Management of *Castor* fiber' (Campbell-Palmer *et al.* 2016)..

The project is designed to reduce the chance of negative impacts occurring, and to minimise the degree of any impacts that do occur. The following approach will be adopted:

- 24 hour Hotline for reporting of actual of potential incidents
- Swift action to deal with any such problems;
- Assistance with landowners to put things right where any damage has occurred.

Landowners will be asked to contact TBT immediately if they see, or suspect, any problematic behaviour. This might include building a dam, lodge, or burrowing in a position that is likely to cause problems. In the event that such reports are made the PSG staff from the partner organisations will visit the area as soon as possible. A judgement will be made as to whether the issue presents a real risk to property or otherwise, and if necessary independent expert advice will be sought. Wherever possible the decision will be taken in consultation with the landowner and a consensus approach adopted. The Project Manager will then either:

- Take no further action;
- Modify or remove the offending structure.
- Assist the landowner with any repairs or remedial work, such as reinforcing a section of bank employing approved natural river engineering structures, or draining an area that has been flooded against their wishes;
- Arrange to remove some or all of the beavers and relocate them to a vacant section of the river catchment;
- In extreme cases, beavers will be removed from the catchment entirely and as a very last resort lethal control may be required.

Such activities will normally be carried out free of charge, and the costs of such works have been built into the project budget. Labour costs will be kept low by using volunteers wherever possible.

7.2.1 Containment

The Cywyn catchment is small; much smaller than some of the other Welsh river systems. Beavers do not readily migrate over watersheds into adjacent catchments. It thus becomes possible to establish a relatively discrete self-sustaining population without committing to a larger area. The river runs down to the sea, but this area will be unsuitable for beavers due to the lack of habitat and beavers do not inhabit salt-water areas.

7.2.2 Monitoring

TBT and WTW will monitor the beavers during the pilot reintroduction. The release sites and rivers will be monitored periodically either through direct observations, camera trapping, microchip

dataloggers or by thermal imagery. This will allow the identification of beaver presence and their occupied ranges.

7.2.3 Exit Strategy

A clear exit strategy will form an integral part of the proposed Carmarthenshire Beaver Reintroduction (CBR). TBT and WTW firmly believes that the project will be successful; however, a strategy for termination has been developed as a precautionary approach.

The Exit strategy would be implemented in the event that:

- 1. Unsustainable and intractable detrimental effects arise as a result of the presence of beavers in the River Cywyn catchment.
- 2. An unacceptable risk to human health, livestock or other wildlife becomes apparent.
- 3. There is an unsupportable level of mortality in the beaver population.

In the event that the exit strategy is triggered and the beavers have to be removed, then the beavers may be:

- 1. Transferred to another UK reintroduction project.
- 2. Housed in captivity or zoological collections.
- 3. Neutered and returned to the river to live out their life-span in the wild.
- 4. Humanely destroyed.

The beaver population would be live-trapped throughout the River Cywyn catchment. This process would be assisted by trail cameras, visual observation and an ongoing search effort for fresh field signs to ensure and verify complete removal. All parties involved in the trial are committed to the Exit Strategy and fully understand its implications. The CBR undertakes to maintain availability of two beaver cage traps at all times for emergency use.

Beavers would be live trapped in specifically designed beaver traps and if to be killed, would be humanely euthanased by a qualified veterinary surgeon. Any cadavers would be stored appropriately for full post mortem examination and sample collection by the Royal Zoological Society of Scotland and/or collaborating vets/pathologists locally. IWC has a freezer room to store any cadavers found on site prior to examination. Following post mortem specimens would be retained for research and education purposes.

In the event that there is majority consent from the stakeholders/landowners involved in the reintroduction that retention of the beaver population in-situ is desirable then arrangements will be made for an institution / formal partnership to assume responsibility for their future management. The CBR envisage that the current project management structure will be dynamic and adapt to the requirements of the project programme. It is logical to assume that project success will be dependent on the effectiveness of the management structures and our intention would be to maintain these groups and secure funding for future phases. Recommendations for future, post-trial, management structures will be an important element of the trial assessment and final report.

At the end of the fourth year of the trial period, the CBR, will make formal recommendations (subject to revisions) to NRW regarding the long term management of the beaver population and their associated structures. This will include a review of the management techniques that are employed in comparable river catchments in Europe. The purpose of the recommendations will be

to ensure a pragmatic management system and associated licensing framework is adopted. The absence of this system would lead to potentially intractable conflict with stakeholders and would trigger the Exit Strategy.

At the end of the initial five years, if there are still overriding concerns about the long-term retention of the beavers, an option would be to extend the project for a further five years.

Procedures for Determining Exit

The procedures for managing and delivering the Exit Strategy will be formally adopted by all CBR Project Management Group partners and permanent advisors through a Memorandum of Agreement.

The procedures will be circulated to NRW for comment and amendments where appropriate will be agreed.

