

# **Review of Biodiversity Opportunities in the Lower Windrush Valley**

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## **Introduction**

The Lower Windrush Valley covers 28km<sup>2</sup> of West Oxfordshire, incorporating the floodplain of the River Windrush from Witney, south to the River Thames at Newbridge. The area is low lying, and mostly within the River Thames and Windrush floodplain.

The majority of land in the area is in agricultural use, mostly arable or pasture, and a major feature of the area is the extensive former and current sand and gravel workings, which have resulted in the creation of 60 gravel pit lakes in the last 60 years.

The Lower Windrush Valley Project (LWVP) was established in 2001 and is hosted by Oxfordshire County Council. The project coordinates action designed to generate benefit from the legacy of mineral extraction, focusing on nature conservation, access to the countryside and landscape improvements. The LWVP's 2015-2025 Strategic Plan sets out a vision for the valley: 'to be a brilliant place for people and wildlife' and includes a series of actions such as 'developing plans to make the valley more biologically diverse' and 'extending local priority habitats'<sup>(1)</sup>.

## **Aim**

This review aims to identify biodiversity opportunities within the Lower Windrush Valley (LWV), and areas in which resources should be targeted to create and enhance key habitats. It is intended that the document will act as a resource for local authorities and planners to inform decisions and local policy, direct biodiversity offsetting funds, and be used by local land managers and conservation organisations to inform habitat maintenance, enhancements or restoration. In addition, it will direct the biodiversity and nature conservation elements of the LWVP Strategic Plan.

The identification of land within an opportunity area does not imply landowner agreement but indicates potential for delivery of objectives set out in this review.

## **Biodiversity and its role in the Lower Windrush Valley**

Biodiversity is defined as the variety of all life on Earth, including all species of animals and plants, and the natural systems that support them <sup>(2)</sup>. With its mosaic of terrestrial and aquatic habitats, the LWV supports a wide range of species, of which some are of national and international importance – more information on these can be found in the 'Key habitats and species' sections of this review.

The LWV's biodiverse landscape intrinsically holds value in the form of natural capital – this is described as "elements of nature that directly or indirectly produce value to people, including ecosystems, species, freshwater, land, minerals, the air and oceans" <sup>(3)</sup>. From natural capital assets such as habitats, water and ecosystems, we derive benefits in the form of ecosystem services – these can either directly provide resources, e.g. timber and fish production, regulate our environment, e.g. improving air and water quality, or give cultural benefits such as a sense of place or aesthetic beauty. Residents across the valley will be receiving multiple benefits from

the LWV's habitats – in particular, with its large grassland and wetland areas, the valley is likely to be providing a wide range of regulating ecosystem services including carbon storage, water quality, flood resilience and pollination. A study carried out by Viridion for BBOWT assessed the water-based ecosystem services for the River Windrush catchment area, and showed that the northern part of the project area is particularly important for flood mitigation <sup>(4)</sup>. Biodiversity itself is a “live” element of natural capital, and many of the benefits that stem from natural capital are as a result of the interactions between biodiversity and non-living resources.

The LWV's landscape is also providing natural climate change mitigation. The LWV project area's grasslands and soils are likely to be a significant source of carbon storage – it is suggested that UK grasslands sequester large amounts of carbon at a rate of around 242 kg/ha/yr <sup>(5)</sup>. Climate change will bring about warmer wetter winters - although parts of the valley are susceptible to flooding, the impact of this will be lessened by the floodplain meadows, which absorb and store water that would otherwise flood low-lying areas <sup>(6)</sup>. As well as these direct benefits, when further climate change pressures such as increasing temperatures and severe weather events come into effect, the valley's network of hedgerows, trees and high quality habitats will allow local wildlife populations to migrate easily across the landscape as they adapt to changing temperatures.

In addition to climate change regulation, natural environments have beneficial effects on human health and well-being. Where people are able to access greenspace, they are more likely to engage in outdoor physical activity, which in turn improves their physical health, for instance, by reducing the risk of obesity and type 2 diabetes. Along with physical benefits, spending even a short amount of time in natural environments reduces stress and depressive symptoms, and improves mood and perceived mental and physical health <sup>(7)</sup>.

