West of England Joint Green Infrastructure Strategy 2020-2030

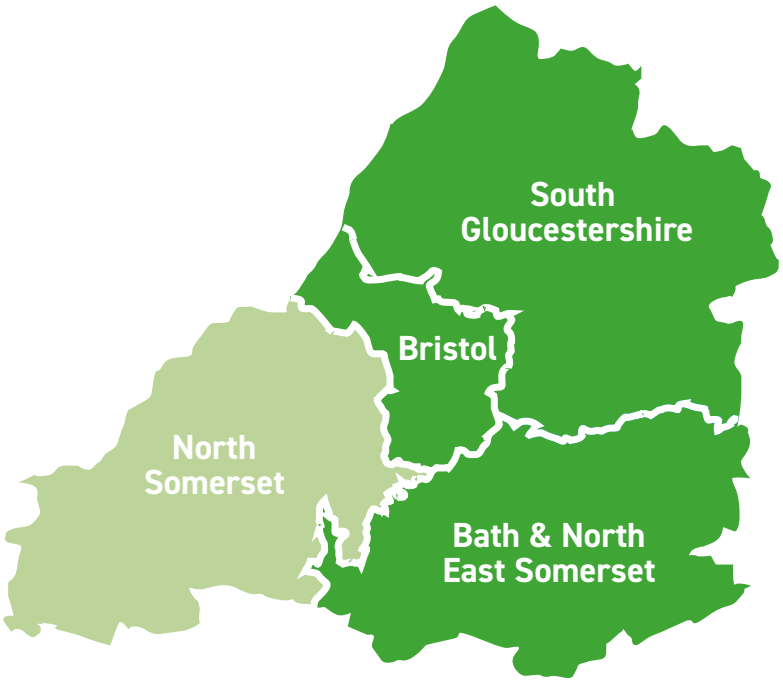
WEST OF ENGLAND Combined Authority

Bath & North East Somerset Council

Bristol City Council

North Somerset Council

South Gloucestershire Council



West of England Combined Authority, Bath and North East Somerset, Bristol City, North Somerset and South Gloucestershire councils are grateful to the following for their collaboration on this strategy:

NATURAL ENGLAND

Environment Agency

Bristol Avon Catchment Partnership

West of England Nature Partnership
Joining up the dots for nature

West of England Joint Green Infrastructure Strategy 2020 – 2030

May 2020

www.westofengland-ca.gov.uk

Photography supplied by Sarah Jackson, Chris Westcott, Mark Smith, Ian Fox and Avon Wildlife Trust.

FOREWORD

The rich and diverse natural environment of the West of England is integral to our region's health and economic prosperity. Well planned and managed, functioning Green Infrastructure (GI) is crucial for people, places and nature and is a key component in addressing environmental impacts including climate change and biodiversity loss.

All four West of England Unitary Authorities (UAs) and the West of England Combined Authority (WECA) have declared a climate emergency. The Joint Green Infrastructure Strategy (JGIS) through providing a multi beneficial approach to strategy, policy and delivery will contribute to addressing:

- inequalities in provision of GI and health.
- achieve well designed, attractive and healthy places that deliver economic benefits and community resilience.
- respond positively to the climate and ecological emergency.

The four West of England UAs and WECA, recognising the critical role that GI plays in supporting sustainable growth and communities, agreed a West of England GI programme of work in 2017.

A West of England GI Working Group[1] set up to undertake the programme, has progressed a number of work streams to produce this JGIS and identified further work required going forward, and actions to be implemented.

This JGIS, led by WECA, is owned by the five authorities – WECA, Bath and North East Somerset, Bristol City, North Somerset and South Gloucestershire councils. It sits alongside and helps facilitate the delivery of other regional and local plans and strategies. These include the Local Industrial Strategy, Joint Local Transport Plan, Local Cycling and Walking Infrastructure Plan, West of England sub regional strategies and local and spatial plans, GI strategies and supplementary planning documents.

Whilst owned by the five authorities the JGIS cannot be delivered by them alone. It is intended for use by and with policy makers and practitioners working in all sectors, particularly those with a role in creating sustainable places; strategic and policy planners, developers, managers of land and natural capital, communities and businesses.

The Strategy will be reviewed and updated to respond to the requirements of new legislation and guidance including the Environment Bill, Agricultural Bill and National Framework of GI Standards as well as delivery of the West of England Nature Recovery Network and Biodiversity Net Gain.

1 The West of England GI Working Group is made up of the four Unitary Authorities, WECA, the Environment Agency, Natural England, West of England Nature Partnership, and Bristol Avon Catchment Partnership.

The overall aim of the West of England JGIS programme is to secure investment in GI planning and provision, similar to that of other infrastructure. By evidencing the need and use of natural solutions to address the climate emergency and declining biodiversity, as well as health and other benefits for people, securing sustained investment in the natural environment and GI should be guaranteed.

The JGIS is a prospectus for how organisations and key partners can engage in joint programmes and projects to work collaboratively to ensure GI is recognised as a key component of providing sustainable places for people and wildlife.

Declining biodiversity facts*:

60% of the world's wild animals have been lost since 1970, including 83% of wildlife in freshwater rivers and lakes.

Insects are a vital part of our ecosystems and play an important role in food production. 75% of the crop types grown by humans require pollination by insects which are in rapid decline.

In the UK, populations of butterflies fell by 46% between 1976 and 2017, and 23 bee and flower-visiting wasp species have become extinct since 1850.

In the West of England, data shows that populations of starlings and swifts fell by 96% between 1994 and 2014.

Three quarters of the land based environment and about two thirds of the marine environment have been significantly altered by human actions.

* Source: Bristol Green Capital Partnership: Recognising and responding to the ecological emergency (2020)

CONTENTS

SECTION 1: INTRODUCTION

WHAT IS GREEN INFRASTRUCTURE?

Green Infrastructure (GI) is a strategically planned and managed network of natural and semi natural areas – green and blue[2] delivering multiple benefits. The planning, management and investment in GI is fundamental and is required at all levels of planning; from strategic, to local, to site specific plans, recognising that GI can be embedded in grey infrastructure (for example roads, rail and flood schemes) and is not in competition with it.

The GI approach allows the coordination and consolidation of broader environmental evidence and assessments into a single approach for delivery of 'environmental mitigations'. These can then be considered in unison to inform the delivery of multi-beneficial GI, as opposed to mitigation for a single issue. In this way GI can be seen as both the delivery element to address an environmental impact, but also a broader approach to enhance existing mitigations to ensure they delivery multiple benefits. (See *Outcomes Section 3.0*)

GI provides a wide range of evidenced economic, social and environmental benefits including:

- Supporting resilient ecosystems and biodiversity.
- Mitigating and adapting the natural and built environment to climate change.
- Conserving and enhancing a legible network of physical green spaces.
- Reducing and managing flood risks and drought.

Green Infrastructure, multifunctionality and place-making

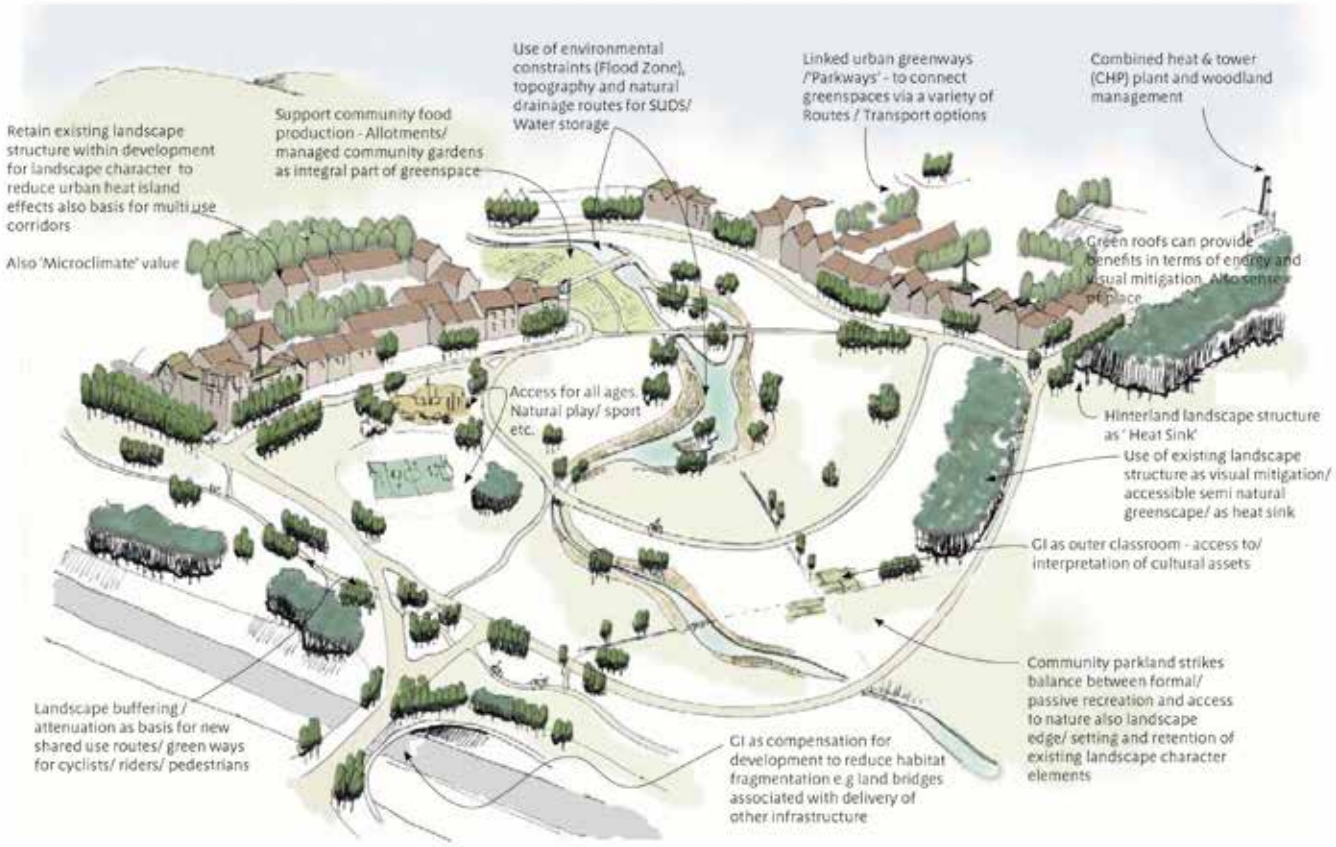


Image courtesy of Natural England.

2 All references to 'green space' in this strategy includes rivers, standing waters, coast waters and estuaries.

- Improving mental and physical health, and the cohesion of local communities.
- Increasing the sustainability of food production.
- Maintaining and enhancing cultural heritage, landscapes and natural resources.
- Promoting economic growth, employment and skills improvement.

THE PURPOSE OF THE STRATEGY

The Strategy is intended to facilitate action by:

- Providing key concepts and tools to enable a consistent approach to GI across the West of England.
- Promoting the development and use of a GI shared evidence base for Local Plan development and other joint or local plans and strategies, and the development of projects/business cases, to contribute to GI enhancement.
- Setting out the role and the current extent of the existing GI network, and identifying both issues and new opportunities for enhancement.
- Recognising the need to prioritise the planning, development of investment in, and monitoring of GI as part of the response to the climate and ecological emergencies, and to new duties including Biodiversity Net Gain and the delivery of Local Nature Recovery Strategies.
- Highlighting the means by which organisations, communities and partnerships can work collectively to create and sustain a fit for purpose GI network across the West of England.
- Providing a prospectus for partners to develop projects to enhance and extend the GI network.

THE APPROACH

The Strategy identifies:

Outcomes (8) – what we seek to achieve.

Principles – how the Outcomes will be delivered across the West of England.

Actions – The Action Plan identifies West of England priority activities to achieve the Outcomes. Some are joint activities or projects and others will be delivered by individual partners e.g. Unitary Authorities as they progress their Local Plans and climate emergency action plans.

See summary diagram on page 8.

SECTION 1 continued

THE APPROACH

Outcomes

- Resilient ecological networks
- Greater resilience to climate change
- Sustainable water management
- Health and wellbeing
- Sustainable places
- Valued healthy landscapes
- Sustainable/local food
- Resilient economy

Principles

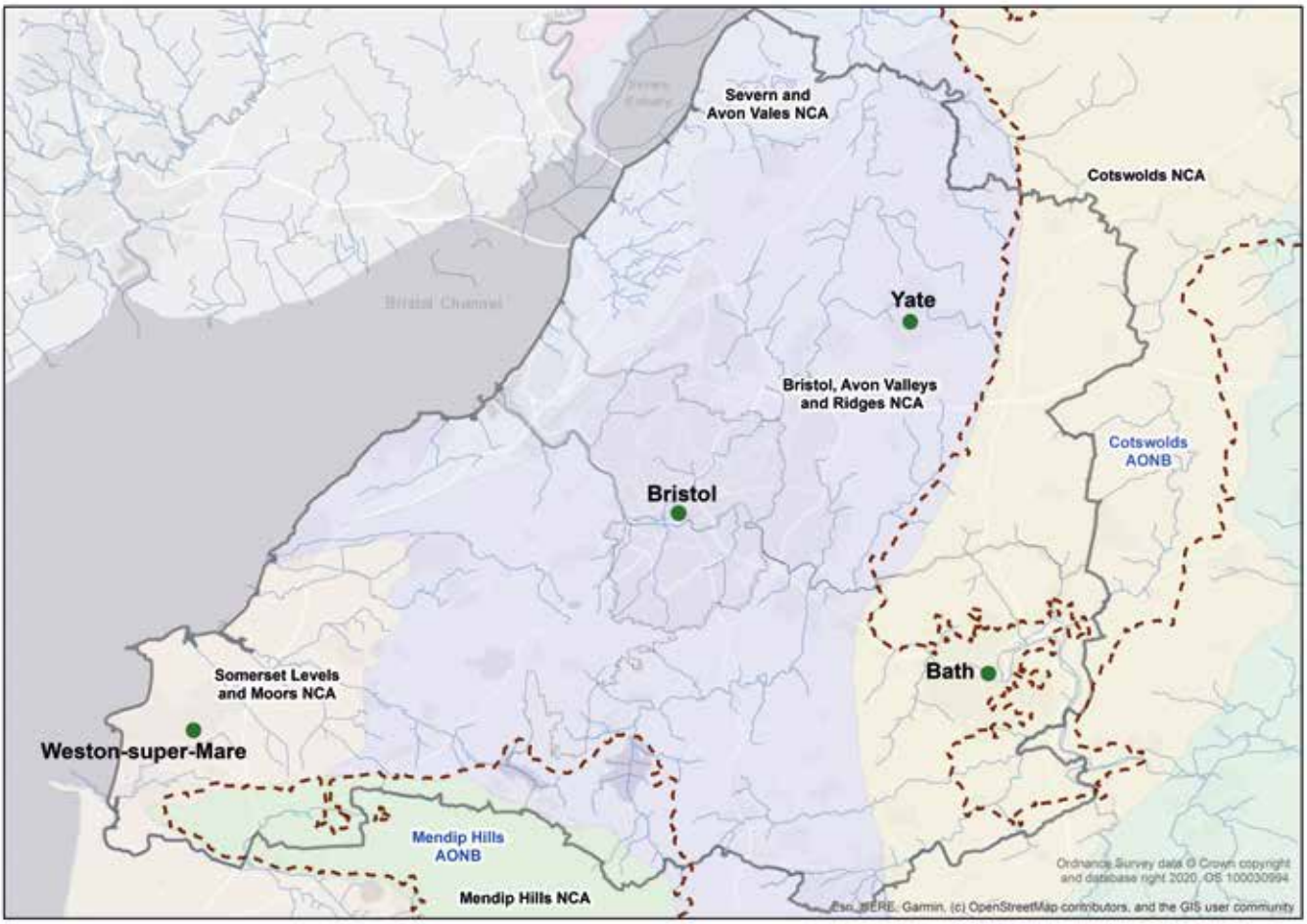
- Educate
- Embed
- Collaborate
- Communicate
- Evidence
- Invest

Action Plan (2020 – 2023)

- R1 West of England GI Working Group
- A1 Final Joint GI Strategy (JGIS) sign off
- A2 Confirmation of how each authority is taking the JGIS forward
- A3 Stakeholder engagement
- A4 Annual review
- A5 Strategic GI Projects – process and delivery
- A6 Explore delivery/funding mechanisms
- A7 Guidance for planners
- A8 Training and support for WECA/ authority officers
- A9 GI Policy Assessment Matrix
- A10 West of England Nature Recovery Network
- A11 Joint Local Nature Recovery Strategy
- A12 The Bristol Avon Catchment Partnership Environmental Services Evidence Review
- S1 West of England Environmental Geographical Information System
- S2 West of England Biodiversity Net Gain Guidance
- S3 West of England Natural Capital Account
- S4 West of England National GI Standards Framework Pilot
- S5 West of England Tree and Woodland Strategy

SECTION 2: WEST OF ENGLAND'S NATURAL ENVIRONMENT

The West of England region, made up of four Unitary Authorities and the West of England Combined Authority, covers 1,336 square kilometres, has five National Character Areas (NCAs) and one river catchment.



SECTION 2 continued

West of England's strategic green and blue resource includes:

3,194km
of Public Rights of Way.

281
international and national designations.[3]

2,155km
of watercourses.

1,119m
people living in the region.

698km
of A road/motorway and railway.

15%
of West of England land is currently providing 'high'[4] natural flood management services.

3 One World Heritage Site (WHS), two Areas of Outstanding Natural Beauty (AONBs), two Special Protected Areas (SPAs), five Special Areas of Conservation (SCAs), one Ramsar site, 184 Scheduled Monuments (SMs), 86 Sites of Special Scientific Interest (SSSIs)

4 www.wenp.org.uk/state-of-environment/

WEST OF ENGLAND'S NATURAL ENVIRONMENT

The natural environment of the sub-region makes a substantial contribution to the distinctive identity, sense of place and quality of life in the West of England, as well as its economy and attractiveness as a place in which to live and invest.

The area is bounded by three natural features of international and national importance – Cotswolds and Mendip Hills Areas of Outstanding Natural Beauty (AONBs) in the north, east and south respectively – two limestone landscapes designated for their outstanding natural beauty, and the Severn Estuary in the west that is a marine and estuarine habitat of international significance. Within and between these there are many more sites of international and national ecological importance, featuring rare species and diverse woodland, grassland and wetland habitats as well as numerous sites of geological importance and a rich historic environment.

Illustration originally commissioned by Avon Wildlife Trust.

SECTION 2 continued

The **key natural and semi natural assets in the West of England** provide social, economic and environmental benefits that can be enhanced by creating bigger, better, more and joined-up habitats. These include:

- **Water/wetlands:** Including the Severn Estuary, with the second highest tidal range in the world, the River Avon, and Chew Valley Lake, an important site for wintering birds. Wetlands, wet woodland and semi-natural grasslands along river flood plains benefit biodiversity, climate regulation and water quality; and can provide flooding mitigation water-based recreation.

- **Grasslands:** Including waterside permanent pasture and wet grassland, calcareous and neutral grasslands, including those of the Mendip Hills and Cotswolds AONBs. Grassland habitats benefit pollinator species and biodiversity in general, improve resilience to climate change, store carbon, reduce soil erosion, provide benefits to the water environment, and can support food production through grazing.

- **Woodlands and parklands:** 6% of the region is semi-natural broadleaved woodland, including ecologically important ancient woodland such as Lower Woods, King's Wood and Urchin Wood, and Leigh Woods. Woodland is a key habitat for a plethora of wildlife, sequesters carbon, can provide natural flood management, and with appropriate access, benefits people's health and wellbeing, and provides recreational spaces.
- **Field boundaries:** The region retains a strong network of hedgerows and dry-stone walls. These features provide ecological corridors, prevent soil erosion, and reinforce landscape character. Restoring and expanding hedgerows and dry-stone walls enhances these benefits, provides recreational benefits and supports retention of rural skills.

These assets support a variety of wildlife in the region including:

- **Invertebrates, including pollinators:** Healthy populations of invertebrates are key to providing sustainable ecosystem services, including pollination and nutrient cycling, and are a vital food source for other wildlife. Invertebrate populations can be increased by protecting existing habitats; linking and managing flower-rich and over-wintering habitat; incorporating natural open space, allotments, green roofs, green walls within the design of new places and spaces; including flower-rich verges as part of footpath and cycle networks; and reducing use of pesticides.
- **Birds:** The West of England is an important region for wildfowl and wading birds, with areas such as the Severn Estuary and Chew Valley being particularly significant sites for these species. However, local populations of a number of bird species such as swifts and starlings, especially insectivorous birds, have declined steeply in recent decades. Maintaining, recovering and enhancing bird populations requires retention, expansion, joining and management of suitable habitat, nesting sites and food sources; and acting to increase invertebrate populations.

- **Bats:** The West of England is an internationally important region for a number of bat species, including the rare Greater Horseshoe and Bechstein's bats. Key to maintaining and expanding these populations is protecting, enhancing and expanding key habitats, foraging areas and flyways, including roost access points, hedgerows, woodlands, grazed pastures, and river corridors. Increased levels of artificial light from development should also be avoided.
- **Fish:** The Severn Estuary and Bristol Channel support one of the most diverse fish assemblages in the UK; juvenile European eel, a critically endangered species, run up the Severn, and Bristol Avon and its tributaries; and the River Chew hosts a breeding stock of Atlantic salmon, another endangered species. Removal of in-stream barriers, including weirs, and improving water quality would greatly facilitate migration and population growth of endangered species, as well as increasing recreational angling opportunities.

SECTION 2 continued

- **Flora:** The West of England is home to a number of nationally and internationally rare plants. As well as their cultural value, a rich and diverse flora forms part of a resilient and dynamic ecosystem and supports a variety of wildlife. The Avon Gorge, one of the top three sites for rare plants in England, has more than 30 nationally rare and scarce plants. Other significant landscapes for flora include the Cotswolds and Mendip Hills AONBs, which include plant species colonising relic lead mined areas.

Continued conservation and appropriate management of sites harbouring rare flora is vital to ensuring its continued presence. Expansion and linking of habitat and sympathetic management of soils will enable all flora and fungi to spread and thrive, providing food and habitat for wildlife and important ecosystem services.

SECTION 3: OUTCOMES & PRINCIPLES

OUTCOMES

The following GI Outcomes are sought as part of an integrated approach to GI in the West of England:

Improved and better-connected ecological networks: Protect, enhance and expand coherent, thriving and resilient ecological networks that deliver net gains in biodiversity and ecosystem services. These include the creation of bigger, better, more and joined-up woodland, grassland and wetland habitats to achieve the ambitions of the West of England Nature Recovery Network.

