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Net-Benefits for Biodiversity Report

Client

Canal & River Trust

Project

Vrywny Reserve

Date

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1.0 INTRODUCTION

1.1 The following report has been prepared by FPCR Environment & Design Ltd. on behalf of the Canal & River Trust. It provides details of a desk study and biodiversity assessment of a proposed off-line nature reserve (the 'Site') Vyrnwy Reserve, on land between the Montgomery Canal and the River Vyrnwy (OS Grid ref. SJ 25835 19272).

Site Location and Context

1.2 The Site, approximately 14.63 ha in size, is under currently agricultural use. It consists largely of other neutral grassland fields, with areas of modified grassland and other broadleaved woodland present. Several individual trees area scattered throughout the site. A mixture of species rich native hedgerows and native hedgerows are present on the boundaries of field compartments. A stream runs along a portion of the western boundary of the site.

1.3 The Site lies between the Montgomery Canal to the south and west, the river Vyrnwy to the north and arable fields to the east. The areas being considered for the development of the new reserve consists of the low-lying ground adjacent to the River Vyrnwy. A smaller area of approximately 6.2 acres is also included within the wider scheme to deliver enhancements for biodiversity.

Development Proposals

1.4 The proposed works for the Vyrnwy Reserve Site is to create an area of wetland habitat with two backwater channels with associated point bars, chutes and a vegetated island which will function as an offline nature reserve. Arisings from the required earthworks will be, as far as possible, utilised on-site and will be incorporated into the landscaping scheme (Green Infrastructure Plan, drawing no. 12805-FPCR-XX-XX-DR-L-0001).

1.5 The nature reserve will be fed from the river Vyrnwy. The wetland will provide suitable habitat for protected submerged and marginal aquatic plant species, including floating water plantain *Luronium natans*, and associated invertebrates found locally in association with the Montgomery canal.

1.6 New terrestrial habitats appropriate to the local context will provide additional biodiversity value.

Aims and Objectives

1.7 This report is broadly based on the Chartered Institute of Ecology and Environmental Management (CIEEM) guidance[1]. The scope and objectives of this report are to:

- Summarise the results of the baseline survey work undertaken on the Site.
- Review potential biodiversity and wider ecosystem benefits.

1 CIEEM (2021) Biodiversity Net Gain Report and Audit Templates Chartered institute of Ecology and Environmental Management, Winchester, UK.

- Provide an overview of the proposed habitats following completion of the scheme.
- Assess the proposals following the DECCA framework: Diversity, Extent, Condition, Connectivity and Aspects of ecosystem resilience.

Legislative Context

1.8 The Environment (Wales) Act 2016 was introduced to put in place the legislation needed to plan and manage Wales' natural resources in a sustainable and joined-up way. The Biodiversity and Resilience of Ecosystems Duty (the Section 6 duty) set out in the Environment (Wales) Act 2016 requires that public authorities must seek to maintain and enhance biodiversity so far as consistent with the proper exercise of their functions, and in so doing, promote the resilience of ecosystems.

1.9 The Well-being of Future Generations (Wales) Act 2015 requires national government, local government, local health boards and other specified public bodies to carry out sustainable development which seeks to ensure that the needs of the present are met without compromising the ability of future generations to meet their own needs.

1.10 Natural Resources Wales (NRW), is the regulatory and advisory body for issues relating to the environment in Wales, and provide expert advice for planning authorities on the likely environmental effects from development proposals. NRW has a duty to ensure that the environment and natural resources of Wales are sustainably maintained, sustainably enhanced and sustainably used (Article 4 of the Natural Resources Body for Wales (Establishment) Order 2012).

Net-Benefits for Biodiversity Approach

1.11 CIEEM have published a briefing paper[2] outlining the Welsh government approach to assessing Net Benefits for Biodiversity (NBB). This has been summarised below.

1.12 The NBB approach intends to deliver an overall improvement in biodiversity. Developments should be designed on a case-by-case basis, considering biodiversity and wider ecosystem benefits that positively impact ecosystem resilience within a placemaking context. Interventions should be proportional to the extent and impact of development and ultimately contribute to a bigger, better, more joined up approach to a resilient and biodiverse ecological network in Wales.

