

# Asesiadau Seilwaith Gwyrdd:

Canllawiau ar gyfer setiau data CNC a sut i'w defnyddio fel rhan o Asesiadau Seilwaith Gwyrdd.

## Green Infrastructure Assessments:

A guide to key Natural Resources Wales' datasets and how to use them as part of a Green Infrastructure Assessment

**Reference number:** GN 042

**Document Owner:** NRM Board, DPAS subgroup

### What is this document about?

This document provides advice on Green Infrastructure Assessments and how NRW data and Area Statements can be used to help inform this process.

### Who is this document for?

This document is aimed at local planning authority staff who are undertaking a Green Infrastructure Assessment.

### Contact for queries and feedback

Planning, Landscape, Energy and Decarbonisation Team,  
[EPP.Planning@cyfoethnaturiolcymru.gov.uk](mailto:EPP.Planning@cyfoethnaturiolcymru.gov.uk)

### Version History

Document Version	Date Published	Summary of Changes
1.0	[06-2021]	Document published
1.1	2023	Re-published as an accessible pdf with updated hyperlinks to data sets on DataMapWales

**Review Date:** [06-2026]

# Contents

Diben y canllaw hwn .....	3
Purpose of this guide .....	4
What is green infrastructure?.....	5
Green Infrastructure Assessments – the ask.....	5
An approach to mapping green infrastructure .....	6
Area Statements and Green Infrastructure Assessments .....	8
Undertaking a Green Infrastructure Assessment.....	9
Step 1: Setting the baseline.....	9
Datasets to help map the current green infrastructure resource .....	11
Datasets to help map ecological assets and networks.....	13
Non NRW data sources .....	16
Datasets to help map climate change mitigation.....	17
Step 2: Identifying priorities .....	19
National risks and challenges .....	22
Regional and local risks and challenges .....	22
Spatialising risks and challenges .....	23
Datasets to map and identify risks and challenges .....	23
Step 3: Identifying opportunities .....	27
Opportunities to improve ecosystem resilience.....	27
Datasets to help identify ecological opportunities .....	30
Protected and priority species.....	33
Identifying opportunities: other services.....	34
Datasets to help identify opportunities to improve the provision of ecosystem services .....	34
Datasets to help identify opportunities for water management (flood risk and water quality) .....	37
Step 4: Green infrastructure at a site level.....	39
Step 5: Review of the Green Infrastructure Assessment.....	42
Glossary .....	43
Annex 1: A list of key NRW datasets .....	44
Annex 2: LANDMAP .....	45

## Diben y canllaw hwn

Mae Llywodraeth Cymru wedi gofyn i bob awdurdod cynllunio yng Nghymru ymgymryd ag asesiad seilwaith gwyrdd. Er mwyn helpu gyda'r broses o lunio'r asesiadau hyn, mae Cyfoeth Naturiol Cymru (CNC) wedi creu'r canllaw hwn. Mae'n darparu trosolwg o'r hyn yr ydym yn ei ystyried yn setiau data cenedlaethol allweddol a gedwir gan CNC a all helpu i lywio eich asesiad seilwaith gwyrdd. Mae hefyd yn disgrifio sut y gellir defnyddio'r data hwn fel rhan o'ch asesiad a lle y gellir dod o hyd i'r setiau data.

Nid yw'r canllaw hwn yn ceisio cwmpasu pob set data a gedwir gan CNC, ond mae'n canolbwyntio ar y rhai yr ydym yn eu hystyried i fod y mwyaf perthnasol yng nghyd-destun seilwaith gwyrdd. Mae hefyd yn cwmpasu datganiadau ardal a sut y gellir defnyddio'r wybodaeth a gasglwyd fel rhan o'r broses honno er mwyn helpu i lywio asesiad seilwaith gwyrdd.

Bydd sefydliadau eraill hefyd yn cadw data sy'n berthnasol i asesiadau seilwaith gwyrdd. Nid yw'r canllaw hwn yn ceisio cwmpasu'r rhain yn fanwl, ond rydym wedi trafod ffynonellau eraill o ddata lle yr ydym yn meddwl y gallai'r rhain ychwanegu gwerth at y data a gyflwynir yn y canllaw hwn. Yn yr un modd, bydd awdurdodau cynllunio hefyd yn cadw setiau data sy'n berthnasol at ddibenion yr asesiad seilwaith gwyrdd, ond nid yw'r rhain wedi'u cwmpasu yn y canllaw hwn.

Mae modd darganfod mwy am ba setiau data eraill a gedwir gan CNC a sefydliadau'r sector cyhoeddus eraill trwy fynd [MapDataCymru](#). Mae CNC hefyd wrthi'n datblygu [porth gwybodaeth amgylcheddol Cymru](#), fersiwn beta o'r hyn y gellir ei gyrchu yma.

Fel rhan o'r canllaw hwn, rydym wedi cwmpasu'r materion a'r cyfleoedd yr hoffai CNC eu gweld yn cael eu hystyried fel rhan o asesiad seilwaith gwyrdd. Fodd bynnag, rydym yn ymwybodol mai dim ond is-set yw'r rhain o'r ystod lawer ehangach o faterion y gall seilwaith gwyrdd helpu gyda nhw.

Felly, ni ddylid dehongli'r wybodaeth a nodir yn y canllaw hwn fel set fanwl o gyfarwyddiadau ar gyfer cynnal asesiad seilwaith gwyrdd, ond fel crynodeb o'r hyn y mae CNC yn ei ystyried yn rhai o'r materion allweddol y gall seilwaith gwyrdd helpu gyda nhw. Rydym yn argymhell bod awdurdodau cynllunio yn cyfeirio yn ôl at Bolisi Cynllunio Cymru er mwyn sicrhau y cwmpeisir yr holl faterion pwysig.

## Purpose of this guide

Welsh Government has asked all planning authorities in Wales to undertake a Green Infrastructure Assessment. To help with the process of drawing up these assessments, Natural Resources Wales (NRW) has put together this guide. It provides an overview of what we consider to be the key national datasets held by NRW that could help inform your Green Infrastructure Assessment. It also describes how this data could be used as part of your assessment and where these datasets can be accessed.

This guide does not attempt to cover all the datasets NRW holds but focusses on those that we consider to be most relevant in the context of green infrastructure. It also covers Area Statements and how the information that has been gathered as part of that process can be used to help inform a Green Infrastructure Assessment.

Other organisations will also hold data that is relevant for Green Infrastructure Assessments. This guide does not attempt to cover those in detail, but we have mentioned other sources of data where we think these could add value to the data presented in this guide. Similarly, planning authorities will also hold datasets that are relevant for the purpose of the Green Infrastructure Assessment, but these have not been covered in this guide.

You can find out what other datasets NRW, and other public sector organisations hold, by visiting Welsh Government's [DataMapWales](#). NRW is also working on the development of a [Wales Environmental Information portal](#), which will also provide access to NRW datasets.

As part of this guide, we have covered the issues and opportunities that NRW would like to see being considered as part of a Green Infrastructure Assessment. However, we are aware these are only a subset of the much wider range of issues that green infrastructure can help with.

The information set out in this guide should therefore not be interpreted as a detailed set of instructions for how to undertake a Green Infrastructure Assessment, but as a summary of what NRW considers to be some of the key issues green infrastructure can help with. We recommend that planning authorities refer back to Planning Policy Wales to ensure all important issues are covered.

# What is green infrastructure?

In Planning Policy Wales, green infrastructure has been defined as:

“the network of natural and semi-natural features, green spaces, rivers and lakes that intersperse and connect places”. Green Infrastructure can function at a range of different scales; from entire ecosystems such as wetlands and rivers to parks, fields and gardens at the local scale and street trees, hedgerows, roadside verges, and green roofs/walls at the micro scale. (PPW 11, paragraph 6.2.1).

It is widely accepted that the grey infrastructure network, such as roads and electricity provision, cannot be planned on a site by site basis. This network needs to be planned at a strategic level to ensure that the right benefits are delivered in the right places.

The environment, on the other hand, has in the past often been considered on a more piecemeal basis. This has contributed to a loss of biodiversity and ecological resilience, as this type of approach makes it difficult to consider the wider ecological networks that development sites may be part of. For the same reason, it has also resulted in a reduction of some of the other benefits that people get from the natural environment.

The concept of green infrastructure was developed to highlight the need to plan this network in a strategic way and to consider it at an early stage in the development planning process. By considering the interactions between the built and the natural environment, it is possible to develop in a way that not only avoids damaging the environment, but enhances it. The strategic planning of the green infrastructure network can also help to ensure that the benefits, or ecosystem goods and services, that we get from the natural environment will be delivered to the places that need them.

## Green Infrastructure Assessments – the ask

The Green Infrastructure Assessments, which Welsh Government has asked all planning authorities in Wales to undertake, should help planning authorities take this strategic approach, by bringing together an evidence base to inform the planning of this network.

Planning Policy Wales (edition 11) describes a Green Infrastructure Assessment as “an integrated map-based evidence resource which uses existing datasets and the best available information to map existing green infrastructure and ecological assets” (PPW 11, 6.2.6). Planning Policy Wales also specifies that the Green Infrastructure Assessments should draw from the evidence provided by Area Statements and Well-being assessments (PPW 11, 6.2.8).

As well as mapping existing green infrastructure, the Green Infrastructure Assessments should also be used to “develop a robust approach to enhancing biodiversity, increasing ecological resilience and improving well-being outcomes” (6.2.7) and to “identify key strategic opportunities where the restoration, maintenance, creation, or connection of green features and functions would deliver the most significant benefits” (PPW 11, 6.2.7). Planning Policy Wales highlights green infrastructure as an important way for planning authorities to deliver their Section 6 duty for biodiversity (PPW 11, 6.2.2).

Protecting and enhancing biodiversity and ecosystem resilience is a key goal of the Green Infrastructure Assessments, but Planning Policy Wales also instructs planning authorities to consider society's wider social and economic objectives and the needs of local communities when preparing their assessments (6.2.4). As green infrastructure can make a significant contribution to improving the overall quality and liveability of the built environment, it also plays an important role in place making (PPW 11, 6.2.4-5)

In summary, Green Infrastructure Assessments need to:

- **Identify** where existing green infrastructure can currently be found and where there may be opportunities for improvement, such as through the provision of new green infrastructure, or the enhancement of existing green infrastructure;
- **Consider** what improvements can be made to biodiversity and ecosystem resilience, as well as consider the needs of local communities and society as a whole and how these can be met through green infrastructure;
- **Be applicable** at a range of different levels, from helping to inform the planning of green infrastructure at a development site level, to the more strategic level planning needed to inform, for example, strategies for growth (6.2.9) or to identify suitable locations for off-site compensation (6.4.21).
- **Be regularly reviewed**, to ensure that the information contained within them is up to date and appropriate for use as an evidence base, to inform development management decisions and assists with relevant reporting requirements (6.2.12)

It is worth highlighting that in addition to Planning Policy Wales, there are other drivers for the delivery of green infrastructure, such as the Wildlife and Countryside Act 1981 and The Conservation of Habitats and Species Regulations 2017.

## An approach to mapping green infrastructure

This part of the document provides some pointers on how to bring together an evidence base that can be used to help inform your Green Infrastructure Assessment. It is not intended as a detailed set of instructions, but instead aims to highlight how NRW data could be used as part of this process. You can find more detailed information about key NRW datasets in the tables that are used throughout this document.

For the purpose of this guide, we have split the process of assessing existing green infrastructure, and identifying opportunities for improvement, into 5 steps. The first three steps form the strategic assessment. The fourth step applies this information at a site level, where the information can also be used to inform placemaking.

