Worcestershire Local Nature Recovery Strategy

Issues and Options Consultation, January 2024

CONSULTATION PAPER

Foreword

Local Nature Recovery Strategies (LNRS) offer us something new and powerful. LNRS will become the framework through which, working together, Worcestershire will make space for nature to thrive. Collaborations between residents, businesses, charities and the public and private sectors will be key in delivering projects to reverse nature's decline, at a time when nature most needs our help.

1 in 6 species are now threatened with extinction in Britain: A quarter of British mammals including our much-loved hedgehogs, dormice and water voles will face extinction in the coming years, and over half of our native flowering plants have declined since 1970. At the same time, Worcestershire can also celebrate conservation success stories: ambitious restoration of heathlands and acid grasslands, the return of flourishing Brown Hairstreak and Grayling butterfly populations, and successes for Worcestershire's new fish passes returning Twaite Shad and Salmon to the upper reaches of the River Severn. The recently launched 'Worcestershire's State of Nature' Report provides a detailed assessment of our natural environment, I encourage you to enjoy reading this to learn more about these remarkable nature recovery projects.

The links between a healthy natural environment and a healthy economy are well understood, there can be no economic prosperity without a healthy natural environment. We rely on nature to keep our air, soil and water clean, to pollinate our crops, to store carbon, and to revive our own mental and physical wellbeing through access to Worcestershire's magnificent network of natural open greenspaces.

This is now your opportunity to shape and contribute to your Local Nature Recovery Strategy. At this initial 'Issues and Options' stage consultation, we want to know what your priorities for nature's recovery are, to understand what opportunities exist local to where you are, and we want your Local Nature Recovery Strategy to recognise your commitments to help restore nature. These could be as small as a new hedgehog highway or as large as a restored floodplain meadow. Together, our contributions will help restore a thriving natural environment, and will provide a lasting legacy for Worcestershire's future generations and support a national Nature Recovery Network.

Councillor Richard Morris
Worcestershire County Council Cabinet Member with Responsibility for Environment

Acknowledgements

Worcestershire County Council is the appointed 'Responsible Authority' for the preparation of Worcestershire's LNRS. The Council is being supported by Natural England, Wyre Forest District Council, Worcester City Council, Bromsgrove District Council, Redditch Borough Council, Wychavon District Council and Malvern Hills District Council (the 'Supporting Authorities').

A project Steering Group has been established to assist with Worcestershire's LNRS preparations. Additional mapping work has been undertaken by Gloucestershire Wildlife Trust and Gloucestershire Centre for Environmental Records as part of a wider Nature Recovery Network mapping project in collaboration with Worcestershire, Herefordshire and Gloucestershire County Councils.

Contents

Executive Summary

The purpose of this document

This document is your first opportunity to give your views on the recovery of nature in Worcestershire within the framework of a Local Nature Recovery Strategy. This document will:

- Introduce the Local Nature Recovery Strategy and what it means for residents, landowners, businesses and organisations in Worcestershire.
- Introduce this Issues and Options Consultation and how responses can be submitted.
- Describe the pressures on and potential opportunities for nature recovery in Worcestershire.

What is a Local Nature Recovery Strategy?

Worcestershire's Local Nature Recovery Strategy will be a locally led plan for improving and enhancing nature and delivering wider environmental benefits across the county.

Worcestershire County Council is one of 48 Responsible Authorities (RA) across England appointed by Government under the Environment Act 2021 to prepare a Local Nature Recovery Strategy. Secondary Regulations and statutory guidance have been published to set out the RA duties and functions.

Each Local Nature Recovery Strategy (LNRS) must:

- Contain a Statement of Biodiversity Priorities with agreed local priorities for nature's recovery.
- Map the most valuable existing areas for nature in a Local Habitat Map.
- Map specific proposals or actions ('measures') for creating or improving habitat for nature and delivery of wider environmental goals.

The LNRS will not compel landowners and managers to make any changes. Instead, it will encourage and guide action through, for example, directing opportunities for funding and investment.

What is the Local Nature Recovery Strategy Issues and Options Consultation?

The first step of the process in preparing our Local Nature Recovery Strategy is to seek views via this Issues and Options Consultation. Comments received will be reviewed and will inform preparation of a full Consultation Draft Local Nature Recovery Strategy in Summer 2024.

What consultation documents are available?

This consultation has two main components:

1. **This LNRS Issues and Options paper.** This sets out:
   - Key threats and pressures facing nature.
   - Potential opportunities for local nature recovery.
   - A short questionnaire [Survey Link] to gather views on LNRS preparation.
2. **A draft Local Habitat Map.** This contains:
   - Key datasets as required by the LNRS statutory guidance.
   - A questionnaire (embedded within the map) to gather information on where opportunities for local nature recovery exist within Worcestershire.

To view the Local Habitat Map, please click **here**[1].

[1] https://gis.worcestershire.gov.uk/website/localnaturerecoverystrategy/

Several evidence base documents have been published, available on the Worcestershire County Council LNRS webpage[2], which help set out our current understanding of the state of nature in Worcestershire and what the opportunities are for nature recovery. Viewing of these documents is encouraged before responding to this Issues and Options consultation.

The pressures facing nature

We are currently in a global biodiversity crisis. This consultation paper sets out some of the evidence for the global and national declines in species and declines in the condition of our natural habitats. We have summarised the key threats to nature as:

1. **Habitat loss, fragmentation and degradation**
   The loss of natural habitat and the fragmentation of habitats into smaller and more isolated patches, often leading to a decline in condition of habitat that remains.

2. **Pollution**
   The introduction of any substance into the environment which has a harmful or poisonous effect on habitats or species. This includes chemical, sediment, air, litter, plastic, noise and light pollution.

3. **Invasive non-native species, pests and pathogens**
   Invasive non-native species, pests and pathogens known to be negatively impacting Worcestershire's biodiversity, including but not limited to American signal crayfish, American mink, New Zealand pygmy weed, Floating pennywort, Water primrose and Chalara ash dieback.

4. **Climate change**
   Predicted impacts of climate change include an increased occurrence of extreme weather events such as flooding, drought, heatwaves and storms.

Headline principles for preparation of the LNRS

This consultation paper sets out five locally determined headline principles that describe what we believe the LNRS should be seeking to achieve overall. Views are invited on these.

1. LNRS delivery should… **achieve bigger, better, more joined-up habitats for nature.**

2. LNRS delivery should… **ensure people have access to and can develop positive connections with nature.**

3. LNRS delivery should… **contribute to meeting the climate change challenge.**

4. LNRS delivery should…**support strategic targeting of land management actions and funding mechanisms.**

5. LNRS delivery should… **support stakeholders to engage and make a positive contribution to nature's recovery.**

[2] www.worcestershire.gov.uk/lnrs

Opportunities for local nature recovery

This consultation paper sets out a range of potential opportunities for nature recovery in Worcestershire. These potential opportunities are informed by the local evidence base and alignment with national conservation targets and priorities. Views are invited on the potential opportunities suggested in this paper, and views on any additional potential opportunities that should be considered for inclusion within the LNRS.

The following potential opportunities for nature recovery in Worcestershire are suggested:

1. **Protected landscapes and their settings (Worcestershire's Areas of Outstanding Natural Beauty).**
2. **Sites listed as locally important for nature conservation (Local Wildlife Sites, Local Geological Sites, Local Nature Reserves, Roadside Verge Nature Reserves).**
3. **Greener towns and villages.**
4. **Supporting pollinators.**
5. **Improving water quality and availability.**
6. **Restoration of rivers and wetland habitats in the floodplain.**
7. **Trees in the landscape.**
8. **Restoration of lowland heathland and acid grassland.**
9. **Restoration of soils and soil health.**
10. **Conservation of key species or species groups.**

Agreeing Biodiversity Priorities and delivery measures

The LNRS must set out locally agreed Biodiversity Priorities and a list of potential measures that would make a positive contribution towards delivering the agreed priorities. This consultation paper outlines the process by which a list of proposed Biodiversity Priorities and associated delivery measures will be developed, and how your views will inform this. The timescale for delivery of this first 'cycle' of LNRS priorities and measures will be 3-10 years (determined by Government).

Next steps

This Issues and Options consultation runs from **Monday 15th January to Friday 23rd February 2024**. Responses are encouraged via a short questionnaire [Survey Link].

A full Consultation Draft Local Nature Recovery Strategy will be published in Summer 2024 and views will be invited on the content of this.

