Cyngor sir ddinbych denbighshire County Council

Eurasian Beaver © Joel Walley

Enclosed Beaver Trial – Project Brief.

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Introduction

The Biodiversity Team at Denbighshire County Council have been exploring opportunities for ecosystem restoration and biodiversity enhancement, to deliver on our targets set out in Denbighshire's Climate Change and Ecological Emergency Strategy, as well as our biodiversity duty under the Environment Act (Wales) 2016.

To this end, we are in the early stages of preparing an enclosed beaver project on our land at Green Gates Nature Reserve, St. Asaph. The nature reserve comprises approximately 70 acres of former grazing land and is currently being converted into a nature reserve.

The aim of the project is to establish a captive family group of beavers on site and monitor their impact on the various species and habitats which are currently being created and are developing on the nature reserve. The project also aims to provide a local case study with a strong focus on education, allowing people to learn about beavers and see their impact first-hand.

The initial duration of the project will be set to five years from when the licence is granted. If this initial phase is successful the intention will be for the beavers to stay beyond the five years to continue the ecosystem restoration and biodiversity enhancement they are expected to deliver at this site. There are no current plans to extend this project beyond the enclosure. The project will be financed through grant funding applied for by the Denbighshire County Council.

Objectives

1. To set up an enclosed beaver project on Green Gates Nature Reserve, near St. Asaph.
2. To work with scientists to monitor the impacts of the project on the various species and habitats on the site and produce detailed reports of the results to act as a case study for other similar schemes.
3. To engage with stakeholders and provide an opportunity for people to see the potential impacts of beavers first-hand.
4. To demonstrate some of the mitigation techniques that can be undertaken to reduce potential human wildlife conflicts.

Beaver Ecology

Beavers are large, semi-aquatic rodents that live within wetland and river habitats. Weighing over 20kg beavers are the second largest rodent in the world, with a thick brown, sometimes black coat, webbed feet and distinctive flat tail with visible scales that acts as a rudder when swimming. They live in family groups usually consisting of the breeding pair and the kits from the previous two years. Beavers are highly territorial, mark their territories, and will fight aggressively with intruding beavers (Campbell-Palmer *et al.* 2016; Zurowski and Kasperczyk 1986; Wilsson 1971).

They will utilise various freshwater bodies including ponds, streams, rivers, marshes, and lakes. Beavers are strong diggers and usually live in large burrows in the banks of a watercourse, which can sometimes be extended into a lodge and are known as bank lodges. Where the banks are not suitable and they cannot burrow, they can construct a free-standing lodge out of mud and branches. These lodges are also known as atoll lodges or brook lodges (Campbell-Palmer *et al.* 2016; Wilsson 1971). They prefer still or slow-moving water with stable depths of at least 60cm but will modify less suitable waterbodies through damming (Gurnell *et al*. 2009). The deeper waters dams provide are a safer environment for the

Fig 1. Beaver dam and pond in Devon. © Joel Walley

beavers to move through and can be used to conceal the underwater entrance to their main lodge (Campbell-Palmer *et al.* 2016; Halley *et al.* 2009).

As an entirely herbivorous species, they feed on a wide range of food sources from a variety of plant species including herbaceous and aquatic vegetation, bark, side branches and leafy stems of trees, and the leaves of woody plants (Campbell-Palmer *et al.* 2016). Foraging usually takes place within 20m of the bank but they will travel further for preferred food sources. They often fell trees to access the bark, side branches and leaves. They can fell trees up to 1m in diameter but prefer smaller saplings (Haarburg and Rosell 2006). Beavers do not hibernate but will create a food cache of submerged woody vegetation next to their main burrow or lodge to see them through the winter (Wilsson 1971).

They have the ability to alter various physical and biological features of a site through their foraging, burrowing and damming activities, often to the benefit of multiple other species, which can increase biodiversity and they are often referred to as a 'keystone species' and 'ecosystem engineers' (Rosell *et al.* 2005; Stringer and Gaywood, 2016; Law *et al.* 2017; Law *et al.* 2019; Dalbeck *et al.* 2020).