This determination will be informed by the publication of an annual report that will detail beaver impacts and associated acceptability. The PSG will also react to any event that triggers (or has the potential to trigger) an Exit criterion immediately and convene extraordinary meetings, including additional stakeholders, where appropriate.

The final decision on whether the Exit Strategy will be triggered will rest with the PSG. The decision will be taken on a clear majority vote. In the event of the Exit being triggered all CBR Project Management Group members and advisors will work in unison to remove all beavers from the catchment. All communications will be dealt with by the nominated lead organisation only.

NRW would both be invited to attend all meetings (in an observational and advisory capacity) and be party to all correspondence relating to Exit triggers.

NRW would authorise the implementation of the Exit Strategy as independent monitors of the trial.

Rogue Individuals.

It is possible that in certain circumstances where public health or safety is involved, that one or two individual beavers might cause an intractable problem. For example, a beaver might persistently block a culvert that keeps a busy road from flash flooding. If attempts to prevent this happening fail, the only remaining alternative will be to catch the beaver and either translocate it or lethally control. The PSG, in consultation with NRW, need to be able to implement this Exit Strategy for one or more specific problem individuals without delay. Of course any non-lethal option will be the preferred route. This management will not reflect on the project as a whole, but is merely a common-sense approach to enable the long-term viability of the total population.

8. Conclusion

The feasibility work that has been conducted in Wales and the rest of Britain demonstrate that the reintroduction of beavers to Wales will be a success.

TBT and WTW consider that the reintroduction of beavers to Afon Cywyn and Nant Cynnen is the appropriate way to proceed and determine the reintroduction of beaver to Wales. TBT and WTW request that NRW grants a licence for the pilot release of Eurasian beaver *Castor fiber* into the wild in Afon Cywyn and Nant Cynnen in West Carmarthenshire, Wales under section 16(4) of the Wildlife and Countryside Act 1981 (as amended).

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Appendix I.

JNCC CRITERIA FOR EVALUATING CONSERVATION TRANSLOCATIONS

In 1995 the International Union for the Conservation of Nature (IUCN) approved guidelines for reintroduction of species. These have been approved by the statutory conservation agencies in Britain. Based on these guidelines the Joint Nature Conservation Committee (JNCC) has developed a process for evaluating and undertaking species translocations for conservation purposes. Any reintroduction to Wales should follow these guidelines. The criteria are addressed below:

AGREED CRITERIA FOR EVALUATING PROPOSED CONSERVATION TRANSLOCATIONS:

i. There should be good evidence that the species is absent from the proposed release site(s) before the initial conservation translocation;

Beavers are no longer present in the wild in Wales having become extinct during the Middle Ages. As of May 2009 a trial reintroduction was underway in Knapdale, Argyll in Scotland. In addition to this beavers have been discovered living wild on some rivers in Scotland having presumably escaped from private collections.

- The release site(s) proposed for establishment should be within the historic range (post 1600, to take account of the first documentation of species distributions in Britain) of the species;
 It is not known exactly when beavers became extinct in Wales or the rest of Britain, but they were present in Wales in 1603. It is widely accepted, that beavers were distributed throughout Britain before over-hunting resulted in their extinction.
- iii. There should be a good understanding of the reasons for the original decline and disappearance of the species considered for translocation and the causes of their reduction or elimination from the site(s) proposed for establishment of the species; Beavers became extinct in Britain (including Wales) primarily due to over-hunting by man. Habitat loss may have played a part in some instances, but the surveys that have been

Habitat loss may have played a part in some instances, but the surveys that have been undertaken in 2008 show beyond doubt that there is plenty of suitable habitat in Wales to support a sustainable population of beavers.

iv. Consideration of the outcome of any previous translocations of the species involved, either in GB or elsewhere;

Translocations of beaver have occurred in many European countries with over 200 reintroductions and translocations having taken place since 1922. Beavers are now living wild within every country within their former European range except for Portugal, Italy and the countries of the southern Balkans. A trial reintroduction has taken place in Scotland 2009 – 2014 and a trial reintroduction is underway in Devon (since February 2015). Experience gained from all these projects would help to inform a reintroduction to Wales.

v. Consultation with other organisations and individuals who may be interested in or affected by the proposed translocation project;

Consultation with the key stakeholder organisations has occurred since 2005. Opinions, concerns, and ideas have been collated so that opportunities and potential problems are highlighted to enable practical solutions to be developed. Further consultation is planned, especially at the local level, to ensure that all organisations and individuals potentially affected by a reintroduction of beaver to Wales are able to feed into the assessment process.

vi. An assessment of the benefits to the species concerned arising from the proposed translocation (over both short and long timescales);

A reintroduction to Britain would contribute to the underlying aim of the Council Directive 92/43/EEC (Habitats Directive) to return native species to their former range. Reintroduction of European beaver to Wales would make a contribution to the favourable conservation status of the species in the EU by considerably extending its range.