The final Local Nature Recovery Strategy will be produced during Winter 2024/25 and delivery of the strategy will commence by March 2025.

The Worcestershire LNRS webpage can be found at www.worcestershire.gov.uk/lnrs.

You can contact us by email on lnrs@worcestershire.gov.uk.

1. Introduction to the Local Nature Recovery Strategy

What is a Local Nature Recovery Strategy?

Local Nature Recovery Strategies are a system of spatial planning for nature and environmental improvement. They're a legal requirement of the Environment Act (2021) whose main purpose is to identify locations to create, restore or improve habitat most likely to provide the greatest benefits for nature and the wider environment. Government's Environmental Improvement Plan confirms that 48 Local Nature Recovery Strategies across England will help to shape a national 'Nature Recovery Network'.

Government has appointed a Responsible Authority to lead the preparation of each LNRS. Worcestershire County Council is the Responsible Authority for Worcestershire, working with seven Supporting Authorities (the six District Councils and Natural England). The process will be guided by statutory and non-statutory advice published by DEFRA, and the involvement of local stakeholders in preparation and delivery of the LNRS is critical.

The LNRS will not compel landowners and managers to make any changes to land management. Instead, the LNRS will encourage and guide action for nature's recovery through, for example, directing opportunities for funding and investment.

Secondary legislation known as the Environment (Local Nature Recovery Strategies) (Procedure) Regulations were made by Government in 2023. This sets out the legal basis and procedures with which Responsible Authorities must comply when developing, consulting on, and publishing the LNRS. Local Nature Recovery Strategy statutory guidance on what the LNRS should contain has also been published.

All public authorities have a statutory duty to 'take account' of any relevant LNRS as part of the strengthened Biodiversity Duty; this includes an intention for LNRS to inform the local plan making process. Separate regulations and guidance on this will be published by DEFRA and the Department for Levelling-Up, Housing and Communities.

What should a Local Nature Recovery Strategy include?

By law, each LNRS must include a **Statement of Biodiversity Priorities** and a **Local Habitat Map**. The LNRS Regulations requires that each strategy will:

- Agree priorities for nature's recovery.
- Map the most valuable existing areas for nature.
- Map specific proposals for creating or improving habitat to benefit nature and help achieve wider environmental goals.

The preparation of the LNRS should involve people and groups from across the public, private and voluntary sectors and help them to work together. The strategy will benefit from stakeholder involvement with knowledge of local habitats, species, and existing projects and initiatives.

Learning from other Local Nature Recovery Strategies

Between August 2020 and May 2021, LNRS preparation was piloted in five areas of England. These pilots provide valuable insight into how the LNRS preparation process should be undertaken and ultimately how delivery of the strategies might be achieved.

You can read more about these Pilot LNRS at www.gov.uk/government/publications/local-nature-recovery-strategy-pilots-lessons-learned

Proposed Worcestershire LNRS mission statement

"Worcestershire's Local Nature Recovery Strategy will be a blueprint for achieving healthier, better connected natural habitats that are richer in wildlife and able to support the recovery of the county's most iconic species. The LNRS will play a key role in improving the county's resilience to climate change, and in supporting our communities to increase their understanding of and engagement with nature."

2. Introduction to this consultation

What is the Local Nature Recovery Strategy Issues and Options Consultation?

This Issues and Options consultation is a 'first conversation' with Worcestershire's residents, communities, businesses, and other organisations about the preparation of the Local Nature Recovery Strategy. It is the first stage of public consultation. This document sets out the pressures facing nature and asks for views on what the priorities are for nature's recovery across Worcestershire.

This Issues and Options consultation runs from 15th January to 23rd February 2024. Comments will then be reviewed, along with any further technical evidence and Government guidance, and a Consultation Draft Local Nature Recovery Strategy will be produced.

What is this consultation seeking to do?

This Issues and Options consultation document will:

- Summarise the key pressures on nature which threaten its recovery.
- Set out a draft mission statement for the Local Nature Recovery Strategy.
- Propose headline principles for the preparation of the Local Nature Recovery Strategy.
- Invite views on the most important local opportunities for nature recovery that the Local Nature Recovery Strategy should focus on.
- Invite views on potential locations where nature recovery measures could be delivered.
- Set out the next steps and timeline for preparation of the Local Nature Recovery Strategy.

What will the consultation not do?

This consultation will not seek to confirm sites for the delivery of nature recovery measures or to commit landowners or managers to delivering nature recovery measures. It will not set out draft policies for nature recovery.

What consultation documents are available?

This consultation has two main components:

1. This LNRS Issues and Options paper contains a summary of the key challenges and opportunities for nature's recovery. Local communities, residents and stakeholders are encouraged to submit responses to some consultation questions [Survey Link], to inform the content of the Consultation Draft Local Nature Recovery Strategy.
2. A draft Local Habitat Map contains key datasets as required by the LNRS statutory guidance and an embedded questionnaire to gather information on where opportunities for local nature recovery exist within Worcestershire.

We have also published several important evidence base documents, which set out the current understanding of the state of nature in Worcestershire and the potential opportunities for nature recovery. We encourage the review of these documents before responding to the Issues and Options consultation.

All of these resources and documents can be found on the Worcestershire LNRS webpage.

You can also contact us directly at lnrs@worcestershire.gov.uk

How do I submit consultation responses?

An LNRS Issues and Options questionnaire is available alongside this Issues and Options paper [Survey Link]. Responses to the questionnaire will inform the subsequent approach and direction of the preparation of Worcestershire's LNRS.

The draft Local Habitat Map contains embedded links to further questions to give feedback/information about potential nature recovery opportunities on specific areas of land.

Please be aware of Worcestershire County Council's GDPR and Privacy Policy notices.

Draft Local Habitat Map

Once published, the Local Habitat Map will provide a way for landowners and managers to view the nature recovery priorities in their location and what practical action could be appropriate for them to deliver. Government has confirmed that nature recovery will be incentivised via the LNRS, including use of the Local Habitat Map to inform Biodiversity Net Gain calculations on strategic significance and the scope and content of Environmental Land Management schemes[3]. Landowners and managers may want to consider how the published Local Habitat Map could support their engagement with these and other financial mechanisms.

The draft Local Habitat Map brings together different data layers within three categories:

- **Areas of Particular Importance to Biodiversity** includes national conservation sites (Special Areas of Conservation, Sites of Special Scientific Interest and National Nature Reserves) and Local Nature Reserves.

- **Other Areas of Particular Importance to Biodiversity** includes Local Wildlife Sites, Local Geological Sites, irreplaceable habitats[4], and other areas identified by Government as being of particular importance[5].

- **Areas that Could Become of Particular Importance to Biodiversity**. What appears on this layer of the map will be informed by responses to this Issues and Options consultation.

Areas that Could Become of Particular Importance to Biodiversity

The **Areas that Could Become of Particular Importance to Biodiversity** map layer currently consists of the following data:

- *Worcestershire's Priority Habitats:* Habitat data derived from the national Priority Habitat Inventory published by Natural England and the Worcestershire Habitat Inventory.

[3] https://www.gov.uk/government/publications/local-nature-recovery-strategies/local-nature-recovery-strategies

[4] These are habitats considered to be of such high conservation value, and their creation or re-creation so difficult, that they are effectively irreplaceable if lost. Government consultation on a formal list of 'irreplaceable habitats' is expected Autumn/Winter 2024. The interim list of irreplaceable habitats is: ancient woodland*; ancient and veteran trees*; blanket bog; limestone pavement; coastal sand dunes; spartina saltmarsh swards; Mediterranean saltmarsh scrub; lowland fen*.
** Found in Worcestershire.*

[5] Secretary of State will notify Responsible Authorities of any other areas of land that must be included within this mapping category.

- *Biodiversity Delivery Areas*: Landscapes selected by the Worcestershire Biodiversity Partnership as having the greatest potential to deliver Local Biodiversity Action Plan objectives.

- *B-Lines*: A national network of 'insect pathways' identified by Buglife to prioritise the restoration of wildflower-rich habitat.

Worcestershire Ecological Networks

The final version of the Local Habitat Map will also include *'Worcestershire Ecological Networks'* within the **Areas that Could Become of Particular Importance to Biodiversity**. These will be mapped networks of priority habitats and surrounding 'opportunity zones' for habitat creation, expansion and restoration.

Mapping Worcestershire's priority habitats is an important part of LNRS preparation. Local Habitat Maps are required to join up or expand existing areas of particular importance for biodiversity, and to establish "larger and more resilient networks of high-quality habitat across the landscape". Worcestershire County Council have collaborated with neighbouring Responsible Authorities to share habitat data and develop coherent ecological networks which bridge administrative boundaries.

