Framework for the South East Wales Networked Environmental Region

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March 2009
Executive Summary

This report has been developed for the Welsh Assembly Government in partnership with the Countryside Council for Wales, the Environment Agency Wales and Wales Environment Link. It is the first stage in a collaborative project to take the concept of a Networked Environment Region and turn it into reality. Phase 2 will address in more detail the implementation issues, and how best to integrate the ‘ecosystem services’ approach into policy.

The concept of a ‘Networked Environment Region’ in South East Wales is designed to complement the vision for South East Wales as a ‘Networked City Region’. The vision sees a network of distinct but connected cities and towns supported by interconnected environmental infrastructure – such as river valleys, coastal wetlands, protected habitats, ancient woodlands, upland heaths, peat bogs and urban green space. Importantly, environmental infrastructure provides ‘ecosystem services’, which have a key role to play in underpinning social and economic development, enhancing quality of life and mitigating the effect of climate change.

Improving the environmental infrastructure can make the landscape more accessible to people, promote healthier lifestyles, increase tourism and improve the image of the region as an attractive place to live and work. Alongside the physical infrastructure of energy or transport, environmental or green infrastructure provides the life-support system essential to the success of the networked city region.

The report begins by identifying the many benefits of environmental networks. In South East Wales, the policy framework of the networked environment region will offer clear direction and focus towards improving the quality of the environment, but more specifically it illustrates how environmental networks can create sustainable jobs, increase land values, attract tourists, provide educational opportunities, promote a healthy lifestyle, and store carbon in plants and soil. Environmental networks also act as ecological networks, providing valuable habitat for flora and fauna. Creating new habitats will help to protect existing biodiversity, linking sites of high nature conservation value into an expanded network. Essential ecosystem services provided by the environment include clean air and water, soil, food, local climate regulation, flood protection and restored landscapes acting as carbon sinks.

The report reviews the policy context – international, national and local – which frames the conceptual networked environment region and then briefly describes the unique characteristics of the South East Wales landscape; which ranges from the uplands of the Brecon Beacons National Park and the rolling farmlands of Monmouthshire and the Vale of Glamorgan, down through the former coalfields and industrial Valleys to the city-coast region of Cardiff and Newport, adjacent to the coastal wetlands of the Gwent Levels and the Severn Estuary.

Opportunities and challenges across the city region are considered. For example, there are clear opportunities to link with the Valleys Regional Park which extends across the South Wales valleys. A proposed framework for the networked environment region is presented, identifying a potential Blue Network and a Natural Network. The Blue Network centres on the principal river systems running North-South through the whole city region – these waterways and their associated floodplains already have a high ecological value and good water quality supporting many wildlife species. The Natural Network would link existing dispersed habitats such as grasslands, heathlands, bogs, woodlands and plantations. Improved links between the Brecon Beacons National Park, the Wye Valley and the Gwent Levels, among others, are the proposed building blocks of this network. To create each network, GIS mapping is used to map existing ‘core areas’ of biodiversity – usually designated or protected sites. The core areas are surrounded by ‘buffer zones’, where habitats which extend or complement core areas can be created. Finally, ‘green connections’ between core areas are created, to build the linked areas up into a network.

In its last chapter, the report highlights the next steps needed towards implementing the networked environment region, and the key policy issues which would need to be considered in the next phase of this work. Potential solutions for the most effective and efficient provision of enhanced ecosystem services will need to be identified and analysed.

Three case studies are attached as appendices to the report. A preliminary assessment is made of how the networked environment region might work in the Heads of the Valleys, the Llantrisant area and the Gwent Levels.
## Executive Summary

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References
1. Introduction & Scope

This document has been prepared by EDAW AECOM, with the assistance of Forest Research, on behalf of the Welsh Assembly Government Spatial Plan Unit and the Countryside Council for Wales in association with the Environment Agency Wales and Wales Environment Link. The purpose is to support the South East Wales Networked Environmental Region (NER) concept described in the Wales Spatial Plan (2008 update) by proposing a number of interconnected and integrated natural connections in the region. The NER concept is a manifestation of the Welsh Assembly Government’s commitment to sustainable development and the Wales Environment Strategy (2006). The NER will protect and enhance the environmental infrastructure of the city-region as the essential life support system for social and economic development, making the landscape more permeable to wildlife and more accessible for people, helping society and wildlife to adapt to climate change, improving the quality of life, promoting healthier lifestyles, increasing tourism and improving the image of the area.

The Wales Spatial Plan sets this challenge: How can the conurbations of South East Wales, which include Cardiff, Newport and the settlements of the Valleys, function as a interdependent city-region of 1.4 million people, in order to reach the critical mass necessary to provide a high quality of life and to be able to compete with comparable areas in the United Kingdom and the European Union? As part of the response to this challenge, the Spatial Plan has established the concept of the NER, which is intended to be a key component in the development of the city-region, supporting the revitalisation of its communities. It is also expected that the city-region concept will encourage people to seek opportunities to improve links between settlements (whether old or new) and to link all settlements with the wider natural environment for which Wales is renowned.

The Wales Spatial Plan also supports the Valleys Regional Park, which encompasses the South Wales coalfield and spans all of the South Wales valleys down to the M4 motorway, from Monmouthshire in the east to Carmarthenshire in the West. The project is being promoted by a group of more than 25 organisations from the public, private and voluntary sectors. The partners share a vision that the sustainable regeneration of the South Wales valleys can be achieved by promoting the spectacular and unique environment.

On its own, the protection of isolated sites is not enough if the effects of past habitat loss are to be reversed. In addition the population of the region and the potential for ecological degradation continues to grow. Man-made climate change is now upon us and is expected to increase average temperatures and the likelihood of both flooding and drought. The negative effects of all this can be softened by the provision of interconnected multi-functional natural greenspace providing and increasing essential ‘ecosystem services’, including soil, clean air and water, food, summer cooling, flood storage, carbon sequestration and wildlife habitat. Such networks can also provide walking and cycling routes and places to play and relax. They will become the primary green infrastructure that supports and binds the city-region.

In preparing this study the authors have been mindful of the importance of the following:

- Building on the current protection of existing sites of high nature conservation value in order to keep them in favourable condition, buffer them and make them hubs and links within an expanding ecological network
- Restoring biodiversity through the creation of new sites of value which will become links in an expanded ecological network
- Building resilience and adaptability in the face of a changing climate
- Creating jobs and increasing prosperity through sustainable economic development
- Recognising South East Wales NER as one of a family of similar and related regional, national and international initiatives
- Promoting diverse interventions that increase the permeability of the landscape to wildlife
- Promoting low carbon transport (including tram, train, cycle and pedestrian routes) within corridors of new wildlife habitat which will link towns with towns and the countryside
- Improving communications between the Heads of Valleys and City Coast regions
- Encouraging ecotourism throughout the region

Considering the political, cultural and ecological interventions which may be required to produce an effective NER

Demonstrating how the creation of the NER might work at the local level

This study marks the beginning of a process. It will explain why ecological networks should be promoted and will indicate where efforts should be concentrated in order to create the NER. However the NER is a long term project that will require further work by many partners working in concert. The proposed network will need to be tested and refined and the process reviewed as our knowledge grows of how networks work and how best to create, utilise and manage them in the specific context of South East Wales. It will also be important to explore in more detail the role of wider ecosystem services and the trade-offs that may need to be made between them.

This report continues by describing the benefits of environmental networks over time and in chapter 2, before considering policy in chapter 3 and describing the South East Wales Region, including its sub-regions, in chapter 4. Chapter 5 discusses opportunities and challenges before the vision is set out in chapter 6. The methodology for using Geographical Information Systems (GIS) for identifying potential ecological networks is described in chapter 7. Our proposals for the network are presented in chapter 8 followed by suggestions for future action in chapter 9. Finally three case studies, designed to show how the network might be delivered locally (in the Heads of the Valleys, Llantrisant Strategic Opportunity Area and Gwent Levels), are included as an appendix.
2. Benefits

Clarity of Vision

People are more likely to be proud of and want to live and work in a neighbourhood where the natural environment is cherished and protected, is improving in quality and is accessible. Where the division between the town and country becomes indistinct, people are more likely to live closer to their work, local services can be maintained and the potential for ecotourism grows: all factors that boost sustainable economic development. The creation of the NER means that green space can be planned, designed and managed as part a growing network and not in isolation. Planners, designers and land managers can look for opportunities to restore and create habitats that will contribute towards the network. Where post-industrial land is restored, its role in the network can be reinforced. By providing an overarching framework, the NER will assist in the identification of local objectives and priorities. It will attract investment and make sure that investment is more effective. The clarity of vision provided by the NER concept is likely to increase public and private sector confidence, participation and investment.