While the steps are numbered here for ease of reference, there is no fixed order in which the assessment should be undertaken. When undertaking the Green Infrastructure Assessment, it can be helpful to revisit previous steps to refine the results, so the process set out below is not intended to be linear.

**Step 1: Setting the baseline** (pp 10-22): What green infrastructure already exists in the area? Where are the key ecological assets and ecological networks? What condition are these in and what are the main threats these are under?

**Step 2: Identifying priorities** (pp 23-30): What are the main socio-economic and environmental challenges that need to be addressed in the area and to what extent can this be done through green infrastructure?

**Step 3: Identifying opportunities** (pp 30-46): At a strategic level, where are the best places to address the issues identified under step 2? What would that look like in practice? E.g. could these challenges be addressed by improving the condition or extent of existing green infrastructure, or is there a need to create new green infrastructure?

**Step 4: Site assessment** (pp 47-49): This is an optional step, which builds on the evidence gathered in steps 1-3, what important green infrastructure assets can be found on proposed development sites? What are the main threats and challenges this green infrastructure is exposed to? What opportunities are there to maintain and improve this green infrastructure as part of the development process?

**Step 5: Monitoring and review** (pp 49-50): Is the Green Infrastructure Assessment helping to deliver the desired results? If not, should the Green Infrastructure Assessment be reviewed?

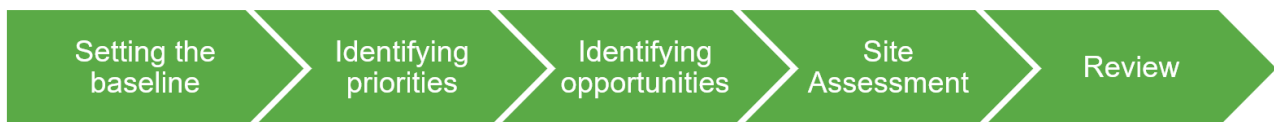


Diagram 1: Flowchart of the GIA process

The five steps above focus on bringing together the evidence needed to deliver a Green Infrastructure Assessment, as described in Planning Policy Wales. While this should result in a valuable information resource to inform strategic development plans and development proposals, the use of green infrastructure is potentially much wider than development planning.

Planning authorities may therefore also wish to consider if it would be helpful to develop a green infrastructure strategy. This kind of strategy could look at how a resilient green infrastructure network is best delivered and the role that different parts of the local authority play within this. It could also be used to inform the development of policies in other parts of the organisation, such as transport and education. This guidance does not cover the development of such a strategy in any detail, but we do consider this to be a valuable additional step.

The focus in this guide is on how NRW data sources can be used to help map existing green infrastructure, as well as opportunities to extend the green infrastructure network. It is useful to bear in mind that while these datasets should provide a reasonable starting point for a Green Infrastructure Assessment, there will be other organisations that also hold relevant information. In addition, there will be different types of information, such as that which can be provided by stakeholders and local experts, which could usefully be considered as part of this process.

Stakeholder engagement and discussions with local experts will be particularly important when it comes to making decisions about where green infrastructure could most usefully be improved.

## Area Statements and Green Infrastructure Assessments

In addition to the national datasets listed in this guide, Natural Resources Wales has developed 7 Area Statements. These Area Statements are high level assessments of the key challenges that different parts of Wales are facing and were developed with input from a wide range of stakeholders, including local authorities. You can find out more on [NRW's Area Statement webpages](#).

The Area Statements set out how and where we can work better together to meet the key challenges in each area, and ensure that natural resources are sustainably maintained, used and enhanced for the benefit of current and future generations.

Area Statements are an important source of information for the planning of green infrastructure and, for that reason, Planning Policy Wales instructs planning authorities to draw from the evidence base provided by Area Statements when developing their Green Infrastructure Assessments.

We recommend that when developing green infrastructure assessments, planning authorities consider the priorities, risks and opportunities that have been identified as part of the Area Statement to help set the strategic context for the assessment.

Area Statements can be used to help inform all steps of a Green Infrastructure Assessment. Examples of the types of questions that could be considered as part of this include:

- For step 1: Have the Area Statements identified any areas that are already playing an important role when it comes to managing environmental risks or maintaining ecological resilience?
- For step 2: What are the main issues that are highlighted in the Area Statement(s) that cover your area? To what extent can these be addressed or delivered through green infrastructure?
- For step 3: Does the Area Statement identify any areas that would benefit from improvement? To what extent could this be delivered through the planning system? Does it identify areas that are likely to benefit from safeguarding? If so, what might be the best way to do this?

It is useful to bear in mind that Area Statements are high level assessments. The assessments do not go down to the level of detail required for a Green Infrastructure Assessment, but they can provide a starting point for identifying risks and opportunities. These risks and opportunities can be refined as part of the Green Infrastructure Assessments, and this evidence can in turn feed into the Area Statements. In that way, Area Statements can help to provide a strategic overview of green infrastructure across county boundaries.

As part of the process of developing Area Statements, NRW pulled together a large number of datasets which form the Area Statement evidence base. This evidence base can be accessed on the [Wales Environmental Information Portal](#).



Many, but not all of the datasets that are brought together on the portal will be relevant for Green Infrastructure Assessments. One of the aims of this guide is therefore to provide clarity to planning authorities on which of our datasets are likely to be most relevant for their Green Infrastructure Assessment.

Although Natural Resources Wales is responsible for producing Area Statements, producing and implementing has been a collaborative process. Each Area Statement has developed place specific mechanisms to involve key stakeholders in this process so as to ensure that national evidence and grassroots technical knowledge together informs our understanding of ecosystem resilience in each place.

In applying the principles of collaboration and stakeholder involvement each of the Area Statements developed a number of products which can be used alongside the national evidence base to better inform some of the societal choices which Green Infrastructure Assessments can usefully take into consideration.

The Area Statements will be updated regularly, and new evidence and information will emerge over time. More information about Area Statements, including links to the Area Statements can be found on [NRW's Area Statement webpages](#). When developing your GIA, we suggest that you contact your local Area Statement team at an early stage to enquire if any additional support is available from NRW to help you develop your Green Infrastructure Assessment.

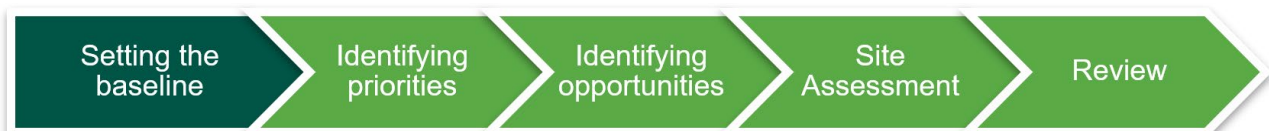
For some areas, additional Area Statement products have been developed, but not all of these are available online. The local Area Statement teams will be able to advise you if this is the case in your area.

The Area Statement teams can be contacted using the following email addresses:

- North West: [northwest.as@cyfoethnaturiolcymru.gov.uk](mailto:northwest.as@cyfoethnaturiolcymru.gov.uk)
- North East: [northeast.as@cyfoethnaturiolcymru.gov.uk](mailto:northeast.as@cyfoethnaturiolcymru.gov.uk)
- Mid Wales: [mid.as@cyfoethnaturiolcymru.gov.uk](mailto:mid.as@cyfoethnaturiolcymru.gov.uk)
- South West: [southwest.as@cyfoethnaturiolcymru.gov.uk](mailto:southwest.as@cyfoethnaturiolcymru.gov.uk)
- South Central: [southcentral.as@cyfoethnaturiolcymru.gov.uk](mailto:southcentral.as@cyfoethnaturiolcymru.gov.uk)
- South East: [southeast.as@cyfoethnaturiolcymru.gov.uk](mailto:southeast.as@cyfoethnaturiolcymru.gov.uk)

## Undertaking a Green Infrastructure Assessment

Step 1: Setting the baseline



**What green infrastructure already exists in the area? Where are the key ecological assets and ecological networks? What condition are these in and what are the main threats these are under?**

Identifying green infrastructure, ecological assets and ecological networks that already exist in an area is an essential step in a green infrastructure assessment. This information can

be used as a starting point for assessing if there are any green infrastructure assets that are particularly important in the area, or if there are any areas that could usefully be improved (step 3).

While it is possible to treat this first step in the assessment as a simple audit of what's there, there are a number of additional questions that are worth considering at this stage. Answering these questions should help to give you a better understanding of the role of each of these green infrastructure assets in the wider green infrastructure network.

In particular, you may wish to consider if it would be useful to add information about the following to your assessment:

- **What condition is the green infrastructure in? Are there any particular threats, such as habitat fragmentation that could usefully be addressed?**

Well-maintained green infrastructure assets are likely to be better at providing certain ecosystem services and benefits, such as recreation and amenity value, than less well-maintained green infrastructure. For that reason, it can be helpful to include information about how a site is managed in your assessment.

You may also, separately, wish to record information about the ecological condition of a site, which will be particularly relevant in the context of biodiversity and ecosystem resilience. [NRW's CuRVE dataset \(Current Relative Value of Ecosystem Resilience\)](#) can be used as a starting point for this.

- **What ecosystem services and benefit(s) does the green infrastructure asset provide? What are the functions it is likely to fulfil?**  
All green infrastructure will provide a range of functions, also called ecosystem services and benefits. Assessing which functions the green infrastructure in your area provides can help to give you a better understanding of whether any areas are particularly important for the provision of ecosystem services and where might be the best places to make improvements.
- **Are there any green infrastructure assets that are particularly important in the area and that could benefit from safeguarding?**

NRW has developed a number of national datasets which can be used to help build up a picture of the current green infrastructure resource, key ecological assets and ecological networks. These datasets can also be used as a starting point for answering some of the questions set out above.

More information about the NRW datasets that we consider to be most useful for this stage of the assessment is provided on the next pages. The datasets are split into four categories: the current green infrastructure resource, biodiversity and ecological resilience, climate change mitigation and landscape. For each of the datasets we have provided a brief explanation of what the data shows and how it could be used as part of a Green Infrastructure Assessment.

Planning authorities are also likely to hold data that is useful for informing this stage of the assessment, such as active travel routes, public rights of way, council owned land and so on. We recommend that these datasets are used alongside the NRW datasets listed in this

part of the guide. Consultation with both internal and external stakeholders can also be used to help answer the questions listed above.

When mapping the current Green Infrastructure resource in your area, it is useful to bear in mind that many ecological processes work on a landscape scale and that some species are highly mobile. We therefore recommend that a GIA also considers if there are any important green infrastructure resources in neighbouring counties that may be impacted by development in your county. NRW's Area Statements can help to provide this strategic overview and we would encourage you to contact your area statement lead to discuss what information and support is available.

## Step 1: Setting the baseline

### Datasets to help map the current green infrastructure resource

The following datasets provide a useful starting point for identifying where the current green infrastructure resource in your area can be found.

#### The All Wales Green Space dataset

##### What does it show?

The All Wales Green Space dataset identifies all areas in Wales that have not been built on or covered with a man-made surface. It is the best available record of green space in Wales.

The dataset shows areas that are designated for nature conservation (such as Sites of Special Scientific Interest, Local Nature Reserves and local wildlife sites) and areas with a legal right of public access.

At a lower level of accuracy, the data set can be further broken down into a typology of sites e.g. open space, amenity space etc., quality assurance e.g. Green Flag Awards, and non-statutory access e.g. public parks, country parks etc.

