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Research Policy Analysis
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The Environmental Assessment of Plans and Programmes (Wales) Regulations 2004

East Wales ERDF Programme 2014-2020

Strategic Environmental Assessment
Environmental Report

April 2014

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Ex Ante Evaluation and Strategic Environmental Assessment for European Regional Development Fund Operational Programme 2014-2020
East Wales

STRATEGIC ENVIRONMENTAL ASSESSMENT

DRAFT ENVIRONMENTAL REPORT

APRIL 2014

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GLOSSARY OF ACRONYMS AND THEIR MEANINGS

AA	Appropriate Assessment, a statutory assessment of the likely and significant effects of a proposal on any site that is of European conservation interest (see SAC, SPA and Ramsar Site), under the terms of the Habitats Directive (92/43/EC). Part of the overall process of Habitats Regulations Assessment (see below).
AONB	Area of Outstanding Natural Beauty, a landscape designation under the National Parks and Access to the Countryside Act 1949.
BAP	Biodiversity Action Plan. Initially the UK government's response to the Convention on Biodiversity 1992 as its plan to halt biodiversity loss. Each of the UK nations now has its own BAP, as do all the local authorities (known as local biodiversity action plans or LBAPs). In Wales there are currently 24 of these. BAPs are non statutory documents.
Cadw	The name given to the Welsh Government's statutory body for the protection of Wales' built heritage, ancient monuments and sites.
CCT	Cross-cutting themes, a term used in the context of the Structural Fund programmes to denote compliance in terms of sustainable development, equal opportunities and poverty alleviation.
CCW	The Countryside Council for Wales, the Welsh Government's statutory body for the protection of biodiversity and landscape and the promotion of access to the countryside. Became part of Natural Resources Wales in April 2013.
CO_2	Carbon Dioxide, a greenhouse gas emitted when burning fossil fuels.
DEFRA	The Department for Environment, Food and Rural Affairs for the United Kingdom. Defra represents the UK's agriculture, fisheries, environment and rural community interests in Europe.
DG	Directorate-General, one of 32 departments of the European Commission.
EA	The Environment Agency, a non-departmental public body whose main duty is to safeguard the quality of air and the quality and availability of water. Became part of Natural Resources Wales in April 2013.
EAU	The Welsh Office Environmental Unit, a department of the Welsh Department prior to the establishment of the Welsh Assembly Government.
EC	The European Community

EEC	The European Economic Community
EIA	Environmental Impact Assessment (in the context of this document), a statutory assessment of the significant environmental effects of a plan or project, and the measures to avoid, mitigate or compensate, or to enhance the environment as an outcome. Operates under the terms of the EIA Directive 337/85/EEC.
ERDF	European Regional Development Fund, one of the EU's structural funds. A financial tool designed to reduce disparities by creating sustainable jobs, economic development, research and development, environmental protection and risk management.
ESF	European Social Fund, also one of the EU's structural funds. A financial tool designed to reduce disparities by promoting adaptability, access to employment, and social inclusion for disadvantaged people.
EU	The European Union.
gha	Global hectares, the measure of a population's ecological footprint.
GHG	Greenhouse gas or gases. As well as carbon dioxide, greenhouse gases include water vapour, methane, nitrous oxide and ozone, all of which contribute to the 'greenhouse' effect by absorbing and emitting radiation within the thermal infrared range.
GVA	Gross Added Value, an economic measure of the total value of goods and services produced in an area, sector or industry.
HRA	Habitats Regulations Assessment. The process of assessing the risk of likely and significant impacts on habitats and species of European conservation interest. The assessment entails a screening process, and where necessary a detailed analysis of likelihood and significance of impacts on biodiversity arising from a plan or project, known as an Appropriate Assessment.
ICOMOS	The International Council of Monuments and Sites, a professional association that offers advice on the protection and conservation of cultural heritage sites and structures around the world.
ICT	Information and Communications Technology.
IUCN	The International Union for the Conservation of Nature, a governmental and non-governmental forum that aims to find pragmatic solutions to environment and development challenges. It is the world's oldest and largest environmental network.
kWh/d/p	Kilo-watt hours per day per person, a measure of energy use.

LDP	Local Development Plan, the statutory local authority spatial plan policy document.
LULUCF	Land use and land use change and forestry, a sector defined by the United Nations as 'a greenhouse gas inventory sector that covers the emission and removal of greenhouse gases resulting from direct human-induced land use, land change and forestry activities.'
NEA	National Ecosystem Assessment, an initial assessment of the state of a nation's ecosystems, their services to human well-being, and a description of pressures and trends likely to influence their future condition.
NGO	Non-governmental organisation.
NNR	National Nature Reserve, a statutory designation that protects the natural interest of a site from potentially damaging operations, whether directly or indirectly.
ODPM	The Office of the Deputy Prime Minister.
R&D	Research and Development.
RDP	Rural Development Programme or Plan.
RSPB	The Royal Society for the Protection of Birds, a conservation NGO.
SAC	Special Area of Conservation, a designation for habitats and species requiring special protection as site of European conservation interest under the Habitats Directive (92/43/EC).
SEA	Strategic Environmental Assessment
SF	Structural Fund(s) are the financial tools set up to reduce regional disparities across the EU. The structural funds are the European Regional Development Fund and the European Social Fund.
SME	Small and medium enterprise. Three categories are defined by the European Commission: 'micro', with a staff of fewer than 10 and/or a turnover/balance sheet total of less than €2m; 'small', with a staff of fewer than 50 and/or a turnover/balance sheet total of less than €10m, and 'medium' , with a staff of fewer than 250 and/or a turnover/balance sheet total of less than €50m/€43m.
SoE	State of the Environment. An assessment of the environmental condition, pressures, responses and trends of a defined area, whether local or global.

SPA	Special Protection Area, a site or area designated for the protection of birds requiring special measures. As in the case of SACs (see above) these are sites of European conservation interest, established under the Birds Directive (79/).
SSSI	Site of Special Scientific Interest, a statutory designation that protects the natural interest of a site from potentially damaging interventions, whether directly or indirectly.
SUDS	Sustainable Urban Drainage Systems.
TEN-T	The Trans-European Transport Network, a transport infrastructure and traffic management system that incorporates rail, road, inland waterways, sea and air transport. Its aim is to facilitate ease of transport and travel across Europe.
UK	The United Kingdom of Great Britain (England, Scotland and Wales) and Northern Ireland.
US	The United States of America
WAG	The Welsh Assembly Government, otherwise known as the National Assembly for Wales, is the Welsh legislature established by the Government of Wales Act in 1998.
WEFO	The Welsh European Funding Office,
WFD	The Water Framework Directive,
WG	The Welsh Government, the executive of the Welsh Assembly Government, established by the Government of Wales Act 2006.