Worcestershire's priority habitats have been grouped into four ecological networks:

- 'Open' habitats (such as grasslands and heathlands).
- Wooded habitats (such as woodlands, hedgerows and orchards).
- Wet habitats (such as rivers, ponds, fens and reedbeds).
- Arable habitats (such as conservation headlands and margins).

These four ecological networks consist of 'core' sites where the priority habitats are present and 'opportunity zones' around the core sites. The size, clustering and connectivity of core sites are key to the shape of the ecological networks. These networks are the proposed locations for where habitat creation or restoration will be targeted to make the most effective contribution to nature recovery.

Draft Local Habitat Map consultation

We are seeking views on:

- The data we should use to inform the '**Areas that Could Become of Particular Importance to Biodiversity**' map layer.
- Locations where nature recovery measures could potentially be delivered within the lifespan of the first LNRS delivery 'cycle' (expected to be 3-10 years).
- The accessibility and functionality of the draft Local Habitat Map.

For example, responses might include telling us about:

- Habitats and species that you believe should be a focus for LNRS delivery locally.
- A piece of land that you own or manage on which you might consider delivering nature recovery measures.
- A particular piece of web-based software that enables a range of users to access a map.

Access the Issues and Options Consultation questionnaire here [Survey Link].

3. The pressures on nature

Nature is in crisis. The majority of global indicators of ecosystem and biodiversity health show a rapid decline, with an unprecedented rate of change in nature's abundance within the last 50 years[6]. This is mirrored in the UK, with the 2023 State of Nature report[7] showing that 1 in 6 wildlife species are in danger of becoming extinct within Great Britain. The report highlights that many species in England have continued to decline since 1970:

- a 32% average decline in abundance across 682 terrestrial and freshwater species surveyed.
- a 22% average decrease in distribution of pollinating insect species surveyed.
- a decrease in the distribution of 64% of flowering plant species surveyed.
- 37.2% of vertebrate species are now threatened with extinction.

JNCC (the Joint Nature Conservation Committee) has concluded that the UK failed to meet 14 of 20 of the 2020 Aichi biodiversity targets[8], with species groups such as farmland and woodland birds and pollinating insects continuing to decline in relative abundance and distribution, and the prevalence of invasive non-native species continuing to increase.

Conservation groups are critical of the Government's assessment of UK delivery of the Aichi targets and have termed 2010-2020 'the lost decade' of action for nature[9].

The key pressures facing nature in the UK today are:

1. Habitat loss, fragmentation and degradation
2. Pollution
3. Invasive non-native species, pests and pathogens
4. Climate change

Evidence of the threats posed by these key pressures is set out in Appendix One.

We are seeking views on whether this list represents the most significant pressures facing nature in Worcestershire.

Access the Issues and Options Consultation questionnaire here [Survey Link].

[6] ipbes_global_assessment_report_summary_for_policymakers_en.pdf
[7] https://stateofnature.org.uk/
[8] Biodiversity in the UK: bloom or bust? (parliament.uk)
[9] a-lost-decade-for-nature-2020 (rspb.org.uk)

4. Headline principles for the preparation and delivery of the LNRS

This section sets out five headline principles that describe what we believe the LNRS should be seeking to achieve at a county level. The suggested principles align with Government's ambitions for Local Nature Recovery Strategies but have been determined locally.

Headline Principle 1:
LNRS delivery should… achieve bigger, better, more joined-up habitats for nature.

The LNRS will be the definitive spatial plan for nature's recovery in Worcestershire. It will identify local biodiversity priorities and delivery measures that will restore habitats, species and landscapes beyond a 2020 baseline. The Worcestershire LNRS will contribute to the mapping and delivery of the England-wide Nature Recovery Network, which is a key commitment in the Government's Environmental Improvement Plan.

The LNRS will champion the creation, restoration and expansion of habitats for nature in support of Government's '30-by-30' commitment, whereby 30% of land is protected for nature by 2030. The Local Habitat Map accompanying the LNRS, which will identify the best areas to target to achieve nature's recovery, will be kept up to date with the best available data.

Worcestershire's protected sites, protected landscapes and locally important sites for nature are at the core of the existing local ecological network. The LNRS will use local ecological network mapping to identify landscapes with existing close-proximity and/or functionally linked sites. These will form the basis of proposals for landscape-scale, habitat mosaic restoration. The LNRS will agree measures to improve the condition of these sites, improve physical and functional links between habitats, and enhance the ability of the ecological network to deliver wider environmental benefits at a landscape scale, with long-term gains secured.

Headline Principle 2:
LNRS delivery should… ensure people have access to and can develop positive connections with nature.

The LNRS will recognise that nature, and access to good quality green and blue spaces near to home, is essential for all of us to maintain good physical and mental health and wellbeing. Delivery of the LNRS will aim to support local communities to have better and easier access to nature-rich natural greenspace in line with Government's '15 to green' commitment, whereby everyone should live within 15 minutes' walk of a natural green or blue space.

Within urban areas good green infrastructure connections will be important in providing access to the local ecological network alongside the direct provision of nature-rich habitats. The LNRS will set out the links between nature recovery and green infrastructure and will champion the 'greening' of urban areas through outcomes such as an increase in canopy cover and a denser network of nature-rich corridors that support sustainable travel to and between accessible green and blue spaces.

Headline Principle 3:
LNRS delivery should… contribute to meeting the climate change challenge.

The LNRS will champion the use of nature-based solutions to achieve nature's recovery and provide climate resilient habitats and landscapes. Nature-based solutions use nature and the

power of healthy ecosystems to protect people, optimise infrastructure and safeguard a stable and biodiverse future.

According to the International Union for Conservation of Nature (IUCN), nature-based solutions can address climate change in three ways[10]:

- Decrease greenhouse gas emissions related to deforestation and land use.
- Capture and store carbon dioxide from the atmosphere.
- Enhance resilience of ecosystems, and as such support societies to adapt to climate hazards such as flooding, sea-level rise, and more frequent and intense droughts, floods, heatwaves, and wildfires.

The LNRS will set out how delivery of the county's biodiversity priorities can contribute to climate change resilience, through the use of nature-based solutions such as Natural Flood Management and Carbon Sequestration.

Headline Principle 4:
LNRS delivery should...support strategic targeting of land management actions and funding mechanisms.

The Local Habitat Map will provide a clear, visual map of areas that either already are or could become of particular importance for biodiversity and the natural environment, where nature recovery activity should be strategically targeted. Land in these strategically important areas may be considered preferentially for certain funding mechanisms to secure nature recovery. Key funding mechanisms for delivery of LNRS priorities and measures will be the new Environmental Land Management Schemes and Biodiversity Net Gain offsetting, but the targeting of other sources of funding, including emerging 'green markets' and 'green finance', may also be guided by the LNRS.

The LNRS will confirm how Biodiversity Net Gain can contribute to the delivery of nature recovery objectives and provide clarity for decision making on where Biodiversity Net Gain offsetting sites are located.

It is anticipated that Local Nature Recovery Strategies will inform delivery of the new Environmental Land Management schemes (ELMs). Further guidance from Defra and Natural England is expected to clarify the interaction between LNRS and ELMs.

Headline Principle 5:
LNRS delivery should... support stakeholders to engage and make a positive contribution to nature's recovery.

The LNRS needs the support of local residents, communities, businesses and other stakeholders because achieving nature's recovery will require collective, collaborative action. It is crucial that a wide range of stakeholders are engaged in LNRS preparation and delivery, and that stakeholders are able to give their active, informed consent to participating in delivery of LNRS measures.

We are seeking views on whether these headline principles are the right ones to inform production of the LNRS.

Access the Issues and Options Consultation questionnaire here [Survey Link].

[10] https://www.iucn.org/our-work/topic/nature-based-solutions-climate

5. Identifying opportunities for local nature recovery

Each LNRS must include a Statement of Biodiversity Priorities for the area. This must describe the strategy area, its biodiversity and the opportunities for nature recovery. Each LNRS must then set out agreed local priorities and measures for achieving nature recovery.

In identifying opportunities for nature recovery, Responsible Authorities should:

- Identify the existing or potential habitats considered to be either locally or nationally important and the practicality of improving existing areas' condition or creating new areas of these habitats.

- Identify the existing or potential species (or groups of species) in the area that the strategy could make a particular contribution to enhancing or recovering and assess the practicality of creating or enhancing habitats to support this.