1.13 Biodiversity enhancements that achieve NBB must be delivered in addition to the implementation of the mitigation hierarchy.

1.14 Planning Policy Wales[3] instructs planning authorities to take account of and promote the resilience of ecosystems.

2 CIEEM. 2022. Welsh Government's Approach to Net Benefits for Biodiversity and the DECCA Framework in the Terrestrial Planning System.

3 Welsh Government (2024) Planning Policy Wales 12. Available at: https://www.gov.wales/sites/default/files/publications/2024-02/planning-policy-wales-edition-12_1.pdf

1.15 Natural Resources Wales (NRW) has developed a framework[4] for evaluating ecosystem resilience based on five attributes and properties specified in the Environment (Wales) Act. This is referred to as DECCA: Diversity, Extent, Condition, Connectivity and Aspects of ecosystem resilience.

- Diversity: maintaining and enhancing diversity at every scale, including genetic, structural, habitat and between-habitat levels. This supports the complexity of ecosystem functions and interactions that deliver services and benefits.
- Extent: incorporating measures which maintain and increase the area of semi-natural habitat/features and linkages between habitats. In general, smaller ecosystems have reduced capacity to adapt, recover or resist disturbance.
- Condition: The condition of an ecosystem is affected by multiple and complex pressures acting both as short term and longer-term types of disturbance. Both direct and wider impacts should be considered, for example avoiding or mitigating pressures such as climate change, pollution, invasive species, land management neglect etc.
- Connectivity: This refers to the links between and within habitats, which may take the form of physical corridors, stepping stones in the landscape, or patches of the same or related vegetation types that together create a network that enables the flow or movement of genes, species and natural resources. Developments should take opportunities to develop functional habitat and ecological networks within and between ecosystems, building on existing connectivity.
- Aspects of ecosystem resilience (adaptability, recovery and resistance): ecosystem resilience is a product of the above four attributes. Adaptability, recovery and resistance to/from a disturbance are defining features of ecosystem resilience.

1.16 Following this guidance, a coherent, cumulative strategy is proposed to provide good quality habitats which connect into existing ecological networks, and accounts for the impacts across the whole site.

1.17 There is no mandatory length of time that management is required for, however all planning proposals must demonstrate that they have both maintained and enhanced biodiversity and built resilient ecological networks.

4 Garrett HM, and Ayling SC. 2021.Terrestrial and freshwater Resilient Ecological Networks: a guide for practitioners in Wales. 43 pp. NRW Report No. 483 Natural Resources Wales. Dolgellau

2.0 BASELINE ASSESSMENT

2.1 A desk-based review of relevant reports was undertaken to understand the Site's baseline characteristics. The following documents were considered:

- Arcadis (2024). Vyrnwy Reserve Soil Reuse, 10048826-ARC-EWE-R1-TN-CE-00002, October 2024.
- Cura Terrae (2025). Vyrnwy Land - Area B – BS 5837: 2012 Arboricultural Report, Impact Assessment and Method Statement, January 2025.
- Dynamic Rivers (Survey and Design) Ltd (2024) Vyrnwy Design Draft, April 2024.
- Ecus Limited (2024). Vyrnwy Reserve Figure 3 Tree Constraints Plan, Drawing number 22517-ARB-01, January 2024.
- Ecus Limited (2025). Vyrnwy Reserve Table 3 Tree Schedule, January 2024.
- FPCR Environment and Design Limited (2025) Green Infrastructure Plan – Vyrnwy Reserve (drawing number 12805-FPCR-XX-XX-DR-L-0001).
- FPCR Environment and Design Limited (2025) Green Infrastructure Statement – Vyrnwy Reserve.
- FPCR Environment and Design Limited (2025) Landscape & Visual Appraisal – Vyrnwy Reserve.
- Habitat Works (2024). Vyrnwy Reserve, Confidential Badger Report, February 2024.
- Habitat Works (2023). Vyrnwy Reserve Site, Preliminary Ecological Appraisal Report, October 2023.

Ecological context

2.2 The Site sits between the Montgomery Canal to the south and the River Vyrnwy to the north. The local landscape is dominated by agricultural fields and an extensive hedgerow network. Individual trees and woodlands are present in association with linear features providing increased biodiversity interest and acting as potential corridors of movement for a range of mobile species.