The LWV is a key leisure area for inhabitants of Witney and surrounding villages, and many of its opportunities are dependent on its biodiversity value. For example, Tar Lakes, a site managed by the LWVP with Smiths Bletchington, is comprised of a complex of lakes that are open for the public to access. The largest lake has a gravel surfaced path suitable for pushchairs and wheelchair users, and a grassy path travels around the other two lakes. Biodiversity related events such as pond dipping, bat walks and nature crafting are frequently held at this site, and annual visitors are estimated to be in the tens of thousands. This path also joins into the wider public rights of way network, which extends across the valley. Rushy Common Nature Reserve is located immediately north of Tar Lakes – this site is accessible to those who have acquired a key through the LWVP, and has a bird hide where the site's wildlife can be watched. Many of the gravel pits have been converted into commercial fisheries and water sports centres – while these have been restored and are used with nature less in mind, they are still important sites that form the landscapes character and provide leisure opportunities.

Biodiversity also adds to the aesthetic and cultural value of the valley's landscape, contributing to local residents' sense of place and appreciation of the natural landscape around them. Several access projects such as the creation of the Windrush Path and the promotion of circular walks across the valley have increased the number of opportunities for the public to connect to the valley's unique natural landscape.

Like much of the county, the LWV's biodiversity has suffered overall declines during the last few decades <sup>(8)</sup>. Agricultural intensification, habitat fragmentation, pollution, and the introduction of invasive species are just some of the drivers that have negatively affected local wildlife populations, in addition to the increasing pressures of climate change. This review outlines steps that can be taken to improve biodiversity across the valley, to benefit both the wildlife and people that live there.

## Policy Context

### National

#### **National Planning Policy Framework, 2019 <sup>(9)</sup>**

The National Planning Policy Framework (NPPF) sets out government's planning policies for England and how these are expected to be applied, with guidance both in drawing up plans and making decisions about planning applications. The document gives guidance on conserving and enhancing the natural environment, and details how development plans should;

- a) *Identify, map and safeguard components of local wildlife-rich habitats and wider ecological networks, including the hierarchy of international, national and locally designated sites of importance for biodiversity; wildlife corridors and stepping stones that connect them; and areas identified by national and local partnerships for habitat management, enhancement, restoration or creation; and*
- b) *promote the conservation, restoration and enhancement of priority habitats, ecological networks and the protection and recovery of priority species; and identify and pursue opportunities for securing measurable net gains for biodiversity.*

#### **25 Year Environment Plan, 2018 <sup>(10)</sup>**

The government's 'A Green Future: Our 25 Year Plan to Improve the Environment' sets out goals for improving the environment within a generation, and leaving it in a better state than we found it. The plan includes an ambition to establish a Nature Recovery Network to provide an additional 500,000 ha of wildlife habitat and link existing valuable sites. One particular action mentioned includes "*Considering how landscape-scale restoration of wildflower-rich grassland, meadows and heathlands could be part of the Nature Recovery Network to provide better access for people alongside improved habitat for pollinating insects*". The NRN also hopes to "*build resilience to climate change, and provide opportunities for species and ecosystem recovery, and for the reintroduction of formerly native species, as well as for local community engagement and business development*".

The plan also commits to take all possible action to mitigate climate change, while adapting to reduce its impact. Natural Flood Management is one such example discussed, which involves "*the use of a variety of measures including tree planting, river bank restoration, building small-scale woody dams, reconnecting rivers with their flood plains and storing water temporarily on open land*".

The plan states that a new environmental land management system will replace the Common Agricultural Policy, which will incentivise and reward land managers to

restore and improve our natural capital and rural heritage. The plan details how “a *new environmental land management scheme will help us deliver more for the environment (including mitigation of and adaptation to the effects of climate change) and provide flexibility, putting more management decisions in the hands of farmers*”.

### **Environment Bill and Biodiversity Net Gain requirements <sup>(11)</sup>**

In January 2020, the government reintroduced the Environment Bill, which sets out plans to protect and improve the natural environment in the UK. The bill includes a mandatory requirement for the biodiversity value of a development requiring planning permission to exceed the biodiversity value of the site pre-development by 10%. This 10% biodiversity net gain may be delivered on the development site, or if not feasible due to site constraints, can be achieved via a registered offsite biodiversity gain or by purchase of biodiversity credits.

### County

#### **Oxfordshire Wildlife and Landscape Study, 2004 <sup>(12)</sup>**

The Oxfordshire Wildlife and Landscape Study (OWLS) explores the relationship between landscape character and biodiversity and provides a strategic framework for decision making by a wide range of local stakeholders. The LWV area sits within the Upper Thames Vale Character Area, which stretches roughly from the south of Bicester to Faringdon. The project area is comprised of five landscape types, which are listed by size as follows;

- River Meadowlands—a linear riverine landscape with a flat, well defined alluvial floodplain, which has pastoral character with meadows, wet and semi-improved pasture.
- Lowland Village Farmlands - a variable, often large scale farmed landscape closely associated with village settlements.
- Alluvial Lowlands - flat landscapes of lowland river valleys, associated with alluvial soils, characterised by a regular pattern of medium-sized hedged fields with permanent pasture and arable cropping.
- Terrace Farmland – a flat, open, intensively farmed landscape overlying river gravel terraces.
- Wooded Plateau - a rolling, semi-enclosed, wooded landscape with a strong pattern of woods and hedgerows.