- Additionally, local partners in the LNRS process should be able to suggest additional habitats and species that they consider important.

Government also expects LNRS to contribute to national environmental objectives, including those within the Environmental Improvement Plan (EIP)[11]. The preparation process for Worcestershire's LNRS should aim to map areas and agree measures where the recovery or enhancement of nature, including the use of 'nature-based' solutions, will contribute to wider environmental benefits and national nature recovery priorities.

Examples of wider national environmental objectives that Government suggest each LNRS should seek to contribute to are:

- Mitigating climate change (for example, through planting trees)

- Improving the water environment (for example, through creating wetlands)

- Mitigating flood risk (for example, through restoring degraded peat)

The EIP has a primary goal of halting the ongoing decline in biodiversity and ensuring thriving plants and wildlife, through the creation, restoration and protection of habitats. Headline targets and commitments within the EIP, to which local nature recovery measures should seek to contribute, include:

- The protection of 30% of our land area and oceans by 2030 (known as '30-by-30').

- Species abundance increased by at least 10% by 2042.

- The creation or restoration of 140,000ha of wildlife-rich habitats outside of protected sites by 2028, rising to 500,000ha created or restored by 2042.

[11] https://www.gov.uk/government/publications/environmental-improvement-plan

- Tree canopy and woodland cover increased to a national average of 16.5% by 2050.
- Reduce nitrogen, phosphorus and sediment pollution from agriculture into the water environment by 10% by 2028, and by at least 40% by 2038.
- Restore 75% of water bodies to good ecological status.
- Everyone should live within 15 minutes' walk of a green or blue space (known as '15-to-green').

Responsible Authorities should use EIP goals and targets to guide the scope of the LNRS and align its priorities with national objectives where possible. Support for LNRS priorities should be sought from across the public, private and voluntary sectors. Potential biodiversity priorities and delivery measures may also be suggested by local stakeholders or identified by sifting published documents and contributions from local partners.

Identifying potential opportunities for local nature recovery in Worcestershire

The underpinning local evidence base for identifying potential nature recovery opportunities and priorities for Worcestershire includes:

- Worcestershire Biodiversity Action Plan (2018-27)
- Worcestershire State of Nature Report (2023)
- The State of Worcestershire's Grasslands report (2023)
- Assessment of floodplain meadows in Worcestershire and their potential to store soil carbon (2023)
- Worcestershire Habitat Inventory (2021)

Set out below are suggested potential opportunities for nature recovery in Worcestershire. These suggestions are informed by the local evidence base, alignment with national priorities, and whether associated LNRS measures might reasonably be expected to make a contribution to delivery of national nature recovery goals and targets, or other local plans or strategies. It is important to note that the LNRS itself will not be a direct funding mechanism for the delivery of these nature recovery opportunities, but will be used to prioritise and inform where existing, new or future external sources of funding for nature recovery are targeted.

We are seeking support for the list of potential opportunities suggested here, and views on any additional potential opportunities that you believe should be considered for inclusion within the LNRS.

Access the Issues and Options Consultation questionnaire here [Survey Link].

Potential opportunity for nature recovery	This is suggested because...
Protected landscapes and their settings. The LNRS could seek to: • Support delivery of the Nature Recovery Plans published by the Malvern Hills National Landscape and the Cotswolds National Landscape.	It could contribute to delivery of the following Environmental Improvement Plan target: • Restore or create 140,000ha of wildlife-rich habitats by 2028, and 500,000ha by 2042 LNRS delivery measures could target priority habitats and species of particular nature conservation importance for Worcestershire that occur within the National Landscapes, including some species that are of UK or European conservation significance such as the dormouse, adder, white-clawed crayfish, grayling butterfly, high brown fritillary butterfly and violet click beetle.
Sites designated or listed as important for nature conservation. The LNRS could seek to: • Contribute to the improvement in condition of nationally designated sites. • Improve the management and condition of Local Wildlife Sites, Local Geological Sites, Local Nature Reserves and Roadside Verge Nature Reserves.	It could contribute to delivery of the following Environmental Improvement Plan target: • Restore or create 140,000ha of wildlife-rich habitats by 2028, and 500,000ha by 2042 It is a priority for the Worcestershire Local Sites Partnership. It provides an opportunity to progress the next steps recommended in the 'State of Worcestershire's Grasslands' report. LNRS delivery measures could target priority habitats and species of particular nature conservation importance for Worcestershire, for example ancient woodlands, grasslands, floodplain meadows and traditional orchards.
Greener towns and villages The LNRS could seek to: • Make our towns and cities greener places. • Improve public access to green spaces. • Improve links between town and countryside for people and wildlife by restoring habitat connectivity.	It could contribute to the wider national environmental objective of mitigating climate change. It could contribute to delivery of the following Environmental Improvement Plan targets: • Everyone should live within 15 minutes' walk of a green or blue space. • Achieving net zero carbon emissions by 2050. It could contribute to delivery of relevant actions within the Worcestershire Green Infrastructure Strategy. It could contribute to delivery of relevant actions within the Worcestershire Health and Wellbeing Strategy. LNRS delivery measures could target priority habitats and species of particular nature conservation importance for Worcestershire, for example woodland, grassland, traditional orchards, canals and road verges.
Supporting pollinators The LNRS could seek to: • Deliver the creation and restoration of habitat and habitat networks for the benefit of pollinating insects.	It could contribute to delivery of the following Environmental Improvement Plan targets: • Restore or create 140,000ha of wildlife-rich habitats by 2028, and 500,000ha by 2042 • Species abundance increased by at least 10% by 2042 It supports Worcestershire County Council's 2015 commitment to make Worcestershire a Pollinator Friendly County. It provides an opportunity to progress the next steps recommended in the 'State of Worcestershire's Grasslands' report.

• Encourage alternative land management approaches to the use of pesticides. • Identify dark skies/dark corridor networks with the aim of reducing or eliminating pollution from Artificial-Light-At-Night.	It could support delivery of Buglife's B-Lines national network, which prioritises the restoration of wildflower-rich habitat. LNRS delivery measures could target priority habitats and species of particular nature conservation importance for Worcestershire, for example grasslands, traditional orchards, scrub.
Improving water quality and availability The LNRS could seek to: • Reduce the impact of pollution on rivers and streams and improve their ecological condition. • Contribute to the management of water quantity and availability to benefit nature and reduce flood risk.	It could contribute to the wider national environmental objective of improving the water environment. It could contribute to the wider national environmental objective of mitigating flood risk. It could contribute to delivery of Water Framework Directive targets. It could contribute to delivery of the following Environmental Improvement Plan targets: • Reduce nitrogen, phosphorus and sediment pollution from agriculture into the water environment by 10% by 2028, and by at least 40% by 2038. • Restore 75% of water bodies to good ecological status. • Restore or create 140,000ha of wildlife-rich habitats by 2028, and 500,000ha by 2042. It could contribute to delivery of relevant actions within the Local Flood Risk Management Strategy. It provides an opportunity for continuation and expansion of Worcestershire's ongoing Natural Flood Management programme. LNRS delivery measures could target priority habitats and species of particular nature conservation importance for Worcestershire, for example rivers and streams, canals, ponds and lakes, fen, marsh and swamp.
Restoration of rivers and wetland habitats The LNRS could seek to: • Improve or restore natural floodplain function and ecosystem services. • Promote carbon sequestration and storage. • Use Nature Based Solutions to deliver wider environmental benefits.	It could contribute to the wider national environmental objective of mitigating climate change. It could contribute to the wider national environmental objective of improving the water environment. It could contribute to the wider national environmental objective of mitigating flood risk. It could contribute to delivery of the following Environmental Improvement Plan targets: • Restore or create 140,000ha of wildlife-rich habitats by 2028, and 500,000ha by 2042. • Reduce nitrogen, phosphorus and sediment pollution from agriculture into the water environment by 10% by 2028, and by at least 40% by 2038. • Achieving net zero carbon emissions by 2050. • Double the number of projects which include Nature Based Solutions to reduce flooding. It could contribute to delivery of relevant actions within the Local Flood Risk Management Strategy.