Employment

Improving the quality of life in South East Wales and reinforcing the perception that the region is a great place to live and work will attract investment and lead to the creation and retention of jobs. The establishment and maintenance of the NER will also create local employment. This is illustrated by the National Trust Wales & Others (2007) who estimate that, across the whole of Wales, 31,766 (FTE) jobs relate to the management of wildlife. Expanding the area of land managed for biodiversity conservation (as is being proposed here) will increase this number. In this way jobs are created locally, helping to replace jobs lost in forestry and agriculture, which require similar skills. Work in habitat creation, management and maintenance as well as more general countryside management skills such as dry stone walling, hedging, animal husbandry and arboriculture will be generated. Some of this work will be carried out directly by individual farmers and landowners (including public bodies and NGOs), whilst other services will be provided by local skilled contractors. The production and maintenance of features such as fencing and gates to control grazing and access, and more specialised items such as sluices and bridges for wetland areas, as well as new products such as road-crossing tunnels for wildlife has the potential to create jobs locally. In addition, there is indirect job creation in other industries providing materials and resources. Examples include tree and plant nurseries (where local suppliers stocking plants of local provenance should be favoured for ecological reasons), timber processing, machinery sales and hire. Forestry products have traditionally been used in construction and there is a renewed interest in using locally sourced timber from sustainably managed forest, however there are new markets for wood products, for example as an energy source in wood chip boilers and combined heat and power plants. There will also be additional requirements for support for advice and training in countryside management skills which will create additional employment and business opportunities. Another category of jobs is visitor management, including the promotion and interpretation of the NER locally, staffing visitor centres, devising information packs, managing car parks and viewing areas and providing guided tours.

Indirect employment follows where visitors spend more on accommodation, food and other retail products. This can stimulate the production of local high value food and craft products. The National Trust & Others (2001) have estimated that, in Wales, one full time equivalent (FTE) job created in conservation supports another 0.44 FTE jobs.

People enjoy working in conservation and are more likely to make a long term commitment to an area if working in this sector. The exact number of new nature conservation jobs likely to be created by the NER will depend on how far public sector funding can be extended or if new private investment can be found, however a larger nature conservation estate with more public access will require more people to look after it.

A study of the National Trust’s Stackpole Estate in Pembrokeshire showed that expenditure of £90,000 on estate maintenance led to 300,000 visitors annually, contributing £2.9 million to the local economy (see also under ‘local spending’ below) and securing 76 FTE jobs.

Local Spending

In considering the economic benefits of existing Natura 2000 (European) protected sites, Finch (2006) reports that significant amounts of extra direct spending can be attributed to the presence of these areas and provides a useful additional income in rural areas that depend largely on agriculture and forestry. An example is that of the RSPB’s reserves in the UK, which in 2002, attracted an estimated £19 million in additional spending in local communities by staff and visitors.

Ecotourism

Carefully provided access to nature conservation sites (which does not damage the interest for which sites are designated) can create tourism which has been shown to help diversify local economies, supplement incomes, and encourage people to continue to settle. Tourists require accommodation and food and often enjoy entertainment, which if provided locally, can benefit deprived areas and encourage the development of new businesses in a more economically diverse local economy.

The RSPB osprey watching site in Gwynedd attracted 73,000 visits in the summer of 2005, which generated £750,000 of visitor spending in the local economy. The six Kite Country Centres set up in Mid-Wales in 1994 also gave a useful insight into the impact of wildlife tourism on the local economy. Together the six centres attracted 148,000 visitors in 1995-6, who spent a total of £2.9 million and directly supported 14 FTE jobs. In addition, it is estimated that the project has indirectly created an additional 114 FTE jobs in Mid-Wales. The red kite and the ‘Kite Country Logo’ have become important marketing tools for the area. A similar story is associated with the nesting ospreys in the Porthmadog area of North Wales, which were seen by around 75,000 visitors in 2005, which (on the basis of evidence from Scotland) are likely to have contributed around £450,000 to the local economy. Ecological restoration associated with the NER has the potential to provide similar opportunities for South East Wales.
Health
Physical inactivity is a major preventable health risk that leads to increased levels of depression, obesity and heart disease, conditions that cost billions of pounds each year in lost output and expenditure on health care. BirdLife International (2007) has shown that the provision of green space and nature reserves encourages people to exercise. Bird (2007) has described how a large number of studies show that nature is good for our mental wellbeing. Sites of high biodiversity interest, particularly close to urban centres, therefore combine nature conservation and health policy goals and represent a good investment for the taxpayer.

Education
Most nature conservation sites have the potential to be an excellent educational resource. Site visits can provide outdoor learning opportunities for school children and others. Facilities that are close to towns may be particularly useful, especially where classrooms can be provided. The Gwent Wildlife Trust (Barclay 2007) reports that the education centre at Magor Marsh is being used by local schools and other groups - with more than 2,000 schoolchildren taking part in structured education programmes each year. During 2008, the RSPB’s Newport Wetlands centre is expected to receive 45,000 visits, 3,000 of which will be made by children from Newport schools.

Land Development
New development which is set in a high quality and biodiverse landscape is more valuable and more likely to be long lived. CABE Space (2005) has shown how there is a clear and direct connection between high quality green space and increased land values. Properties close to parks for example, have higher values and sell more quickly. CABE Space argues that networks of green spaces have the potential to create even more value than isolated sites.

Ecosystem Services
The NER will also enhance the ability of the environment to provide essential ‘ecosystem services’ which include flood prevention, the cleansing of air and water and pollination. Ecosystem services are essential for our existence. For example, without pollination undertaken by insects, which rely on the natural environment for survival, agriculture and therefore civilisation would collapse. Life may continue despite the gradual degradation and loss of ecosystem services, however the cost of neglect may only come to light after disaster has struck. Increasing the capacity of the landscape to provide ecosystem services will improve our ability to survive disasters (like flood and drought), which are predicted to become more frequent with climate change (see EFTEC 2005). Clearly the complexity of natural systems and their interaction with human society make the estimation of the monetary value of ecosystem services subject to much uncertainty but their importance to the continuing survival of modern civilisation cannot be overstated. Studies from the US suggest that each dollar spent on conservation would help to preserve ecosystem services worth 100 times this value. A report for the Scottish Executive (Williams et al 2003) has estimated that ecosystem services in that country have a value of £17 billion per annum. On a global scale this value is estimated to be trillions of dollars. Such values should be estimated and accounted for when considering the management of green infrastructure and other natural resources. Scotland’s network of Natura 2000 sites is estimated to bring benefits to residents and visitors that have been valued at £210 million per year, an amount which outweighs the cost of management by 7 times, reinforcing, along with all the other evidence now emerging, the suggestion that expenditure on the NER should be a priority for the citizens of Wales.

Biodiversity
Increasing demands for intensive agriculture, industry, housing and transport have caused fragmentation of wildlife habitat. Many habitats and species are unable to survive in isolation and have already become extinct or are under threat. This threat is likely to be exacerbated by climate change, where local conditions may become unsuitable for some species, which may also be unable to migrate because of barriers or an inhospitable landscape. Populations in small isolated sites are smaller and therefore tend to be more vulnerable to local extinction following disasters, like flooding or fire. Edge effects and impacts from human activity are also more likely to severely affect small sites. Restoring lost habitats is the answer to the problems caused by fragmentation, however given the scale and complexity of these problems, choosing where to invest limited financial resources in any given region or district can be a difficult decision. Direction and impetus can be given to such efforts by identifying potential ecological networks. Expanding and linking areas for wildlife to create multi-functional ecological networks provides the most efficient solution to this serious challenge of habitat loss, fragmentation, local extinction and the need to allow wildlife to move more freely through the landscape.

‘Human needs and a healthy environment are not opposing claims that must be balanced; instead, they are inexorably linked by chains of cause and effect. We need a healthy environment because we need clean water, clean air, wood and food.’
Jared Diamond

Pollination by bees - an example of an essential ecosystem service.
3. Policy

Although there are no policies that have been drafted with the specific intention of prioritising the creation of ecological networks, international, national, regional and local policy on nature conservation and planning often makes reference to networks or provides support for their establishment. They are summarised here:

International

The Convention on Biological Diversity (1992) was a landmark treaty because it recognised for the first time in international law that the conservation of biodiversity is ‘a common concern of humankind’ and is an integral part of the sustainable development process. It was adopted at the Earth Summit in Rio de Janeiro and requires signatory states to work together to establish a worldwide network of protected areas.

The EU Habitats Directive (1992) does not refer specifically to ecological networks although Article 10 of the Directive requires member states to improve the ecological coherence of all Natura 2000 sites through land-use planning and development policies. The directive states that ‘this will involve the management of features of the landscape which are of major importance for wild fauna and flora including those which by virtue of their linear and continuous structure (such as rivers with their banks or the traditional systems for marking field boundaries) or their function as stepping stones (such as ponds or small woods), are essential for the migration, dispersal and genetic exchange of wild species.’

The Emerald Network (1998) was an initiative of the Council of Europe designed to extend the Natura 2000 network to include signatory countries of the Bern Convention (1982). The Emerald Network includes sites in the EU, Monaco, Burkina Faso, Morocco, Tunisia and Senegal.

The EU Directive on the Conservation of Wild Birds (1979) requires European member states to provide a network of sites to conserve wild birds (Special Protection Areas) and this has reinforced the work to establish the Natura 2000 network.

