

sirgar.llyw.cymru
carmarthenshire.gov.wales

Revised 2018-2033 Local Development Plan

Green and Blue Infrastructure Assessment Technical Report

December 2023

Mae'r ddogfen yma hefyd ar gael yn Gymraeg

This document is also available in Welsh

Cyflwynir elfennau wedi'u mapio a gynhyrchwyd o'r asesiad hwn ar Fap [Cynigion a Mapiau Mewnosod yr Ail Gynllun Datblygu Lleol Diwygiedig](#)

Mapped elements produced from this assessment are presented on the [Second Revised LDP Proposal Map and Insets Maps](#)

Contents

1. Introduction.....	3
1.2. Purpose of this Assessment.....	4
1.3. Defining the 'GBI Approach'	4
1.4. What is GBI?	5
2. Value of GBI	6
3. Legislative Framework	11
3.2. Methodology.....	16
4. GBI Baseline (Step 1)	18
4.1. GBI Assets Considered.....	18
4.2. Assigning GBI Functions	20
4.3. Mapping Methodology	22
5. Identifying Priorities (Step 2).....	25
5.2. International Context	25
5.3. National Context.....	27
5.4. Regional Context.....	28
5.5. Local Context	29
6. Identify Opportunities (Step 3)	34
6.2. Wellbeing & Recreation.....	34
6.3. Biodiversity & Ecosystem Resilience	35
6.4. Woodlands & Air Pollution.....	36
6.5. Water Quality	37
6.6. Policy Implementation	38
7. rLDP Site Assessment (Step 4)	40
8. Review (Step 5)	55
8.2. Conclusion	56
Appendices.....	57
Appendix A: GBI Typology & Mapping Data Sources	57
Appendix B: Asset & Function GBI Theme Alignment.	61
Appendix C: rLDP Issues Identification.....	62
Appendix D: Stakeholder Engagement.....	64
References.....	71

Abbreviations

(r)LDP (revised) Local Development Plan (also referred to as the 'Plan')

BBNP Bannau Brycheiniog National Park

CBEEMS Carmarthen Bay and Estuaries European Marine Site

CCC Carmarthenshire County Council (unitary area referred to as 'County')

CMM Caeau Mynydd Mawr

CRoW Countryside and Rights of Way Act 2000

GBI Green and Blue Infrastructure (Assessment – syn. with GIA)

HRA Habitats Regulations Assessment

LA(s) Local Authorit(y/ies)

LNR(s) Local Nature Reserve(s)

LPA(s) Local Planning Authorit(y/ies)

NbS Nature-based Solutions

NFI National Forest Inventory

NNRP National Natural Resources Policy

NRW Natural Resources Wales

PEN Priority Ecological Networks

PPW Planning Policy Wales

PRoW Public Rights of Way

PSB Public Service Body

SAC Special Areas of Conservation

SDGs Sustainable Development Goals

SNMR Sustainable Management of Natural Resources

SPA Special Protection Areas

SPG Supplementary Planning Guidance

SSSI Sites of Special Scientific Interest

SuDS Sustainable Drainage Systems

1. Introduction

- 1.1.1. Green and Blue Infrastructure (GBI) is an effective way to complement the built environment whilst alleviating various social, economic, and environmental challenges that are pertinent to delivering sustainable development. In essence, it is focused on actualising the benefits of public goods, ecosystem services, and natural resources whilst also safeguarding the environment for the enjoyment of future generations. In many instances, the enhancement of the GBI network can reduce costs for individuals, businesses (including developers), and public bodies, whilst enhancing the wellbeing of our communities and complementing traditional infrastructure. The benefits of GBI have been evidenced through peer reviewed studies undertaken throughout Wales, the UK, and internationally. Such research has been promoted and summarised in detail by many environmental organisations including Natural Resources Wales (NRW), the Wildlife Trust, and Forest Research, and is later discussed in Chapter 2.
- 1.1.2. Nationally, Welsh Government has produced guidance for public bodies on integrating GBI into decision-making, particularly within planning. This is in line with the strategic focus and international ambition of resolving climate change, and is further highlighted through the £8.1bn of support recently invested into the development of related infrastructure¹. At the local level, Carmarthenshire County Council (CCC) has itself declared both a climate and nature emergency², and is committed to resolving the fundamental issues driving these. Within our collective policy making toolkit, thoughtful GBI remains at the forefront for promoting sustainable development and delivering solutions for pertinent issues.



1.2. Purpose of this Assessment

- 1.2.1. The purpose of the present GBI assessment (alternatively known as a GIA) is to inform the development and implementation of the 2nd Deposit revised Local Development Plan (rLDP) 2018–2033. This documents plays a key part of the rLDP evidence base and sits alongside other related assessments such as the Integrated Sustainability Appraisal and Public Open Space Assessment. Together, these documents help foster an inclusive and transparent process when developing associated land management policies, and ultimately helps to ensure that the rLDP is integrated with local needs, the legislative framework, and strategic priorities (as later discussed).
- 1.2.2. Planning Policy Wales (PPW) states that Local Planning Authorities (LPAs) “*should seek opportunities to increase habitat connectivity, mitigate habitat fragmentation, and secure wider green infrastructure benefits along transport networks*” by undertaking a GBI Assessment (Paragraph 4.1.33, Edition 11)³. As later established in Chapter 4, the present assessment effectively forms the environmental baseline for the proactive management and enhancement of the County’s natural resources, in line with the growth delivered by the rLDP. Additionally, it seeks to provide a mechanism to support the implementation of local planning policies with the aim of promoting a GBI approach within land-use planning, and ensures that GBI forms an integral part of future development.

1.3. Defining the ‘GBI Approach’

- 1.3.1. A GBI approach to land-use planning, design and management enables us to efficiently deliver more from the land in a sustainable way. By considering the wide range of functions that GBI can provide simultaneously, GBI can help enhance the primary use of the land whilst unlocking a number of other benefits. At its heart, the aim of GBI is to sustainably manage the many (often conflicting) pressures for housing, industry, transportation, energy, agriculture, nature conservation, recreation, and aesthetics. Implementing GBI is much more than traditional provision of green space such as parks and gardens. A strategic approach focused on delivering Nature-based Solutions (NbS) must be multifaceted, and should encompass other initiatives to address a range of current and future socio-economic and environmental challenges.

1.4. What is GBI?

- 1.4.1. Green infrastructure is defined by PPW as a multifunctional “*network of natural and semi-natural features, green spaces, green corridors, rivers, and lakes that intersperse and connect places*”⁴. On a landscape scale, this can comprise of entire ecosystems such as wetlands, woodlands, heathlands, and waterways. On a local scale, it might comprise of parks, fields, footpaths, Public Rights of Way (PRoW), cycle ways, common land, open access land, canals, allotments, cemeteries, landscaped areas, and gardens. On smaller scales, individual urban interventions (e.g., street trees, roadside verges, and green roofs) can all contribute to the GBI network, its functionality, and the overall derived ecosystems services and public goods.
- 1.4.2. In recognition of the important role which nature-based Sustainable Drainage Systems (SuDS) and aquatic habitats such as wetlands and ponds have within the built environment, a more complete notation of GBI is made within this report.
- 1.4.3. When appropriately designed, constructed, and managed, GBI has the potential to deliver a wide range of benefits for people and wildlife. Planning integrated with GBI is increasingly seen as an alternative to retrofitting costly grey infrastructure however, it requires deliberate action on reshaping our traditional ways of working. Additionally, as a signatory of the [Placemaking Charter for Wales](#), CCC is committed to the development of sustainable quality homes. Thoughtfully integrated GBI can help promote the principles of placemaking which are centred around People and Community, Movement, Public Realm, Location, and Identity, amongst other factors.

2. Value of GBI

2.1.1. This chapter discusses the benefits that GBI can provide across several themes.

Health & Well-being

2.1.2. Research has found that spending time in and around nature provides protection against a range of diseases, including depression, diabetes, obesity, ADHD, cardiovascular disease, and cancer⁵. Other research has shown that people are more active if they live within attractive and inspiring natural environments⁶.

2.1.3. GBI can also have a positive influence on air quality through the absorption and interception of air pollutants, lowering air temperatures (via transpiration) reducing ozone formation, and through oxygen production.

2.1.4. Research linking well-being and GBI is well established, and has shown that:

- People who moved to live in areas with high greenspace provision experienced both an immediate and sustained improvement in their mental health⁷;
- People living near green spaces experience fewer mental and physical health problems than those in more built-up areas⁸;
- People who live farthest from public parks are 27% more likely to be overweight or obese compared to those living near parks⁹;
- Asthma rates among children falls by 25% for every extra 343 trees per square kilometre in the places where they lived¹⁰;
- Between 90 and 94% of people who took part in green exercise reported better mental and physical health, with research also showing that physical activity in green environments has greater psychological and physiological benefits than physical activity in other settings¹¹.

Sense of Place

- 2.1.5. GBI can make a positive contribution to improving quality and sense of place. Provision of well-maintained greenspace can have a positive effect on local activities and businesses, and improve the perceived image of urban environments and the confidence of inhabitants and potential investors. Multifunctional GBI situated close to places where people live, socialise, and work, has been shown to be strategically important for quality of life¹². Associated biodiversity benefits have also been shown to have intrinsic links to both language and culture¹³, with many unique words and phrases obtained from the natural world.

Social Cohesion

- 2.1.6. Quality greenspaces can positively impact several key social indicators. For example, the addition of street trees and accessible greenspace have been shown to make neighbourhoods more attractive, relaxing, comfortable, and welcoming¹⁴. Additionally, GBI can help to increase levels of social interaction and integration, bringing together individuals from different social groupings that may not usually interact, alongside helping to facilitate a sense of community¹⁵.
- 2.1.7. Research has shown that 83% more people engaged in social activity within greenspaces as opposed to 'non-green' settings. In one study, greenspace in a housing complex was shown to increase social activity and instil a sense of community, with people learning more about their neighbours alongside feeling supported¹⁶.
- 2.1.8. GBI has also been attributed to reducing crime levels in areas as greenspaces are often more used and surveilled¹⁷. Social ties can be stronger in greener communities. Reported incidences of domestic violence, as well as burglary and general crime, have been shown to be lower in residences near natural spaces¹⁸.

Economy

- 2.1.9. Protecting and investing in GBI can support economic success and sustainable growth. GBI and the natural environment underpins our economy, providing a vast number of products and services which are worth millions of pounds to local, regional, and national economies¹⁹. Our landscape, environment and wildlife are amongst its greatest resources, worth more than £8bn to the Welsh economy²⁰.

Well-being benefits

2nd Deposit rLDP

2.1.10. Accessible GBI can provide many potential health and wellbeing benefits, which, in turn, can have positive economic effects. In the UK, greenspaces have been shown to be worth at least £30 billion annually in health and wellbeing benefits²¹. A further £21 billion a year could be saved if everyone had access to greenspaces²². The health benefits of living with a view of green space are worth up to £300 per person per year.

Property prices

2.1.11. Research has shown that UK property values could increase by 34% as a result of investment in GBI. A case study by the Forestry Commission²³ found that property values were enhanced in areas surrounding a community woodland and that it had also stimulated new development worth £75 million. GBI can also help developers increase viability of sites by utilising the multi-functionality of GBI, such as combining open space with SuDS and biodiversity requirements.

Economic Activity

2.1.12. Accessible GBI can also attract visitors and result in increased trade with local businesses and associated jobs. In Bruges, it has been estimated that GBI has contributed €5.6m to the local economy over a 20-year period²⁴. In the UK, the regeneration of Glasgow Green was shown to result in almost double the initial £15m investment in visitor spending and also created 35 new full-time jobs²⁵. In Wales, the Wales Coastal Path has attracted nearly three million visitors and was worth an estimated £16m to the Welsh economy between 2011 and 2012 alone²⁶.

Productivity

2.1.13. Workers who can see a green environment from their desks experience 23% less time off sick. These workers also report greater job satisfaction, with other benefits including:

- 15% increase in worker productivity when office spaces are enhanced with plants;
- 12% increase in reaction times when in the presence of plants;
- Employees with views of trees and landscapes took an average of 11 hours less sick leave per year than employees with no view. This equates to an average saving of around £1,600 per employee; and

- Workers with a view of nature handle calls 6-7% faster than those with no view. This generates annual productivity savings of around £2,400 per employee²⁷.

Biodiversity

2.1.14. One of the primary drivers of habitats and species loss is unsustainable land use. For instance, some 11,000 amenity trees were lost as a result of increased development pressures over a three-year period²⁸. However, the protection of existing and provision of new or improved habitats through GBI can provide important refuges for wildlife. For instance:

- Urban forests can act as refuges for threatened bird species in urban areas²⁹;
- Green roofs can increase biodiversity by providing habitat for invertebrate, bird, and rare plant species³⁰; and
- Urban mammal occurrences in gardens have been found to positively correlated with the availability of nearby GBI³¹.

2.1.15. Furthermore, GBI can improve connectivity between existing areas of nature, reducing habitat fragmentation and loss, and increase ecological resilience. Linear GBI features have been shown to benefit the movement of some UK species³².

2.1.16. The implementation of SuDS can improve water quality and, thereby, the diversity of species such as dragonflies and molluscs downstream³³.

2.1.17. Even small green patches have a potential to benefit movement of biodiversity. Well-managed roundabouts and verges support a wide variety of plants and insects, especially if they are not intensively mown and are planted with native plants and trees³⁴.

Climate Change

2.1.18. In both urban and rural areas, it is important to recognise how land can affect the rate of carbon emissions and the incidence of flooding. GBI will play an increasingly important role in increasing climate resilience within our towns and villages. Increasing the surface area of green cover can provide a number of benefits towards tackling climate change, as evidenced below.

Carbon Sequestration

2nd Deposit rLDP

- 2.1.19. GBI can remove greenhouse gases from the atmosphere. UK forests remove approximately 4 million tonnes of carbon from the atmosphere every year, which is equivalent to 14.8 million tonnes of carbon dioxide³⁵. Small scale GBI interventions can also contribute to carbon sequestration, with a study showing that 10 pots of a certain flower species could process 1.3 kilograms of carbon dioxide per day³⁶. These findings are exemplified within Leicester where one study reported that the average amount of carbon stored within GBI across the city was 31.6 tonnes per hectare, with 7.6 tonnes stored in private gardens alone³⁷.

Heat Amelioration

- 2.1.20. Depending on location, type, and extent, GBI can provide shade, cooling, and wind interception. Research in Greater Manchester suggested that increasing the area of GBI by 10% in areas with GBI deficiencies could result in a cooling effect of up to 2.5°C³⁸. Open spaces with significant tree cover have been shown to have lower temperatures than those without trees due to shading from heat and UV radiation³⁹.

Air & Water Quality

- 2.1.21. GBI can mitigate risks associated with reductions in air and water quality. The urban heat island effect has been attributed to the temperature-dependent formation of pollutants such as volatile organic compounds (VOCs) and ozone, increasing levels by approximately 12% in certain settings⁴⁰. Research in Wrexham showed that local trees removed 60 tonnes of air pollution each year (which equated to a £700,000 per year saving for the NHS)⁴¹. Additionally, riparian habitats have been shown to improve water quality by removing sediments, pesticides, nutrients, and heavy metals from water courses⁴².

Flood Risk

- 2.1.22. GBI can increase the water retention capacity of the environment, which can mitigate against both droughts and flooding. A study in Wrexham found that trees intercepted 27 million litres of rainfall per year. Green roofs have also been shown to retain up to 87% of rainwater⁴³.

3. Legislative Framework

- 3.1.1. Nationally, Wales has undergone a fundamental legislative and policy shift, with a strong emphasis on sustainable development principles to secure the long-term well-being of its residents. This presents a pathway for local government to identify and mitigate risks on placed on natural resources, and take advantage of the opportunities they provide in an efficient process that ensures the right action, is taken in the right place, and at the right time.
- 3.1.2. An exhaustive compilation of planning and sustainability related materials can be found in the Integrated Sustainability Appraisal (Appendix B). Nevertheless, a summary of those penitent to GBI have been included below.

Well-being of Future Generations Act 2015

- 3.1.3. The Well-being of Future Generations (Wales) Act 2015 requires public bodies to improve the economic, social, environmental, and cultural well-being of Wales in accordance with the principle of sustainable development. This means seeking to ensure that the needs of the present are met without compromising the ability of future generations to meet their own. The Act puts in place seven well-being goals, which public authorities must work towards to ensure sustainable development (Figure 1).



Figure 1. Seven Well-being Goals of the Well-being of Future Generations Act 2015

National Natural Resources Policy 2017

3.1.4. The focus of the National Natural Resources Policy (NNRP) is the sustainable management of Wales' natural resources, to maximise their contribution to achieving goals within the Well-being of Future Generations Act. The policy sets out three National Priorities. These are:

- Delivering NbS;
- Increasing renewable energy and resource efficiency; and
- Taking a place-based approach.

3.1.5. The State of Natural Resources Report shows that investment in our natural resources, in particular in areas which deliver the most in terms of both ecosystem resilience and benefits across all the well-being goals, can help:

- Increase GBI in and around urban areas;
- Ensure coastal management and adaptation;
- Increase canopy cover and well-located woodland close to towns and cities where it will have the greatest recreational and ecosystem service value;
- Maintain, enhance, and restore floodplains and hydrological systems to reduce flood risk and improve water quality and supply; and,
- Restore of our uplands and managing them for biodiversity, carbon, water, flood risk and recreational benefits.

Planning Act (Wales) 2016

3.1.6. The Planning Act Wales sets out a framework for sustainable development in accordance with the Well-being of Future Generations Act, and has the purpose of ensuring that the development of land contributes to improving the economic, social, environmental, and cultural well-being of Wales. The planning system is central to achieving sustainable development in Wales. It provides the legislative and policy background to manage the land use in the public's interest so that it contributes positively to the achievement of the well-being goals.

Active Travel (Wales) Act 2013

3.1.7. The Active Travel (Wales) Act promotes walking and cycling as the preferred option for shorter, everyday journeys such as those to and from the workplace or education establishment, or in order to access health, leisure or other services and facilities. The Active Travel Act requires LAs to produce Integrated Network Maps, identifying

2nd Deposit rLDP

the walking and cycling routes required to create fully integrated networks for walking and cycling to access work, education, services, and facilities.