Fig 2. Beaver feeding activity. © Joel Walley

History of Beavers in Britain

The Eurasian beaver *Castor fiber* is native to Wales and had a widespread distribution across Britain through Europe and into Asia, but they were hunted to extinction by humans mainly for their fur and meat (Halley *et al.* 2020). In Wales it is thought they became extinct after the Middle Ages and by the end of the 16th Century they were extinct from the rest of Britain (Coles, 2006; Coles, 2019; Leow-Dyke, 2021).

This was unfortunately echoed across Europe, although some relict populations managed to survive within some countries in Europe and Asia. However, through greater legal protection, active reintroductions and translocations their near extinction has been reversed (Halley and Rosell, 2002; Halley *et al.* 2020). Since the 1920s there have been over 205 successful reintroductions to over 25 European countries (Halley *et al.* 2012; Leow-Dyke, 2021).

The first official beaver reintroduction to Britain took place in Scotland in 2009 where five beaver families from Norway were released into Knapdale Forest, Argyll (Scottish Beaver Trial (SBT) 2009-2014), which incorporated a free-living population on the Tayside catchment in east Scotland (Jones and Campbell-Palmer, 2014; Gaywood *et al.* 2015). In 2016, the Scottish Government announced that both populations could remain in Scotland and in May 2019 the Eurasian beaver became a European Protected Species in Scotland (Jones and Campbell-Palmer, 2014; Gaywood *et al.* 2015; Gaywood, 2018; Leow-Dyke, 2021).

Since the SBT there has been a further reintroduction trial on the River Otter in Devon, led by Devon Wildlife Trust from 2015-2020. These beavers have been allowed to remain following the end of the trial (Brazier *et al.* 2020a). There are also a number of enclosed trials elsewhere in Britain with one of the most recent in mid Wales at Cors Dyfi nature reserve (Leow-Dyke, 2021).

Benefits of Beavers

The SBT found that overall, the activity of beavers had a positive influence on biodiversity, including the abundance and diversity of other species (Gaywood *et al.* 2020). The Devon Beaver Project (an enclosed site) have encountered similar results where the activity of beavers has created a heterogeneous habitat structure through selective foraging and burrowing activities, creating more complex environments (Elliot *et al.* 2017; Brazier *et al.* 2020a). This has led to an increased species richness for bats and bryophytes, and an increase in botanical and invertebrate diversity (Blythe *et al.* 2017; Brazier *et al.* 2020a; Leow-Dyke, 2021).

Studies on hydrology have also shown that in certain areas the creation of beaver dams can help reduce the risk of downstream flooding through holding back water and slowing the flow (Puttock *et al.* 2017; Brazier *et al.* 2020b). Beaver dams can also hold a significant amount of sediment and filter nutrients entering a site, which can help improve water quality further downstream (Puttock *et al.* 2017; Puttock *et al.* 2018; Brazier *et al.* 2020b; Leow-Dyke, 2021).

Fig 3. Beaver created wetland next to farmland in Devon. © Joel Walley

Potential Risks

From previous low levels the Eurasian beaver is now established across most of its former range in Europe. Since the 1920's there have been over 200 successful translocations to over 25 countries. The minimum global population estimate in 2020 for the Eurasian beaver was 1.5 million (Halley *et al.* 2020). They are a common and widespread species throughout many countries and exist alongside people without causing any harm or negative effects. In the UK there are dozens of enclosed beavers, including those in many urban areas. This is tried and tested, and we do not consider any significant risks from the species or our proposed approach.

As with any project there are risks involved, however many of these can be mitigated or avoided entirely by careful design and consideration, as has been evidenced by other schemes across the UK and Europe. For completeness some identified risks are described in the following paragraphs.

There is a potential risk that the habitat or forage inside the enclosure is found to be unsuitable for beavers, resulting in health issues. To address this, we have had a feasibility study completed, as well as a series of site works, and have set up a technical advisory group to ensure the site is suitable before release. Following release, the beavers and their activities will be regularly monitored through direct field observations and with the assistance of camera traps. It is also possible that the enclosure could become unsuitable due to a breeding beaver population. Again, the beaver family will be closely monitored and some of the progeny may need to be moved on to another project in Britain.