Greater resilience to climate change: Provide natural solutions to build resilience against the impacts of climate change including use of well-designed GI to stabilise slopes and attenuate flood water, absorb carbon, and increased use of trees to reduce urban heating.

Sustainable water management: Optimise and improve the use of GI to deliver an improved water environment by working with natural processes to help reduce flood risk, manage drought, improve water quality and improve connectivity to reduce the loss and quality of aquatic habitats and wildlife.

Health and wellbeing for all: Improve the network of active travel routes and accessibility to green spaces to support healthy lifestyles and mental wellbeing, and provide more opportunities for people to connect with landscape and nature, and address inequalities in provision.

Create and maintain sustainable places: New development which maximises the multiple benefits of GI in delivering resilient, healthy and environmentally friendly places and a net gain in natural capital by investing in GI for the long term.

Create and maintain valued healthy landscapes: Design and deliver high quality GI that improves local sense of place and protects and enhances landscape character and the natural, cultural and heritage services that they provide.

Support sustainable and local food production: Increase opportunities for local food production in urban and rural areas and increase food sovereignty by, for example, protecting the best and most versatile agricultural land and enhancing our pollinator network.

Build a resilient economy: Create attractive areas for investment and job creation, and support the environmental resilience of economic sites by enhancing GI relating to housing, businesses and other associated infrastructure.

PRINCIPLES

To implement the JGIS and achieve the Outcomes the five authorities will apply the following principles:

Educate: Ensure that the multi-functional benefits of GI including contribution to human health and wellbeing are better understood and clearly recognised by authorities, agencies and other partners. Resulting in increased allocation of funding for GI and a GI focus integrated into the planning and development process, through using the tools and metrics, required by national legislation.

Embed: Apply a natural capital approach in accordance with national legislation and guidance to seek to ensure that new development delivers a net gain in natural capital whilst protecting irreplaceable habitats, and support the maintenance and enhancement of the strategic GI network.

Collaborate: The authorities, agencies and other partners in their delivery of GI across the West

SECTION 3 continued

of England will ensure early, continuous and effective engagement with each other.

Communicate: Promote wider public understanding of GI and natural capital, the benefits it provides and opportunities to enhance GI in the West of England.

Evidence: Monitor and keep an up-to-date West of England shared GI and biodiversity evidence base.

Invest: Secure investment in GI through the planning process and other delivery and funding mechanisms to deliver strategic GI priorities and its long term stewardship.

THE IMPORTANCE OF CONNECTIVITY

An interconnected system of vital landscapes of scale is critical to building a sustainable future. Benefits are maximised when green and blue space conservation and management are integrated with agricultural land management, development and built infrastructure planning.

Fragmented green and blue space results in poorly functioning landscapes with highly negative impacts on the ecosystem services we depend on. This in turn can have significant impacts on flood and drought risk, which can cause more far reaching repercussions on existing and proposed development.

Well planned and managed GI conserves and creates well connected natural networks of wetlands, woodlands, grasslands, field boundaries and parklands. These are critical to provide habitat for wildlife and to sustain ecosystem services such as clean water, climate regulation, and crop pollination. Interconnected GI enables wildlife to migrate, reproduce, and adapt to changing conditions. It helps to alleviate heat stress, slow surface water run-off, and protect against soil and coastal erosion. Connected green and blue infrastructure also gives people ways to access, enjoy, and appreciate the natural world.

GI linked across scales, outlined below, creates ecological networks and initiates new relationships between urban and rural areas by building connectivity and resilience, reducing fragmentation and severance.

- **At the regional scale** GI creates a connected network of green spaces which respond sensitively to landscape character and conserve natural ecosystem values and functions. It provides vital services like clean water, soil for agriculture, and breathable air.
- **At the local scale** it creates green space between and around built areas. It connects communities with nature and retains the important scenic and cultural landscapes that make a community unique.
- **In built areas** it connects public spaces like parks, streets and waterfront with surrounding landscapes. It also includes the tree canopy that keeps cities cooler in summer, adds natural beauty, helps clean the air, and reduces storm water run-off.

Recognising that connectivity between different GI assets can help maximise the benefits they generate, three key GI networks match with the *Building with Nature*[5] site based themes of Wildlife, Water and Wellbeing:

- **Wildlife** – to protect and enhance wildlife, creating networks where nature can thrive, and supporting the creation of development which more effectively delivers a net gain for wildlife – Nature Recovery Network.
- **Water** – a commitment to improving water quality, on site and in the wider area: reducing the risk of flooding and managing water naturally for maximum benefit – Hydrological Network (Catchment Based Approach).
- **Wellbeing** – to deliver health and wellbeing benefits through the green features on site, making sure they can be easily accessed by people close to where they live – Sustainable Movement Network.

5 Building with Nature standards are being used by developers and planning authorities to deliver benefits for nature www.buildingwithnature.org.uk

The West of England Nature Recovery Network identifies priority areas for habitat creation, enhancement and connectivity with the aim of creating a resilient and dynamic ecological network within and beyond the West of England and sets out ambitions to realise nature recovery. Progress against these ambitions will be monitored through the work of the West of England Nature Partnership (WENP) working with the five authorities. The integrity of our most important sites of ecological and geological interest must be preserved and opportunities to reduce fragmentation and increase connectivity between those sites should be identified, enabling wildlife to flourish and adapt to changing climates.

The Hydrological Network as with other networks, extends beyond the West of England and is managed through the Catchment Based Approach (CaBA).The West of England area covers 17 of the 23 sub-catchments in the Bristol Avon Catchment. CaBA facilitates good planning and management of the water environment by taking account of the whole water network and land area that contribute to the water flow and quality. The 17 sub-catchments in the West of England are described in the West of England Hydrological Network (Appendix 3).

Sustainable Movement Network – GI can be an integral part of transport planning to provide sustainable movement (cycling and walking) and to deliver net gain for the environment. This includes the role of the waterways in terms of transporting people and goods but also the linear and flat towpaths and river paths provide active transport, environmental gain, health and wellbeing benefits and opportunities. The Joint Local Transport Plan vision is to connect people and places for a vibrant and inclusive West of England.

SECTION 4: POLICY CONTEXT

Duties and obligations regarding Green Infrastructure (GI) are set out in European conventions, national legislation and national, sub-regional and local policy. These give substantive weight to the need for plan making, policy development and economic development to be sustainable through the integration, development and maintenance of GI.

Green Future – Our 25 Year Plan to improve the environment sets ambitious goals for the natural environment and seeks to ensure that better account is taken of its value to our health and prosperity. The ambitions are now translated into the Environment Bill and include a requirement to develop Local Nature Recovery Strategies and a duty on public authorities to actively carry out strategic assessments of the actions they can take to enhance and conserve biodiversity.

A key action from the 25 Year Plan the Government is bringing forward through the Environment Bill is a mandatory approach to **Biodiversity Net Gain (10%)**. As part of the West of England GI work programme, work is underway to develop West of England Biodiversity Net Gain Guidance with further work identified to decide on options for delivery including monitoring. See *Action Plan – Action S2*.

The role of well-designed places and the natural environment in determining people's **health and wellbeing** is increasingly being recognised in local and national policy. The importance of GI is highlighted in local authorities' Health and Wellbeing (HWB) Strategies. See *Useful references* for links.

The NHS and Public Health England are committed to driving a 'whole person' approach to health that considers the wider determinants of health and wellbeing, in which the natural environment plays a key part. The NHS' Long Term Plan notes that the NHS is shaping the future of the built environment, recognising the importance of well-designed development to people's health and wellbeing. This approach to integrated care is adopted more locally through Sustainability Transformation Partnerships (STPs): the Bristol, North Somerset and South Gloucestershire Clinical Commissioning Group (CCG) Healthier Together STP, and the Bath and North East Somerset, Swindon and Wiltshire CCG's STP.

NATURAL CAPITAL, ECOSYSTEM SERVICES AND NET GAIN

It is important to understand these terms as they are integral to the GI outcomes, and as part of the wider context to provide an integrated approach to environmental planning and to aid mainstreaming of the environment in policy and decision making processes, and delivery of net gain. They all feature along with GI, in national guidance including the Government's 25 Year Environment Plan, and National Planning Policy Framework and are referenced in the Environment Bill which makes Biodiversity Net Gain mandatory.

The connections between the concepts are explained as follows:

1. The environment provides a finite stock (natural capital) of multifunctional assets such as geology, soil, water, plants and animals.
2. This natural capital provides us with ecosystem services such as food, fuel, climate regulation, crop pollination and natural flood management.
3. Different people value different ecosystem services for different reasons; thus policy and decision making often require trade-offs to be made.
4. GI provides both an approach and delivery mechanism to secure multiple benefits through a connected network of green space and features.

The diagram overleaf shows how these individual terms relate to each other.

From Biodiversity Net Gain to Environmental Net Gain

Net Gain	Biodiversity	Natural Capital	Environmental
What are the wider or indirect environmental impacts?			Natural Capital (pressures) Net Gain
What are the impacts of habitat change for people?		Natural Capital (stocks) Net Gain – capacity to provide ecosystem services	Natural Capital (stocks) Net Gain – capacity to provide ecosystem services
What are the impacts of habitat change for wildlife?	Biodiversity Net Gain	Biodiversity Net Gain	Biodiversity Net Gain

Source: Green Infrastructure: A policy update presentation by Douglas McNab, Team Leader Env & Planning. TCPA. 10th July 2019.

The West of England strategic policies –there is a legal duty imposed on local planning authorities to cooperate with each other, and with other prescribed bodies, on strategic matters that cross administrative boundaries. The legislation and guidance makes it clear that development plans are intended to contain strategic policies. The National Planning Policy Framework provides that joint working between strategic policy making authorities is part of a positively prepared and justified strategy.

The strategic planning framework has significant environmental implications. As of July 2019, all five West of England authorities have declared climate emergencies committing to area wide carbon neutrality by 2030. The future location of housing, population, jobs and infrastructure has a significant impact on the delivery of these climate emergency commitments. It is therefore essential that strategic policies and spatial strategy for the West of England embraces a strong GI and nature recovery network. This is necessary to avoid severance of GI and ecological networks and deliver appropriate mitigation where issues are identified. The strategic policy approach to climate change and environmental issues will be revisited and taken forward through the new planning policy documents, and this will be done as expediently as possible. Alternative methods may be explored to fast-track planning policies that are necessary to guide development to ensure compliance with the 2030 target.

Joint Local Transport Plan (JLTP4) supports delivery of transport schemes set out in local transport strategies across the region, including the Bath and Bristol Transport Strategies, and those covering cycling, walking, public transport, parking and the main road network. Its vision *'Connecting people and places for a vibrant and inclusive West of England'*, and five objectives:

- take action against climate change and address poor air quality.
- support sustainable and inclusive economic growth.
- enable equality and improve accessibility.
- contribute to better health, wellbeing, safety and security.
- create better places.

All align with the benefits GI provides.

The JLTP4 has regard for the JGIS and shares many of the GI Outcomes. The design and delivery of transport schemes in the JLTP4 will

SECTION 4 continued

take both existing and potential GI into account and seek to avoid severance of GI and ecological networks by delivering appropriate mitigation where issues are identified. Taking a landscape scale scheme approach has potential to mitigate other issues and optimise the benefits of GI.

West of England's Local Cycling and Walking Infrastructure Plan (LCWIP) identifies a series of walking and cycling routes which have been prioritised for future investment, using a methodology set out by the Department for Transport. The design and delivery of these routes will include consideration of GI opportunities. A suite of other walking and cycling schemes and strategies sit alongside the LCWIP as regional priorities and are listed in the JLTP4.

Local Industrial Strategy (LIS) – draws on the unique strengths of the people and places across the West of England. It sets out the region's ambition to be a driving force for clean and inclusive growth. There is the potential to enhance GI as part of LIS long term sustainable infrastructure investment, supporting both the LIS and JGIS objective of enhancing natural capital.

Local Plans – The JGIS will be used to inform a wide range of policies within each Unitary Authority Local Plan and ensure a consistent and strong GI policy that is supported and enhanced by other policies in the plans. Each Unitary Authority is currently revising its Local Plan. See *Useful references* for links.

The JGIS also supports preparation of appropriate Supplementary Planning Documents (SPDs).

ASSESSMENT AND DEVELOPMENT OF POLICIES

In developing the West of England JGIS the four UAs tested the development of the GI Policy Matrix *(See Useful references)*. This is a resource to help improve the coverage and strengthen policy wording of GI in local plans and strategies.

The GI Policy Assessment Matrix is to be applied by each of the UAs in the drafting of their Local Plans.

GREEN INFRASTRUCTURE STANDARDS

The West of England JGIS approach is a pilot for the National Framework of Green Infrastructure Standards project, which is led by Natural England. The West of England pilot proposal is to test the Framework, its suitability, usability and effectiveness. The Natural England project that involves 12 pilots will get underway in June 2020. See *Action Plan – Action S4*.

The West of England pilot will bring together the GI Policy Matrix and Building with Nature (BwN) standards to test the Natural England GI Standards Framework. The BwN three key themes are Wildlife, Water and Wellbeing. There are also three levels of BwN Awards – Candidate, Achieved and Excellent. BwN case studies include Elderberry Walk, Bristol, and Gloucester Services, M5.

SECTION 5: WEST OF ENGLAND GREEN INFRASTRUCTURE: Evidence and assessment

GREEN INFRASTRUCTURE MAPPING

To ensure an integrated Green Infrastructure (GI) network, **the JGIS combines information and evidence in the form of mapped data** to support the GI Outcomes. This evidence can be used to identify existing GI and opportunities across a range of geographical scales including West of England, GI Area, local and at site/ project level. An interactive map resource is under development using the map and data layers tabled in Appendix 1. Currently this resource is only accessible to West of England GI Working Group partners but the intention is to develop a shared environmental mapping system that is available to the public. See *Action Plan – Action S1*. The majority of the map layers are accessible via the Government website. https://magic.defra.gov.uk/

Good mapping and analysis of GI assets as well as understanding issues affecting communities is key to GI planning. Mapping provides a visual and spatial representation of attributes and enables the identification of the links that are vital for effective GI, and also the opportunities that can deliver multiple benefits. Connectivity reduces fragmentation and severance.

Geographic Information System (GIS) and geospatial technologies are therefore incredibly useful to plan, deliver, and monitor GI. A wide variety of professionals including: planning and transport officers, development management, open space managers, ecologists, and sustainable travel managers use GIS. The need to develop and manage a shared interactive environment and ecological map/data resource, that is kept updated, is therefore recognised as a priority. See *Action Plan – Action S1*.

GREEN INFRASTRUCTURE AREAS

To assist assessment of GI at a more localised level below West of England and National Character Areas (NCAs), **22 GI Areas have been profiled and digitised into map layers.**

The GI Area approach is intended to assist GI delivery by facilitating a focus on specific landscape areas and the development of local partnerships as well as operating across groups of areas or the whole West of England area and beyond. They are intended to guide policy making at a strategic level by providing evidence and identify cross local authority boundary projects at a more detailed level than the NCAs.

Fundamentally the **GI Areas should be viewed as enablers**, a tier down from the NCAs, that help to deliver GI and GI functions effectively: primarily at a strategic level, but also more locally whilst continually recognising the need to respond sensitively to landscape character and the functions (water management, access networks, habitat enhancements and open space) and services they each deliver are inter-connected to some greater or lesser extent.

Unitary Authorities are undertaking more detailed local mapping work to support understanding of their natural capital and development of Local Nature Recovery Networks.

GI Area profiles – these provide a written narrative summary of the relevant Landscape Character Assessments, with a list key of issues, opportunities, and projects (both current and potential) within the GI Area. These profiles are currently being drafted and require further input by partners to ensure a full overview of current assets and opportunities. They will be updated on a regular basis and be linked to an interactive map layer and database of projects.

SECTION 5 continued

The GI Areas can be used to assist:

- Planning of new development. Not only in consideration of new GI but linking with existing GI initiatives that new development could further enhance/support or link to.
- Identifying opportunities for landscape scale cross boundary working and joint working between different authorities/bodies/communities.
- Highlighting key issues e.g. loss of habitat, incidence of flooding or low flows that may lend themselves to different GI interventions.
- Identifying future priorities for targeting resources/bidding for funding.

The GI Area profiles, in using Landscape Character Assessments, include reference to **historic landscape character and individual features and sites within them**. This includes designed landscapes and their settings such as formal historic parks and gardens, and/or the setting of individual historic settlements and heritage assets such as Conservation Areas, important Listed Buildings, critical views and vistas, Scheduled Monuments which provide historical, social, economic, cultural and environmental context and benefits.

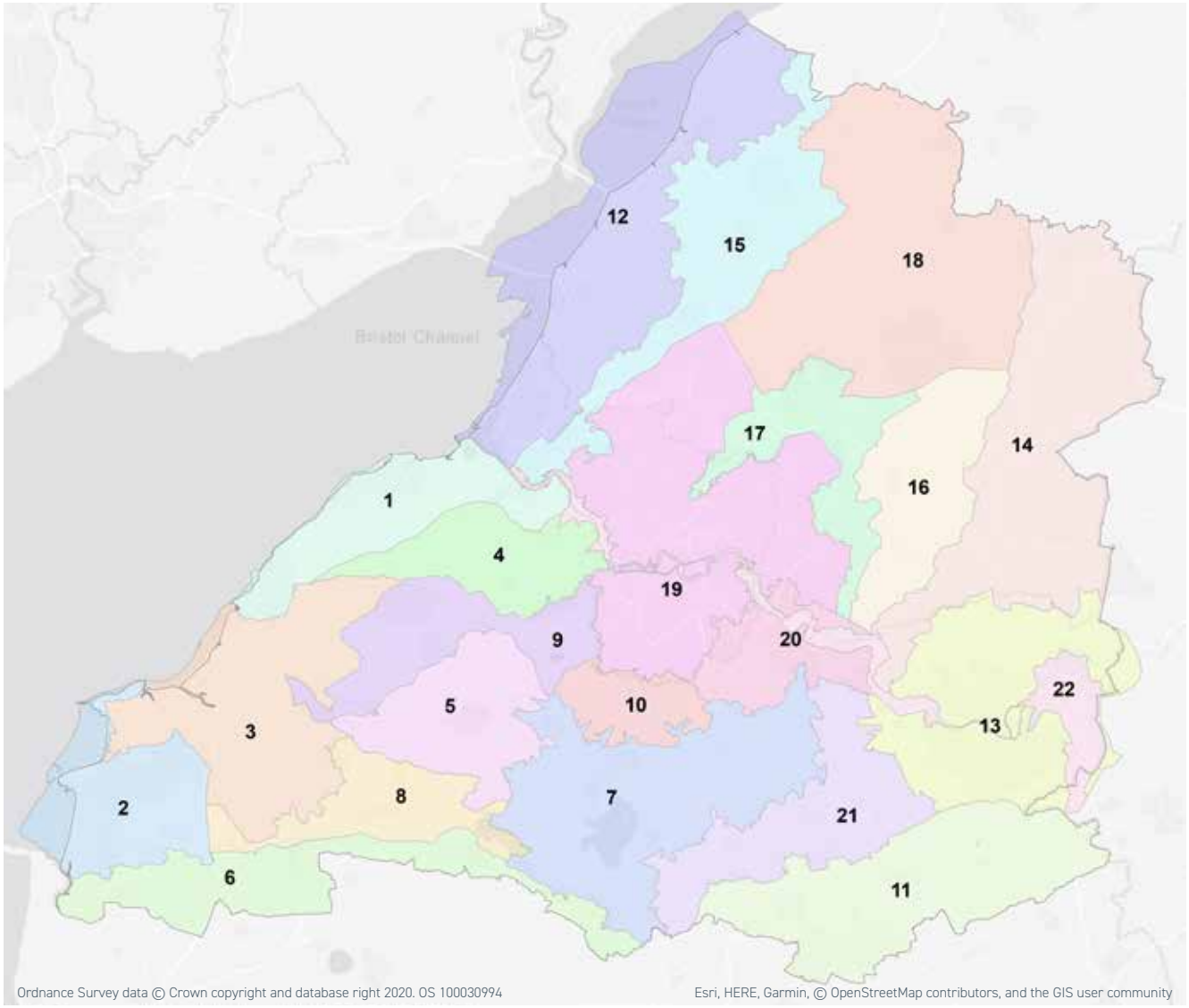
Well designed and high quality GI can protect and enhance as well as improve connectivity for access and **sense of place**. Understanding the origins and history of the semi-natural and designed landscapes can provide information on how these areas could be managed, conserved and protected. It is crucial that a holistic approach is taken towards the management of green spaces that incorporates an understanding of their intrinsic heritage values.

With regard to **water catchment areas**, there is a description of each of the 17 hydrological sub catchments in Appendix 3 with the respective issues and opportunities (identified to date and not exhaustive) being incorporated with the relevant GI Area profiles.