vii. Consideration of any possible harmful effects to donor populations;

Potential donor populations used to source a reintroduction programme would not be adversely affected by the removal of animals. Beaver management in Bavaria involves the annual removal of up to 300 animals, some of which could be used to supply a reintroduction to Wales.

viii. Assessment of any possible harm to other species or habitats at the proposed recipient sites;

Studies show that the activities of beavers significantly increase biodiversity within riparian and wetland habitats and have an overall beneficial effect on habitats and species.

ix. The fit with other conservation objectives of the statutory agency concerned;

As a keystone species beavers have the potential to be a major management tool in river and wetland systems in Wales, benefiting a wide range of species and habitats thus helping to achieve certain core objectives of Nature Resources Wales. The reintroduction of beavers would also comply with one of the aims of the Habitats Directive to return native species back to their former range, as well as being in line with key objectives of the Welsh Assembly Government's proposed Natural Environment Framework.

x. The likely chances of success of the proposed conservation translocation;

Reintroduction/translocation of beavers in Europe has been overall highly successful. To date over 200 translocations have taken place throughout Europe since 1922 with the vast majority being successful and lessons have been learnt from the few failures that have occurred. There is now a wealth of experience to draw upon and approved procedures and best practice are well understood. Three trial captive pairs in extensive enclosures in the proposed area are breeding successfully and living naturally without support feeding.

xi. Confirmed availability of earmarked funds to complete the planned translocation and subsequent monitoring;

Preliminary investigations into potential sources of funding have been undertaken. More detailed plans would be developed as the assessment continues and exact locations for release sites are selected.

xii. Use of the most appropriate donor stock, taking into account the ecology, behaviour and genetic constitution of the species.

Recent studies have suggested that there are two lines of Eurasian Beaver: *Castor fiber fiber* in Western Europe and *Castor fiber vistulanis* in Eastern Europe and beyond (see Halley, D.J. (2010). Sourcing Eurasian beaver *Castor fiber* stock for reintroductions in Great Britain and Western Europe (*Mammal Review* 2010, Mammal Society). A reintroduction to Wales should as far as practical seek to involve the translocation of *Castor fiber fiber*, using donor stock from Germany, France or Norway. A combination of all three donor stocks could help to improve the genetic diversity of a newly established population.

Appendix II. Proposed Licence Details

Wildlife and Countryside Act 1981 (as amended)

LICENCE - Release of non-native species and those listed under Schedule 9

This licence authorises acts that would otherwise be offences under the above legislation. Any request for information in this licence will be considered under the Environmental Information Regulations 2004 and the Freedom of Information Act 2000 as appropriate.

Natural Resources Wales Ref:

Wildlife Licensing First Floor Temple Quay House 2 The Square Bristol BS1 6EB **T: 0845 601 4523 F: 0845 601 3438**

Under the Wildlife and Countryside Act 1981 (as amended) Natural Resources Wales has granted this licence for Non-native species and Schedule 9 (Wildlife and Countryside Act) for the purpose of:

Permitting an activity prohibited by section 14, under section 16(4)(c) to: Name (in full): Dr Nicholas Fox **Company Name:** International Wildlife Consultants Ltd Address: Penllynin Farm, Llysonnen Road, Carmarthen County: Carmarthenshire Postcode: SA33 5EH Between the dates of: 1 May 2016 and 30 April 2021 At (locations): **Site/Location Name** County Location Afon Cywn and Nant Cynnen Carmarthenshire 51° 51'50"N 4° 25'11"W Catchment For the following species: Number Activity **OS Grid** Species Method Detailed Location Reference Common Name (Taxonomic Name) Eurasian 10 pairs plus Release Release Cywyn 51° 51'50"N any dependent catchment 4°25'11"W beaver (Castor fiber) young

This licence is granted subject to the licensee, including servants and named agents, adhering to the conditions and notes specified below.

Date:

Signature:

(for and on behalf of Natural Resources Wales WARNING

□ This licence authorises acts that would otherwise be offences under the Wildlife and Countryside Act 1981 (as amended). Any departure from the conditions relating to this licence may be an offence under this legislation.

□ This licence conveys no authority for actions prohibited by any other legislation;

□ This licence can be modified or revoked at any time by Natural Resources Wales, but this will not be done unless there are good reasons for doing so. The licence is likely to be revoked immediately if it is discovered that false information had been provided which resulted in the issue of the licence.

LICENCE CONDITIONS

General

□ The licensee will follow protocols and processes laid out in their 'Application to reintroduce the Eurasian Beaver (*Castor fiber*) to Carmarthenshire' by Dr Nicholas Fox.

Any major deviation from these protocols and processes must first be agreed in writing with Natural Resources Wales.

□ The licensee must ensure that all appropriate permissions are in place to undertake the licensed activities and these are in place, as necessary, prior to the licensed activity commencing.