Another identified risk is the beavers escaping from the enclosure. The enclosure will be constructed in line with the standard fencing specification for beaver enclosures, and regular fence checks will be completed to ensure the enclosure is secure.

Lastly, there is a potential risk of damage to surrounding land/property through flooding, felling, burrowing, or feeding activities of the beavers. However, this is highly unlikely due to the beavers being restricted to an enclosure, the location of the enclosure in the centre of our landholding, and the topography of the site.

How we intend to take the project forward

Project Timeline:

1. Feasibility Study
2. Creation of a Technical Advisory Group
3. Site Preparation
4. Creation of a Stakeholder Group
5. Consultation
6. Beaver Licence Application
7. Management Preparation
8. Release
9. Ongoing Management, Monitoring, and Engagement

Feasibility Study

An initial feasibility study has been commissioned to assess the suitability of Green Gates Nature Reserve for an enclosed beaver population and produce options for hydrological works, habitat creation, and protection of infrastructure to make the reintroduction possible.

This study will be carried out by our consultants at Systra (hydrology) and Biodiversity Advanced Ltd (ecology), with options to be presented to the Technical Advisory Group. However, as Denbighshire County Council has overall responsibility for the project they will have final say on which option is taken forward, whilst taking into consideration the recommendations from the advisory group members.

Creation of the Technical Advisory Group

An Advisory Group will be set up to advise on all technical aspects of the project going forward. The role of the group is to provide expertise and advice to ensure that the project is successful and delivers against the objectives set out in our project brief. The group will include a range of members, with the following roles and responsibilities outlined in the table below. More members can be added throughout the project if the existing advisory group members feel the addition to be beneficial.

Members	Roles	Responsibilities
Denbighshire County Council (DCC)	Landowner and project management	Overall responsibility for the project, managing grant funding and organising contractors. DCC will also provide technical expertise on aspects of species and habitat ecology.
DCC's Flood and Drainage Teams	Advisory	DCC's flood and drainage teams will provide technical advice and guidance to ensure that all relevant issues have been considered and addressed.
North Wales Wildlife Trust	Advisory	NWWT will provide specialist technical advice and guidance to ensure that all relevant issues have been considered and addressed (particularly officers involved in the Welsh Beaver Project). Some work may be contracted out to them on the commencement of the project as well.
NRW	Advisory	NRW will provide technical advice and guidance to ensure that all relevant issues have been considered and addressed.
Welsh Government	Advisory	Welsh Government will provide technical advice and guidance to ensure that all relevant issues have been considered and addressed.
Consultancies	Consultants	Consultancies will be contractors for various parts of the project as required.
Universities	Volunteers	A local university may be included to study and monitor the impacts of the project on the various species and habitats on the site and assist with the production of reports and case studies to support other similar schemes.

In the preparation stage of this project the Technical Advisory Group will meet on an ad hoc basis when new issues require discussion.

Site Preparation

Before the project can begin, the site will need to be made suitable for a beaver family. This will involve hydrological works to create new waterbodies and maintain water levels on site. As well as habitat improvement works including the planting of woody species, sowing seed, and plug planting to increase the diversity and abundance of vegetation on site. Further details can be found in our feasibility study. Due to funding timelines, site preparation works will begin before applying for a licence to introduce beavers. The habitats created will be improved for biodiversity, regardless of whether beavers are eventually introduced to the site, in line with our wider objectives for the site. Protected species surveys will be completed prior to any works on site.

Fence installation will also need to be completed. The enclosure will be constructed in line with the standard fencing specification for beaver enclosures that are already in use and have been licensed for various beaver projects around Britain.

Creation of a Stakeholder Group

We will be creating a Stakeholder Group of local landowners, organisations, groups, and communities that will be directly impacted by the release. The purpose of this group will be to keep stakeholders informed on the progress of the project and results of the reintroduction, answer questions, and build links with the community to make this project a success.

In the preparation stage of this project, updates will be provided on an ad hoc basis as the project progresses. Once the project is established and the beavers released, regular updates will be provided to the stakeholder group on their status and any recorded impacts.

Please see the below table.