- 3.1.8. The planning system has an important role in promoting the delivery of the Active Travel Act, and establishing a conducive environment to make it easier for people to walk and cycle.

Environment (Wales) Act 2016

3.1.9. The Environment (Wales) Act 2016 introduces the Sustainable Management of Natural Resources (SNMR) and sets out a framework to achieve this as part of decision-making. The objective of the SMNR is to maintain and enhance the resilience of ecosystems and the benefits they provide. The Act requires us to set out the challenges our natural resources and ecosystems face and the opportunities they can provide. This means looking at the ways we currently manage our natural resources and how we can reduce the pressures on them. The Act also instils a duty on Welsh Government to produce and implement a National Natural Resources Policy for the achievement of SMNR in Wales.

3.1.10. Sustainable management of natural resources is defined in the Environment Act as:

“...Using natural resources in a way and at a rate that maintains and enhances the resilience of ecosystems and the benefits they provide. In doing so, meeting the needs of present generations of people without compromising the ability of future generations to meet their needs, and contributing to the achievement of the well-being goals in the Well-being of Future Generations Act.”

3.1.11. The principles of sustainable management of natural resources:

- Require us to think about the complex relationships between nature and people over the long term;
- Help us to think about the benefits that we get from natural resources now and in the future, recognising the ways they support our well-being;
- Encourage us to think about ways of making our ecosystems more resilient.

3.1.12. Natural resources are defined in the Environment Act as:

- Animals, Plants & Other Organisms;
- Air, Water & Soil;
- Minerals;
- Geological Features & Processes;
- Physiographical Features; and
- Climatic Features & Processes.

- 3.1.13. Section 6 of the Environment (Wales) Act 2016 requires Public Authorities, which exercise their functions in relation to Wales, to maintain and enhance biodiversity and promote the resilience of ecosystems (referred as the Section 6 Duty). To comply with this duty, Welsh Government Guidance states that Public Authorities must embed the consideration of biodiversity and ecosystems into their early thinking and business planning, including any policies, plans, and projects, as well as their day-to-day activities.

Planning Policy Wales – Edition 11

- 3.1.14. PPW sets out the national objectives for sustainable development within Wales and signposts to a series of Technical Advice Notes (TANs). PPW highlights the fundamental role which GBI has in shaping places and improving well-being, by providing multiple functions and benefits for social, economic, and environmental resilience. It states that planning authorities should adopt a strategic and proactive approach to GBI, which should be fully integrated into development planning.

Countryside & Rights of Way Act 2000

- 3.1.15. The Countryside and Rights of Way (CRoW) Act 2000 introduced new provisions to modernise PRow management and create a new Statutory Right on Foot to certain types of open land. It followed a study of the economic, environmental, and social benefits and costs of different approaches for improving access to open countryside. The Open Access Land designation to land such as mountain, moor heath, down and registered common has expanded public access opportunities to GBI on a landscape scale.
- 3.1.16. As part of the CRoW Act, a duty was placed on all LAs to develop and publish a Rights of Way Improvement Plan (ROWIP). The ROWIP is a 10-year strategic plan by which LAs identify, prioritise and plan for improvements to their local rights of way network considering the particular needs of less able people. This assists the Authority in meeting its statutory obligations under relevant access legislation as well as contributing to the achievement of the well-being goals. It also requires the appointment of Local Access Forum to advise LAs and others on the improvement of public access to land for open air recreation and the enjoyment of the area.

3.2. Methodology

3.2.1. Currently, there is no national standard for devising a GBI assessment. Therefore, this assessment follows a pragmatic approach by adhering to advice from NRW⁴⁴ in addition to the several key stages which are commonly found within most conventional plan-level GBI assessments (Table 1).

Table 1. Stages adapted from those outlined in Guidance Note 042 'Green Infrastructure Assessments' (June 2021). For ease of reference, the step numbers contained within this assessment corresponding with each appropriate stage detailed within the guidance note. Those Actions underlined indicate the consideration given to the South-West Wales Area Statement.

Assessment Stage	Actions
Develop Methodology	<ul style="list-style-type: none"> Review of the overarching legal framework which concerns planning and environment. Consider existing guidance notes and any shortcomings of previous assessments. Outline methodology undertaken.
GBI Baseline (Step 1)	<ul style="list-style-type: none"> Collate data and establish baseline for existing GBI within the County. Outline key ecological assets/networks; asset condition; perceived benefits; and main threats. <u>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?</u>
Identifying Priorities (Step 2)	<ul style="list-style-type: none"> Review existing policies, strategies, related assessments, and any relevant consultations with communities and stakeholders in both a local and Welsh context. Outline the main socio-economic and environmental challenges that need to be addressed in the area and to what extent can this be done through GBI. Review any standards of quantity, accessibility, and quality in relation to GBI. <u>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?</u>
Identifying Opportunities (Step 3)	<ul style="list-style-type: none"> Identify and evaluate strategic options to address the local priorities. Consider how might these be achieved in practice (i.e., could these challenges be addressed by improving the condition or extent of existing GBI, or is there a need to create new GBI?) Identify surpluses/deficiencies in quality and accessibility against the employed standards. Produce settlement maps to support the interpretation of results. <u>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?</u>

2nd Deposit rLDP

rLDP Site Assessment (Step 4)	<ul style="list-style-type: none">• Results to inform the assessment of further development in line with LDP allocations (i.e., outline what important GBI assets can be found on proposed development sites?; what are the main threats and challenges GBI is exposed to?; and, what opportunities are there to maintain and improve this GBI as part of the development process?).
Review (Step 5)	<ul style="list-style-type: none">• Summarise assessment findings.• Outlining onward monitoring requirements and conditions for review, considering the reporting framework included within the LDP.• Outline next steps for GBI Strategy and associated Supplementary Planning Guidance.

4. GBI Baseline (Step 1)

- 4.1.1. The final GBI Baseline maps for Carmarthenshire can be viewed [here](#).
- 4.1.2. It is intended that these maps will be continually updated as and when new information becomes available.

4.1. GBI Assets Considered

- 4.1.1. GBI assets range from country parks lakes and woodlands to urban interventions such as green roofs and street trees. They can be specific sites at the local level or broader environmental features at the landscape scale within and between rural and urban areas such as wetlands, moors and mountain ranges. In addition to those definitions previously outlined in Section 1.4, the Landscape Institute further defines GBI assets as:

“a network of natural and semi-natural features, green spaces, rivers and lakes that intersperse and connect by villages towns and cities. Individually these elements are GBI assets, and the roles that these assets play are GBI functions. When appropriately planned, designed and managed, the assets and functions have the potential to deliver a wide range of benefits - from providing sustainable transport links to mitigating and adapting the effects of climate change.”

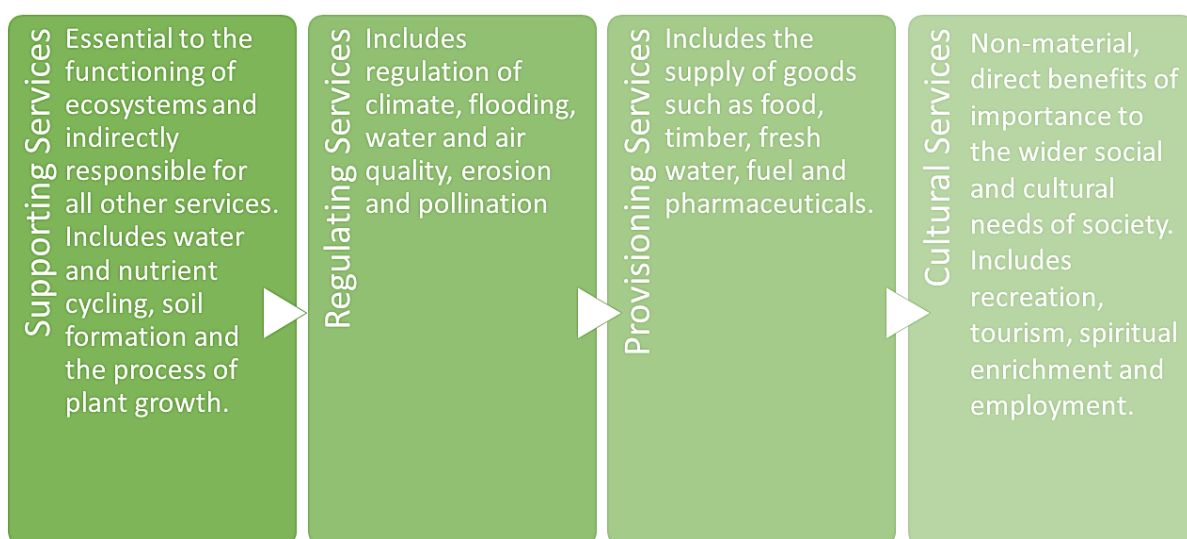
- 4.1.2. GBI assets have been identified within the study area, some of which are outlined briefly below. A more detailed typology can be found in Appendix A.



Green Infrastructure Assets

4.2. Assigning GBI Functions

- 4.2.1. GBI functions are centred on the public goods and ecosystem services which certain GBI assets can provide. They may have obvious primary functions, but each asset can perform different functions simultaneously – a concept known as multifunctionality. For example, woodland contributes to climate change mitigation by absorbing and storing carbon dioxide as well as providing aesthetic, recreational and wildlife functions. Public open spaces have the potential to be multifunctional if opportunities for providing natural areas as well as formal play/sports facilities are maximised. Public spaces could also provide flood alleviation, particularly when SuDS are embedded alongside them. However, in some cases, it may not be appropriate for an individual asset to be fully multifunctional, for example a wildlife site that is designated for its ground nesting birds should not necessarily be fully accessible as that is likely to be detrimental to its primary function.
- 4.2.2. Appendix B identifies which functions can be delivered by each of the identified GBI assets. It should be noted that the functions delivered by each asset will be different depending on a number of factors and so this table is indicative and not exhaustive.
- 4.2.3. Underpinning the multiple functions that GBI assets perform is the concept of ecosystem services. Ecosystem services are defined as the benefits provided by GBI that contribute to making life both possible and worth living (e.g. clean air, water, food, and materials). They include:



- 4.2.4. The list of functions which GBI provides could be very long, however this can be simplified by grouping the functions which are similar and provide broadly the same

benefits. With this in mind, table 2 shows similar functions grouped according to delivery against six themes.

Table 2. This assessments classification of GBI Functions

GBI Theme	GBI Function	Abbreviation
Health & Well-being	Recreation	Rec
	Active travel	AT
	Trapping air pollutants	TAP
Biodiversity	Pollination	Pol
	Habitat for wildlife	HW
	Corridor for wildlife	CW
Climate Change & Sustainability	Shading from the sun	ShS
	Soil stabilisation	SS
	Carbon storage	CSt
	Water storage and conveyance	WSC
	Coastal storm protection	CSP
	Pollutant removal	RP
Social Cohesion	Community space	CSpa
	Local food production	LFP
Economy	Providing jobs	PJ
	Lifelong learning	LL
	Skills and volunteering	SV
Sense of place	Visual contribution to landscape	VCL
	Connection to local environment	CLE
	Noise absorption	NA
	Heritage & culture	HC

4.2.5. Whilst individual GBI assets can serve one or more functions, connectivity between different GBI assets can help maximise the benefits that they generate. Well-connected GBI assets create infrastructure that is adaptive and resilient to environmental changes. Physical connections make the most impact, often by creating physical ‘stepping stones’ that encourage biodiversity migration and connect places with sustainable walking or cycling routes. Linked together, GBI assets form important multifunctional GBI networks which should be considered at all spatial scales.

4.2.6. All mapped assets were assigned GBI functions following a literature review as to ascertain the numerous functions each GBI type can provide. This was discussed and agreed as part of a GBI working group, with representation from planning, conservation, landscape, PRoW and active travel. It is recognised that assigning of

functions can be subjective and location dependant, however it provides grounding on which further detail can be later added at a site-specific level.

4.3. Mapping Methodology

4.3.1. The baseline assessment covered the unitary authority area of CCC, and did not consider infrastructure within other neighbouring LPAs including those located within the area of Bannau Brycheiniog National Park (BBNP) within Carmarthenshire (Figure 1). Additional assessment was also undertaken for each housing allocation outlined within the 2nd Deposit rLDP (later discussed in Chapter 7).

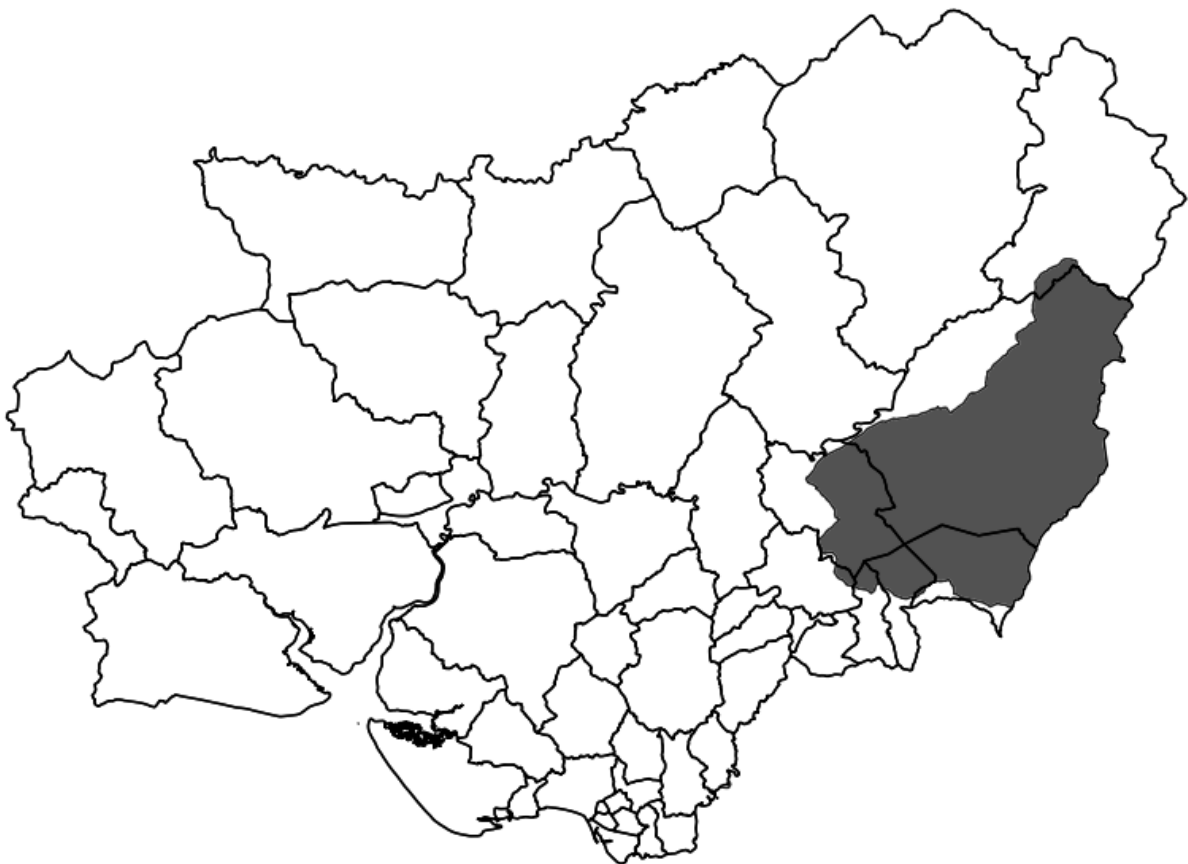


Figure 2. Map of the County. While within Carmarthenshire, the area shaded in grey is neighbouring BBNP and is excluded from the scope of this assessment.

4.3.2. In summary, the following methodology was utilised:

- Ordnance Survey Mastermap Topography layer was used as a base map for mapping GBI assets onto. All subsequent layers were standardised and verified to this layer. From this layer, buildings, road, rail layers were removed. This left a layer that included land and water;

2nd Deposit rLDP

- From this, the ‘manmade’ attributes were removed from the topography layer. This left ‘natural’ and ‘multiple’ attributes which translate into a base map of greenspace and private gardens respectively.;
- To this, rLDP settlement limits were added and a 500m buffer zone around these limits was produced. Subsequent layers were then clipped to these 500m buffer zones for verification at the settlement level. Some layers were retained to show connectivity at a landscape level.;
- Each relevant GBI asset layer was overlaid onto the base map and were verified. Layers were also checked for duplications.

4.3.3. The datasets listed in Appendix A contributed towards the baseline audit. Publicly available datasets were acquired through DataMapWales and Ordnance Survey. Additional data layers were sourced from various departments within CCC including PRow, Active Travel and Conservation.

Scale of mapping

4.3.4. Strategic GBI at the landscape scale provides the wider framework and context to support GBI at the more local levels. Not all GBI assets are mapped at this scale.