Beavers

 \Box All beavers to be released must be the Eurasian beaver (*Castor fiber*) sourced from a legally taken and held captive population.

□ Only beavers certified as healthy and fit for release by a qualified veterinary surgeon are to be released. Specifically they must be confirmed as being free from the Taenid *Echinococcus*

multilocularis.

□ All beavers released must be marked with digital identification chips. This includes any beavers caught subsequently during the project that are found not to have an identification chip.

□ Information on sex, genetic profile and approximate age of each beaver released from captivity must be obtained and documented prior to release.

□ Information on approximate age and sex must be obtained for all field caught animals.

□ Any known deaths of beavers must be reported to Natural Resources Wales. If the carcass is available a post mortem must be carried out by a suitably experienced veterinary surgeon and the report copied to Natural Resources Wales.

□ The release of beavers must be undertaken in accordance with best practice, e.g. using 'soft release' techniques.

Release site

□ Prior to the release beavers, written permission must be obtained from the landowner/s of the release site/s.

Access to land occupied by beavers

□ Before any beavers are released, the licensee must satisfy Natural Resources Wales that is has secured written permission from sufficient relevant owners of land on or adjacent to the Afon Cynnen to allow access onto land for the purpose of monitoring impacts and the health of the beavers, carrying out reparations in the event of damage caused by beavers and (if necessary) to remove beavers from the river.

Exit strategy

□ Natural Resources Wales reserves the right to terminate the trial if it deems this is necessary for whatever reason and will make the final decision on any proposal by the Project Management Group to invoke the exit strategy.

□ Before any beavers are released, a written guarantee that the licensee will underwrite the reasonable costs of an exit strategy must be provided to Natural Resources Wales.

□ Before any beavers are released, the licensee must make public to all interested and relevant parties, the existence, criteria and content of the exit strategy.

Protected sites

□ Any impacts of beaver activity on or adjacent to protected sites must be closely monitored and Natural Resources Wales kept informed.

□ Natural Resources Wales must be consulted on any proposed remedial or mitigation measures on or in the vicinity of protected sites.

Public awareness

□ Provision must be made for interested and relevant parties to communicate with the Project Management Group.

Reporting

□ Natural Resources Wales must be provided with annual reports providing an update of the progress of the project against its published objectives.

Standard conditions

□ The licensee shall permit an officer of Natural Resources Wales, accompanied by such persons as he/she considers necessary for the purpose, on production of his/her

identification on demand, reasonable access to the site for monitoring purposes and to be present during operations carried out under the authority of this licence for the purpose of ascertaining whether the conditions of this licence are being, or have been, complied with. The licensee shall give all reasonable assistance to an officer of Natural Resources Wales and any persons accompanying him/her.

□ The licensee is responsible for ensuring that operations comply with all terms and conditions of the licence.

NOTES

1. The provisions of the Animal Welfare Act (2006) and the Wild Mammals Protection Act (1996) must be complied with at all times.

2. Natural Resources Wales checks compliance with licences and the attached conditions.

3. Amendments to the list of people authorised to act under this licence can be made by completing their details on line or by contacting Natural Resources Wales. Additional authorised persons must not undertake licensable activities until their name is listed on a valid licence.

4. You are advised to carry a copy of this licence with you at all times whilst undertaking licensed activities.

Additional note(s):

AN1: Nothing in this licence confers a right of entry to any land or property.

AN2: Animals should be released at a location and a time where the risk of injury to themselves, other animals/birds or people is minimised.

Additional Authorised Individuals

Jo Oliver Derek Gow Andrew Love-Jones Peter Lewis Peter Smith Remy Van Wijk Rob Parry Adrian Lloyd Jones Alicia Leow-Dyke Sion Thomas Thomas Spink James Robinson Matthew Aggett **Appendix III. Public Consultation Survey**

Are you:		
Carmarthenshire resident	Yes	No
Resident in Cywyn/Cynnen catchment	Yes	No
Land-owner along Afon Cywyn or Nant Cynnen	Yes	No
Active farmer along Afon Cywyn or Nant Cynnen	Yes	No
Have you fished these rivers in the past three years?	Yes	No
Are you representing:	an organisation	?
	your personal vi	ews?

What organisation are you representing?			
Have you read the project proposal?	Yes	No	

What are your views?	Unconditional support
	Support with conditions below:
	Neutral
	Do not support for reasons below:
Do you have any comments that you would like recorded?	

If you would like to be updated on this project, please give contact details. Your contact details will not be circulated outside this project. Name:

Email address:

Organisation if applicable

Thank you for taking the time to share your views.