Stakeholders	Roles	Responsibilities
Denbighshire County Council (DCC)	Landowner and project management	Responsible for providing updates to the Stakeholders.
Local County Councillors	Stakeholder	The Local Members are important stakeholders and can also help to signpost landowners and other community members to the project.
Nature Friendly Farming Network	Stakeholder	The Nature Friendly Farming Network will not be directly involved in the project but can help to signpost landowners to the project and help highlight potential issues for the farming community.
Farming Unions	Stakeholder	Farming unions will not be directly involved in the project but can help to signpost landowners to the project and help highlight potential issues for the farming community.
NRW People and Places Team	Stakeholder	The NRW People and Places Team are an important stakeholder and can also help to signpost landowners and other community members to the project.
St. Asaph City Council	Stakeholder	St. Asaph City Council are an important stakeholder and can also help to signpost landowners and other community members to the project.
Welsh Water	Stakeholder	Welsh Water are an important stakeholder and can also help to signpost landowners and other community members to the project.
Public Service Board	Stakeholder	The Public service board is an important stakeholder and can also help to signpost landowners and other community members to the project.
Clwyd Catchment Partnership	Stakeholder	The Clwyd and Elwy Catchment Partnerships are an important stakeholder and can also help to signpost landowners and other community members to the project.
Nearby Businesses	Stakeholder	Nearby businesses will be kept up to date on the project.
Conservation NGO’s	Stakeholder	Relevant conservation NGO’s will be kept up to date on the project.
Local Environment Groups	Stakeholder	Local environmental groups will be kept up to date on the project.
Local Anglers and Angling Groups	Stakeholder	Local anglers and angling groups will be kept up to date on the project.

Consultation

We are aware that consultation will be an important part of the proposals, particularly from a licensing perspective. As an enclosed project, we feel that this is of local interest only, and any impacts beyond the boundary of our site will be very limited if they exist at all. For this reason, we intend to do a local consultation with neighbouring landowners, and those immediately upstream and downstream of the watercourse which runs through the centre of our landholding. The consultation will run for a period of 1 month.

At a later stage, if required by the IUCN licensing panel when submitting our licence application, we can open a wider consultation using the 'County Conversation' tool which will seek to get consultation responses from across Denbighshire to understand if there are likely to be impacts beyond our site and our immediate neighbours. This would also run or a period of 1 month.

Beaver Licence Application

Currently a beaver reintroduction requires licensing by Natural Resources Wales, through the Wildlife and Countryside Act 1981. While an enclosed project may not require a licence NRW have stipulated that one should be applied for. This licence will be sought prior to the commencement of the project.

Management Preparation

For Denbighshire staff to be able to effectively manage the beaver population once in situ, there will need to be a management plan in place, as well as training completed, and equipment purchased before release of the beaver pair and/or family group.

To ensure the impacts of the beaver can be correctly mitigated for, a minimum of two members of staff will be trained in beaver handling, dam removal and notching, if this is considered necessary after discussion with the NWWT and NRW. In time volunteers may also be used to assist with some of these tasks. It is important that there is always one

trained member of staff on call to address any urgent needs of the beavers and the surrounding landowners.

The management plan will outline policies and procedures covering the issues of animal welfare, potential impacts to the infrastructure within the enclosure or surrounding land/property through possible flooding, felling, burrowing, or feeding activities of the beavers. The management plan will also outline the policies and procedures in the event of a beaver escape, as well as plans for progeny. An exit strategy will be developed as part of this project.

Animal Welfare

Prior to release into the enclosure, the beavers will be health screened. Following release, the beavers and their activities will be regularly monitored through direct field observations and with the assistance of camera traps. If an individual beaver appears to show any signs of health concerns advice from beaver experts and veterinarians will be sought.

As part of the education program visitors will be brought to the enclosure to see beaver signs and watch for beaver activity where possible. All these interactions will also be recorded. Minimal interference will be aimed for with the beavers, aiming to ensure they have as natural and stress-free a life as possible.

With enclosed beaver projects regular enclosure checks are important to ensure the welfare and safety of the beavers. Denbighshire County Council staff will enclosure perimeter checks, in line with the licence requirements. Checks will be needed for infrastructure such as the fencing and any protective measures inside the enclosure, as well as water level and forage availability.