GLOSSARY OF TERMS

Avoidance In the context of this report, avoidance is used to mean a decision not to proceed with a project in order to avoid an impact; to relocate a project in order to avoid an impact; or to manage a project in such a way that it avoids an impact that may be seasonal in nature.

Cumulative or synergistic In the context of this report, cumulative effects are effects which alone do not result in a significant impact, but collectively do so. For example the cumulative effect of a number of acceptable developments, or discharges that individually do not have a significant impact. Synergistic effects are those that are not simply cumulative, but result in a further effect that may be positive or negative. The effects of chemical cocktails in a river may be synergistic, as may be the economic and social effects of interventions.

Ecological footprint An indicator of the demands made on the environment by a population, measured in global hectares. The ecological footprint for Wales in 2006 was about 4.4 gha. In other words, the population is consuming the equivalent of 4.4 'planet earths'.

Environmental Assessment A method or procedure for predicting the effects on the environment of a proposal, either for an individual project or a higher-level strategy (a policy, plan or programme), with the aim of taking account of these effects in decision-making. The term “Environmental Impact Assessment” (EIA) is used, as in European Directive 337/85/EEC, for assessments of projects. In the SEA Directive, an environmental assessment means “the preparation of an environmental report, the carrying out of consultations, the taking into account of the environmental report and the results of the consultations in decision-making and the provision of information on the decision”, in accordance with the Directive’s requirements.

Environmental Report A key output of the SEA process as required by the SEA Directive. Sets out to identify, describe and evaluate the likely significant effects on the environment of implementing a plan or programme.

Ex Ante Evaluation The process of evaluating the overall effects of a programme prior to its adoption. Carried out in parallel with the development of a programme, in order to inform it in terms of likely outcomes in order to optimise its implementation.

Indicator A measure of variables over time, used in this case to measure the extent to which objectives are being attained.

Mitigation Used in this case to refer to measures to reduce or offset significant adverse effects on the environment.

Objective: A statement of what is intended, specifying the desired direction of change as a result of interventions

Plan or Programme: The term “plan or programme” covers any plans or programmes to which the SEA Directive applies.

Responsible Authority: The organisation which prepares a plan or programme subject to the Directive and is responsible for the SEA. In this case WEFO is the responsible authority.

Scoping: The process of determining the extent and level of detail of an SEA, including the environmental effects and alternatives which need to be considered, the assessment methods to be used, and the structure and contents of the Environmental Report.

Screening: The process of deciding whether a plan or programme requires SEA.

Strategic Environmental Assessment (SEA): Generic term used to describe environmental assessment as applied to policies, plans and programmes. In this report, “SEA” is used to refer to the type of environmental assessment required under the SEA Directive.

SEA Directive: European Directive 2001/42/EC “on the assessment of the effects of certain plans and programmes on the environment”.

SEA Regulations: The regulations transposing the SEA Directive into law, namely The Environmental Assessment of Plans and Programmes (Wales) Regulations 2004.

Significant environmental effects: Effects on the environment which are significant in the context of a plan or programme. Criteria for assessing significance are set out in Annex II of the SEA Directive.

1 INTRODUCTION

1.1 Purpose

1.1.1 This Strategic Environmental Assessment (SEA) report of the East Wales European Regional Development Fund (ERDF) Programme ('the proposed Operational Programme') has been produced by Bangor University in association with Old Bell3 on behalf of the Welsh European Funding Office (WEFO). The assessment has been carried out in accordance with the requirements of the European SEA Directive (2001/42/EC) and the implementing regulations for Wales, the Environmental Assessment of Plans and Programmes (Wales) Regulations 2004 (Welsh Instrument 2004 No. 1656 (W.170)).

1.1.2 This SEA is carried out in conjunction with the development of the proposed Operational Programme and the Ex Ante Evaluation. It sets out to ensure that the proposed Operational Programme contributes positively to a high level of environmental protection, as well as supporting the goal of the Welsh Government (WG) of working towards sustainable development. It does this:

- by setting out the environmental parameters within which the proposed Operational Programme will operate;
- by identifying, describing and assessing likely significant effects on the environment arising from the proposed Operational Programme's implementation;
- by considering reasonable alternatives.

The purpose of this SEA is therefore is to ensure that it informs the development of the proposed Operational Programme before its adoption, and to provide an environmental context for its implementation.

1.2 SEA requirements

1.2.1 This Environmental Report complies with the requirements of the Environmental Assessment of Plans and Programmes (Wales) Regulations 2004 (Welsh Instrument 2004 No. 1656 (W.170)) (see paragraph 1.1.1 above). Table 1 identifies those sections within the Environmental Report that relate to the specific requirements of Regulation 12 and Schedule 2 of the Regulations.

Table 1: References to the SEA Regulations

Environmental Report - Information to be included	
1. An outline of the contents, main objectives of the plan, and of its relationship with other relevant plans and programmes.	**Section 3 pages 28-31**
2. The environmental characteristics of areas likely to be significantly affected.	**Section 4 pages 32-65**
3. Any existing environmental problems which are relevant to the plan including, in particular, those relating to any areas of a particular environmental importance, such as areas designated pursuant to Directives 79/409/EEC and 92/43/EEC.	**As above; see in particular section 4.17 pages 62-63**
4. The environmental protection objectives, established at international, Community or Member State level, which are relevant to the plan and the way those objectives and any environmental considerations have been taken into account during its preparation.	**Appendix 1**
5. The likely significant effects on the environment, including short, medium and long-term effects, permanent and temporary effects, positive and negative effects, and secondary, cumulative and synergistic effects, on issues such as: biodiversity; population; human health; fauna; flora; soil; water; air; climatic factors; material assets; cultural heritage including architectural and archaeological heritage; landscape; the interrelationship between the above factors.	**Section 5 pages 66-84**
6. The measures envisaged to prevent, reduce and as fully as possible offset any significant adverse effects on the environment of implementing the plan.	**As above; see section 5.2 pages 76-83**
7. An outline of the reasons for selecting the alternatives dealt with, and a description of how the assessment was undertaken.	**Section 6 pages 85-88**
8. A description of measures envisaged concerning monitoring in accordance with Regulation 17.	**Section 8 pages 92-93**
9. A non-technical summary of the information provided under paragraphs 1 to 9.	**Accompanying document**

1.3 SEA process prior to the Environmental Report

1.3.1 An **initial meeting** between the consultants and WEFO and Welsh Government officials was held on 10 December 2012 in Cardiff to determine the broad nature and scope of the SF programmes and to establish a timetable for consultation.

1.3.2 Subsequently, a **Screening Report** was produced on January 4 for consultation with the statutory bodies (the Environment Agency, the (then) Countryside Council for Wales and Cadw), in accordance with the requirements of the SEA Directive, in order to determine the need for a full SEA of the East Wales ERDF Programme. It was confirmed that, owing to the potentially significant effects that could arise from the proposed Programme, a full SEA was required.