#### **Oxfordshire Minerals and Waste Core Strategy, 2017 <sup>(13)</sup>**

The Minerals and Waste Local Plan Core provides the planning strategies and policies for the development that will be needed for the supply of minerals and management of waste in Oxfordshire over the period to the end of 2031. The LWV project area falls within the Thames, Lower Windrush & Evenlode Valleys Mineral Strategic Resource Area – this is one of the county’s principal locations for aggregate minerals extraction, in particular for sharp sand and gravel. It is noted that “*Within the Lower Windrush Valley, proposals for mineral working and restoration should recognise the role of the Lower Windrush Valley Project. Within the floodplain, restoration of mineral workings should where possible include provision for increased flood storage capacity to reduce the risk of flooding elsewhere*”.

#### **Biodiversity and planning in Oxfordshire, 2014 <sup>(14)</sup>**

This policy document gives guidance to planners and developers on dealing with

various biodiversity features which should be protected and enhanced through the planning system. The Lower Windrush Valley is highlighted as an example area where priority species populations must be protected or enhanced, stating that *“wet grasslands along river valleys such as the Cherwell, Windrush and Ray provide important remnant habitat for curlew and other wetland birds such as snipe, lapwing and redshank. Development should avoid habitat fragmentation and impacts on the hydrology of these areas. Opportunities should be taken to improve and extend suitable habitat”*.

#### **Review of Environmental Sensitivity in Oxfordshire, 2016** <sup>(15)</sup>

This report reviews the environmental assets within Oxfordshire, and their sensitivity to land use changes. Within this report assessing environmental assets and their sensitivity, the Windrush Valley was classed as a hotspot of environmental sensitivity, due to its *“flood risk, status as a Conservation Target Area in the gravel pits and wetlands, and The Devil’s Quoits archaeological site (henge and stone circle)”*.

#### **Oxfordshire Nature Recovery Network (draft), 2020** <sup>(16)</sup>

At the time of writing, the Thames Valley Environmental Record Centre and Wild Oxfordshire are in the process of developing a Nature Recovery Network for the county. A draft of the NRN map shows that the entire LWV area has been identified as a Recovery Zone, which is a priority area for habitat creation and restoration (See Appendix 1 for draft map). The LWV’s lakes have additionally been classified as part of the Core Zone, where the highest level of biodiversity protection, management and enhancement should occur.

#### **Strategic-Scale Environmental Opportunities Mapping: Doubling Nature in the Oxford-Cambridge Arc, 2020** <sup>(17)</sup>

This report maps the priority strategic-scale environmental opportunity zones in the Oxford-to-Cambridge Growth Arc. The Lower Windrush Valley forms part of the Upper Thames, Wytham and Cothill opportunity zone, identified as part of the strategic-scale and collectively agreed areas of high environmental value and opportunity and large-scale investment potential in the Ox-Cam Arc. The main conservation activities identified are to *“Protect, buffer, extend and connect existing sites as part of overall catchment management approach. Create further extensive floodplain grassland, reedbeds and wetland, linking through to the Oxford Meadows SAC and the planned floodplain grazing marsh/grassland as part of the Oxford Flood Alleviation Scheme (FAS)”*.

#### District

#### **West Oxfordshire Local Plan 2031, 2018** <sup>(18)</sup>

The West Oxfordshire Local Plan sets out a vision of the District in 2031 and provides an overarching framework to guide and deliver that vision. It identifies The Lower Windrush Valley Project as a delivery mechanism for Landscape Character in Policy EH2 and states *‘Special attention and protection will be given to the landscape and biodiversity of the Lower Windrush Valley Project’*. It also notes that development proposed within or close to a CTA should identify the biodiversity constraints and opportunities and show how the proposal will help to achieve the aims of the CTA.