2.3 The Montgomery Canal is a Special Area of Conservation (SAC) / Site of Special Scientific Interest (SSSI). The Montgomery Canal is designated for its unique aquatic plant life including the Annex II species, a primary reason for SAC site selection, floating water plantain *Luronium natans*. This is the largest and the most extensive population of floating water-plantain in Britain[5].

5 JNCC (2004). NATURA 2000 - STANDARD DATA FORM. UK0030213 Montgomery Canal. Available at https://sac.jncc.gov.uk/site/UK0030213

2.4 One further national statutory designated site was identified within 2km of the site. This was:

- Pont Llanymynech Road Verge Nature Reserve, a site designated for botanical species occurring on historic quarry ground, namely bee orchids, pyramidal orchids and bright yellow rock rose.

2.5 The PEAR (Habitat Works, 2024) reported no additional non-statutory designated sites within 2km of the site.

2.6 At a national level, the site is located within NCLA 17 'Montgomeryshire Hills and Vales'. At a local level, the site is covered by two Landscape Character Areas (LCA): LCA 8 'Severn Farmlands'.

- The 'Severn Farmlands' is an extensive open valley landscape along the Severn and Vrynwy rivers. The LCA is low-lying with a wide floodplain, which lies at around 60m at its lowest point.

2.7 Development Management Guidelines for this LCA includes:

- Protecting the setting of the Montgomery Canal, seeking opportunities to further enhance access to and enjoyment of the canal and open up / enhance views of the canal.
- Environmental improvements and enhanced management of hedgerows, hedgerow trees and woodland (e.g. through agri-environment schemes) could result in positive landscape change.

Habitat baseline

2.8 The PEAR (Habitat Works, 2024) provides full habitat descriptions for the Site. In brief, the Site comprised largely of other neutral grassland fields, with areas of modified grassland, bramble scrub and other broadleaved woodland present. Several individual trees area scattered throughout the site. A mixture of species rich native hedgerows and native hedgerows are present on the boundaries of field compartments. A stream runs along a portion of the western boundary of the site.

2.9 Hedgerows are priority habitats[6] and considered to be of key significance in Wales.

Protected and notable Species

2.10 Table 1 summarises the species findings reported within the PEAR (Habitat Works, 2024).

6 Environment (Wales) Act 2016 - Section 7. Available at: https://www.biodiversitywales.org.uk/Environment-Wales-Act

Table 1: Species record summary - adapted from PEAR (Habitat Works, 2024)

Species / Species assemblage	Local status
Badger *Meles meles*	The closest badger record was 643m to the south of the site. The Site provides suitable habitat for commuting and foraging and sett building. Full results of the badger records can be seen within the Confidential Badger Report (Habitat Works 2024).
Bats	No records were returned for within the Site boundary however, a number of records were returned for bats within the 2km search area. Species records returned included: • Common Pipistrelle *Pipistrellus pipistrellus* • Soprano Pipistrelle *Pipistrellus pygmaeus* • Lesser Horseshoe Bat *Rhinolophus hipposideros* The sits between two high quality commuting and foraging corridors for bats. The hedgerows, woodland and grassland on site provide connectivity between these two features, as well as supporting commuting and foraging in their own right. A number of mature trees were identified across the site that contain features like to be of high potential interest to roosting bats.
Birds	No recent records of notable bird species were returned within the Site boundary. Numerous records for 55 different bird species were returned within 2km of the Site. These included Schedule 1 species (WCA, 1981) and Species of Principal Importance (Welsh Government, 2016). Habitats within the site, namely mature trees, broadleaved woodland, hedgerows, grassland and the watercourses adjacent to site provide areas of suitable foraging and nesting for a wide range of bird species, including schedule 1 and red and amber listed species. A single barn owl was recorded exiting from a rot hole in T104, a mature oak tree.
Botanical records	Local records included 14 key species within 2km of the Site including priority species and fully protected species. This included floating water-plantain recorded on the Montgomery Canal to the south of the Site. No key plants have been recorded on-site (Habitat Works 2024).