Escapes

The enclosure will be constructed in line with the standard fencing specification for beaver enclosures that are already in use and have been licensed for various beaver projects around Britain. Regular fence checks will be completed to ensure the enclosure is secure, however, in the event of an escape it will be the Denbighshire County Council's responsibility to recapture the beaver/s.

An escape and recapture plan will be developed as part of the project, and this will be overseen by Denbighshire County Council.

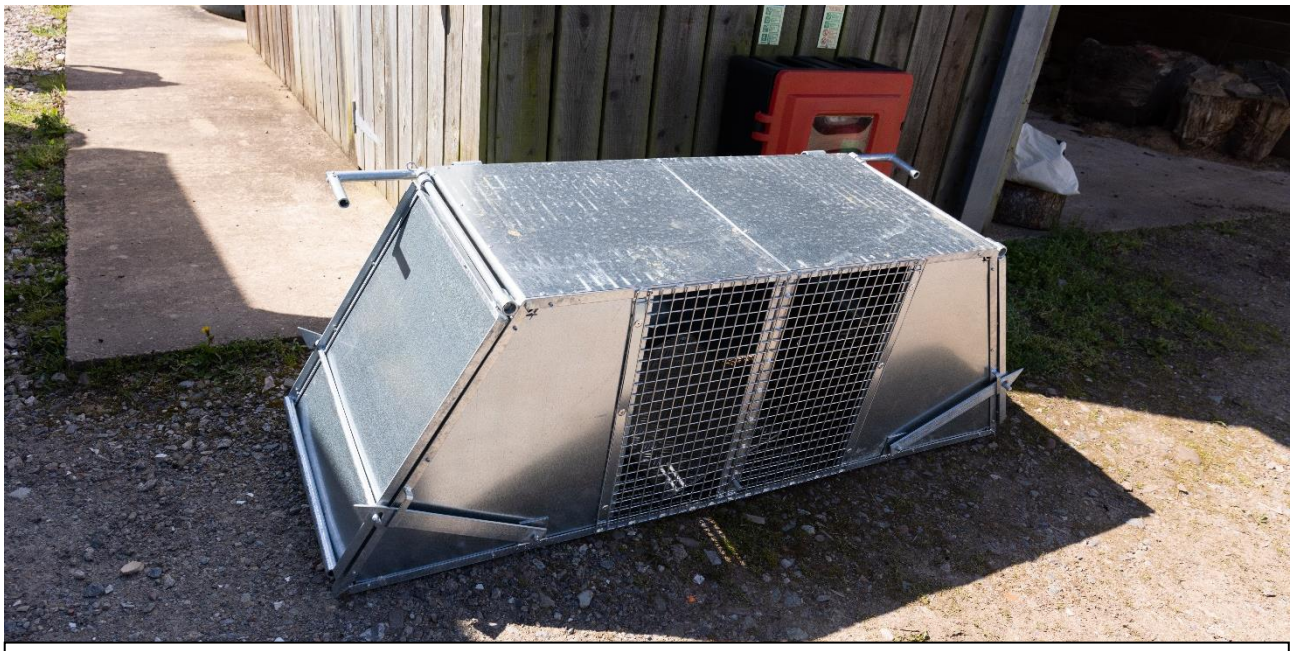

Fig 4. Beaver Trap. © Joel Walley

Breeding

In the wild, beaver pregnancy rates and litter size have been found to decrease when the population density increases, and sexual maturity delayed. Research has found that beaver populations are relatively self-regulating becoming stable in 30-40 years. However, as this is an enclosed project, the beaver family will be closely monitored and some of the progeny may need to be moved on to another project in Britain.

Exit Strategy

This project will be a five-year trial, but it is hoped the project will extend beyond 5 years. Denbighshire County Council believe the project will be successful, however a strategy for removal has been developed as a precautionary approach. If the project cannot continue after 5 years or the project must finish early, the beavers will be removed under licence and transferred to another project in Britain. The triggers for implementing an exit strategy are abnormal events that are deemed significant and cannot be rectified, for example:

- Persistent escape from the enclosure e.g. an animal escapes every week.
- An abnormally high level or mortality in the beaver family or adverse impacts on animal welfare in the enclosure.
- Unsustainable and intractable detrimental effects arise on land, property or livelihoods as a proven direct result of beavers within the enclosure at Green Gates Nature Reserve.