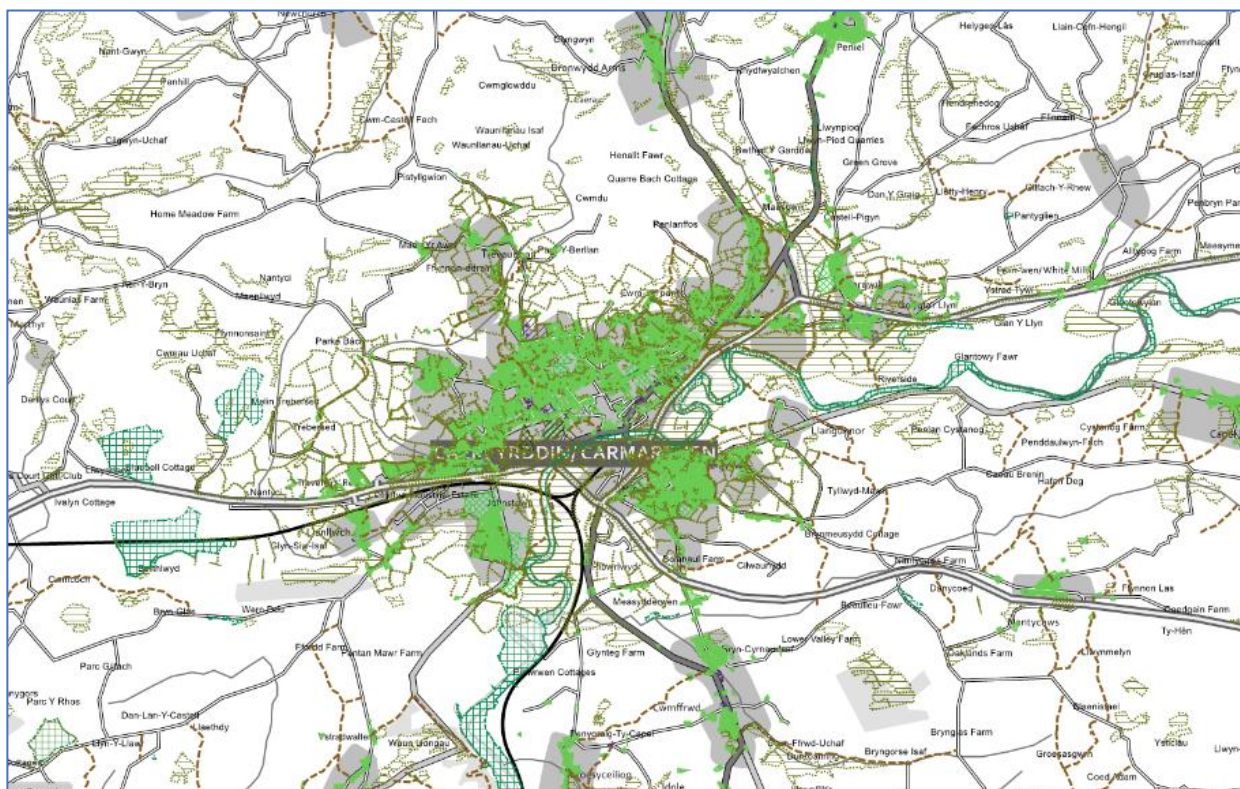


Figure 3. Example of landscape scale Green and Blue Infrastructure mapping

2nd Deposit rLDP

4.3.5. Where existing GBI assets are likely to be affected by new development (within settlement limits), these areas have been mapped in more detail to ensure conservation and enhancement of GBI for local communities and environments.



Figure 4. An example of Green and Blue Infrastructure mapping at settlement scale

5. Identifying Priorities (Step 2)

5.1.1. This chapter outlines some of the socio-economic and environmental challenges that need to be addressed, and to what extent these be rectified through GBI.

5.2. International Context

Sustainable Development Goals

5.2.1. The [2030 Agenda for Sustainable Development](#), adopted by all United Nations Member States in 2015, provides a shared blueprint for peace and prosperity for people and the planet, now and into the future. At its heart are the 17 Sustainable Development Goals (SDGs), which are an urgent call for action by all countries in a global partnership.

- Goal 1. End poverty in all its forms everywhere;
- Goal 2. End hunger, achieve food security and improved nutrition and promote sustainable agriculture;
- Goal 3. Ensure healthy lives and promote well-being for all at all ages;
- Goal 4. Ensure inclusive and equitable quality education and promote lifelong learning opportunities for all;
- Goal 5. Achieve gender equality and empower all women and girls;
- Goal 6. Ensure availability and sustainable management of water and sanitation for all;
- Goal 7. Ensure access to affordable, reliable, sustainable and modern energy for all;
- Goal 8. Promote sustained, inclusive and sustainable economic growth, full and productive employment and decent work for all;
- Goal 9. Build resilient infrastructure, promote inclusive and sustainable industrialization and foster innovation;
- Goal 10. Reduce inequality within and among countries;
- Goal 11. Make cities and human settlements inclusive, safe, resilient and sustainable;
- Goal 12. Ensure sustainable consumption and production patterns;
- Goal 13. Take urgent action to combat climate change and its impacts;
- Goal 14. Conserve and sustainably use the oceans, seas and marine resources for sustainable development;
- Goal 15. Protect, restore and promote sustainable use of terrestrial ecosystems, sustainably manage forests, combat desertification, and halt and reverse land degradation and halt biodiversity loss;
- Goal 16. Promote peaceful and inclusive societies for sustainable development, provide access to justice for all and build effective, accountable and inclusive institutions at all levels;

2nd Deposit rLDP

- Goal 17. Strengthen the means of implementation and revitalize the global partnership for sustainable development.
- 5.2.2. These SDGs are interrelated with the Well-being of Future Generations (Wales) Act 2015.
- 5.2.3. Whilst highlighting the role in which GBI can play, a 2019 report on the [*critical role of infrastructure for the SDGs*](#) argues that efforts to increase investments in GBI should not eclipse work to ensure that traditional infrastructure is sustainable⁴⁶.
- 5.2.4. A recent review considers both the direct and indirect ways in which GBI (particularly within an urban setting) can contribute to poverty alleviation. Direct links can include the provision of goods, employment in GBI development, maintenance, and restoration, and land for urban agriculture, income generation and dwelling. Additionally, indirect links can include cash savings, improved physical and mental health, improved social networks, improved educational outcomes, and regulation of natural disasters⁴⁷.

International MoU on Nature Based Climate Action

- 5.2.5. Recognising the importance of a nature-based approach as a key component of climate change action, Welsh Government has helped initiate the International Memorandum of Understanding on Nature Based Climate Action. As a founding signatory, Welsh Government has committed to:
- promote investments in enhancing ecosystem resilience as part of the response to the need for mitigation and adaptation;
 - look to natural or “green” infrastructure solutions to reduce climate risk and provide wider ecosystem services whilst safeguarding biological diversity and ecosystem health;
 - the use of tools and assessments that promote the understanding of the wider value of biodiversity and healthy ecosystems in addressing climate change and providing wider multiple benefits;
 - the development of tools to measure the benefits of integrated approaches to climate change (including ecosystem services, safeguarding biological diversity, carbon sequestration, and wider co-benefits that support increased resilience);
 - the need for enhanced technical and scientific cooperation and measurement in relation to implementation; and,

- foster closer links between ecosystem management, climate-change adaptation, and sustainable development.
- 5.2.6. By providing quantitative evidence of the influence of infrastructure on sustainable development, climate mitigation, and adaptation, [Infrastructure for Climate Action](#)⁴⁸ highlights the key role that infrastructure plays in fostering climate compatible development. For GBI to contribute towards achieving wellbeing goals (including SDGs), it emphasises the need for taking a holistic, systematic, and integrated approach to infrastructure development.

5.3. National Context

Second State of Natural Resources Report (SoNaRR2020)

- 5.3.1. [SoNaRR2020](#) sets out a range of opportunities for action to move towards a sustainable future and a green recovery across Wales. It states that...

“Wales has made significant progress in response to the global climate emergency and enhancing the natural environment. However, there is still much to do; Wales is not yet meeting the four long-term aims of sustainable management of natural resources, and it is vital that future policy decisions are rooted in this evidence”⁴⁹.

- 5.3.2. Since the publication of the previous report, the four long-term aims of SMNR are:
- Aim 1. Stocks of natural resources are safeguarded and enhanced;
 - Aim 2. Ecosystems are resilient to expected and unforeseen change;
 - Aim 3. Wales has healthy places for people, protected from environmental risks;
 - Aim 4. Contributing to a regenerative economy, achieving sustainable levels of production and consumption.
- 5.3.3. In principle, it is recognised that GBI can help protect and replenish those nature resources previously outlined paragraph 3.1.11, as exemplified by wetlands which can be used to improve water quality and biodiversity ⁵⁰.

State Of Nature Report

- 5.3.4. According to the State of Nature 2019 report⁵¹, the latest findings showing that 17% of species in Wales are at risk of extinction. Whilst there is no overall average figure for changes in species abundance for Welsh wildlife, there is data on certain groups:

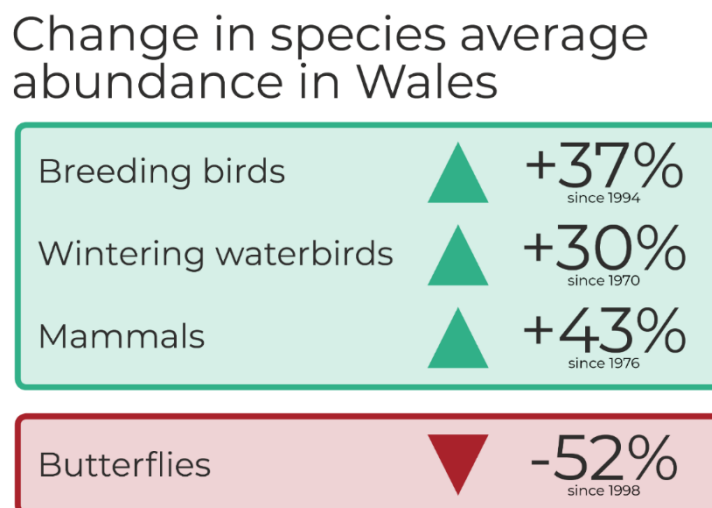


Figure 5. Source: State of Nature Report, 2019.

- 5.3.5. Alongside the provision of habitat once implemented, GBI mapping alone is demonstrated to play a key role in ecosystem restoration and biodiversity conservation through aiding strategic policy development and decision making⁵².

5.4. Regional Context

South West Wales Area Statement

- 5.4.1. Under Part 1 of the Environment (Wales) Act 2016, Area Statements were produced by NRW and cover the marine and six land regions across Wales. The South West Wales Area Statement (SWWAS) covers Carmarthenshire, Neath Port Talbot, Pembrokeshire, and Swansea, and represents 22% of total population and 23% of all Welsh landmass.
- 5.4.2. NRW have a duty to produce Area Statements with the aim of informing 'place based' action. Areas statements bring together data, information, and ways of engaging others to help understand the state and trends of natural resources of specific areas, the pressures on them and their benefits. Area Statements also use evidence to consider the relevance of the National Resources Policy priorities. They also provide an evidence base for rLDPs, as well as feeding into local Well-being Plans.

- 5.4.3. The SWWAS was produced in 2020 against a backdrop of Welsh Government's declaration of a climate and a nature emergency. As such, changes have been made to the rLDP in order to reflect the priorities identified in the SWWAS and the interrelated nature of these two emergencies (that are in themselves symptoms of the unsustainable management of natural resources and development, at the expense of future generations). Adapting to the climate and nature crises require a whole systems approach, and as such both issues feature across all the SWWAS themes which are Reducing health inequalities; Ensuring sustainable land management; Reversing the decline of, and enhancing, biodiversity; and Cross-cutting theme: Mitigating and adapting to a changing climate.
- 5.4.4. Urban GBI is identified as a major component in addressing the health inequalities experienced within the region⁵³.

5.5. Local Context

- 5.5.1. Carmarthenshire is the third largest county in Wales, covering some 2,365 square kilometres and representing 11.5% of the Country's total land mass. As a '*county of contrasts*', the south-east consists of many urban and industrial areas whereas the remainder is particularly rural and frequently complemented by livestock agriculture. Within the LPA area, former coal, steel, and other heavy industries have left their environmental legacy. Nevertheless, the County is diversifying into a modern economy inclusive of light engineering, new technological and service industries, and other business enterprises.
- 5.5.2. Carmarthenshire has a rich natural and cultural environment, characterised by magnificent coastlines, quiet estuaries, steep wooded valleys, and rugged uplands. Throughout the County there is a patchwork of woodland and fields, bounded by hedgerows. The coastal and estuarine environments are rich in species, most of which are of considerable conservational importance.
- 5.5.3. There are 10 internationally important sites for nature conservation that lie wholly or partially within Carmarthenshire, as well as five National Nature Reserves (NNR) and 89 Sites of Special Scientific Interest (SSSIs) and six Local Nature Reserves (LNRs).
- 5.5.4. The natural beauty of the county also fosters a vibrant tourism and recreation industry. Therefore, it is important that such features are protected as they are fundamental to the physical, economic, and well-being of Carmarthenshire's residents, visitors, and workers.

Cabinet Vision Statement 2022–2027 (July 2022)

- 5.5.5. In addition to tackling poverty and climate change, the Cabinet’s vision statement includes strengthening the economy and increasing prosperity, and investing in housing, education, culture, infrastructure, and the environment to make a real difference to people’s lives. The encompassing nature of GBI means it can relate to these aspects, however one priority of specific relevance includes:
- 5.5.6. *“Recognise the needs of our diverse communities, ensuring that the right homes are built in the right places...”*
- 5.5.7. The vision statement was presented at Cabinet by the Leader and informed the Corporate Strategy following public consultation.

Corporate Strategy 2022-2027

- 5.5.8. The Corporate Strategy for CCC sets out strategic priorities and aspirations, and outlines what it plans to do in order to achieve its vision for Carmarthenshire over the next five years. At the heart of this approach is integration and collaboration across the Council and with our stakeholders, and our focus going forward will be on *Developing Carmarthenshire, Together: One Council; One Vision; One Voice*.
- 5.5.9. It also sets out the Council’s well-being objectives. These include, but are not limited to:
- Enabling our children and young people to have the best possible start in life (Start Well);
 - Enabling our residents to live and age well (Live & Age Well); and
 - Enabling our communities and environment to be healthy, safe and prosperous (Prosperous Communities).
- 5.5.10. As established in Chapter 2, GBI can play a key role in addressing these issues.

Public Service Boards

- 5.5.11. Each public body has a responsibility to take all responsible steps to meet the national Well-being objectives. In addition, the associated Well-being Act establishes Public Service Boards (PSBs) for each LA area in Wales. Each PSB has the responsibility of improving the economic, social, environmental, and cultural well-being of its area by working to achieve the well-being goals and by setting objectives.

5.5.12. In Carmarthenshire, the PSB has set the following well-being objectives in order to achieve Wales' wellbeing goals:

- 1: Ensuring a sustainable economy and fair employment;
- 2: Improving well-being and reducing health inequalities;
- 3: Responding to the climate and nature emergencies;
- 4: Tackling poverty and its impacts; and
- 5: Helping to create bilingual, safe and diverse communities.

5.5.13. In response to objective 3, the Well-being Plan⁵⁴ specifically refers to embedding a partnership approach to developing GBI.

Welsh Index of Multiple Deprivation

5.5.14. The Welsh Index of Multiple Deprivation (WIMD) is the official measure of relative deprivation for small areas in Wales. It identifies areas with the highest concentrations of several different types of deprivation. It is a National Statistic produced by Welsh Government.

5.5.15. WIMD ranks areas from 1 (most deprived) to 1,909 (least deprived). It does not provide a measure of the level of deprivation in an area, but rather whether an area is deprived relative to all other areas in Wales. The [WIMD 2019 Guidance](#) provides more information on use and interpretation of the results.

5.5.16. WIMD is currently made up of eight separate domains of deprivation. Those below consider the Physical Environment which measures factors that may impact on the wellbeing or quality of life of those living in a given area including proximity to accessible natural greenspace.

5.5.17. In 2019, Carmarthenshire (including the BBNP area) contains 112 Low Super Output Areas (5.9% of the 1909 total in Wales). Of the 20% most deprived Low Super Output Areas in Wales within the Physical Environment domain, 24 are within the Carmarthenshire which accounts for 21.4% of those in the LA and 1.3% of those in Wales (Figure 6).

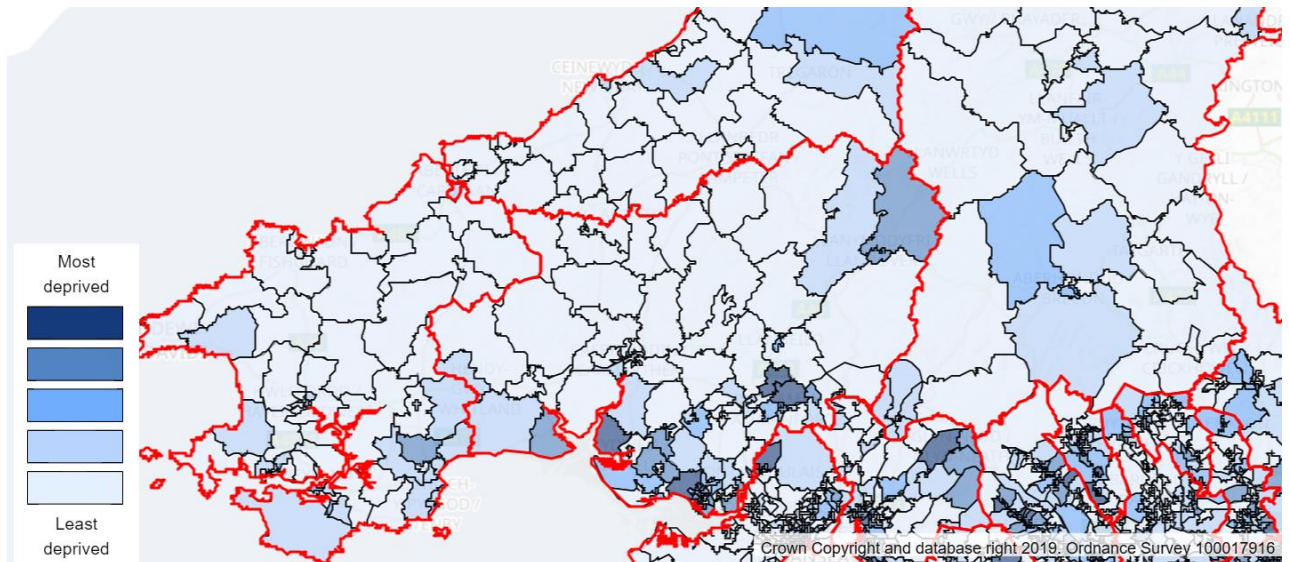


Figure 6. Deprived Low Super Output Areas in Carmarthenshire as assessed against indicators within the physical environment. Hengoed 2 (01001925), St. Ishmael 2 (W01000723), Llandybie 1 (W01000680), and Llandybie 2 (W01000681) are sequentially ranked the most deprived within the LA.