Species / Species assemblage	Local status
Great crested newt *Triturus cristatus* (GCN) and other amphibians.	Four records of GCN were returned within 2km of the Site within the last 10 years. However, the locations of these records were outside of the mobile buffer zone (500m) for this species. One record of common frog *Rana temporaria* was returned within 2km of the Site. (Habitat Works 2024)
Hedgehog *Erinaceus europaeus*	Two records were returned from the data search, both of which lying outside the Site boundary but within 2km of the Site. The habitats within the Site are of moderate ecological value to hedgehogs due to presence of foraging, commuting, and hibernation habitat.
Fish	Records of five key fish species were returned from the River Vyrnwy adjacent to the site. These records included fish listed as Species of Principal Importance (Welsh Government, 2016).
Otter *Lutra lutra*	Six records of otter were returned within 500m of the centre of the site, with records as recent as 2020. These included records from the River Vyrnwy adjacent to the northern boundary of the Site and Montgomery Canal adjacent to the southern boundary of the Site.
Reptiles	Four recent records were retuned for Grass snake *Natrix Helvetica*, all on our adjacent to the Montgomery Canal. The nearest being directly adjacent to the south of the Site. A record single slow worm *Anguis fragilis* was returned outside of the Site but within the 2km buffer zone. No evidence of reptiles was recorded during the field visit, however it was identified that the location of site between two waterbodies and the mosaic of habitats present along the site provide optimal basking, foraging and commuting habitat for reptiles.
Invertebrates	No records of notable invertebrates within the Site boundary. Records of 54 species were recorded within 2km of the Site comprising of moth, dragonfly/damselfly, mayfly and butterfly species.

2.11 No records of invasive species were returned within the Site boundary. Several invasive species were recorded within 2km of the Site. These were:

- Mandarin duck *Aix galericulata*
- American mink *Neovision vision*
- Harlequin ladybird *Harmonia axyridis*

- Eastern grey squirrel *Sciurur carolinesnsis*
- Water fern *Azolla filliculoides*
- Canadian waterweed *Eloadea canadensis*
- Nuttall's waterweed *Elodea nuttallii*
- Himalayan balsam *Impatiens glandulifera;*
- Least duckweed *Lemna minuta*
- Montretia *Crocosmia pottsii x aurea = C. x crocosmillflora*

2.12 Himalayan balsam was recorded along the feeder stream connecting the Montgomery canal to the River Vyrnwy adjacent to the northwestern corner of the Site.

Potential for biodiversity and wider ecosystem benefits.

2.13 Consideration has been given to how the Site could deliver improvements for biodiversity and wider ecosystem. Currently, the Site is predominantly used for grazing, providing provisioning (food) benefits, with additional supporting benefits (space for nature).

2.14 At a landscape level the site provides connectivity between the Montgomery canal and the River Vyrnwy. Improvements to the site could enhance this function. New tree planting and scrub creation could provide connecting and/or stepping-stone habitat between woodlands that adjoin the Montgomery canal to the north and South of the Site.

2.15 Habitat creation could provide new wetland habitat to support species found within the Mongomery canal SAC/SSSI, particularly Floating water-plantain *L. natans*.

2.16 Species specific enhancements could include tailored interventions for those species / species assemblages known to be found locally, including bats, birds, invertebrates, reptiles and otter. This could be in the form of appropriate habitat creation and management, and/or the provision of artificial features such as bat and bird boxes.

3.0 PROPOSED SCHEME

Proposed Design

3.1 Site proposals are illustrated in the Green Infrastructure Plan (FPCR 2025), drawing no. 12805-FPCR-XX-XX-DR-L-0001.

3.2 The proposed works for the Vyrnwy Reserve Site is to create an area of wetland habitat with two backwater channels with associated point bars, chutes and a vegetated island which will function as an offline nature reserve.

3.3 The nature reserve will be fed from the river Vyrnwy. The wetland habitat will support protected submerged aquatic plant species, as well as marginal wetland plants, namely floating water plantain *Luronium natans*, and associated invertebrates found locally in association with the Montgomery canal.

3.4 New terrestrial habitats appropriate to the local context will provide additional biodiversity value.

Potential Impacts

3.5 The potential impacts of the proposals have been considered in previous assessments and are summarised in table 2 below.