1.3.3 A meeting was held with the then Countryside Council for Wales to discuss our approach to the SEA in terms of biodiversity concerns.

1.3.4 A **Scoping Report** was produced on 14 January 2013. The first draft Environmental Report was based on responses to the Scoping Report and to subsequent consultations with statutory and non-statutory interests (see Appendix 6 for a list of consultation respondents).

1.3.5 WEFO organised a series of consultation events to engage stakeholders in the development of the 2014-2020 SF and RDP Programmes. As part of these events, stakeholders were given the opportunity to comment on the first draft Environmental Report. A second draft Environmental Report was produced in response to those consultations.

1.3.6 This third draft has been produced in order to reflect the most recent iteration of the proposed West Wales and Valleys Operational Programme (7 October 2013), and reviews the analysis of the proposed Operational Programme's objectives.

2 SEA PROCESS AND ASSESSMENT METHODOLOGY

2.1 Approach and overall SEA tasks

2.1.1 The approach that has been adopted is based on a number of advisory documents, chiefly the guidelines of the former Office for the Deputy Prime Minister (ODPM) 2005[1], and the EC's guidance documents on implementing the SEA Directive[2] and Ex Ante Evaluation (Annex 1) 2012[3]. Note was also taken of guidance provided by the Environment Agency[4], the Countryside Council for Wales[5], RSPB[6], and the Scottish Executive[7].

2.1.2 Table 2 describes the SEA stages and tasks.

Table 2 SEA stages and tasks

STAGE	TASK
Setting the context and objectives	*Establish the baseline and deciding on the scope.* *Identify/review relevant policies, plans and programmes and sustainable development objectives that will affect or influence the programme.* *Collect relevant social, environmental and economic baseline information.* *Identify key sustainability issues for the SEA to address and define objectives.*

[1] *"A Practical Guide to the Strategic Environmental Assessment Directive". ODPM 2005.*
[2] *"Implementation of Directive 2001/42 on the Assessment of the Effects of Certain Plans and Programmes on the Environment". European Commission DG Environment. Undated.*
[3] *"Guidance document on ex ante evaluation. The Programming Period 2014-2020. European Regional Development Fund. European Social Fund. Cohesion Fund". European Commission DG Regional Policy. DG Employment, Social Affairs and Inclusion, June 2012.*
[4] *"Strategic Environmental Assessment and Climate Change: guidance for practitioners". Environment Agency. August 2011.*
[5] *"Strategic Environmental Assessment. Guidance for Practitioners". Countryside Council for Wales. SEA Guidance Note series. August 2007.*
[6] *"Strategic Environmental Assessment. Learning from Practice". RSPB. Undated.*
[7] *"Strategic Environmental Assessment Toolkit". Natural Scotland. Version 1 September 2006.*

STAGE	TASK
Setting the context and objectives *(continued)*	*Develop SEA framework, objectives, indicators and targets.* *Test the plan or programme objectives against the sustainability objectives and whether the programme objectives are consistent with one another.* *Produce scoping report and undertake consultation with the consultation bodies.*
Developing and refining the options	*Carry out appraisal of the proposed programme options and make recommendations for improvement.*
Appraising the effects of the draft programme	*Predict effects and carry out assessment of the effects of the draft programme* *Propose measures to maximise benefits and mitigate adverse effects.* *Develop proposals for monitoring.* *Prepare the Environmental Report of the draft programme.*
Consulting on the Environmental Report and draft Programme	*Consult on the Environmental Report along with the draft programme.* *Carry out appraisal of significant changes made as a result of consultation.*
Implementation and monitoring	*Inform consultees that the programme has been adopted.* *Issue statement summarising information on how the SEA results and consultees' opinions were taken into account, etc.* *Make programme and final Environmental Report available for public viewing.*

2.2 Challenges in undertaking the SEA

2.2.1 The study was constrained by two key factors:

- By its nature, the proposed Operational Programme is not spatial, but provides generic descriptions of the kind of activities likely to be supported under each priority and theme across the whole of the East Wales area. It was therefore difficult at times to envisage potential significant environmental effects with certainty, and therefore a precautionary approach has been taken to the assessment of effects.

- Conversely, the Programme is itself constrained by the need to prioritise regional economic activity, and the timescale over which it will operate. Therefore, the identification of *reasonable* alternatives is constrained in terms of alternative themes or combinations of themes, alternative timescales and alternative priorities.

2.3 Development of SEA objectives

2.3.1 Whilst there is no requirement under the SEA Directive to produce objectives or indicators as part of the SEA process, their use is promoted as an appropriate tool for identifying and assessing potential environmental effects, both positive and negative.

2.3.2 The objectives were developed from a review of literature that included:

- The draft 2014-2020 Operational Programme consultation documents (together with the post-consultation ERDF Operational Programmes)
- WEFO's Environmental Sustainability Cross Cutting Theme Matrix and Guidance[8]
- The Welsh Government: Programme for Government[9]
- Wales Environment Strategy[10]
- Wales National Ecosystem Assessment[11]
- EU 6th Environmental Action Plan & Sustainable Development Strategy[12]

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[8] *The consultation documents issued 14 January 2013. The Cross Cutting Guidance comprises 14 Guidance notes listed in the bibliography*

[9] *Programme for Government. Welsh Government. 2011 (http://wales.gov.uk/docs/strategies/ 110929fullen.pdf & http://wales.gov.uk/docs/strategies/120528fullen.pdf)*

[10] *WAG Cardiff. Environment Strategy Action Plan October 2008. (http://wales. gov.uk/ desh/publications/enviroprotect/environmentstrategy/environmentactionplan/esap0811e.pdf;jsessionid =7D4C112D25E2CF42B4AD153E9C57CDA0?lang=en)*

[11] *National Ecosystems Assessment (2011): Chapter 20: Status and Changes in the UK's Ecosystems and their Services to Society: Wales. World Conservation Monitoring Centre Cambridge.*

[12] *Decision No 1600/2002/EC of the European Parliament and the Council laying down the sixth community environmental action programme. July 2002. (http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=OJ:L:2002:242:0001:0015:EN:PDF)Summary and explanation. (http://europa.eu/legislation _summaries/ agriculture/ environment/l28027_en.htm)*

- 2007-13 ERDF East Wales Strategic Environmental Assessment[13]
- Wales Spatial Plan[14]
- European Commission Core Indicators[15]
- EU2020 targets[16]

2.3.3 As well as the review of the above literature, the following local level documents were analysed in order to develop a comprehensive list of both high level and locally focused objectives:

- Powys County Council Unitary Development Plan. Adopted Plan. Strategic Environmental Assessment. Final Report. March 2010.
- Cardiff Local Development Plan 2006-2026. Strategic Environmental Assessment. Scoping Report 2011.
- Flintshire Unitary Development Plan. Sustainability Appraisal and Strategic Environmental Assessment. Sustainability Report Addendum. August 2007.
- Monmouthshire Local Development Plan. Draft Sustainability Appraisal and Strategic Environmental Assessment. Scoping Report. March 2008.
- Monmouthshire Local Flood Risk Management Strategy. Strategic Environmental Assessment. December 2012.
- Newport Local Development Plan. Initial Sustainability Appraisal Report. January 2010.
- Vale of Glamorgan Local Development Plan. Sustainability Appraisal Scoping Report. July 2007.
- Wrexham Local Development Plan Sustainability Appraisal. Draft Scoping Report. August 2006.