LDP Issues

5.5.18. As part of the preparation of the rLDP, a number of engagement events were undertaken in order to identify locally relevant issues that could be addressed through the planning system. A list of 38 issues were generated, covering a range of topics. Key topics from this consultation are shown in the following word cloud.



5.5.19. Any onward policies and strategy aimed at promoting GBI would provide the opportunity to create a coordinated response to a number of the issues identified here. Appendix C has prioritised these into key GBI themes (which are also referenced in *PSD3: Green and Blue Infrastructure Network*).

Greening 8 Towns in Carmarthenshire

5.5.20. Undertaken in 2022, this stakeholder engagement exercise set out the key issues and opportunities for the GBI network within and around eight towns in the county. It

was guided by the following overarching Vision, which was drafted in line with feedback from key stakeholders (see Appendix D).

“Carmarthenshire’s GBI network will be planned for strategically. This will ensure a coherent and well-connected series of natural assets which work with natural processes. The network will lie at the heart of efforts to combat the biodiversity and climate crises.

Responsibility for Carmarthenshire’s GBI network will be distributed across all Council departments, in close collaboration with a range of external partners including local communities. This will allow for the design and management of each GBI asset to go beyond the ornamental and decorative, and provide functions for People, Nature and Place – rooted in the County’s distinctive local strengths.”

- 5.5.21. Concerns raised were centred around the need for green re-generation, effective biodiversity management, and greenspace accessibility. Future iterations of this body of work will need to capture a rapidly shifting policy agenda. This is likely to include evolving legislation on tree cover, net zero requirements and nature recovery policy, as well as new sources of funding.

Carmarthenshire Nature Partnership

- 5.5.22. Welsh Government have produced a [Nature Recovery Action Plan](#)⁵⁵ that sets out how Wales will deliver the commitments of the UN Convention on Biological Diversity⁵⁶ and the EU Biodiversity Strategy⁵⁷ to halt and reverse the decline in our biodiversity.
- 5.5.23. In Carmarthenshire, a [Local Nature Recovery Plan](#)⁵⁸ was developed based on the objectives of the national plan, and addresses the issues that are driving the decline in biodiversity locally.
- 5.5.24. Prepared by the Carmarthenshire Nature Partnership, a draft version of the Carmarthenshire’s State of Nature Report 2023 indicates that many of the local threats to Carmarthenshire’s wildlife mirrors national trends.
- 5.5.25. It recommends that public bodies must prioritise planning for GBI that will both help to create Resilient Ecological Networks, and benefitting people, putting sustainable development that invests in nature at the heart of local decision-making.

6. Identify Opportunities (Step 3)

6.1.1. Whilst this section does not explicitly outline the situation and extent of potential GBI enhancements, it instead sets out some existing tools and programmes of work which may prove useful in identifying specific opportunities within the County (particularly during the implementation of the rLDP).

6.1.2. As part of *Greening 8 Towns in Carmarthenshire*, stakeholder engagement supported several GBI network enhancement opportunities (see Appendix D). While aiming to address a wide variety of sustainability issues, these were centred around...

- Creating rain gardens;
- Restoring river corridors and wetlands;
- Environmental education;
- Creating a green setting for heritage assets;
- Greening the places where people live, work and visit;
- Enhancing tree cover;
- Providing green routes to walk and cycle;
- Rethinking the functions of parks and grass areas;
- Finding space for community growing; and
- Creating playful spaces.

6.2. Wellbeing & Recreation

6.2.1. It is well-understood that GBI is inherently linked to the many typologies that make up open space including those originally put forward in TAN16⁵⁹. A recently conducted *Public Open Space Assessment* determined all electoral wards within Carmarthenshire were deficient in play space provision, and only 39% of electoral wards met the current adopted standards for outdoor sports. In addition to assessing adherence to other well-regarded standards for both amenity and natural greenspace, such findings spatially highlight areas of existing deficiencies and can be used to inform future GBI opportunities, particularly those contributing to the public

realm. Any onward implementation of GBI should consider promoting access, exercise, and play, and alleviating the prevalence of open space shortages currently experienced within the County. This is a crucial consideration for embedding the Play Sufficient Duty within the GBI context.

6.3. Biodiversity & Ecosystem Resilience

6.3.1. The *Carmarthenshire Nature Recovery Plan 2020-2030*⁶⁰ details those Section 7 priority habitats and species which are of key significance to maintain and enhance biodiversity in Carmarthenshire. It was produced with the help of the West Wales Biodiversity Information Centre and local county recorders. An extensive list can be found in [Appendix 2](#) of the Nature Recovery Plan (page 51-55)⁶¹, although absence of records does not necessarily indicate absence of the species in Carmarthenshire⁶². Those national S7 priorities which are further identified as local priority species and habitats are:

- Roadside verges
- Church and chapel burial grounds and cemeteries
- Strandline beetle (*Eurynebria complanate*)
- Barn owl (*Tyto alba*)
- Little-ringed plover (*Charadrius dubius*)

6.3.2. It is well-known that the mechanisms of ecosystem resilience are difficult to quantify, often preventing a meaningful description at a strategic level. To overcome this, PPW has identified five⁶³, inter-connected attributes of ecosystem resilience to ensure the most effective types of data are considered when developing programmes designed to build ecosystem resilience⁶⁴. Collectively referred to as the 'DECCA resilience framework', these are as followed:

- Diversity
- Extent
- Condition
- Connectivity

- Adaptability

6.3.3. Relating to these 5 attributes, [NRW CuRVE dataset \(Current Relative Value of Ecosystem Resilience\)](#) can be used to help inform the process of identifying potential opportunities for the maintenance, enhancement or re-creation of resilient ecological networks (Figure 7).

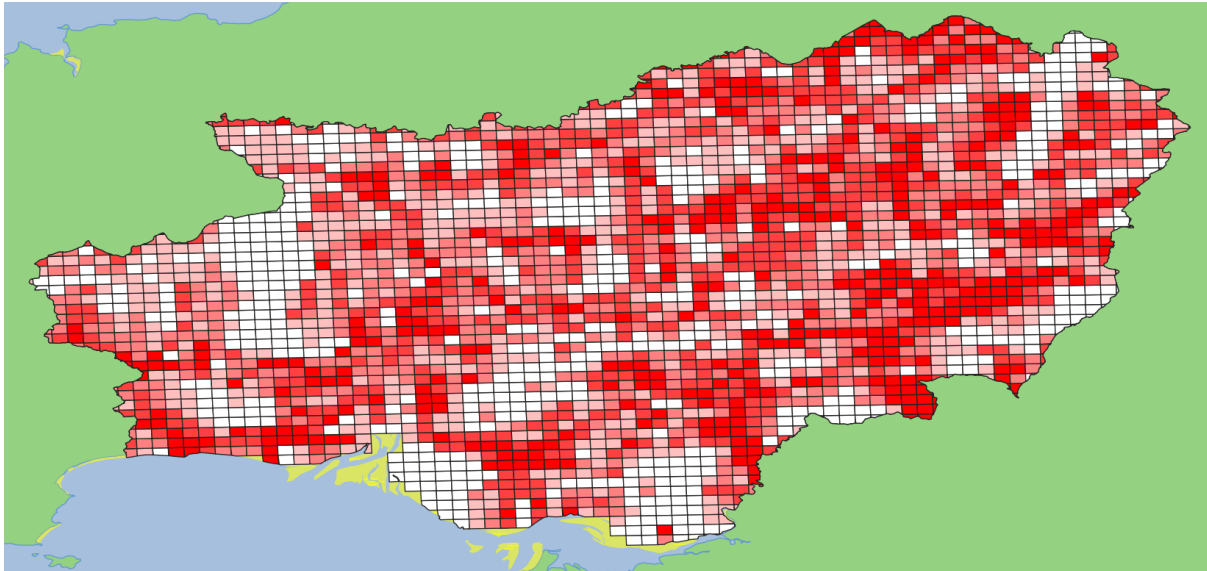


Figure 7. CuRVE map depicting patterns of relative connectivity within Carmarthenshire, at a scale of 1km². Dark red represents areas of high ecological connectivity whereas white depicts low. Whilst in practice consideration would be needed to the other 4 attributes, this map shows are large areas to the South-West (near Trelech, Llanelli, and Kidwelli) which have may benefit GBI improvement focused on addressing habitat connectivity ⁶⁵.

6.4. Woodlands & Air Pollution

6.4.1. A dedicated tree and woodlands strategy is being developed to help address air pollution in the County, and sits alongside an action plan to tackle the present deficiency in overall tree cover. This was partly produced in response to the designation of three air quality management zones for nitrous oxide in Carmarthenshire, one each in Llanelli, Llandeilo, and Carmarthen. The Woodland Trust describes how vegetation planted in the right places can help improve urban air quality on a local scale by capturing pollutants and forming a protective barrier between them and people⁶⁶. Additionally, the Woodland Trust has also produced a Woodland Access Standards which are widely adopted in forestry-related policy. It recommends that that everyone should have access to a wood of at least:

- 2 ha within 500m of every home;

- 20 ha within 4km of every home.

6.4.2. A non-exhaustive assessment of the aforementioned standards against NRW's Open Access dataset for Dedicated Forests revealed that the majority of residential homes do not adhere to these (Figure 8). GBI may present an opportunity to address such deficiencies.

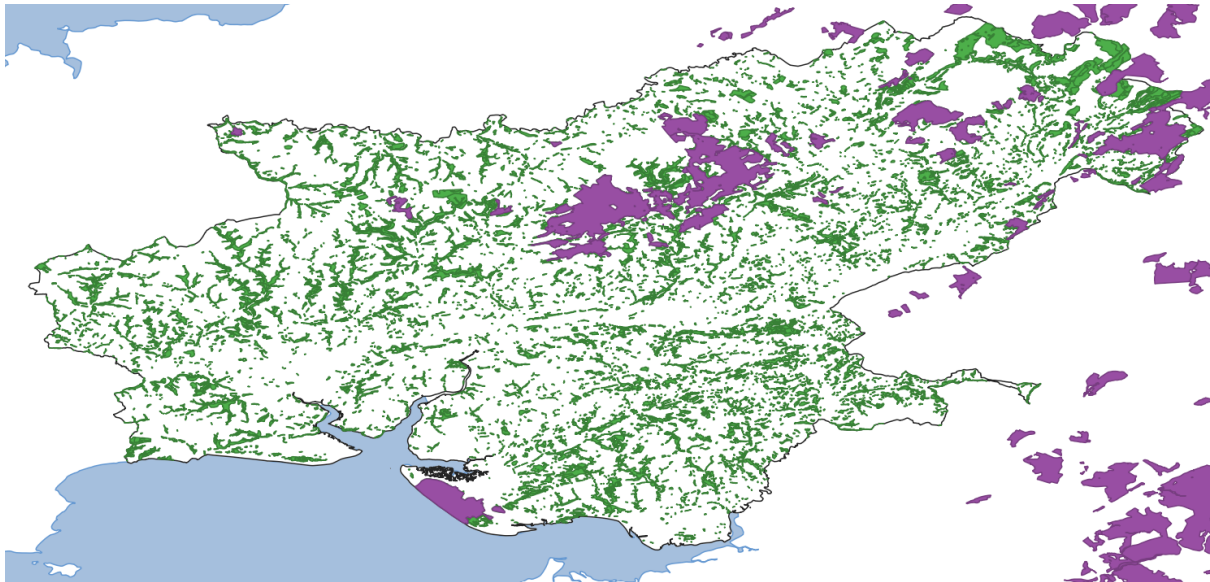


Figure 8. According to the National Forest Inventory 2020, approximately 18.1% of land area within Carmarthenshire (excluding BBNP) is under some form of woodland management (signified by the green and purple combined). This figure drops to ~15.7% when excluding felled trees. By creating respective 500m and 2km buffer zones around the accessible woodlands (purple) and comparing them with the Local Land and Property Gazetteer, only ~1.4% of residential dwellings were within 500m of a public accessible woodland whereas ~6.5% were within 2km. ⁶⁷

6.5. Water Quality

6.5.1. In January 2021, NRW published evidence which showed that over 60% of riverine Special Areas of Conservation (SAC) waterbodies in Wales fail against revised phosphorus standards. As a result, NRW subsequently issued planning advice to avoid further deterioration in environmental capacity where new developments have the potential to create further phosphorus pollution. These actions are required to demonstrate the compliance with the Conservation of Habitats and Species Regulations 2017 as amended.

6.5.2. In Carmarthenshire, phosphate guidance impacts the respective catchments of the Afon Teifi, Afon Tywi, Afonydd Cleddau, River Wye and River Usk. In response, CCC commissioned the development of supplementary materials to help effectively enable the progression of the rLDP and permit sustainable development within the affected

areas. Fundamentally, this represents an opportunity for the integration of NbS such as wetlands and riparian buffer zones, and is the situation of such is outlined within the Interim Action Plan for Nutrient Neutrality⁶⁸. Such solutions can also offer other benefits for biodiversity and flood alleviation.

6.6. Policy Implementation

6.6.1. Whilst consideration for GBI is threaded throughout the rLDP (particularly through the integration of placemaking), the two most pertinent policies relating to GBI have been included below. Ultimately, these help to ensure proposed development is acceptable in planning terms, and provide a mechanism for delivering upon the discussed opportunities.

PSD3: Green and Blue Infrastructure Network

Development proposals shall demonstrate effective Green and Blue Infrastructure (GBI) design solutions which:

1. Maximise retention, protection, and integration of existing GBI assets and prioritise those of highest value, quality, and condition within and on the development site boundaries;
2. Deliver overall enhancement to the value, quality, and condition; and extent, diversity, and connectivity of the GBI network within and on the development site boundaries;
3. Deliver effective integration and maximise connectivity with existing GBI assets adjacent to the development site boundaries and with the wider GBI network;
4. Maximise opportunities to achieve multi-functionality by integrating GBI functions to deliver combined objectives which benefit Biodiversity, Climate Change and Sustainability, Health and Wellbeing, Sense of Place, and Economy; and,
5. Include long-term management and maintenance proposals to ensure that effective GBI design solutions are deliverable for the lifetime of the proposed development.

Planning applications will require submission of surveys and assessments appropriate to the site and nature of development, to establish a baseline for GBI design solutions.

All planning applications for major developments will be required to submit a Green Infrastructure Statement to demonstrate how GBI design solutions have been considered and accommodated as part of the proposed development.

6.6.2. PSD3 aims to ensure that GBI assets are valued, protected, enhanced, and managed through the GBI network. Once adopted, planning applications will require submission of surveys and assessments appropriate to the site and nature of development, to enable evaluation of the location, quality, and condition of all existing GBI assets on, and adjacent to the proposed site boundary.

- 6.6.3. By upholding associated requirements under PPW11, the condition to submit a Green Infrastructure Statement further ensures that opportunities within/connected to the proposed development site are actualised and any potential impacts are mitigated.

PSD4: Green and Blue Infrastructure – Trees, Woodlands, and Hedgerows

Proposals for development shall:

1. Maximise retention, protection, and integration of existing trees, woodlands and hedgerows and prioritise those of highest value, quality, and condition within and on the development site boundaries through iterative site layout design which avoids potential impacts;
2. Minimise potential impacts to retained trees, woodlands and hedgerows through site specific design, method statements and protection measures.
3. Provide appropriate compensation planting for unavoidable loss of trees, woodlands, and hedgerows to deliver overall enhancement to extent and cover. Opportunities for translocation of existing hedgerows should be considered where feasible;
4. Provide sufficient space and rooting volume within site layout and in relation to adjacent land uses to enable effective growth of existing and newly planted trees, woodlands, and hedgerows to maturity and to avoid potential challenges to retention for the lifetime of the development;
5. Identify and deliver management works to improve the value, quality and condition of existing trees, woodlands, and hedgerows within and on the development site boundaries; and
6. Deliver additional planting of trees, woodlands, and hedgerows appropriate to the site and development type that will deliver both long term landscape benefits and net benefits for biodiversity.

- 6.6.4. PSD4 recognises the important contribution that trees, woodlands, and hedgerows can have to the environment and to our communities. Their value within urban form is particularly recognised. As previously discussed, these assets can help tackle air pollutants, flooding, and noise pollution, and provide numerous other benefits including the provision of shade and visual amenity. They also provide extensive areas of habitat for wildlife, especially mature trees.

7. rLDP Site Assessment (Step 4)

- 7.1.1. The proposed situation and extent of development proposals contained within the rLDP can be used to determine the potential impacts placed upon the GBI network. Whilst this process ultimately informs site selection and suitability (as outlined within the Site Assessment Methodology), it also enables the identification of enhancement opportunities which may, in turn, be used to help shape any eventual planning applications received on that site.
- 7.1.2. In light of the above, an assessment of rLDP proposals against Carmarthenshire's GBI baseline has been undertaken (Table 3). It considers how the area and boundary of a given site relates to the GBI network and the resilience of ecosystems within the nearby vicinity. This includes Priority Ecological Networks (PENs) which, as areas of connectivity between Protected Sites (e.g., Section 7 Habitats), provide a framework to inform the location of action to build functional resilient ecological networks based on important places for biodiversity conservation. Additionally, it also includes a comparison against the 2020 version of the National Forest Inventory (NFI) to provide information on whether the site may impact existing forests and woodlands. Further supplementary information has been provided in the notes such as linkage to the Habitat Regulation Assessment (HRA) to inform a site's relation to European Designated Sites.
- 7.1.3. As a desk-based assessment, further on-site interrogation is required at the project level in order to more accurately account for what GBI assets can be found there, and best inform the main threats and challenges to these, and whether there are opportunities to maintain and improve these as part of the development process.
- 7.1.4. It should also be noted that the vast majority of allocations (including all proposals for major development) must include SuDS and some form of open space provision which both have individual criteria for promoting amenity and conserving biodiversity (pertinent to the adoption of the associated proposed policies). Whilst targeted to address different socioeconomic and environmental issues, the requisite for such requirements ensures the promotion of sustainable development and supports the attainment of both local and national well-being goals.