Table 2: Potential Development Impacts

Assessment Report	Key Issues
Habitat Works (2023). Vyrnwy Reserve Site, Preliminary Ecological Appraisal Report, October 2023.	In the absence of mitigation, the scheme has the potential to adversely affect the following ecological receptors: • Due to the close proximity of the SAC/SSSI to the Site and direct hydrological connection, there is the potential for direct adverse effects associated with pollution. • Priority habitat (hedgerows) through root damage from groundworks in close proximity. • Loss of individual trees and areas of bramble scrub. • Reptile through injury during construction and vegetation removal. • Nesting birds through destruction of nests and eggs during vegetation removal. • Bats through potential roost loss and habitat loss through construction. • Badger through sett destruction and injury during construction. • Otter through impacts on the River Vyrnwy and Montgomery Canal were otters were previously recorded. • Water vole suitable habitats impacted during the construction phase. Invasive species could be spread during the construction phase, namely Himalayan balsam.
Habitat Works (2024). Vyrnwy Reserve, Confidential Badger Report, February 2024.	Please see confidential badger report for full details of potential impacts. In the absence of mitigation, the scheme has the potential to adversely affect badgers in the following ways: • Potential disturbance of badgers. • Temporary loss of foraging habitat during construction phase. • Potential harm to individual badgers during the construction phase.

Assessment Report	Key Issues
Ecus Limited (2024). Vyrnwy Reserve Figure 3 Tree Constraints Plan, Drawing number 22517-ARB-01, January 2024.	The removal of T022, T023, T030, T034 and T041 will be required to facilitate the proposed groundworks and habitat creation on site.
Cura Terrae (2025). Vyrnwy Land - Area B – BS 5837: 2012 Arboricultural Report, Impact Assessment and Method Statement, January 2025.	For Area B, one field compartment within the southeastern corner of the site, the development proposals indicate that no trees or groups will need to be removed and the retention and protection of all trees within the site boundary is likely to be suitable throughout the development. Retained trees will need protecting from development operations to ensure that they are not negatively impacted during the development. Any works that are proposed within the root protection area of retained trees must be carried out as specified in the arborical method statement.
Dynamic Rivers (Survey and Design) Ltd (2024) Vyrnwy Design Draft, April 2024.	An existing field drain crosses the site. This feature will be severed as part of the proposed development works. The exact location of any utility services and apparatus must by confirmed on site prior to any excavation works commencing.
FPCR Environment and Design Limited (2025). Green Infrastructure Statement – Vyrnwy Reserve.	The LVA concludes that the proposed wetland reserve could be successfully accommodated within the local landscape and the landscape proposals would result in some limited and localised beneficial effects, including contributing at a local level to the guidelines for LCA 8 as a result of opening up and enhancing areas of modified grassland and other broadleaved woodland present. Several individual trees area scattered throughout the site. A mixture of species rich native hedgerows and native hedgerows are present on the boundaries of field compartments. A stream runs along a portion of the western boundary of the site. Hedgerows are priority habitats and considered to be of key significance in Wales. The Montgomery Canal SAC / SSSI is designated for its unique aquatic plant life including the Annex II species, floating water plantain Luronium natans (a primary reason for Special Area of Conservation (SAC) site selection). This is the largest and the most extensive population of floating water-plantain in Britain. Habitat connectivity to the wider landscape is provided by the retained vegetation, by the Montgomery Canal and by the River Vyrnwy.

Assessment Report	Key Issues
Arcadis (2024). Vyrnwy Reserve Soil Reuse, 10048826-ARC-EWE-R1-TN-CE-00002, October 2024.	Approximately 60,000-80,000m^3 of arisings are to be created from the proposed groundworks on site. 22,000m^3 are proposed to be taken offsite, leaving between 38,000-58,000m^3 to re-use onsite. These arising will be used to form the two bunds within the south of the site. The bunds have been designed with an offset to allow retention of the trees in this part of the site (area A and area B) and also to avoid any ponding around the retained trees which could damage them. The arboricultural surveys and reports should be referred to for the protection of these retained trees.

Mitigation Hierarchy

3.6 Biodiversity enhancements that provide NBB must be considered subsequently to the implementation of the mitigation hierarchy (i.e. in addition to).

3.7 The mitigation hierarchy has informed the specific measures detailed in the above assessments and can be broadly summarised as follows:

Avoid

3.8 Site designs have avoided impacts to higher value habitats where possible. This includes the retention of woodland blocks, meadow grassland and individual trees.