[13] *DTZ/Royal Haskoning (2006): West Wales and the Valleys ERDF Convergence Programme 2007-13. Strategic Environmental Assessment Environment Report. Draft report. Royal Haskoning Exeter*
[14] *Welsh Assembly Government (2008): People, Places, Futures. The Wales Spatial Plan. 2008 update. July 2008. WAG Cardiff.*
[15] *European Commission. Programming period 2014-2020. Monitoring and evaluation of European cohesion policy - European Regional Development Fund and Cohesion Fund. Concepts and Recommendations. Guidance document. November 2011. (http://ec.europa.eu/regional_policy/information/evaluations/guidance_en.cfm#1)*
[16] *Communication from the Commission. Europe 2020 - a strategy for smart, sustainable and inclusive growth. (http://eur-lex.europa.eu/LexUriServ/LexUriServ. do?uri= COM: 2010: 2020: FIN:EN:PDF) (see also http://ec.europa.eu/ europe2020/pdf/targets_en.pdf for specific targets).*

2.3.4 The result of this process was the development of 48 generic questions, namely:

In its delivery, will the Programme:

- *help to protect or enhance historic buildings, areas and areas of landscape/townscape character?*
- *improve access to buildings and landscapes/townscapes of historic/ cultural value?*
- *increase the total area of land designated for its landscape/townscape quality?*
- *use architectural design to enhance and promote the local distinctiveness and the "sense of place" of development?*
- *protect and enhance landscape and seascape character?*
- *increase levels of light pollution?*
- *increase levels of noise pollution?*
- *improve the quality and increase the quantity of publicly accessible open space?*
- *deliver more sustainable location patterns?*
- *improve the management of the impacts of access and recreation?*
- *protect and enhance rare or endangered species and habitats and provide opportunities for habitat creation/restoration?*
- *protect habitats and minimise the fragmentation of nature corridors and networks in accordance with Biodiversity Action Plans?*
- *provide opportunities for people to come into contact with and appreciate wildlife and the natural environment?*
- *avoid damage to sites of geological interest?*
- *maintain and enhance ground and surface water ecological and chemical quality?*
- *maintain levels of abstraction and recharge within the carrying capacity of the region?*
- *improve the quality of coastal waters?*
- *maintain and improve local air quality?*
- *reduce the amount of derelict, contaminated, degraded and vacant/ underused land?*
- *encourage the development of brownfield land in preference to greenfield where appropriate?*
- *avoid the loss of good quality soils to development?*
- *maintain and enhance soil quality? maintain and enhance soil quality?*
- *reduce greenhouse gas emissions?*
- *contribute to the ability to adapt to the impacts of climate change?*
- *reduce or manage flooding?*
- *ensure sustainable use of raw materials (e. g. timber, fresh water, minerals)?*
- *reduce imported materials such as minerals?*
- *promote the use of recycled and secondary materials?*
- *reduce the need for energy?*
- *increase the production and/or use of renewable energy?*

- *increase energy efficiency (e.g. energy efficiency in buildings, transport modes, etc)?*
- *reduce the use of fossil fuels?*
- *avoid dependency of new development on remotely derived energy resources?*
- *reduce car traffic?*
- *encourage walking, cycling and use of public transport?*
- *encourage development to coalesce into compact nodes?*
- *improve access to and encourage the use of ICT?*
- *reduce HGV traffic by switching to alternative transport modes?*
- *increase proportion of waste recycling and reuse?*
- *reduce the production of waste?*
- *reduce the proportion of residual waste to landfill?*
- *reduce hazardous waste?*
- *reduce waste in the construction industry?*
- *promote healthy lifestyles?*
- *reduce health inequalities among different groups in the community?*
- *provide development patterns that do not harm the linguistic character of Welsh speaking communities?*
- *encourage the mainstreaming of the Welsh language? encourage the mainstreaming of the Welsh language?*
- *ensure settlements can absorb growth without damage to character?*

2.3.5 These were distilled into 34 objectives. In order to reflect the high level of the Programme, and in keeping with previous and other SEAs at this level, these provided the basis for the 13 objectives against which the Programme was assessed, and were retained as sub-objectives. The 13 objectives were grouped under three headings:

- The need to protect and enhance natural and cultural values for their own sake;
- The need to conserve the natural resources that humanity relies on;
- The need to protect and enhance the environment in which people live and work

2.3.6 In carrying out the assessment, then, reference is made to the 13 objectives and their sub-objectives. Table 3 contains a list of the SEA objectives and sub-objectives against which the effects of the proposed Operational Programme are assessed in section 5.

2.3.7 It should also be noted that the objectives are not scored or weighted, since they are interdependent and potentially mutually reinforcing. However, it is recognised that *within* some objectives there is a hierarchy of priority concerns. For example the objective to 'protect and enhance biodiversity' implies that in some circumstances, *avoidance* must be the only option (in the

case of ancient woodlands, say, or of designated habitats and species), whereas in others, *mitigation* and/or *compensation* might be appropriate. In any case, all mitigation and compensation measures must ensure an *enhancement* of the status quo wherever possible, should relate to any development proposal in terms of scale, and should be local to that proposal.