Release

Once the site has been prepared and has sufficient food and habitat to support a beaver family, and we are in receipt of a licence, we will begin the process of release. This will require sourcing and health screening a pair of beavers or a small family unit of beavers, followed by release into the enclosure. The sourcing of beavers will be arranged through North Wales Wildlife Trust and the Welsh Beaver Project Officer.

Following release, we will monitor the beavers closely through direct field observations and with the assistance of camera traps. Regular enclosure checks will also be necessary.

Ongoing management, monitoring, and engagement

To achieve our project objectives, we will need monitoring and engagement work going forward, plans for which are outlined below. To ensure the success of the project it is important that regular updates are made available. A separate Communications Plan has been created, which can be referred to.

Monitoring Plan

Research will be an important part of the project, aiming to build additional evidence for the impacts of beavers within the Welsh landscape. Our Technical Advisory Group will steer all research. Projects may be carried out by local Universities, Denbighshire County Council Staff, consultants, and volunteers. The following topics may be interesting to focus on, where resources allow.

1. Water Monitoring: Water monitoring will aim to show the changes in water flow and chemistry since the introduction of the beavers. This could include some of the following;
    a. Installation and monitoring of dip wells.
    b. Installation of V-notch weirs at the inflow and outflow of the enclosure.
    c. Water samples taken on a regular basis measuring organic matter, dissolved oxygen, nitrogen, phosphate, and sediment load.
    d. Installation and monitoring of dip wells.

2. Landscapes Changes: To record the change of the landscape since the beaver's introduction surveys will be carried out at regular intervals to map the site and show the changes to the watercourse structure, and location of dams. This could include;
    a. Mapping of the site on an annual basis.
    b. Fixed point photography.
    c. Aerial footage of the site on an annual basis.

3. Flora and Fauna Surveys: To assess the impact of the beavers on other life within the enclosure key species will be monitored. This could include;
    a. Bats.
    b. Amphibians, including great crested newts.
    c. Aquatic invertebrates.
    d. Birds.
    e. Floral surveys.
    f. Invasive species.
    g. Tree surveys and mapping.
    h. Fish surveys (to be carried out up and downstream as well as in the enclosure).
    i. Badgers, water voles, and otters (if present).

Education and Engagement Plan

The project also aims to provide a local case study with a strong focus on education, allowing people to learn about beavers and see their impact first-hand. To achieve this, we will target the following categories:

1. Local Schools: A school local to the selected site will be involved in the beaver project from the start, visiting the enclosure, working on art projects, and receiving special access when appropriate.
2. Universities: The intention will be to engage at least one University in the monitoring of the enclosure, with students able to collect and analyse data.
3. Members of the public: Where possible local volunteers will be utilised to carry out surveys and monitoring, to help local people take ownership of the beavers. Some guided walks may be offered if appropriate. Outreach will also be carried out through talks.
4. Farming Community: Where possible guided walks and talks will be offered to the farming community to help build knowledge and understanding of beaver ecology and benefits.

Conclusion

Over the next few years, we plan to progress this project and establish an enclosed Eurasian beaver family on Green Gates Nature Reserve. We believe the addition of beavers to this site will create a dynamic and species-rich wetland habitat, helping us to achieve our biodiversity targets set out in Denbighshire's Climate Change and Ecological Emergency Strategy, and the Environment Act (Wales) 2016. One of our main aims for this project will be to raise awareness of beavers and their ecology, and the potential benefits they can bring to Wales' natural environment. As well as demonstrate some of the mitigation techniques that can be undertaken should any potential impacts arise as a result of beaver activity. Hopefully reducing the likelihood of human wildlife conflict in the future as the wild beaver population in Britain inevitably increases.

By working closely with the technical advisory group and our consultants, we will have a science-led approach to this project, utilising all the latest research, working with experts in this field, and with a focus on collecting data to monitor the impacts of the beavers on the landscape, species, habitats, hydrology, and water quality within their enclosure.

Eurasian Beaver © Joel Walley

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