3.9 Retained trees and hedgerows will be protected in-line with the Arboricultural Method Statement (Cura Terrae 2025).

3.10 The timings of works will be sensitive to both seasonal constraints and daylight hours, avoiding certain impacts on specific protected species.

3.11 Pre-works checks and precautionary working methods (including provision of Ecological Clerk of Works and Toolbox Talks) will further contribute to avoiding impacts on protected species.

Minimise

3.12 Works will proceed in line with a Construction Environmental Management Plan (CEMP), ensuring that the working area is contained to prevent potential impacts spreading into the surrounding habitats. This includes provision for demarcating working areas, protective fencing, provision of mammal ramps, designated fuelling and storage areas, sediment traps, signage, and biosecurity measures.

3.13 Should lighting be required, it will be designed to comply with an ecologically sensitive lighting scheme.

3.14 There will be some loss of individual trees and meadow grassland and riverbank-side habitat to facilitate the proposals. All bramble scrub is set to be lost under the proposals. Sensitive site designs have sought to minimise impacts by avoiding any areas of higher habitat quality and targeting impacts to cover the minimum necessary areas to facilitate the scheme.

Restore

3.15 Restoration of habitats following temporary impacts will focus on the riverbanks. Due to the limited scale of impacts, following any necessary profiling, these will be allowed to recolonise

naturally. There will be targeted monitoring and management to protect these areas from invasive species, and respond if any areas fail to reestablish.

3.16 Restoration following temporary impacts arising from site compounds, storage and access will aim to provide betterment, enhancing the value of these areas in line with the wider green infrastructure proposals.

3.17 The CEMP will contain provision to address any unintentional negative impacts, including pollution incident protocols.

Compensate

3.18 The loss of bramble scrub will be compensated for with new native scrub planting distributed in a mosaic across the areas of meadow grassland bund to the south of the site. This will provide a greater diversity of plant species and microclimates which in turn will support a wider range of animal and invertebrate species. Areas of lower value grassland that have been lost are to be replaced with meadow grassland, which are of greater value for supporting biodiversity. The planting of 41 individual trees across the bund areas to the south of the site will compensate for the loss of individual trees from the baseline.

3.19 A general wildflower grassland mix will be seeding in areas which have been disturbed during construction phase, and a wet meadow seed mix will be used on areas closer to the proposed wetland habitats. On-going management will be undertaken with consideration given to the biodiversity value of the grassland. Grazing or mowing will be utilised sensitively to promote a species rich sward, with spatial variation providing a range of ecological niches (tufted grassland, varied sward height, areas of bare ground, etc).

4.0 NET BIODIVERSITY BENEFITS

4.1 The aim of the proposals is to create a new nature reserve. The above section details the impacts and mitigation in relation to the necessary construction works. The following section focusses on the additional benefits that the reserve will provide in the long-term. This has been structured following the DECCA framework.

Diversity

4.2 The key element of habitat creation is the new wetland areas with associated low-density reed and marginal planting. In addition, there will be new scrub and individual tree planting, and compensatory grassland creation. This represents an increase in habitat diversity relative to the meadow grassland baseline. Planting mixes for each habitat type will utilise a diverse range of native species, and the wetland and associated backflow channels from the River Vyrnwy will allow for additional opportunities for colonisation by *L. natans* and other aquatic species found within the local area.

4.3 Management will promote further structural diversity, creating spatial and temporal variation within habitats, allowing for natural cycles of regeneration.

Extent

4.4 The creation of the wetland habitat and associated backwater channels will increase the extent of available habitat for aquatic species, including *L. natans*. Where natural colonisation is not forthcoming, transplanting of specimens will be used to aid the establishment of a new population.

4.5 The proposed new scrub habitat creation represents a significant increase relative to the limited amount of this habitat found on the baseline. The planting of 41 individual trees across the bund areas to the south of the site will compensate for the loss of individual trees from the baseline. In the long-term this will provide new foraging, sheltering and breeding habitat for a range of species.

4.6 In the short-term, bat and bird boxes will be provided to increase the available nesting and roosting resources. Hibernacula will be created to provide suitable sheltering habitat for herpetofauna and invertebrates.