Table 3 List of SEA objectives and sub-objectives

	Objective	Sub-objective
Protect and enhance natural and cultural heritage	1. Protect places, landscapes and buildings of historic, cultural and archaeological value	Deliver Cadw's conservation programme for monuments in state care, alongside the designation of further heritage assets
	2. Protect and enhance landscapes, seascapes, townscapes and the countryside	Improve the quality of the local built environment
		Develop an integrated approach to eco-system health
		Improve management of common land
		Protect and enhance access to the coastline and countryside
		Avoid significant alteration to urban landscape character
	3. Protect and enhance biodiversity	Protect internationally, nationally and locally designated nature conservation sites
		Protect Biodiversity Action Plan (BAP) habitats and species, increase area of habitat

	Objective	Sub-objective
Protect and conserve natural resources	4. Protect and improve the region's water quality	Monitor and regulate known and emerging environmental hazards
		Protect and enhance the quality of groundwater, rivers, lakes, and coastal waters
		Comply with 'good' status under the Water Framework Directive (WFD)
		Protect and enhance the salmonid and other fisheries
		Avoid physical disturbance to the water and water edge environment
		Reduce diffuse pollution from agriculture, acid precipitation and other sources
	5. Protect the water resource and ensure its sustainable use	Maintain levels of abstraction and recharge within the carrying capacity of the region

		Maintain and enhance ground and surface water physical, ecological and chemical quality
		Monitor use and discharge rates
	6. Guard against land contamination, encourage reuse of existing buildings and of previously developed land of low ecological quality	Introduce higher construction standards in new housing
		Monitor and regulate known and emerging environmental hazards
	7. Minimise the requirement for energy generation use, promote efficient energy use and increase the use of energy from renewable resources	Generate up to twice as much renewable electricity annually by 2025 as we use today
	8. Minimise waste increase re-use, recycling and recovery rates	Restrict biodegradable materials going to landfill
		Re-use materials from existing buildings
	9. Minimise the need to travel; provide alternatives to car use	Optimise opportunities to work locally
		Promote sustainable transport
		Protect and enhance public transport system
		Legislate to place a duty to provide cycle routes in key areas

Maintain and improve the human environment	**Objective**	**Sub-objective**
	10 Limit and adapt to climate change	Reduce emissions of greenhouse gases
		Provide measures to enable adaptation to climate change
		Ensure infrastructure and material assets are resilient to potential increases in extreme weather events (such as storms, floods and heat waves, as well as extreme cold weather).
		Build in flexibility to enable the modification of assets in the future without incurring excessive cost.
		Work to ensure we have a sustainable food and fisheries industry
		Protect and manage soil
		Reduce the risk of flooding
		Complete flood and coastal risk plans
	11. Protect and improve air quality	Minimise the use of processes that produce toxic air pollutants, and incorporate extensive safety and capture processes for those that occur

	12. Improve physical and mental health and reduce health inequalities	Minimise environmental nuisance such as fly-tipping, littering, dog fouling, graffiti, noise pollution, and light pollution
		Monitor and regulate known and emerging environmental hazards
		Protect and enhance existing greenspace
	13. Improve public access to land	Improve opportunities to access green space

2.4 Development of SEA indicators

2.4.1 The indicators were adapted from the review of literature, as shown in Appendix 2. There is no scoring or weighting in the case of indicators.

The indicators and their relevant objectives are shown in Appendix 3.

2.4.2 It should be noted that the proposed Operational Programme for East Wales has its own indicators, based on Commission core indicators and specific programme indicators set by the European Commission, as well as specific programme indicators. These are separate to the indicators referred to here, and include, for example, a number of economic indicators that are not relevant to this report. Appendix 4 lists the indicators for each of the four Priority Axes contained in the proposed Operational Programme.

2.5 Assessment methodology

2.5.1 The assessment consists firstly of an analysis of each of the potentially supported types of actions listed in the proposed Operational Programme against the objectives of the SEA, based on a range of criteria derived from the Directive and supporting guidance. The criteria are discussed in section 2.6.

2.5.2 The results of this analysis were aggregated and set out as a basic compatibility test, as illustrated in section 5.2.

2.5.3 Finally, levels of risk were assessed for proposed supported actions that appeared to produce a negative effect when matched against the SEA objectives. Negative effects were considered in terms of:

- The possibility of the effect exceeding a standard established by policy[17].
- The possibility of the effect exceeding a threshold established by a regulation or an EC directive.
- Acceptability of the effect by acknowledged interests most likely to be impacted on by it.

2.5.4 Risk was assessed for the *likelihood* of a negative effect occurring, and the *significance* of the effect should it occur as a result of the proposed intervention. This element therefore highlights the need for avoidance, mitigation or compensation, or a combination of them. This is shown in section 6.1.

2.6 Criteria for analysis

2.6.1 The criteria for the detailed analysis were developed on the basis of advice given in the ODPM guidance document, which refers to *'...scale and permanence and the nature and sensitivity of the receiving environment.'* (p.32) and the advice given by DG Environment[18]

2.6.2 Some indicative activities may be *irrelevant* to the SEA objective, and this is indicated where this is judged to be the case. In some cases this may be not known, in which case it will be indicated as such. Where an indicative activity may be relevant, this is indicated as having a *direct* effect, an *indirect* effect, or an effect that may be *cumulative* or *synergistic.*

2.6.3 Such effects may be *negative* or *positive*, and these may be differing in degree, so as to indicate very positive or very negative impacts.

2.6.4 Assessment also needs to be made with reference to *spatial extent*, that is whether the effect is likely to be local, regional, national or international; and to *duration*, that is whether the effect is likely to be short (1-2 years), medium (3-5 years), long (6+ years) term or permanent.

2.6.5 These criteria are described below (Table 4), and were used to carry out the detailed analysis of effects.

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[17] *For example, some operations such as the restoration of land by the use of soil materials and its subsequent aftercare are based in part on conditions related to planning policy (see TAN 6 Planning for Sustainable Rural Communities). Likewise the standards that apply to the development of renewables (in terms of location, visual effects, spatial layout etc.) are largely based on policy (see TAN 8 Planning for Renewable Energy). Wales policy statements are also relevant.*

[18] *"Implementation of Directive 2001/42 on the Assessment of the Effects of Certain Plans and Programmes on the Environment". DG Environment. Undated.*

Table 4: Criteria used for analysis of effects

Reference	Symbol	Description
Irrelevant	**O**	An indicative activity is judged not to impact on the SEA objective.
Unclear	**?**	Difficult to envisage an impact, but limited confidence that there will be no impact.
Direct	**Dir**	There will be a discernible change to an aspect of the environment directly resulting from implementing an activity.
Indirect	**Ind**	There will be a discernible 'downstream' or 'parallel' change to another aspect of the environment, as a result of implementing an activity.
Cumulative/synergistic	**CS**	There will be a discernible change to an aspect of the environment arising from a number of anticipated activities.
Negative	**x**	There will be a loss or reduction in the integrity of an aspect of the environment.
Positive	✓	There will be an increase in the integrity of an aspect of the environment.
Local	**L**	Any discernible change to an aspect of the environment is likely to be at the farm/ neighbourhood/community/habitat scale.
Regional	**R**	Any discernible change to an aspect of the environment is likely to be at a county or sub-regional level.
National	**N**	Any discernible change to an aspect of the environment is likely to be beyond the scale of the Programme but not beyond Wales.
International	**Int**	Any discernible change to an aspect of the environment is likely to have international implications.
Short term	**ST**	Any discernible change to an aspect of the environment as a result of an activity is likely to last from 1-2 years
Medium term	**MT**	Any discernible change to an aspect of the environment as a result of an activity is likely to last for 3-5 years
Long term	**LT**	Any discernible change to an aspect of the environment as a result of an activity is likely to last beyond the life of the Programme (6+ years) but will not be permanent
Permanent	**P**	Any discernible change to an aspect of the environment as a result of an activity is likely to be permanent

2.6.6 The risk analysis of potentially negative effects used was tabulated using the symbols and criteria shown here:

Definite	**Def**	The effects will be inevitable unless remediated in some way.
Probable	**Prob**	These effects are likely to occur as a result of the implementation of an indicative action.
Possible	**Poss**	These effects may occur as a result of the implementation of an indicative action.
Unlikely	**Unl**	Effects are unlikely to occur as a result of the implementation of an indicative action alone.