Appendix IV. Risk Assessment

Risk Review Prepared in	This document has been produced to identify potential elements of risk associated with a trial restoration project				
response to:	for Eurasian beavers (<i>Castor fiber</i>) into the Catchment of the River Cywyn. The analysis includes both physical and procedural risk. All hazards identified have been analysed for their risk potential. Precautionary measures are proposed where the hazard is considered significant. The risk rating has been quantified using the likelihood versus severity matrix displayed at the bottom of the document.				
Project Name:	Carmarthenshire Beaver Re-Introduction project for Eurasian beavers (<i>Castor fiber</i>) to the River Cywyn catchment.				
Project Description:	The project involves the release of up to ten pairs of European beavers into the River Cywyn Catchment. The project will aim to analyse the impact of beaver activity by monitoring their effect on biodiversity (fish), hydromorphology and water quality - sediment/nutrient/chemical capture.				
Catchment:	River Cywyn				
Central Grid Reference of site:	51°51′ 50″ N 4° 25′ 11″ W				
Document prepared on:	1 July 2015				
Document prepared by:	International Wildlife Consultants Ltd. Dr Nick Fox (Director)				

Beaver effect	Analysis of Risk	Precautions taken or in place	Severity	Probability	Revised risk
and impact			of Risk	of risk	level from

					matrix
Flooding	•		•		
Detrimental flooding caused by damming	Dams that are created across channels may cause localised flooding and pond creation. In an unsuitable location flooding could be undesirable i.e. in drainage ditches on level land south of Bancyfelin. It is highly unlikely that dams will be constructed in the main river channel downstream from Ricketts Mill. This risk is therefore associated with tributary and headwater streams.	Regular monitoring to assess where dams are being constructed to observe their impact will be undertaken by field staff. Where dams are in unsuitable positions or causing untenable flooding they will be removed or "mitigation drained" using established techniques to an acceptable level. If required fencing of key points to prevent beaver access/egress.	Moderate	Possible	Moderate
Flooding at the base of established notable trees	Where flooding occurs in low lying land due to dam creation inundated trees will eventually die.Mature trees may be subject to felling activity by beavers.	Field staff will monitor the beaver dams and their associated impact on standing trees. If the tree becomes unsafe and is in a location near to access routes, footpaths or power lines then the tree will be manually felled. Important veteran trees will be identified through the catchment audit and specific mitigation measures will be employed to ensure unacceptable loss of these features does not occur.	Moderate	Unlikely	Acceptable
Deadwood discarded in the water causes flooding	Trees and branches will be transported into water courses for feeding and as building materials. If not used as a food source or as a building material the dead wood could be moved by the water to	Regular monitoring of the catchment by field staff and volunteers would identify any areas of risk. Areas of critical obstruction - roads, access tracks etc. would be cleared of any adjacent debris on a regular basis and prior to any flood risk	Moderate	Very Unlikely	Acceptable

	cause obstructions and flooding.	warnings.			
Flooding of access routes by dam creation	Where access routes cross over the water course there is potential for localised flooding to occur. In reality there are few if any access routes that could be flooded.	Regular monitoring of dam creation and any potentially impacted flood area would be assessed by field staff. Dams would be removed or "mitigation drained" to an acceptable level as necessary. If required fencing of key points to prevent beaver access/egress.	Slight	Unlikely	Acceptable
Flooding of fences from dam creation	Where fence lines are in close proximity to the water course there is potential for localised flooding to occur.	Regular monitoring of dam creation and any potentially impacted flood area would be assessed by field staff. Dams would be removed or "mitigation drained" to an acceptable level as necessary. If required fencing of key points to prevent beaver access/egress.	Moderate	Unlikely	Acceptable
Large woody debris washed down stream	In the event of a significant flood event large woody debris could detach and wash down stream causing further flooding and obstruction.	This is happening at the moment. We expect the beavers to mitigate this effect on balance.	Moderate	Possible	Moderate
Failure of beaver dams	If a major beaver dam or a series of smaller impoundments burst simultaneously they could present a flood risk.	Beavers maintain dam structures to prevent breakdown with regular maintenance. When abandoned / unmaintained the material employed to create these structures generally remains	Severe	Very Unlikely	Acceptable

		in situ and slowly decays. Where dam breaches do occur it is commonly the case that most of the expelled debris is trapped elsewhere by other impoundments or dead			
		wood habitat.			
Public health					
Contraction of Echinococcus multilocularis	<i>Echinococcus multilocularis</i> is a tape worm which is currently not present in the UK. It can be carried by a range of mammalian species but is only transmitted by the carnivores which consume their cadavers. If contracted in egg form from the faeces of infected carnivores it can be transmitted to humans and cause illness or death.	Ensure only UK born captive bred beavers are used to augment the existing population. Vet check pre-release.	Very severe	Very Unlikely	Acceptable
Spread of water borne pathogens in water (e.g. <i>Giardia,</i> <i>Cryptosporidium</i>)	The river Cywyn and the local coast is not used extensively for recreation. It is currently subject to multiple pollution events, mainly dairy run off and slurry contamination, both point pollution and ongoing diffuse pollution.	Screening of beavers before release.	Moderate	Unlikely	Acceptable
Agriculture and for	restry				
Damage to crops	Neighbouring properties that have tilled crops may be impacted through damming and also foraging by beavers.	Active field monitoring of beaver locations and activity by field staff and volunteers. If required fencing of key points to prevent	Slight	Unlikely	Acceptable