Table 3. Assessment of rLDP proposals against Carmarthenshire’s GBI baseline. Unless stated otherwise, figures are expressed as percentage of site area. Resilience Framework obtained via NRW CuRve data, range from zero to 100, with higher numbers indicating that the factor contributes more to resilience. Other contextual information including assessment against NFI2020 is contained within the notes section. c¹= Connectivity, c²=Condition.

Site Ref	Name	Area (Ha)	PEN	S7 Habitat	Urban Trees	Hedgerows	Resilience Framework					Notes
							D	E	C ¹	C ²	A	
Residential Allocations												
Cluster 1												
PrC1/h10	Brynhyfryd	1.4			7.8	4.5	20	22	53	45	42	Site benefits from existing hedgerows, and contributes towards urban canopy cover.
PrC1/h12	Heol Castell Pigyn, Abergwili	1.6				5.7	22	19	61	34	38	Site contributes towards urban canopy cover.
PrC1/h4	Tir gerllaw Parc y Delyn	1.5			6.2	7.8	19	22	56	43		Site benefits from existing hedgerows, and contributes towards urban canopy cover.
PrC1/h5	Dwyrain o Rhodfa Deveraux	0.3			26	7.3	13	16	52	45		Existing hedgerows and urban trees present throughout site.
PrC1/h8	Heol Llansteffan	1.6			5.2	2.8	30	29	52	38	75	Approximately 20m from Afon Tywi SAC and SSSI (although not within phosphate sensitive catchment). HRA determined that the proximity of the site to a water course may present risks to otter.
SeC1/h4	Cae Canfas, Heol Llanelli	0.7					29	44	58	38	0	
SeC1/h7	Tir cyfagos Heol Glyndwr	0.5					18	33	50	35	38	
Sec2/h2	Tir y tu cefn i Parc y Ffynnon	0.6					26	32	56	37	0	Approximately 320m from CBEEMS. HRA determined that the proximity of the site is unlikely to cause significant effect.
SuV1/h1	Gerllaw Fron Heulog	0.6					27	33	60	41		
SuV1/h2	Tir gerllaw Lleine	0.7					27	33	60	41		
SuV10/h2	Aberdeuddwr / Pantyfedwen	1.6					18	23	45	38		
SuV11/h1	Tir ar Ysgol Alltwalis	0.4					27	38	53	43	0	The site is adjacent to a water course and is spatially linked to Afon Tywi SAC. HRA determined that the proximity of the site to a water course may present risks to otter.
SuV12/h1	Gerllaw Gwyn Villa	1.5		12.2			26	27	61	44	0	Desk study indicates a dispersed expanse of Purple Moor Grass & Rush Pastures (Section 7 Habitat) northwest of the site. Dependent on recommendations following on-site ecological surveys the mitigation hierarchy must be followed. Site also abuts a hectare of woodland to the West. The site is adjacent to a water course and is spatially linked to Afon Tywi SAC. HRA determined that the proximity of the site to a water course may present risks to otter and the aquatic environment.

Site Ref	Name	Area (Ha)	PEN	S7 Habitat	Urban Trees	Hedgerows	Resilience Framework					Notes
							D	E	C ¹	C ²	A	
SuV12/h2	Llandre	0.4					23	30	50	45	0	The site is adjacent to a water course and is spatially linked to Afon Tywi SAC. HRA determined that the proximity of the site to a water course may present risks to otter and the aquatic environment.
SuV14/h1	Fferm Cefn	1.9	20.4				28	38	53	43	25	Site may have importance for the ecological connectivity of Semi-Natural Grassland. On-site GBI should seek to create, enhance, or restore relevant habitat (particularly within the PEN area) to aid connectivity between nearby protected sites.
SuV16/h1	Heol Llwynddewi	0.6					23	35	47	47		Within Riverine Phosphate Sensitive SAC Catchment.
SuV17/h1	Y Tu ol i hen saerniaeth, Ffordd yr Orsaf	1.5					13	11	53	45		Within Riverine Phosphate Sensitive SAC Catchment.
SuV19/h2	Tir gerllaw a ti cefn i Haulfan	0.9					20	38	53	41		
SuV20/h1	Tir gerllaw Fferm Llwynhenry	0.5					26	27	53	47	0	
SuV4/h1	Tir yn Fferm Troed Rhiw	0.6					31	50	53	38	0	The site is adjacent to a water course and is spatially linked to Afon Tywi SAC and CBEEMS. HRA determined that the proximity of the site to a water course may present risks to otter and the aquatic environment.
Cluster 2												
PrC2/h1	Beech Grove, Pwll	0.7	16.2				33	45	51	33	0	Site may have importance for the ecological connectivity of Native Woodland. On-site GBI should seek to create, enhance, or restore relevant habitat (particularly within the PEN area) to aid connectivity between nearby protected sites.
PrC2/h10	Tir gerllaw Y Dell, Ffwrnes	3.3			6.1		25	34	46	44	100	According to NFI2020 the site is 99.5% woodland, majority felled but surrounded by broadleaf. Site continues to contribute towards urban canopy cover. The site is spatially linked to CBEEMS. HRA determined that the proximity of the site to a water course may present risks to the aquatic environment.
PrC2/h16	Ynys Las, Cefncaeau	1.4			0.9		20	36	30	43		The site is spatially linked to CBEEMS. HRA determined that the proximity of the site to a water course may present risks to the aquatic environment.
PrC2/h20	Harddfan, Bryn	0.2			19		19	30	25	38		Site contributes towards urban canopy cover.
PrC2/h23	Porth Dwyrain Dafen	5.5			1.1	0.7	23	33	36	41		The site is spatially linked to CBEEMS. HRA determined that the proximity of the site to a water course may present risks to the aquatic environment.

Site Ref	Name	Area (Ha)	PEN	S7 Habitat	Urban Trees	Hedgerows	Resilience Framework					Notes
							D	E	C ¹	C ²	A	
SeC3/h2	Tir oddi ar Stryd	0.9			6.3		22	31	73	45		Site contributes towards urban canopy cover, and is spatially linked to CBEEMS. HRA determined that the proximity of the site to a water course may present risks to otter and the aquatic environment.
SeC3/h3	Llys Felin	1.1		0.8	1.1	2	28	41	47	41	75	Desk study indicates an area of Coastal and Floodplain Grazing Marsh (Section 7 Habitat) southeast of the site. Dependent on recommendations following on-site ecological surveys the mitigation hierarchy must be followed.
SeC6/h2	Tir rhwng Heol Clayton a Dwyrain Heol Broanllt	1.1			9	8.2	27	28	60	36	42	
SeC7/h3	Golwg Yr Afon	2.3			29		40	66	52	43	0	NFI2020 suggests the site is 26.5% Broadleaf Woodland. The site is spatially linked to CBEEMS, and in proximity to Burry Inlet and Loughor Estuary SSSI. HRA determined that the proximity of the site to a water course may present risks the aquatic environment.
SeC7/h4	Gyferbyn Parc Morlais	1.4	1.6		5.6	2.7	17	30	54	42	0	Site may have importance for the ecological connectivity of Fenland. On-site GBI should seek to create, enhance, or restore relevant habitat (particularly within the PEN area) to aid connectivity between nearby protected sites. Approximately 150m from CBEEMS, and in proximity to Burry Inlet and Loughor Estuary SSSI and SPA. HRA determined that the proximity of the site may present risks the aquatic environment.
SeC7/h5	Maesydderwen	0.3			33		17	30	54	42	0	Site contributes towards urban canopy cover. Recent aerial imaging shows that a large portion of the site may be shrub. Dependent on recommendations following on-site ecological surveys the mitigation hierarchy must be followed.
SeC8/h2	Cae Linda	2.9	See notes		2.4		35	60	47	38	20	Site may have importance for the ecological connectivity of Native Woodland (2.9%) and Semi-Natural Grassland (41.2%). On-site GBI should seek to create, enhance, or restore relevant habitat (particularly within the PEN area) to aid connectivity between nearby protected sites.
SuV22/h2	Tir gerllaw i Ty Newydd, Heol Meinciau	0.5					23	34	59	45		

Site Ref	Name	Area (Ha)	PEN	S7 Habitat	Urban Trees	Hedgerows	Resilience Framework					Notes
							D	E	C ¹	C ²	A	
SuV23/h2	Tir gerllaw Little Croft	1.2	See notes	5.9			28	59	49	44	75	Site may have importance for the ecological connectivity of Native Woodland (2.5%) and Semi-Natural Grassland (100%). On-site GBI should seek to create, enhance, or restore relevant habitat (particularly within the PEN area) to aid connectivity between nearby protected sites. Additionally, the site is within an area that contains suitable habitat for the CCM SAC Marsh Fritillary metapopulation. Desk study indicates an area of Purple Moor Grass & Rush Pastures (Section 7 Habitat) southeast of the site. Dependent on recommendations following on-site ecological surveys the mitigation hierarchy must be followed.
Cluster 3												
PrC3/h1	Tir i'r cefn o 16-20 & 24-30 Heol Betws	0.5			22		29	55	42	38	50	HRA determined that the proximity of the site may present risks the aquatic environment. Site contributes towards urban canopy cover.
PrC3/h14	Nantydderwen	0.7		56.4	30	3.8	30	51	60	45	0	Desk study indicates an area of Purple Moor Grass & Rush Pastures (Section 7 Habitat), covering the north half of the site is almost entirely. On-site GBI should seek to create, enhance, or restore relevant habitat (particularly within the PEN area) to aid connectivity between nearby protected sites. Additionally, the site benefits from existing hedgerows, and contributes towards urban canopy cover.
PrC3/h15	Tir oddi ar Heol Caegwyn	0.5	100				30	51	60	45	0	Site may have importance for the ecological connectivity of Semi-Natural Grassland. On-site GBI should seek to create, enhance, or restore relevant habitat (particularly within the PEN area) to aid connectivity between nearby protected sites.
PrC3/h18	Tir gerllaw Brynlluan	1.3	83.9		3.6		31	54	62	40	75	As above. Additionally, the site is within an area that contains suitable habitat for the CCM SAC Marsh Fritillary metapopulation.
PrC3/h20	Tir i'r Gogledd o Maespiode	2.3			3	8.5	16	23	46	41		Site benefits from existing hedgerows, and contributes towards urban canopy cover.

Site Ref	Name	Area (Ha)	PEN	S7 Habitat	Urban Trees	Hedgerows	Resilience Framework					Notes
							D	E	C ¹	C ²	A	
PrC3/h26	Tir oddi ar Parc-y-Mynydd	0.9	See notes	0.1	3.2		33	67	61	48	75	NFI2020 suggests the site is 25.7% Broadleaf Woodland. Site may have importance for the ecological connectivity of Native Woodland (100%) and Semi-Natural Grassland (100%). On-site GBI should seek to create, enhance, or restore relevant habitat (particularly within the PEN area) to aid connectivity between nearby protected sites. Additionally, the site is within an area that contains suitable habitat for the CCM SAC Marsh Fritillary metapopulation, and is in close proximity to Caeau Blaenau-mawr SSSI and CCM SAC. Desk study indicates an area of Purple Moor Grass & Rush Pastures (Section 7 Habitat) southeast of the site. Dependent on recommendations following on-site ecological surveys the mitigation hierarchy must be followed.
PrC3/h27	Tir oddi ar Nant-y-Ci	0.8	See notes	99	8.7	7.7	23	35	54	44	0	Site may have importance for the ecological connectivity of Native Woodland (100%) and Semi-Natural Grassland (100%). On-site GBI should seek to create, enhance, or restore relevant habitat (particularly within the PEN area) to aid connectivity between nearby protected sites. Desk study indicates an area of Purple Moor Grass & Rush Pastures (Section 7 Habitat) southeast of the site. Dependent on recommendations following on-site ecological surveys the mitigation hierarchy must be followed. Additionally, the site benefits from existing hedgerows, and contributes towards urban canopy cover.
PrC3/h28	Tir ar safle'r ffatri rhwng Rhif 22 & 28 Heol Bethesda	1.1	83.4		16		35	61	46	43	25	Site may have importance for the ecological connectivity of Semi-Natural Grassland. On-site GBI should seek to create, enhance, or restore relevant habitat (particularly within the PEN area) to aid connectivity between nearby protected sites. Additionally, the site contributes towards urban canopy cover, and is within an area that contains suitable habitat for the CCM SAC Marsh Fritillary metapopulation.
PrC3/h6	Tir gerllaw Maes Ifan, Heol Maesquarre	1.6	See Notes			1.8	37	60	36	41	25	Site may have importance for the ecological connectivity of Native Woodland (65.2%) and Semi-Natural Grassland (92.7%). On-site GBI should seek to create, enhance, or restore relevant habitat (particularly within the PEN area) to aid connectivity between nearby protected sites. HRA determined that the proximity of the site may present risks the aquatic environment.

Site Ref	Name	Area (Ha)	PEN	S7 Habitat	Urban Trees	Hedgerows	Resilience Framework					Notes
							D	E	C ¹	C ²	A	
PrC3/h8	Tir oddi ar Heol y Parc	0.8		43.7	5.6	1.3	28	43	57	45	75	Desk study indicates an area of Purple Moor Grass & Rush Pastures (Section 7 Habitat) within the site boundary. Dependent on recommendations following on-site ecological surveys the mitigation hierarchy must be followed. The site is within an area that contains suitable habitat for the CMM SAC Marsh Fritillary metapopulation, and is spatially connect to CBEEMS. The site benefits from existing hedgerows and trees.
SeC11/h1	Tir yn Heol Llannon	0.6	100	19.6			35	63	50	45	15	Desk study indicates several dispersed areas of Purple Moor Grass & Rush Pastures (Section 7 Habitat) throughout the site. Dependent on recommendations following on-site ecological surveys the mitigation hierarchy must be followed. The site may have importance for the ecological connectivity of Semi-Natural Grassland. On-site GBI should seek to create, enhance, or restore relevant habitat (particularly within the PEN area) to aid connectivity between nearby protected sites. The site is within an area that contains suitable habitat for the CCM SAC Marsh Fritillary metapopulation, and is spatially connect to CBEEMS.
SeC9/h2	Heol Gelynen	0.2	See Notes		23		36	71	47	40	58	The site may have importance for the ecological connectivity of Semi-Natural Grassland (88.9%) and Native Woodland (7.6%). On-site GBI should seek to create, enhance, or restore relevant habitat (particularly within the PEN area) to aid connectivity between nearby protected sites.
SuV26/h1	Tir i'r cefn o Garreg Lwyd	0.8					28	49	61	42	38	
SuV27/h1	Tir gerllaw i Ty Newydd	0.2	17.3				48	51	56	43		In proximity to Carmel NNR, Cernydd Carmel SSSI and SAC. The site may have importance for the ecological connectivity of Semi-Natural Grassland. On-site GBI should seek to create, enhance, or restore relevant habitat (particularly within the PEN area) to aid connectivity between nearby protected sites.
SuV30/h1	Gerllaw Pant y Brwyn	0.2	100	79.4			34	58	69	45		Desk study indicates several dispersed areas of Purple Moor Grass & Rush Pastures (Section 7 Habitat) throughout the site. Dependent on recommendations following on-site ecological surveys the mitigation hierarchy must be followed. Additionally, site may have importance for the ecological connectivity of Semi-Natural Grassland. On-site GBI should seek to create, enhance, or restore relevant habitat (particularly within the PEN area) to aid connectivity between nearby protected sites.

Site Ref	Name	Area (Ha)	PEN	S7 Habitat	Urban Trees	Hedgerows	Resilience Framework					Notes
							D	E	C ¹	C ²	A	
Cluster 4												
SeC12/h1	Trem Y Ddol	0.9				6.5	33	34	59	44	0	In proximity to Afon Teifi SSSI and within the associated riverine Phosphate Sensitive SAC Catchment.
SeC12/h3	Tir y tu cefn i Dolcoed	1.3	59.9		16		37	38	56	48	88	In proximity to Afon Teifi SSSI and within the associated riverine Phosphate Sensitive SAC Catchment. The site may have importance for the ecological connectivity of Native Woodland. On-site GBI should seek to create, enhance, or restore relevant habitat (particularly within the PEN area) to aid connectivity between nearby protected sites. Contributes to urban canopy.
SeC13/h1	Gerllaw Y Neuadd	0.5					31	33	52	49		In proximity to Afon Teifi SSSI. Within Riverine Phosphate Sensitive SAC Catchment. The proximity of the site to a water course may present risks to otter that may be in the area.
SeC14/h1	Garej Blossom	0.6		0.5			27	39	54	43	0	NFI2020 suggests the site is 9.2% Broadleaf Woodland. Desk study indicates several dispersed areas of Purple Moor Grass & Rush Pastures (Section 7 Habitat) throughout the site. Dependent on recommendations following on-site ecological surveys the mitigation hierarchy must be followed. Within Riverine Phosphate Sensitive SAC Catchment.
SeC14/h2	Tir gerllaw Maescader	0.8		5.2			27	39	54	43	0	Desk study indicates several dispersed areas of Purple Moor Grass & Rush Pastures (Section 7 Habitat) throughout the site. Dependent on recommendations following on-site ecological surveys the mitigation hierarchy must be followed. Within Riverine Phosphate Sensitive SAC Catchment.
SuV33/h1	Tir gyferbyn Brogeler	0.3					31	39	53	48		Within Riverine Phosphate Sensitive SAC Catchment.
SuV35/h1	Tir gerllaw Arwynfa	2.5					19	30	46	37	50	Within Riverine Phosphate Sensitive SAC Catchment.
SuV36/h1	Cae Pensarn Helen	0.3					18	33	58	40	50	
SuV36/h2	Tir yn Bryndulais	0.7					17	17	47	43		Within Riverine Phosphate Sensitive SAC Catchment.
SuV37/h2	Tlr i'r De o Cae Coedmor	0.9	99.7				24	31	47	45		Within Riverine Phosphate Sensitive SAC Catchment. The site may have importance for the ecological connectivity of Semi-Natural Grassland. On-site GBI should seek to create, enhance, or restore relevant habitat (particularly within the PEN area) to aid connectivity between nearby protected sites.