#### **West Oxfordshire Infrastructure Delivery Plan, 2015** <sup>(19)</sup>

The WODC Infrastructure Delivery plan identifies the infrastructure that is needed to support future growth in the district. The majority of the proposed projects in the plan that are located within the LWV area are in relation to access and highways, however there are several that refer to the area's potential biodiversity work;

- Various projects to improve accessibility, recreation opportunities, tourism, landscape and nature conservation within the Lower Windrush Valley Project area
- Conservation Target Areas – biodiversity restoration through maintenance, restoration and creation of BAP priority habitats across the District
- Local Wildlife Sites – potential enhancements and Improved connectivity across the District
- Restoration of Emma's Dike, Witney

## Method

In 2019, the LWVP commissioned the Thames Valley Environmental Record Centre (TVERC) to undertake habitat mapping of the Lower Windrush Valley. Using aerial photography and existing habitat and ecological survey information, a Phase 1 habitat map was produced, which forms the basis of the strategy's baseline information (see Appendix 2).

The UK Biodiversity Action Plan (BAP) priority habitats were also mapped (see Appendix 3) to examine the distribution of each priority habitat and identify areas where they could most suitably be created, extended or connected. Great crested newt and water vole data from TVERC was additionally used to inform the Ponds and River Corridor opportunity maps.

The habitats highlighted in the Lower Windrush Valley Conservation Target Area (CTA) and Upper Thames CTA were used to inform the selection of key habitats and opportunity areas (see Appendix 4 for CTA designations and maps). The CTAs represent areas where habitat restoration and / or creation can deliver the greatest benefits, helping to buffer, extend and link existing priority habitats and making isolated sites less vulnerable.

The following broad habitats were identified to form the basis of this plan;

- **Grassland** – with a focus on Floodplain Grazing Marsh and Lowland Meadow
- **Lakes**
- **Ponds**
- **Reedbed**
- **River corridor**
- **Hedgerows**

The maps and data available, as well as the LWVP's knowledge of the area, were then used to set out several objectives for each of the habitats and identify opportunity areas.

During this process the Lawton Review principles<sup>(20)</sup> were applied to each area where relevant, i.e.;



- Better – improving the quality of existing priority habitats
- Bigger – expanding areas of priority habitat
- More – creating new areas of priority habitat
- Joined – enhancing ecological connections between areas of priority habitat

Mitigating against climate change is also at the heart of the objectives outlined within the opportunity areas. As it is not fully understood how species will adapt to the changing climate, a key focus has been on ensuring connectivity across the landscape is maintained so species are able to spread to new habitats if needed, and maintain the quality of those habitats – the Lawton Review principles feed directly into this thinking.

Once the overall objectives had been established for each habitat, and opportunity areas identified, more specific activities for each habitat were outlined that would enable the progression towards the objectives. These range from small scale activities such as ongoing management of Standlake Common reedbed to larger initiatives such as a valley-wide pond creation project.

## **Key habitats and species**

Generally, the key habitats in the Lower Windrush Valley are neutral meadows and pastures, and wetlands which have a number of associated key species and may support fauna of interest.

### Neutral meadows and pastures

The Lower Windrush Valley grasslands are part of a mixed lowland farmland habitat and, where flooding is frequent, form part of valuable floodplain grazing marsh of particular importance for breeding waders. In the Lower Windrush most of the riverside pasture has been ploughed, fertilised or reseeded over the years. There are only around 15ha of species rich neutral grassland in the valley, which can be found on just a few isolated sites. Lining the valley's grassland is a network of hedgerows, with a range of different management techniques and varied biodiversity values.

### **Designated grassland sites**

Ducklington Mead Site of Special Scientific Interest (SSSI): this site supports over 70 flower and grass species and is particularly notable for nationally scarce snakeshead fritillary. It also contains several species mainly confined to well-established unimproved neutral pastures, such as great burnet and pepper saxifrage <sup>(21)</sup>.

Langley's Lane Meadow SSSI: an unimproved meadow near the River Thames. The site has a large colony of nationally scarce green-winged orchids <sup>(22)</sup>.

Dunster Meadow Local Wildlife Site: an unimproved meadow that lies partly on the calcareous gravel terrace and partly on alluvium of the River Windrush. The grassland is species-rich both in the higher calcareous and wetter neutral areas <sup>(23)</sup>.

### Wetlands

## Lakes

An estimated 20,000ha of standing open water has been created by sand and gravel extraction in the UK to date and the lakes in the Lower Windrush Valley contribute c.428ha to that total. Use across the lakes is as follows:

- Angling: 39 lakes totalling 245ha (57%)
- Water sports: 6 lakes totalling 105ha (25%)
- General public access and amenity: 3 lakes totalling 12ha (3%)
- Nature conservation: 2 lakes totalling 31ha (7%)
- Private use / unknown: 6 lakes totalling 36ha (8%)

A 2004 Baseline Ecological Survey of 40 lakes in the Lower Windrush found that water quality in the gravel pit lakes was generally high for Oxfordshire, with the potential to support many different types of aquatic plant and provide food and shelter for a variety of aquatic insects, birds and fish. The survey recorded a total of 122 wetland plants and 192 invertebrates <sup>(24)</sup>. The Lower Windrush Valley is considered nationally important for wintering wildfowl, specifically shoveler and gadwall <sup>(25)</sup>, and is also designated as a nationally Important Stonewort Area <sup>(26)</sup>.