The EU Water Framework Directive (2000) which promotes integrated river basin (catchment) management throughout Europe, requires member states to maintain their rivers in ‘good ecological condition’ and to prepare river basin management plans.

United Kingdom

One Future - Different Paths, The UK’s Shared Framework for Sustainable Development (2005) sets out goals and principles and promotes an integrated, innovative approach that delivers higher levels of employment, and a just society that promotes social inclusion, sustainable communities and personal well-being. The document also advocates the protection and enhancement of the physical and natural environment and efficient use of resources and energy. It identifies five guiding principles, namely

- Living within environmental limits
- Ensuring a strong, just and healthy society
- Achieving a sustainable economy
- Promoting good governance
- Using sound science responsibly

The framework then goes on to identify four priority areas for immediate action, as follows:

- Sustainable consumption and production
- Climate change and energy
- Natural resource protection and environmental enhancement
- Sustainable communities

The Natural Environment and Rural Communities Act 2006 has reinforced the role of public bodies and statutory undertakers to give due regard to the conservation of biodiversity.

The NER addresses all of these priority areas to a greater or lesser extent.

National

The Welsh Assembly Government’s Environment Strategy (2006) has five key themes namely:

- Addressing climate change
- Sustainable use of resources
- Distinctive biodiversity, landscapes and seascapes
- Our local environment
- Environmental hazards

The NER is particularly relevant to the first four of these themes and its development will address many of the outcomes referred to in the second Environment Strategy Action Plan (2008). In particular the NER will help to address Environment Strategy ‘Outcomes’ which relate to clear leadership, an example set by small developed nation, environmental policy integration, climate change resilience, water and soil conservation, biodiversity conservation, habitat connectivity, access to greenspace and encouragement of walking and cycling. The Wales Environment Strategy makes special reference to landscape-scale projects that will increase the resilience of biodiversity to climate change.

In Wales, the National Assembly has a duty to promote sustainable development in exercising all functions. Since the publication of Learning to Live Differently (2000), sustainable development has been at the heart of the Welsh Assembly Government’s work. This was reinforced by the publication of Wales: A Better Country in 2004 and a programme for putting the policy into effect was set out in the Sustainable Development Action Plan (2004).

The duty of Welsh Ministers to promote sustainable development has been reinforced by the Government of Wales Act 2006. This has led to the pro-
The Wales Spatial Plan: SE Wales Delivery Plan (2008) sets out the overarching objectives and action necessary to achieve the sustainable development of the South East Wales region. Strategic Planning Guidance for SE Wales - SE Wales Strategic Planning Group (2001) provides guidance for those involved in preparation of local plans. South East - The Capital Network (2004), part of the Wales Spatial Plan, envisages a highly skilled workforce competing successfully with other cities both in the UK and abroad. It promotes stronger links between the Valleys and the City-Coast and seeks to spread prosperity within the area and elsewhere in Wales. It promotes ecological restoration and makes specific reference to wildlife corridors (including rivers) as important in their own right but also providing valuable protection against flooding and a resource for leisure and tourism. This document also refers to the importance of the river corridors in the Valleys Regional Park and the value of better links with the Brecon Beacons National Park to the north. The Valleys Regional Park, which is being promoted by a wide coalition of authorities and agencies and third sector organisations, will encourage activity which is related to countryside, tourism and heritage across the Valleys (Coffman 2008). The overall aim of the Valleys Regional Park is to raise the quality of the area's heritage, thereby contributing to the regeneration of South Wales. The Valleys Regional Park covers an area of over 200,000 hectares and is home to more than 1 million people. Large landowners are responding to the challenge of improving the environment of the region. For example Forestry Commission Wales has recently responded positively to a call by the WAG for a 'Forest for the Valleys' as part of the Heads of the Valleys programme (Forestry Commission Wales 2008).

Regional

The Welsh Assembly Government is also preparing a Green Jobs Strategy which will support organisations and employers in Wales to best improve their own environmental performance and take advantage of the growing market in green products and services. The consultation period on the draft also ended in February 2009. The NER will be an important generator of green jobs in the region.

It is becoming clear that climate change is one of the biggest challenges facing the world. The Welsh Assembly Government has recently prepared a high level policy framework and is currently preparing detailed proposals for action on climate change which will be ready as a draft consultation document in Spring 2009. The NER should be considered as part of the South East Wales region's response to that call for action.

Planning Policy Wales (Welsh Assembly Government 2002), provides the strategic policy framework for the effective preparation of local planning authority development plans. The PPW, together with the Technical Advice Notes (TANs) and circulars comprise national planning policy which should be taken into account by local planning authorities in the preparation of local development plans. Land use planning is important in terms of the Assembly's Sustainable Development Scheme and sustainable development principles now guide the PPW. Although the PPW does not address the issue of ecological networks directly it does consider relevant factors, including the location of new development, new guidance on biodiversity and the Local Biodiversity Action Plan process as well as accessibility to reduce the need to travel. TAN 5 (Technical Advisory Note 5: Nature Conservation 2006) gives advice on development control issues for Special Protection Areas (SPAs), Special Areas of Conservation (SACs), and Sites of Special Scientific Interest (SSSIs), the selection and designation of non-statutory nature conservation sites and the protection of species, commons and greens. It refers to the importance of corridors, links and stepping stones in the ecological network. People, Places, Futures: The Wales Spatial Plan (2004), sets out a direction for Wales for the next 20 years. It gives firm direction in terms of sustainable spatial development.

Local planning authorities in Wales are progressively replacing Unitary Development Plans (UDPs) with new Local Development Plans (LDPs). LDPs are guided by the higher level policies of the Welsh Assembly Government (see above) and provide clarity and consistency for decisions about developments. Local planning applications should be determined in accordance with these plans. LDPs are associated with a high degree of public consultation and are subject to a Strategic Environmental Assessment, Sustainability Appraisal, Annual Monitoring Report (AMR) and a full review every four years. Local authorities also prepare a number of other plans and policies which may have an influence in terms of implementation of any overarching plans to create ecological networks or green infrastructure. They include:

- Local greengrass or open space strategies
- Community strategies
- Biodiversity action plans
- Landscape character assessments
- Local transport plans
- Rights of way improvement plans
- Walking and cycling strategies
- Healthy living strategies
- Local ‘Agenda 21’ strategies

Framework for South East Wales Networked Environmental Region
The Valleys Regional Park covers most of the sub-region.
4. The South East Wales Capital Region

Introduction

The South East Wales Capital Region spans an area between Monmouth in the east to Bridgend in the west and to Merthyr Tydfil and Abergavenny in the north to the Severn Estuary in the south. Some of the nation's most important conurbations occur in the region including the capital city Cardiff as well as 13 other substantial towns. This is the most populated region of Wales with an area of only 2809 km² (about 13.5% of the country's surface area) yet it is home to 1.4 million people (nearly 50% of the country's population). The coal industry that dominated the Valleys from the 19th century, closed in the 1970s and 1980s and with it other heavy industry around which many of the towns grew. Much unemployment and hardship followed and there is a wide consensus that the area has yet to fully recover from that collapse. However new industries have grown up, including distribution and light industry, leisure, service and tourism. In general, the large cities on the coast, such as Barry, Pontypridd, Newport and Bridgend, well connected by road and rail, have become the major economic drivers, yet the hinterland, especially the Valleys area, remains deprived. Investment in relatively isolated areas is a requirement if the whole of South East Wales is to function as one interconnected city-region.

Transport

A number of major roads cross the region. Parallel to the coast, the M4 motorway links England with Newport, Cardiff, Bridgend and Swansea. Skirting the Brecon Beacons National Park to the north of the region, the A465 trunk road spans the Heads of Valleys and connects Merthyr Tydfil with Abergavenny where it joins with the A40 (T) which connects Brecon and Monmouth. Other major roads reach up the principal valleys in which there has been past industrial use and settlement thus linking the A465 (T) and the M4. The railway enters the region from England via the Severn Tunnel. The mainline links Newport, Cardiff and Port Talbot with Swansea, with branch lines to Barry, Bridgend and larger towns in the Valleys. An extensive network of public footpaths and bridleways criss-cross the countryside. South East Wales is also crossed by a number of long distance National Cycle Network routes. The best known is the largely traffic-free Taff Trail, which follows the Taff Valley from Cardiff Bay in the south to the Brecon Beacons in the north. Other routes, with more challenging topography to suit more experienced off-road cyclists, include the National Cycle Network Route 47 which links Neath and Pontypridd. In addition there are plans to develop the Valleys Regional Park as a centre of excellence for cycling.