Site Ref	Name	Area (Ha)	PEN	S7 Habitat	Urban Trees	Hedgerows	Resilience Framework					Notes
							D	E	C ¹	C ²	A	
SuV37/h3	Tir gerllaw i Lleinau	0.5	100				24	31	47	45		Within Riverine Phosphate Sensitive SAC Catchment. The site may have importance for the ecological connectivity of Semi-Natural Grassland. On-site GBI should seek to create, enhance, or restore relevant habitat (particularly within the PEN area) to aid connectivity between nearby protected sites.
SuV38/h1	Maes y Bryn	0.3					22	37	56	36	0	Within Riverine Phosphate Sensitive SAC Catchment.
SuV39/h1	Tir gerllaw Yr Hendre	0.5	100				29	42	51	41		Within Riverine Phosphate Sensitive SAC Catchment. The site may have importance for the ecological connectivity of Native Woodland. On-site GBI should seek to create, enhance, or restore relevant habitat (particularly within the PEN area) to aid connectivity between nearby protected sites.
SuV43/h1	Blossom Inn	0.7					14	11	50	43		Within Riverine Phosphate Sensitive SAC Catchment.
Cluster 5												
SeC15/h2	Tir gerllaw Bryndeilog, Tywi Avenue	1.2				5.5	14	22	35	38	0	In proximity to Afon Tywi SSSI. Within Riverine Phosphate Sensitive SAC Catchment.
SeC16/h1	Gogledd Chwarter Llandeilo	1.7			22		30	37	47	44	100	In proximity to Crug Farm Quarry SSSI. Within Riverine Phosphate Sensitive SAC Catchment. Site contributes to urban tree cover.
SeC17/h1	Tir gyferbyn a Ysgol Gynradd Llangadog	0.5					19	25	60	44		Within Riverine Phosphate Sensitive SAC Catchment.
SeC17/h2	Tir ger Heol Pendref	0.4					17	18	58	48		Within Riverine Phosphate Sensitive SAC Catchment.
SuV51/h1	Tir gyferbyn Neuadd y Pentref	0.5					14	22	36	45		Within Riverine Phosphate Sensitive SAC Catchment.
Cluster 6												
SeC18/h1	Tir gerllaw i Teras Britannia	2.7			6.8	6.5	16	11	60	38		Site benefits from existing hedgerows, and contributes towards urban canopy cover.
SeC18/h3	Tir gerllaw i Cefn Maes	4.2			1.3	6.8	16	11	60	38		Site benefits from existing hedgerows, and contributes towards urban canopy cover.
SeC18/h4	Tir yn Heol Llaindelyn	0.4			6.7		16	11	60	38		Site contributes towards urban canopy cover.
SeC18/h5	Tir gerllaw i Gwynfa, Heol yr Orsaf	0.3				13	15	16	26	43		Site benefits from existing hedgerows.
SeC18/h6	Tir y tu cefn i Heol yr Orsaf	1.0				7.3	15	16	26	43		Site benefits from existing hedgerows.
SeC18/h7	Tir gerllaw i Cae Gardde	0.8			2.4		16	11	60	38		Site contributes towards urban canopy cover.
SeC19/h1	Tir yn Park View, Trevaughan	0.4					29	48	60	42		HRA determined that the proximity of the site may present risks to otter and the aquatic environment.

Site Ref	Name	Area (Ha)	PEN	S7 Habitat	Urban Trees	Hedgerows	Resilience Framework					Notes
							D	E	C ¹	C ²	A	
SeC19/h2	Tir yn Hufenfa Hendy-gwyn	2.3					19	32	68	40	0	HRA determined that the proximity of the site may present risks to otter and the aquatic environment.
SeC20/h3	Tir oddi ar Stryd Clifton	0.8					31	38	56	47		
SuV55/h2	Tir i'r Gogledd o Tafarn Cross Inn	0.5					12	27	53	41	50	
SuV56/h1	Tir y tu cefn i Talar-wen	0.6					6	5	44	40	58	
SuV58/h1	Tir gerllaw a y tu cefn i Lon Dewi	0.4					24	32	56	44	0	HRA determined that the proximity of the site may present risks to otter and the aquatic environment.
SuV58/h2	Tir oddi ar Heol Drefach	1.4					21	27	49	43	75	HRA determined that the proximity of the site may present risks to otter and the aquatic environment.
SuV59/h2	Gogledd i Maes y Llewod	1.1					23	24	45	36		
SuV60/h1	Tir yn College-bach	0.4					22	45	53	38	58	
SuV61/h1	Tir yn Fferm Nieuport	0.4	>0.1				38	53	75	40		The site may have importance for the ecological connectivity of Native Woodland. On-site GBI should seek to create, enhance, or restore relevant habitat (particularly within the PEN area) to aid connectivity between nearby protected sites.
Gypsy & Traveller Sites												
PrC/GT2	Pen-y-bryn (estyniad), Bynea, Llanelli											
PrC2/GT1	Tir ym Mhenyfan, Trostre, Llanelli											
Mixed Use Sites												
PrC1/MU3	Adfywio a Safle Defnydd Cymysg Nantycaws	87.3	81.3	26.7			28	61	52	42	38	Desk study indicates several dispersed areas of Purple Moor Grass & Rush Pastures (Section 7 Habitat). Dependent on recommendations following on-site ecological surveys the mitigation hierarchy must be followed. Additionally, site may have importance for the ecological connectivity of Semi-Natural Grassland. On-site GBI should seek to create, enhance, or restore relevant habitat (particularly within the PEN area) to aid connectivity between nearby protected sites.
SeC16/MU1	Beechwood	1.6					17	27	53	41	0	Within Riverine Phosphate Sensitive SAC Catchment.
PrC2/MU1	Cyn Gwaith yr Hen Gastell	3.6			2.7		25	43	51	42	0	Site contributes towards urban canopy cover.

Site Ref	Name	Area (Ha)	PEN	S7 Habitat	Urban Trees	Hedgerows	Resilience Framework					Notes
							D	E	C ¹	C ²	A	
SeC4/MU1	Ger y Lan Porth Tywyn	1.2	0.9		14		33	50	57	43	75	In proximity to Burry Inlet and Loughor Estuary SSSI, CBEEMS SAC, and Burry Inlet SPA. The site may have importance for the ecological connectivity of Sand Dunes. On-site GBI should seek to create, enhance, or restore relevant habitat (particularly within the PEN area) to aid connectivity between nearby protected sites. Site contributes towards urban canopy cover.
SeC4/MU1	Ger y Lan Porth Tywyn (North)	1.7	93.6		1.2		33	50	57	43	75	As above.
PrC1/MU1	Gorllewin Caerfyrddin	65.3		1.3	2.7	5.1	18	27	64	33		HRA determined that the proximity of the site may present risks to otter and the aquatic environment. Desk study indicates several dispersed areas of Purple Moor Grass & Rush Pastures (Section 7 Habitat). Dependent on recommendations following on-site ecological surveys the mitigation hierarchy must be followed.
PrC3/MU1	Gwaith Brics Emlyn	10.3	12.9		0.3		24	38	62	48	50	The site is within an area that contains suitable habitat for the CCM SAC Marsh Fritillary metapopulation. The site may have importance for the ecological connectivity of Semi-Natural Grassland. On-site GBI should seek to create, enhance, or restore relevant habitat (particularly within the PEN area) to aid connectivity between nearby protected sites. Site contributes towards urban canopy cover.
SeC20/MU1	Parc Gwyliau Lacharn	11.8					31	44	56	47	38	NFI2020 suggests the site is 5.4% Woodland (Broadleaf and Mixed). In proximity to Afon Tywi SSSI and SAC. The southern edge of the site borders Laugharne RIGS (504).
PrC1/MU2	Pibwrlwyd	32.1			0.9	3.9	20	22	53	45	42	In proximity to Afon Tywi SAC and Glan Pibwr Stream Section SSSI.
PrC2/MU2	Porth Trostre	1.3		0.2	14	2.6	19	38	37	45		HRA determined that the proximity of the site may present risks to the aquatic environment. Desk study indicates several dispersed areas of Purple Moor Grass & Rush Pastures (Section 7 Habitat). Dependent on recommendations following on-site ecological surveys the mitigation hierarchy must be followed.
PrC2/MU3	Yr Hen Adeilad YMCA	0.1					9	31	48	48		HRA determined that the proximity of the site may present risks to the aquatic environment.

Site Ref	Name	Area (Ha)	PEN	S7 Habitat	Urban Trees	Hedgerows	Resilience Framework					Notes
							D	E	C ¹	C ²	A	
Proposed Employment Land												
PrC2/E2(iv)	Ardal i'r gorllewin o Heol Gors	1.5			16		16	29	35	41	0	HRA determined that the proximity of the site may present risks to otter and the aquatic environment. Site contributes towards urban canopy cover.
PrC2/E2(ix)	Ardal i'r gorllewin o Llys Aur	0.8			1.5		23	33	36	41		As above.
PrC2/E2(vi)	Ardal i'r gorllewin o'r Y Goleudy	1.9					26	41	32	38		HRA determined that the proximity of the site may present risks to otter and the aquatic environment.
PrC2/E2	Dafen	0.0					26	41	32	38		As above.
PrC3/E1	Dwyrain Cross Hands	18.6	99.9		16	2.4	34	63	54	34	75	The site is within an area that contains suitable habitat for the CCM SAC Marsh Fritillary metapopulation. The site may have importance for the ecological connectivity of Semi-Natural Grassland. On-site GBI should seek to create, enhance, or restore relevant habitat (particularly within the PEN area) to aid connectivity between nearby protected sites. Site contributes towards urban canopy cover.
SeC4/E1	Dyfaty, Porth Tywyn	3.1	32.4	100		0.6	30	52	49	45		HRA determined that the proximity of the site may present risks to otter, bird assemblages, and the aquatic environment. Desk study indicates several dispersed areas of Lowland fens and Reedbeds Coastal and Floodplain Grazing Marsh (Section 7 Habitat) throughout the site. Dependent on recommendations following on-site ecological surveys the mitigation hierarchy must be followed. Additionally, site may have importance for the ecological connectivity of Native Woodland. On-site GBI should seek to create, enhance, or restore relevant habitat (particularly within the PEN area) to aid connectivity between nearby protected sites.
SeC13/E1	Hen Ffowndri	0.4					30	29	72	47		In proximity to Afon Tywi SAC. Within Riverine Phosphate Sensitive SAC Catchment.
SeC16/E2	Hen Neuadd Y Farchnad	0.2					30	37	47	44	100	Within Riverine Phosphate Sensitive SAC Catchment.
PrC3/E3(ii)	Heol Stanllyd (De)	2.2	100	36.4	15		34	63	54	34	75	The site is within an area that contains suitable habitat for the CCM SAC Marsh Fritillary metapopulation. In proximity to Caeau Ffos Fach SSSI. Desk study indicates several dispersed areas of Purple Moor Grass & Rush Pastures (Section 7 Habitat). Dependent on recommendations following on-site ecological surveys the mitigation hierarchy must be followed.

Site Ref	Name	Area (Ha)	PEN	S7 Habitat	Urban Trees	Hedgerows	Resilience Framework					Notes
							D	E	C ¹	C ²	A	
												Additionally, site may have importance for the ecological connectivity of Semi-Natural Grassland. On-site GBI should seek to create, enhance, or restore relevant habitat (particularly within the PEN area) to aid connectivity between nearby protected sites.
PrC3/E3(iii)	Heol Stanllyd (Dwyrain)	0.6	100		10		34	63	54	34	75	The site is within an area that contains suitable habitat for the CCM SAC Marsh Fritillary metapopulation. In proximity to Caeau Ffos Fach SSSI and CCM SAC. Site may have importance for the ecological connectivity of Semi-Natural Grassland. On-site GBI should seek to create, enhance, or restore relevant habitat (particularly within the PEN area) to aid connectivity between nearby protected sites.
PrC3/E3(i)	Heol Stanllyd (Gorllewin)	2.0	70.2		2.4		31	54	56	40	75	As above.
SeC18/E1	Parc Busnes Sanclêr	0.4			28	13	16	11	60	38		Site contributes towards urban canopy cover.
PrC3/E7(iii)	Parc Hendre (Dwyrain)	1.1	24.8		3.1	3.8	24	33	39	39	0	HRA determined that the proximity of the site may present risks to otter and the aquatic environment. Site may have importance for the ecological connectivity of Native Woodland. On-site GBI should seek to create, enhance, or restore relevant habitat (particularly within the PEN area) to aid connectivity between nearby protected sites.
PrC3/E7(ii)	Parc Hendre (Gogledd)	2.0			12		29	40	58	42	75	HRA determined that the proximity of the site may present risks to otter and the aquatic environment. Additionally, site contributes towards urban canopy cover.
PrC3/E7(i)	Parc Hendre (Gorllewin)	2.2			24		25	40	54	40	75	As above.
PrC3/E7(iv)	Parc Hendre (South)	3.0			0.9		25	40	54	40	75	As above.
PrC2/E2(viii)	Tir ar Gat Llanelli oddi ar Heol Aur	3.8			6.7	1.1	23	33	36	41		Site benefits from existing hedgerows, and contributes towards urban canopy cover.
PrC2/E2(iii)	Tir ar Heol Aur	1.7			0.6		13	16	39	37	0	Site contributes towards urban canopy cover.
PrC2/E2(v)	Tir ar Heol Croppin	0.4			58		23	33	36	41		As above.
PrC1/E1(iii)	Tir i'r de o Heol Alltynap	1.0			17	5.7	25	37	46	37	75	Site benefits from existing hedgerows, and contributes towards urban canopy cover.

Site Ref	Name	Area (Ha)	PEN	S7 Habitat	Urban Trees	Hedgerows	Resilience Framework					Notes
							D	E	C ¹	C ²	A	
PrC3/E2(ii)	Tir i'r de o Parc Mawr	2.7	100	81	3		31	54	56	40	75	Desk study indicates a large expanse of Purple Moor Grass & Rush Pastures (Section 7 Habitat). Dependent on recommendations following on-site ecological surveys the mitigation hierarchy must be followed. Additionally, site may have importance for the ecological connectivity of Semi-Natural Grassland. On-site GBI should seek to create, enhance, or restore relevant habitat (particularly within the PEN area) to aid connectivity between nearby protected sites.
SeC19/E2	Tir i'r de o'r Hen Hufenfa	1.3		7.5		3.1	19	32	68	40		Desk study indicates a small area of Coastal and Floodplain Grazing Marsh (Section 7 Habitat). Dependent on recommendations following on-site ecological surveys the mitigation hierarchy must be followed.
PrC2/E2(i)	Tir i'r dwyrain o Calsonic	4.7			3.1		13	16	39	37	0	Site contributes towards urban canopy cover.
PrC2/E2(vii)	Tir i'r dwyrain o Ganolfan Ambiwylans Awyr	1.3			4.2		26	41	32	38		As above.
PrC3/E2(iii)	Tir i'r Gogledd o Dunbia	1.9	100		4.4		31	54	56	40	75	Site may have importance for the ecological connectivity of Semi-Natural Grassland. On-site GBI should seek to create, enhance, or restore relevant habitat (particularly within the PEN area) to aid connectivity between nearby protected sites.
PrC1/E1(ii)	Tir i'r gogledd o Heol Alltynap	1.2			10	4	22	20	64	37	75	Site benefits from existing hedgerows, and contributes towards urban canopy cover.
PrC3/E2(i)	Tir i'r gorllewin o Castell Howell	1.0	100	85	0.4		40	73	58	40	83	According to NFI2020 the site is 6.7% Broadleaf Woodland. Desk study indicates a large expanse of Purple Moor Grass & Rush Pastures (Section 7 Habitat). Dependent on recommendations following on-site ecological surveys the mitigation hierarchy must be followed. Additionally, site may have importance for the ecological connectivity of Semi-Natural Grassland. On-site GBI should seek to create, enhance, or restore relevant habitat (particularly within the PEN area) to aid connectivity between nearby protected sites.
PrC1/E1(i)	Tir i'r gorllewin o Ffordd Gorllewin Cillefwr	2.0			2.5		26	31	56	35		Site contributes towards urban canopy cover.
PrC2/E2(ii)	Tir i'r gorllewin o Gestamp Tallent	1.6			16		13	16	39	37	0	As above.

Site Ref	Name	Area (Ha)	PEN	S7 Habitat	Urban Trees	Hedgerows	Resilience Framework					Notes
							D	E	C ¹	C ²	A	
SeC16/E1	Ystad Ddiwydiannol Beechwood	0.3					17	27	53	41	0	Within Riverine Phosphate Sensitive SAC Catchment.
PrC3/E6	Ystad Ddiwydiannol Capel Hendre	0.5	100		14		29	40	58	42	75	The site is within an area that contains suitable habitat for the CCM SAC Marsh Fritillary metapopulation. site may have importance for the ecological connectivity of Semi-Natural Grassland. On-site GBI should seek to create, enhance, or restore relevant habitat (particularly within the PEN area) to aid connectivity between nearby protected sites.
PrC3/E8	Ystad Ddiwydiannol Cilyrychen	0.8					31	53	60	43	0	
SeC19/E1	Ystad Ddiwydiannol Hendy-Gwyn	0.5				5.5	22	30	59	38		Site benefits from existing hedgerows, and contributes towards urban canopy cover.
Strategic Sites												
PrC1/SS1	Yr Egin	3.4			1.4	3.5	17	22	57	35		Site benefits from existing hedgerows, and contributes towards urban canopy cover.
PrC2/SS1	Pentref Gwyddorau Bywyd a Llesiant Llanelli	22.4			3.6		45	64	31	49	75	Site contributes towards urban canopy cover.