West of England GI Areas:

1 Clevedon Portishead and Gordano
2 Weston-super-Mare and Environs
3 North Somerset shoreline and Moors
4 Wooded uplands, Abbots Leigh, Tickenham, Failand
5 North Somerset Open Plateau and wooded slopes
6 Mendip Slopes and outliers
7 Chew Valley
8 Yeo Valley and Spring line villages
9 Nailsea, Backwell, Long Ashton and Environs
10 Dundry Hill
11 Cam, Wellow and Somer Valley around Norton Radstock
12 Severn Estuary Shoreline and levels
13 Bath and Environs – Bathscape
14 Cotswold Scarp and Dip Slope
15 Ridges, Shirehampton to Tytherington
16 Pucklechurch Ridge, Boyd and Golden Valleys
17 Frome Valley – Westerleigh Vale – Oldland Ridge
18 The South Gloucestershire Vales
19 Greater Bristol
20 Keynsham and Environs
21 Undulating plateau Newton St Loe to Hinton Blewett
22 River Avon Valley

West of England Green Infrastructure Areas



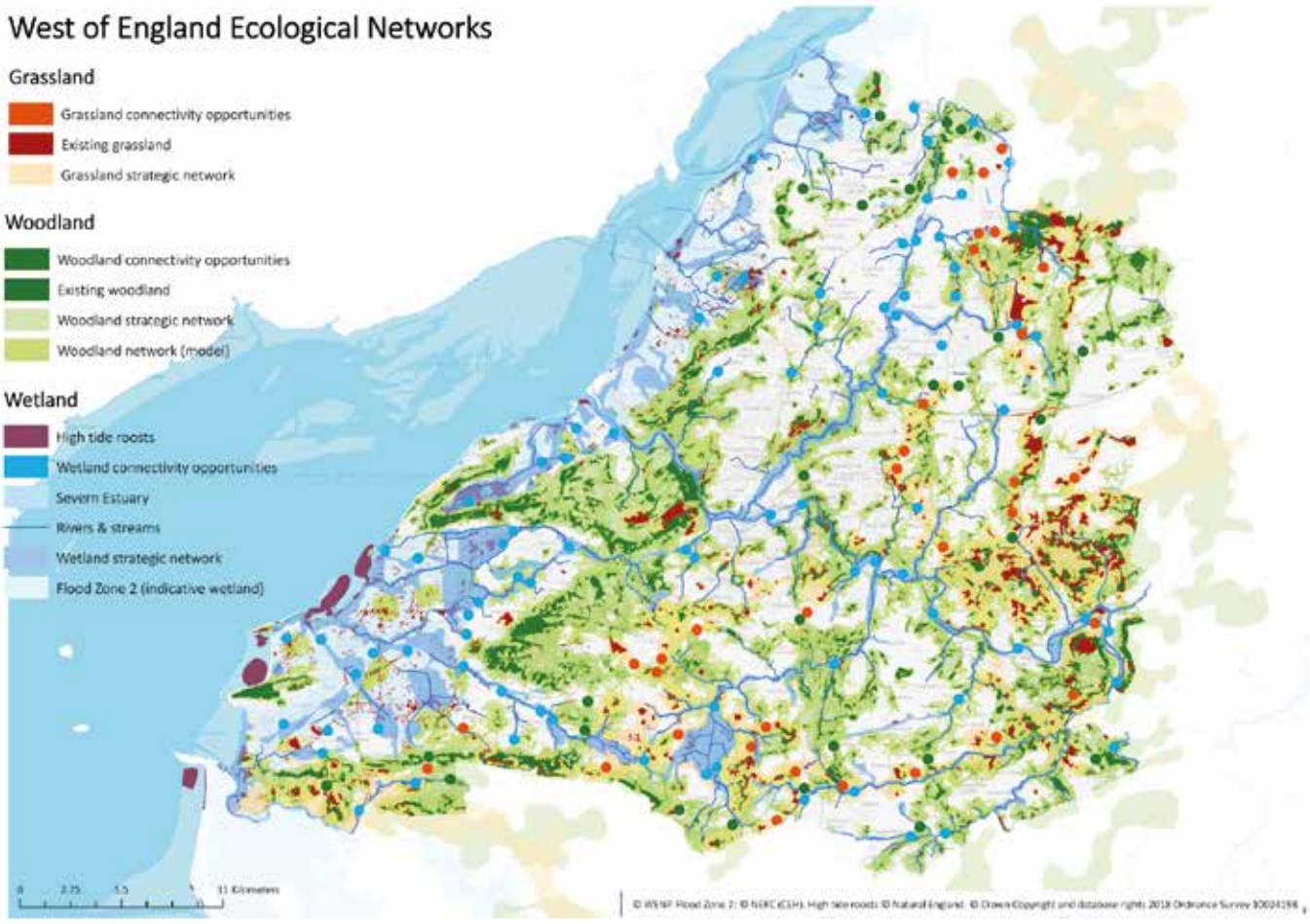
SECTION 6: STRATEGIC GREEN INFRASTRUCTURE PROJECTS

In developing and preparing this JGIS a number of **strategic projects have emerged** (see *Action Plan*) including the production of the West of England Tree and Woodland Strategy, and West of England Biodiversity Net Gain (BNG) Guidance and the West of England Natural Capital Account. Some are evidence and data related projects and others are on the ground delivery projects or a combination of the two. The JGIS will assist in identifying areas of priority for delivery of BNG and Habitat Regulation Assessment requirements and mitigation.

In order to assess and prioritise GI projects a **Project Assessment Form** has been devised. (Appendix 4). The Project Assessment Form is to capture GI projects that are in development or developed but not yet implemented. It is intended to assist prioritisation of projects and to set out projects that might be integrated with other schemes and that may not have identified GI opportunities at the outset or been aware of existing GI initiatives in the relevant area.

Part of prioritising will relate to the appropriateness of particular **funding opportunities** and being able to demonstrate a projects relevance to national context e.g. delivering the 25 Year Environment Plan, Environment Bill and/or regionally addressing the climate and ecological emergency .

It is intended to produce and **maintain a database of current and proposed strategic GI activity**. This will be used to identify opportunities for joint working and to prepare full project proposals to bid to funding programmes as part of wider schemes e.g. housing/transport/landscape schemes.



Source: WENP Nature Recovery Network for the West of England; A Methodology (2018)

SECTION 7: DELIVERY, FUNDING AND MONITORING

DELIVERY

The West of England authorities as owners of the Strategy commit to its delivery and to implementing the Action Plan. This will be led by WECA on behalf of the Unitary Authorities.

The West of England GI Working Group will continue to support implementation of the Action Plan with individual partners and organisations taking the lead on specific projects or activities.

Natural England (NE) and the Environment Agency (EA) have been involved in developing the JGIS with the West of England authorities and other local partners and endorse its use. As a shared document bringing together the latest evidence and delivery tools, NE and the EA expect it to provide an invaluable platform for the delivery of a thriving natural environment, with benefits to communities across the West of England, bringing the Government's 25 Year Environment Plan to life.

Planners, Public Health, developers, project managers, community groups and other organisations all have a role including:

Local Authorities

a) Engaging with partnerships to understand how well planned GI can deliver Councils aims and outcomes.

b) Supporting and guiding the development of Local Plans and associated planning documents.

c) Allocating funding for GI in Infrastructure Delivery Plans.

d) Supporting planning responses when advising on GI expectations within development proposals including S106 and Community Infrastructure Levy contributions and requirements.

e) Ensuring use as a reference document to other strategies such as Local Transport Plans, Rights of Way Improvement Plans and Green Space Strategies.

f) Working with partners, supporting events and outreach work, particularly with schools, to increase the understanding of GI.

West of England Combined Authority

a) Leading, influencing and convening role in taking forward the JGIS Action Plan.

b) Increasing awareness of potential projects which could be supported and/or taken forward by partnership organisations.

c) Supporting and guiding the targeting of resources to enhance GI through management of existing projects.

d) Helping develop business cases for GI projects that are identified as priorities when funding becomes available.

Public Health

a) Provide public health input and advice into local and regional spatial and transport planning.

b) Help identify and advocate for policies and strategies that improve people's access to and use of high quality green spaces.

c) Communicate the benefits of access to high quality green and blue space for people's health and wellbeing.

Developers

a) Supporting and guiding the production of masterplans and other documents associated with major development areas.

b) Identifying on-site/off-site opportunities to enhance existing GI and create new GI as part of a development brief.

c) Implementing agreed GI together with arrangements for management.

SECTION 7 continued

Partnerships

a) Increasing awareness of potential projects which could be supported and/or taken forward by partnership organisations.

b) Understanding the broader GI context in which projects are undertaken, in order to facilitate GI links between projects.

c) Supporting and guiding the targeting of resources to enhance GI through management of existing projects.

d) Helping in the selection of new GI projects to be brought forward as and when funding becomes available.

Community groups and other organisations (e.g. friends groups and charities)

a) Providing guidance for making GI improvements happen on the ground through the development of new and existing projects.

b) Providing information on potential sources of funding.

c) Providing evidence to support the development of Neighbourhood Plans.

Defra, Environment Agency and Natural England

a) Providing advice, predominantly on Local Plans, SPD and major development projects on delivery of high quality green and blue infrastructure.

b) Work with West of England partners to embed 25 Year Environment Plan aims into decision-making and delivery frameworks. This includes building understanding of how GI delivery, Nature Recovery Networks, Biodiversity Net Gain, natural capital assessment, and nature-based solutions to climate and flood risk support better outcomes for particular places and communities.

c) Natural England will support West of England authorities in development of strategic solutions for addressing effects of West of England growth on protected sites and species, and seek to align solutions with JGIS priorities.

d) Support actions to further develop targeted GI projects and priorities where investment can maximise benefits.

e) Help secure relevant opportunities to test or pilot new ways of delivering and funding GI and other objectives, e.g. ongoing piloting of National Framework for GI standards.

Non-Government Organisations (NGOs) including National Trust, Avon Wildlife Trust, Woodland Trust

a) Continue to work with West of England authorities through established partnerships such as West of England Nature Partnership, Bristol Avon Catchment Partnership and landscape partnerships including Bathscape.

b) Provide specialist guidance and support.

c) Develop and deliver initiatives to communicate and implement the Nature Recovery Network as part of the JGIS.

Through existing joint working practice between authorities and organisations including partnerships such as Bristol Avon Catchment Partnership, West of England Nature Partnership, Local Enterprise Partnership, Natural History Consortium, Mendip Hills AONB Partnership, and Cotswold Conservation Board there are mechanisms to consider environmental issues and schemes, and identify potential wider cross boundary benefits.

Duty to Cooperate

As delivery of the JGIS concerns a strategic issue with cross boundary implications it is covered by the local authority and prescribed bodies 'Duty to Cooperate' and will be demonstrated through including GI in 'Statements in Common' provided to support Local Plan making.

Key partnerships that have been integral to developing this Strategy and its delivery going forward are:

West of England Nature Partnership (WENP)

The West of England Nature Partnership (WENP) is a cross-sector partnership working to restore the natural environment in the West of England through embedding the value of nature in decision-making across spatial planning, public health and economic development.

Bristol Avon Catchment Partnership (BACP)

The Bristol Avon Catchment Partnership (BACP) comprises a range of organisations, groups, authorities and individuals dedicated to working together to improve the water environment and provide wider benefits for people and nature at a catchment scale – known as a catchment based approach (CaBA). The Bristol Avon catchment encompasses the North Somerset coastal streams and the Lower Severn Vale sub-catchments.

FUNDING

The Action Plan (Section 8) sets out what is required moving forward and takes account of current resources both within the five authorities and within partnerships, Government bodies, and individual bodies. Through continued joint working, including the GI Working Group, the partners will continue to explore funding opportunities to help deliver GI initiatives.

The West of England Strategic Solutions Panel will be a forum to discuss shared priorities, phasing and sequencing of GI priorities/projects that will inform work on the Infrastructure Investment and Delivery Plan, including identifying appropriate funding streams and potential delivery mechanisms by the organisations that sit on the Panel. Collaborative working with a wide range of stakeholder organisations will be key.

Longer term there will be **stakeholder discussion** where required as part of wider collaboration for how the West of England could be resourced for environmental benefit and valuing natural capital. The key intention would be to ensure resourcing, coordination and integration of the objectives of the JGIS in development plans, Joint Local Transport Plan, Local Industrial Strategy, major scheme bids and natural capital related plans and strategies regarding water, clean air, land management.

Funding for maintaining and managing existing GI is a significant challenge for local authorities already struggling to fund most basic public services. In view of the climate and ecological emergency, understanding our region's natural capital (the assets and services), their value and cost of managing them now and in the future will provide informed decision making across services and with other delivery partners, and will lead to improved integrated delivery, benefitting public health and wellbeing, green space provision, flood management and wildlife.

The authorities will also be reviewing national Government incentives and funding opportunities that may arise with the enacting of the Environment Bill 2020.

MONITORING

The West of England GI Group reporting to the West of England Infrastructure Officer Board (IOB) and Strategic Directors will provide an annual review to be shared on the WECA and WENP media channels.

SECTION 7 continued

Defra 25 Year Environment Plan indicators and WENP Nature Recovery ambitions.
Defra have set out an indicator framework for the 25 year Environment Plan (May 2019) setting out commitment to deliver a comprehensive set of indicators which collectively describes environment change as it relates to the 10 goals in the 25 Year Plan. The framework of indicators is developed on the concept of natural capital. There are 66 indicators under 10 broad themes. Defra will where possible, make data available to allow analysis at local scales including local authority or catchment.

It is therefore proposed that as part of the monitoring of delivery of the JGIS that the Defra indicators are used and analysed for the West of England when available.

Delivery of the West of England Nature Recovery Network ambitions (listed below) will be monitored through the work of WENP working with the authorities.

West of England Nature Recovery ambitions

- Create 5,108 hectares of wildlife-rich habitat outside the protected site network by 2043.
- Double our woodland by 2060.
- Close the connectivity gaps with 580 hectares of new native woodland and 660 hectares of new species-rich grassland by 2050.
- All water catchments to be in good ecological status and all SSSIs in favourable condition by 2027.
- Double the amount of land managed for environmental gain from 2018 levels by 2050.
- All new developments achieve well connected and appropriate Biodiversity Net Gains that contribute across these ambitions.
- Double the abundance of wildlife from 2018 levels by 2050.
- Develop a strong and living evidence base to hold the above ambitions to account and help us make the smartest decisions for nature's recovery.

SECTION 8: ACTION PLAN 2020 – 2023

	Actions	Lead partner(s)	Funding £ (+ source)	Time scale
	Resourcing (R)			
R1	**West of England GI Working Group** to continue to be resourced by WECA, the four UAs and key partners to assist: • Implementation of the Action Plan. • Provide oversight and updates on new regulations and matters regarding GI. • Update GI evidence and information base including GI Areas.	WECA	£ Officer time	2020-23
	Activities (A)			
A1	Final Joint GI Strategy sign off process to be confirmed and completed.	WECA	£ Officer time	April-June 2020
A2	Each UA to confirm how they will take JGIS forward into respective Local Plans with other programmes as part of the signing off process.	UAs	£ Officer time	May/June 2020
A3	Set up appropriate workshops/process for stakeholder engagement to develop the GI Area profile information and GI evidence recognising that current work is limited to existing asset mapping. The profiles need to identify and describe importance of connectivity of the assets including species movement to assist Local Nature Recovery Strategies and other plans and strategies.	WECA	£ Officer time	Sept–Dec 2020
A4	Produce annual review on JGIS delivery. Review and monitor actions including delivery of strategic GI projects and report on environment change through use of Defra 25 Year Plan indicators.	UAs & WECA	£ Officer time	2020-2023
A5	Agree process for submission of strategic GI projects, assessment and prioritisation using Project Assessment Form, and management including liaison with submission leads, identifying funding and preparing bids and business cases, and monitoring progress.	UAs & WECA, EA, NE	£ Officer time	2020

SECTION 8 continued

	Actions	Lead partner(s)	Funding £ (+ source)	Time scale
	Activities (A) continued			
A6	Investigate delivery/funding mechanisms/finance models e.g. Landscape Enterprise Networks (LENs) – BACP is piloting the LENs approach in the Bristol Frome sub-catchment (GI Areas 17, 18,19). Investment Fund/Environment Fund/ Natural Capital Trust/reverse auctions are to be investigated including appetite amongst various potential investors for specific finance models.	WECA on behalf of/ alongside UAs	£ Officer time	2020-2023
A7	Develop guidance for planners on Local Plan development regarding consideration of GI and its relationship with Natural Capital and ecosystem services and related legislative requirements including Biodiversity Net Gain, Nature Recovery Strategies and Habitat Regulations. Guidance will include example policies and GI Policy Assessment Matrix.	UAs & WECA	£ Officer time	2020
A8	Provide GI training/support to WECA/UA officers to deliver strategic and Local Plans that will deliver effective GI to support delivery of new development – i.e. contain strong GI policy and requirements including for master planning that demonstrates effective integration of GI as well as natural capital, and ecosystem services. Training will include guidance and support on use of the GI Policy Assessment Matrix.	UAs & WECA	£ Officer time	2020-23
A9	The GI Policy Assessment Matrix (see *Useful references*) is to be applied by WECA and each of the UAs in the drafting of strategic spatial plan and Local Plans. External assessment of the draft policies is available via matrix developer via GI Working Group.	UAs & WECA	£ Officer time	2020-23
A10	West of England Nature Recovery Network is to be used by WECA and the four UAs to assess, identify and prioritise opportunities for ecological enhancement through their Local Plans and strategies including any Local Nature Recovery Strategies (Environment Bill) and delivery of Biodiversity Net Gain.	UAs & WECA	£ Officer time	2020-23
A11	Joint Local Nature Recovery Strategy – consider joint approach in response to Environment Bill requirement.	UAs & WECA, WENP	£ Officer time	2021-23

	Actions	Lead partner(s)	Funding £ (+ source)	Time scale
	Activities (A) continued			
A12	The Bristol Avon Catchment Partnership (BACP) Environmental Services Evidence Review and BACP Action Plan are to be used by the four UAs to assess, identify and prioritise opportunities for enhancement through their Local Plans and strategies.	UAs with BACP	£ Officer time	2020-23
	Strategic GI Projects (S)			
S1	West of England environmental and ecological Geographical Information System (GIS) and geospatial technologies to plan, build, and monitor GI. Establish a shared and managed data platform for sharing West of England data that is to be kept updated, reviewed and used for monitoring progress. Obtain mapping/data identified as necessary to respond to new regulations and requirements e.g. habitat and land use/change data.	WECA/UAs	£? TBC Partnership contributions	2020-21
S2	West of England Biodiversity Net Gain (BNG) – complete and take forward West of England Guidance and options for delivery – shared resourcing, and mechanisms and processes for implementing e.g. tool kits and SPDs, recording and managing BNG across West of England.	WECA/NE/ UAs	£20,000 (Guidance commission)	2020-23
S3	West of England Natural Capital Account (NCA) – assist development of NCA and incorporate output as part of shared mapping and data.	EA	£ Officer time	2020
S4	West of England National GI Standards Framework pilot – deliver pilot as outlined in proposal to Natural England.	UAS/ WECA/NE	£ Officer time	2020
S5	West of England Tree and Woodland Strategy – produce, coordinate/identify strategic approach to tree and woodland planting e.g. targeting of new woodland creation schemes/joint funding bids and consider Ash Die Back – to assess and understand risk and impact to West of England.	WENP	£ TBC	2020

GLOSSARY

Bristol Avon Catchment Partnership (BACP)

The Bristol Avon Catchment Partnership (BACP) comprises a range of organisations, groups, authorities and individuals dedicated to working together to improve the water environment and provide wider benefits for people and nature at a catchment scale – known as a catchment based approach (CaBA). Formed in 2012 with the support of Central Government, the partnership has produced a catchment plan to work towards achieving a better water environment for all. BACP is supported by a steering group and there are also various project task groups who meet regularly to develop and deliver partnership projects from across the catchment.

The Bristol Avon catchment encompasses the North Somerset coastal streams and the Lower Severn Vale sub-catchments.

Partners are: Avon Wildlife Trust, Bath & North East Somerset Council, Bristol Avon Rivers Trust, Bristol City Council, Bristol Water, Environment Agency, Farming & Wildlife Advisory Group – South West, Natural England, North Somerset Council, South Gloucestershire Council, West of England Rural Network, Wessex Water, Wiltshire Council, Wiltshire Wildlife Trust. Funded by Wessex Water.

www.wessexwater.co.uk/environment/catchment-partnerships/bristol-avon-catchment-partnership

The Bristol Avon Catchment is the entire area of land, rivers, streams and wetlands that eventually drain to the sea via the River Avon at Bristol. The Bristol Avon Catchment has 23 sub-catchments. Seventeen of these are within or partly within the West of England area, whilst the remaining parts of the catchment extend into Wiltshire and Mendip. The catchment includes all the different types of landscape that we build on, cultivate and modify; all of these human interventions have an impact on the water environment and the benefits (ecosystem services) it provides for wildlife and people.

BACP Environmental Services Evidence Review and Action Plan enable partners to identify the key water-based issues and opportunities and support decision making across the catchment area.

https://www.wessexwater.co.uk/environment/catchment-partnerships/bristol-avon-catchment-partnership

Biodiversity Net Gain is a requirement for development projects, in which biodiversity losses are outweighed by measures taken to avoid, minimise or compensate impacts of the project.

Bristol Regional Environmental Records Centre (BRERC) plays a key role as the central biodiversity and geodiversity data provider in the West of England.

Funded by Bath & North East Somerset Council, Bristol City Council, South Gloucestershire Council, The Environment Agency, Wessex Water and Avon Wildlife Trust.

www.brerc.org.uk

Building with Nature provides a clear set of standards and a technical user guide to help applicants to benchmark evidence of how their development or policy meets the benchmark standard for high quality GI.

The benchmark can be used to certify a development scheme at different stages from pre-application, through to post-construction maintenance; and can be used to certify a final publication of a policy document.

www.buildingwithnature.org.uk

A catchment area is a hydrological unit. All the precipitation that falls into a catchment area eventually ends up in the same river going to the sea. Catchment areas are separated from each other by watersheds. A watershed is a natural division line along the highest points in an area. Catchments are divided into sub-catchments, also along the lines of elevation.

Catchment Based Approach (CaBA) an inclusive, civil society-led initiative that works in partnership with Government, local authorities, water companies, businesses and more, to improve the water environment and provide wider benefits for people and nature at catchment scale.

Design West is an independent service that provides design review, policy support, consultancy and training to promote excellence in urban design, sustainability and place-making across the West of England. Design West brings together the best expertise from across the built and natural environment sectors and works collaboratively with decision-makers and the development sector to shape better places. Design West was established in partnership with the five authorities, and is delivered by the Architecture Centre, a registered charity. Design West deliver regular design review panels in the four West of England authority areas.

Ecosystem services – described as the *"multiple benefits gained by people from the natural environment,"* the 'ecosystems approach' has been developing as a branch of science and policy since the late 1980s. In 2005 the UN's *Millennium Ecosystem Assessment (MA)* was published. This assessed the consequences of ecosystem change on human well-being. The findings provide a state-of-the-art scientific appraisal and basis for action to conserve and use ecosystems and their services sustainably. The MA classified ecosystem services into four categories:

- Provisioning services: products obtained from ecosystems, including food, fibre, fuel, medicines and fresh water.
- Regulatory services: benefits obtained from the regulation of ecosystem processes, including air quality regulation, climate regulation, water regulation, erosion regulation, water purification, disease regulation, pest regulation, pollination, natural hazard regulation.
- Cultural services: non-material benefits people obtain from ecosystems through recreation, reflection, cognitive development, aesthetic experiences and spiritual enrichment.
- Supporting services: services necessary for the production of all other ecosystem services including soil formation, photosynthesis, primary production, nutrient cycling and water cycling.

EU Green Infrastructure definition: *Green Infrastructure is a strategically planned network of natural and semi-natural areas with other environmental features designed and managed to deliver a wide range of ecosystem services such as water purification, air quality, space for recreation and climate mitigation and adaptation. This network of green (land) and blue (water) spaces can improve environmental conditions and therefore citizens' health and quality of life. It also supports a green economy, creates job opportunities and enhances biodiversity. The Natura 2000 network constitutes the backbone of the EU Green Infrastructure.*

Green Infrastructure planning is a successfully tested tool to provide environmental, economic and social benefits through natural solutions and help reduce dependence on 'grey' infrastructure that is often more expensive to build and maintain.

http://ec.europa.eu/environment/nature/ecosystems/index_en.htm

Landscape Enterprise Networks (LENs) link management and investment in landscapes to the long-term needs of business and society. It does this by helping businesses to work together to influence the quality and performance of the landscapes in which they operate.