	It provides an opportunity to progress the next steps recommended in Worcestershire's soil carbon assessment report. It provides an opportunity for continuation and expansion of Worcestershire's ongoing Natural Flood Management programme. It could begin to address the huge historical and ongoing losses of wetland habitat within Worcestershire highlighted in the State of Nature report. LNRS delivery measures could target priority habitats and species of particular nature conservation importance for Worcestershire, for example wet grassland, wet woodland, ponds and lakes, reedbed, fen, marsh and swamp.
Trees in the landscape The LNRS could seek to: • Restore, enhance, connect and buffer habitat networks. • Establish new trees, hedgerows, woodlands, orchards and wood pasture and parkland. • Increase the active, sustainable management of existing trees, hedgerows, woodlands, orchards, and wood pasture and parkland. • Improve the ecological condition of existing trees, hedgerows, woodlands, orchards, ancient and veteran trees, wood pasture and parkland.	It could contribute to the wider national environmental objective of mitigating climate change. It could contribute to the wider national environmental objective of mitigating flood risk. It could contribute to delivery of the following Environmental Improvement Plan targets: • Increasing tree canopy and woodland cover to 16.5% of total UK land area by 2050. • Restore or create 140,000ha of wildlife-rich habitats by 2028, and 500,000ha by 2042. • Halt and reverse forest loss and land degradation globally by 2030. • Achieving net zero carbon emissions by 2050. It could contribute to delivery of the England Trees Action Plan. It could contribute to delivery of Keepers of time: ancient and native woodland and trees policy in England. It could contribute to delivery of relevant actions within the Worcestershire Green Infrastructure Strategy. It provides an opportunity for the continuation and expansion of current projects (e.g. Severn Treescapes) and the continued management of the nation's forests (e.g. the Wyre Forest). LNRS delivery measures could target priority habitats and species of particular nature conservation importance for Worcestershire, for example woodland, ancient and veteran trees, wood pasture and parkland, hedgerows, traditional orchards, scrub, black poplar, true service tree.
Restoration of lowland heathland and acid grassland The LNRS could seek to:	It could contribute to delivery of the following Environmental Improvement Plan targets: • Restore or create 140,000ha of wildlife-rich habitats by 2028, and 500,000ha by 2042. • Achieving net zero carbon emissions by 2050. It provides an opportunity for the continuation and expansion of current projects e.g. Dropping Well Farm and Burlish Meadows restoration projects.

• Restore, enhance and buffer existing habitat networks. • Create or restore new areas of habitat.	LNRS delivery measures could target priority habitats and species of particular nature conservation importance for Worcestershire, for example acid grassland, lowland heathland, scrub, adder, common lizard.
Restoration of soils and soil health The LNRS could seek to: • Promote nature-friendly farming practices to improve soil management and restore soil health. • Support the protection of soils to reduce soil loss and reduce sediment and nutrient pollution in watercourses. • Restore soils to deliver carbon capture and sequestration.	It could contribute to the wider national environmental objective of mitigating climate change. It could contribute to delivery of the following Environmental Improvement Plan targets: • Bring at least 40% of England's agricultural soil into sustainable management by 2028, and 60% by 2030. • Achieving net zero carbon emissions by 2050. LNRS delivery measures could target priority habitats and species of particular nature conservation importance for Worcestershire, for example wildlife-supporting features on arable farmland, hedgerows and grassland.
Conservation of key species and species groups The LNRS could seek to deliver measures to benefit particular species or groups of species which are of high nature conservation priority in Worcestershire. Potential opportunities are listed here.	• Farmland and wetland bird species, for example skylark, tree sparrow, corn bunting, lapwing, grey partridge, yellowhammer, barn owl, linnet, reed bunting, curlew, yellow wagtail, turtle dove. • Saproxylic insects for which Worcestershire has nationally notable populations or sites, for example noble chafer beetle, violet click beetle and stag beetle. • Mammals, for example otter, dormouse, water vole, bats, hedgehog. • Species whose numbers or distribution are particularly threatened by invasive non-natives, pests or pathogens, for example ash, oak, elm, white-clawed crayfish. • Wildlife in the urban environment, for example slow worm, hedgehog, bats, peregrine falcon, swift, garden birds, and pond species such as common frog, great crested newt and dragonfly and damselfly species. • Woodland and hedgerow butterflies, for example wood white, brown hairstreak, pearl-bordered fritillary. • Migratory fish in the Rivers Severn, Teme, Avon and Stour and their tributaries, for example Atlantic salmon, twaite shad, lamprey and European eel.

6. Agreeing Biodiversity Priorities for Worcestershire

The LNRS must set out agreed Biodiversity Priorities for nature recovery and identify actions or 'measures' that would make a positive contribution towards delivering the agreed priorities.

Government will require Responsible Authorities to review the LNRS every 3-10 years, with the exact date of review commencement decided by the Secretary of State. For this first LNRS delivery 'cycle' the focus will therefore be on setting Biodiversity Priorities and measures that can be delivered within this 3–10-year timescale, whilst acknowledging that some habitats and species will require a longer timescale to achieve good condition or healthy and thriving populations.

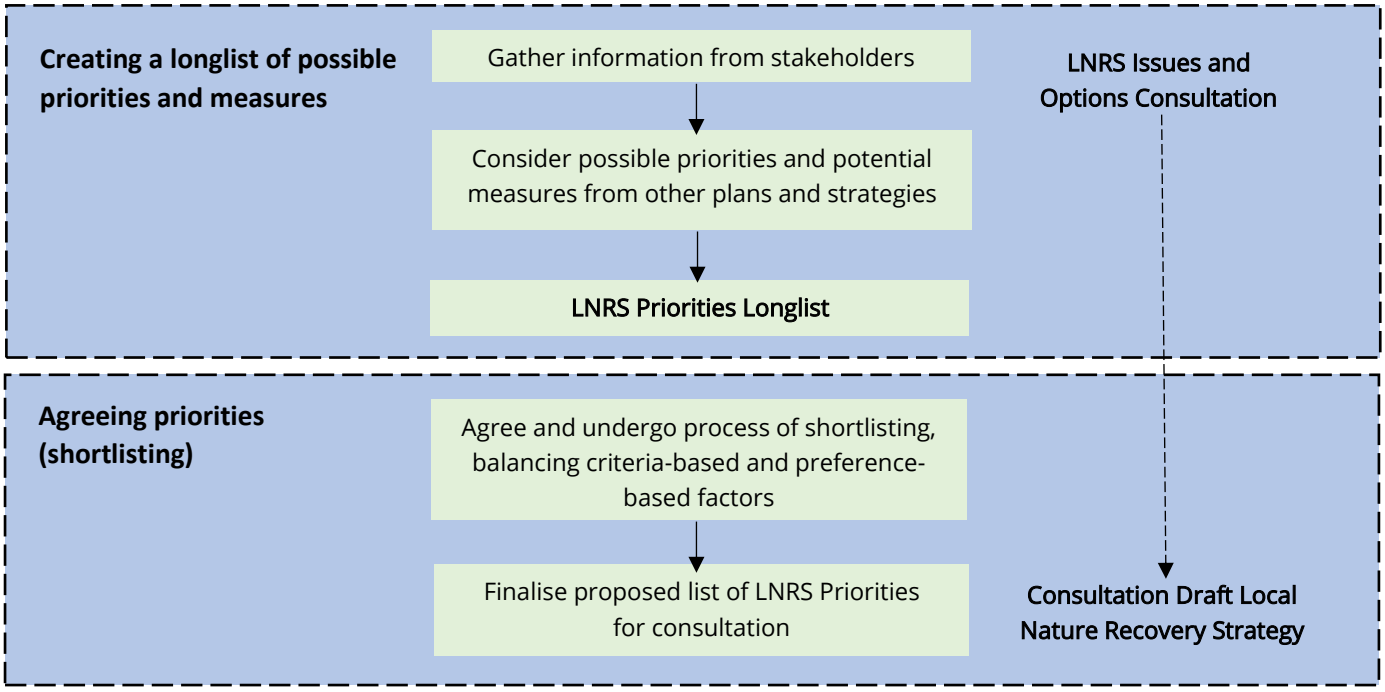
How will the Biodiversity Priorities be selected?

A key output of this Issues and Options consultation will be a longlist of potential opportunities for nature recovery in Worcestershire. The list will comprise the opportunities suggested in Section 5 above plus other opportunities put forward by those responding to the consultation.

The Responsible Authority, working with the Supporting Authorities and local habitat and species experts who comprise the LNRS steering group, will develop a framework of criteria to score these opportunities and select a final list of proposed Biodiversity Priorities for Worcestershire. This process will also be informed by any further statutory guidance published by Government.