Natural and Historic Heritage

Although the most densely populated part of Wales, the south-east is still largely rural with some outstandingly beautiful countryside and internationally important wildlife habitats. The geology of the south-east is particularly diverse and distinctive, with the coal measures and limestones of the Carboniferous period in the Valleys contrasting with the old red sandstones of the Devonian period which skirt the coalfield. The geology has given rise to a dramatic scenery of hills and valleys and great diversity of soils. The Wye Valley Area of Outstanding Natural Beauty is located along the eastern borders. Along the coast is the Gwent Levels, with its Sites of Special Scientific Interest (SSSIs). A belt of SSSIs and ancient woodlands spans the northern side of the M4 motorway and in places reach up the hillsides which line the Valleys. Other important but often small sites are peppered throughout the region. Much of the Vale of Glamorgan’s spectacular coastline is nationally recognised through its designation as a Heritage Coast. The former industrial areas of Merthyr Tydfil and Blaenafon are recognised as Landscapes of Outstanding Historic Interest. Blaenafon is also designated as a World Heritage Site for its complex of remaining industrial facilities relating to the birth of the modern steel industry. Rivers and tributaries running roughly north-south drain the Valleys and end their journeys in the tidal creeks that enter the Severn Estuary.

Sub-regions

The Wales Spatial Plan divides the South East Region of Wales into three sub-regions, namely the Heads of the Valleys, Connection Corridors and City Coast and these are described in outline below. The drawing over the page shows the sub-regions and key settlements, also identified in the spatial plan. Detailed information on the character of the sub-regions is available from the Countryside Council for Wales’ citations for the region’s Landscape Character Areas (CCW 2007).

Heads of Valleys

This sub-region is located between the Brecon Beacons and Black Mountains National Park to the north and to the towns of Tonyandy, Abercynon and Blackwood to the south. The landscape is varied: in the southern part of the area the river valleys have sizeable settlements which grew up during the industrial revolution. Overlooking these towns and rivers are extensive plateaux of sheep-grazed acid grassland with patches of relict woodland, plantations, bog, heath and moorland. The A465 cuts east-west across the northern tip of the sub-region linking roads from the Valleys but forming a significant barrier, with the flat-topped mountains of the Brecon Beacons National Park adjoining the region to the north. The landscape rises to a height of 886 metres – the highest point in southern Britain. This sub-region makes up part of the Valleys Regional Park.

Connection Corridors

Urbanised river valleys, run roughly north-south across this sub-region. Between the valleys are hills which typically have wide expanses of sheep-grazed acid and neutral grassland with scattered woodland, heath and moorland. The M4 motorway forms the southern boundary of the area. The Monmouthshire lowland agricultural landscape, with pasture, hedgerow and scattered woods marks the eastern edge of the sub-region. This gently undulating landscape includes the floodplain of the River Usk. A network of winding roads and rural lanes link the historic towns of Usk and Abergavenny and many smaller villages which are centred on old stone-built churches. The striking limestone gorge of the Wye Valley marks the border between Wales and England. The Swansea Bay area forms the south-western boundary of the sub-region.

City Coast

The M4 motorway forms the northern boundary of this area. The motorway stretches from the Severn in the east to Bridgend in the west and passes through a variety of rural and urban landscapes, including the towns of Newport and Bridgend. To the south-east is the Gwent Levels, a low lying landscape located on the northern shores of the Severn Estuary, which is the setting for the conurbations of Newport and Cardiff. Much of this landscape of grazing marsh (one of the most important in the UK) has been reclaimed from coastal saltmarsh and is crossed by a network of historic drainage ditches (known locally as reens). Cardiff and Barry are located in the south of the sub-region. Cardiff is fringed by woodlands, fields and parkland some of which penetrate deep into the urban fabric. To the west of Cardiff is the Vale of Glamorgan: a distinctive lowland landscape. It is characterised by rich agricultural lands with scattered woods, fringed by a rugged coastline. Ancient villages are linked by a network of rural lanes.
Bridgend is located to the north-west. Porthcawl within the Swansea Bay area forms the western edge of the region. Cardiff itself contains three major river valleys: the Taff, Ely and Rhymney together with other watercourses such as the Nant Fawr. These add to the character of the city and provide corridors for wetland wildlife (like the otter) between the Severn Estuary and the countryside beyond. About 30% of Cardiff is greenspace which includes river valleys, farmland, parkland and woods.

Functional Zones
The RSPB, in association with the Wales Spatial Plan South East Area Environmental Group, has described 6 distinct zones in the SE Wales region (RSPB Undated). Zone 1 is the northern section of the Valleys Regional Park, within the Heads of Valleys. Zone 2 corresponds with the Connections Corridor in the spatial plan. Zone 3 is the Vale of Glamorgan - an area of mixed farmland close to the coast and to the west of Cardiff. Zone 4 is another lowland farmland landscape in Monmouthshire. Zone 5 is the Gwent and Cardiff levels in the City Coast region of the spatial plan and Zone 6 is the Severn Estuary, an internationally important area for birds.

Rivers
The drawing over the page shows the major rivers and floodplains of South East Wales. The topography of the Heads of Valleys and Connection Corridor means that the rivers (for example the Taff) are relatively steep and fast flowing through these sub-regions. Floodplains in the Valleys tend to be narrow, however property close to these areas can be vulnerable to flash flooding. In order to protect the towns and villages which have grown up on the banks of these rivers, channelisation and flood defences are a common feature. Once these rivers reach the coastal cities of Cardiff and Newport, they are much quieter, however the floodplain, albeit protected, is more extensive and many more people live within it. The Gwent Levels are effectively one large floodplain, vulnerable to both fluvial and potentially, given climate change, coastal flooding. The Rivers Usk SAC and River Wye SAC to the east of the sub-region are very different in character. They are typical meandering lowland rivers. Largely rural, they include many natural features, including fluvial geomorphological features and riverine habitats like floodplain forests. Associated with most of the river valleys are ancient woodlands and other valuable habitats, including wet grasslands. The Wye in particular has extensive tracts of ancient woodland associated with it.

Soils
The drawing on page 13 shows the distribution of soils in the sub-region. It highlights the contrast between the more rugged upland areas of the Valleys, where the underlying geology consists of coal measures, with their relatively thin, acid podzols and the lowlands with their deep, fertile, brown soils which are so important for agriculture. The soil map also clearly distinguishes the Gwent Levels with its characteristic wetland gley soils.

Study Area: Extract from People, Places, Futures-The Wales Spatial Plan Update 2008
Framework for South East Wales Networked Environmental Region

South East Wales
The Blue Network

Legend
- Study Area
- Flood Risk (TAN 15)
- Rivers
- Primary Key Settlement
- Strategic Opportunity Area
- Key Settlement of National Importance

Data Source: ESRI, Ordnance Survey, Welsh Assembly Government, CCW and RDAW
Map Source: © OS Crown copyright. All rights reserved 100020049, 2008
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Framework for South East Wales Networked Environmental Region

South East Wales Soil Classification

Legend
- Study Area
- Brown Soils
- Ground-water Gley Soils
- Lithomorphic Soils
- Man-made Soils
- Peat Soils
- Pelosols
- Podzolic Soils
- Surface-water Gley Soils
- Unsurveyed Soils mainly urban and industrial
- Other Soils
- Administrative Divisions
- Major roads
- Primary Key Settlement
- Strategic Opportunity Area
- Key Settlement of National Importance

Data Source: ESRI, Ordnance Survey, Welsh Assembly Government, CCW and EDAW
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Framework for South East Wales Networked Environmental Region

South East Wales
Designated Sites

Legend
- Study Area
- Major Roads
- Rivers
- Urban Areas
- Heritage Coast
- Sites of Special Scientific Interest
- National Parks
- Biosphere
- National Nature Reserves
- Country Parks
- Ancient Woodland
- Local Nature Reserve
- Special Protection Areas
- Rural
- Area of Outstanding Natural Beauty
- Special Area of Conservation
- Prehistoric Key Settlement
- Strategic Opportunity Area
- Key Settlement of National Importance

Data Source: ESRI, Ordnance Survey, Welsh Assembly Government, CCW and EDAW

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Last Updated: March 2009
5. Opportunities & Challenges

Introduction
The principal opportunities and challenges associated with the proposal to create a Networked Environmental Region in South East Wales are as follows:

Opportunities

- Concerns over energy security and the increasing likelihood of extreme weather events (for example flash flood and drought) associated with climate change (Jenkins & Lowe 2003) means that more and more people are likely to be willing to consider radical changes in lifestyle and the ways in which the landscape is managed. There is now an opportunity to promote ambitious programmes like ecological or green infrastructure networks, providing their multi-functional role as part of sustainable development is fully understood and explained.

- The promotion of better health and well being by encouraging a more active lifestyle requires more provision of accessible open space, cycle-paths and footpaths. These facilities can be integrated into the ecological network.

- There is an interest in creating jobs close to residential areas that do not require people to commute into the major towns and cities. There is also considerable interest in outdoor work that brings people into close contact with nature. There is an opportunity to show that investment in an ecological network can be an investment in local high quality jobs.

- The improvement in environmental quality associated with the establishment of the NER will constitute an opportunity to boost tourism and spread economic development across the region.

- The NER represents an opportunity to establish multi-functional green infrastructure which could also function as transportation corridors. Foot-paths, cycleways or even a tramways could be integrated into the wider ecological network. Green bridges, underpasses and ducts can be used to enable people and wildlife to cross major roads. Existing transportation corridors may be enhanced to become components of the network.