Glossary continued

National Character Area (NCA)

Natural England complying with its responsibilities as set out in the Natural Environment White Paper, *Biodiversity 2020* and the European Landscape Convention, produced profiles for 159 National Character Areas (NCAs). These are areas that share similar landscape characteristics, and which follow natural lines in the landscape rather than administrative boundaries, making them a good decision-making framework for the natural environment.

NCA profiles are guidance documents which can help communities to inform their decision-making about the places that they live in and care for. The information they contain supports the planning of conservation initiatives at a landscape scale, informs the delivery of Nature Improvement Areas and encourages broader partnership working through Local Nature Partnerships.

Each NCA provides a wide range of benefits to society. Benefits (ecosystem services) derived from the attributes and processes (both natural and cultural features) within the NCA area.

www.gov.uk/government/publications/national-character-area-profiles-data-for-local-decision-making

Natural capital – The natural capital framework demonstrates how elements within our natural world contribute to achieving the outcomes we seek as individuals and society more generally. According to HM Treasury's Green Book: *Appraisal and Evaluation in Central Government:*

"Natural capital includes certain stocks of the elements of nature that have value to society, such as forests, fisheries, rivers, biodiversity, land and minerals. Natural capital includes both the living and non-living aspects of ecosystems. Stocks of natural capital provide flows of environmental or 'ecosystem' services over time.

These services, often in combination with other forms of capital (human, produced and social) produce a wide range of benefits. These include use values that involve interaction with the resource and which can have a market value (minerals, timber, freshwater) or non-market value (such as outdoor recreation, landscape amenity). They also include non-use values, such as the value people place on the existence of particular habitats or species." (p.45)

Natural Capital Account – Providing an overall assessment of the value of a stock of assets is known as natural capital accounting. In terms of accounting, valuing a snapshot of natural capital (for example, the value of parks within a local authority area) may be expressed in annual flow terms (parks provide £ million services per year) or as capital asset value (the lifetime value of parks is ££ million).

Economic valuation can demonstrate the value of a natural capital asset, which may in turn generate support for a wider agenda of environmental improvement, or prompt a new dialogue with stakeholders.

Extracts above taken from: Enabling a Natural Capital Approach (ENCA) guidance (2020) a comprehensive document providing information and resources for natural capital.

Natural History Consortium a partnership of 13 members reflecting the West of England region's reputation as a leading centre for the understanding and appreciation of the natural world. It delivers informative events and activities. Facilitates, develops, and disseminates novel communication techniques. Builds, supports and pilots effective partnerships that bring together diverse organisations that face similar challenges and issues, and to help organisations learn from each other.

www.bnhc.org.uk/

Strategic Solutions Panel brings together infrastructure delivery bodies, commissioners and statutory bodies with strategic oversight to coordinate and enable delivery of the West of England strategic development priorities. The panel is coordinated by WECA, and meets quarterly. Membership of the Panel includes

the four West of England Unitary Authorities, Highways England, Environment Agency, NHS England and Network Rail.

Water Framework Directive Citizens, environmental organisations, nature, water-using sectors in the economy all need cleaner rivers and lakes, groundwater and bathing waters.

Water protection is therefore one of the priorities of the Commission. European Water Policy should get polluted waters clean again, and ensure clean waters are kept clean.

http://ec.europa.eu/environment/water/water-framework/index_en.html

West of England GI Working Group – set up by local authorities with WECA to undertake West of England GI programme of work. Officers representing the four UAs, WECA, Environment Agency, Natural England, West of England Nature Partnership, Bristol Avon Catchment Partnership have contributed their time to monthly meetings and workshops to develop and run workstreams including Biodiversity Net Gain, Policy Matrix work, environment data and mapping.

West of England Nature Partnership (WENP)

The West of England Nature Partnership (WENP) is a cross-sector partnership working to restore the natural environment in the West of England through embedding the value of nature in decision making across spatial planning, public health and economic development.

Established in 2012, WENP is the designated Local Nature Partnership (LNP) for the West of England. LNPs are a key commitment from the 2011 Government White Paper, *The Natural Choice: Securing the Value of Nature.* Taking up an action from the Government 25 Year Environment Plan WENP has produced the West of England Nature Recovery Network setting out ambitions for the recovery of nature in the 25 Year Environment Plan. This forms an integral part of the West of England GI Plan.

www.wenp.org.uk/

The Partnership is governed by the WENP Board, which comprises representatives from: Bristol City Council, South Gloucestershire Council, North Somerset Council, Bath & North East Somerset Council, Avon Wildlife Trust, and Wessex Water, Bristol Water, Natural England, WECA, Local Enterprise Partnership, Avon Wildlife Trust, National Trust, Woodland Trust, Natural History Consortium, BACP, and the Environment Agency.

The local authorities, Wessex Water and Avon Wildlife Trust currently fund the partnership.

USEFUL REFERENCES

There is a wealth of information on Green Infrastructure on the internet. Below are some key documents/links to further information:

Town and Country Planning Association has an extensive range of publications offering practical guidance and case studies:

www.tcpa.org.uk/Pages/Category/green-infrastructure

The Green Infrastructure Partnership (GIP) is a large network of people and organisations that support the creation, enhancement and promotion of Green Infrastructure in the UK.

Membership is free. In addition to opportunities to network and influence Green Infrastructure at a strategic level, members receive a monthly GIP newsletter, which includes the latest Green Infrastructure news, events, publications and funding opportunities.

www.tcpa.org.uk/pages/category/green-infrastructure-partnership

Mainstreaming Green Infrastructure – Alister Scott is the NERC Knowledge Exchange Fellow who has assisted policy work on the West of England Joint GI Strategy. As Knowledge Exchange Fellow, Alister Scott working with the Town and Country Planning Association (TCPA), describes his role as a catalyst integrating multiple planning policy and practice viewpoints across key stakeholders who use/shape the planning system.

The Policy Matrix Assessment Framework has been devised from three different GI research projects. First, an English GI Benchmark 'Building with Nature', a NERC project developed by the Gloucester Wildlife Trust and the Centre of Sustainable Planning and Environments at UWE (Sinnett, et al., 2018). Second, an 'Integrated Green Infrastructure Approach' developed and promoted in Scotland by the Glasgow and Clyde Valley Green Nature Partnership (2017) and third, a NERC funded project on 'Mainstreaming Green Infrastructure in the planning system' which seeks to improve the way GI is valued and used in policy and decision making processes drawing on existing research and practice perspectives (Scott 2018).

The goal of the Matrix is to ensure that there are sufficient policies that explicitly cover the full range of functions performed by GI which are mainstreamed throughout the local plan/strategy document rather than just in the 'environment' section and in one isolated Green Infrastructure policy. Furthermore, there is a goal to ensure that the GI policies themselves have sufficient clarity and strength to result in appropriate delivery and action on the ground. Working with Alister Scott, exemplar policies have been identified and a GI policy drafted for consideration by West of England UAs.

https://mainstreaminggreeninfrastructure.com/

Understanding our growing environmental vocabulary in England: Connecting Green Infrastructure, Natural Capital, Ecosystem services and Net Gain(s) within the English Planning System – Alister Scott et al (2019)

https://mainstreaminggreeninfrastructure.com/

The Green Space Factor and the Green Points System – this paper presents advice on how to implement the Green Space Factor, a tool for calculating Green Infrastructure requirements for new developments.

Using this methodology gives local authorities certainty about the Green Infrastructure benefits being provided; developers some flexibility in what they deliver; and communities the benefits of increased Green Infrastructure.

The tool was so successful that it has since been included in the planning policies of multiple municipalities across Europe.

www.tcpa.org.uk/the-green-space-factor-and-the-green-points-system

Reuniting Health with Planning is a UK-wide TCPA initiative focused on improving skills, understanding and knowledge of practitioners, planners and non-planners especially those in public health and the built environment, involved in policy making and developments at the national and local levels. Includes PERFECT factsheet 1 – Green Infrastructure and Health

www.tcpa.org.uk/healthyplanning

PERFECT is an international Green Infrastructure partnership led by the TCPA.

Professionals from around Europe use PERFECT to collect and share research, knowledge and best practice to help encourage further investment in Green Infrastructure throughout the continent.

Countries partnering in PERFECT are the United Kingdom (Cornwall Council and the TCPA), Hungary, Austria, the Netherlands, Slovenia, Slovakia and Italy.

www.tcpa.org.uk/perfect

Guidance for delivering new Garden Cities

The TCPA has produced a suite of guidance with practical steps for all those interested in making 21st century Garden Cities a reality. Guidance provides detail and case studies on a wide range of key issues, including planning, investment, land assembly, delivery, and long term stewardship. It includes 11 Guides, including Guide 7 – Planning for green and prosperous places, includes case studies including Bicester's Green Infrastructure planning toolkit, and Guide 9 - Long Term Stewardship – how to fund long term management and maintenance.

www.tcpa.org.uk/guidance-for-delivering-new-garden-cities

Linear Infrastructure Network

The Linear Infrastructure Network (LINet) has produced a flyer which sets out the benefits of well designed and maintained Green Infrastructure alongside grey infrastructure assets.

www.ciria.org/News/blog/LINet_sets_out_the_benefits_of_green_infrastructure_to_enhance_infrastructure_resilience.aspx

Nature Recovery Network (NRN) methodology – how the NRN was created and what it means:

www.wenp.org.uk/wp-content/uploads/2019/05/Towards-a-Nature-Recovery-Network-for-the-West-of-England-A-Methodology.pdf

UNITARY AUTHORITY LOCAL PLANS

Bath & North East Somerset Council

www.bathnes.gov.uk/services/planning-and-building-control/planning-policy/local-plan-2016-2036

Bristol City Council

www.bristol.gov.uk/planning-and-building-regulations/local-plan-review

North Somerset Council

www.n-somerset.gov.uk/my-services/planning-building-control/planningpolicy/local-plan/

South Gloucestershire Council

www.southglos.gov.uk/environment-and-planning/planning/planning-policy/plans-in-preparation/new-south-gloucestershire-local-plan-2018-2036/

Useful References continued

PUBLIC HEALTH AND WELLBEING STRATEGIES

Bristol's HWB Strategy has as a priority to 'Create a high quality and well-connected built and green environment, and manage the health impacts of Climate Change'.

www.bristol.gov.uk/documents/20182/34772/HW%20Strategy%20Document_2013_web.pdf/9dcfd365-4f01-46be-aaf3-0874d75c7c33

Bath & North East Somerset's HWB Strategy has as a priority to 'Create healthy and sustainable places'.

www.bathnes.gov.uk/sites/default/files/banes_health_and_wellbeing_strategy_2015_-_2019_0.pdf

One of the four collective areas for action in **South Gloucestershire's HWB Strategy** is to 'Maximise the potential of our built and natural environment to enable healthy lifestyles and prevent disease'.

https://edocs.southglos.gov.uk/download/healthandwellbeingstrategy_1034.pdf

Appendix 1
West of England GI Strategy mapping

Mapping of Green Infrastructure (GI) provides a visual and spatial representation of existing GI assets and potential opportunities to enhance and extend existing assets. The spatial understanding of GI enables the identification of the links that are vital for effective GI planning. The West of England Joint Green Infrastructure Strategy (JGIS) has identified a series of mapped datasets as part of the evidence necessary to help support the delivery of its eight outcomes:

- Supporting resilient ecosystems and biodiversity.
- Mitigating and adapting the natural and built environment to climate change.
- Conserving and enhancing a legible network of physical green spaces.
- Reducing and managing flood risks and drought.
- Improving mental and physical health, and the cohesion of local communities.
- Increasing the sustainability of food production.
- Maintaining and enhancing cultural heritage, landscapes and natural resources.
- Promoting economic growth, employment and skills improvement.

A number of the mapped datasets will be used to assist in monitoring change and progress in achieving the JGIS outcomes.

The geospatial data developed for the JGIS will be available as:

1) An interactive mapping tool which allows interrogation of GI at different geographical scales in the West of England is to be developed in line with the JGIS Action Plan.
2) 22 GI Area profiles – these provide a narrative of GI assets (described under five infrastructure categories) issues and strategic GI projects underway and strategic GI opportunities obtained from the mapped evidence. See *Appendix 2 – Methodology and example GI Area profile*. It is intended that this information will be linked to the interactive mapping tool when established.

Table 1 identifies the mapping layers used to inform the JGIS. Most are open data source maps accessible on: https://magic.defra.gov.uk/ and available to download from the governments open data archive: https://data.gov.uk/.

These maps and the various geospatial data layers are the starting point for the assessment of GI within the West of England. Layers that will be made available within the interactive map vary in geographic scale. Some, such as the Nature Recovery Network work at a West of England scale, however are not suitable for viewing at a field boundary scale. Others are ward based, for example Index of Multiple Deprivation mapped areas .

As the authorities utilise the West of England geospatial evidence provided at localised resolutions, more detailed geospatial data will be made available and potentially added to a shared mapping platform.

Appendix 1 continued

Table 1: Mapped datasets used to inform the West of England Joint Green Infrastructure Strategy

Collection	Display Name	Coverage
Base maps	West of England GI Areas	West of England
	West of England Phase 1 surveys	West of England
Housing growth in the West of England	West of England UA Core Strategy site allocations	West of England
	West of England Joint Local Transport Plan 4 Schemes • Cycle routes • Highways • Junction upgrades • New rail stations • Park & rides • Public transport • Rail improvements	West of England
Deprivation (2015 IMD) in the West of England	West of England Index of Multiple Deprivation (2015)	West of England
Recreational and Healthy Living infrastructure	West of England Neighbourhoods vulnerable to heat index	UK
	Limestone Link	West of England
	Monarchs Way	West of England
	River Avon Trail	West of England
	Two Rivers Way	West of England
	National walking trail	UK
	Cotswold Way	West of England
	Other National Trails	West of England
	West of England UA Park and green space	West of England
	West of England Common land and town/village greens	West of England
	Accessible greenspace in the West of England (ANGst) 500ha+ with 10km buffer	West of England
	Accessible greenspace in the West of England (ANGst) 100ha+ with 5km buffer	West of England
	Accessible greenspace in the West of England (ANGst) 20ha+ with 2km buffer	West of England
	Accessible greenspace in West of England (routing) Greenspace	West of England
	Accessible greenspace in West of England (routing) Catchments	West of England
Productive land	West of England Traditional orchards	West of England
	West of England Allotment plots	Bristol City Council (BCC)
	West of England Agricultural land classification grades	West of England

Collection	Display Name	Coverage
Ecological/Geological infrastructure	WENP Nature Recovery Network: Wetland strategic network	West of England
	WENP Nature Recovery Network: Grassland strategic network	West of England
	WENP Nature Recovery Network: Woodland strategic network	West of England
	West of England Ramsar sites West of England Special Areas of Conservation (SAC) West of England Special Protected Areas (SPA) West of England Sites of Specific Scientific Interest (SSSI) West of England Local Nature Reserve National Nature Reserve West of England Nature Improvement Area (NIA) West of England Strategic Nature Areas (SNA) West of England Sites of Nature Conservation Interest (SNCI)	West of England
	Avon Wildlife Trust Reserves	West of England
	Trust owned land	West of England
	Regionally Important Geological Sites (RIGS)	Bristol City Council (BCC)
	WENP Nature Recovery Network Grassland existing WENP Nature Recovery Network Grassland network model WENP Nature Recovery Network Grassland connectivity opportunities WENP Nature Recovery Network Woodland existing WENP Nature Recovery Network Ancient woodland existing WENP Nature Recovery Network Woodland network model WENP Nature Recovery Network Ancient woodland network model WENP Nature Recovery Network Woodland connectivity opportunities WENP Nature Recovery Network Wetland high tide roosts (Natural England data) WENP Nature Recovery Network Wetland connectivity opportunities	West of England
	West of England Priority Habitats	West of England Extract
	West of England Coastal floodplain grazing marsh	West of England Extract
	Bristol City Council Wildlife Network Sites	BCC

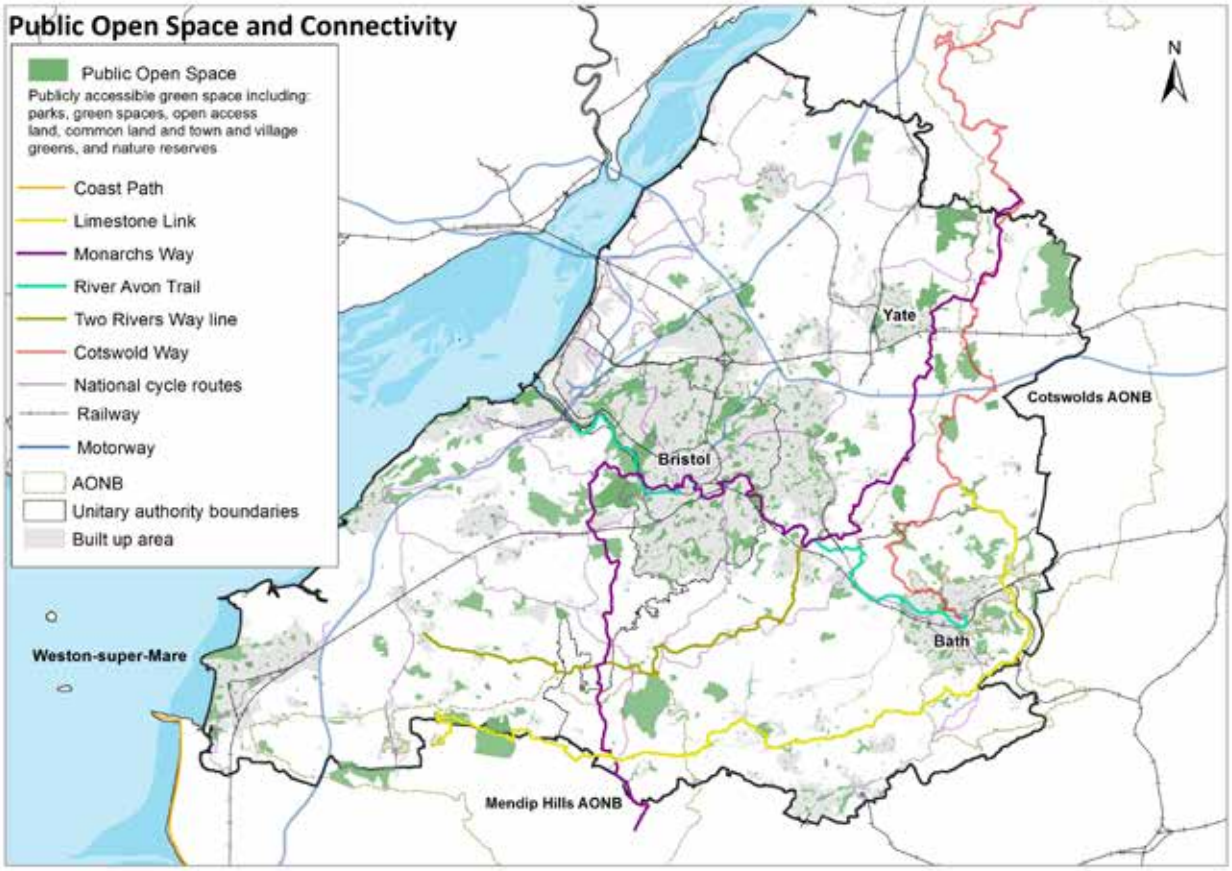
Appendix 1 continued

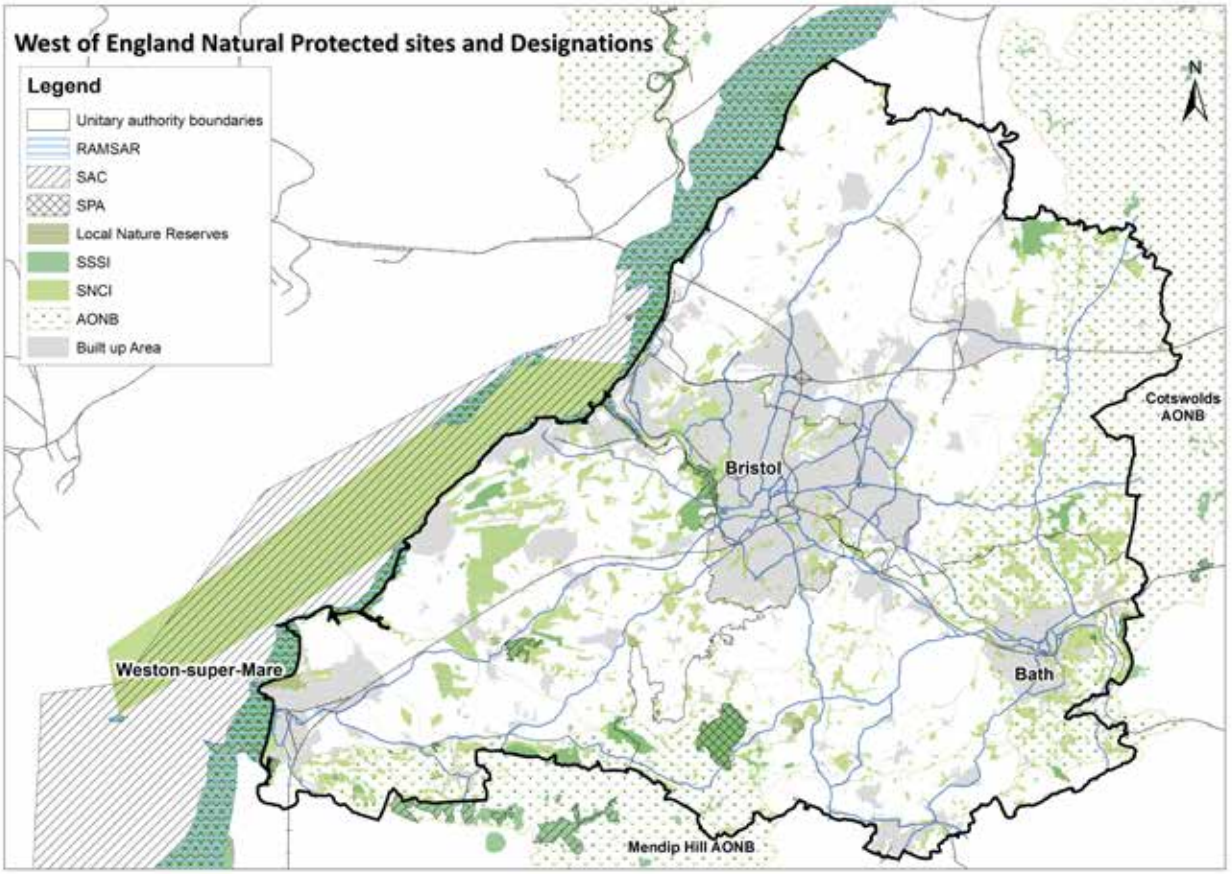
Collection	Display Name	Coverage
Heritage/Cultural infrastructure	West of England Historic parks and gardens	West of England
	West of England Registered battlefields	West of England
	West of England Scheduled Monuments	West of England
	Bath World Heritage Site	Bath & North East Somerset Council (B&NES)
	West of England Listed buildings	West of England
Landscape infrastructure	Areas of Outstanding Natural Beauty	West of England
	West of England National Character Areas	West of England
	Bath World Heritage Site Setting	B&NES
	West of England Landscape Character Areas (LCAs)	West of England
Hydrological infrastructure	Bristol Avon Catchment Sub catchment areas	West of England
	WFD Overall status (cycle 2)	West of England
	West of England Flood Zone 2	West of England
	West of England Flood Zone 3	West of England
	Topography	West of England
	West of England Neighbourhood Flood Vulnerability Index (NFVI)	West of England
	West of England Indicative Flood Risk areas (PFRA) people sensitivity to flood risk	West of England
	West of England Indicative Flood Risk areas (PFRA) communities at risk	West of England
	West of England Flood Risk areas	West of England
	West of England watercourses (main rivers and watercourses)	West of England
Habitat Regulations Assessment (HRA) maps	Buffers for European sites within the West of England (buffers based on existing national best practice across the country and assessments undertaken to support WOE UA local plan HRA - 200m for air pollution, 4km for Physical Damage/Loss – off-site habitat, 7km for recreational pressures.)	West of England
	SAC 200m Buffer	West of England
	SAC 4Km Buffer	West of England
	SAC 7Km Buffer	West of England
	SPA 200m Buffer	West of England
	SPA 4Km Buffer	West of England
	SPA 7Km Buffer	West of England
	Ramsar 200m Buffer	West of England
	Ramsar 4Km Buffer	West of England
	Ramsar 7Km Buffer	West of England
	West of England Bat Consultation Zones	West of England