##### What can it help me understand?

This dataset can be used as a starting point for identifying the current green space resource in an area. As the dataset provides information on whether the green space is natural, or not, it can also be used to get a more detailed picture of the areas where people are likely to go to experience nature close to home.

When combined with other datasets, such as the Welsh Index of Multiple Deprivation, it can also be used to identify areas where developing new or improving existing green space is likely to deliver the most significant socio-economic benefits, for example by targeting investment in areas where access to green space is more limited.

## **Where to access and how to use the data**

The All Wales Green Space dataset is not publicly available but is available to all public bodies who are signatories of the Public Sector Geospatial Agreement. It has also been shared with all local authorities in Wales.

The data set is known as the [NRW GI](#) data set and can be accessed on DataMapWales by any member of the Public Sector Geospatial Agreement or their authorised agents.

The data set will never be “complete” as such, because changes in real life will always happen faster than the data set can be updated. We plan to update the data set at least annually to reflect changes in land use and information gathered from site visits (“ground truthing”). Please note that much of the data has been created by local authorities using expert judgement and was not checked through site visits.

## **Urban tree canopy cover**

### **What does it show?**

The urban trees dataset shows the location of every single urban tree and every urban tree group in 220 urban areas in Wales. Trees have been categorised based on the spread of their canopy into small (3-6 metres), medium (6-12 metres) and large trees (over 12 metres).

Canopy spread can be used as a proxy for the amount of ecosystem services that an urban tree provides, with larger trees likely to provide more benefits. In addition, the data has been analysed against other 3rd party datasets to identify spatial relationships to patterns of urban tree cover.

### **What can it help me understand?**

This dataset can be used to analyse the distribution of urban trees and identify areas that may benefit from additional planting.

### **Where to access the data**

View the [Urban Tree Cover 2018](#) data set on DataMapWales.

### **Additional data**

Reports have been produced for every county in Wales, which analyse urban tree coverage in each area. These reports highlight the spatial distribution of trees across towns and cities and contain additional information to help with planning and managing urban trees, as well as examples of how the data can be applied. All the reports related to this work are available on [NRW's urban trees web page](#).

## Datasets to help map ecological assets and networks

We recommend the use of the following datasets to get a better understanding of key ecological assets in the area.

Some of the datasets listed here also provide information on opportunities for improvement and these datasets are therefore also relevant for step 3 of the assessment

### Protected sites network

#### What does it show?

This dataset shows the boundaries of Sites of Special Scientific Interest (SSSI), Special Protection Areas (SPA), Special Areas of Conservation (SAC) and Ramsar sites across Wales and, where relevant, the management units these have been broken into.

#### What can it help me understand?

The protected sites network is an important component in maintaining and enhancing ecosystem resilience and should be recognised as such as part of a Green Infrastructure Assessments.

#### Where to access the data

This dataset can be downloaded from DataMapWales, where it is called [the “unitisation boundaries” dataset](#).

### Phase I Habitat Survey

#### What does it show?

This dataset holds comprehensive habitat cover data for the whole of Wales. The maps include information on the location and extent of semi-natural habitat types, with additional information recorded as target notes.

#### What can it help me understand?

These datasets can be used to identify habitats of principal importance, as identified under Section 7 of the Environment (Wales) Act 2016. These could be recognised and considered alongside the designated sites network within the Green Infrastructure Assessment. In combination with datasets such as CuRVE (see page 34) this dataset could also be used to identify where interventions to build ecosystem resilience are best targeted.

#### Where to access and how to use the data

The [Terrestrial Phase 1 Habitat Survey](#) maps can be found on DataMapWales.

When displayed using a geographic information system or web-based viewer the location and extent of single or multiple categories of habitat can be viewed.

This dataset consists of many habitat categories some of which are more valuable from an ecosystem resilience perspective than others. Examples include:

- Unimproved grassland habitats
- Semi-natural woodland, scrub and parkland habitats
- All heathland, mire, bog, swamp, marginal, inundation, open water and coastal habitats

Certain habitats types can be used in conjunction with a range of other data, to help identify where opportunities to restore and create habitats may occur. For example, areas of semi-improved grassland may act as good candidates for restoration, while arable land may be better suited to woodland creation.

When using this dataset it is important to note that:

- The outputs from these datasets are static and, as they were undertaken some time ago (between 1979 and 1991) they do not reflect changes in the extent and type of land cover that may have occurred subsequently.
- Some urban areas are covered, but as the minimum size of habitat patch recorded lies between 0.1 and 0.25 ha, there are gaps in the habitat coverage for urban areas
- A combination of ground truthing and cross referencing with recent remote sensing data may help to address some of the limitations of the data.

### **Additional guidance**

The Lle meta data for this dataset includes references to various handbooks and other publications which describe how the data for the surveys were collected.

## **Habitat networks**

### **What does this dataset show?**

Connectivity is a key aspect of ecosystem resilience. Connectivity is about the movement within and between ecosystems. It usually applies to the movement of organisms: from foraging or migration of individuals, through dispersal of seeds and genes, to the major shifts of species' populations to adjust to a changing climate. It can also refer to movement of natural processes, for example, cycling of water and nutrients between different components of a landscape.

Habitat connectivity allows ecosystems to function and recover from pressures and demands but it is reduced through habitat loss and fragmentation, creation of barriers, and erosion of the 'permeability' that allows movement across the landscape

NRW's habitat network maps were created to help provide an understanding of the general patterns of ecological connectivity across a landscape, as well as an idea of how this connectivity can be improved.

Maps were created for broad leaved woodlands, semi natural grassland, heathland, fens and bog ecosystems in upland and lowland versions for the whole of Wales. Maps for sand dunes are currently under development.

For each ecosystem a map is provided which shows a network made up of the existing habitat, as well as adjoining permeable land through which species typical of that habitat are most likely to move.

### **What can it help me understand?**

This dataset is useful for identifying important existing areas of connectivity for ecosystem resilience that can then be recognised and considered within green infrastructure assessments. It can also be used to help identify opportunities where habitats could be maintained, restored and created to improve ecological connectivity and build ecosystem resilience. A priority network layer has also been developed for broadleaved woodlands, heathland and lowland semi-natural grassland which can be used to help inform the development of Resilient Ecological Networks.

When combined with other datasets, such as NRW's WINS (Welsh Information for Nature Based Solutions) it can be used to identify areas where improving habitat connectivity may also help to deliver other ecosystem services.

### **Where to access and how to use the data**

The [Habitat Networks](#) data are downloadable from DataMapWales. When displayed using a geographic information systems or web-based viewer the location and extent of existing habitat can be seen together with its associated network

The network itself is made up of several network layers. The core, focal and local network layers demonstrate how actions to build ecosystem resilience might be prioritised. Generally speaking, suitable habitat restoration or creation within the core network zone is likely to help less-mobile species that require significant areas of habitat, these are often our rarest species. Similar activity within the local network zone would benefit more mobile species with smaller habitat requirements, often our commoner species. The focal network would benefit species that lie somewhere in between

In addition, a priority network layer is also available for broad-leaved woodland, heathland and lowland semi-natural grassland. It includes related Sites of Special Scientific Interest and other biodiversity hotspots. This network is anticipated to make an important contribution to the development of Resilient Ecological Networks, as described within Welsh Government's Natural Resources Policy (2017). Priority networks for fens and bogs are currently under development by NRW.

It is recommended that all habitats, together with all their layers, are viewed together for green infrastructure assessment purposes.

When using these maps it is important to note that:

- This dataset is modelled data. This means that it is based on a number of assumptions, which combine to give a general idea of what we can reasonably expect to find in a certain area. There is always a level of uncertainty associated with this type of data, and we would therefore recommend that this data is used in combination with local knowledge, before it is used to make a decision for action on the ground.

- the model does not include any data that might otherwise constrain habitat restoration or creation such as other protected sites, protected species, scheduled ancient monuments, topography, soil type etc.
- in certain situations, land will offer opportunities to improve connectivity for more than one type of habitat.
- connectivity does not 'stop' at the boundaries of the networks – areas shown as part of a network on the maps are simply more likely to have good connectivity than those that are not.
- in certain situations, connectivity may have negative impacts, for example, if it risks facilitating the spread of diseases, fire, or invasive non-native species.
- that the modelled data is based on Phase 1 habitat data. The accuracy of this data was high at the time of collection. However, much of this data is now old and may no longer reflect the situation on the ground. As a result, the maps need to be analysed in combination with other data layers (biodiversity, historic environment etc) to ensure decisions about habitat restoration and creation take account of relevant constraints. A combination of ground truthing and cross referencing with recent remote sensing data is also recommended to help address some of the limitations of the maps underlying data.

Where analysis of other data identifies constraints to habitat restoration or creation, or where opportunities exist to restore or create more than one type of habitat on a given piece of land, expert ecological advice should be sought. Referral to priorities within the Area Statement may also be useful.

### **Additional guidance**

NRW has produced a handbook on the use of the Habitat Network Maps (Latham J and Rothwell J. 2019. *A handbook on habitat networks. Practical application for improving connectivity and building ecosystem resilience*. NRW Evidence Report No. 275. NRW. Bangor). This handbook can be requested by sending an email to [EPP.Planning@cyfoethnaturaolcymru.gov.uk](mailto:EPP.Planning@cyfoethnaturaolcymru.gov.uk)

## **Non NRW data sources**

Other non NRW - datasets that are likely to be useful for mapping ecosystem resilience include:

- Data sets about the location, extent, importance and condition of designated sites including Sites of Importance for Nature Conservation (SINCs), Local Nature Reserves and Local Wildlife Sites. These can usefully be considered alongside similar data for statutorily protected sites to identify land considered suitable for protection to prevent further decline of ecosystem resilience. They can also be used to inform identification of adjoining or linked land that could be managed to buffer, increase extent, connectivity or otherwise address pressures and demands upon these sites.
- Data sets about the location, abundance etc of species of principal importance for Wales, published under Section 7 of the Environment (Wales) Act 2016, such as the datasets available from the local environmental record centres. These datasets can



usefully be considered alongside designated site and habitats of principal importance, also published under Section 7 of the Act, datasets to ensure that species requirements, which may otherwise be overlooked as a result of an ecosystem and site led approach, are taken into account.

- Data sets about soil type and topography. These can dramatically influence habitat type and can usefully be considered alongside other datasets when assessing the feasibility of restoring or creating particular habitat types, such as for example floodplains or calcareous grassland.

## Datasets to help map climate change mitigation

NRW's State of Natural Resources Report 2020 identified the climate emergency as one of two major threats to the natural environment and society as a whole (link to SoNaRR to be inserted). We therefore recommend that Green Infrastructure Assessments highlight any green infrastructure resources that are likely to play a role in either tackling the causes of climate change or minimising the impacts of climate change.

The evidence presented in this section focusses on green infrastructure assets that help with climate change mitigation, but there will be other datasets in addition to the ones listed below that will also be relevant to the climate change topic. For example, the urban trees, green spaces and natural flood risk solution datasets that are mentioned in other parts of the guide can all help to reduce the impact of climate change on the built environment, while habitat networks can make the natural environment more resilient to climate change.

There will also be other green infrastructure assets that play a role in the context of climate change that NRW does not have data on, such as hedgerows and small areas of scrub, so it is important to bear in mind that the datasets described here only provide a partial picture of how green infrastructure can be used to help mitigate the effects of climate change.

## The Unified Peat Map of Wales

### What does it show?

This map shows the extent of peatlands in Wales, which are Wales' largest terrestrial ecosystem store of carbon and also act as important reservoirs for biodiversity and a wide range of other ecosystem services.