- The restoration of rivers as part of an expanded ecological network can provide flood mitigation, wildlife habitat, improved water quality, improved safety and better access for people. Pictured here is the River Rhondda at Hopkinstown.
- Key settlements will need to consider the form and function of green infrastructure even more carefully. There is an opportunity to integrate local green infrastructure into the NER. Mitigation schemes for new development can contribute towards this.

- In the upland areas there are large estates in single ownership. The Forestry Commission, for example has substantial land holdings and future plans that are compatible with the establishment of ecological networks.

- There is an opportunity to merge some of the aims and objectives of the Valleys Regional Park and the NER.

- There is an opportunity to integrate a catchment level management approach with the NER.

- Rising sea levels will emphasise the importance of the Gwent Levels in coastal management, wetland restoration and accessible greenspace for the neighbouring conurbations and sustainable transport links.

- Action for species can be integrated into the NER. For example the rare marsh fritillary butterfly would benefit from the creation of marshy grasslands which would form part of the network. The otter and water vole (both UK BAP priority species) would benefit from river restoration.

- Even carefully planned small scale interventions, like native tree and hedge planting, have the potential to create vital links in the NER.

### Challenges

- The characteristic topography of the Valleys, with distinct habitat zones with changing elevation and roads and urban development concentrated close to the rivers, means that there is limited permeability for wildlife from east to west.

- Major roads, for example the M4 in the south and the A465 in the north, represent barriers or hazards to many species of wildlife.

- In the lowlands and urban areas, land ownership is often fragmented.

- The public may not be aware of the benefits of, or fully supportive of, the ecological network concept.

- In the early stages of its establishment, the NER, which is a long term project, cannot reach every district. Therefore public support for the project in certain parts of the region may be limited.

- There are uncertainties over the sources, types and levels of funding for ecological networks.

- Rising energy and food prices may encourage landowners to intensify agricultural use of land, switching to biofuel and higher price food crops. Modest grants of public funds designed to encourage landowners to create and manage habitat may become unattractive.

- Smaller settlements are poorly developed with respect to the provision of visitors facilities that would encourage tourism that exploits an expanded ecological network.

- Poorly planned and designed urban development in key locations has the potential to interrupt the process of establishing the NER.
6. Vision

The Welsh Assembly Government is committed to leadership on environmental issues through its policies, programmes and the way that it conducts its business. The second Environment Strategy Action Plan issued in 2008 requires an increase in the extent and connectivity of habitats and improved access to and enhancement of the natural environment. The conservation of natural resources and efforts to provide resilience to the effects of climate change are priorities for all regions of Wales.

The South East Wales Networked Environment Region, developed under the framework of the Wales Spatial Plan and in partnership with the Countryside Council for Wales, will address these objectives and promote sustainable development. It acknowledges the vital role which ‘ecosystem services’ play in underpinning lasting social and economic progress.

A successful Networked Environment Region will provide high quality natural connections, protect the environment whilst facilitating access for all, restore biodiversity and foster prudent use of natural resources.

The shared vision is to develop a beautiful multifunctional network of green infrastructure that makes the landscape more permeable to wildlife, provides ecosystem services (including wildlife habitat, clean air and water and other natural resources), supports economic growth, stores carbon, provides renewable energy, builds resilience to climate change, promotes healthy living, provides access for walkers and cyclists, recreation and learning and strengthens culture.

Some of the key functions that the Networked Environment Region will perform include the following:
- Clean air and water
- Access to green space and the wider countryside
- Gateways to settlements
- Cycling and walking routes
- Renewable energy
- Carbon sinks
- Employment
- Culture, inspiration and places for life-long learning

In the whole City-Region, the intention is to strengthen the protection of designated sites and landscapes by restoring wildlife habitat and increasing the permeability of the landscape to wildlife and people. Carbon will be stored through soil building and woodland and wetland restoration. Catchment management and flood management will be improved and opportunities to use river corridors as part of the network will be exploited wherever practicable. These aspirations will need to be addressed as opportunities arise - for example through the local planning process, through design briefs and masterplans for new developments and through the forward planning and work plans of those who have a key influence over the landscape. This holistic approach will create high quality jobs and revitalise the region. The three sub-regions have different characters and priorities and these are considered in turn:

Heads of the Valleys
- Strengthen the protection of statutory and non-statutory designated sites and existing landscapes of high wildlife and cultural value on the hills by restoring adjacent hilltop and hillside complementary habitat of woodland, grassland and wetland. This will include projects which will act as measurable carbon sinks or providers of biofuels (eg coppice) and other renewable energy sources.
- Improved connections for both people and wildlife with the adjoining Brecon Beacons National Park
- Reduce downstream flooding by increasing the capacity of the uplands to retain rainfall in more woodland and wetland.
- Improve access to and the ecological, landscape and water quality of the upland sections of the rivers which drain the heads of the valleys area.
- A more attractive setting for work, leisure and tourism by improving public access to natural greenspace both within the sub-region and in adjacent areas. This will include the provision of new ‘gateways’, footpaths and cycle routes.
- New centres for rural development and eco-tourism destinations close to the major settlements including Abergavenny, Brecon, Merthyr Tydfil, Ebbw Vale and Abergavenny.
- Full coordination with the development of the Valleys Regional Park with an emphasis on local employment

Connection Corridors
- Strengthen the protection of statutory and non-statutory designated sites and existing landscapes of high wildlife and cultural value by restoring complementary habitat of woodland, hedgerows and grasslands.
- Improved connections for both people and wildlife with the adjoining more heavily wooded areas to the east and west, including connections between Llantrisant and Caerphilly and the more rural areas beyond.
- Reduce downstream flooding by increasing the capacity of the hillsides which overlook settlements to retain rainfall in more woodland.
- Improve access to and the ecological, landscape and water quality of the middle sections of the rivers draining the connection corridor area.
- New eco-tourism gateways to the connection corridors in the Valleys Regional Park. These will be associated with key settlements which include Llantrisant, Pontypool, Caerphilly, Blackwood, Cwmbran and Pontypool to enjoy the improved connections with the countryside.
- Improved connections for both people and wildlife with the adjoining Brecon Beacons National Park
- Reduce downstream flooding by increasing the capacity of the uplands to retain rainfall in more woodland and wetland.
- Improve access to and the ecological, landscape and water quality of the upland sections of the rivers which drain the heads of the valleys area.
- A more attractive setting for work, leisure and tourism by improving public access to natural greenspace both within the sub-region and in adjacent areas. This will include the provision of new ‘gateways’, footpaths and cycle routes.
- New centres for rural development and eco-tourism destinations close to the major settlements including Abergavenny, Merthyr Tydfil, Ebbw Vale and Abergavenny.

City Coast
- Strengthen the protection of statutory and non-statutory designated sites and existing landscapes of high wildlife and cultural value by restoring coastal marshes, including the Gwent Levels and river corridor habitats.
- Improved connections for both people and wildlife with the coastal landscapes and the river corridors.
- Reduced flood risk to major conurbations by increasing the storage capacity of the adjacent coastal marshes and river floodplains.
- A more attractive setting for work, leisure and eco-tourism by improving public access to natural greenspace within the sub-region and adjacent areas. This will include the provision of footpaths and cycle routes to allow people and visitors to explore the coast between Cardiff and Newport and follow river corridors into the Connection Corridor sub-region.
7. Identifying the Network

Introduction
The existing landscape does include many areas of high ecological value, however these tend to be isolated fragments of the continuous swathe of natural habitat that once covered the landscape before deforestation, agricultural intensification, the industrial revolution and urban development. An ecological network works by protecting existing high value sites (biodiversity hot spots) as core areas, particularly where these are in clusters, protecting these core areas with buffer areas and creating new habitats to link core areas and improve connectivity. Buffer areas do not necessarily have to consist of exactly the same habitats as the core areas that they adjoin, but they should complement core areas and be sympathetically managed. Where habitat is created to expand and interlink complexes of sites this should be determined at the local level based on the characteristics of each area, however consideration should be given not only to maximising the permeability of the area to wildlife and people. Although Wales is a largely rural country, the South East Region is densely populated and in places heavily urbanised. However there are extensive tracts of open countryside and in some places an intimate mix of urban development and countryside. Landscape-scale ecological networks are usually promoted in open countryside. In urban areas there is now much interest in creating interconnected green infrastructure networks, for both people and wildlife. The special blend of town and country that occurs in South East Wales means that the NER will ultimately become a mix of large landscape-scale connections in the wider countryside which link with local green infrastructure networks developed around existing and proposed communities.