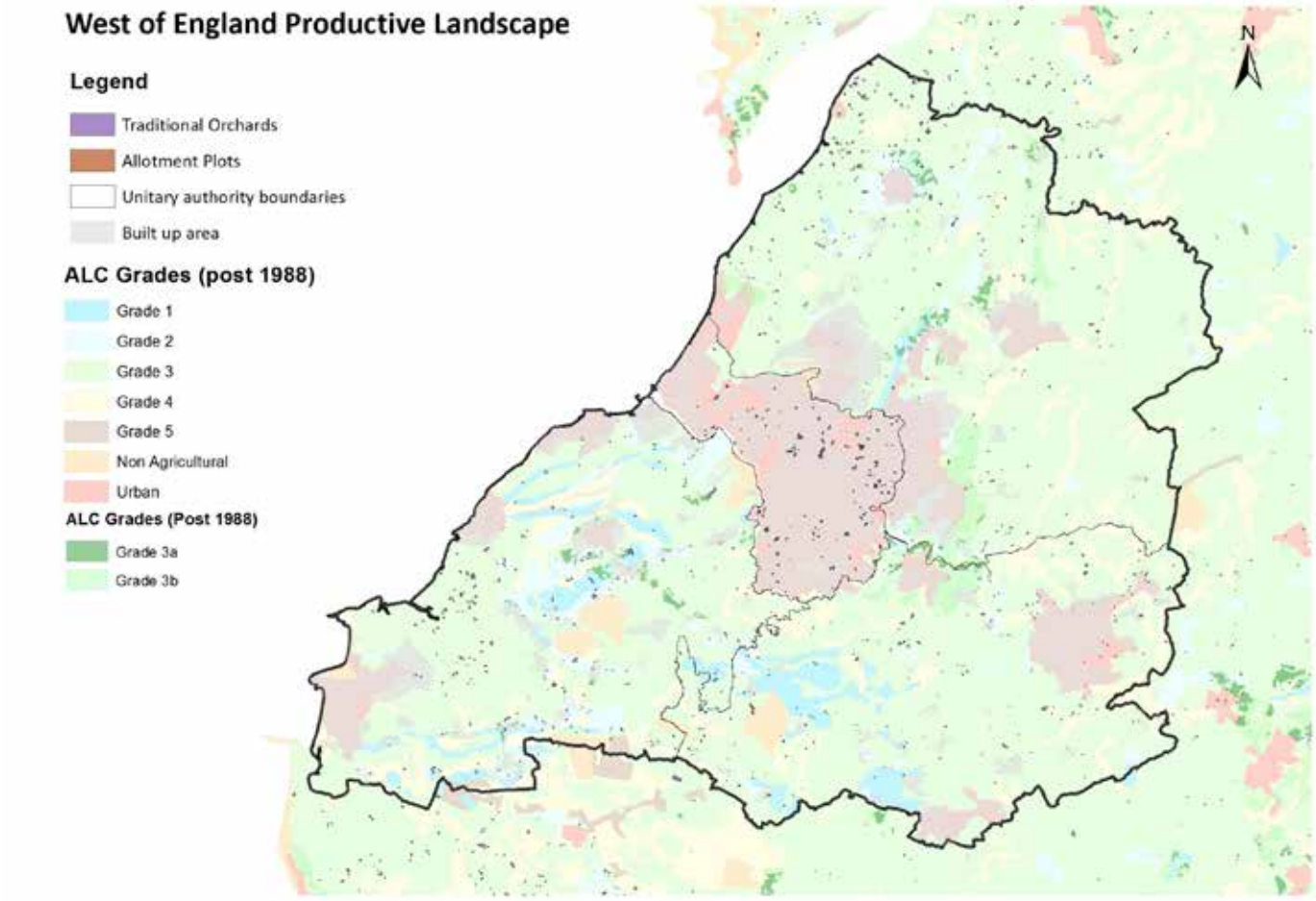
Collection	Display Name	Coverage
Habitat Regulations Assessment (HRA) maps (cont'd)	Bath and Bradford on Avon Greater Horseshoe Juvenile Sustenance Zones	B&NES
	Bath and Bradford on Avon Greater Horseshoe Consultation Zones	B&NES
	Bath and Bradford on Avon Lesser Horseshoe Consultation Zones	B&NES
	Bath and Bradford on Avon Lesser Horseshoe Juvenile Sustenance Zones	B&NES
	Bath and Bradford on Avon Lesser Horseshoe Maternity FCS consultation zones	B&NES
	Bath and Bradford on Avon Bechstein's Sensitive Zone	B&NES
	Mells Valley SAC Consultation Zones	B&NES
	Mells Valley Juvenile Sustenance Zone	B&NES
	North Somerset and Mendip Hills Bat SAC Greater Horseshoe consultation zone	NSC
	North Somerset and Mendip Hills Bat SAC Greater Horseshoe Juvenile Zone	NSC

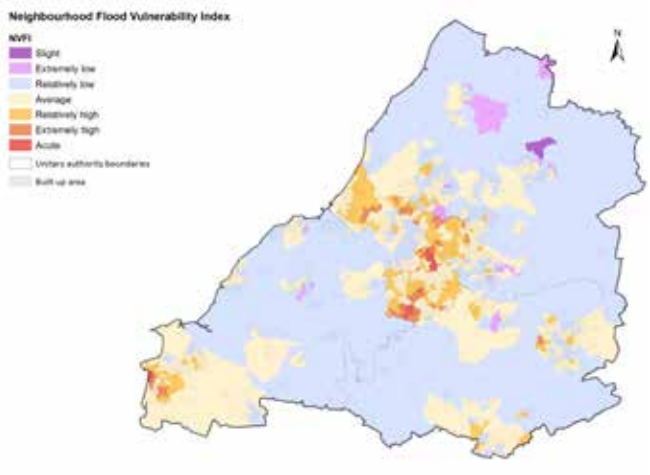
The following pages show regional maps of existing key GI assets and areas of population vulnerable to flooding and heat.

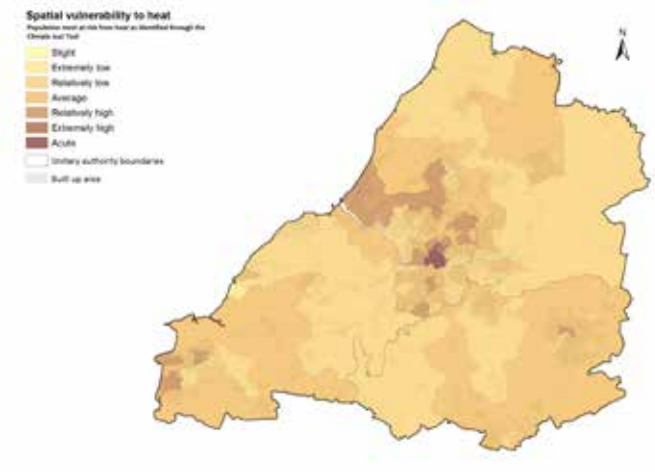
Appendix 1 continued











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Lindley, S. J., O'Neill, J., Kandeh, J., Lawson, N., Christian, R. & O'Neill M. (2011) "Climate change, justice and vulnerability", Joseph Rowntree Foundation Report, York http://www.jrf.org.uk/publications/climate-change-justice-and-vulnerability.

Appendix 1 continued

Appendix 2: Example Draft Green Infrastructure Area Profile Area 13 – Bath and Environs (Bathscape)

The Location

This area comprises the city of Bath and its surrounding landscape setting as defined by the boundary of the City of Bath World Heritage Site setting. Bath lies "in a hollow in the hills", the hills being the far southerly tip of the limestone escarpment and dip-slope of the Cotswolds ridge and the hollow being formed by the valley of the River Avon as the river and its' tributaries has cut through the ridge.

Situated within the National Character Areas: NCA107 Cotswolds (primarily) and NCA 118 Bristol Avon Valley and Ridges (small western section)

Strategic GI Projects Underway

- River Avon Waterspace.
- Bathscape – includes addressing key issues of on-going loss of priority grassland habitats through neglect or conversion to woodland. Loss of grassland sites to woodland could become a significant issue due to increasing pressures from national woodland targets and lack of awareness of the value of un-improved grasslands. Improved access to open space by local communities and visitors.
- Bath Riverline (see also GI Area 22).
- Natural Flood Management Project (See Hydrological Network Appendix 3).

Strategic GI Opportunities

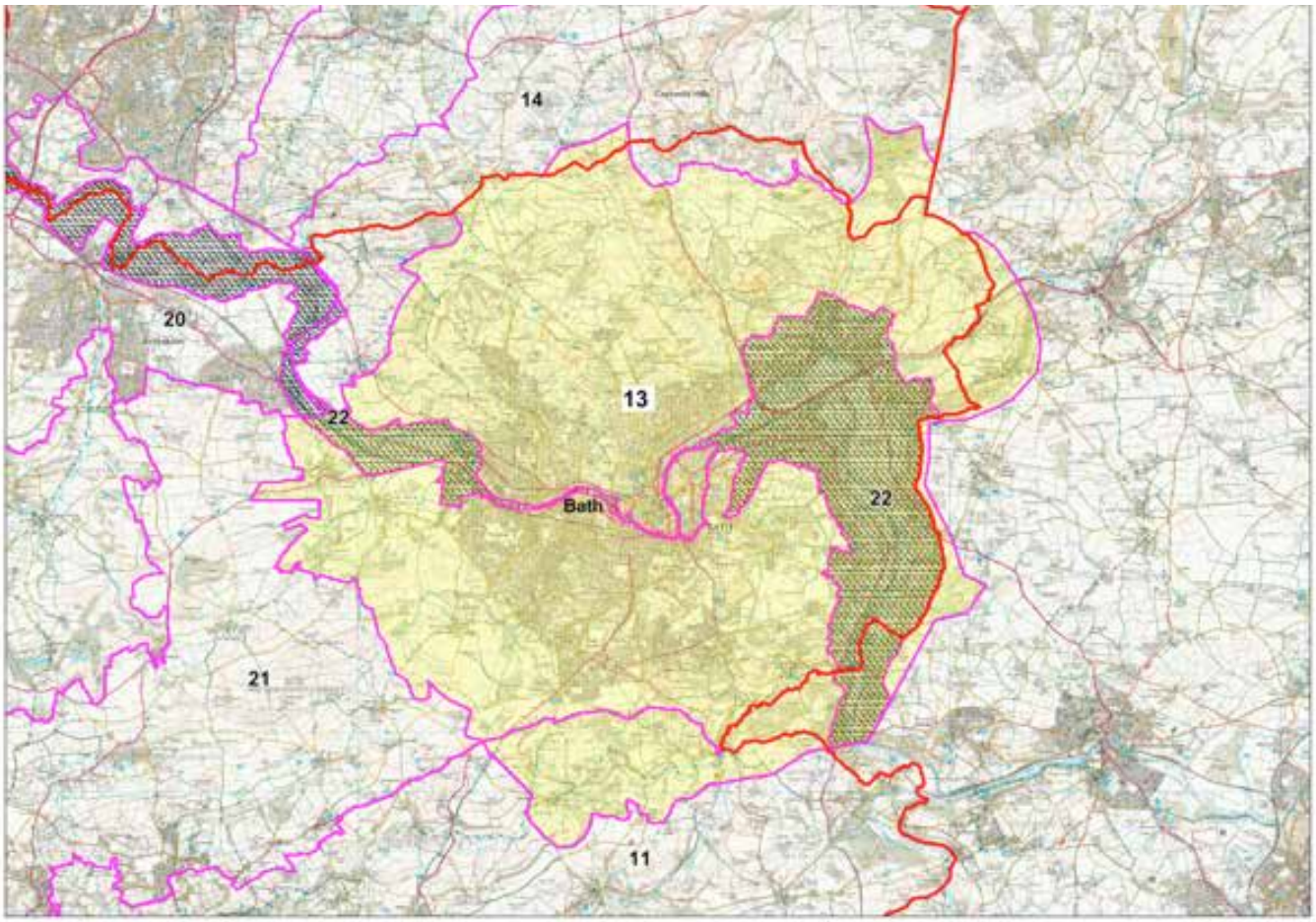
- The priority grassland and woodland habitats that characterise the area provide opportunities to help restore, expand and reconnect key habitats across the area, and to provide accessible biodiverse places for people to explore via existing footpaths and cycleways. The existing priority habitats are small and fragmented, and need to be expanded and buffered through habitat restoration and appropriate grazing regimes. These measures would help expand the range and extent of key habitat and support and expand the diverse bat communities.

Key issues to be addressed:

- Water quality, flooding and fish passes.
- Connectivity (walking/cycling) new and to link to existing.
- Development pressure/World Heritage Site.
- Urban tree issue.
- Grassland and woodland management.

- The West of England Nature Recovery Network shows opportunities to improve:
  - grassland connectivity particularly identifying key connectivity gaps to the north and south of the area.
  - woodland networks particularly to the north and south of the area, and seeking to buffer and connect existing ancient woodland.
  - river restoration, including habitat enhancements and removal of fish barriers.
- Urban tree planting and improved management of existing trees and woodland. B&NES producing Tree and Woodland Plan (2020).
- Landscape City – development and extension of Bathscape to reach wider audience and increased area.
- Bathampton Meadows – enhancement of green space for wildlife and people as part of Bath Riverline Project.

Appendix 2 continued



Recreational and Healthy Living Infrastructure

- There is a network of well used walking routes in this area and some cycle routes. Includes Cotswolds Way, Bath Skyline Walk (National Trust), Two Tunnels Greenway, K&A Canal towpath, River Avon Trail, Bristol and Bath Railway Path, Limestone Link long distance path.
- Recreational areas include publicly accessible woodland; open access land in the Weston Valley; National Trust open access land at Widcombe, Claverton Down and Little Solsbury Hill as well as Prior Park (paid entry); common land on Little Solsbury Hill and Bannerdown; and private recreational land including several golf courses and the Bath Racecourse.
- Parks and green spaces including Henrietta Park, Royal Victoria Park, Pultney Gardens, Sydney Gardens and Bathampton Meadows.

Ecological/Geological Infrastructure

The ecological and geological assets listed below are individual sites that form part of the West of England Nature Recovery Network (NRN). Understanding and recognising the importance of connectivity of habitats for species is key to delivery of the NRN.

The area includes Geological SSSIs at Newbridge and Bathampton, and a number of Regionally Important Geological (RIGs) sites including Swainswick Road cutting and Springfield Quarry. There are Local Nature Reserves: Carrs Wood near Twerton, at Odd Down, Bannerdown and at Kensington Meadows and Avon Wildlife Trust reserves including Brown's Folly and Bathampton Oxbow.

There are clusters of ponds within the city, and veteran trees across the north west of the area.

Key habitat and species

This area is particularly rich in wildlife assets and opportunities. The area provides a local stronghold of unimproved grasslands and ancient woodlands and so provides a hotspot of designated sites and both notable and protected species, including 12 of the UK's 18 bat species. The area includes key components Bathford and Bradford on Avon Bath SAC, including Brown's Folly SSSI, which provide internationally important hibernation sites for Greater and Lesser Horseshoe bats and Bechstein's bat. The area includes numerous SNCIs comprising of calcareous and neutral grassland, ancient semi-natural woodland especially on steep slopes in enclosed limestone valleys, river and stream habitats, mosaics of grassland, broadleaved, largely ancient woodland and some marsh grassland and stream-side habitat located predominantly on the steeper slopes. The river Avon provides a significant wildlife corridor through the area and providing key links to the east and west.

Hydrological Infrastructure

Sub-Catchments: Lower Bristol Avon, By Brook Key waterways and features include the Bristol Avon, Lam Brook, Newton Brook and St Catherines Brook.

Heritage/Cultural Infrastructure

City of Bath World Heritage Site. Great Spas of Europe designation (decision to be confirmed 2020). Scheduled Monuments. Conservation Areas. Registered historic parks and gardens at Kelston Park and Newton Park. Important historic buildings outside the city of Bath including Beckford's Tower landscape, Beckford's Tower, Prior Park mansion, Midford Caste, Sham Castle, Kelston Park mansion, Newton Park mansion, Claverton Manor, St. Catherine's Court. Industrial heritage including Somerset Coal Canal, Caisson and Locks at Combe Hay, rail viaduct at Midford, Dundas Aqueduct and Claverton Pumping Station.

The Landscape Infrastructure

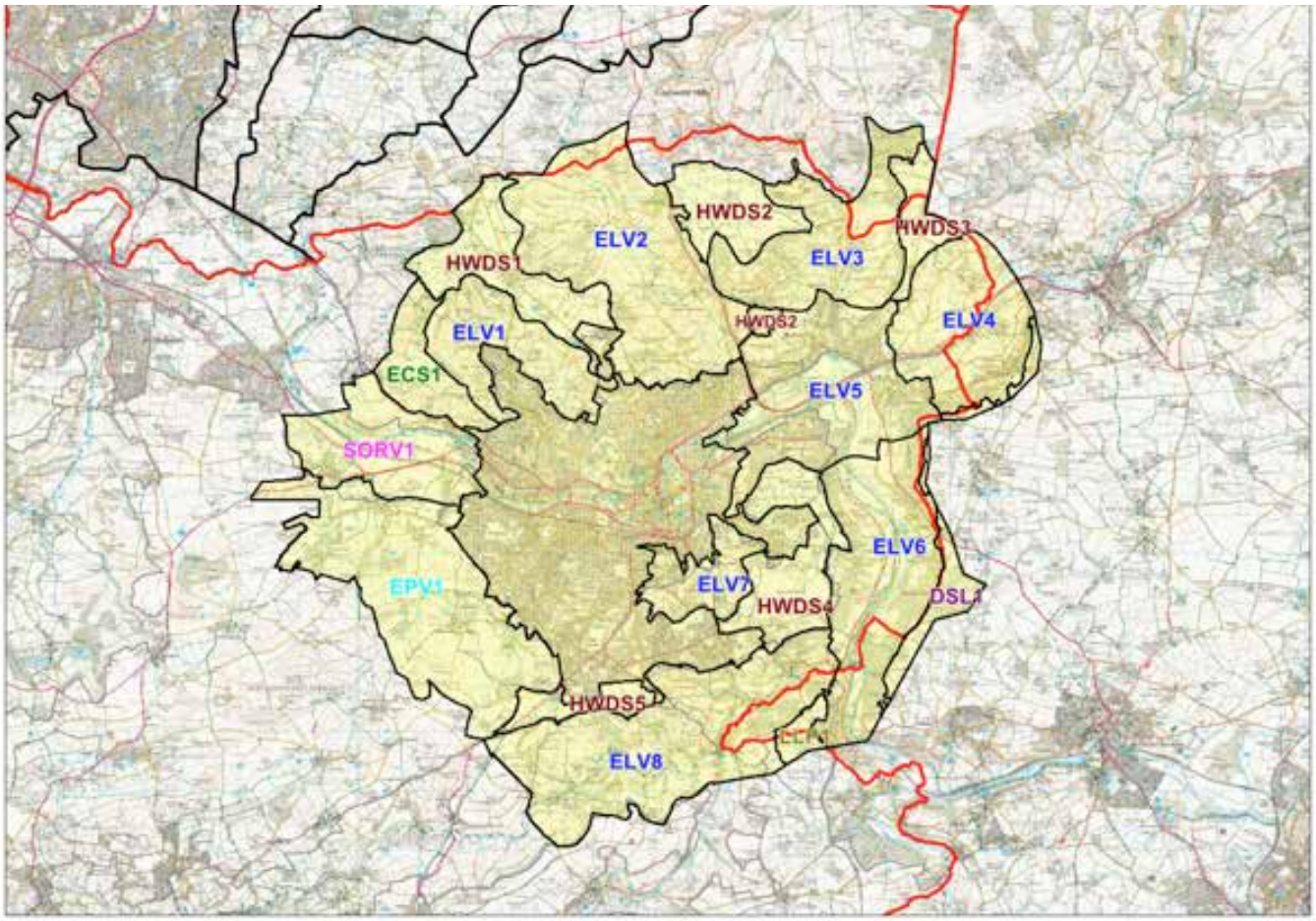
Ref: Bathscape Landscape Character Assessment 2018 (this is a detailed assessment specifically carried out for the Bathscape area). Other assessments which cover this area contributed to the Bathscape LCA. The Bathscape LCA did not cover the city of Bath itself for detailed information about the city character refer to Bath City-Wide Character Appraisal SPD 2005. The City of Bath World Heritage Site Setting SPD 2013 is also relevant. If the Great Spas of Europe application is successful the additional UNESCO designation may lead to review of WHS Setting SPD.