	Beavers are unlikely to forage >20m from river banks and few crops are palatable to beavers – however localised impacts can be significant. There is little or no cropping other	beaver access / egress.			
	adjacent to the river.				
Tree felling on livestock fencing	The woodland banks which lie alongside the water course are not fenced. The livestock fences which are in place along the river could be breached if a tree fell on them.	Routine checking of any fence lines which are in close proximity to beaver activity. Where trees have begun to be felled these must be assessed to see which way they will fall. If they are falling towards the fence then the tree must be removed by field staff.	Very severe	Very Unlikely	Acceptable
Transmission of Bovine Tuberculosis	The risk that beavers could become a new vector for TB.	Bovine TB has never been recorded in beavers. Beavers are no more likely than other mammals, including man, to be vectors. Beavers seldom stray more than 20m from water and are less likely than many other mammal species that frequently traverse and forage on livestock areas to come into contact with cattle.	Slight	Unlikely	Acceptable

Potential bank collapse caused by burrowing – access by heavy machinery	Beaver burrows can extend several metres into river banks where substrate allows digging. The banks of the River Cywyn would permit burrowing therefore collapse at various points and times are possible. These structures are created as living abodes in friable soils, in elevated banks. There is very little use of heavy machinery close to this river owing to the type of farming and to the terrain.	Active field monitoring of beaver locations and activity by field staff and volunteers. Relocation of animals if beaver activity is considered to potentially have a negative impact. If required use chain link fencing of key points on the bankside to prevent beaver access / egress or filling the burrow systems with stone or aggregate mix in sand bags. Training events and workshops for landowners bordering areas of beaver activity to look for field sign and ensure risk awareness for heavy machinery access is understood.	Severe	Unlikely	Moderate
Flooding of agricultural land from dam creation	Where agricultural land borders the Cywyn and its tributaries low lying land could be flooded by the creation of dams. This is unlikely in the land adjacent to the main river channel due to the height of river banks and also the low probability of dams being built due to the width of the river and high flow rates.	Regular monitoring of dam creation and any potentially impacted flood area would be assessed by field staff. Dams would be removed or "mitigation drained" to an acceptable level as necessary. If required fencing of key points to prevent beaver access/egress	Slight	Possible	Acceptable
Fish					
Trout spawning	Damming of trout spawning areas.	Regular monitoring to assess where dams	Moderate	Possible	Moderate
areas and fish	Many of these are currently	are being constructed to observe their			
migration	subject to mud and trampling by	impact will be undertaken by field staff .			

impacted by damming and flooding	cattle. We expect beavers to improve the gravel beds and the food resources for trout. There are no salmon on this river.	Where dams are in unsuitable positions or causing untenable impacts they will be removed or "mitigation drained" using established European techniques to an acceptable level. If required fencing of key points to prevent beaver access/egress.			
Designated feature	es			•	
Significant detrimental impact upon designated features of SAC/SSSI	There are no SSSIs, N2Ks or designated features in this catchment.		None	None	Acceptable
Beavers			Ľ		
Road traffic accidents and near misses due to beaver activity near roads.	Injury to general public and beavers. Damage to vehicles. Only one major road, 9 minor roads and one railway line cross this river and its tributaries. Most are on bridges high above the river and are unlikely to be crossed by beavers. They will use the water.	If required, road signage to alert drivers of beaver presence. If required, fencing of key points to prevent beaver access / egress	Low	Unlikely	Acceptable
Beaver related human injuries	Beavers are crepuscular animals and are principally active at night/dusk and dawn. Beavers commonly utilise numerous recreational water bodies across Europe and America without incident. Therefore there is no	Do not allow members of the public to attempt to capture or touch a beaver. Only a trained person to handle animals and minimise contact. All necessary PPE, first aid and required	Trivial	Very Unlikely	Acceptable

perceived risk to the pu	lic equipment with personnel. Tetanus
through direct beaver cau	ed vaccinations are up-to-date.
injuries. Like any other wildlife	if
approached too closely	or
attempts are made to handle a	ny
animals, particularly in	he
breeding season beavers may	act
more aggressively.	
Injuries from beavers could oc	ur line line line line line line line line
through poor handling.	
Fall or trip resulting from cont	act land
with beavers.	
Immersion in water resulting fr	om line i
monitoring activity.	
have the second by the second s	
Loss of beavers Beavers move into ot	er Active field monitoring of beaver locations Low Unlikely Acceptable
from trial area neighbouring catchments wh	and activity by field staff and volunteers.
control and management wo	IIU
be impeded.	implementation of missing beaver
Given the areas of hah	protocol.
available in comparison to	he Recenture and relocation of animals if
numbers of beavers be	ng beaver activity is considered to have, or
released, there should not	be potentially have, a negative impact.
sufficient pressure on the beau	ers
to attempt to disperse outside	he
catchment within the first 5 yea	S.
People	