Low	Any effect arising from a proposed intervention is likely to be minimal. No adaptation of the Programme is anticipated.
Moderate	Any effect arising from a proposed intervention is likely to be significant. The Programme may require adaptation.
High	Any effect arising from a proposed intervention is likely to be substantial. The Programme will require adaptation.

2.7 Habitats Regulations Assessment

2.7.1 The Scoping Report identified a number of sites of European interest within the East Wales Programme area, including approximately 35 Special Areas of Conservation (SACs) wholly or partly within the East Wales Programme area; approximately 4 Special Protection Areas (SPAs) wholly or partly within this area; and 3 Ramsar sites[19]. They are discussed in more detail in section 4 of this report.

2.7.2 Despite its non-spatial nature, as a result of the consideration of the potential for effects of the proposed Operational Programme on SACs and SPAs and on European protected species in the first draft Environmental Report, and further to discussions held with the then CCW, it was agreed that a separate Habitats Regulation Assessment (HRA) should be undertaken by the same team. The Assessment is being presented in parallel with this Environmental Report.

2.7.3 Given the proposed Operational Programme's high-level nature, the effect of the Assessment has been to screen it out. Any subsequent lower-tier plan or project is likely to require its own Habitats Regulations assessment as a matter of law or policy.

[19] *Source - JNCC (http://jncc.defra.gov.uk/page-4) accessed 18/01/2013. It should be noted that in some cases, a site may be designated under two or all three categories.*

2.8 Scoping

2.8.1 The Scoping Report is a key element of the environmental assessment of the proposed Operational Programme, and some aspects of that report are retained here in an amended form.

2.8.2 As well as those documents listed above (section 2.3.2) which informed the development of objectives and indicators, a number of other European, UK and Wales-level plans, programmes and policies were reviewed, in order to identify linkages between the proposed Operational Programme and this SEA, and to provide information on priorities and environmental issues. A summary of that review can be found in Appendix 1.

2.8.3 Whilst the full list is too lengthy to provide in full, the following key Wales policy documents have informed this report:

- One Wales One Planet (2009)
- Wales Spatial Plan (2008 update)
- Environment Strategy (2010 update)
- Tourism strategy (2006/2010 update)
- Transport Strategy
- Waste Strategy
- Energy Policy Statement (2010)
- Climate Change Strategy (2010)
- Coastal Flood Erosion Strategy (2011)
- Historic Environment Strategy (2012)
- Infrastructure Investment Plan (2012)
- Sustaining a Living Wales (2012)
- Planning Policy Wales (2011)

2.8.4 In addition, a number of SEAs undertaken for Plans, Policies and Programmes were examined:

- South East England Regional Assembly: ERDF Programme 2007-13 SEA
- WEFO: West Wales and the Valleys ERDF Operational Programme 2007-13 SEA
- Environment Agency: Western Wales River Basin District Management Plan SEA. December 2008
- Welsh Government. Flood and Coastal Erosion Risk Management: National Strategy. Habitat Regulations Assessment. June 2011
- North Wales Regional Waste Group. Strategic Waste Management Options SEA. October 2007
- Welsh Assembly Government. National Transport Plan SEA. March 2010

- Forestry Commission Wales. Woodlands for Wales Strategy. Voluntary SEA. March 2009
- Welsh Assembly Government. Wales Spatial Plan Update. SEA Statement. March 2009

3 The PROPOSED ERDF OPERATIONAL PROGRAMME

3.1 Introduction

3.1.1 The proposed Operational Programme establishes a framework for ERDF investment in East Wales for the period 2014-2020 (figure 1). The current proposal provides information on the Programme's objectives in the context of European, UK and Wales policies. It also describes the Programme's selected priorities, and a list of interventions that could support activity over the next funding period.

3.1.2 The proposed Operational Programme is designed to deliver economic development in a sustainable manner, that is in a manner that does not diminish Wales' environmental and social values. Furthermore, it *'...should be implemented in a way which ensures opportunities are not lost to exploit and strengthen economic, social and environmental outcomes.'*[20]

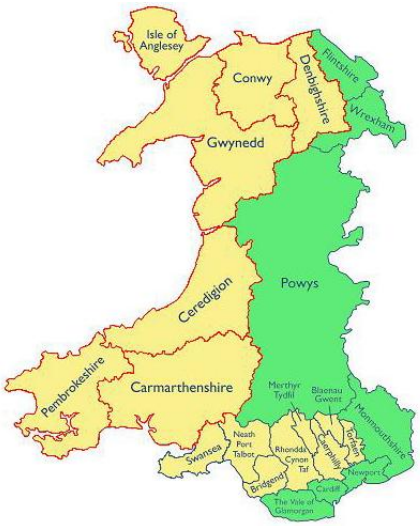

Fig.1 East Wales Structural Funds area

3.2 Vision, Axes and Specific Objectives

3.2.1 Although the most recent draft Operational Programme proposal[21] does not set out a specific vision, previous documents have stated that:

'Our vision is that by 2020, we will see a confident, ambitious and entrepreneurial Wales, prospering from sustainable economic growth. In line with the Welsh Government's clear commitment to sustainable development, including equality and inclusion, and tackling poverty the programme should be implemented in a way which ensures opportunities are not lost to exploit and strengthen economic, social and environmental outcomes.' [22]

3.2.2 The proposed Operational Programme has been based on the selection of six appropriate Thematic Objectives (TO's) from a suite of eleven such objectives

[20] *Consultation on European Structural Funds Programmes for West Wales and the Valleys 2014 - 2020*
[21] *7 October 2013*
[22] *Consultation on European Structural Funds Programmes for West Wales and the Valleys 2014 - 2020*

defined by the European Commission in its Common Provisions Regulation[23]. The selected TO's are:

- Strengthening research, technological development and innovation (TO1)
- Enhancing access to and use and quality of ICT (TO2)
- Enhancing the competitiveness of SMEs (TO3)
- Supporting the shift to a low-Carbon economy in all sectors (TO4)
- Promoting sustainable transport and removing bottlenecks in key network infrastructures (TO7)
- Promoting social inclusion and combating poverty (TO9)