The criteria used, detail of how they were applied, and the proposed list of Biodiversity Priorities will then be published in the Consultation Draft Local Nature Recovery Strategy for public consultation. The Consultation Draft LNRS will also set out potential delivery measures for each of the proposed Biodiversity Priorities.

Process for agreeing priorities and identifying potential measures within the LNRS:



Criteria for the selection of proposed Biodiversity Priorities may include:

- The national and local conservation status of habitats, species and sites.
- Alignment with the delivery of national nature recovery goals and targets.
- The existence of a local 'champion' – individual or organisation – to lead delivery of nature recovery measures.
- The urgency with which nature recovery measures **need** to be delivered.
- The timescale over which nature recovery measures **can** be delivered.
- The potential availability of funding.
- The availability of land on which to deliver required nature recovery measures.

We are seeking support for the process of selecting a list of proposed Biodiversity Priorities, and views on the criteria that should be used in the selection process.

Access the Issues and Options Consultation questionnaire here [Survey Link].

7. Next steps

Timeframe for LNRS preparation

This Issues and Options consultation runs from Monday 15th January to Friday 23rd February 2024.

A full Consultation Draft Local Nature Recovery Strategy will be published in Summer 2024 and views will be invited on the content of this.

The final Local Nature Recovery Strategy will be produced during Winter 2024/25 and delivery of the strategy will commence by March 2025.

Responsible Authorities must review and republish their Local Nature Recovery Strategies as part of an ongoing cycle, the timescale for which will be determined by the Secretary of State. This will be every 3-10 years.

Participating in the consultation

Responses to this Issues and Options consultation are encouraged via a short questionnaire [Survey Link].

The Worcestershire LNRS webpage can be found at www.worcestershire.gov.uk/lnrs. This will contain:

- Any consultation documents associated with this and future revisions of the LNRS.
- Information about how to get involved in the preparation, review or delivery of the Worcestershire LNRS, depending on which stage the LNRS cycle is at.
- New documents, or signposts to documents, that contribute to our local evidence base.
- A link to the latest version of the Local Habitat Map and information on how to use this.
- Reports on progress towards achieving the measures set within the LNRS.

You can contact us by email on lnrs@worcestershire.gov.uk.

What else do you need to know before responding to this consultation?

Please note the following:

- Any information submitted in response to this consultation will be in the public domain and may be published. The County Council will assess consultation responses and will redact (blank out) any 'personal data' and 'special category data' from any published documentation. Site boundaries drawn and submitted in response to the questionnaires embedded within the draft Local Habitat Map will not be published at this stage of LNRS development.

- Your consultation response will not commit you, the County Council, our partners or other stakeholders to undertake a particular activity at a particular location.

- Any maps presented within the Local Habitat Map should be treated as 'draft' and consequent care taken with their interpretation.

- Any reference to 'opportunity areas' or 'target areas' outlines general principles to be applied rather than any finalised LNRS product. Habitat creation or restoration

opportunity zones in the draft LHM are not exclusive to a specific type of habitat. They indicate which type of nature recovery activity would have the greatest beneficial impact.

- Consultees located either inside or outside of the mapped opportunity areas are encouraged to provide us with your thoughts on our approach to developing these maps, the selection of underpinning data and their legibility.

- These mapped opportunity zones and ecological networks may change in time as we gather and analyse new environmental data. Your contributions through this consultation are an important part of this process.

- LNRS preparation will be further informed by additional Government guidance published over the next 12 months.

APPENDIX ONE: The Pressures on Nature

Habitat loss, fragmentation and degradation

The loss and fragmentation of natural habitat into smaller and more isolated patches presents an existential threat to the UK's wildlife. A recent report on the extent of global biodiversity loss ranks the UK 12th from the bottom out of 240 global countries and territories for 'biodiversity intactness', a measure of how nature is faring under pressures exerted from human-driven land use change. England fares even worse: the country has a 47% Biodiversity Intactness Index score, ranking us 7th from the bottom[12].

By far the greatest land area in the UK is given to agricultural production. In 2019 enclosed farmland covered 12,694,693ha or 52% of total land cover, whilst unenclosed farmland, for example upland grazing areas, covered a further 20% of the UK. During the same period the extent of urban development in the UK increased by 30%, from 1,418,964ha to 1,843,901ha (7% of UK land cover)[13].

The scale of ongoing loss of natural habitats in the UK should not be underestimated, for example:

- Wetland drainage to convert land to agricultural use began during Roman times, accelerated through the 17th-19th centuries with technological innovations, and peaked in the post-war 1970s, when around 1 million ha of land was drained during that decade alone. More recently, over 1,000 ha of wetland was lost to development between 2006-2012[14].
- Up to 90% of lowland ponds in the UK were lost in the 20th century to neglect, development or in-filling[15].
- 97% of the UK's species-rich grasslands have been lost since the 1930s, estimated at 7.5 million acres[16]. A study looking at land cover gains and losses in Great Britain between 1990-2015 found that 2,505km^2 of grassland was lost to urban development during this period[17].
- The post-war drive for food security saw large-scale hedgerow removal across the UK, as subsidies were given to intensify agricultural production. An estimated 500,000km of hedges were destroyed prior to the enactment of the 1997 Hedgerow Regulations[18].
- 15% of homeowners have replaced part or all of their garden with hard, impermeable surfaces to provide parking, and 10% have replaced some of their garden's lawn with artificial grass[19].
- 324ha of woodland was lost in 2021, mainly to development[20].

As natural habitat is lost and replaced by other land uses, the remaining patches become more fragmented and isolated. Habitats may become surrounded by land uses that are hostile to wildlife, or habitat patches may be cut off from one another by physical barriers such as roads or

[12] 48398rspb-biodivesity-intactness-index-summary-report-v4.pdf
[13] Habitat extent and condition, natural capital, UK - Office for National Statistics (ons.gov.uk)
[14] https://nbn.org.uk/wp-content/uploads/2019/09/State-of-Nature-2019-UK-full-report.pdf
[15] https://nbn.org.uk/wp-content/uploads/2019/09/State-of-Nature-2019-UK-full-report.pdf
[16] Importance of Meadows | Magnificent Meadows
[17] Almost 2 million acres of GB grassland lost as woodland and urban areas expand | UK Centre for Ecology & Hydrology (ceh.ac.uk)
[18] A history of hedgerows - People's Trust for Endangered Species (ptes.org)
[19] Gardens being uprooted in favour of driveways and artificial grass - Aviva (avivab2b.co.uk)
[20] Forestry-Commission-Key-Performance-Indicators-Report-2022-23.pdf (publishing.service.gov.uk)

through the impact of diffuse pollution including noise and light. Fragmentation often leads to a reduction in the quality of the remaining habitat as management is altered or neglected. Habitat loss already means that wildlife has less space overall in which to survive, but species that are now unable to disperse through the altered landscape become more vulnerable to disease, loss of genetic diversity and to localised extinction.

Another serious consequence of habitat loss and fragmentation is a loss of ecosystem function. Habitats are not just places for wildlife to live, in their natural state they are also complex and dynamic systems that may be functionally linked at different scales. Key ecosystem processes include solar energy flow, carbon cycling, mineral cycling and water cycling[21]. As habitats are lost or degraded the connections within these systems can suffer the same fate, with consequences for human society as well as wildlife. For example, the historic draining of wetlands, continued built development in the floodplain, and the canalisation of rivers and streams has resulted in habitats which can soak up and store floodwater being lost or becoming fragmented within their historic floodplain. The result is a wetland ecosystem that is prevented from functioning naturally, increasing both the risk of flooding and the potential severity of flood impacts for local communities.

Pollution

The introduction of any substance into the environment which has a harmful or poisonous effect can be termed a pollutant. There are now few places on Earth where human-origin pollutants cannot be found or do not impact the wildlife and habitats in that location[22].

Chemical and sediment pollution

Contamination from chemicals and sediments significantly impacts the ecological health of the UK's freshwater habitats in particular, but terrestrial habitats are also affected. Only 14% of English rivers are currently meeting good ecological status[23].

The main sources of chemical and sediment pollution entering our rivers and streams are:

- Agriculture and rural land management: the cause of 40% of water-borne pollution, largely as diffuse pollution arising via run-off from farmland.
- The water industry: wastewater discharges and sewer overflows contribute 35% of the pollution entering rivers and streams.
- Domestic sources and transport infrastructure: 18% of water-borne pollution comes from these sources, including fats and oils poured down sinks, wet wipes flushed down toilets, and brake and tyre particulates washed from the surfaces of roads[24], [25].