Significant detrimental impact due to large increase in visitor numbers to release area		Information and media campaign will help to manage visitors and their activities. Interpretation, recreation and access management plan developed and implemented based at Ricketts Mill. Visitor numbers and activities monitored through informal interviews with residents and landowners.	Slight	Unlikely	Acceptable
Significant detrimental impact on local area infrastructure due to marked increase in visitor numbers to release area	There could be capacity problems at local car parks which causes damage to infrastructure. RTAs could occur due to overcrowding of roadside locations.	Information and media campaign to manage visitor numbers and concentrate activity in areas with high carrying capacity. To be completed with support and advice from local authorities and highways teams. Interpretation, recreation and access management plan developed and implemented. Visitor numbers monitored and interventions made if numbers cause an unacceptable risk. Public profile will be kept low in early years while a tourism approach is developed.	Severe	Unlikely	Acceptable

Tree felling on	Tree felling is a gradual process for	Field staff would carry out regular checks to	Very	Very	Acceptable
People	larger trees. If the tree was part	assess the presence of unstable / part	severe	Unlikely	
	felled and unstable there is a small	felled trees standing above or below a			
	risk that the tree could fall, with	footpath. If the tree is below the footpath			
	increased likelihood of falling if	the angle at which it is being felled should			
	subjected to strong winds.	be analysed and if falling toward the path it			
		should be manually removed. If falling			
		away from the path the tree can be left in			
		situ until further assessment is necessary.			
		Prior to removal of the unsecure tree the			
		footpath must be clearly signed to inform			
		the public of the over-head risk.			
Falling into	The River Cywyn is suitable for	If foraging burrows are created that extend	Slight	Unlikely	Acceptable
beaver burrows -	beaver burrowing activity	out with the bank side these should be			
people	therefore burrow collapse or the	identified and the hazard managed with			
	giving way of burrows under a	locally adaptable solutions.			
	person's weight is possible.				
Tree felling on	Any trees which are in a	Regular inspection by field staff of any	Very	Very	Acceptable
buildings or	potentially hazardous position	trees in close proximity to properties or	severe	Unlikely	
homes	with regard to houses / buildings	buildings where beaver felling is possible.			
	will be protected.	Protection of any identified trees.			
Dead wood	Beaver felling can produce a	Routine checks of the wooded areas and	Slight	Possible	Acceptable
discarded on	landscape where 60% of the cut	scrubland will identify and felled trees.			
woodland floor	timber remains unused. Tree	Where trees are felled and branches are			
	felling is most likely to be in areas	left as "dead wood" adjacent to access			
	adjacent to the water course away	routes or footpaths field staff will ensure			
	from access routes and footpaths.	that any trip or fall hazards are removed.			
	However some dead or hung-up				
	material may pose a risk.				
Infrastructure					

Tree felling on access routes	There are access routes to properties in the catchment that cross water courses. These access routes are often culverted underneath. Access tracks could flood if blocked by beaver activity.	Routine checks should be made of the access routes. These checks need to ensure that culverts are unblocked. In the event of regular beaver activity recognised mitigation methods would be implemented to prevent blockage. These would be regularly monitored and cleared by field staff as required.	Slight	Unlikely	Acceptable
Tree felling on power lines/telegraph wires	Tree felling by beavers or trees falling as a result of root inundation by water could result in risk to the overhead cables.	An infrastructure audit will identify where there are likely power services that could be impacted by beaver activity. Any trees likely to prove hazardous would be coppiced or pollarded to a satisfactory height, protected with wire mesh grills or anti-game paint. Routine inspection of all the remaining trees in the vicinity of the overhead power lines would then ensure that any arising issues are identified in advance.	Severe	Very Unlikely	Acceptable
Beaver blockage of main culverts	Beavers have the potential to block and impede water flow associated with drainage infrastructure. By their nature all culverts along the water course will be within beaver impacted habitat.	IWC will be completing a full infrastructure audit within the river catchment and compile maintenance regime information. This will identify where there are culverts that are at risk from blockage from beaver activity. All smaller culverts must be routinely checked for blocking by field staff and unblocked as necessary. Where this issue is persistent then beaver deceiver grills will be installed to prevent blockage and maintained by field staff.	Moderate	Possible	Moderate

Platforms in culverts	Large culverts present the opportunity for modification as platforms/burrows.	Culverts that have been identified as high risk will be grilled prior to any beaver release.	Moderate	Very Unlikely	Acceptable