There are seven landscape types and 18 landscape character areas in the Bathscape area which reflects the complexity of the landscape. It is not practical to summarise each character area and so this summary is based on the landscape types with some reference to the character areas within them.

Note: Landscape Types are those used in the Cotswolds AONB LCA which covers most of the Bathscape area, apart from the Eroded Plateau and Valleys and the Settled Open River valley Landscape types which are located outside the Cotswolds AONB and has been derived based on the landscapes described in the Rural Landscapes of Bath and North East Somerset LCA.

Appendix 2 continued

Landscape Character Areas



Landscape Type	Character Summary
Escarpment Comprises 1LCA: ESC1: Dean Hill to Prospect Stile	• Steep, west and south-west facing scarp slope: ESC1 has complex highly indented slopes due to complex geology with fullers earth bands, and frequent past landslips. • Dramatic panoramic views: ESC1 views are over Bath, Keynsham, Bristol and countryside in-between and extending as far as Wales, the Mendips and Wiltshire Down. Notable views from Kelston Roundhill, and Prospect Stile were also important Georgian view points. • Primarily pasture with calcareous grassland on steeper slopes: ESC1 primarily pastoral with few areas of calcareous grassland but also includes some seeded wildflower meadows on upper shallower slope. • Woodlands, hedgerows, scrub and isolated tress give a well treed landscape: ESC1 has limited woodland, an open landscape towards the north and north-west and a well treed feel towards the south. • Small scale settlements on lower slopes, well treed, sunken roads and tracks. ESC1 has no settlements, isolated farms and houses, and limited tracks and one well treed, sunken lane. • ESC1 has tranquil landscape.

Landscape Type	Character Summary
Enclosed Limestone Valley Comprises eight LCAs: ELV1 Weston Valley ELV2 Swainswick & Charlcombe Valley ELV3 North End & St. Catherine's Valley ELV4 Lower By Brook Valley ELV5 Bathampton Meadows & River Avon Tributary Confluences ELV6 Bathampton and Limpley Stoke Valley ELV 7 Perrymead & Widcombe ELV 8 Cam & Midford Brook Valley	• Moderately broad but enclosed river valleys with steep sides separated by areas of Low Limestone Plateaux and High Wold Dip-Slope. Considerable variation in degree of openness within valleys themselves for example Northend and St. Catherines is very enclosed whilst much of Perrymead and Widcombe is very open and visually important for Bath, now and historically. These ELVs are also characteristically highly undulating and complex due to geology and tendency to landslip. • Strong physical enclosure of valleys creates a secluded character; true for all except Bathampton Meadows and river Avon confluences which is very open, overlooked by villages of Batheaston, Bathampton and Bathford as well as having A4, canal, railway. Overall high degree of tranquillity. • Rural character with local influences from large urban centres – only in Bathampton Meadows & River Avon Confluences area. • Significant areas of woodland, of which a number are ancient semi-natural woodlands particularly on upper and steeper slopes. True of most areas especially Northend and St Catherines and Cam & Midford Brook valleys. • Areas under both arable and pastoral use, together with areas of rough pasture and scrub. Most valleys are almost entirely pastoral except for By Brook and Cam and Midford valleys which are more mixed. • Fields of varying sizes, dependent on slope, mainly enclosed by hedgerows with frequent hedgerow trees forming a patchwork landscape. • Road networks following valley bottoms, connecting settlements and ascending valley sides to more isolated dwellings. • Industrial heritage of the valleys signified by the presence of railways, mills and canal network within Avon Valley. • Impressive features of Victorian engineering; and surviving vernacular structures such as terraces of weavers' cottages. Especially Cam & Midford Brook Valley and Bathampton & Limpley Stoke Valley associated with canal and railways. • Strong cultural influences especially related to Georgian period. Some important churches dating back to medieval period. • Local to Bathscape LCA ELVs are considerable areas of calcareous grassland on steep, upper valley slopes as well as significant habitat mosaics of grassland, scrub and woodland. • Local to Bathscape is the geological complexity and prevalence of landslip influencing landform of the valleys and the associated cultural importance of the influence of William Smith the geologist particularly in the Cam and Midford Valley.

Appendix 2 continued

Landscape Type	Character Summary
High Wold Dip Slope Comprises five LCAs: HWDS1 Lansdown Plateau HWDS2 Charmy Down & Little Solsbury Hill HWDS3 Bannerdown & The Rocks HWDS4 Claverton & Bathampton Down HWDS5 Sulis Plateau	• Soft, gently undulating rolling landscape dissected by a series of predominantly south-east flowing rivers. Bathscape areas are less typical being smaller, mostly flat and dissected by the west flowing river Avon and also its stream and small river tributaries. • Transitional landscape displaying many of the characteristics of the neighbouring High Wold and Dip-Slope Lowland landscape character types. • Large scale open arable fields with little tree cover, as well as a more complex mosaic of smaller scale arable and pasture contained within a strong framework of hedges and woodland. Very little woodland in the Bathscape areas. • Stone walls less prevalent than on the High Wold, but notable adjacent to roads and in vicinity of settlements. Stone walls relatively common in Bathscape areas. • Intermittent long distance views towards the High Wold and across neighbouring lowlands. No views to the High Wold but many from plateau edges to the river valleys, wider countryside, the city of Bath and across to other HWDS plateau areas. • Sparsely settled with intermittent isolated farmsteads and dispersed hamlets, many marking fording or bridging points. No fording or bridging points in Bathscape area but very sparse settlement is characteristic. Lansdown Plateau has significant recreational facilities incl. racecourse, flood lit playing fields and golf course. • Evidence of small scale quarrying in shallow delves, often overgrown by trees and scrub. Especially on Claverton and Bathampton Down associated with Georgian limestone quarrying. • Grain of landscape patterns often aligned along the course of Roman roads that cross the area. Fosse Way runs along spine of Bannerdown & the Rocks. • Intermittent occurrence of airfields on shallow sloping elevated landscapes. No active airfields but WW2 airfield on Charmy Down. • Significant archaeological interest with Scheduled Monuments on Lansdown Plateau, Little Solsbury Hill and Claverton and Bathampton Down.

Landscape Type	Character Summary
Dip Slope Lowlands DSL1 Plateau Edges around Monkton Farleigh	• Broad area of gently sloping, undulating lowland with a predominantly south-easterly fall, changing to a north-easterly fall in the southern perimeter of the area. DSL1 conforms to this. • Lowland landform gently dissected by infrequent small watercourses flowing into the main rivers that cross the area, reinforcing the general grain of the topography. DSL1 is a narrow area right at the top of the Dip-Slope. • Strong and structured farmland character, more intimate and smaller in scale than the High Wold and High Wold Dip-Slope. • Well managed, productive agricultural landscape of mixed arable and improved pasture, together with more limited areas of permanent pasture, mainly within the valley bottoms. HWDS1 is primarily pastoral. • Seasonal variations in colour and texture associated with mixed arable farming. N/A for DSL1. • Medium to large-scale, regular fields predominate mainly enclosed by hedgerows, with hedgerow trees, together with some stone walls or post and wire fencing. • Woodland cover limited to intermittent copses and shelterbelts within agricultural land, but balanced by extensive broadleaved, mixed and coniferous plantations within the large estates and associated farmland areas. • Limited areas of ancient woodland and species rich grassland. • Settlement pattern of intermittent small nucleated villages, hamlets, and isolated farmsteads, together with occasional larger settlements. No settlements in DSL1, isolated properties. • Distinctive pattern of large estates and associated planned parkland landscape and woodland occurring throughout the Dip-Slope Lowland. DSL1 at edge of large estate. • Evidence of long period of occupation of the area.

Appendix 2 continued

Landscape Type	Character Summary
Low Limestone Plateau LLP1 Limpley Stoke Water Tower & Hayes Wood Plateau	• Gently undulating open plateau – LLP1 is a very small area, slightly domed. • Expansive long distance views across the open plateau to distant hills and immediate surrounding valleys. • Generally equal distribution of arable and pastoral land of medium and occasionally large sized, geometric fields enclosed principally by hedgerows with mature hedgerow trees. Hedgerows in LLP1 are poor, clipped low but with some good trees. • Sparse woodland cover of small farm woodlands and shelterbelts limiting the sense of exposure. LLP1 has one medium sized ancient semi-natural woodland on top of plateau. • Limited areas of species-rich grassland on the fringes of the landscape type. None on LLP1. • Sparsely settled with little settlement beyond isolated farmsteads. • Communication routes principally limited to minor roads connecting small settlements and individual dwellings. • Limited number of archaeological remains, although their presence verifies the long history of settlement and use of the area.
Eroded Plateau & Valleys EPV1 Corston & Newton Brook Valleys	• Eroded plateau and valleys comprising gently rolling plateau area, hills and ridges divided by relatively narrow valleys. • Significant area of coal measures of Somersetshire Coalfield with mining into early 20th century concentrated around Clutton/High Littleton/Timsbury. None in EPV1. • Scattering of notable small and mostly conical hills stand out from the plateau as at Farmborough Common, Duncorn Hill and Winsbury Hill. None in EPV1 but are views to Winsbury and Duncorn Hill. • Overall a linear landscape with east-west running ridges and valleys. • Relatively open, mixed farming landscape with a predominance of arable in some areas. • Extensive views over the rolling landscape from the plateaus and ridges with valley bottoms often hidden from view. • Woodland limited overall but concentrated in two areas – to the north around Englishcombe and Newton St. Loe where there are numbers of small woods and copses; and through the coalfield where there is one large woodland (Greyfield), as well as smaller areas often associated with past mining activities. • Tree-lined, tightly meandering brooks set down into steep-sided valley bottoms. • Characteristically well-trimmed hedges. • Scattered villages and hamlets, with settlement concentrated in the coal field area. Most are located on valley sides and floors with notable exceptions being plateau villages of Timsbury and Marksbury.

Landscape Type	Character Summary
Settled Open River Valley SORV1 River Avon Valley West	• Open river valley with shallow to moderately sloping, low valley sides which run up to the Cotswolds escarpment in the north, giving an overall asymmetrical valley form throughout. • Settlements of Saltford, Corston, parts of Keynsham and Kelston on valley slopes. • Largely undeveloped flood plain with tree-lined freely meandering river. • Largely arable farming on flood plain and pastoral farming on valley slopes with clipped hedgerows predominant in arable areas and overgrown hedgerows predominant in pastoral areas. • Limited woodland with small copses on valley sides and wooded river cliff below Kelston. • Open views across and along valley limited by valley sides and Cotswolds hills. • Important transport corridor with A4 and GWR main line railway as well as Bristol and Bath Railway Path on disused railway line. • Historic parkland at Kelston Park. • Evidence of past industrial activity along river especially at Saltford and Keynsham.

Landscape Issues:

- Lack of management of woodland, trees and hedgerows, a particular problem where these are skyline features.
- Signs of deterioration in calcareous and neutral grassland SNCIs, scrub encroachment an issue. Also some agricultural management issues with neglect of pasture especially on steeper slopes, problems with viability and some visually detracting horticultural and horsiculture activities.
- Development encroaching on skylines and green hillsides including tall buildings in city blocking views to green hillsides. Cumulative effects.
- Transport pressures leading to search for new Park and Ride within Bathscape area as well as possible new roads.
- Some poor design, location and materials of new buildings on valley sides leading to poor integration in landscape and visually detracting.
- Loss and deterioration of trees along river Avon within Bath mainly due to development encroachment (against principles in WHS Setting SPD).
- Loss of orchards.
- Inappropriate woodland siting on upper steep slopes or lack of management leading to loss of historically important views e.g. below Prospect Stile.

Appendix 2 continued

Appendix 3
West of England Hydrological Network
produced for the West of England JGIS by BACP (Nov 2019)

About this document

This document describes the river and wetland network of the West of England, and the challenges and opportunities relating to the water environment as part of the West of England's Green Infrastructure (GI) Strategy. It is important to recognise that the river and wetland system is a continuous network of watercourses and wetlands that crosses the whole of the West of England and extends beyond it. The water network crosses political boundaries as well as the boundaries of the GI Areas described in the GI Strategy. The water flows according to the natural topography known as a Catchment – a natural basin-shaped area of land from which all the precipitation drains via a network of watercourses to a common outlet. Most of the West of England sub-region lies within the Bristol Avon Catchment. Water from the headlands in South Gloucestershire, Wiltshire and Somerset drains via a network of rivers and tributaries into the Bristol Avon which flows through Bath and Bristol, out into the Severn Estuary at Avonmouth.

The Catchment Based Approach (CaBA)

The natural topography and flow of the water system makes it essential that all stakeholders work together on a catchment basis, across political boundaries. The Catchment Based Approach was developed to enable us to do this. CaBA is an inclusive, civil society-led initiative that works in partnership with Government, local authorities, water companies, businesses and others, to maximise the natural value of our environment. It facilitates good planning and management of the water environment by taking account of the whole water network and land area that contribute to the water flow and quality. This approach supports achievement of the targets under the Government's 25 Year Environment Plan.

The Bristol Avon Catchment Partnership (BACP) was formed in 2012, bringing together a range of organisations and local communities who work together using the Catchment Based Approach to improve the water environment and provide wider benefits for people and nature at a catchment scale. BACP is one of over 100 catchment partnerships across England.

	GI Area →	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22
Hydrological Sub-Catchment ↓																							
Axe (Somerset Catchment)			X				X																
Bristol Avon-City		X			X					X	X									X			X
Boyd															X		X						
Bristol North Rhynes													X			X							
Bristol Frome															X	X	X	X	X	X			
By Brook															X								
Cam Midford												X											
Chew						X	X	X			X										X		
Congressbury Yeo & Banwell			X	X		X	X	X	X														
Kenn		X		X	X	X				X													
Little Avon															X				X				
Lower Bristol Avon														X	X					X	X	X	X
Portbury Ditch		X			X																		
Sherston Avon															X								
Siston																	X	X		X			
Somerset Frome												X											
Trym																				X			
Upper Bristol Avon																X							
Severn Estuary													X										

Fig 1. Key to intersection of West of England GI Areas and Bristol Avon sub-catchments

Appendix 3 continued

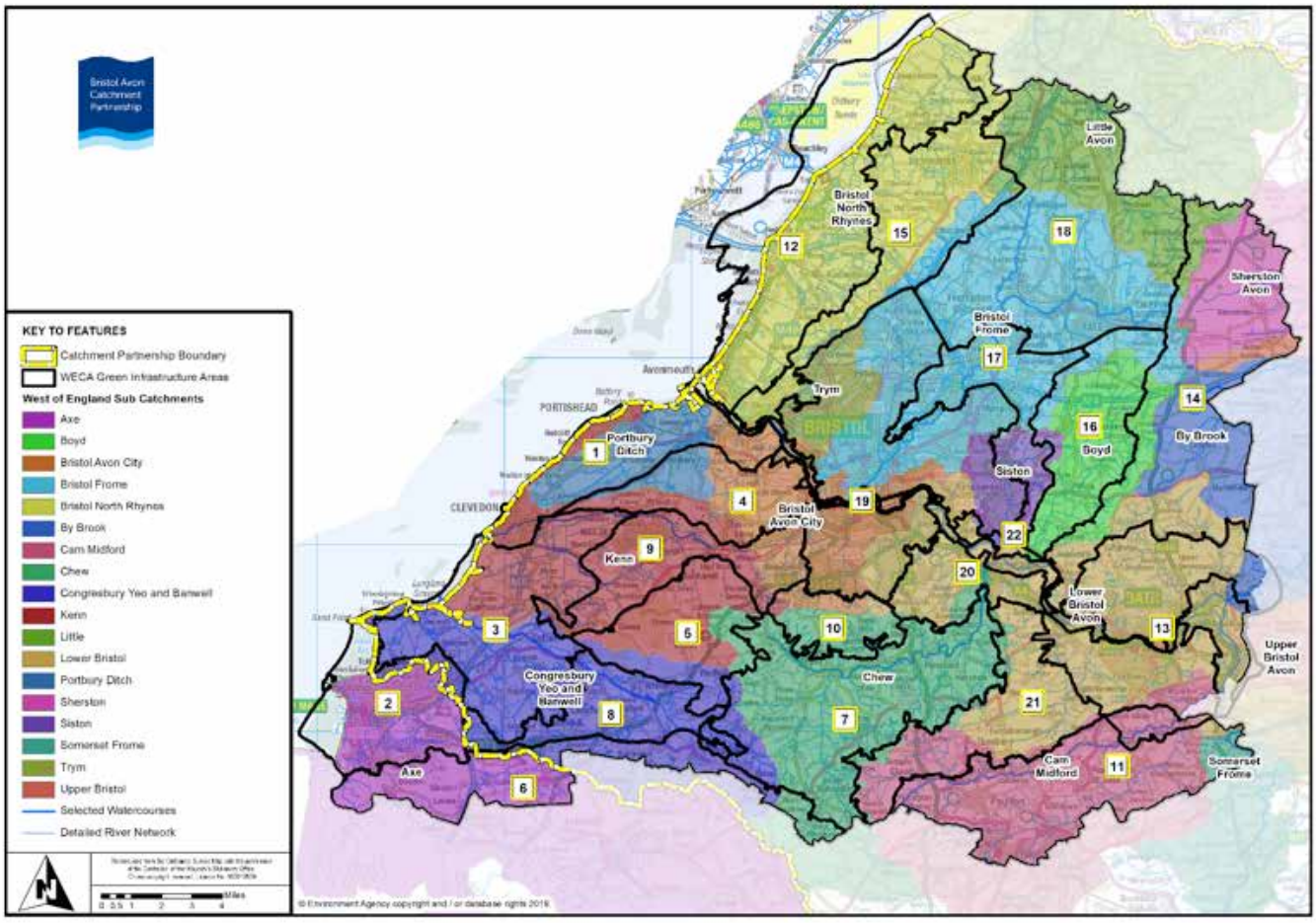


Fig 2: Bristol Avon hydrological Sub Catchments and West of England GI Areas (September 2019)

The geography of the West of England sub-region overlaps 17 of the 23 sub-catchments of the Bristol Avon Catchment (about 60%). The 22 West of England GI Areas overlay these hydrological sub-catchments but do not correspond to them. Hence to understand the water infrastructure within any given GI Area, users of this document will often need to refer to the descriptions of more than one hydrological sub-catchment. The key (Fig 1) and map (Fig 2) above show which sub-catchments intersect with which GI Areas.

This document describes the water environment of the 17 Bristol Avon sub-catchments which lie wholly or partly within the West of England sub region. It also includes the Severn Estuary which lies to the west and the Axe sub-catchment, part of which lies within the West of England, but is within the Somerset Catchment rather than the Bristol Avon Catchment.

Water quality classifications are taken from 2016 WFD Cycle 2 classifications[i].

i EA Catchment Data Explore https://environment.data.gov.uk/catchment-planning

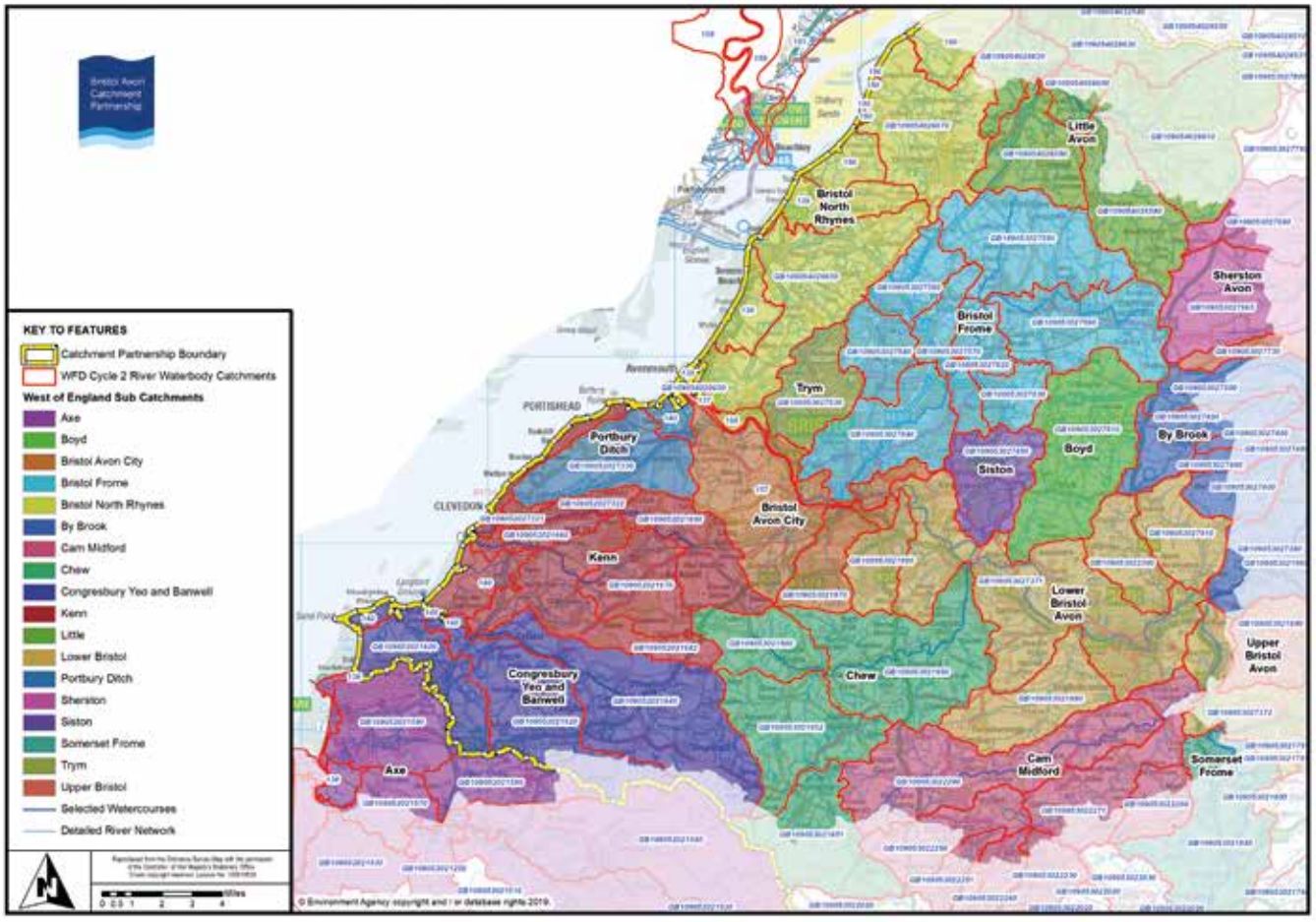


Fig 3: Bristol Avon hydrological Sub Catchments and waterbodies in the West of England (September 2019)

Hydrological sub-catchment descriptions

AXE (Somerset Catchment not Bristol Avon Catchment)

GI Area intersection: Areas 2, 6

Waterbodies and other water features:

River Axe (GB109052021570), Lox Yeo (GB 109052021570) and Uphill Great Rhyne (GB109052021590).