[21] UK NEA (unep-wcmc.org)
[22] Chemical pollution has passed safe limit for humanity, say scientists | Pollution | The Guardian
[23] https://committees.parliament.uk/committee/62/environmental-audit-committee/news/160246/chemical-cocktail-of-sewage-slurry-and-plastic-polluting-english-rivers-puts-public-health-and-nature-at-risk/
[24] https://www.gov.uk/government/publications/water-and-sewerage-companies-in-england-environmental-performance-report-2020/water-and-sewerage-companies-in-england-environmental-performance-report-for-2020
[25] https://committees.parliament.uk/publications/8460/documents/88412/default/

Fertiliser and pesticide run-off, wastewater and sewage all significantly impact the health of the UK's freshwaters. Raised nitrogen and phosphorus levels within rivers and streams cause algal blooms that shade out sunlight and reduce available oxygen levels for plants, fish and invertebrates. Pesticides can directly kill aquatic life or lead to physiological or behavioural disruption[26].

The rate of soil erosion by water from farmland in the UK is estimated to be between 0.1-0.3 tonnes per hectare per year[27]. The resulting increase in sediment within watercourses leads to a loss of fish spawning sites as silt is deposited and a reduction in sunlight, affecting plant growth. The extent of sewage discharges into the UK's inland waterbodies and the sea is the subject of current Ofwat[28] and Environment Agency[29] investigations. In 2022 raw sewage was released into the UK's rivers and seas an average of 825 times a day[30], with several water companies seeming to be in breach of their legal permits[31]. The impact of these events on wildlife is evidenced by the death of over 1,400 fish during a single incident[32].

Air pollution

Air pollution is a major environmental issue affecting biodiversity and ecosystem services, human health, and contributing to climate change[33].

The five most damaging emissions[34] (pollutants released into the air) are categorised as:

- Particulate matter, including smoke from industrial and domestic sources and dust from exhausts.
- Ammonia, mostly released from agricultural sources such as fertilisers, manure and slurry.
- Nitrogen oxide, from exhaust emissions, energy generation and industrial combustion.
- Sulphur dioxide, from energy generation, industrial combustion and domestic burning.
- Non-methane volatile organic compounds, mostly from industrial emissions and agriculture.

Acidification[35] or eutrophication[36] of habitats are the two main impacts of the deposition of these pollutants. The latest report for the UK Biodiversity Indicator on air pollution shows that in 2019 67.7% of the area of sensitive habitats in the UK exceeded critical loads for nitrogen deposition[37], a pollutant from which habitats such as grassland are particularly sensitive to damage. This was an improvement from 2010 data (74.4%). A detailed breakdown of trends in 'critical loads' of

[26] https://cdn.buglife.org.uk/2022/08/Chemical-Pollution-The-Silent-Killer-of-UK-Rivers-2022.pdf
[27] https://www.parliament.uk/globalassets/documents/post/postpn265.pdf
[28] https://www.ofwat.gov.uk/investigation-into-sewage-treatment-works/
[29] https://www.gov.uk/government/collections/environment-agency-investigation-into-sewage-treatment-works
[30] https://www.bbc.co.uk/news/explainers-62631320
[31] https://www.bbc.co.uk/news/science-environment-66670132
[32] https://www.bbc.co.uk/news/uk-england-sussex-66097906
[33] https://data.jncc.gov.uk/data/4514c266-d156-41ca-86ef-1efb58eb9ceb/jncc-air-pollution-bulletin-10-2021.pdf
[34] https://www.gov.uk/government/publications/air-quality-explaining-air-pollution
[35] Where pH decreases over time.
[36] Where nitrogen levels increase over time.
[37] https://jncc.gov.uk/our-work/ukbi-b5a-air-pollution/

atmospheric emissions onto sensitive habitats and the UK's protected site network was published by Rowe *et al*, 2022[38]. The UK Air Pollution Information System provides a database of information on specific pollutants and their impacts on individual habitats, ecosystems and species[39].

Litter and plastic pollution

Litter in the environment can directly harm wildlife through being ingested, causing external injury or through trapping or entanglement. The impact of the accumulation of plastics, in particular microplastics (fragments smaller than 5mm), within ecosystems is a significant concern and the subject of current research[40]. Microplastics have now been found in Arctic and Antarctic waters and at the bottom of the deepest parts of the ocean[41]. Studies have shown the presence of microplastics in UK freshwater environments[42], with poor management of untreated wastewater a primary cause[43], and that these microplastic deposits are washed from inland freshwater systems into the seas during severe flooding[44]. The major sources of microplastics in the environment are synthetic fibres arising from washing machine wastewater, degraded packaging products, and road-marking paints[45].

Microplastics are ingested by a range of organisms across the food chain. Studies have found plastic present in the guts of 50% of freshwater invertebrates sampled in South Wales[46], that they are being widely ingested by a range of marine mammal species in British waters[47], and that microplastics are present in the droppings of small mammals such as wood mice and field voles[48]. Microplastics are present in the food that we eat: surveys in Norwegian waters and in the English Channel found 83% of lobsters and 36.5% of trawled fish had plastic fibres within their bodies[49].

Discarded fishing gear also impacts on marine environments, injuring wildlife and contributing to the ubiquitousness of microplastics in the oceans[50]. A recent global study found that enough nets were lost or discarded into the seas each year to cover Scotland[51], and discarded nets, lines and ropes are estimated to make up 46% of the Great Pacific Garbage Patch[52], a collection of floating debris that spans 600,000 square miles and contains an estimated 1.8 trillion shards of plastic[53].

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[38] https://uk-air.defra.gov.uk/library/reports?report_id=1087
[39] https://www.apis.ac.uk/
[40] https://www.meri.manchester.ac.uk/research/expertise/plastics/
[41] https://www.bas.ac.uk/project/impact-of-plastic-in-the-polar-regions/
[42] https://www.sciencedirect.com/science/article/abs/pii/S0025326X16307251
[43] https://www.manchester.ac.uk/discover/news/microplastic-pollution-in-uks-rivers/
[44] https://www.nature.com/articles/s41561-018-0080-1
[45] https://www.ceh.ac.uk/sites/default/files/Microplastics%20factsheet%20310120.pdf
[46] https://www.cardiff.ac.uk/news/view/1301891-plastics-found-in-fifty-percent-of-freshwater-insects
[47] https://www.theguardian.com/environment/2019/jan/31/microplastics-found-every-marine-mammal-uk-study
[48] https://www.sciencedirect.com/science/article/abs/pii/S0048969722037767
[49] https://committees.parliament.uk/writtenevidence/66841/pdf/
[50] https://www.msc.org/what-we-are-doing/preventing-lost-gear-and-ghost-fishing
[51] https://www.theguardian.com/environment/2022/oct/16/new-study-reveals-staggering-scale-of-lost-fishing-gear-drifting-in-earths-oceans
[52] https://www.worldwildlife.org/stories/ghost-fishing-gear
[53] https://www.newyorker.com/magazine/2023/07/03/book-reviews-plastic-waste

The UK Government is due to introduce further measures to tackle plastic pollution, as part of a global coalition aiming to end plastic pollution by 2040[54].

Noise pollution

The most common reaction of wildlife to anthropogenic noise is avoidance behaviour, observed in a wide variety of species[55, 56]. A recent two-year study into the effect of road noise on bat activity found that foraging and feeding was reduced by approximately two thirds for a distance of up to 20m away from the source of the noise[57]. The researchers concluded that this was due to direct avoidance behaviour by the bats, rather than a disruption of echolocation calls.

Other impacts include noise-induced permanent injury (recorded in both marine[58, 59] and freshwater species) and a reduction in the ability to detect predators. Living in noisy environments can also result in altered stress hormone levels and increased stress-responsiveness, which negatively affects body condition and breeding success. A paper published by the UK Civil Aviation Authority summarises the findings of a number of studies which researched the impacts of noise on wildlife (predominantly birds) close to roads and airports[60]. Increased aggression, interference in defence of territories, altered song frequencies and lower reproductive success are some of the impacts noted by the various studies.

Light pollution

Excessive or badly designed artificial lighting may result in light pollution, where light intrudes into places it is not needed or wanted. Some impacts of light pollution are felt on a landscape scale, such as when the glow emitted from towns or major highways lights up the night sky and denies us the experience of true darkness or starlight[61], something that most people in the UK have in common with 99% of the US and European population[62].