8. Review (Step 5)

Recommendations for Policy Development

- 8.1.1. It is recommended that development proposals should be expected to maintain, protect, and enhance Carmarthenshire's GBI network, ensuring that individual GBI assets are retained and integrated into any new development, wherever possible, GBI should be a primary consideration in the site selection and design of proposed development, and early consideration of how GBI will be integrated into a development, as well as the subsequent management and maintenance of GBI assets is vital. It is recommended that planning applications should be accompanied by a green infrastructure statement which demonstrates consideration of these factors and, where there is potential for loss of GBI, it should be demonstrated how this loss is to be mitigated.
- 8.1.2. It is also recommended that a GBI policy for the revised LDP should be strategic and should be cross-referenced in policies on biodiversity, landscape, placemaking, recreation and flooding. This will ensure that GBI is integrated throughout the revised LDP and demonstrates the need for protection and enhancement of GBI assets across Carmarthenshire.
- 8.1.3. NB: Given the iterative nature of the development of the rLDP, the aforementioned recommendations have already been implemented (as indicated in section 6.6).

Safeguarding GBI

- 8.1.4. This assessment gives a baseline of Carmarthenshire's GBI assets and the functions that they deliver. In order to promote the enhancement of the GBI network, this work should be further built on, to identify areas of need, and opportunities for the enhancement of GBI assets in these areas. This would result in mapping of need and opportunity which could be referred to when prioritising GBI projects and obtaining funding.
- 8.1.5. Additionally, PPW specifies that GBI 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)⁶⁹. Therefore, it is recommended that as and when new datasets become available, the appropriate steps are updated accordingly. This should be undertaken in accordance with NRW's advice⁷⁰.

- 8.1.6. It is recommended that this assessment is further built on by Supplementary Planning Guidance (SPG) that incorporates this evidence base, but also provides further guidance and good practice case studies on ways in which GBI can be protected and enhanced depending on need.

Embedding a Holistic Approach

- 8.1.7. It should be recognised that planning policy is only one part of the overall administrative and policy framework that is required for the successful delivery of GBI at a strategic level. This may be facilitated by the PSB in their duties under the Well-being of Future Generations Act 2015, however the LA may wish to consider the strategic delivery of NbS by reflecting this assessment in other plans and strategies (e.g. housing, highways, landscape). Linkage should also be made to the work undertaken by NRW in relation to the preparation of Area Statements.
- 8.1.8. It is recommended that a County-wide GBI strategy should be developed in order to establish a mechanism by which GBI consideration is embedded within Council activities. This GBI assessment represents a useful starting point for the development of such a strategy.

8.2. Conclusion

- 8.2.1. The present assessment provides a reference of information to support the development and integration of GBI within Carmarthenshire's 2nd Deposit rLDP. This has been done through identifying GBI assets, assigning them with their derived environmental and socioeconomic functions, and mapping them to ultimately create a baseline of the GBI network across the County. Finally, this has enabled the assessment of proposals contained within the rLDP to establish the main threats and opportunities to promoting a GBI approach within the development process.
- 8.2.2. Ultimately, this assessment has demonstrated how GBI can contribute to the overall mitigation of planned development. In Wales, public bodies have a duty to contribute to action on climate change, economic growth, maintenance, and enhancement of healthy ecosystems, maximising mental and physical wellbeing and to promote culture and heritage through the Well-Being of Future Generations Act 2015. A GBI approach, as here identified, can help to achieve these aims.

Appendices

Appendix A: GBI Typology & Mapping Data Sources

GBI Type	Description	Data available?
Active travel routes	Routes that are publicly accessible can be utilised for walking, and cycling. They often provide or enhance connectivity between other green and open spaces.	CCC active travel route mapping
Agricultural Land	Land managed for agriculture, including grazing land, crop production fields and hedgerows.	NRW Predictive Agricultural Land Classification (ALC) Map
Allotments, community gardens, orchards	Allotments are small plots which collectively make up a larger greenspace. These plots are available to members of the public to rent for the cultivation of fruit, vegetables, and flowers. Orchards: Areas populated with fruit bearing trees. Can be publicly or privately owned	CCC Greenspace assessment <ul style="list-style-type: none"> Allotments OS Greenspace layer <ul style="list-style-type: none"> Allotments
Graveyards, Cemeteries and churchyard	Land used as burial grounds including cemeteries and churchyards, usually grass covered with occasional shrubs.	CCC Greenspace assessment <ul style="list-style-type: none"> Cemeteries and churchyards OS Greenspace Layer <ul style="list-style-type: none"> Cemetery Religious Grounds
Coastal habitat	Beaches, estuaries, sand dunes, marshes and semi-natural open land by the coast	SINC mapping <ul style="list-style-type: none"> Sand Dunes Coastal Floodplain/grazing marsh
Derelict Land	Land which has been disturbed by previous development or land use but is now abandoned. Waste or derelict land is often recolonised by a process of natural succession. Land is classed as derelict when it is in the early stages of natural succession. As succession proceeds it may be reclassified to a different GBI type e.g. grassland or woodland.	No mapping available

Designated Nature/Geological Sites Stat and non-stat	Most green Infrastructure assets are assumed to provide at least some biodiversity interest however this refers to sites specifically noted for biodiversity/geological value. SACs, SPAs, Ramsar, SSSIs, RIGs, LNR, AONB, National Parks	Regionally Important Geological and Geomorphological Sites (RIGS) (may not be complete?) National Nature Reserves (NNR) Local Nature Reserves (LNR) Species Areas of Conservation (SAC) Special Protection Areas (SPA) Sites of Special Scientific Interest (SSSI) Ramsar All layers accessed from Lle portal http://lle.gov.wales/home
Equipped/designated play areas	Includes Local Areas for Play (LAPs), Local Equipped Areas for Play (LEAPs), Neighbourhood Equipped Area for Play (and informal recreation) and provision for children and young people (NEAPs).	CCC Greenspace Assessment <ul style="list-style-type: none"> • Provision for children and youth OS Greenspace Layer <ul style="list-style-type: none"> • Play space
MUGA's and skateparks	Multi-use Games Area (MUGA) and Skate Parks	Some mapped via OS Greenspace layer <ul style="list-style-type: none"> • Playspace
Functional Greenspace	SuDS and flood storage	No mapping currently available
Amenity Greenspace and open space	Usually publically owned and managed and routinely accessible for public use. Their landscape value can sometimes be minimal because of poor design. They include 'left over' green spaces within housing and other forms of development, as well as most road verges. Includes informal recreation spaces, green spaces in and around housing and village greens and areas of work such as offices.	CCC Greenspace assessment <ul style="list-style-type: none"> • Amenity Greenspace
Grassland, heathland, moorland, scrubland	Grassland which is not agriculturally improved. Includes downlands, commons and meadows. Also includes moorland, shrub and bracken.	NRW Common land layers CCC SINC mapping
Green roofs	Roofs of buildings, bus shelters or any other form of construction which are partially or wholly covered with vegetation.	No mapping currently available

Green Walls / Living Walls	A wall partially or completely covered with greenery.	No mapping currently available
Heritage Sites and Historic Parks and Gardens	Historic country estates, historic urban public parks and historic sites and monuments.	CADW scheduled ancient monuments layer (GD) Castles layer (GD)
Institutional Grounds	Green space on the grounds of institutions such as schools, universities and colleges, hospitals and nursing homes. Does not include outdoor sports facilities.	Partially covered by CCC greenspace assessment.
Outdoor sports facility Sports Ground Playing Pitches (FIT)	Includes sports pitches, school and other institutional playing fields, golf courses and other outdoor activities. Usually consist of vegetated sports surfaces, boundary shrubbery, trees and hedges. Can occur within parks.	CCC Greenspace assessment • Outdoor Sports Facility OS Greenspace layer • Other Sports • Playing Fields • Golf Course • Bowling Green • Tennis Courts
Park or public garden	Includes urban parks, country parks and formal parks. Generally designed for public access and enjoyment. Facilities may be present onsite which can enhance visitor attachment.	CCC Greenspace assessment • Parks and Gardens OS Greenspace layer • Public Parks Gardens
Private domestic gardens	Privately owned greenspace within individual dwellings which are generally not publicly accessible. These plots vary in size but often make up a significant part of the green fabric of urban areas. Land may include trees, shrubs, grass and flowering plants.	Mastermap Topography layer • Labelled 'Multiple'
Public rights of way	PRoW are publicly accessible and includes facilities such as footpaths, bridleways, and pavements. They often provide or enhance connectivity between other green and open spaces.	Carmarthenshire County Council PRoW mapping.
Street trees	Generally, in urban areas, a row/collection of individual trees along side of the road.	NRW Urban Tree Cover Assessment 2013

Water Body	Expanses of open water, including large lakes, small ponds, reservoirs and harbours. Also includes the sea.	CCC Greenspace assessment <ul style="list-style-type: none"> • Inland water
Water Course	All areas of running water, including rivers, estuaries, small streams, canals and aqueducts.	OS Greenspace layers <ul style="list-style-type: none"> • Standing Water
Wetland	Land dominated by wet habitats, including fen, marsh, bog, and wet flush vegetation. Wetlands associated with coasts are classified as coastal habitats.	CCC Greenspace assessment <ul style="list-style-type: none"> • Natural and Semi-natural • Inland water CCC SINC mapping
Woodland	All forms of woodlands including deciduous woodland (both ancient semi-natural and woodlands) and mixed and coniferous woodland (including plantations and shelterbelts) Includes newly planted woodland.	CRoW Open Access – Dedicated Forests National Forestry Inventory 2016

Appendix B: Asset & Function GBI Theme Alignment.

			GBI Assets																											
			Allotments	Churchyards & Cemeteries	Outdoor Sports Facilities	Parks & Gardens	Amenity Greenspaces	Play Spaces	Private Gardens	Active Travel Routes	Public Rights Of Way	Fen Swamp	Woodland	Grazing Floodplain	Heathland	Sand Dunes	Marshy Grassland	Bog	Saltmarsh	Standing Water	Common Land	Hedgerows	Open Country	Urban Street Trees	Green Roofs	Green Walls	Wetlands	Designated Nature Sites	Designated Geological Sites	
GBI Themes & Function	Health & Well-Being	Recreation	X	X	X	X	X	X	X	X		X		X	X				X	X		X						X		
		Active Travel							X	X																				
		Trapping Air Pollutants										X	X					X				X		X	X	X	X			X
	Biodiversity	Pollination	X	X	X	X	X		X			X	X	X	X	X	X		X		X	X	X	X	X	X	X	X	X	
		Habitat for Wildlife		X		X			X			X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
		Corridor for Wildlife	X	X	X	X	X	X	X			X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
	Climate Change & Sustainability	Shading from Sun										X												X	X	X				
		Soil Stabilisation										X				X			X			X								
		Carbon Storage	X	X	X	X	X	X	X			X	X	X	X	X	X	X			X	X	X	X	X	X	X	X		X
		Water Storage & Conveyance		X	X	X	X	X	X			X	X	X	X		X	X	X	X	X		X	X	X	X	X	X		
		Coastal Storm Protection												X		X			X									X		
		Removal Of Pollutants										X	X					X							X	X	X	X		X
	Social Cohesion	Community Spaces	X	X	X	X	X	X	X	X		X								X	X		X	X					X	X
		Local Food Production	X						X																					
	Economy	Providing Jobs		X	X	X			X	X	X		X									X		X	X	X	X	X	X	X
		Lifelong Learning	X																										X	X
		Skills & Volunteering	X		X																	X						X	X	X
	Sense Of Place	Visual Contribution to the Landscape				X	X		X			X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
		Connection to the Local Environment	X		X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X		X	X	X	X	X	X	X	X
		Noise Absorption											X											X	X	X				
Heritage & Culture		X	X	X	X			X	X	X	X	X	X	X	X	X	X	X	X	X		X	X	X	X	X	X	X	X	

Appendix C: rLDP Issues Identification.

The 38 summary issues are as follows, split over each GBI Theme. Further detail is set out within the Issues Vision and Objectives Topic Paper.

Sense of Place

8. Rich landscape and townscape qualities
12. Beauty, peace and quiet, open green spaces and fresh air are also contributors to happiness in rural areas.
22. A predominantly rural county where 60% of population live in rural areas
26. Need to appreciate the sense of place – a county of contrasts
27. Disused buildings across the County
28. Need to measure the impact of development on the Welsh Language
30. Important archaeological sites and historic features
31. Highest number of Welsh speakers in Wales

Health & Well-being

9. An aging population
10. 60% of adults are reported as being overweight or obese
13. Air Quality Management Areas in Carmarthen, Llanelli and Llandeilo
14. Our big NHS change and any implications

Biodiversity

6. Biodiversity designations ranging from international to local levels
- Climate Change and Sustainability
5. Risks from flooding and the challenges presented by climate change
 7. An ecological footprint that is currently exceeding sustainable levels
 23. Ensuring infrastructure capacity can support development, including highways
 24. The need to promote and access alternative forms of transport
 33. Need to promote energy efficiency in proposed and existing development

2nd Deposit rLDP

UCI 1 Response to the publication of the NRW Guidance on Phosphate Levels in protected Riverine SACs.

UCI 4 Declaration by the Council of a Nature Emergency.

Climate Change & Sustainability

11. Community life, education and public services indicate well-being in rural areas
15. Rural and urban deprivation
16. Over 1 in 3 households living in poverty
17. Council's target to provide 1,000 affordable homes
18. Lack of new homes being built in some Service Centres and Local Service Centres
19. Lack of a five-year housing land supply and need for a housing mix
20. Changes in population and household forecasts indicate that significantly less homes are needed through to 2033.
21. Housing sites not being brought forward and built
29. Need for affordable housing within our communities to retain young families

UCI 3 Declaration by the Council of a Climate Emergency.

UCI 5 Ten Towns Initiative.

Economy

1. The £1.3 billion Swansea Bay City Deal, with projects identified in Llanelli and Carmarthen
2. Varying vibrancy and vitality within our retailing town centres
3. Appropriate growth is needed in rural areas (including employment opportunities)
4. A buoyant Visitor economy with potential for growth
25. Lack of employment opportunities, broadband and public services in rural area

UCI 2 Recognise and reflect the impacts arising from Covid-19.

Appendix D: Stakeholder Engagement

Online Survey

An online survey was sent out on the 20 October 2021 to a wide range of over 150 consultees. This included:

- Statutory/technical stakeholders.
- Elected Members and town councillors.
- Community groups with an interest/stake in GBI

Consultees were asked for:

- Their views on the draft GBI Vision for Carmarthenshire (taken from the existing Green Infrastructure Assessment).
- Their views on how the GBI network in each town performs on the themes of People, Nature and Place, along with reasons for these ratings.
- Any opportunities or ongoing projects in each these towns.

In total, 50 responses were received to the online survey.

Interactive map

The link to the interactive map was sent out along with the survey, on same date and to the same stakeholders. The map allowed stakeholders to leave points on the map across any of the 8 towns, identifying either:

- Strengths
- Room for improvement, or
- Opportunities

In total, 149 comments were left on the interactive map. The number of comments covering each area were as follows:

- Carmarthen: 33
- Llanelli: 50
- Ammanford/ Cross Hands: 29
- Kidwelly: 17
- St Clears: 7
- Llandovery: 9
- Newcastle Emlyn: 4
- Cwmamman: 0

Virtual workshops

Three virtual workshops were held, which included a presentation from LUC and a CCC elected member, followed by a discussion of over-arching key challenges and opportunities using a MIRO 'virtual whiteboard'. Each workshop was targeted at a different category of stakeholder.

In total, 48 people participated in the virtual workshops. This included:

2nd Deposit rLDP

- 21 technical stakeholders at Workshop 1.
- 21 elected Members at Workshop 2.
- Six community group representatives at Workshop 3.

Comments on Draft Vision

Consultees were asked to comment on a proposed draft vision for GBI in Carmarthenshire. The consultees responses were as follows:

- Concerns over top-down management of nature.
- Needs more emphasis on placemaking and blue infrastructure.
- Concerns over IT access (process of consultation)
- Need for long-term commitment and community as a partner.
- Need to both preserve and grow green spaces/forest areas.
- Too wordy – needs plain English and clarity over what ‘green’ means. Too many buzz words/corporate language and is too long. If more accessible, it will be a more shared vision.
- More emphasis needed on managing biodiversity.
- Need for more cohesion among fragmented assets.
- Need to revisit building proposals and see if they conform to the Vision.
- Vision should reference Climate Change and working toward a carbon-neutral Council.
- Need to recognize the need to recovery from damage by human activity.
- Need to include working with the environment.

Comments on each of the focus towns

Carmarthen: People

- Need for coordination and investment in green spaces.
- Lack of green spaces and poor maintenance.
- Invasive species in river
- Few cycle lanes.
- Beautiful landscape but not accessible for all generations.
- Too much hard infrastructure in the centre/poor public realm, and planting regimes/landscaping do not provide ecosystem services.
- More play facilities needed in town centre.
- Car-dominated centre.
- More urban greening needed in town centres.
- Need to engage community on what projects taken forward.
- Big opportunity for e-bike infrastructure.
- Outside scope – public transport.

Carmarthen: Nature

- Concerns over coping with rising water levels – bit opportunity for SuDS.
- River habitats threatened by development and in poor condition.
- Very little nature within the town, no wild areas and few mature trees.
- Allotments and wetlands need preserving.

Carmarthen: Place

- Sense of identity and history well promoted.

2nd Deposit rLDP

- Town has a lot of potential to attract people, but general appearance of the town/lack of maintenance affects tourism sector – town looks tired/littered.
- Need to make more of the riverside.
- Needs more outdoor seating and outdoor life (music/performance).
- Needs space to contemplate.
- SuDS and green walls would contribute to place as well as ecosystem services.
- Too much hard surface and car dominance.

Carmarthen: Ongoing projects

- Civic Society managing flowerbeds.
- Town Council Historic Walks scheme
- Carmarthen Riverside Association.
- Ongoing work to enhance wetland area.

Llanelli: People

- Focus on those who are missing out on GBI.
- Green spaces being lost to development.
- Lack of investment and need to “sell” the town better.
- Northeast side of town is underdeveloped e.g., paths up to Swiss Valley and Pen y Fan Quarry.
- Coastal walking/cycle path is successful and important.
- Concerns over abuse/anti-social behaviour in green spaces.
- Poor air quality along A484.
- More seating needed on paths and in parks for older people.