3.2.3 The proposed Operational Programme is working to four Priority Axes that aim to address the above TO's:

Axis 1 **Research and Innovation** (comprising elements related to TO1 and TO4)

Axis 2 **SME Competitiveness** (comprising elements related to TO1, TO3, TO2 and TO9)

Axis 3 **Renewable Energy and Energy Efficiency** (relating to TO4 only)

Axis 4 **Connectivity** (comprising elements related to TO2 and TO7)

3.2.4 A number of Specific Objectives have been devised under each axis, namely:

Axis 1 Research and Innovation

1. To increase the success of Welsh research institutions in attracting competitive and private research funding.
2. To increase the level of innovation undertaken across all sectors of the Welsh economy, in particular within Welsh SMEs, leading to a growth in productivity.
3. To increase the successful translation of research and innovation processes into new and improved commercial products, processes and services, in particular through improved technology transfer from HEIs.
4. To increase the success of Welsh research institutions in attracting competitive and private research funding (related to low carbon research and innovation).
5. To increase the successful translation of low Carbon research and innovation processes into new and improved commercial products,

[23] See Brussels, 14.3.2012; COM(2011) 615final/2 http://ec.europa.eu/regional_policy/sources/docoffic/official/regulation/pdf/2014/proposals/regulation/general/general_proposal_en.pdf

processes and services, in particular through improved technology transfer from HEIs.

Axis 2 SME Competitiveness

1. To increase the amount of finance available to SMEs for both business start-up and for business expansion.
2. To increase the number of SME start-ups through the provision of information, advice and guidance and support for entrepreneurship.
3. To increase SME productivity through the provision of advice and guidance, in particular through encouraging ICT exploitation.
4. To increase the growth of those SMEs with growth potential, in particular through accessing new markets (both domestic and international).
5. To address market failures in the availability of finance, in particular risk capital, for Welsh SMEs to undertake innovation and commercialise R&D.

Axis 3 Renewable Energy and Energy Efficiency

1. To increase the number of small-scale renewable energy schemes established.
2. Increase the energy efficiency of the existing Welsh housing stock, particularly in areas of fuel poverty.

Axis 4 Connectivity

1. Increasing urban mobility to and from key urban and employment centres to increase access to jobs.
2. To increase the access of Welsh businesses to high speed ICT networks in peripheral areas and strategic sites to support increased levels of productivity and business growth.

3.3 Conclusion

3.3.1 Flexibility will be required to allow for programming choices that reflect evolving needs and changing circumstances within the period of the proposed Operational Programme. It will be essential that the Operational Programme achieves a transformational effect on the Welsh economy and its people, and this will need to be demonstrated to the European Commission. This particular report is concerned with ensuring that at worst the Operational Programme is delivered without detriment to the environment; at best that it ensures enhanced environmental impacts, benefiting people and the economy. In all cases transparency should be sought in the decision-making process and consideration for the environment be seen as an opportunity rather than a threat.

3.3.2 It should be noted that there is commitment to integrate and align the Structural funds with the Rural Fisheries funds, an important development in strategic thinking and planning compared to the approach under the current 2007-2013 programmes. Whilst appreciating that alleviation of poverty and regeneration of communities is an overarching ‘must have’ from the perspective of stakeholders, the importance of the environment in achieving these ‘people’ and ‘prosperity’ aspirations must be made clear at the outset.

4 ENVIRONMENTAL ISSUES AND BASELINE DATA

4.1 Introduction

4.1.1 The scoping process aimed to identify the key environmental issues that will influence the proposed Operational Programme development, and to scope in or out those issues that are relevant to the achievement of its objectives. This section describes the current state of the environment for the sub-region, in order to provide a context for understanding the potential for adverse (and positive) effects that may arise from the proposed Operational Programme's implementation.

4.1.2 Because the proposed Operational Programme does not identify particular land allocations, the baseline is inclusive in its scope. It would be premature to assume that it will not influence certain environmental aspects, however slightly.

4.2 Sourcing baseline data

4.2.1 The State of the Environment Statistical Bulletin (2012) provides an annual summary on a range of indicators reviewing the state of the environment and allocates them a status based on their long term trends[24]

4.2.2 The indicators, on which the above summary is based, cover a variety of topics including climate change, waste, flooding, water quality and biodiversity. The results for individual indicators can be found in the 'State of Environment Report' which is published alongside the bulletin. In addition to the report, data is available via the StatsWales website[25].

4.2.3 Some of the statistics in the State of the Environment report correspond to or are similar to some of the Welsh Government's Sustainable Development Indicators[26]. The status of some indicators may differ between the two publications (for example, ecological footprint). This is because the Sustainable Development Indicators look at more recent trends and present progress against an agreed set of indicators from a baseline year of 2003 (or the nearest year for which data are available), whereas the State of the Environment report considers progress over a longer term (in some cases, where data permits, from the 1990s).

[24] *http://wales.gov.uk/topics/statistics/ theme/environment/?lang=en#*
[25] *https://statswales.wales.gov.uk/Catalogue/Environment-and-Countryside*
[26] *http://wales.gov.uk/topics/statistics/headlines/sustaindev/120829/?lang=en*

4.2.4 As well as these key sources, the literature review included a number of other documents and websites such as the UK National Ecosystem Assessments, Health Statistics, ERDF 2007-13 East Wales Analysis, Environment Strategy and Action Plan, and the Wales Sustainable Development Scheme.

4.2.5 Whilst there are no significant contradictions between statistics, some anomalies were identified as a result of different baseline scopes, starting dates, criteria and indicators and perhaps different approaches to aggregating data. Where relevant, these have been indicated.

4.2.6 Much of the immediately available data is based either at local (i.e. development plan and below) levels or at Wales or UK levels, and is presented here largely at Wales level. Where possible, specific reference is made to East Wales, bearing in mind the diversity of character within this region.

4.3 East Wales - Overview

4.3.1 East Wales covers an area of 7,650 km^2 with about 150km of coastline[27]. East Wales is highly diverse topographically, ecologically, geologically and culturally, with a population of some 1.1 million, 36% of the total population of Wales, living in a highly diverse mix of urban and rural settlements.

4.3.2 Whilst much of the region's population lives in concentrated settlements such as Cardiff (population 341,000), Newport, Flint and Wrexham, East Wales is predominantly rural[28] with agriculture being the dominant land use[29].

4.3.3 Administratively, the region contains the local authorities of Cardiff, Flintshire, Monmouthshire, Newport, Powys, Vale of Glamorgan and Wrexham. The economy is highly diverse, with relatively affluent areas especially around the Vale of Glamorgan and Monmouthshire, and relatively depressed areas in parts of Powys, Wrexham, Flint and Newport.