GIS Analysis of SE Wales Region
The starting point for identifying the network is to map existing habitats of value, including the core network of designated sites, to consider the ability of various species of wildlife to disperse from existing sites and to map the permeability to wildlife of the area between existing sites. Catchpole (2007) advises that the most natural landscapes are the most permeable. Major roads and urban areas are least permeable with a range of actively managed environments between the two extremes. The Countryside Council for Wales has provided phase 1 habitat survey data for the whole region and this was used to prepare maps of different habitat types. Maps showing the topography and distribution of soils, rivers, designated sites and other features was also used in the analysis. Using ESRI ArcGIS (Geographical Information Systems) software, habitats were grouped into associations and potential dispersal distances for a representative group of species drawn as an equi-distant perimeter zone around each parcel. Methodology for assigning potential dispersal distances followed Catchpole (2006) and Marulli et al (2005). Catchpole has reviewed the literature on the dispersal abilities of various woodland, heathland, mire and grassland species ranging from trees to ground flora to butterflies and mammals. The network size required for various species to be able to persist in the landscape also varies considerably and our knowledge of many species is incomplete, however using the best available information, landscape ecologists are reaching consensus on recommendations for setting dispersal zones for the purposes of planning ecological networks (see Kettunen et al 2007). In our analysis, existing parcels larger than 25 ha were shown on the plan with the maximum dispersal distance perimeter zone. Parcels of between 5 and 25 ha were given 0.4 of the distance and parcels smaller than 5 ha received no dispersal zone. The dispersal distances used in the analysis were 0.75 km for woodland, 0.3 km for heathland, 0.5 km for grassland, and 0.25 km for mires and bogs. Maps of these habitats with dispersal zones overlaid onto permeability maps were then used to find the most promising ecological connections. These show areas where connections could be made between a range of habitats through a permeable landscape. These potential links, which are typically several kilometres wide, are areas where sustained action can be targeted over a long period of time. Interventions will include improved management, habitat restoration and creation, taking account of conditions at the local level to maintain an appropriate mosaic of habitats.

Planning Networks
Methods for the creation of ecological networks has been described at the European scale by the European Centre for Nature Conservation (2008) at the national scale in Wales by Dr Jim Latham’s team at CCW (see Latham et al 2008 and map over the page) and at a regional scale by Cheshire County Council (2008) amongst others. The strategic planning will continue to be led by the Welsh Assembly Government and CCW with its partners but local planning and implementation will be undertaken by local authorities and landowners, including government bodies like the Forestry Commission and Environment Agency but also NGOs and private landowners. The recommended method of building the ecological network is to maintain the highest quality sites as core areas. These sites are biodiversity ‘hot spots’ which are usually designated and protected in spatial plans. They may also be areas identified as Priority Habitats in the national or local Biodiversity Action Plans. Clusters of designated sites make ideal core areas. The next stage in assembling the network at the local level is to surround and protect core areas with buffers, where habitats that effectively extend or complement core areas can be created. Where nature conservation is not the primary focus in buffer areas, management would normally be sympathetic to the wildlife for which the core area has been designated. Where there are clusters of core sites, buffer areas can merge. Where two clusters of high quality buffered sites are separated by hostile landscape, corridors may be created to form connections. Where possible, barriers to the dispersal of wildlife should be removed. Where barriers, like roads for example, are immovable, consideration should be given to providing crossings. The choice of habitats to be restored or created will be determined at the local level and will depend on biodiversity action plan priority habitats and species, the history of management, soils, aspect, hydrology, nature and quality of the adjacent habitats and intended uses, if any.
Framework for South East Wales Networked Environmental Region

Natural Connections in Wales:
A provisional analysis of areas with relatively high ecological connectivity between protected sites, based on combinations of habitat networks and other landscape features. SSSIs are shown in yellow; natural connections in green. Further analysis is underway to include environmental variables such as topography to refine the map.
- Dr Jim Latham of CCW.

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Framework for South East Wales Networked Environmental Region

This drawing shows a GIS analysis which combines a map of landscape permeability with a map showing woodland areas with dispersal zones (buffers) added. This plan, which is one of many produced for the analysis, is particularly useful for identifying core areas (which are largely designated sites) and potential large-scale woodland connection corridors, which would be at the heart of restored woodland network.
8. The Proposal

The Blue Network

The most intact and extensive ecological network in the South East Wales region is that of the river systems (see drawing on page 12). They begin in the mountain-top bogs of the Brecon Beacons and end in the Severn Estuary after passing through, or close by, all the cities, towns and villages. They already have high ecological value and connectivity. Water quality is generally good and this has allowed species like the otter to return to reaches that were dead during the period when heavy industry dominated the economic life of the region. The rivers and their floodplains are closely associated with other important habitats, including woodlands (both ancient and modern) and grasslands.

However the rivers, though much improved, have lost many of their natural features and in some areas access is poor or difficult. In the twentieth century flood defence works often focussed on the objective of getting water downstream as quickly as possible, causing losses in biodiversity and amenity. Other problems with invasive alien flora and fauna have also damaged the ecology of the region’s rivers. Now there is a requirement to maintain high ecological quality in rivers and increasing interest in restoring and enhancing rivers to improve their appearance, increase biodiversity and improve drainage characteristics. There is also now growing evidence that retaining and infiltrating water is an effective way of reducing the risk of flood downstream. Sustainable (urban) drainage systems (SUDS) in new developments, which mimic natural watercourses, integrate well with restored watercourses. The restoration of rivers can be combined with the provision of adjacent wetland and terrestrial habitats and access paths, for pedestrians and cyclists, both local and long distance. The Blue Network can become integrated with the region’s footpath and cycle network. Special projects to create rare habitats like floodplain forest should also be considered.

Much of the Gwent Levels is flood prone and this area is therefore considered as part of the Blue Network. The Gwent Levels can form part of an important green lung for the adjacent cities of Cardiff and Newport. There will be opportunities to restore some areas to ecologically important wetlands, following the example of the Newport Wetlands which were designated as a National Nature Reserve in 2008. Restored wetlands can store carbon (studies have shown how wetland restoration can lock up more than 70 tonnes of carbon per hectare per year). Such areas can also be crossed by new cycleways and footpaths.

The Natural Network

The drawing over the page shows the proposed ‘natural’ network. Starting in the north, it would work with the existing major blocks of intact habitat which extend into extensive mosaic of grasslands, heathlands, bogs, woodlands and plantation associated with the Brecon Beacons National Park. East-west links can be improved to the immediate north of the South East Wales Region, within and along the margins of the Brecon Beacons National Park. The first main connection is on the high ground between Aberdare and Merthyr Tydfil. This block of habitat does not extend beyond the urban settlements associated with the Taff Valley, however there is the possibility of extending this corridor along the Taff Valley (part of the Blue Network) with its associated riverside woodlands and grasslands.

Another block of habitat extends south from an area between Abergavenny and Ebbw Vale. This substantial block does not extend as far as Pontypool, however there is the potential to extend this corridor south towards Newport, along the Usk Valley as part of the Blue Network or on a parallel track through open country with scattered woodlands between Pontypool and Newport.

To the east of the South East Wales region, are extensive tracts of woodland which are associated with the well-wooded Wye Valley. Much of the area is in an Area of Outstanding Natural Beauty. By extending these woodlands (and other complementary habitats) west towards Newport an important new connection could be established. A well wooded area would then straddle the border from the Forest of Dean, westward towards Newport. The Wye Valley is already an important corridor, and should continue to be recognised as such.

North of the M4 motorway, to the west of the region, there is potential to create another natural connection. This would ultimately connect with extensive woodlands and restored woodlands (former plantations to the west). This connector could extend east, forming a green belt between Cardiff and Caerphilly and greening open land between Llantrisant and Pontypool, where at the local level it would form part of the green infrastructure for new communities in that growth area.

Also forming a green belt for Cardiff and Newport, the Gwent Levels can also connect to the Blue Network and through those river corridors to the wider network.

The Proposal - The Natural Network

To the east of the South East Wales region, are extensive tracts of woodland which are associated with the well-wooded Wye Valley. Much of the area is in an Area of Outstanding Natural Beauty. By extending these woodlands (and other complementary habitats) west towards Newport an important new connection could be established. A well wooded area would then straddle the border from the Forest of Dean, westward towards Newport. The Wye Valley is already an important corridor, and should continue to be recognised as such.

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Also forming a green belt for Cardiff and Newport, the Gwent Levels can also connect to the Blue Network and through those river corridors to the wider network.
South East Wales
Natural Connections

Legend
- Study Area
- Rivers
- Major Roads
- Broadleaved woodland
- Designated Sites
- Ancient Woodland
- Woodland
- Grassland
- Urban Areas
- Blue Natural Connections
- Green Natural Connections
- Wider Area Connections
- Primary Key Settlement
- Strategic Opportunity Area
- Key Settlement of National Importance

The Proposed Natural Network

Data Source: ESRI, Ordnance Survey, Welsh Assembly Government, CCW and EDAW
Map Source: © OS Crown copyright. All rights reserved 100020419. 2008

Last Updated: September 2008
9. Next Steps

Follow-up Work
As part of the continuing development of the ecosystems services approach, the Countryside Council for Wales, supported by the Heads of the Valleys Programme, has funded the production of a suite of tools which will use the Forest Research habitat network approach to complement the NER Framework. The first element is a detailed web-based ‘alerts’ mapping package for planners, developers and other interested groups to identify where key areas of habitat connectivity (for woodlands, wetlands, heaths and grasslands) currently exist. The same web-based package will also include more detailed mapping layers, covering opportunities for habitat creation and more detailed ecological information, which will be accessible to expert practitioners to advise and inform the strategic planning and development control process. This facility will cover the whole of South East Wales from Monmouthshire to Swansea. The second element is a more detailed case study illustrating how ecological connectivity principles can be applied to master planning and detailed site development. The final element of the toolkit is comprised of two sets of best practice advice on how to incorporate eco-connectivity into the planning process. Specifically targeted towards LDPs, the first set will look at what can be done by authorities at the start of the plan production process, when there will be opportunities to use the eco-connectivity principles to evaluate site allocations and steer policies, while the second looks at LDPs near the end of production and will make suggestions for what can be done, in the form of supplementary internal guidance, to ensure that eco-connectivity principles are applied through the future implementation of the Plan. The intention is for this toolkit to be readily available in order to encourage practitioners to take forward the NER vision in a practical way.