## Ponds

The Lower Windrush Valley contains at least 90 ponds, which are priority habitats, including gravel pit lakes less than 2ha in size, ponds specifically created to provide additional wildlife habitat as part of minerals restoration and garden ponds. Twenty of the ponds associated with mineral sites were surveyed in 2007 and the results clearly demonstrated that they offered a different habitat to the larger lakes and so added to the overall biodiversity of the valley. The survey recorded 98 wetland plants and 181 invertebrates, including 8 plant and 25 invertebrate species not previously recorded in any of the larger gravel pit lakes in the valley <sup>(27)</sup>.

## Reedbeds

There are several small areas of reedbed in the Lower Windrush Valley with a total area of approximately 3.5ha, the largest of which is approximately 1ha in size at Standlake Common Nature Reserve. Reedbeds are a priority habitat and even relatively small areas provide important habitat for birds and invertebrates.

## Rivers and watercourses

The River Windrush flows through a largely pastoral landscape from its source in the Cotswolds north of Temple Guiting down to its confluence with the River Thames at Newbridge. In the Lower Windrush the river flows in two channels for much of its length, dividing just north of Langel Common in Witney and rejoining at Broad Bridges just south of Standlake. The high density of watercourses within the Lower Windrush is a particular feature of the area, with more than 80km of river, stream or brook classified as a main-river by the Environment Agency <sup>(28)</sup>.

The section of the River Windrush that flows through the Lower Windrush Valley was classified as Moderate by the Environment Agency in 2019 according to WFD assessment, with the reasons for not achieving Good status listed as sewage discharge and diffuse pollution from transport and agriculture <sup>(29)</sup>. The river corridors have particular potential for fauna such as otter and water vole, which are UK Priority Species.

### **Designated wetland sites**

Standlake Common Local Wildlife Site comprises a large lake with marginal areas of grassland and scrub. It has a range of wetland habitat including open water, shallows and a small area of reedbed (1ha). The lake has gently sloping banks with gravel beaches and a number of islands offering valuable habitat for nesting birds <sup>(30)</sup>.

Dix Pit Local Wildlife Site includes Dix Pit lake which is the largest lake in the Lower Windrush Valley. The open water is attractive habitat for birds, especially wildfowl that winter in the UK. It is particularly good for terns, ducks, grebes and gulls <sup>(31)</sup>.

The locations of designated grassland and wetland sites, and other key sites, are depicted on a map in Appendix 5.

### Key species

#### **Water voles**

The Lower Windrush Valley is a Local Key Area for water voles <sup>(32)</sup>. A population was initially recorded by the Water Vole Recovery Project on the lower River Windrush in 2001 and the area was designated a Local Key Area for water voles. After re-introduction by WildCru in 2005, a population on the eastern branch of the river appeared to thrive and extend their range southwards to the Thames - water vole activity was also identified on the western branch in subsequent years, indicating that they had migrated across from the eastern branch.

#### **Otters**

After suffering a huge population crash in the late 1950s, otters began to return to the Upper Thames and Windrush in the mid-1990s and numbers are now steadily increasing <sup>(33)</sup>. Otters are listed as near threatened on the global IUCN Red List of Threatened Species and protected in the UK as their populations are still fragmented nationally and they reproduce slowly. Otters are regularly sighted across the project area, particularly in the Newbridge and Standlake area, where there have been several otter deaths on the main road.

#### **Stoneworts**

LWV gravel pits are of high value in terms of their wetland plant biodiversity. In a survey of all the valley's lakes in 2004, a total of 27 uncommon wetland plant species were recorded in the survey, the stonewort assemblage being of particular interest with 8 uncommon species <sup>(24)</sup>. Stonewort species richness confirmed the value of the LWV as a nationally Important Stonewort Area.

#### **Snakeshead fritillaries**

Ducklington Mead SSSI has been designated both for its rare hay meadow plant community and its population of snakeshead fritillary. This plant species is found at only found on a handful of sites in the UK, and is classified as Vulnerable on the Vascular Plant Red Data List for Great Britain. Information on the plant assemblage at Ducklington Mead SSSI is collected annually to monitor the presences of the fritillary and other rare species the meadow holds.