Artificial light at night significantly alters the natural environment for wildlife and has been shown to disrupt and alter migration patterns, change feeding behaviour, and interfere with reproductive success[63, 64]. A report on the impacts of artificial light on invertebrates highlights death or injury through contact with hot surfaces, increased predation levels, and disturbance to navigation as just some of the impacts[65]. Light pollution even affects pollination: two thirds of the UK's insect species are active at night and research has shown that nocturnal pollinator visits

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[54] https://www.gov.uk/government/news/uk-strengthens-pledge-to-end-plastic-pollution-by-2040
[55] https://www.countryfile.com/news/noise-pollution-found-to-threaten-the-survival-of-many-species/
[56] https://research.bangor.ac.uk/portal/files/57132207/fevo_11_1130075.pdf
[57] https://www.vwt.org.uk/blog/the-impact-of-traffic-noise-on-bat-activity/
[58] https://www.nhm.ac.uk/discover/news/2022/july/underwater-noise-pollution-risking-lives-whales-dolphins.html
[59] https://education.nationalgeographic.org/resource/noise-pollution/
[60] https://publicapps.caa.co.uk/docs/33/The%20Effects%20of%20Aircraft%20Noise%20on%20Biodiversity%20CAP2517.pdf
[61] https://www.cpre.org.uk/explainer/why-were-working-to-restore-night-skies/
[62] https://www.science.org/doi/10.1126/sciadv.1600377
[63] https://www.nature.com/articles/s41559-020-01322-x
[64] https://www.cms.int/en/news/new-guide-helps-cities-curb-light-pollution-impacts-wildlife
[65] https://cdn.buglife.org.uk/2019/08/A-Review-of-the-Impact-of-Artificial-Light-on-Invertebrates-docx_0.pdf

to flowers declines by 62% in some light-polluted areas[66]. The impacts of artificial lighting on bats include the desertion of roosts or alterations to the timing of emergence to feed, disruption or severance of flight paths and reduction in foraging efficiency[67].

Invasive non-native species, pests, and pathogens

Non-native species are considered invasive when they begin to exert detrimental impacts on native wildlife through the spread of disease, competition for resources, or by direct consumption, parasitism or hybridisation. Of the 3,248 non-native species recorded in Great Britain, 194 are considered to be having a negative or strongly negative effect on native biodiversity[68]. The number of invasive non-native species with established (breeding) populations in 10% or more of the territory of Great Britain increased in all ecological zones between 1960 and 2020 (by 120% in terrestrial environments, 250% in freshwater environments and by 1,350% in marine environments[69]). Between 10-12 new non-native species are estimated to become established each year. Government strategy sets out the UK's approach for dealing with invasive non-natives[70].

Some of the invasive non-natives known to be negatively impacting Worcestershire's biodiversity include:

- American mink: major predator and cause of the decimation of water vole populations.
- Signal crayfish: competes for habitat and resources with, and transmits crayfish plague to, the native white-clawed crayfish.
- Himalayan balsam: dominates and destabilises riverbanks, a major cause of soil erosion and water quality deterioration.
- American skunk-cabbage: dominates wetland environments to the exclusion of native plants.
- New Zealand pygmyweed: forms dense mats on the water surface, shading out other aquatic species and depleting oxygen in the water.

Plant pests and pathogens include insects and other invertebrates, bacteria, fungi and viruses which feed on and/or cause disease in plants and affect plant health or plant products. Worldwide there are 90,000 species on the database of the European and Mediterranean Plant Protection Organisation with the potential to cause damage or disease; the UK Plant Health Risk Register currently identifies 700 of those as a known or potential threat to the UK[71].

Biosecurity measures aim to prevent the introduction and spread of harmful organisms, which may happen via accidental importation of infected plant material, by wind-blown spores, or by poor hygiene when people, animals or plants move (or are moved) from place to place. The

[66] https://www.buglife.org.uk/campaigns/light-pollution/#:~:text=Caterpillar%20populations%20declined%20by%2052,unable%20to%20find%20their%20way

[67] https://www.bats.org.uk/news/2023/08/bats-and-artificial-lighting-at-night-ilp-guidance-note-update-released

[68] UKBI - B6. Invasive species | JNCC - Adviser to Government on Nature Conservation

[69] UK Biodiversity Indicators 2022. Indicator B6: Pressure from invasive species | JNCC Resource Hub

[70] The Great Britain Invasive Non-Native Species Strategy 2023 to 2030 (nonnativespecies.org)

[71] Plant biosecurity strategy for Great Britain (2023 to 2028) - GOV.UK (www.gov.uk)

increase in global travel and trade is a key factor in the spread of pests and pathogens, with roughly 100 outbreaks detected each year in the UK attributed to this. Plant pests and pathogens affect both the natural environment and commercial crop production. For example, worldwide there are now 85 known pests of apple orchards, 160 tomato plant pests and 165 pests which threaten potato cultivation[72].

Some of the most high-profile organisms impacting on UK biodiversity include Dutch elm disease, Phytophthora, Chalara ash dieback and the Asian longhorn beetle. Some of these are subject to statutory controls due to the seriousness of the threat[73].

During the 1970s and 1980s, repeated Dutch elm infections have been described as an epidemic that resulted in the death of most mature English elm in lowland central and southern Britain[74]. The species survives as a common hedgerow component in large parts of Worcestershire, but trees remain vulnerable as they mature and grow and become more visible to the bark beetles that spread the disease.

Chalara ash dieback was first reported in Worcestershire in 2015[75] and has since been found in every 10km square in the county. The disease has significant implications for the timber market as well as for the biodiversity of native woodlands as ash is grown for a range of end-uses. Fungal spores can be blown over great distances by the wind, but good biosecurity measures can help to prevent and minimise spread[76].

Climate change

The Intergovernmental Panel on Climate Change (IPCC) reports that continuing accumulation of greenhouse gases in the atmosphere have led to average global surface temperatures rising by 1.1°C in the decade 2011-2020 compared to 1850-1900, with temperatures rising faster since 1970 than at any time over at least the last 2000 years. The average rate of sea level rise due to warming is now 3.7mm per year, an increase from an average of 1.3mm per year between 1901 and 1971. In IPCC modelling a 1.5°C rise in temperature is more likely than not to be reached by 2040 even under a very low emissions scenario[77].

The impacts of these higher average temperatures and changes in sea level will not be uniform around the planet. Warming will generally be greater over larger land masses and in some areas has already exceeded a 1.5°C rise. At this level of average warming extreme heatwaves will become widespread and more people will be exposed to severe drought and water shortages[78]. The predicted long-term climatic trends in the UK are for warmer, wetter weather and it is expected that Worcestershire will experience significant changes in weather conditions in the future, with the occurrence of extreme weather events such as flooding, drought, heatwaves and storms likely to increase. UK summer temperatures in 2022 were 0.9°C above the 1991-2020

[72] Plant biosecurity strategy for Great Britain (2023 to 2028) - GOV.UK (www.gov.uk)
[73] High profile pests and diseases - UK Plant Health Information Portal (defra.gov.uk)
[74] Dutch elm disease: Central and southern Britain. - Forest Research
[75] Chalara ash dieback in the UK (fera.co.uk)
[76] Ash dieback (Hymenoscyphus fraxineus) - Forest Research
[77] https://www.ipcc.ch/report/sixth-assessment-report-cycle/
[78] A Degree of Concern: Why Global Temperatures Matter – Climate Change: Vital Signs of the Planet (nasa.gov)

seasonal average and the annual mean temperature in 2021 was 0.1°C above the average for the same period, and 1°C above the average for 1961-1990[79]. The decade from 2011 to 2020 was on average 9% wetter than the period 1961-1990.

The impact of climate change on the UK's natural environment is set out in the latest UK Climate Risk Independent Assessment[80]. The report uses 18 indicators to assess the risks and opportunities to habitats and species presented by climate change, covering temperature change, water scarcity, wildfire, flooding, wind, altered hydrology, and the role of climate change in the increasing threat from pests, pathogens and invasive non-native species. The report concludes that a more integrated ecosystem services-based or nature-based solutions approach can contribute to climate change adaptation.

[79] https://www.ons.gov.uk/economy/environmentalaccounts/articles/climatechangeinsightsuk/august2022#current-state-of-theclimate-in-the-uk

[80] Berry, P. and Brown, I. (2021) Natural environment and assets. In: The Third UK Climate Change Risk Assessment Technical Report [Betts, R.A., Haward, A.B. and Pearson, K.V. (eds.)]. Prepared for the Climate Change Committee, London Technical Report - UK Climate Risk