Policy Integration
At the policy level, further work will be required to acknowledge and fully integrate the South East Wales NER into initiatives and plans. Strategic planning documents can emphasise the importance of the NER. A substantial part of the proposed NER will be within the Valleys Regional Park, therefore the future of both this important project and the NER can be closely aligned. Local authorities can promote the NER in LDPs. LDPs have good potential to stimulate local response to the NER, with community and local landowner involvement particularly desirable and beneficial. Also at the local level, supplementary planning guidance, green infrastructure or open space strategies and local biodiversity action plans can all be directed in support of the NER. The NER should also be considered in the context of reviews of land management under the Rural Development Plan for Wales.

Urban Growth and Green Infrastructure
The Wales Spatial Plan has identified entries for growth which include Cardiff, Newport and the towns that are within or very close to the proposed NER, including: Aberdare, Aberavannwy, Blackwood, Caerphilly, Llantrisant, Merthyr Tydfil, Pontypool and Pontypridd. Policy now favours dense development on brownfield sites with good links to transport nodes and the provision of new readily accessible green infrastructure. Through planning guidance and design codes, local authorities can require prospective developers to provide adequate green infrastructure within schemes, but they may also wish to consider how this green infrastructure connects with and contributes towards the wider NER. CACE (2005) has recently issued advice on the planning of eco-towns, which include a recommendation that 40% of new settlements should be green infrastructure. New urban development projects could contribute towards the proposed network by including a similar provision of green infrastructure and include ecological connections and gateways linking people to the NER.

Land Restoration and Regeneration
The region has decades of experience of restoring former industrial land. 1,200 sites covering 10,000 ha have been revegetated or redeveloped, however there are still more sites (many of them owned by the Welsh Assembly Government) to be decontaminated and brought back into use. Where these sites are within or close to the NER, project proponents should consider what can be done to contribute towards ecological connectivity and public access to green space. WAG may wish to consider how its portfolio of former industrial sites and regeneration projects can contribute to the delivery of the NER.

Transportation
Consideration of the potential impacts of new transportation projects on the natural environment is a statutory requirement, however new transportation corridors also have the potential to act as ecological corridors. Therefore transport planners and those interested in improving the transportation network (for example the South East Wales Transport Alliance - SEWTA) should be consulted regarding the NER. Cyclepaths have a high degree of compatibility with ecological corridors. It may therefore be possible to consider the possibility of routing cyclepaths into and through ecological connection corridors. Transport planners should consider how the NER can cross major barriers.

Forests and Woodlands
The Government owns large areas of forest estate in South East Wales, particularly in the Valleys Regional Park and within connections in the proposed NER. The Forestry Commission Wales has shown considerable enthusiasm in supporting the regeneration of the area (FC Wales 2008) and should be invited to cooperate with plans to develop the NER.

Flood and Catchment Management
The Environment Agency Wales is preparing Catchment Flood Management Plans (CFMPs) which will help to decrease flood risk by improving warning systems, working with the planning authorities and land managers and providing flood defences. Ecological restoration, which will be a key part of the development of the NER, often involves creating habitats that reduce run-off rates. The restoration of bogs and mires is a good example of this. Floodplain forest and, in urban areas, the larger components of Sustainable Drainage Systems, should be also considered. CFMPs could take account of the NER when proposed ecological connections are located within a catchment. Where improvements to rivers and flood defences are sought, these can be considered in relation to the Blue Network component of the proposed NER. In the Gwent Levels, cooperation should be sought with the Internal Drainage Boards in order to establish that component of the NER.

Carbon Sequestration
The growth of plants and soil building microbes in restored habitats results in the absorption of carbon dioxide (a greenhouse gas) from the atmosphere. Therefore the NER will become a carbon sink. Planting woodland or restoring wetland stores carbon in the vegetation and soil. In the UK storage rates of more than 1 tonne of carbon per hectare per year can be achieved and this has the potential to continue, with restored peat or coastal wetland, for example, over millennia. Signatories of the Kyoto Protocol (1998), which includes Wales through the UK, are committed to reducing green house gas emissions. Though relatively new, the establishment of voluntary offset and carbon trading schemes is underway and these have the potential to fund habitat restoration (especially wetland) elements of the NER.

Renewable Energy - Wood Products
Wood products, for example pellets derived from short-rotation coppice, can be used to fuel combined heat and power plants. Although willow or poplar short-rotation coppice (SRC) and other plantations would not be core components of an ecological network they could be included in buffer
areas or part of a wider parkland landscape. DEFRA has an grant scheme to assist with the establishment of energy crops and the Forestry Commission provide advice on the establishment and management of short rotation coppice. In Scandinavia and elsewhere, SRC has been shown to work well in lowland areas where it can be fertilised by (and therefore help to clean) wastewater from sewage treatment plants.

Rural Development Funding
The Welsh Assembly Government distributes funds through the Tir Gofal scheme from the EU Common Agricultural Policy budget to farmers and landowners. In recent years, the aims of support schemes have broadened from the single objective of increasing agricultural output to the wider objectives of improving the environment and diversifying the rural economy. Elements of the NER which require sensitive management of extensive farmland (both privately and publicly owned), could be funded in this way.

Partnership and Expertise
The delivery of the NER will be realised by genuine partnership of a wide range of organisations, both public and private. The Welsh Assembly Government will provide a strong and inspirational lead on strategic spatial planning and will consider the network as it undertakes both its rural and urban development programmes. The Countryside Council for Wales will continue to provide technical advice and policy support. The Environment Agency Wales will play an increasingly important role as the Water Framework Directive takes effect. The catchment management approach will bring the organisation into more contact with areas beyond the immediate vicinity of watercourses and floodplains. Local authorities, with their crucial role in local planning will shape the NER at the local level. Conservation organisations, including the RSPB and the Wildlife Trusts, amongst others, will play an important role in purchasing and managing core areas but also in restoring habitat within ecological connections and educating the public.
Appendix:

Case Studies
The Area

This study area is between Abergavenny and Ebbw Vale in the north of the region. The River Usk flows to the west of Abergavenny and to the north are the uplands of the Brecon Beacons National Park. The land is hilly with agricultural fields with hedgerows on the more gentle slopes and acid grassland and heathland on steeper inclines. Patches of woodland, some quite extensive, are dotted throughout the area. A number of roads lie between Brecon Beacons and land to the south including The Heads of the Valleys Road (A465T) and the A40.

Issues

- The A465T and A40 roads are barriers for the movement of wildlife associated with the woodland-heathland mosaic which occurs on both sides of the road.
- A large part of the land around the A465T and A40 trunk roads is poor quality habitat on agricultural land of limited permeability to some species.
- The current high value of crops might encourage cultivation of intensive crops instead of low intensity grazing or other wildlife friendly regimes (that would benefit, for example lapwing, a UK BAP Priory Species).
- There is a question as to whether or not uplands should be dominated by woodland.
- Sustainable transport routes (ie footpaths, cycleways) are not always available for use between towns, villages and countryside, thus making the region less attractive to tourists and people who wish to reduce reliance on the car.
- General lack of investment and depopulation in parts of the sub-region.

Objectives

- Ecological connectivity maximised, through creation of hedges, woodlands and restoration of heathlands etc. making links between the Heads of the Valleys, the Brecon Beacons National Park and south towards Pontypool.
- Use the river corridors (The Blue Network) to cross the HoV road.
- Support the creation of a successful Valleys Regional Park.
- Improved or new sustainable transport links throughout the Valleys Regional Park and between the Valleys Regional Park and the Brecon Beacons National Park and the Coast.
- Create a greener perception of the Heads of the Valleys.

Proposals

- Mosaic of woodland, heathland and bog to be established on uplands. Details will depend on analysis of site conditions and history.
- Agricultural land planted with new hedgerows with tree-lines planted and old hedges repaired. Only native species of trees and shrubs that occur locally should be used.
- Restoration of species-rich grasslands to be encouraged in lowland areas.
- Upgrade the ecological condition of the river corridors.
- Major towns of the Valleys are linked to the City Coast and where possible with each other by frequent services of low-carbon public transport.
- New footpaths and cycleway routes to be established between Heads of the Valleys and Brecon Beacons National Park.