Condition

4.7 Long-term management will be delivered by the Canal & River Trust and will focus on maintaining and enhancing the Site's biodiversity value. A key focus for management will be to monitor and combat any invasive species encroachment.

4.8 Public access will be controlled with visitors directed to a viewing area along a mown pathway, with wider access to the site discouraged..

4.9 The management approach will be flexible, rather than purely prescriptive in order to build in resilience and adapt to potential impacts from climate change or other irregular events.

Connectivity

4.10 The main connectivity benefit at the Site will be the new areas of scrub and tree planting to the south of the site. This will provide stepping stone habitats, supporting connectivity across the

site between the River Vyrnwy and the Montgomery Canal and the offsite woodlands and hedgerows that these features are linked to.

Aspects of ecosystem resilience

4.11 The purpose of the off-line nature reserve is to provide a sustainable, long-term freshwater habitat with favourable conditions to support rare and protected submerged aquatic plant species, as well as marginal wetland plants and associated invertebrates.

4.12 The reserve will allow the targeted management of *L. natans* free of any constraints related to active waterway management of the main canal. This will provide greater resiliency when considered in context of the wider population within the Montgomery Canal SAC/SSSI.

4.13 New scrub and individual tree planting will increase connectivity to the wider landscape, strengthening the green corridor along the canal. New opportunities for a range of species will be created through the provision of diverse habitats and new structural complexity.

4.14 Long-term management provided by the Canal & River Trust will focus on ensuring the biodiversity value of the site is protected, and any incidents are responded to appropriately.

Outline Management Proposals

4.15 In order to secure the NBB discussed above, a formal management strategy should be adopted. The management approach will be flexible, rather than purely prescriptive in order to build in resilience and adapt to potential impacts from climate change or other irregular events. Table 3 provides a summary of targets for habitat management. It does not aim to provide a detailed management plan.

Table 3: Habitat Management Objectives

Habitat (Landscaping Plan Reference)	Targets for Creation/Management
Standard Trees	• New tree planting should prioritize native species. • Retain deadwood in-situ where possible, or re-use elsewhere on site. • Replacement planting of failed specimens during establishment period.
Woodland	Woodland management will promote the development of a stratified structure with canopy, understory/shrub layer and ground flora. In the long-term selective thinning and coppicing where appropriate will allow greater light penetration. This will promote natural regrowth, increasing opportunities for butterflies and other insects, which in turn provide food for birds, bats and mammals. Retention of both standing and fallen deadwood will be promoted to further enhance biodiversity value. • New tree planting should prioritize native species . • Trees will be planted in species clusters of c. 3-5 individuals, promoting structural species diversity throughout the planting area. • Replacement planting of failed specimens during establishment period. • Woodland thinning after 10 years to create opportunities for natural regeneration, and then repeated periodically to maintain a diverse age and spatial structure. • Additional planting to be considered where natural regeneration has not been successful.

	• Felled trees to be kept and used to fallen deadwood. • Consideration of ring barking targeted individuals to create standing dead wood (DBH > 10cm).
Grassland	Grassland habitat will provide suitable habitat for wildlife including amphibians, reptiles, birds and invertebrates. Meadow grassland will be managed to promote structural diversity. This could include areas of tussocky grassland, selectively mown / strimmed areas, and areas of bare ground, creating a range of micro-climates. Grazing may be used as an alternative to mowing but stocking density and duration should be managed to promote biodiversity value, and avoid a uniformly grazed sward. • Areas requiring seeding to be seeded using a native species rich seed mix to achieve a diverse sward. • Management will encourage a varied sward height of the grassland. • Limit encroachment of any bracken and scrub. • Create temporary areas of bare ground to provide opportunities for invertebrates.
Native Scrub	Areas of native scrub will be situated within the bund areas. These blocks are largely located in close proximity to the woodland. • Planting will ensure a diversity of native species within each block of scrub with no one species comprising more than 75% cover in any block • Any invasive non-native species are to be removed if present; • Replacement planting of failed specimens during the establishment period • Additional planting after 10 years where natural regeneration has not been successful.
Open Water	The backflow channels will be primarily designed and managed to support a population of *L. natans.* All additional management objectives are secondary to this goal. • Regular management to reduce/remove invasive non-native species. • Management should reflect approaches used in the Mongomery Canal SAC / SSSI[7]. • Water quality should be classified as Good (Water Framework Directive) • Management of habitats within the reserve will be free from fertilizer input to prevent eutrophication of the waterbodies.
Marginal Plants	Marginal area are expected to colonise naturally from the surround area, with a limited amount of supplemental planting provided within the proposals. Management of the marginal zones will reflect requirements listed above for open water areas.
Hedgerows	• Retained hedgerows are to be gapped up with new native planting. • Failed specimens will be replaced during establishment. • Hedgerows will be managed to encourage tall, wide, and bushy features • Rotational management of hedgerows with approximately one-third to be cut in any year (target can be adapted dependent on hedgerow condition).