#### **Wetland birds**

The abundance of freshwater habitats across the area brings in a wide variety of wetland bird species including waders, ducks and water-based raptors. Analysis of

Wetland Bird Survey (WeBS) data for the five years up to 2015/16 shows that the LWVP area is nationally important for wintering wildfowl, in particular for gadwall and shoveler <sup>(25)</sup>. A baseline ecological study of the lakes in 2005 also indicated that the area was nationally important for coot, pochard and tufted duck at the time <sup>(24)</sup>.

## **Upcoming developments in the Lower Windrush Valley**

The LWV is constantly evolving, with mineral extraction continuing and several substantial housing developments close by.

### Gill Mill

The extension to Gill Mill quarry covers approximately 100ha of land to the north of the valley and will create a range of habitats through the restoration process over the next 20 years. These will include reedbeds (61 ha), reed marshland progressing to wet woodland (27ha), lakes for recreation (40ha), meadows (22ha) and retained woodland and riparian margins (16ha). See Appendix 6 for Gill Mill Restoration Plan.

### Stonehenge Farm

Stonehenge Farm quarry, at the south of the valley, will cover an area of approximately 40ha and be restored to a mix of open water and reedbeds. See Appendix 7 for Stonehenge Farm Restoration Plan.

### Dix Pit

Dix Pit is a 54ha former quarry and airfield which is now the location of a number of waste related operations, including a landfill site, a Household Waste Recycling Centre (HWRC) and Waste Transfer Station (WTS). Long-term restoration plans have not yet been confirmed for the site, but will likely involve areas of grassland, woodland and hedgerows.

### Tar Farm Lakes

In 2020, a planning application was approved for five lakes, known as 'Tar Farm Lakes', to be used as a commercial fishery by Linear Fisheries and the installation of access tracks and other supporting infrastructure. The scheme is due to complete in summer 2021 and will likely affect biodiversity of the lakes and adjacent river corridor as they become more intensively managed.

### East Witney Strategic Development Area

The East Witney Strategic Development Area is at the pre-application planning stage, with around 450 homes planned at the northern end of the LWV.

### Cotswolds Garden Village

An outline planning application has been submitted for the development of 215ha of land north of Eynsham, 6 km from the LWV. The proposed development includes 2200 homes and will increase pressure on nearby greenspaces.

## Objectives and Opportunity Maps

### Grassland

#### **Objective 1: Creation and restoration of species-rich neutral grassland**

- Create database of current grassland management across the LWV, schemes and landowners
- Identify sites to target for restoration or creation of species-rich neutral grassland, with a focus on those that would increase connectivity
- Promote species-rich grassland restoration and creation to relevant landowners

#### **Objective 2: Connect and extend floodplain grazing marsh habitat**

- Identify potential connectivity sites and contact landowners to investigate land management practices for improvement
- Carry out ditch/watercourse maintenance to encourage inundation, and offer landowner advice

#### **Objective 3: Maintain favourable management of lowland meadow sites**

- Engage with land managers of key sites and offer support and advice to ensure appropriate management techniques are being followed

#### **Objective 4: Expand lowland meadow habitat and buffer key sites**

- Engage with landowners that surround key sites to inform about importance and evaluate their own land management practice

### **Grassland Opportunity Map**

The grassland opportunity map illustrates three opportunity areas. Lowland meadow sites in the LWV have been mapped and a lowland meadow buffer zone has been identified using field boundaries to map the adjacent fields.

There are numerous opportunities for creation and restoration of species-rich neutral grassland across the area, but this review identifies the southern end of the LWV as a priority for these activities. This is largely due to the presence of several areas of semi improved neutral grassland and floodplain grazing marsh which could benefit from expansion and connection. Improvements in this area would also support the connection between Chimney Meadows and grassland to the north, towards Eynsham and Oxford.

### Lakes

#### **Objective 1: Appropriate management of lakes to maintain and enhance biodiversity interest and water quality**

- Survey of target lakes to assess changes since 2004 ecological surveys and update recommendations for management
- Implement recommendations for management - engage fishery and leisure business and clubs to offer management advice, and if appropriate habitat management plans.