The Axe discharges to Bathing Waters. It is a heavily modified waterbody in the lower catchment, with potential opportunities to enhance. The upper catchment suffers from low flows and there are opportunities to review how water is used.

The Lox Yeo is a narrow flood plain and is distinguished by its twisty nature in comparison to the rhyne network. The Axe is a more intensively farmed area and water level management of the rhyne network reflects its use.

There are land management issues resulting in agricultural pollution. Opportunities for fish and eel passage improvements.

Water Quality

Overall the Water Framework Directive (WFD) classification is "Poor" due to high levels of phosphates, low dissolved oxygen, and poor Macrophyte and Phytobenthos due to sewage and agricultural diffuse pollution. There are also high levels of lead compounds in some water bodies due to abandoned mines and quarrying activity.

The River Axe discharges into the Severn Estuary via the Weston-super-Mare Uphill Slipway, this is designated via the European Bathing Water Directive and is currently classified as having Poor status and bathing is not advised due to water quality failures. There are other designated Bathing Waters within this stretch of the River Axe sub-catchment/Severn Estuary coastline, they range from sufficient through to excellent condition.

Appendix 3 continued

For the most up to information on Bathing Waters please go to the following resource: https://environment.data.gov.uk/bwq/profiles/

Flooding

Management of water levels via tidal structures and embankments.

The catchment is defended from flooding by significant banked infrastructure which will need updating. Brean Cross Sluice is coming to the end of its life and will need assessment as to any future flood intervention. The Bleadon Sluice (Bristol Water) structure is in need of refurbishment although in flood risk terms has limited value, and is more of water resource structure for the water company.

Water Resources

A heavily modified water course with significant abstraction by water companies and IDBs. There is an AMP 7 review of catchment issues downstream of the Cheddar reservoir including WFD aspects programmed to begin in April 2020. The failure of Bleadon Sluice has meant that Brean Cross Sluice has been needed to impound more water resulting in a longer length with higher water levels.

Ecology

Natural England have undertaken a survey along the coast regarding roosting birds. There is a Special Area of Conservation (SAC) in the catchment for protection of routes/corridors. Somerset Wildlife Trust have produced bat mitigation guidance for the SAC area.

Low invertebrate numbers due to water industry activity, agriculture and rural land management.

Water Vole habitat on the Bleadon levels.

Development Pressures/Climate Change

Development must respect the natural drainage ponds, springs and tributaries and not interrupt surface water flow routes with sustainable drainage which supports biodiversity, amenity and water quality.

The nature of the structures which are designed for agricultural use may need to change if there an increase in urbanisation.

What are the opportunities?

Opportunities to improve the river environment by addressing the highly modified status of the lower part of the catchment, addressing low flows in the upper catchment, addressing fish passage issues, diffuse pollution from agriculture and land management and point source pollution from sewerage.

Projects already being developed/delivered

Restoring the River Axe – Axe Catchment Strategy in development: Strategy for improvements to Fisheries, habitats, diffuse pollution, land management and run-off. Led by BART.

BRISTOL AVON CITY

GI Area intersection: Areas 1, 4, 9, 10, 19, 20

Waterbodies and other water features and issues

This heavily modified water body includes the Bristol Avon river (GB530905415405), Bristol's floating harbour and the Malago (GB109053021970).

Water Quality

Overall WFD Classification is Moderate, failing for phosphate due to urbanisation, transport drainage and sewage mis-connections.

Flooding

Tidal and fluvial flood risk especially to the city centre from the Avon and including residual flood risk to Ashton Vale. Complex flood structures associated with both the Avon and its tributaries (Ashton Vale catchment).

Water Resources

Prior to completion of new CAMS assessment little is known of this area.

Ecology

The sub-catchment is heavily modified due to flood protection and urbanisation. It is failing the WFD for invertebrates.

Issues include: Invasive species; barriers for fish passage; un-natural watercourse channels; chemical quality of the watercourse.

Development Pressures/Climate Change

City centre development/regeneration. Proposed development in Ashton Vale must be managed appropriately.

What are the opportunities?

Developer contributions towards upgrade of flood defence infrastructure e.g. Ashton Vale weedscreen.

River restoration – ecological enhancements to benefit fish and aquatic species, fish barrier improvements/removal.

Green corridor opportunities as part of flood risk works.

BACP projects already being developed/ delivered

Extended WaterSpace Study – Bristol: BACP (Proposed) Strategic Project led by B&NES and BACP. Collaborative work programme for delivering partnership improvements to the River Avon corridor and associated land – cross authority boundary approach to delivering improvement to various water based issues. Potential to extend WSS model both upstream into Wiltshire and downstream into Bristol.

Upper Avon Restoration Project: Potential multiple benefits project. Large scale river restoration opportunity, including: weir removal, river restoration, improved fish passage, reduced flood risk through increased floodplain connectivity.

BOYD

GI Area intersection: Areas 14, 16

Waterbodies and other water features

The Boyd (GB109053027510) flows from its source in the north to its confluence with the Bristol Avon near Bitton.

Water Quality

The overall WFD classification is Moderate. Failures are due to high phosphate levels and poor ecology for fish and invertebrates, due to sewage and agricultural land management, physical barriers to fish migration and Invasive Non-Native Species (North American Signal Crayfish).

Flooding

Flood risk to several properties in Bitton.

Water Resources

Prior to completion of new CAMS assessment little is known of this area. Probably little to be concerned about.

What are the key opportunities?

Removal of weirs upstream of Bitton.

BRISTOL NORTH RHYNES (Lower Severn Vale)

GI Area intersection: Areas 12, 15

Waterbodies and other water features

The sub-catchment includes the Oldbury Naite Rhynes (GB109054026670) and the Chestle Pill (GB109054026650).

Flat land with LSIDB (Lower Severn Internal Drainage Board) managed watercourses draining to the Severn Estuary through large tidal outfalls. Land-type is a mixture of agricultural and industrial within the Avonmouth/Severnside Enterprise Area.

Water Quality

Overall WFD Classification is Poor. Most of the catchment is failing the Water Framework Directive for phosphate, dissolved oxygen, fish and invertebrates. The reasons for phosphate failures can be attributed to water industry sewage inputs and diffuse inputs from agriculture and rural land management.

Flooding

Flooding in Oldbury-on-Severn associated with the Pickedmoor Rhyne, tide locking and surface water flooding. The South Gloucestershire Council Lead Local Flood Authority is undertaking a study with the Parish Council investigating this. Concerns over ongoing maintenance of rhynes by LSIDB and riparian landowners. Management of ongoing development in and around Thornbury contributing to additional flows into the rhyne system (Pickedmoor Brook/Oldbury Naite rhyne).

Water Resources

Prior to completion of new CAMS assessment little is known of this area. These level controlled environments are more about management rather than flow.

Ecology

Oldbury Naite and Chestle Pill rhynes are failing WFD due to pressures on morphology from physical modification due to flood protection measures causing barriers for fish passage and un-natural watercourse channels.

Additional issues: Invasive species; chemical quality of the watercourse.

Appendix 3 continued

Development Pressures/Climate Change

Ongoing development in and around Thornbury must be managed sustainably.

What are the key opportunities?

River restoration – ecological enhancements to benefit fish and aquatic species, fish barrier improvements/removal.

Provision of oversized flood attenuation to reduce the risk of flooding downstream. (SGC have produced new hydraulic modelling which could be developed and extended by developers or the council to inform the design).

BACP projects already being developed/ delivered

Oldbury Naite Rhynes Project (Proposed Project). FWAG South West. To build on AFL Project and work with farmers to deliver multiple benefits to tackle poor Fish and Phosphate status. Opportunity area for wetland creation, habitat and flood risk.

BRISTOL FROME

GI Area intersection: Areas 14, 15, 16, 17, 18, 19

Waterbodies and other water features

Bristol Frome (GB109053027840, GB109053027820 and GB109053027560, Bradley Brook (GB109053027570), Stoke Brook (GB109053027540), Folly Brook (GB109053027830), Hortham Brook (GB109053027580), and Laddon Brook (GB109053027590)

Heavily modified river with high flood risk and significant water quality failures. This is an area of high population growth with significant further planned development increasing the pressure on Natural Systems.

Water Quality

Overall WFD Classification is Moderate to Poor. Widespread failures of river and groundwater for ammonia, phosphate, sediment, dissolved oxygen. The reasons for phosphate failures can be attributed to agricultural and rural land management and urban development. There are also some issues with contaminants from urban run-off, e.g. hydrocarbons, metals and herbicides, as well as point source pollutions from industry, sewage, septic tanks on private properties.

Flooding (or Low Flows)

High risk areas for flooding: 130 properties at risk in Yate and Chipping Sodbury, 347 properties at risk within Flood Zone 3 and 1500 at risk within Flood Zone 2. Waste and debris in river channels (Riparian responsibility, but EA do large amount of work). Access to river channels increasingly difficult in part due to new development. Increased storminess and peak flows. Impact of sea levels on the outfall and climate change. Low flows around Frenchay.

Water Resources

Not a heavily abstracted catchment but does suffer from known low flow issues around Frenchay.

Ecology

Some areas of the Frome catchment are failing the Water Framework Directive for invertebrates, fish, Macrophytes and Phytobenthos. Some sections are heavily modified due to urbanisation and flood protection, including a significant wiers and other barriers to fish and eel migration. Other reasons for the fish classification include sedimentation from agricultural and rural land management. Additional issues include degraded habitat for aquatic plants and animals, poaching and erosion of riverbanks, poor channel morphology, invasive species.

Development Pressures/Climate Change

Significant planned development along Bristol Frome river corridor.

What are the key opportunities?

Natural Flood Management; land-based interventions: working with farmers and landowners to reduce diffuse pollution and flood risk and improve biodiversity; opportunities to work with business sector using the LENS approach to unlock funding for multiple benefits; ecological enhancements to benefit fish and aquatic species, fish barrier removal/improvements; fish strategies to reconnect migration routes and habitat; Sustainable Urban Drainage; opportunities to enhance the GI corridors; community engagement and educational interventions to improve environmental care, access and recreation, health and wellbeing; opportunities to unlock developer contributions at key development sites such as the Yate Western Gateway; planning to give space for water/buffer zones/enhancing the water environment – e.g. proposed FAS upstream of Chipping Sodbury;

improving Frome Valley walkway for health and wellbeing for people, habitats and wildlife; retrofitting of SuDS, green roofs etc for urban green spaces for wildlife; enhancing/better management of current GI/Council owned parks and improving links with the current green spaces; usage of the West of England Sustainable Drainage Developer guide.

BACP projects already being developed/ delivered

'River Frome Reconnected' – BACP Strategic Project. Key partners include Bristol City Council, South Gloucestershire Council, Environment Agency, Wessex Water. Multi-benefits project to address key issues including flood risk, development pressure, agricultural diffuse pollution, asset management, barriers to fish, poor river management, sedimentation, lack of access, poor provision of green space, public health and wellbeing and community engagement. Including opportunities to develop a LENS approach working with business sector; development of Heritage Walkway along the river corridor; fish passage improvements.

Bristol Frome Natural Capital Pilot Project – EA led project as part of the national programme to develop Natural Capital approaches and accounting methodology.

Chipping Sodbury Small Habitat Improvements Project – Led by Wild Trout Trust. Ongoing project to improve biodiversity and habitat for flow-loving, gravel spawning fish including wild brown trout.

BY BROOK

GI Area intersection: Area 14

Waterbodies and other water features

By Brook (GB109053027380, GB109053027480, GB109053027460), Broadmead Brook (GB109053027490), Doncombe Brook (GB109053027400). Most of catchment failing WFD and some areas at risk of flooding.

Water Quality

Overall WFD classification is Moderate, failing for phosphates and Macrophytes and Phytobenthos due to sewage and diffuse pollution from agriculture and rural land management.

Flooding

Slaughterford sluice is an uneconomic asset. There are opportunities to review options for intervention here.

Water Resources

This catchment is now closed to all consumptive abstraction of any kind. The level of abstraction around Malmesbury has been carefully modelled and can be delivered within the current licence volumes. There is some flexibility for future growth but if significant development were to occur this would have to be supplied from elsewhere. The closure of the Sherston Avon forms part of a wider closure of upstream catchment which will probably extend to Melksham or beyond.

Investigations are planned from 2020 to assess any hidden impacts of stream support abstraction to the Sherston Avon on neighbouring catchments to the north including the Ozleworth Brook.

Ecology: Failing WFD on fish and Macrophytes and Phytobenthos.

What are the key opportunities?

Opportunity for natural flood management interventions to slow the flow and upstream flood storage around Bridge Yate.

Other opportunities include improvements to fish passage (see BART/EA report into fish passage in the catchment).

BACP projects already being developed/ delivered

PEBBLE (Protecting and Enhancing the By Brook and its Local Environment): Wiltshire Wildlife Trust has carried out extensive stakeholder engagement during 2019/20 leading to the completion of an Action Plan for the By Brook sub-catchment and development of sub-projects for the next phase of PEBBLE. Various multiple-benefit projects/ actions have been identified to improve the water environment.

Appendix 3 continued

CAM MIDFORD

GI Area intersection: Area 11

Waterbodies and other water features

Kilmerston Stream (GB1090522230), Snails Brook (GB1090522240), Wellow Brook (GB10905322250 and GB1090522271), Somer (GB1090522251), Lyde Brook (GB1090522260), Cam Brook (GB1090522290).

Overall WFD classification is Poor, failing for fish and phosphates due to water industry activity, agriculture and rural land management.

Water Quality

The rivers in the catchment are failing the Water Framework Directive for phosphate due to sewage and agricultural diffuse pollution from agricultural and rural land management.

Flooding

Flood risk at Midsomer Norton and Radstock from the River Somer/Wellow Brook but flood risk reduced by a flood alleviation tunnel and flood defence scheme. Without these there would be extensive flooding on big events. There is also some flood risk on the Cam and Midford at Hallatrow, Radford, Camerton, Combe Hay and Midford.

Water Resources

Prior to completion of new CAMS assessment little is known of this area.

Ecology

Most of the rivers are failing the Water Framework Directive for fish. Reasons for this include a number of barriers/weirs to fish and eel migration, plus Hydrology (drought) in one of the catchments. Some areas also failing for Macrophytes and Phytobenthos.

Issues include: Invasive species; barriers for fish passage; un-natural watercourse channels; chemical quality of the watercourse.

What are the key opportunities?

River restoration – ecological enhancements to benefit fish and aquatic species, fish barrier improvements/removal.

Safeguarding and maintaining the flood risk management infrastructure.

BACP projects already being developed/ delivered

Wellow and Cam Inititiative: Ongoing project led by BART to improve river management, barriers to fish, sedimentation, diffuse pollution, recreation and access.

CHEW

GI Area intersection: Areas 5, 6, 7, 10, 20

Waterbodies and other water features and issues

River Chew (GB109053021851, GB109053021852, GB109053021950) Winford Brook (GB109053021900), Chew Valley Lake (GB30943096)

Water Quality

WFD Classification of Chew Valley lake is Poor, failing for phosphate, Macrophytes and Phytobenthos and Phytoplankton, due to water industry activity and diffuse pollution from agricultural and rural land management. The rest of the sub-catchment is classified as Moderate, failing due to phosphorus, Macrophytes and Phytobenthos .

Flooding

High risk of flooding being a rapid response catchment with very little lead time to flooding. Residential areas of Chew Stoke and Chew Magna have Property Level flood resilience e.g. flood barriers. Risk of flooding though remains. There is also risk of flooding at Pensford/Woollard and some risk at Keynsham although most of the town is above the flood level.

At the top of the catchment Winford experiences flooding on both High St and Church Rd with residential flooding in 2012.

Water Resources

Works have been ongoing in this catchment since 2015 with a couple of adaptive management schemes below Chew (in this catchment) and Blagdon reservoir (Congresbury Yeo). This work will continue into the next AMP cycle. Aim is to adjust compensation flows so that they are more natural. So far most significant benefit is re-establishment of section of water course down stream of Chew.

In CAMS terms this catchment is heavily abstracted and is practically closed to any additional consumptive abstraction.

Ecology

The Winford Brook is failing the Water Framework Directive for fish, the reasons for this include a number of barriers/weirs to fish migration and fish restocking.

Issues include: Barriers for fish passage; un-natural watercourse channels; chemical quality of the watercourse.

What are the Key opportunities?

River restoration – ecological enhancements to benefit fish and aquatic species, fish barrier improvements/removal.

Natural Flood Management focussing on land management to help reduce surface water flooding and reduce diffuse pollution along with creating opportunities for habitat enhancement and tree planting.

BACP projects already being developed/ delivered

River Chew Partnership Project. BACP Strategic Project: Led by BART. To identify key water-based issues and develop strategy including barrier removal, NFM and catchment management. Multiple benefits for Chew and downstream communities of Keynsham and Bristol

Bristol Water River Chew Project: Ongoing Project led by Bristol Water will assess WFD impacts of the reservoir on downstream rivers and trial mitigation options including altered compensation flows, flushing releases, river restoration, work with landowners to reduce silt ingress.

River Chew Fishery Improvement Project. Ongoing Project led by BART to scope fisheries improvements.

Mendip Lakes Partnership Project (extends into Congresbury Yeo and Banwell sub-catchment). BACP Strategic project led by Bristol Water. Working with farmers across the Blagdon and Chew Reservoir catchments to improve water quality and enhance habitats.

CONGRESBURY YEO AND BANWELL

GI Area intersection: Areas 2, 3, 5, 6, 7, 8

Waterbodies and other water features

River Banwell (GB109052021600), River Oldbridge (GB109052021620), River Yeo (GB109052021640)

The rhyne network SSSIs support a diversity of aquatic plants and invertebrates and are a rare example of where Natural England have designated the watercourses and not the fields between the rhynes. The majority of the catchment is within the IDB area.

Water Quality

Overall WFD Classification is Moderate. The Congresbury Yeo and Banwell are failing the Water Framework Directive for phosphates due to diffuse pollution from agricultural and rural land management, water industry and trade discharges and urban transport run-off. The River Oldbridge is also failing for dissolved Oxygen due to diffuse pollution from agriculture.

Flooding

Fluvial Flood risk at Congresbury – reliant on flood storage areas, and the embankments which extend beyond the village. At Wrington on the Rye Brook a new flood alleviation scheme to protect Wrington is due to be finished in 2019. A two-stage flood alleviation scheme on the right bank of the Banwell, within the catchment has been built to compensate for the development of Parklands. Low lying farms are at risk of flooding throughout the catchment, and in Banwell surface water run-off is a cause of property flooding.

Tidal flood risk – Huckers Bow sluice has recently been rebuilt and together with New Bow Sluice and Tutshill form part of the sea defences which are protecting villages. Climate change reducing the standard of protection.

Tide locking on the Banwell and the development of Parklands and Weston Villages with associated surface water drainage in the catchment, have required a strategic approach to flood risk and the development of the 2 stage Banwell scheme together with the Superpond (reservoir). Any further development needs to consider not only peak flows, and timings, but the volume of water and the long-term storage within the catchment.

Appendix 3 continued

The nature of the structures which are designed for agricultural use may need to change if there an increase in urbanisation.

Water Resources

Works have been ongoing in this catchment since 2015 with adaptive management schemes below Blagdon reservoir. This work will continue into the next AMP cycle. Aim is to adjust compensation flows so that they are more natural.

In CAMS terms this catchment is heavily abstracted and is practically closed to any additional consumptive abstraction.

New PWS investigations over abstraction impact planned from 2020.

Bristol Water use the springs at the source of the Banwell. The water balance between abstraction and low flows is controlled. The source of the Banwell is in the EA source protection zone 1 aquifer.

Ecology

The Congresbury Yeo is a heavily modified water body due to water industry infrastructure. The Banwell is an artificial waterbody for land drainage purposes. This water body is failing fish due to impacts on morphology from land drainage and water abstractions by water industry.

Issues include: Invasive species; un-natural watercourse channels; chemical quality of the watercourse.

Development Pressures/Climate Change

North Somerset Council's vision is for garden villages within these catchments with a wide range of GI, net gain for biodiversity and climate resilient builds.

What are the key opportunities?

River restoration – ecological enhancements to benefit fish and aquatic species, fish barrier improvements/removal, water vole habitat on the rhyne network, foraging for bats along the rhyne networks. Promotion of scrubbed-over ditches and ponds back to open water bodies and reduced diffuse pollution to encourage biodiversity in the rhynes, wet woodland may be appropriate.

BACP projects already being developed/ delivered

Bristol Water River Congresbury Yeo Project. Ongoing project led by Bristol Water will assess WFD impacts of the reservoir on the rivers downstream and trial mitigation options including altered compensation flows, flushing releases, river restoration, work with landowners to reduce silt ingress.

North Somerset Levels & Moors Partnership Project (BACP Strategic Project) – see Kenn sub-catchment.

Mendip Lakes Partnership Project (see Chew sub-catchment).

KENN

GI Area intersection: Areas 1, 3, 4, 5, 9

Waterbodies and other water features and issues

Kenn (GB109052021670) Kenn Moor SSSI (GB109052021682), Land Yeo river (GB109052027321, GB109052027322, GB109052021690), Blind Yeo (GB109052021660)

The sub-catchment has a network of ecologically important watercourses that have Site of Special Scientific Interest (SSSI) designation.

Water Quality

Overall WFD classification is Poor, failing for phosphate and dissolved oxygen, hydrological regime, Macrophytes and Phytobenthos, due to water industry activity, urbanisation and diffuse nutrients input from agricultural and rural land management.

Yearling Ditch was built during the development of the M5. It takes a proportion of highway drainage and new pollution control measures are needed here and where the M5 surface water comes into the rhyne network.

Flooding

Tidal Flood risk at Clevedon – maintain standard of protection with Sluices for the Blind Yeo and Land Yeo and embankments.

High water table and poor water conveyance are recognised issues affecting the area and may influence the location, scale and suitability of development and the need for measures to ensure there are no adverse impacts on or outside of the development area.

Issues: Maintenance of the 'viewed rhynes' by the IDB. Maintenance/longevity of control structures (Cooks Clyce, Blind Yeo Outfall, Land Yeo Outfall) these are used for the penning levels in the IDB area which support the agricultural nature of the area.