### What can it help me understand?

In their natural state peatlands have the potential to contribute to climate regulation by sequestering carbon and are therefore an important green infrastructure resource. Human activity such as drainage, overgrazing and conversion to grassland and forestry have resulted in detrimental impacts on Welsh peatlands. By combining this data with other datasets, such as the WINS data on bog restoration, opportunities for restoring this habitat can be identified.

### How to use the data

This dataset can be requested from NRW by sending an email to:  
[datadistribution@cyfoethnaturiolcymru.gov.uk](mailto:datadistribution@cyfoethnaturiolcymru.gov.uk)

Or it can be accessed from DataMapWales where it is known as [Unified Peat Map of Wales](#).

## National Forest Inventory Woodland Wales

### What does it show?

This dataset shows the location and extent of all woodlands of 0.5 ha and over across Wales. It shows the types of woodland (broadleaved, mixed etc) and includes interpreted open areas within woodland.

### What can it help me understand?

Woodlands provide a wide range of ecosystem services, including carbon sequestration, biodiversity and recreation opportunities. This dataset can be used to identify all small and larger woodlands in the area, which combined with the urban tree dataset mentioned above should provide a good overview of where this important green infrastructure resource can be found.

### How to use the data

This dataset can be downloaded from the Forest Research website by following this link:  
[National Forest Inventory - Forest Research](#)

## Datasets to help map the landscape context

NRW landscape datasets contain information about landscape character and features such as distinctiveness, extent, sense of place, value and tranquillity.

These datasets can help us understand how places have been shaped over time and offer map-based evidence to inform green infrastructure assessments and future placemaking. The datasets listed here can be used to help build a picture of the green infrastructure resource that is currently available in urban, peri-urban and rural areas.

## LANDMAP dataset

### What does it show?

The LANDMAP dataset covers a wide range of information and as part of this guide we have prepared an additional information sheet which explains which questions in LANDMAP we consider to be most relevant in the context of planning green infrastructure. This information sheet can be found in Annex 2 of this document. This also provides some additional information on how LANDMAP data can be used to help inform the planning of green infrastructure

### What can it help me understand?

LANDMAP is highlighted in Planning Policy Wales as an important data source to inform green infrastructure assessments. We suggest that this dataset would be useful for setting the context for a green infrastructure assessment as it helps to provide an overview of the green infrastructure assets that exist in an area and outlines how these contribute to the area's landscape character and sense of place. LANDMAP can also be used as a basis for assessing how potential green infrastructure improvements might fit into the landscape and where they can be used to improve overall landscape quality.

### How to use the data

The LANDMAP data layers can be downloaded from the DataMapWales by following these links [Geological Landscape](#), [Landscape Habitats](#), [Visual & Sensory](#), [Historic Landscape](#), [Cultural Landscape](#).

## Tranquil Areas Map of Wales dataset

### What does it show?

The Tranquil Areas Map of Wales shows zones of tranquillity, identified as Zone B significant disturbance; Zone C some disturbance; Undisturbed and Urban.

### What can it help me understand?

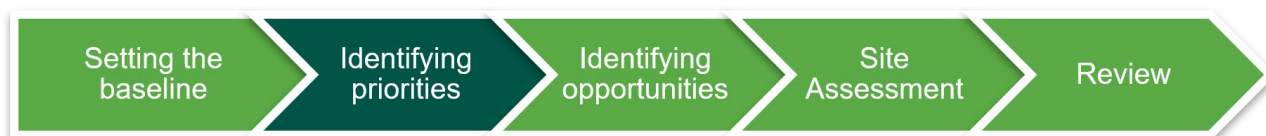
This information can be used for identifying areas that are already important from a tranquillity point of view as well as areas where green infrastructure interventions could improve relative tranquillity and perceived soundscape, particularly when linked to population density and well-being benefits.

It may help to identify areas where lowering artificial light may improve dark skies and habitat corridors important for night foraging.

### How to use the data

The [Tranquil Areas Wales](#) data can be downloaded from DataMapWales. A [Storymap](#) explaining the data is also available.

## Step 2: Identifying priorities



### What are the main socio-economic and environmental risks and challenges that need to be addressed in the area and to what extent can this be done through green infrastructure?

As well as mapping what green infrastructure currently exists in an area, Planning Policy Wales also instructs planning authorities to “identify key strategic opportunities where the

restoration, maintenance, creation, or connection of green features and functions would deliver the most benefits”.

Information on strategic opportunities can be used in a number of different ways. It could, for example, be used to ensure that future opportunities to improve the green infrastructure network are not lost as part of the development process. It could also be used to target funding, such as through Section 106 agreements, in the areas where the most significant improvements can be made.

As will be clear from diagram 1 on the next page, green infrastructure is capable of providing a wide range of benefits, often in the same place. In practice, nearly everywhere will have the potential to deliver either a greater range of ecosystem services, or more of the benefits it is already providing.

This multifunctionality can make the process of deciding where green infrastructure could most usefully be improved, or which areas should be safeguarded, a daunting task, as there will be many different combinations of benefits that could be delivered through green infrastructure.

For that reason, it can be useful to start by considering what the main socio-economic and environmental issues are in your areas and if any of these could (partially) be addressed through green infrastructure. In line with the holistic way of working promoted in the Placemaking Principles (PPW 11, 2.7) we would recommend that you consider risks and challenges on a range of scales; from global issues such as climate change, to local issues, such as access to greenspaces.

Over the next pages we have set out some additional information about what NRW considers to be the key risks and challenges that green infrastructure can help with.

When reading this, it is important to bear in mind that NRW's remit as an organisation does not extend to all the issues that may be relevant in the context of a Green Infrastructure Assessment and the information set out over the next pages should therefore not be seen as a complete list of all the risks and challenges that green infrastructure can help with. We recommend that you refer back to Planning Policy Wales to ensure all important issues in your area are covered.

# What can green infrastructure do?



# What is green Infrastructure?



**Diagram 1: the benefits of green infrastructure**

As a Planning Authority, you will also have plans, strategies and datasets that can be used to supplement the information provided over the next few pages, such as for example Open Space Assessments and, where relevant, National Park Management Plans.

Input from stakeholders and local experts will also be important for filling in the local detail and helping you decide which risks and challenges could most usefully be addressed in different places.

## National risks and challenges

At the national level, [the State of Natural Resources Report 2020](#) (SoNaRR 2020) identified the nature and the climate emergencies as the two key strategic environmental challenges for Wales to address.

The nature emergency is the unprecedented decline in biodiversity as the result of the pressures that people place on the environment. The Section 6 duty that was introduced in the Environment (Wales) Act 2016 has an important role to play in helping to address this challenge.

Planning Policy Wales considers Green Infrastructure Assessments to be an important tool in helping planning authorities to meet this duty. For example, the evidence that is gathered as part of the assessments can help to ensure that important ecological assets are maintained and that key opportunities to improve ecosystem resilience are not lost.

Green Infrastructure Assessments could also be used to identify how biodiversity can be improved alongside development, and in this way can help meet the requirement set out in the CPO letter of 23/10/2019<sup>1</sup> to secure biodiversity enhancements alongside planning developments.

The climate emergency is the imminent threat that the world is facing from the warming of the planet and the resulting destabilisation of the climate which impacts, for example, food cultivation and the built environment. Green Infrastructure Assessments could help by identifying areas that are already playing a role in mitigating the impacts of climate change, as well as considering how both the natural and the built environment can be made more resilient to the impacts of climate change.

Areas that are already playing a role in helping to address either the nature or climate emergency, or that have the potential to do so, could be identified in the Green Infrastructure Assessment as key green infrastructure assets in their own right, regardless of whether they provide many additional ecological services.

After considering how your green infrastructure can help to address the nature and climate emergencies, a similar exercise should be undertaken for any other regional, or local priorities that you may identify as relevant for your area.

## Regional and local risks and challenges

At the regional level, NRW's Area Statements should provide a reasonable starting point for identifying what the main environmental issues are, whereas Wellbeing Plans can be used as a basis for identifying socio-economic priorities in the area.

Environmental data, local policies and strategies, as well as discussions with local stakeholders and experts can all help to highlight additional priorities that green infrastructure can help with.

---

<sup>1</sup> [securing-biodiversity-enhancements.pdf \(gov.wales\)](#)

All this information can be brought together to draw up a list of what the priorities in the area are that could be delivered through green infrastructure. As part of this, you may want to consider the following questions:

- What are the priorities for biodiversity and ecosystem resilience in your area? Are there any species that would particularly benefit from improvements to green infrastructure?
- What are the main socio- economic issues in the area? To what extent could these be addressed through green infrastructure?
- Are there any significant local environmental hazards and risks? Who, or what is being impacted by these issues and what is the extent of this impact? Could green infrastructure help to address these issues?

## Spatialising risks and challenges

Once you have identified what the most important issues are that green infrastructure could help to address, you may wish to consider if it would helpful to map where these risks and challenges are located.

While it is not essential to spatialise these issues, doing so can help to highlight areas that may benefit from green infrastructure being improved. It can be particularly useful for identifying if there are any areas where multiple problems coincide, which may indicate an area where changes are needed most.

The next page highlights a number of datasets that can be used for spatialising risks and challenges, but this not intended as an exhaustive list. There may be other issues you wish to consider as part of your assessment, or other types of information, such as expert knowledge, or information provided by stakeholders that could be used to supplement this data. Your own authority is also like to hold relevant datasets which could be considered as part of the assessment.

## Datasets to map and identify risks and challenges

### Climate change adaptation & mitigation

**Are there areas at significant risk of surface water flooding, or areas where this is likely to become an issue in the future?**

DataMapWales contains the [Flood Risk Assessment Wales](#) data set which shows areas at risk from flooding from rivers, the sea, surface water and small watercourses.

The [Flood Map for Planning](#) also takes into account climate change projections.

These maps can be used as a starting point for identifying areas that may benefit from green infrastructure interventions. Because of the scale of the data used, the maps are not designed for small-scale investigation.

**Are there areas at risk from the urban heat island effect, or areas where this is likely to become a problem in the future?**

NRW does not have any specific data on this topic, but Welsh Government published an assessment of the area's most vulnerable to heat islands and the associated maps are available from Welsh Government on request.

**Are there areas where active interventions to mitigate climate change are feasible, such as increasing tree cover or restoring peatlands?**

The **WINS** project has mapped [opportunities for restoring peat bogs](#) with the aim of providing a range of services, including maintaining carbon stores. This dataset also contains a map of constraints to peat bog restoration. The opportunity and constraint maps should be used alongside each other.

As part of the WINS project, [opportunities to plant woodlands for carbon sequestration](#) have been mapped, as well as constraints.

More information about the WINS project can be found later in this guide.

## **Biodiversity and ecological resilience**

**From an ecosystem perspective, are there any areas that are relatively less resilient? If so, what might the underlying causes be and could any of these be addressed through the Green Infrastructure Assessment?**

The [CuRVe](#) dataset on DataMapWales can be used to get an overview of the relative ecological resilience of different areas and the factors that influence this. More information about the CuRVe dataset can be found later in this guide.

**Where are the protected or priority species or habitats in your area? Are any of these likely to be affected by development? What can be done to safeguard and improve these species and habitats?**

NRW does not have any specific datasets on this issue, but we would encourage you to work with your Local Nature Partnerships to identify what the key priority and protected species are that should be considered as part of the Green Infrastructure Assessment. We'd also recommend that you make use of the data held by [Local Record Centres](#) on Protected and Priority Species. The Local Authorities' own officers, such as County Ecologists may also be aware of additional records that are not included in the Local Record Centres' datasets.