- Maintain gravel islands and shorelines to ensure appropriately managed for wading birds e.g. cutting and inundation

**Objective 2: Creation and management of habitat for key species groups e.g. stoneworts, waders and invertebrates**

- Creation or maintenance of new scrapes and shingle shorelines at suitable sites
- Creation or maintenance of bare shingle islands at suitable sites
- Reduction of over-shading at lake margins

**Lake Opportunity Map**

Lakes in the Lower Windrush Valley have been mapped using TVERC's Phase 1 habitat data and identified as either mesotrophic or eutrophic standing water. Using the LWVP's knowledge of lake use, age and condition, as well as the results of the 2004 Baseline Ecological Survey of 40 lakes, we have selected lakes to be targeted for ecological surveys and assessment. Sites were chosen to reflect a range of lake uses and ages, or because they are considered particularly valuable, due to either presence of a target species or a high species diversity.

Ponds

**Objective 1: Creation of clean water ponds and pond complexes, with varying depths and sizes of waterbodies**

- Valley wide pond creation initiative focusing on sites already identified for their suitability
- Pond creation campaign for residents and landowners
- Seek opportunities for further pond creation within new minerals extraction schemes, and housing schemes where SuDS are to be incorporated

**Objective 2: Current ponds maintained or enhanced for amphibians, invertebrates and wetland plants**

- Survey of key ponds to assess quality and inform recommendations for management
- Give landowners advice on pond management and enhancements – this may include fencing off existing ponds on agricultural sites, invasive species management or carrying out fish removal where necessary

**Objective 3: Creation of habitat for great crested newts**

- Work with great crested newt (GCN) district licencing delivery bodies such as the Newt Conservation Partnership to support creation of ponds designed for this species

**Pond Opportunity Map**

Existing ponds have been mapped using a dataset provided by Freshwater Habitats Trust, although there are likely to be additional unmapped ponds in the LWV. The pond creation opportunity areas are sites identified as suitable for pond creation by LWVP and with some level of landowner support. These are the suggested starting

point for pond creation initiatives.

The Great Crested Newt Opportunity Zones represent a 1km buffer around great crested newt records in the LWV. A 1km buffer has been used because compensation sites selected as part of district licensing are usually within 1km of existing great crested newt records.

### Reedbed

#### **Objective 1: Creation of a substantial reedbed to increase reedbed resource in LWV**

- Create at least one large (over 20ha) reedbed as part of Gill Mill Quarry restoration

#### **Objective 2: Increase reedbed habitat resource and improve the quality of existing small reedbed habitats**

- Identify any other existing small areas of reedbed habitat and assess their quality
- Ongoing management of Standlake Common reedbed
- Give advice to landowners on reedbed management, i.e., cutting and control of water levels, allowing expansion if appropriate
- Investigate creation of other small areas of reedbed for invertebrates, small mammals, birds
- Establish a reed cutting volunteer network to support landowners with management of small reedbeds

### **Reedbed Opportunity Map**

Existing reedbed and the area of reedbed planned as part of the Gill Mill quarry restoration plans have been mapped. The reedbed opportunity area extends from Stonehenge quarry to the east, where restoration plans include approximately 20ha of reedbed, and stretch across to a series of lakes in the Standlake area, including Standlake Common where there is a 1ha reedbed.

### River Corridor

#### **Objective 1: Conserve and enhance the in-channel and river corridor habitats of watercourses in the Lower Windrush Valley**

- Survey the length of the River Windrush for bank habitat classification and the presence of priority & invasive species, in order to identify targeted areas for management.
- Restoration of Queen Emma's Dyke in Witney
- Creation of kingfisher banks in strategic locations along the River Windrush
- Removal of Himalayan balsam along the watercourses

#### **Objective 2: Improve water quality of watercourses in the Lower Windrush Valley**

- Improved water quality monitoring of River Windrush, streams and ditches

- Expand the reach of the existing Yellow Fish scheme to other land and property owners in local area
- Raise awareness of water quality issues and the causes in the catchment and campaign for improvements to be made

### **Objective 3: Maintain and restore water vole populations**

- Engage with riparian landowners to improve margins for water voles by reducing habitat fragmentation, encouraging bank vegetation growth, implement buffer strips
- Maintain and extend the current level of mink monitoring and eradication on the river in collaboration with BBOWT and landowners

### **River Corridor Opportunity Map**

Rivers and streams identified in the Phase 1 mapping produced by TVERC have been mapped as well as all statutory main rivers. The water vole target watercourses have been identified using water vole data from TVERC, as well as local knowledge, and are stretches that currently have a good population of water voles, or those with occasional records that could benefit from habitat improvements.