Water Resources

In CAMS terms this catchment is heavily abstracted and is practically closed to any additional consumptive abstraction. CAMS will show this catchment as mainly red or yellow across the flow range.

Numerous PWS investigations planned to commence in 2020 which may lead to significant change to abstraction. Specifically, Blind yeo, Lox Yeo, Land yeo, Chelvey and stream above Barrow tanks.

Ecology

The water bodies are failing the Water Framework Directive for fish. The waterbodies in this catchment are heavily modified or artificial for flood protection, land drainage and urbanisation, all this has an impact on the morphology with un-natural channels and barriers/weirs to fish and eel migration.

Issues include: Invasive species; un-natural watercourse channels; chemical quality of the watercourse.

The area is known to be used by Horseshoe bats for foraging and commuting. There is evidence of significant activity at the West End area and flight corridors are expected around the south western edge of Nailsea linking south to key habitats around Backwell via the rhyne network.

Development Pressures/Climate Change

Polluting discharges to the SSSI's in the area are already causing detrimental impacts and these risks will increase with development around Nailsea.

The Parish Brook is a contour drain and in the summer the penning levels are high that any further discharges to the brook could cause flooding.

New developments will require long term storage as part of the solution to their drainage around Nailsea. As the lack of conveyance within the Kenn catchment due to the flat nature of the watercourse combined with high tides means the ability of the watercourse to take increased volumes can be limited. The nature of the structures which are designed for agricultural use may need to change if there an increase in urbanisation.

What are the key opportunities? (high level)

River restoration – ecological enhancements to benefit fish and aquatic species, fish barrier improvements/removal.

Proposal for a constructed wetland for existing development to contain and filter pollution before discharging to the SSSI, this is also an opportunity to provide GI with habitat creation and recreation opportunities. This needs to be extended so all new developments use the same approach.

BACP projects already being developed/ delivered

North Somerset Levels & Moors Partnership Project. BACP Strategic Project (also covering Portbury Ditch, Congressbury Yea & Banwell sub-catchments). Key partners include, Avon Wildlife Trust, North Somerset Council, Natural England, Wessex Water. Work with landowners to improve habitat management for wildlife and to promote soil management to help mitigate flooding, improve water quality and increase habitat for wetland birds.

Nailsea Multi-Functional Constructed Wetland. Led by North Somerset Council to identify how a multifunctional wetland can be implemented.

LITTLE AVON

GI Area intersection: Areas 14, 18

Waterbodies and other water features: Little Avon (GB109054026580, GB109054026600, GB109054026610, GB109054026620) and Tortworth Brook (GB109054026590)

Water Quality

Overall WFD Classification is Moderate, failing for phosphate and fish. Some areas also failing on Macrophytes & Phytobenthos. The reasons for phosphate failures can be attributed to water industry sewage inputs and diffuse inputs from agriculture and rural land management.

Flooding

146 properties at risk of flooding in the 1% AEP flood event within the catchment. Tide locking of Little Avon trying to discharge at Berkeley. Increased flood risk due to climate change.

Appendix 3 continued

The Environment Agency need to improve the Flood Warning Service in this area by installing a new gauge towards the upstream end of the catchment.

Water Resources

Considerable pressure on the catchment at normal and low flows as seen through CAMS (Catchment Abstraction Management Strategies) assessment (Note: new CAMS abstraction licensing strategies to be formalised and published in the next six months – this applies to all sites in this list). Likely to be no water available for consumptive abstraction at these flows.

Due to concerns over abstraction, there are a couple of WINEP PWS (Water Industry Natural Environment Programme Public Water Supply) investigations going forward from 2020 on the Little Avon and Ozleworth Brook.

There are a number of sites where natural low flows occur or are exacerbated by abstraction.

Ecology

Issues include: Invasive species, habitat and in-channel morphology could be improved; barriers for fish passage; un-natural watercourse channels; chemical quality of the watercourse.

What are the key opportunities? (high level)

Potential to develop a River Restoration partnership project to address diffuse pollution issues and provide ecological enhancements to benefit fish and aquatic species, fish barrier improvements/removal.

Emerging Tidal Strategy for Bristol – links/ties in to this.

MetroWest Project to reconnect trainline – Portishead to Bristol.

BACP projects already being developed/ delivered

Little Avon Restoration Project: BACP Strategic Project. Led by BART to address diffuse pollution issues, improve river habitat and fish passage.

LOWER BRISTOL AVON

GI Area intersection: Areas 13, 14, 19, 20, 21, 22

Waterbodies and other water features

Bristol Avon (GB109053027371), Brislington Brook (GB109053021980), Newton Brook (GB109053021880), Lam Brook (GB109053022300), St Catherine's Brook (GB109053027810).

Water Quality

Overall WFD is Moderate. WFD failures are due to high phosphate levels due to water industry activity and agriculture and rural land management. Urbanisation and transport are also contributing to high phosphates in Brislington Brook, as well as poor numbers of invertebrate and Macrophyte and Phytobenthos. The Lower Bristol Avon is failing the Water Framework Directive for phosphate, this can be attributed to water industry discharges.

Flooding

Flood risk at Bath particularly around Pultney weir area, elsewhere through the city a conveyance scheme reduces flood risk, needs to be safeguarded.

Flood risk at Saltford and Keynsham from the River Avon.

Flood risk to Broadmead Industrial Estate including boat dwellers.

Increasing climate change.

Water Resources

This is a heavily impacted watercourse upstream of the West of England. CAMS is under development but it will show a completely closed catchment (i.e. no further abstraction for consumptive use) around Malmesbury and this may possibly extend down to Melksham.

Major new PWS (Public Water Supply) investigations into a group of abstractions from Chippenham to Melksham from 2020. Additional growth would put pressure on these resources. Water usage will have to consider Impacts across boundaries.

Ecology

Issues include: Invasive species, barriers for fish passage, low invertebrate levels and Macrophyte and Phytobenthos levels in some waterbodies. Sections of the Lower Avon through the city of Bath are heavily modified due to flood protection and

urbanisation. This is likely to have an impact on fish. Un-natural watercourse channels which will impact the morphology with a number of barriers/weirs to fish and eel migration. Chemical quality of the watercourse.

Development Pressures/Climate Change

Much of the sub-catchment is highly urbanised

What are the Key opportunities? (high level)

River restoration – ecological enhancements to benefit fish and aquatic species, fish barrier improvements/removal

Enhancement of GI with a parkland network along the River Avon (Water Space Study)

BACP projects already being developed/ delivered

Water Space Bath Project BACP Strategic Project: Led by B&NES. To provide an evidence-based, collaborative, strategic action plan to enable sustainable growth and regeneration of the river and canal corridor in Bath and North East Somerset.

Bath and North East Somerset (B&NES) Natural Flood Management Trial. Ongoing Project. Led by B&NES with FWAG-SW. Working with local landowners to implement natural flood management solutions to help reduce flood risk.

PORTBURY DITCH

GI Area intersection: Areas 1, 4

Key Waterbodies and other water features

Portbury Ditch (GB109052027330)

The Clapton Moor character area has linear valley with a flat and gently undulating valley base the area forms part of the WLMP area (managed by the IDB) and the Gordano Valley Nature Reserve. The Portbury Docks and industrial area is an important employment area and has a network of rhynes.

Water Quality

Overall WFD classificiation is Moderate, failing the Water Framework Directive for dissolved oxygen, the reason for this is due to physical modification for land drainage and historic landfill leaching.

Flooding

Defended tidal flood risk.

Maintenance and operation of flood risk infrastructure.

Impacts of Climate Change.

Water Resources

Prior to completion of new CAMS assessment little is known of this area. These level controlled environment are more about management rather than flow.

Ecology

Portbury Ditch is a heavily modified water body due to land drainage which impacts on morphology with un-natural channels.

The Portbury Wharf Nature Reserve is a known location for water voles and is a managed nature reserve.

Issues include: Invasive species; un-natural watercourse channels; chemical quality of the watercourse.

Development Pressures/Climate Change

Development must respect the natural drainage ponds, springs and tributaries and not interrupt surface water flow routes with sustainable drainage which supports biodiversity, amenity and water quality.

What are the key opportunities?

River restoration – ecological enhancements to benefit fish and aquatic species, fish barrier improvements/removal.

Wet woodland planting to provide a boundary feature and visual separation from the expanding urban areas

The WLMP is required for the maintenance of high water tables to preserve organic cultural and palaeoenvironmental evidence.

BACP projects already being developed/ delivered

North Somerset Levels & Moors Partnership Project. BACP Strategic Project – see Kenn sub-catchment.

Appendix 3 continued

SHERSTON AVON

GI Area intersection: Area 14

Waterbodies and other water features

Sherston Avon (GB109053027690) and Luckington Brook (GB109053027665)

Water Quality

Overall WFD classification is Moderate, with failure due to high phosphates from the water industry, agriculture and rural land management.

Flooding

Malmsbury is sensitive to flood risk. There are opportunities for slowing the flow/Natural Flood Management techniques.

Water Resources

This is a natural catchment and suffers seasonal low flows during periods of dry weather. It is a sensitive catchment but does not see much extraction. Water company reviews have recognised this and so there are no additional pressures from a water resources requirement currently.

What are the key opportunities?

Introduction of NFM; improvements to fish passage; possible water quality improvements through improved agricultural practices, habitat improvements.

BACP projects already being developed/ delivered

SHRIMP 2: Potential project led by BART. To deliver improvements identified during SHRIMP 1 pilot project and the Upper Avon Sediment Pathways Project for more extensive river restoration works in the Upper Avon from the source to Easton Grey.

SISTON

GI Area intersection: Areas 16, 17, 19

Waterbodies and other water features

Siston Brook (GB109053027450)

Water Quality

Overall WFD classification is Moderate, failing for phosphate due to urban development and transport, industry and agriculture.

Flooding

Localised flood risk around Bridgeyate. There is a need for more accurate hydraulic modelling to understand flood risks in the sub-catchment.

Water Resources

Prior to completion of new CAMS assessment little is known of this area. Probably little to be concerned about.

Ecology

Issues include: Failing WFD standards for fish; many and significant barriers for fish and eel migration (weirs); invasive species.

What are the key opportunities? (high level)

River restoration – ecological enhancements to benefit fish and aquatic species, fish barrier improvements/removal

SOMERSET FROME

GI Area intersection: Area 11

No description included as a very small part of this sub-catchment lies within the West of England area.

TRYM/HAZEL BROOK

GI Area intersection: Area 19

Waterbodies and other water features

River Trym (GB109053027530)

Water Quality

Overall WFD classification is Moderate, failing on phosphates due to urban development and diffuse sources from agricultural and land management.

Flooding

Highway flooding at Henbury Road/Crow Lane ford.

Water Resources

Prior to completion of new CAMS assessment little is known of this area. There is unlikely to be any major issues in this catchment.

Ecology

The Trym is failing the Water Framework Directive for fish and invertebrates. It is a heavily modified waterbody due to urbanisation and flood protection, which will impact the morphology and can be attributed to fish failures. Other reasons for the fish classification include sewage inputs, misconnections and water pollution incidents.

Additional issues include: Invasive species; barriers for fish passage; un-natural watercourse channels; chemical quality of the watercourse.

Development Pressures/Climate Change

Station Road/Wyck Beck Road (A4018) development has planning permission but not built yet.

What are the key opportunities?

River restoration – ecological enhancements to benefit fish and aquatic species, fish barrier improvements/removal.

UPPER BRISTOL AVON

GI Area intersection: Area 14

Description not included as a very small part of this sub-catchment lies in the West of England area.

SEVERN ESTUARY

GI Area intersection: Area 12

Waterbodies and other water features

The Severn Estuary has numerous nature conservation designations to reflect its important habitats, species and geology. The Estuary is designated as an International Ramsar site, Ramsar sites are designated to stem the loss of wetlands now and in the future. The qualifying interest features of the Severn Estuary Ramsar overlap with those of the other Severn Estuary designations, including the Special Protection Area (SPA) and Special Area of Conservation (SAC). The Severn Estuary is also classified as a Marine Conservation Zone (MCZ) and has various Special Sites of Scientific Interest (SSSIs).

The water quality of the Severn Estuary is an important indicator of the overall health of the Estuary's ecosystem and also an important factor in influencing tourism, recreational activities and the commercial/industrial sectors. Water quality in the Estuary, is complex; with a large variety of inputs from numerous different sources and complex interactions between contaminants and 'master variables' such as salinity and dissolved oxygen. Due to the high levels of suspended sediment and the tendency of many contaminants to associate with particulate matter due to their low solubility, sediment quality is also an important issue in the Estuary.

Water Quality

The water quality in the Severn Estuary is monitored and reported in line with the following designations:

The transitional water from the mouth of the Bristol Avon (i.e. Avonmouth) to the tidal limit (the weir at Hanham, River Avon) is classified as Heavily Modified with an overall WFD Moderate status.

The transitional water (i.e. the Severn Estuary) is managed through Natural Resources Wales (NRW). The Lower Severn transitional waterbody has an overall Moderate status with Moderate ecological status and Failing chemical status, it has a Good status for fish and invertebrates.

There are currently two designated coastal Bathing Waters within the Bristol Avon Catchment boundary, Clevedon is currently designated as having Good status, whilst Sand Bay (northern side of Weston-Super-Mare) is currently designated as Sufficient. See the River Axe section for further information on the other relevant Bathing Waters along the Severn coastline.

Flooding

High flood risk from tidal flooding. Whilst this is partly being managed by the Avonmouth/Severnside Enterprise Area Ecology Mitigation and Flood Defence Project (£80 million project to improve flood defences along a 17km stretch of coastline between the River Avon and Aust to address the inconsistent standard of protection at present and some defacto/informal defences in places) other sections further north (around Oldbury-on-Severn) will need to be addressed at some point to keep pace with sea level rise. Impacts of constructing flood defences need to be considered. The risks of flooding will increase due to climate change and sea level rise – need to review UKCP18 projections.

North Somerset Section – Defences at Weston, Clevedon and Portishead and on the lower Avon at Pill.

Appendix 3 continued

Defended tidal flood risk is a mixture of Control Sluices and Tidal Flaps with embankments and sand dunes along the coast line.

Maintenance and operation of flood risk infrastructure is mainly managed by the EA.

Impacts of Climate Change Weston has been built to a 200yr standard with a climate change allowance. Clevedon, Portishead and Pill will require monitoring.

Weston Beach recycling annual movement of sand to protect the toe of the sea defences .

Sand Bay dunes – Environment Agency are monitoring the changes within the dunes.

Water Resources

Generally the Severn Estuary is outside of the scope of the CAMS or indeed WR in Wessex area, there are though links to Bristol Water as their largest abstraction is from the Sharpness canal which takes its water from the Severn. This site can be affected if a Severn drought order is enacted, restricting abstraction.

Ecology

This is a WFD waterbody. Issue to consider are: Salt marsh loss; public access.

North Somerset coastal squeeze has been identified in front of the Severn defences.

Development Pressures/Climate Change

It is proposed that if significant long-term erosion occurs on the Uphill dune system at Weston, designating the area as a CCMA should be considered.

What are the key opportunities?

Linkages to other plans and documents including the Shoreline Management Plan 2, the Severn Estuary Strategy and the ASEA project.

NSC Coastal Path being developed as part of the national strategy.

BACP Catchment-wide Projects being developed/delivered

Catchment Fisheries Strategy: BACP Strategic Project led by BART. A Catchment Fisheries Strategy is required to: comprehensively identify the fish barriers/opportunities across the catchment; provide information to help address and improve fish habitat; identify areas for river restoration and WFD failures. It will inform all partnership projects on how fisheries improvements can be built in to existing and developing projects to deliver multiple benefits.

Bristol Avon Citizen Science: Ongoing education/ engagement project led by BART. Working with community groups, individuals and landowners to develop understanding of water issues in the catchment and increase citizen science monitoring.

Your Fisheries: Ongoing strategic project led by BART. Working with Angling Clubs and the Environment Agency to trial the 'Your Fisheries' System – innovative new fisheries data system aimed to improve assessments of fish stocks.

Wessex Diffuse Pollution Reduction Plan: Ongoing educational project led by the Environment Agency. To identify sources of water pollution across Wessex and measures for farmers to improve farm nutrient and soil management efficiencies, reduce diffuse pollution and farm profitability, without compromising food production.

Source to Sea: Potential multiple benefit landscape scheme to improve ecosystem management for the River Avon. Potential public and community engagement project to increase use of River Avon as green/blue corridor for recreation and tourism.

Glossary

AFL – 'A Forgotten Landscape' project www.aforgottenlandscape.org.uk/useful-information/

AMP – (water company) Asset Management Programme

BACP – The Bristol Avon Catchment Partnership (BACP) www.wessexwater.co.uk/environment/catchment-partnerships/bristol-avon-catchment-partnership

B&NES – Bath & North East Somerset Council

BART – Bristol Avon Rivers Trust www.bristolavonriverstrust.org/

CAMS – Catchment Abstraction Management Strategy

EA – Environment Agency www.gov.uk/government/organisations/environment-agency/about

IDB – Internal Drainage Board

LSIDB – Lower Severn Internal Drainage Board https://lowersevernidb.org.uk/

Macrophytes and Phytobenthos: Aquatic and marginal plants that provide habitat, food and oxygen that supports other equatic/marginal life such as fish and invertebrates.

NFM – Natural Flood Management

PWS – Public Water Supply

SAC – Special Area of Conservation

SUDS – Sustainable Urban Drainage Systems

WFD – EU Water Framework Directive

WLMP – Water Level Management Plan

Contributors

The BACP would like to thank all partners who contributed towards the development of this document.

Appendix 3 continued

Appendix 4
West of England Green Infrastructure Project Assessment Form

1. Project/programme name:	
2. GI Area(s):	
3. Lead organisation:	
4. Delivery partners:	

5. Assessment criteria		
5.1 Supporting delivery of West of England GI Outcomes:		
West of England GI Outcomes (National Framework of GI Standards outcomes)	**Tick**	**What will the project deliver?**
Ecological connectivity (Nature connected places)		
Resilience to climate change (Resilient places)		
Sustainable water management		
Health and wellbeing (Active healthy places)		
Sustainable places (Inclusive equitable places) (Beautiful safe and well designed places)		
Valued healthy landscape		
Sustainable food production		
Resilient economy (Prosperous, investible valued and Smart places)		

Appendix 4 continued

5.2. Describe the way in which the project aligns with regional policy and strategy e.g. West of England Joint GI Strategy, West of England Nature Recovery Network, West of England Biodiversity Net Gain, climate and ecological emergency action plans, Joint Local Transport Plan, Local Industrial Strategy, corporate strategies

5.3 Describe how stakeholders including community have been involved in developing this project. What engagement has taken place to date and what level of financial/other support has been secured?

5.4 Describe project timescale and phasing

5.5 Funding
i) Dependency: Is the project dependent on other work/funding? If yes, explain and give details.

ii) Deliverability: What other funding has been secured and how can you demonstrate partner commitment?			
	Provider	Value	Financial year to be spent
Funding secured			
iii) Describe how this project could be scaled up further, if further funding secured?			

6. Project spend

	2020-21	2021-22	2022-23	Total
Development costs				
Implementation costs				
Total				

7. Describe how this project would be monitored and managed on completion

Appendix 4 continued

Assessment Form Guidance notes

The Project Assessment Form is to capture GI projects that are in development and or developed but not yet implemented.

It is intended to assist prioritisation of projects and to set out projects that might be integrated with other schemes that may not have identified GI opportunities at the outset or been aware of existing GI initiatives in the relevant area.

Part of prioritising will relate to appropriateness to particular funding opportunities and being able to demonstrate projects relevance to national context e.g. delivering 25 Year Plan, Environment Bill and or regionally addressing the climate and ecological emergency and in combination, facilitating/enabling growth.

Whilst this is not an application for a specific fund or grant scheme, the information provided on this form is likely to be similar to many grant schemes and therefore information provided can be cut and paste into actual applications.

Notes for completing form:

1. Project/programme title: May be programme that includes projects or project that is part of a programme.
2. GI Area(s) Name the relevant West of England GI Area(s)
3. Lead organisation: name of organisation/ body submitting the form.
4. Delivery partners: name those currently engaged.
5. Assessment criteria:

5.1 West of England GI outcomes. Tick all those that apply and indicate how: e.g. Ecological connectivity – what it is connecting and area of habitat (Ha). West of England GI Joint Strategy Outcomes are shown opposite.

5.2 Reference strategies and relevant policies, targets, ambitions.

5.3 Reference consultation, community support and need for this project.

5.4 Timescale – describe project phases, and state if part of longer term project e.g. being phased to fit with funding/partner timescales, or part of a wider programme.

5.5 Funding – this section is to give an overview of factors that influence prioritising.

6. Project cost: summary only. This is not an application form for funding so detail not required.
7. Monitoring and management – describe who would be the responsible body(s) on completion. Describe any key milestones/ targets that would be monitored and reported and to whom.

West of England Joint GI Strategy Outcomes

1. **Improved and better-connected ecological networks:**
   Protect, enhance and expand coherent, thriving and resilient ecological networks that deliver net gains in biodiversity and ecosystem services, including the creation of bigger, better, more and joined-up woodland, grassland and wetland habitats.
2. **Greater resilience to climate change:**
   Provide natural solutions to build resilience against the impacts of climate change including use of well-designed GI to stabilise slopes and attenuate flood water, absorb carbon, and increased use of trees to reduce urban heating.
3. **Sustainable water management:**
   Optimise and improve the use of GI to deliver an improved water environment by working with natural processes including Sustainable Urban Drainage schemes (SUDs) to help reduce flood risk, manage drought, improve water quality and improving connectivity to reduce the loss and quality of aquatic habitats and wildlife.

4. **Health and wellbeing for all:** Improve the network of active travel routes and accessibility to green spaces to support healthy lifestyles and mental wellbeing and provide more opportunities for people to connect with nature, and address inequalities in provision.
5. **Create and maintain sustainable places:** Development maximises the multiple benefits of GI in delivering resilient, healthy and environmentally friendly places and a net gain in natural capital by investing in GI for the long term.
6. **Create and maintain valued healthy landscapes:** Design and deliver high quality GI that improves local sense of place and protects and enhances landscape character and the natural, cultural and heritage services that they provide.
7. **Support sustainable and local food production:** Increase opportunities for local food production in urban and rural areas and increase food sovereignty by for example, protecting the best and most versatile agricultural land and enhancing our pollinator network.
8. **Build a resilient economy:** Create attractive areas for inward investment and job creation, and support the environmental resilience of economic sites by enhancing GI relating to housing, businesses and other associated infrastructure.

WEST OF ENGLAND Combined Authority

Bath & North East Somerset Council

Bristol City Council

North Somerset Council

South Gloucestershire Council