## **Managing environmental risks**

**Are there areas where air or noise pollution is an issue?**

No NRW data is available on these topics, but other data sources include:



[The Environmental Noise map](#) on DataMapWales (NB this is updated every few years so it may be best to search for “noise” in the DataMapWales data catalogue to get the most up to date data set).

For air quality, potential areas for improvement will have been identified through the planning authority’s work on local air quality management

The [Welsh Air Quality Data and Statistics Database](#) contains data relating to Air Quality in Wales from the present day back to 1986.

**Are there water bodies that do not meet the criteria for good ecological status? Are any of these failures the result of diffuse pollution (e.g. surface water run off)? Are there opportunities to better integrate water into the local environment through sustainable drainage (SuDs)?**

[Water Watch Wales](#) is a data portal for the River Basin Management Plans, which includes information on the status of water bodies in Wales, as well as associated information, such as Protected Areas and water bodies with targeted interventions.

The information on this portal can be used to help identify areas where there may be opportunities to improve the water environment to deliver a wide range of benefits including an improvement to water quality, or where the water environment should be protected. Data layers such as “lakes waterbodies interim” and “river waterbodies interim” can be used to identify the general status of water bodies.

Where this status is less than good the “reasons for not achieving good” spreadsheet can be used to identify the reasons for these water management issues. Green infrastructure, and particularly Sustainable Drainage Systems, can be used to help manage some, but not all of these pressures and the spreadsheet can be filtered into categories which include ‘urban and transport’ (Column Q) and activities such as industrial estates, land drainage, urbanisations, roads etc (column O) to identify where green infrastructure is most likely to make a difference.

Please note that the LLFA is the statutory consultee on surface water drainage, not NRW.

**Are there areas at significant risk of flooding?**

NRW maintains the **Communities at Risk Register**, which identifies those communities most at risk of flooding, based on a number of factors, including the hazard they are exposed to, the speed of onset of flooding and their ability to respond in terms of social vulnerability to flooding. It also considers factors such as the presence of flood defences and availability of flood warnings. This register is updated annually and is shared with all local authorities in Wales. The [Communities at Risk Register \(CaRR\)](#) can be found on DataMapWales.

[Detailed flood risk maps](#) are available to view on Natural Resources Wales’ website and The [Flood Risk Assessment Wales](#) map show the present day Defended risk, based on a combination of National Model datasets and more detailed local models where available. This map can be used to get a better understanding of the number of properties at risk of flooding from fluvial, coastal and surface water flooding, which could be used as a way of identifying where improving GI might be most beneficial for helping to mitigate flood risk and deliver greater socio-economic benefits.

## Landscape and amenity

**Are there areas where people do not have sufficient access to green space? Are there areas that might benefit from active travel routes?**

NRW's **Accessible Greenspace Toolkit** provides a detailed method for assessing if a local authority has enough of the right kind of green spaces, in the right places to help meet the wellbeing needs of their local residents. This toolkit is available on request from NRW by sending an email to [EPP.Planning@cyfoethnaturiolcymru.gov.uk](mailto:EPP.Planning@cyfoethnaturiolcymru.gov.uk).

You can apply the methodology in the toolkit to the Wales Green Infrastructure data set to identify areas which may lack access to sufficient green space, and then target these for site visits to assess the scale and solutions to any problems.

**Are there any particular socio-economic issues in the area that green infrastructure could help to address? Where might be the best places to do so?**

The **Welsh Index of Multiple Deprivation (WIMD)** can be used to pinpoint areas with particular socio-economic issues. When combined with the Wales Green Space data set areas can be identified that may benefit from additional green infrastructure. The WIMD is a datasets that is managed by StatsWales and it [can be downloaded from their website](#).

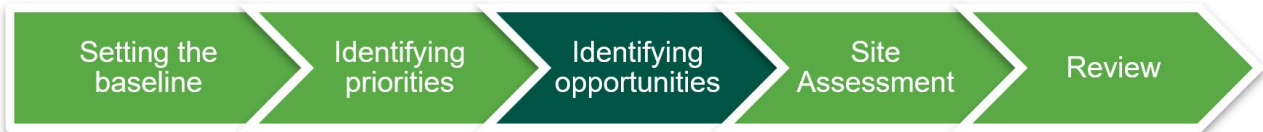
**Are there any areas where visual amenity could usefully be improved?**

**LANDMAP data** can be used as a starting point for identifying areas that might benefit from improvement at a strategic level. The [LANDMAP Visual & Sensory layer](#) is available from DataMapWales.

The datasets outlined above can be used as a starting point for identifying where some of the main issues that green infrastructure can help to address are concentrated. These can either be mapped individually or combined into 'heat maps' which can be used to identify where multiple issues coincide. This in turn, can provide the starting point for the next stage of the assessment, i.e. identifying where the best opportunities for improving the green infrastructure network are.

When looking for solutions, it is important to bear in mind that while for some issues the green infrastructure solution is best located close to where a problem occurs, this does not hold true for all of the issues listed above. Different ecosystem services work at different scales, so the best area to improve for example an issue such as flood risk will not necessarily be in the area where the problem manifests itself. So, it is important not to treat a map of where the issues are, as a map of where the solutions are.

## Step 3: Identifying opportunities



**At a strategic level, where are the best places to address the risks and challenges identified under step 2? What would that look like in practice? For example, could these challenges be addressed by improving existing green infrastructure, or is there a need to create new green infrastructure?**

When it comes to identifying opportunities, Planning Policy Wales encourages planning authorities to consider both the needs of biodiversity and the needs of people, but in many ways these needs are intertwined.

Generally speaking, a functioning, resilient ecosystem is better able to deliver a range of ecosystem services, than a less resilient ecosystem. When it comes to identifying areas where the most significant improvements to the green infrastructure network can be made, NRW would therefore argue that identifying opportunities for improving ecosystem resilience provides a reasonable starting point.

We are however aware that focussing solely on ecosystem resilience is unlikely to address all the priorities that were identified under step 2 of the assessment. This section therefore also provides information on how other ecosystem services could be considered as part of this assessment.

As stated previously, the focus in this guide is on NRW datasets and how these can be used as part of the process of developing a Green Infrastructure Assessment. Others, including your own planning authority may also hold datasets that are useful for this step. We'd also like to stress the importance of supplementing any data used during this stage with stakeholder engagement and discussions with local experts and other local authority departments. Datasets can be a valuable tool to help you explore options, but the final decision of which options are best, are best made in discussion with stakeholders.

### Opportunities to improve ecosystem resilience

Ecosystem resilience has been defined by NRW as “the capacity of ecosystems to deal with pressures and demands, like climate change, changes in land and sea use, pollution, over-exploitation and alien species, either by resisting them, recovering from them, or adapting to them, whilst retaining their ability to deliver ecosystem services and benefits now and in the future” (SoNaRR2020).

NRW considers the designated site network to be an important resource for maintaining ecological resilience, but the resilience of this network depends on a much wider area than that which has been designated. Steppingstones and habitat corridors are important for linking designated sites to both the wider environment and each other, whereas buffer areas around designated sites can help to increase the overall resilience of the network.

Planning Policy Wales 11 (paragraph 6.4.9) has identified the following five, inter-connected attributes of ecosystem resilience:

- Diversity
- Extent
- Condition
- Connectivity
- Adaptability

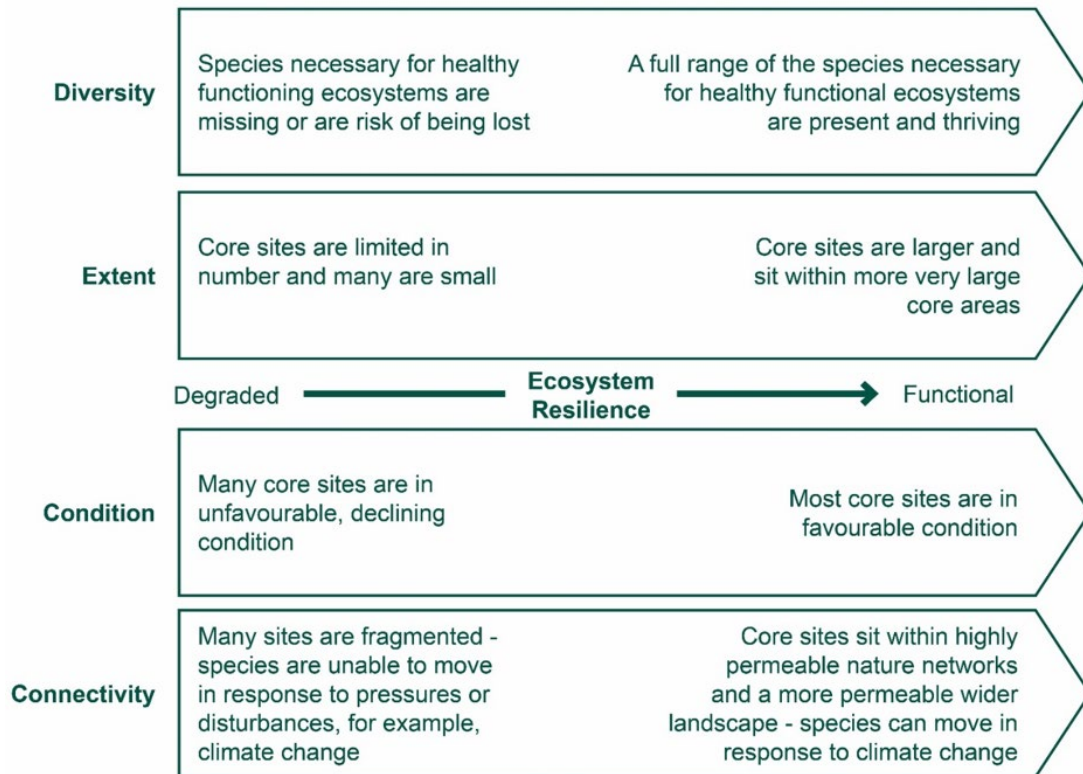
These five attributes together form the DECCA framework. Interventions targeted at improving these attributes are likely to protect and build ecosystem resilience. The DECCA framework therefore provides a useful starting point for identifying actions.

NRW has produced a practitioners' guide for the development of resilient ecological networks which we recommend you read alongside this guidance. The focus in that guide is on protected sites, but many of the principles put forward in this guide for how to build ecological resilience can also be applied to green infrastructure. [The Practitioner's Guide to Resilient Ecological Networks](#) can be accessed on NRW's website.

Examples of what building ecological resilience could look like in the context of green infrastructure include:

- **Improving diversity** by maintaining and restoring a variety of different semi-natural habitats and features and where appropriate managing individual habitats to increase their structural diversity
- **improving the condition** of an area of green infrastructure, for example by changing or enhancing how that area is managed, such as changing a mowing regime, so that the site becomes more attractive to wildlife, or the removal of invasive species, such as Himalayan Balsam
- **increasing the extent** of natural and semi-natural areas so that ecological processes can be maintained or restored. Creating a buffer around important areas of green infrastructure, by restoring or creating similar habitats around the existing area of green infrastructure would be especially beneficial
- **improving connectivity** between areas of green infrastructure as increased connectivity will help species to move around more. This in turn provides greater opportunities for them to complete all their life stages, which may have different environmental requirements, and make them more resilient to environmental stress. Improving connectivity could, for example, be achieved by adding in new wildlife corridors to connect important areas of green infrastructure.

The diagram on the next page further illustrates what building ecosystem resilience could look like in practice.