Table 1: Risk Rating Analysis Matrix						
Probability (Likelihood)						
<u>Severity</u>	1 Very Unlikely (Freak event – No known history)	2 Unlikely (Unlikely sequence of events)	3 Possible (Foreseeable	4 Likely (Easily	5 Very Likely (Common	
(Hazard Consequence)			under usual circumstances)	foreseeable – Odd incident may have occurred)	occurrence – Aware of incidents)	
1 Negligible (No visible damage)	Trivial 1	Trivial 2	Acceptable 3	Acceptable 4	Acceptable 5	
2 Slight (Minor damage to structures/ Minor cuts, bruises – No	Trivial	Acceptable	Acceptable	Moderate	Moderate	
long-term effects)	2	4	4	8	10	
3 Moderate (Extensive damage to structures/ Heavy bruising, deep flesh	Acceptable	Acceptable	Moderate	Substantial	Substantial	
wound).	3	6	9	12	15	
4 Severe (Major damage to structures)	Acceptable	Moderate 8	Substantial	Substantial	Intolerable	

5 Very Severe	Acceptable	Moderate	Substantial	Intolerable	Intolerable
(Major damage					
leading to					
replacement of					
structure/ to					
personal long term					
disability or death)	5	10	15	20	25

 Table 2. Interpretation of the Actions and Timescales required relative to the Risk Rating identified using the above Analysis Matrix.

Risk Rating	Action and Timescale				
Trivial					
1 to 2	No action is required to deal with trivial risks and no documentary records need be kept (insignificant risk).				
Acceptable					
3 to 6	effective solutions or improvements that impose minimal or no additional cost burden. Monitoring is required to ensure that the controls are maintained.				
Moderate					
8 to 10	Efforts should be made to reduce the risk but the costs of prevention should be carefully measured and limited. Work should not commence until prevention of the risk is in place.				
Substantial					
12 to 16	Work should not be started until the risk has been reduced. Considerable resources may have to be allocated to reduce the risk. Where the risk involves work in progress, the problem should be remedied as quickly as possible.				
Intolerable					
20-25	Work should not be run until the risk level has been reduced. While the control measures should be cost-effective, the legal duty to reduce the risk is absolute. This means that if it is				

not possible to reduce the risk, even with unlimited resources, then the work must not be run.

Appendix V.

CARMARTHENSHIRE BEAVER REINTRODUCTION

LAND-OWNER PARTICIPATION

Beavers lived here on your farm up until about 300 years ago. They were hunted out for their fur, but they served a useful role in keeping the rivers open and alive. Many species depend on them to provide habitat and they are the farmer's friend in helping to decrease pollution from slurry, and in controlling bankside over growth.

As a signatory to the EU Habitats Directive (Article 22), Wales has undertaken to restore the Eurasian Beaver, to a 'satisfactory conservation status'. Most EU Beaver Range States, including Scotland and England, already have such projects in place.

The Carmarthenshire Beaver Re-introduction Group has applied for a licence from Natural Resources Wales under Section 16(4) of the Wildlife and Countryside Act 1981, to re-introduce Eurasian beavers into the catchment of the Afon Cywyn and Nant Cynnen to establish a planned founder population for Wales.

To obtain this licence, the project first has to comply with a large number of governmental requirements and we can supply you with full details of the application in hard copy. Updates of the project are also available online. If you wish, you can also put your name on our emailing list for updates.

There are six key requirements to be met to support the re-introduction:

- 1. The beavers will be captive-bred Eurasian Beavers.
- 2. The beavers do not carry any parasites or diseases of public health concern such as Bovine TB or the parasite *Echinococcus multilocularis*. BovineTB has never been recorded in beavers.
- 3. A Project Management Group will oversee and deliver all aspects of the project including a well-resourced team of field staff to avoid, mitigate, manage and document impacts of beavers, with a 24 hour Hotline service.
- 4. An agreed Management Plan for the population.
- 5. A risk assessment.
- 6. An exit strategy in case of insuperable problems.

Management Access

In order for the project to work successfully our project team may, from time to time, contact you to ask for permission to access to your riverside land. The purpose of these visits will be:

- Creating initial release sites.
- Drainage of dams where water levels might cause disruption to normal farming practices.
- Removal of debris from culverts.
- Installing temporary fencing alongside crops that have been tilled alongside the river.
- Protection of important trees with wire-mesh tree guards.
- To monitor vegetation and wildlife.
- To manage the beavers and their effects.
- To trap beavers for health checks or translocation.

No visits will be carried out without your prior permission. All staff will adhere to any directions that you give. Our team is fully insured and will employ best practice measures in terms of health and safety and also farm and wetland biosecurity. We will use the boundaries supplied by you on the map to guide us on your land.

The Project Hotline Number is:	(Office hours)
	(Emergencies out of hours)
The Project Hotline email address is:	
—	
I would like a full hard-copy of the project proposa In English/ Welsh.	l: Yes/No
I would like to be on the email list for updates: Yes	/No
Name:	
Address:	
Telephone number:	
Signature.	
	-

Appendix VI. Disease Risk Assessment

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