7 Natural Resources Wales (2008) Core Management Plan including Conservation Objectives for Montgomery Canal Special Area of Conservation (SAC) (and SSSI).

	• A minimum of 1m adjacent to the hedgerows will be managed as 'undisturbed' ground.
Bat and Bird Boxes	Annual visual checks of bat and bird boxes will be undertaken from a distance to ensure that they are structurally sound. Where they are damaged, they will be replaced on a like for like basis. A suitably licensed bat worker should undertake any physical works required on installed bat boxes. If they remain unused for an extended period, consideration should be given to relocating them elsewhere within the Site.

5.0 CONCLUSIONS

5.1 The proposals deliver a new nature reserve which provides biodiversity benefits tailored to the local situation. The mitigation hierarchy has been followed to account for construction impacts with additional NBB provided through the creation of an offline pond and new woodland planning, improving habitat connectivity and resilience.

5.2 The above have been guided by the Biodiversity Net Gain Good Practice Principles[8]. These principles are applicable for developments across the UK and provide a framework to illustrate that projects followed good practice. Table 4 lists the principles along with a description of how the principles has been applied to this assessment.

Table 4: Application of the Biodiversity Net Gain Principles to the Proposals

Principle	Indicators
Principle 1: Apply the Mitigation Hierarchy	Site design followed a stepwise approach to avoid impacts (retain trees, grassland, hedgerows and woodland and implement sensitive timings of works), minimise impacts (limit extent of working areas), restore habitats (remediation of river banks), and compensate for remaining impacts (new planting and seeding).
Principle 2: Avoid losing biodiversity that cannot be offset by gains elsewhere	The proposals have sought to retain higher distinctiveness habitats where compensation could not provide equivalent value in a short-time frame. Primarily this applies to mature trees, woodland, hedgerows and areas of other neutral grassland.
Principle 3: Be inclusive and equitable	Ecological input has been provided from an early design stage to inform the proposals. Both internal Canal & River Trust and external ecological consultants have inputted to the designs. The DECCA framework has been applied to consider the proposals in the context of the wider landscape.
Principle 4: Address risks	The habitats recommended for creation include those that would be suitable for establishment in the local area. Management will ultimately strive to maintain and enhance these habitats. This includes risks from invasive species, and impacts of climate change.
Principle 5: Make a measurable Net Gain contribution	The proposals were primarily considered qualitatively more than quantitatively in-line with the NBB assessment. Habitats being lost include medium distinctiveness grassland habitats, bramble scrub and individual trees as well as low distinctiveness grassland habitats. These habitats have been replaced with higher value wetland, grassland and

8 CIEEM, CIRIA, IEMA. (2016) Biodiversity Net Gain: Good practice principles for development

	native scrub habitats. The proposed habitat quality and species diversity in this area should markedly improve with the change in management.
Principle 6: Achieve the best outcomes for biodiversity	The reserve is being created to provide supporting habitat for the Mongomery Canal SAC / SSSI and in particular, populations of *L. natans*.
Principle 7: Be additional	NBB has been measured in addition to requirements under the mitigation hierarchy. Further species-specific enhancements will be provided in the form of bat and bird boxes and hibernacula.
Principle 8: Create a Net Gain legacy	Long-term management will be provided by the Canal & River Trust. A key part of management will include volunteer work parties which will provide an opportunity for wider community engagement.
Principle 9: Optimise sustainability	The proposals have been carefully designed to manage water-levels between the reserve and the canal, ensuring that neither creates a detrimental impact on the other.
Principle 10: Be transparent	All source material has been referenced within this report, ensuring clarity for reviewers.

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