NRW has a number of datasets that can help in the process of identifying where ecological resilience could most usefully be improved. Some of these are listed under step 1 (useful datasets for mapping biodiversity and ecological resilience).

Also, worth mentioning in this context is NRW's CuRVe dataset which provides a relative ecosystem resilience value for the whole of Wales. More information on this dataset and how it could be used to identifying areas that are likely to be more ecologically resilient and where there are likely to be opportunities to improve this, can be found below.

# 1. Step 3: datasets to help identify opportunities

## Datasets to help identify ecological opportunities

### **CURVE (Current Relative Value of Ecosystem Resilience)**

#### **What does it show?**

The CuRve dataset provides a relative value of ecosystem resilience for the whole of Wales (excluding marine areas). The data is reported on 1 km squares and is derived from a wide range of datasets which relate to the five attributes of ecosystem resilience: diversity, extent, condition, connectivity and adaptability (DECCA).

#### **What can it help me understand?**

This dataset is useful to get an understanding of the current state of ecosystem resilience in an area. It can also be used to analyse the variance of ecosystem resilience within and between given areas and to get a better understanding of what factors drive this variation. As such, it can help inform the prioritisation, design and targeting of interventions for maintaining and enhancing that ecosystem resilience.

For example, the CURVE data can be used to identify where the most important areas for either ecosystem resilience as a whole, or for a particular aspect of ecosystem resilience such as habitat connectivity or condition are in your area. In areas with lower ecosystem resilience, the underlying data on the factors that drive variations in ecosystem resilience can be used to identify how best to improve that resilience.

CURVE is modelled data. This means that it is based on a number of assumptions, which combine to give a general idea of what we can reasonably expect to find in a certain area. There is always a level of uncertainty data is used in combination with local knowledge, before it is used to make a decision for action on the ground.

#### **Where to access and how to use the data**

[CURVE](#) maps can be found on DataMapWales. When displayed using a geographic information system or web-based viewer a series of maps can be viewed. The first of these, is a summary heatmap displaying the current relative value (CuRve) of ecosystem resilience for each 1km squares across Wales. A summary of the factors that underpin this map (and their relationship to DECCA) is set out below.

As well as the overall summary map, there are maps for each of the attributes of resilience, such as diversity, extent and condition, which allow the user to assess which of the attributes contribute to resilience in a particular area and, consequently, where there may be room for improvement. The data set can be further explored by viewing the factor (level 3) map layers within the atlas (see “factors underpinning the CuRve mapping” set out below).

Data in the factor and attribute layers is also displayed in heatmap form, with relative values for each factor and attribute assigned at a 1km square resolution. The values used in these maps range up to 100, with higher numbers indicating that the factor contributes more to resilience.

When using this data, it is important to note that:

- The attribute and CuRve overview maps do not attempt to take account of every potential factor that could affect ecosystem resilience. Factors have been selected based on their relation to DECCA, compatibility and data quality.
- Because of the data's resolution, it is better placed to inform strategic level planning, than it is to inform planning decisions at a development site level.

### Factors underpinning the CuRve mapping

Attribute (level 2): Diversity Factor (level 3): Proportion of land within Sites of Special Scientific Interest
Attribute (level 2): Diversity Factor (level 3): Topographic diversity
Attribute (level 2): Diversity Factor (level 3): Diversity of semi-natural habitats
Attribute (level 2): Extent Factor (level 3): Area of semi-natural habitat extent
Attribute (level 2): Extent Factor (level 3): Patch dynamics
Attribute (level 2): Condition Factor (level 3): Pressure on air quality: Ozone and ammonia emissions
Attribute (level 2): Condition Factor (level 3): Pressure on air quality: Acidification
Attribute (level 2): Condition Factor (level 3): Condition of Special Areas of Conservation (SACs)

Attribute (level 2): Condition Factor (level 3): Water condition
Attribute (level 2): Condition Factor (level 3): Presence of invasive, non-native species (INNS)
Attribute (level 2): Condition Factor (level 3): Diversity of positive plant indicator species
Attribute (level 2): Condition Factor (level 3): Risk of soil erosion
Attribute (level 2): Connectivity Factor (level 3): Number of discreet ecological networks
Attribute (level 2): Connectivity Factor (level 3): Length of connective features
Attribute (level 2): Connectivity Factor (level 3): Presence of river modifications
Attribute (level 2): Adaptability Factor (level 3): Habitat recovery period

### Further guidance

As well as the overall summary map, there are maps for each of the attributes of resilience, such as diversity, extent and condition, which allow the user to assess which of the attributes contribute to resilience in a particular area and, consequently, where there may be room for improvement. The data set can be further explored by viewing the factor (level 3) map layers within the atlas (see “factors underpinning the CuRVE mapping” set out above).

Data in the factor and attribute layers is also displayed in heatmap form, with relative values for each factor and attribute assigned at a 1km square resolution. The values used in these maps range up to 100, with higher numbers indicating that the factor contributes more to resilience.

When using this data, it is important to note that:



- The attribute and CuRVe overview maps do not attempt to take account of every potential factor that could affect ecosystem resilience. Factors have been selected based on their relation to DECCA, compatibility and data quality.
- Because of the data's resolution, it is better placed to inform strategic level planning, than it is to inform planning decisions at a development site level.

The metadata for this data set includes reference to a report which describes the methodology for development of the CuRVe atlas.

### Additional information

A report which outlines the methodology used for developing the CuRVe atlas can be requested from NRW by sending an email to [EPP.Planning@cyfoethnaturiolcymru.gov.uk](mailto:EPP.Planning@cyfoethnaturiolcymru.gov.uk)

## Protected and priority species

While improving the overall ecological resilience of your area is likely to benefit a wide range of habitats and species, you may also find it useful to consider the needs of specific protected and priority species in more detail.

The SoNaRR 2020 report provides information on the species and habitats that are under threat at a national level, while lists produced in response to Section 7 of the Environment (Wales) Act 2016 list habitats and species of principal importance for conservation of biodiversity in Wales.

The SoNaRR 2020 report is published on our website: [Natural Resources Wales / State of Natural Resources Report \(SoNaRR\) for Wales 2020](#)

You can find the interim lists of section 7 habitats and species on: [Wales Biodiversity Partnership - Environment \(Wales\) Act \(biodiversitywales.org.uk\)](http://biodiversitywales.org.uk)

There are many habitats and species included on the interim section 7 list and **not all** of these will necessarily be present in your area.

Of those that are present in your area, some may be affected more severely by development than others. This will, for example, depend on the type and likely impacts of the development, and the species' sensitivities to those ecological impacts.

We would recommend that local expert knowledge (including that of County Ecologists) and information from Area Statements and local strategies and priorities are used to establish if there are any protected and priority species in the area that should be considered in more detail as part of the assessment. Local Record Centres will be an important source of information and we would also encourage you to work with your Local Nature Partnerships to identify what the key priority and protected species are that should be considered as part of the Green Infrastructure Assessment.

As part of this process, we recommend that you consider the following questions:

- Which protected and priority species are present your area?

- Should any of these be considered in more detail as part of the Green Infrastructure Assessment, for example because they are likely to be significantly affected by development?
- What green infrastructure assets do they use and are any of these likely to be affected by development? If so, could these be identified as key green infrastructure assets in the assessment? How could the Green Infrastructure Assessment be used to protect and improve these assets?

## Identifying opportunities: other services

While improving ecosystem resilience may provide a logical starting point for a Green Infrastructure Assessment, focussing solely on ecosystem resilience won't necessarily address all the priorities that were identified under step 2 of the assessment. It is true that there are often opportunities to improve the local environment in a way that benefits both people and biodiversity, but the best places to meet the needs of either of these do not necessarily coincide. This is why, when looking at opportunities, it is essential to be clear about what the priorities are for your area, how these are best balanced in different places, and how these could be delivered.

Areas that provide an opportunity to deliver multiple benefits at the same time, are likely to be important areas from a green infrastructure point of view. But there may also be areas that are capable of delivering a much more limited range of benefits. These areas could still be important, for example if there are not many other areas that can deliver these benefits, or if delivering these benefits is likely to have a significant impact on either people's wellbeing or the environment.

NRW has produced a number of datasets that can be used as a starting point for identifying where the best areas may be for addressing specific environmental issues. More information about these datasets can be found over the next few pages.

These datasets can be used either individually, to identify the best areas for improving a particular issue, or in combination with datasets such as CuRVE and habitat connectivity to identify areas where benefits to both people and biodiversity can be delivered together.

When considering the information set out over the next pages, it is important to bear in mind that while green infrastructure can make a significant difference to certain issues, the impact of green infrastructure on other issues such as river flooding and noise and air pollution, is more limited. So, while our maps show the best areas for improving a range of issues, this does not mean that green infrastructure by itself can completely resolve these problems. There will be cases where green infrastructure will be more effective when used alongside other measures, than it is as a stand-alone solution.

## Datasets to help identify opportunities to improve the provision of ecosystem services

NRW's WINS project aims to improve our understanding of how the natural environment delivers environmental benefits to people and where there may be opportunities to deliver more, or a wider range of these ecosystem services. The acronym WINS stands for "Welsh Information for Nature Based Solutions".

The maps that were created as part of this project focus on the five policy themes set out in the Natural Resources Policy:

- Ecological Resilience and Connectivity
- Marine and Freshwater Water Quality
- Natural Flood Management
- Woodland Planting (for a number of different objectives)
- Urban and Peri-Urban Green Infrastructure

For each of these themes, maps were created which show the areas that are currently likely to contribute to these themes (stock maps), and where there may be potential for improvement (opportunity space).

The WINS data gives an insight into how the environment functions and which areas are likely to be important for providing a range of ecosystem services. The data can be used as a starting point to help identify what is most important in an area and where there may be potential to improve the provision of ecosystem services and deliver improvements to wellbeing.

The WINS maps cover a wide range of ecosystem services and benefits and not all of these will necessarily be relevant within the context of green infrastructure planning. The next page shows the maps which we consider to be most relevant in the context of green infrastructure planning.

### **How to use the WINS data**

The maps are intended as a source of information that can be used as a starting point for identifying management options. They are not definitive instructions about what the best land management options are in a particular location and the maps should not be used as such. Where relevant the information needs to be supplemented with other sources of information and/ or stakeholder engagement to ensure that other factors such as the need for a particular service and/ or the preferences of stakeholder are considered.

The maps were produced to inform action at a strategic level, rather than on a site basis. There is nevertheless potential to use the data as a starting point for identifying options at the local level, provided the limitations on how to use the data, as set out in this section are borne in mind.

Many of the maps are based on modelled data. The level of modelling used is different for each map, as is the estimated accuracy of each model. For some of the modelled data inputs the level of accuracy is known (e.g. slope data modelled from the NRW Digital Terrain Data DTM data), while for others the accuracy is unknown (e.g. Ffridd search area).

Modelled data always introduces a level of uncertainty into the final dataset and we therefore consider it essential that other sources of information and/or ground survey are used before the data is used to inform action on the ground.

More information about the WINS project [can be found on the WINS portal](#). A technical report was produced for this project which identifies all data that has been modelled, and describes the limitations identified of each dataset. This user guide can be requested from [library@cyfoethnaturiolcymru.gov.uk](mailto:library@cyfoethnaturiolcymru.gov.uk)

## **WINS: Demand for Urban Greenspace - Air Pollution**

### **What does it show?**

The map identifies areas where there are known air quality issues and considers three separate factors to identify potential areas for intervention. The three factors are the intensity of the air pollution problem, population density and relative levels of deprivation.