### Hedgerows

#### **Objective: Hedgerows across the Lower Windrush Valley to be managed to achieve or maintain favourable condition**

- Survey to update hedgerow mapping and assess quality and species present
- Create materials providing advice on tree and hedgerow planting and management for landowners
- Hedgerow restoration where required with new hedge planting to fill gaps and hedgelaying
- Volunteer hedgelaying group, and promotion of group to landowners
- Encourage management cycle over 20+ years to create good structural diversity
- Promote the planting of suitable tree species to replace trees lost to ash dieback disease

### **Hedgerow Opportunity Map**

Hedgerows were not included in the Phase 1 habitat map produced by TVERC but we have mapped 2009 hedgerow information held by the LWVP.



## Projects

The following table describes projects or activities that could be delivered by landowners, environmental organisations and groups, or local authorities that will contribute towards the objectives identified in this review. It is not a comprehensive list of activities but provides examples of potential projects, their estimated costs, and potential funding sources and stakeholders.

Objective	Project or activity	Description	Benefits	Estimated cost	Anticipated funding sources	Stakeholders
Grassland O3	Maintain favourable management of lowland meadow sites	Engage with landowners and ensure appropriate management techniques are being used  Give support and advice to land managers of the key sites	Better managed lowland meadow habitats, protecting limited resource and increasing value	£1,500	S106  Grants	Landowners  LWVP  Floodplain Meadows Partnership
Lakes O1	Improved management of key gravel pit lakes	Updated management advice for lakes, creation of management plans and support with implementation. To include surveys.	Maintain high value of LWV lakes for wetland plants and invertebrates.  Maintain status as nationally important for wintering wildfowl and stoneworts	£7,500 per lake	S106  Grants	Landowners  LWVP  Freshwater Habitats Trust
Ponds O1	Pond creation initiative	Pond complexes created with ponds of varying sizes, depths and gradients.	Benefit BAP species such as great crested newt and water vole, and a wide range of other freshwater species.	£15,000	S106  Biodiversity offsetting funds  Grants	Landowners  LWVP  Freshwater Habitats Trust

<b>Objective</b>	<b>Project or activity</b>	<b>Description</b>	<b>Benefits</b>	<b>Estimated cost</b>	<b>Anticipated funding sources</b>	<b>Stakeholders</b>
Reedbed O2	Management of Standlake Common reedbed	Reedbed to be cut on rotation to slow natural succession to scrub/woodland. Removal of Willows.	Reedbed habitat maintained as succession slowed. Increased structural variation providing ideal conditions for wildlife.	£600 per annum	S106 Grants	Landowner LWVP
River Corridor O1	Restoration of Queen Emma's Dyke	Habitat improvements following effects of sewage effluent and lack of previous management  Large woody debris / opposed log deflectors; gravel	Re-establish habitat diversity in the watercourse.  Improvements for water voles  Greater aesthetic value for local residents	Unknown	S106 Biodiversity offsetting funds Grants	Witney Town Council Environment Agency Thames Water LWVP
Multiple	Volunteer monitoring network	Volunteer monitoring network established and training provided to support data collection. For example: hedgerow mapping, riverfly monitoring, reptile surveys	Volunteer and training opportunities for local residents  Increased species knowledge to inform management and enhancement activities	£1000 per annum	S106 Grants	LWVP Volunteers

## Conclusion

The Lower Windrush Valley is a biodiversity hotspot with areas of high value habitat in need of conservation, and potential for habitat creation and enhancement. This review identifies opportunities to increase biodiversity value through appropriate management, habitat restoration or creation, and recommends investment of funds in order to achieve this. This document should be considered a starting point and guide for land managers and any organisation or landowner planning biodiversity enhancement initiatives in the Lower Windrush Valley. Timescales have not been specified for the activities identified in this review as delivery is dependent on funding and landowner support.

### The LWVP's Priorities

Over the next 5 years, the LWVP's priorities for biodiversity and nature conservation will be maintaining the high-quality BAP priority habitats present in the valley, such as Lowland Meadow SSSI sites, and improved management and enhancement of gravel pit lakes. The LWVP will also seek to develop a volunteer monitoring network which will meet community engagement and education objectives as well as supporting biodiversity projects.

### Next steps

The LWVP will share this review, and promote its use as a guide and reference, with local authorities, land managers, and other groups or organisations with an interest in biodiversity or land management in the Lower Windrush Valley, such as the Windrush Catchment Partnership and Wild Oxfordshire. It will also be available to members of the public via our website.

The LWVP will continue to develop and deliver activities focusing on the opportunity areas and priorities identified in this review and will seek funding to enable delivery of schemes. However, it is expected that a collaborative approach between landowners, minerals operators, local authorities and other organisations will be required in order to meet the objectives set out.

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