Llanelli: Nature

- High reliance on grant funding/lack of revenues.
- Climate change is low priority in planning system.
- Some mowing regimes changed – but questions over how effective?
- More needed for pollinators e.g., bee boxes.
- Room for more trees planted in Pen y Fan and Sandy Park.
- Lots of green around the town.
- More street trees needed.
- Poor biodiversity and management of nature.

Llanelli: Place

- Town centre and peri-urban areas need investment.
- Town does not draw people in, and shops moved out to Parc Trostre. Looks drab and tired.
- Anti-social behaviour in certain places/around seating.
- Could make more of tourism potential using GI – street trees, planters, landscaping, verges, more connections.
- More focus needed on walking routes between station and town centre, as well as historic walking routes.

Llanelli: Ongoing projects

- Tyshia Redevelopment.
- Peltra redevelopment of Penyfan park
- Cruyff Foundation

2nd Deposit rLDP

- Wellbeing centre redevelopment of Delta lake area.
- Incredible Edibles projects.
- Town Council-run forums in Burry Port.
- Wild corner of Pwll Park developed for wildflowers/pollinators (Llanelli Naturalists/Pwll Residents Association/LRC).
- WI movement trying to adopt areas for wildlife.
- Rotary Club hoping to promote environmental schemes in Llanelli.

Ammanford/Cross Hands: People

- Needs imagination/a lot more that can be done.

Ammanford/Cross Hands: Ongoing projects

- Park re-generation (Betws)

Kidwelly: People

- Calls for protection of Glan yr Afon Nature Reserve.
- Great natural resources as on estuary – but undervalued and loss of habitat. Need enhancements.
- Insensitive management of features e.g. leaving some areas wild.
- Popular green spaces at the Quay and surrounding areas.
- Cycle route between Kidwelly and Pembrey could be improved further.
- Footpaths being eroded by motorized vehicles.
- Poor maintenance of footpaths at the Quay and Glan Yr Afon.
- Flood risk – needs more space to absorb floodwater within the flood zone.
- Roads not safe for cycling – including Sustrans Route 4.

Kidwelly: Nature

- Castle is a draw for tourism, but natural aspects of town undervalued and threatened by development.
- Council only just stopped using pesticides/herbicides, but residents don't like 'messy' areas. Needs re-education.
- Trees need to be maintained and cared for – but costs money.
- Abundance of wildlife in the Quay and Glan Yr Afon.
- Strong community of volunteers looking after green spaces.
- Land by old canal is good for nature and old landfill site + other nice pockets.

Kidwelly: Place

- Town looks shabby and poorly maintained. Needs better backdrop for castle attraction. Town been allowed to decline, which is offputting for visitors.
- Need integrated approach to tourism and GBI – as an estuary town.
- Castle and surrounding areas well looked after, but rest of town not.
- Small paved area by church used for small markets – need more spaces like this.

Kidwelly: Opportunities

- planting of trees at Glan yr Afon and the Quay and maintaining the habitats, walkways and signage.

2nd Deposit rLDP

- Canalside areas (Kymer Canal) – e.g. more wildflower areas, shelters, picnic tables, hides.
- Increasing interest in wildlife here using information panels and links with schools etc. to encourage love for natural world.
- Lots of open space could be improved for nature.
- History Shed Experience.
- Town Square redevelopment.

Kidwelly: Ongoing projects

- wildlife projects and volunteer work at Glan yr Afon.
- Cydweli Common Ground/Tir Cyffredin Cydweli is a serious, constituted, conservation group.
- Black Cat Strategy is trying to encourage tourism but needs to be fully aware about Environmental issues.
- History Shed Experience – but divergent opinions

St Clears

- No comments received via survey.

Llandovery

- No comments received via survey.

Newcastle Emlyn: People

- Some good walking routes, but room for more.
- Existing green areas poorly maintained.

Newcastle Emlyn: Place

- Some businesses have closed when banks closed – tourists may pass by the town. Town attractions are poorly publicized.

Cwmamman: People

- Good (and good work over recent years) but scope for improvement
- Excellent riverside walk.

Cwmamman: Nature

- Wildflower planting needed

Cwmamman: Place

- Ways to improve sense of place e.g at key locations – establish an identity around rich cultural heritage.
- Very little tourism and very little to do.

Cwmamman: Opportunities

- Via Community Development Officer. Lots of ongoing projects.

Summary of discussion

Three virtual workshops were held, which included a presentation from LUC and a CCC elected member, followed by a discussion of over-arching key challenges and opportunities using a MIRO 'virtual whiteboard'. All comments raised in the discussion are included in 'snapshots' of the virtual whiteboard in Appendix A.

The discussion started with an introduction to three core themes the GBI strategy will focus on: people, nature and place. Then consultees were prompted to discuss the following questions with a focus on the core themes:

- What are the key issues and opportunities facing green and blue infrastructure in Carmarthenshire?
- What are the major delivery challenges?

The key issues raised by consultees in discussion were as follows:

What are the key issues and opportunities facing green and blue infrastructure in Carmarthenshire?

People

- Carmarthenshire towns benefit from parks and green spaces but play provision, sport and recreational use of the spaces needs to be improved
- Carmarthenshire benefits from a network of rivers but recreational use and leisure activities could be introduced to wider their use, it is understood this has been successful in other counties.
- The provision of green space is generally good but safe pedestrian access to these spaces can be poor.
- Rural residents have poor active travel or public transport options to access parks, castles, lakes etc.
- Towns where arranged leisure activities were available were more successful in bringing people together to use green spaces. This was reported to support mental health and wellbeing.
- There is a desire and need for more community growing space.
- Projects in schools should be encouraged e.g. SuDs and growing projects.
- More information could be provided on local green and blue spaces to encourage their use.
- Mental and physical health is considered a priority for green and blue spaces.
- Need more safe and joined up pedestrian and cycling routes to schools and around towns.

Nature

- In rural environments more needs to be done to educate people so that they can learn more about their surroundings. These could include information boards, apps or arranged sessions.
- Communication and education about projects for nature is key to the success of projects.
- Declining biodiversity in Carmarthenshire.
- Water quality and phosphate issues.
- Flooding – tidal and river.
- Sustainable drainage and rainwater control.

2nd Deposit rLDP

- Better tree maintenance.
- Agricultural issues and pollution.
- Educating a sense of pride in nature for the next generation.
- Stewardship of natural assets.
- Create outdoor classrooms.

Place

- In many parks, anti-social behaviour including drug abuse is a concern. Llanelli was named as somewhere where parents are afraid to take their children to green spaces in town as there is often broken glass and needles left on the ground.
- Developing railway paths into footpaths was considered the best option for providing new routes into the countryside.
- Opportunity for energy production within coastal areas.
- Combatting noise and air pollution.
- GBI-led regeneration and new development.
- Increase the use of Welsh language for natural assets.
- Connection to the environment in ex-industrial and rural towns.
- Improve and make the most of existing green assets, heritage assets and landmarks.
- Introduce living walls.
- Rewilding underused areas.

What are the major delivery challenges?

- Challenge of maintenance and management. Concern about management of new parks/green leisure spaces given a reported lack of staff and volunteers to manage the existing spaces.
- Joined up approach e.g. ten towns initiative – need to work with this as there is an important link between many of the initiatives.
- Leadership and upskilling of planners.
- Concern regarding funding mechanisms for future developments.
- Distinction between private and public spaces.
- Delivering of GBI through the planning system and new development.
- Private or unknown ownership of land and rivers.
- Need for good communication, education and engagement.
- Drawing on community resources / energy.
- Function of spaces.

References

¹ [£8.1bn to support green infrastructure | GOV.WALES](#)

² [Net Zero Carbon by 2030 \(gov.wales\)](#)

³ Whilst the next iteration of Planning Policy Wales (version 12) is expected, proposed changes to version 11 have been published in letter dated 11 October 2023 from Julie James AS/MS. This places a stronger emphasis on GI through the requirement of GI statements, Net Benefit for Biodiversity Biodiversity and the Step-wise Approach, Protection of SSSIs and Woodlands. [Addressing the nature emergency through the planning system: update to Chapter 6 of Planning Policy Wales | GOV.WALES](#)

⁴ Paragraph 6.2.1 (PPW 11)

⁵ Kuo (2015) - How might contact nature promote human health? Promising mechanisms and a possible central pathway.

⁶ Department of Health (2008) - Health inequalities: progress and next steps

⁷ Exeter University (January 2014) - [Green spaces deliver lasting mental health benefits.](#)

⁸ De Vries S, Verheij, Groenewegen and Spreeuwenberg (2007) - Natural Environments – healthy environments? An exploratory analysis of the relationship between greenspace and health.

⁹ Coombs, Jones and Hillsdon (2010) - The relationship of physical activity and overweight to objectively measured green space accessibility and use.

¹⁰ Lovasi, Quinn, Neckerman, Perzanowski and Rundle (2007) - Children living in areas with more street trees have lower prevalence of asthma.

¹¹ Mind – Ecotherapy: the green agenda for mental health

¹² Chiesura (2004) - The role of urban parks for the sustainable city - Landscape and Urban Planning, 68, 129–138

¹³ Gorenflo Romaine Mittermeier and Walker-Painemilla (2012) - Co-occurrence of linguistic and biological diversity in biodiversity hotspots and high biodiversity wilderness areas.

¹⁴ Pretty, Peacock, Hine, Sellens, South and Griffin (2007) - Green exercise in the UK countryside: Effects on health and psychological well-being, and implications for policy and planning - Journal of Environmental Planning and Management 50(2): 211-231.

¹⁵ Pikora, GBIlles-Corti, Knuiiman, Bull, Jamrozik and Donovan (2005) - Neighbourhood environmental factors correlated with walking near home: using SPACES - Medicine and Science in Sports and Exercise 2005;38(4):708-714.

¹⁶ Sullivan, W. C., Kuo, F. E. and DePooter, S. F. (2004). The fruit of urban nature: vital neighbourhood spaces. Environment and Behavior 36 (5), 678–700.

¹⁷ Wolfe and Mennis (2012) - Does vegetation encourage or suppress urban crime? Evidence from Philadelphia, PA - Landscape and Urban Planning 2012; 108 (2-4): 112-122.

¹⁸ Davies, P. and Deaville, J. (2008). Natural heritage: a pathway to health. Countryside Council for Wales.

¹⁹ Sunderland (2012) - Microeconomic evidence for the benefits of investment in the environment – Review - Natural England Research Report 033.

²⁰ [Economic assessment of the Health benefits of walking on the Wales Coast Path](#)

²¹ The UK National Ecosystem Assessment (UK NEA) - <http://www.teebweb.org/>

²² Natural England (2009) - Our Natural Health Service: The role of the natural environment in maintaining healthy lives - NE

²³ Forestry Commission (2005) Bold Colliery Community Woodland; District Valuer's Report on Property Values, Penrith: Forestry Commission North West England Conservancy.

²⁴ DG Environment (2012) - Multi-functionality of green infrastructure – EU

²⁵ EFTEC (2013) - Green Infrastructure's contribution to economic growth: a review - A Final Report for DEFRA and Natural England

²⁶ BBC (January 2013) - Wales coastal path brings £16m economic boost - <http://www.bbc.co.uk/news/uk-wales-21259987>

²⁷ [The Power of Nature for Employee Wellbeing - Business in the Community \(bitc.org.uk\)](#)

²⁸ [naturalresources.wales/media/4123/tree-cover-in-wales-towns-and-cities-2014-study.pdf](#)

²⁹ Mortberg and Wallentinus (2000) - Red-listed forest bird species in an urban environment - assessment of green space corridors - Landscape and Urban Planning 50(4): 215-226

³⁰ Gedge and Kadas (July 2005) - Green roofs and biodiversity – page 161-169, Volume 52 Number 3, BioloGBIst http://livingroofs.org/images/stories/pdfs/Biol_52_3_Kadas.pdf

³¹ Baker, P.J. and Harris, S. (2007). Urban mammals: what does the future hold? An analysis of the factors affecting patterns of use of residential gardens in Great Britain. Mammal Review 37 (4), 297–315

³² Eycott, A., Watts, K., Brandt, G., Buyung-Ali, L., Bowler, D., Stewart, G. and Pullin, A. (2008). Which landscape features affect species movement? A systematic review in the context of climate change. Forest Research report for Defra. Forest Research, Farnham

³³ Funk, A., Reckendorfer, W., Kucera-Hirzinger, V., Raab, R. and Schiemer, F. (2009). Aquatic diversity in a former floodplain: remediation in an urban context. Ecological Engineering 35 (10), 1476–1484.

³⁴ Helden, A.J. and Leather, S.R. (2004). Biodiversity on urban roundabouts - Hemiptera, management and the species-area relationship. Basic and Applied Ecology 5, 367-377.

³⁵ Forestry Commission England (no date) – Trees and Climate Change

³⁶ A. Ismail, M. Samad, A. Rahman, F. Yeok Cooling potentials and CO₂ uptake of Ipomoea Pes-Caprae installed on the flat roof of a single storey residential building in Malaysia

³⁷ Z. Davies, J. Edmondson, A. Heinemeyer, J. Leake, K. Gaston, Mapping an urban ecosystem service: quantifying above-ground carbon storage at a city-wide scale J. Appl. Ecol., 48 (5) (2011), pp. 1125-1134

³⁸ Gill, S.E., Handley, J.F., Ennos, A.R. and Pauleit, S., 2007. Adapting cities for climate change: the role of the green infrastructure. *Built environment*, 33(1), pp.115-133.

- ³⁹ Potchter, O., Cohen, P. and Britan, A. (2006). Climatic behavior of various urban parks during hot and humid summer. *International Journal of Climatology* 26 (12), 1695–1711.
- ⁴⁰ Beckett, K.P., Freer-Smith, P.H. and Taylor, G. (1998). Urban woodlands: their role in reducing the effects of particulate pollution. *Environmental Pollution* 99, 347–360.
- ⁴¹ European Environment Agency (2012) - EU Forests, Health & Climate Change.
- ⁴² Jeffries R., Darby, S.E. and Sear, D. A. (2003). The influence of vegetation and organic debris on flood-plain sediment dynamics: case study of a low-order stream in the New Forest, England. *Geomorphology* 51, 61–80 / Vellidis, G., Lowrance, R., Gay, P. and Wauchope, R.D. (2002). Herbicide transport in a restored riparian forest buffer system. *Transactions of the ASAE* 45, 89–97.
- ⁴³ VanWoert, N.D., Rowe, D.B., Andresen, J.A., Rugh, C.L., Fernandez, R.T. and Xiao, L., 2005. Green roof stormwater retention. *Journal of environmental quality*, 34(3), pp.1036-1044.
- ⁴⁴ [Guidance Note 042 Green Infrastructure Assessments \(final June 2021 \(cyfoethnaturiol.cymru\)\)](#)
- ⁴⁶ [The-critical-role-of-infrastructure-for-the-SDGs_EN.pdf \(unops.org\)](#)
- ⁴⁷ Shackleton, C.M., 2021. Urban green infrastructure for poverty alleviation: evidence synthesis and conceptual considerations. *Frontiers in Sustainable Cities*, 3, p.710549.
- ⁴⁸ [Infrastructure-for-climate-action_EN.pdf \(unops.org\)](#)
- ⁴⁹ [SoNaRR2020 Executive Summary \(naturalresources.wales\)](#)
- ⁵⁰ [wwt.org.uk/uploads/documents/2023-07-31/wwt-water-quality-route-map.pdf](#)
- ⁵¹ [The State of Nature 2019 report: 17% of species in Wales are at risk of extinction \(senedd.wales\)](#)
- ⁵² Estreguil, C., Dige, G., Kleeschulte, S., Carrao, H., Raynal, J. and Teller, A., Strategic Green Infrastructure and Ecosystem Restoration: geospatial methods, data and tools, EUR 29449 EN, Publications Office of the European Union, Luxembourg, 2019, ISBN 978-92-79-97294-2, doi:10.2760/06072, JRC113815.
- ⁵³ [Natural Resources Wales / Reducing health inequalities](#)
- ⁵⁴ [psb-well-being-plan.pdf \(thecarmarthenshirewewant.wales\)](#)
- ⁵⁵ [Nature recovery action plan | GOV.WALES](#)
- ⁵⁶ [Home | Convention on Biological Diversity \(cbd.int\)](#)
- ⁵⁷ [Biodiversity strategy for 2030 \(europa.eu\)](#)
- ⁵⁸ [Carmarthenshire Nature Partnership \(gov.wales\)](#)
- ⁵⁹ [tan16-sport-recreation-open-space.pdf \(gov.wales\)](#)
- ⁶⁰ [Carmarthenshire Nature Partnership \(gov.wales\)](#)
- ⁶¹ <https://www.carmarthenshire.gov.wales/media/1222449/carms-nature-recovery-plan-pt-4.pdf?v=202005070957380000>
- ⁶² Full lists of species and habitats listed under S7 of the Environment (Wales) Act (2016) can be accessed here: <https://www.biodiversitywales.org.uk/Environment-Wales-Bill>

⁶³ Edition 11 (paragraph 6.4.9)

⁶⁴ [resilient-ecological-networks-practitioner-guide.pdf \(cyfoethnaturiol.cymru\)](#)

⁶⁵ Contains Natural Resources Wales information © Natural Resources Wales and Database Right. All rights Reserved. Contains Ordnance Survey Data. Ordnance Survey Licence number AC0000849444. Crown Copyright and Database Right. Contains data supplied by Natural Environment Research Council.

⁶⁶ [Tackling Air Pollution With Trees - Woodland Trust](#)

⁶⁷ Based on information supplied by the Forestry Commission. © Crown copyright and database right 2022 Ordnance Survey [100021242]. Contains Natural Resources Wales information © Natural Resources Wales and Database Right. All rights Reserved. Contains Ordnance Survey Data. Ordnance Survey Licence number AC0000849444. Crown Copyright and Database Right.

⁶⁸ See phosphate topic paper for full details.

⁶⁹ Reference is made to endnote 3.

⁷⁰ See pages 42 and 42 of [Guidance Note 042 Green Infrastructure Assessments \(final June 2021 \(cyfoethnaturiol.cymru\)\)](#)