## **WINS: Demand for Urban Greenspace - Noise Pollution**

### **What does it show?**

The map shows areas where there are problems with noise pollution and considers three separate factors to identify potential areas for intervention. The three factors are the intensity of noise pollution problem, population density and deprivation.

## **WINS: Demand for Urban Greenspace - Risk of Pluvial Flooding**

### **What does it show?**

This map shows areas at risk of standing water accumulating during heavy rainfall and areas at risk of strong overland flow (surface water run off). This information can be used as a starting point for identifying areas where green infrastructure interventions could be used to help disrupt flow paths. An additional map has been created which shows where taking action is likely to be of most benefit based on population density and the Welsh index of multiple deprivation.

## **WINS: Demand for Urban Greenspace - Urban accessible greenspace**

### **What does it show?**

The map shows urban greenspace and identifies greenspaces that are more likely to have a more 'natural' feel, as this has been shown to have the greatest impact on improving mental health issues. The map also shows the 'catchment area' for each greenspace, which are the areas that are in close proximity to the greenspace.

Urban areas that do not currently have access to greenspace have been identified, and prioritised according to the number of people affected by the lack of greenspace and the relative level of deprivation in the area. This has been summarised as part of a greenspace demand map.

### **Where to access the data**

All four "WINS: Demand for Urban Greenspace" data layers described above can be viewed by visiting the [Wales Environmental Information Portal](#).

## **WINS: Opportunities for community woodlands**

### **What does it show?**

The map shows the current woodland resource within 2km of urban areas and identifies additional opportunities for creating community woodlands. Demand for additional woodlands has been estimated based on a combination of the number of children living in the area and relative deprivation levels.

### **Where to access the data**

The data can be viewed by visiting the [Wales Environmental Information Portal](#)

## **WINS: Opportunities for bog restoration**

### **What does it show?**

The map shows bog habitat that is currently in degraded condition. In these areas there is likely to be significant scope to improve these habitats with the aim of delivering a range of services, including the maintenance of an important carbon store. Peat soils under coniferous plantations also provide a potential opportunity for improvement, particularly if the peat soil is in good condition.

### **Where to access the data**

The data can be viewed by visiting the [Wales Environmental Information Portal](#).

## **Datasets to help identify opportunities for water management (flood risk and water quality)**

There are two different data products available that can be used to help identify areas where maintaining and improving green infrastructure could be beneficial in helping to mitigate flood risk; NRW's natural flood management opportunity maps and WINS flood risk opportunity maps.

These two datasets cover similar issues, but the WINS dataset is underpinned by more detailed data. The Natural Flood Management Opportunity maps were developed as part of the Working with Natural Processes Research & Development project<sup>1</sup> covering England and Wales, and are therefore more useful where there is a need to identify and consider cross border issues (i.e. between Wales and England).

The two data products should align, but as the WINS data includes a wider range of datasets in its analysis there may be some inconsistencies. Where this is the case, the WINS dataset takes precedence.

## **Natural Flood Management opportunity maps**

### **What do these maps show?**

These maps are hosted by the JBA Trust and can be used to help identify areas where fluvial flood risk can be reduced by working with natural processes. There are a number of different data layers available, including:

- **Floodplain Reconnection Potential:** this is our best estimate of locations where it may be possible to establish reconnection between a watercourse and its natural floodplain, especially during high flows.
- **Floodplain Woodland Planting Potential:** this is our best estimate of locations where tree planting on the floodplain may be possible, and effective to attenuate flooding.
- **Riparian Woodland Potential:** this is our best estimate of locations where tree planting may be possible on smaller floodplains close to flow pathways, and effective to attenuate flooding.
- **Runoff Attenuation Potential:** this is our best estimate of locations of high flow accumulation across the land surface or in smaller channels, where it may be possible to temporarily store water and attenuate flooding during high flows.
- **Wider Catchment Woodland Potential:** this is our best estimate of locations where there are slowly permeable soils, where scrub and tree planting may be most effective to increase infiltration and hydrological losses.

### Where to access the data

These maps are hosted by the JBA trust and [can be accessed on their website.](#)

### Additional information

It is recommended that the Natural Flood Management Opportunity maps are used alongside the [Working with Natural Processes Evidence Directory](#) to help users think about the types of measures that could be used and where they may be most effective within a catchment.

There is also a written guide which sits alongside the Evidence Directory and the maps, which explains how to use them to develop a business case for implementing working with natural processes to reduce flood risk. This can also be accessed by following the link above.

## Welsh Information for Nature Based Solutions (WINS)

### What do these maps show?

As part of the WINS project (Welsh Information for Nature Based Solutions), a number of maps were created that are relevant for flood risk management. These are:

**WINS: Demand for natural flood management:** This map shows catchments feeding into urban areas that are at an elevated risk from fluvial flooding. These are the areas that are likely to benefit most from flood management solutions, including natural flood management.

**WINS: Woodland Planting Opportunities for Natural Flood Risk Management:** This map identifies opportunities for woodland planting that are likely to deliver flood management benefits.

It covers opportunities for riparian planting and drainage channel shelter belts, woodland planting opportunities in floodplains and woodland opportunities in the wider catchment. There is an additional data layer which shows catchments that are feeding into urban areas that are at an elevated risk from fluvial flooding. This is where demand for natural flood management is likely to be greatest. By looking at the two data layers alongside each other, areas where natural flood management is likely to result in the most significant benefits can be identified.

As well as a map that brings all the opportunities together, there are separate maps showing the opportunities and constraints for planting catchment, floodplain and riparian woodland, as well as bog restoration, which can bring a significant amount of other benefits, such as improvements to water quality, improving ecosystem resilience and reducing carbon emissions. These detailed maps can be used to pinpoint more specific interventions.

**WINS: Reducing Risk of Pluvial Flooding:** This map shows the risk of standing water accumulating during heavy rainfall as well as the areas which are at risk.

#### Where to access the data

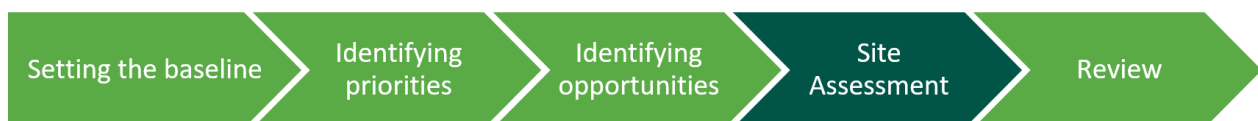
The data can be viewed by visiting the [Wales Environmental Information Portal](#)

The Pluvial Flooding map can be found under the Urban Green Infrastructure tab.

#### Additional information

More information about how to use and interpret the WINS datasets [can be found on the WINS portal](#). There is also a **WINS user guide**, which can be requested by sending an email to [library@cyfoethnaturiolcymru.gov.uk](mailto:library@cyfoethnaturiolcymru.gov.uk)

## Step 4: Green infrastructure at a site level



**Building on the evidence gathered during steps 1-3, what important green infrastructure assets can be found on proposed development sites? What are the main threats and challenges this green infrastructure is exposed to? What opportunities are there to maintain and improve this green infrastructure as part of the development process?**

The datasets mentioned in the previous sections can be used to help identify opportunities at a strategic level. For example, these can be used to identify the best places to build

ecosystem resilience on a county wide scale, or to assess if there are any strategic opportunities to improve other ecosystem services.

As part of the Green Infrastructure Assessment, it could also be helpful to identify what opportunities there are for maintaining and improving the green infrastructure network at a more detailed level. This can be a particularly useful exercise to undertake in areas that are under pressure from development, such as around allocation sites.

By bringing together evidence on the green infrastructure assets that are currently important on a site, as well as what opportunities there are to improve these as part of a development, the Green Infrastructure Assessment can help local authorities in implementing the Section 6 Duty. Doing so will also help meet the expectations set out in the [Dear CPO letter \(dated 23/10/2019\)](#).

In this letter, Welsh Government asked local authorities to ensure that biodiversity and ecosystem resilience considerations are taken into account at an early stage in the development plan preparation, as well as when considering development proposals. Carrying out more detailed assessments for sites that are under pressure of development, should help to ensure that any key green infrastructure assets, and opportunities to improve them in these areas, are not lost.

If a more in-depth assessment is undertaken, we would recommend that it builds on the outputs from steps one to three as set out in this guidance. This will help to ensure that site assessments take account of the strategic context and avoid a situation where green infrastructure ends up being planned on a more piecemeal basis.

Some of the datasets mentioned in this guide go down to a fine level of detail, but others work best at a broader scale. For a more in-depth assessment of specific sites, we therefore recommend that data gathered during steps 1-3 is supplemented with more local information, such as that which can be obtained from recent aerial photographs, site surveys and local expert knowledge.

The site assessment could usefully consider the following points:

### **1. Avoid causing damage**

In line with Planning Policy Wales, the first priority for creating a resilient green infrastructure network is to avoid causing damage to those green infrastructure assets that already exist on the site. As a first step it would therefore be useful to establish what the current state of the site is. The following questions may be worth considering as part of this:

- Applying the attributes of ecosystem resilience, as set out in Planning Policy Wales (para. 6.4.9), what is the baseline state of biodiversity and ecological resilience of the site? What is the condition of the site and what are the main threats or pressures affecting it?
- How does the site relate to the wider landscape? Are there any protected sites nearby? Are there protected or priority species on, or in the vicinity of the site? Are these likely to be dependent on the proposed development site in any way? Does, or could, the site, play a role in connecting up other habitats?



- What are the key green infrastructure resources in and around the allocation site? What ecosystem services do these provide? Should any of these green infrastructure resources be safeguarded?
- How might development affect these green infrastructure assets, protected sites or protected or priority species? What can be done to avoid damage to these green infrastructure and ecological assets?

## **2. What opportunities are there to improve the existing green infrastructure on the site?**

When it comes to opportunities to improve existing green infrastructure you could consider the following:

- Are there opportunities to improve the condition of the green infrastructure assets or ecological assets that can already be found on the site? For example, by putting long-term management agreements for green infrastructure assets in place.
- Are there opportunities to improve the extent or connectivity of the current green infrastructure? For example, by creating buffers around existing habitat, or connecting up areas of green infrastructure that are on and off site?
- In the case of biodiversity improvements, how long is it likely to take before a net benefit for biodiversity can be achieved? Welsh Government's Principles for Achieving a Net Biodiversity for Biodiversity (draft, unpublished) specify that improvements should be achievable within as short a time as possible. This may have implications for the types of green infrastructure solutions that are used.
- Are there any other issues in, or around the site that could be addressed through green infrastructure, such as flood risk or climate change mitigation? What are these, where and how might these be addressed?
- Are there any other benefits that could be delivered through green infrastructure on the site?

## **3. Delivering new green infrastructure**

- Building on the results of points 1 and 2 above, what potential is there to create new green infrastructure, such as SuDS<sup>1</sup>, recreational space, or green transport networks? Where would be the best places to do this?
- How could the long-term management of this new green infrastructure be secured?
- Are there any risks that new green infrastructure could have a negative impact, such as the impact of streetlights on nocturnal, light-sensitive species along active travel routes?