Delivery

- Further more detailed GIS analysis and detailed network planning in local areas required.
- Most of the area’s agricultural land is considered to be poor or very poor in quality. Therefore it could still be appropriate for farmers to participate in the Tir Gofal (‘land in care’) agri-environment scheme despite increased value of land for food production.
- Existing public forest estate includes some plantations which can be restored to broadleaved woodland, heathlands or bogs.
- The South-East Wales Transport Alliance (Sewta) sees enormous potential in extending the local rail network. Perhaps this could be extended to bring tourists into this part of the HoV and nearer the Brecon Beacons?

Measuring success

Smart targets should be set (i.e. specific, measurable, achievable, realistic and time bound) regarding all aspects of the interventions needed to establish a working environmental network. Some specific targets should be tied into BAPs and management plans and/or correspond to particular policies and strategies. A key target would be area of habitat restored/created within the NER connection corridor locally. Indicator species can be selected to measure increase in increasing permeability of the landscape.
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Creation of mosaic of native heathland, grassland & woodland

Grassland mosaic restoration (eg. to benefit lapwing)

Major barriers

River corridor improvements

South East Wales
Case Study
Heads of the Valleys

Legend
- Study Area
- Rivers
- Designated Sites
- Ancient Woodland
- National Park

Habitat Association
- Woodland
- Coastal
- Wet (Mire, Bog and Fen)
- Miscellaneous
- Acid Grasslands
- General Grassland
- Major Roads
- Unimproved Grassland
- Networked Ecological Connections

Data Source: ESRI, Ordnance Survey, Welsh Assembly Government, CCW and EDAW
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Last Updated: September 2003
Framework for South East Wales Networked Environmental Region

Case Study
Llantrisant Area

The Area
Llantrisant is on the A473, 15 km north-west of Cardiff, and is part of a ribbon of towns and villages stretching 7 km north-east towards the River Taff. Another ribbon of urban development has grown up on the A468 on the other side of the river and this merges with the town of Caerphilly 4.5 km north-east. To the south lies the M4 motorway which has a number of ancient woodlands and protected sites particularly along its northern side stretching westwards towards Swansea. With the exception of major roads Llantrisant is virtually encircled by open countryside with agricultural fields (mainly improved grasslands with hedgerows) and patches of woodland.

Issues
- The Llantrisant - Caerphilly corridor has become increasingly developed with retailing, leisure complexes as well as housing. The two towns are in danger of becoming coalesced to the detriment of amenity and ecological connectivity.
- Llantrisant and north-west Cardiff which has seen major growth over the past 30 years is one of three Strategic Opportunities Areas (SOAs) that have been identified, which offer potential regional benefits if developed sustainably
- There is a need for many workers to commute to Cardiff because of the lack of employment opportunities locally
- A number of major roads encircle Llantrisant and Caerphilly and form formidable barriers in achieving wildlife permeability (especially North - South).
- Marshy grassland in this area supports the rare marsh fritillary butterfly, a UK BAP Priority species

Objectives
- To maintain the open nature of the land between Llantrisant, Caerphilly and Cardiff
- To link the land between Llantrisant and Cardiff to the wider countryside via a major green (mainly woodland but also species-rich grassland and hedgerow) connection which follows the northern side of the M4 corridor.
- Make provision for Priority BAP species (e.g. marsh fritillary butterfly) by including adequate habitat (e.g. marshy grassland) in woodland mosaics.
- To maximise the benefits of the River Taff corridor between Llantrisant and Caerphilly. (The Taff River also links the Heads of Valleys and the City Coast)
- To improve links from Llantrisant to Caerphilly and Cardiff by improved or new sustainable transport links including bus, train, cyclepath and footpath
- To ensure that adequate green infrastructure is provided in and around growth points in order to continue to provide essential ecosystem services

Proposals
- In the local plan, develop policies for the NER locally, which protecting open land corridors, if necessary through new developments.
- New wildlife habitat to be created in and alongside the Taff River
- Ecological connection corridors not to be planted solely with native woodland, but mosaic of restored species-rich grassland habitats to be included. Farms should see new hedgerows with potential tree-lines planted and old hedges repaired. Only native species of trees and shrubs that occur locally should be used for habitat restoration.
- Improved train services between Cardiff, Llantrisant and Caerphilly
- New sensitively designed footpaths and cycleways linking Cardiff, Llantrisant and Caerphilly

Delivery
- Further more detailed GIS analysis and detailed network planning in local areas required
- Development briefs and design codes to make special reference to NER requirements.
- River restoration agenda on River Taff to be discussed with Environment Agency Wales.
- Encouragement of traditional environmentally friendly land management practices via Tir Gofal or other applicable agri-environment schemes on suitably qualified land within green connections of NER.
- Liaison with SEWTA over sustainable transport aspects of NER locally.

Measuring success
Smart targets should be set (i.e. specific, measurable, achievable, realistic and time bound) regarding all aspects of the interventions needed to establish a working environmental network. Some specific targets should be tied into BAPs and management plans and/or correspond to particular policies and strategies. A key target would be area of habitat restored/created within the NER connection corridor locally. Indicator species can be selected to measure increase in permeability of the landscape.
Framework for South East Wales Networked Environmental Region

South East Wales
Case Study 3
Llanishen Area

Legend
- Marsh Frillery
- Study Area
- Major Roads
- Designated Sites
- Ancient Woodland
- Rivers
- Improbable Grassland
- Marshy grassland

Habitat Association
- Woodland
- Coastal
- Acid (Marl, Bog and Fen)
- Miscellaneous
- Acid Grasslands
- General Grassland

Data Source: ESRI, Ordnance Survey, Welsh Assembly Government, CCW and EDAW
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Last Updated: March 2009

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The Gwent Levels is a low-lying area of land located on the northern shores of the Severn Estuary, which is bounded by the conurbations of Newport and Cardiff. This landscape was first reclaimed from saltmarshes in Roman times and is crossed by a network of historic drainage ditches (reens) enclosing rich agricultural land. This is Wales' largest coastal grazing marsh and one of the top four in the whole of the UK. It is of exceptional importance for wildfowl.

Issues
- If poorly controlled, urban growth of Cardiff and Newport could affect the integrity of the Gwent Levels
- The Levels are of high ecological value, but have been undervalued in the past and management is not always ideal.
- The Levels provide a crucial coastal defence in a time of changing climate in what is a very important heavily populated area. For this reason, it is undoubtedly one of the key strategic environmental resources of the region.
- There is poor connectivity to the north because of the M48, M4 and other major roads.

Objectives
- The open land between Newport and Cardiff should be maintained and enhanced to function as a green lung for the growing cities of Newport and Cardiff
- New sustainable transport links (eg sensitively designed cyclepaths) can link Newport and Cardiff across the Levels
- Sustainable development of the Levels for wetland creation, ecotourism, education, carbon sequestration and similar purposes. Building on the good work of the Newport Wetlands Reserve
- The Levels linked to the wider countryside via the major 'blue corridors' of the Usk Valley.

Proposals
- Gwent Levels to be promoted as strategically important green infrastructure for Newport and Cardiff, a multi-use wetland in the form of a single landscape-scale project.
- New cyclepaths on sensitively planned and designed alignments
- New tram connection between Newport and Cardiff?
- Carbon sequestration projects funded by carbon trading. Example is the Regulated Tidal Exchange (RTE) pioneered by RSPB on Exe Estuary.
- River restoration projects improving links with Usk Valley.

Delivery
- Further more detailed GIS analysis and detailed network planning in local areas required
- Local plans, development briefs and design codes to make special reference to Gwent Levels and NER requirements. Planning approvals for major developments around key settlements may include conditions which support the NER.
- Wetland restoration, river restoration agenda on River Usk to be discussed with Environment Agency Wales.
- Encouragement of traditional environmentally friendly land management practices via Tir Gofal or other applicable agri-environment schemes on suitably qualified land within the Gwent Levels.
- Liaison with SEWTA/ Cardiff City Council/ Newport City Council over sustainable transport opportunities of Gwent Levels.

Measuring success
Smart targets should be set (i.e. specific, measurable, achievable, realistic and time bound) regarding all aspects of the interventions needed to establish a working environmental network. Some specific targets should be tied into BAPs and management plans and/or correspond to particular policies and strategies. A key target would be area of habitat restored/created within the Gwent Levels. Indicator species can be selected to measure increase in permeability of the landscape. Carbon stored through wetland creation should be measured and made public.
Framework for South East Wales Networked Environmental Region

South East Wales
Case Study
Gwent Levels

Legend
- Study Area
- Major Roads
- Rivers
- Green Belt
- Cycle routes
- Further development of Gwent Levels for city flood alleviation, biodiversity & recreation

Habitat Association
- Woodland
- Coastal
- Wet (Mire, Bog and Fen)
- Miscellaneous
- Acid Grasslands
- General Grassland
- Gwent Levels

Data Source: ESRI, Ordnance Survey, Welsh Assembly Government, CCW and EBAW
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