Evidence gathered as part of the strategic green infrastructure assessment can help to inform this work, but please note that because of the grain of some of our datasets, it is

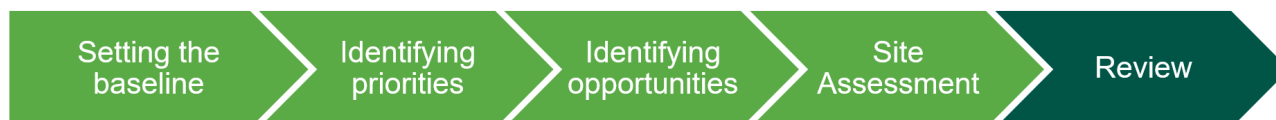
---

<sup>1</sup> Almost all new development must include a sustainable drainage system (SuDS) which must meet criteria for amenity and biodiversity. SuDS deliver many functions in the same place and offer great opportunities to safeguard, connect and create new green infrastructure. The Wales SuDS standards can be accessed here: <https://gov.wales/sites/default/files/publications/2019-06/statutory-national-standards-for-sustainable-drainage-systems.pdf>.

always best to supplement this data with local knowledge when applying this information at a more detailed level.

An example of how this type of assessment could be undertaken can be found in [Monmouthshire's Green Infrastructure Study](#)

## Step 5: Review of the Green Infrastructure Assessment



### **Is the Green Infrastructure Assessment helping to deliver the desired results? If not, should the Green Infrastructure Assessment be reviewed?**

Planning Policy Wales specifies that Green Infrastructure Assessments should be regularly reviewed to ensure that information on habitats, species and other green features and resources is kept up to date (PPW 11. Paragraph 6.2.12). Planning Policy Wales does not specify how often the assessment should be reviewed. It could be argued that there are different triggers for reviewing different parts of the assessment and that it may therefore not always be necessary to review the entire Green Infrastructure Assessment. For example:

#### **Step one: setting the baseline**

The baseline should be reviewed when new datasets become available, or when significant changes are made to any of the datasets that form the basis for this part of the assessment. While NRW regularly reviews and updates some of its datasets, this is not the case for all the datasets mentioned in this guide.

If you used NRW datasets for your assessment, we would recommend that you look at Annex 1 of this document to see if any of these datasets have been updated since you carried out your GIA.

#### **Step 2 and 3: identifying priorities and opportunities**

Unless there are significant changes to the green infrastructure baseline, such as the identification of new habitat networks, step 2 and 3 do not necessarily need to be updated every time new data becomes available.

We suggest that a review of step 2 and 3 should be triggered if:

- The plans or policies that informed step 2 (identifying priorities) are updated. This may, for example, include new, or different priorities identified in Area Statements, or Well-being plans, for as far as these are relevant in the context of green infrastructure
- Monitoring highlights that the Green Infrastructure Assessment is not helping to deliver the desired results

Planning Policy Wales only provides limited information on monitoring. It instructs planning authorities to use the best available data to monitor a set of key species and habitats.

These indicators should be incorporated into both the Annual Monitoring Reports, and where appropriate, into the Section 6 Plan and Report (PWW11, paragraph 6.2.12)

These indicators could be used to assess if the Green Infrastructure Assessment is delivering the desired results. However, as these indicators are limited to biodiversity and ecosystem resilience, they are unlikely to provide a complete picture of whether the Green Infrastructure Assessment is making a real difference on the ground. It may therefore also be useful to monitor a few additional indicators.

The planning authority will need to decide what would be most meaningful to monitor in their area. One option could be to develop indicators for some, or all of the priorities identified as relevant under step 2. Examples of what that might look like include indicators on tree cover and/ or urban trees, surface water flooding or access to green space.

Alternatively, if the planning authority has decided to develop a Green Infrastructure Strategy or Plan which includes green infrastructure targets, then those targets could also be used as a basis for the development of indicators.

#### **Step 4: Site assessment**

We recommend that the site assessment is reviewed if any of the information that is brought together under step 1, or steps 2 and 3 changes.

### **Additional resources**

The [Habitat Opportunity Mapping in Northamptonshire and Peterborough report](#) produced by Natural Capital Solutions in 2018 for the Nene Valley Nature Improvement Area outlines a GIS based approach to the identification resilience and deliver ecosystem services.

The [WFD advice note for local authorities](#) provides further guidance on the use of sustainable drainage systems, including the Greener Grangetown, Cardiff case study which showcases what can be achieved through SuDs.

The Landscape Institute's [Position Statement on Green Infrastructure](#) details a number of examples of how to plan and implement green infrastructure.

[LANDMAP Landscape and a Changing Climate \(2019\)](#) explores the direct and indirect impacts of projected climate change on the landscape characteristics and qualities by 2050. The changing climate of Wales is likely to have significant direct and indirect impacts on landscape character and quality. Landscape change may also be evident from mitigation and adaptation measures. Landscape character can provide an important communication tool to raise awareness and understanding of the risks and opportunities of climate change because people relate to landscapes as places to live, work and enjoy.

Part II identifies the landscape and visual changes from potential mitigation and adaptation measures and how these may impact upon landscape types, their character and qualities.

## **Glossary**

**Ecological networks:** The connections within and between ecosystems, which allow movement of and interaction between species.

**Ecosystem:** An ecosystem is made up of living organisms, plants, animals and micro-organisms, in conjunction with their non-living environment, air, water, minerals and soil, and all the diverse and complex interactions that take place between them (PPW 11, paragraph 6.4.1).

**Ecosystem resilience:** The capacity of ecosystems to deal with disturbances, either by resisting them, recovering from them, or adapting to them, whilst retaining their ability to deliver services and benefits now and in the future (SoNaRR 2016).

**Ecosystem services:** The benefits that are provided by ecosystems, which contribute to making human life both possible and worth living. Examples include products such as food and water, regulation of floods, soil erosion and disease outbreaks, as well as non-material benefits such as recreational and spiritual benefits in natural areas. The term ‘services’ is usually used to encompass the tangible and intangible benefits that humans obtain from ecosystems, which are sometimes separated into ‘goods’ and ‘services’.

**Green infrastructure:** “the network of natural and semi-natural features, green spaces, rivers and lakes that intersperse and connect places” (PPW 11. Paragraph 6.2.1).

**Green Infrastructure component or asset:** the elements that make up a green infrastructure network. These range in scale from individual street trees to entire ecosystems (PPW 11) and include rivers, streams, canals and other water bodies, sometimes called ‘blue infrastructure’.

## Annex 1: A list of key datasets

Name of dataset	Download link	Date of last update
All Wales Green Space Dataset	This dataset is available from NRW on request by sending an email to <a href="mailto:EPP.Planning@cyfoethnaturiolcymru.gov.uk">EPP.Planning@cyfoethnaturiolcymru.gov.uk</a> Public Sector Geospatial Agreement members can access the data via DataMapWales	2020
Urban Tree Canopy Cover	<a href="#">Urban Tree Cover 2018</a>	03/12/2020
Protected Sites Network	<a href="#">Unitisation</a> data set	22/01/2021
Phase I Habitat Survey	<a href="#">Terrestrial Phase 1 Habitat Survey</a>	31/12/1997
Habitat Network Maps	<a href="#">Habitat Networks</a>	01/01/2008
Unified Peat Map	<a href="#">Unified Peat Map of Wales</a>	01/06/2015
National Forest Inventory	<a href="#">National Forest Inventory Wales 2016 (Forest Research)</a>	29/10/2015
LANDMAP	<a href="#">Geological Landscape</a> , <a href="#">Landscape Habitats</a> , <a href="#">Visual &amp; Sensory</a> , <a href="#">Historic Landscape</a> , <a href="#">Cultural Landscape</a> .	01/09/2017

Name of dataset	Download link	Date of last update
Tranquil Area Map of Wales	<a href="#">Tranquil Areas Wales</a>	31/03/2009
Flood Risk Assessment Wales	<a href="#">Flood Risk Assessment Wales</a>	19/02/2021
Communities at Risk Register	<a href="#">Communities at Risk Register (CaRR)</a>	September 2019
Working with natural processes (natural flood risk management)	The data can be viewed here: <a href="#">Working with Natural Processes: Map (jbahosting.com)</a>	July 2014
Accessible Greenspace Toolkit	This toolkit is available from NRW on request by sending an email to <a href="mailto:EPP.Planning@cyfoethnaturiolcymru.gov.uk">EPP.Planning@cyfoethnaturiolcymru.gov.uk</a>	n/a
CuRVE	<a href="https://datamap.gov.wales/layergroups/inspire-nrw:CuRve">https://datamap.gov.wales/layergroups/inspire-nrw:CuRve</a>	April 2021
WINS	The data, and accompanying background information can be <a href="#">viewed on the WINS portal</a>	April 2020

## Annex 2: LANDMAP

LANDMAP is highlighted in Planning Policy Wales as a key data source for Green Infrastructure Assessments. In the section below we have made a start with identifying the questions from LANDMAP (Q) that are likely to be most useful in the context of green infrastructure.

The **LANDMAP Geological Landscape** dataset identifies the physical and geological influences that are intrinsically linked to the landscape contributing to local distinctiveness, geodiversity and may be assets to include within the network for cultural benefits. It identifies areas of outstanding and high geological landscape value (Q33 & 24), highlights where the integrity of features and exposures should be conserved (Q21), their rarity (Q31) and Q32 if they are a classic example. The classification and Q4,5 & 6 explain topographical character and characteristic components and we consider these questions to be most relevant in the context of planning green infrastructure.

This dataset is best used alongside other geological datasets, such as Geological Conservation Review Sites, Regionally important geological and geomorphological sites and Geoparks. Links to these datasets are provided in the spreadsheet that is linked to this guide.

The **LANDMAP Landscape Habitats** dataset identifies primary and mosaic habitats at a landscape scale, including Phase I, important species and BAP habitats which could be incorporated into a green infrastructure network (classification and Q 5, 7, 9, 11,14 & 24). Q2 identifies landscapes with special or functional links and Q42 connectivity and cohesion, opportunities for enhancing connectivity and resilience of ecosystems. Understanding value (Q45 & 46), trend (Q27) and areas showing real change (1b) can help identify opportunities

for enhancement (areas of moderate value or declining) and conservation (identified as high and outstanding value, constant and improving).

This dataset is best used alongside the datasets set out in the ecological resilience section of this guide, which provide finer grained information on what habitat connectivity and ecosystem resilience mean at a local level.

The LANDMAP **Visual and Sensory** dataset identifies landscape characteristics, qualities and patterns that contribute to local distinctiveness, sense of place, setting and tranquillity (Q3, 10, 24 & 25), benefits important for health and well-being. Boundary types identified in Q 7 can contribute to understanding of opportunities for improving these important landscape elements. Opportunities to reinstate lost features or enhance existing features through improvement, conservation and change can be sourced from Q31, 33-38 & 39. Understanding value (Q46 -51), trend (Q28) and areas showing real change (1b) can help identify opportunities for enhancement of lower quality landscapes with the aim of contributing to wellbeing (areas of moderate or low value or declining) and/or landscape conservation (identified as high and outstanding value, constant and improving).

Q54 provides the landscape type key to link to the report on the potential impacts of climate change on landscapes available from

<https://cdn.naturalresources.wales/media/688626/eng-landmap-landscape-and-a-changing-climate.pdf?mode=pad&rnd=131989289330000000>

The **LANDMAP Historic Landscape** dataset identifies historic land uses, patterns and features that contribute to historic landscape character (Q4) and archaeological interest (Q13) contributing to cultural services and benefits related to heritage. It includes traditional boundary features mapped consistently at a pan-Wales level (Q12) highlighting important historic linear connections for green infrastructure networks. Areas of outstanding and high historic landscape value are identified (Q40-41) as are principal management recommendations (Q27).

The LANDMAP **Cultural Landscape Services** dataset identifies the Wales Tranquil Area assessment (Zone B significant disturbance; Zone C some disturbance; Undisturbed; Urban) in the context of the LANDMAP Visual & Sensory areas (Q6) and any Dark Sky status (Q7).