4.3.4 East Wales is largely defined by the irregular border with England. On the western side the mass of the Cambrian Mountains and its function as a watershed and catchment for several major rivers is another defining element.

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[27] *The length of the coast varies according to different measurement criteria. The source used here is CCW, 2006, 'Advice to the Welsh Assembly Government - Extending Access to the Coast' which gives the length as 1296km.*
EUCC: http://www.coastalguide.org/wales/ gives the total length as 1562km. The British Cartographic Society gives the length as 2740km: http://www.cartography.org.uk/default.asp?contentID=749.

[28] *For a discussion on definitions of 'rural' see Pateman, T. (2011). Rural and Urban areas: comparing lives using rural/urban classifications. Office for National Statistics.*

[29] *UK 2005. The Official Yearbook of the United Kingdom of Great Britain and Northern Ireland. London: The Stationery Office. 2004. pp. 279. ISBN 0-11-621738-3.*

The Glamorgan Heritage Coast, between Aberthaw and Porthcawl and the Severn Estuary establishes the southern boundary.

4.3.5 The Rivers Dee in the north and Severn flowing east and south create two broad river valley landscapes and their estuaries define the north and south eastern points of Wales. Each of these is a Ramsar site and is therefore of international conservation value. The lower courses of the Wye and the Usk are also nationally significant because of their wooded valleys and the pattern of settlement along their banks.

4.3.6 The three main upland areas are the Berwyn Mountains, the Cambrian Mountains and the Radnorshire Hills. These are largely grazed peat moorland, although there are significant areas of afforestation and of windfarm development. In contrast, Monmouthshire and the Vale of Glamorgan are two of the most fertile parts of Wales and are characterised by their prosperous farming communities, small towns and villages.

4.3.7 East Wales includes much of the Brecon Beacons National Park, part of the Fforest Fawr geopark and one AONB, the Wye Valley. The Gwent Levels are an important wetland area, which includes the National Wetland Centre. East Wales has significant areas of country and urban parkland. These include green tongues along river banks that create links or corridors into the countryside.

4.3.8 The larger part of the East Wales area is within the central landmass of Wales. It tends therefore to be colder in winter than the west of Wales, and to have a slightly lower rainfall[30]. The potential for hotter weather due to climate change patterns might affect the water catchment levels in rivers and reservoirs.

4.3.9 The Countryside Council for Wales (now Natural Resources Wales) produced the Wales Tranquil Areas Map in 1997 to provide a national assessment showing the areas of land affected by noise and visual intrusions (including light pollution) in the landscape. The Map was updated in 2009 to enable the change in extent of tranquil areas over the last twelve years to be assessed[31]. Light pollution within this central landmass is low because of the lack of large settlements. In contrast, it is high around the settled areas on the south coast and in the north east.

[30] *See www.metoffice.gov.uk/climate/uk/wl/print.html*
[31] *Wales Tranquil Areas Map (2009), Report by Land Use Consultants for CCW*

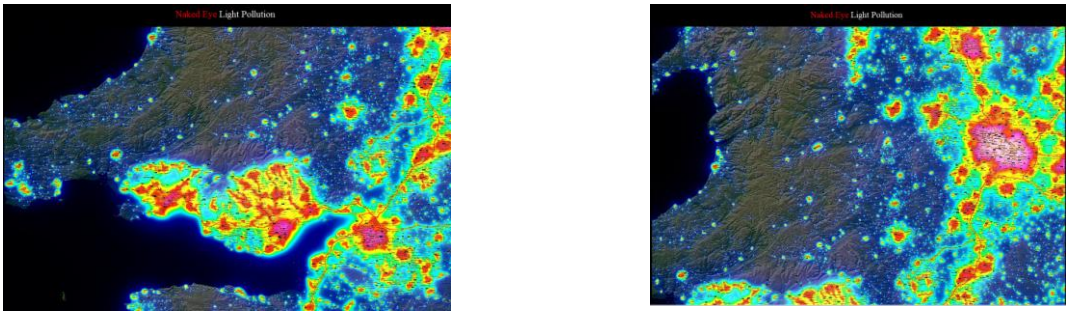

Fig 2: Light pollution in Wales. Source Stargazers Forum

4.3.10 Pollution from carbon, nitrous oxide and particulate emissions is likely to vary considerably between areas of relatively limited road traffic and the industrialised commuter conurbations. On the other hand, ground level ozone is associated with rural areas.

4.3.11 Any significant manufacturing industry is largely confined to the Cardiff-Newport area. Other industrial, agricultural, and forestry practices are associated with polluting water courses, sensitive habitats and coastal/marine environments[32]. Redundant and abandoned mines are the source of groundwater pollution, and with increasing flood conditions, this is a problem that may be exacerbated[33]. There may be localised incidents linked to leachate leaking from poorly secured landfill sites[34]

4.3.12 The main direct link between the northern part of East Wales and the southern part is the A483 trunk road from Chester that links the main settlements on the eastern side and which meets with the A470 from the north west and with various other trunk roads coming from the west. The M4 provides a fast road spine between Chepstow and Bridgend.

4.3.13 The urban industrialised border of Flintshire and Wrexham (the Dee Triangle) in the North East that has well-developed links with parts of England particularly West Cheshire, Manchester and Liverpool. Commuting flows testify to these links as 31% of Flintshire's working residents work outside

[32]*See StatsWales for example: https://statswales.wales.gov.uk/Catalogue/Environment-and-Countryside/State-of-the-Environment/Environmental-Hazards/NumberOfDaysWithModerateOrHigherPollutionLevels-by-Area-Year*

[33]*See for example 'Industrial and Urban Groundwater Pollution'. UK Groundwater Forum. BGS NERC 'The State of Groundwater in England and Wales. Environment Agency. (undated). cdn.environment-agency.gov.uk/geho0906bldb-e-e.pdf*

[34] *See for example: http://www.bbc.co.uk/news/uk-wales-19048472*

Wales and 17% of Wrexham's residents work outside Wales, approximately three times the average for Wales[35].

4.3.14 Recent flood events have resulted in severe localised disruption of road traffic in parts of South Wales. The incidence of severe weather is projected to increase over the next 30 years[36]. This has clear implications for the functioning of the regions concerned and future of their resilience and attractiveness to inward investors and to businesses already located within the region.

4.3.15 The rail link between Wrexham and Newport or Cardiff runs via Shrewsbury. People living in the rural hinterland of East Wales are dependent on private vehicles and buses for transport. The urban south and the Vale of Glamorgan are served by a main line railway and some local lines.

4.3.16 East Wales has a significant diversity of cultural character and heritage, although the Welsh language is not as well represented as in the north and west. In the north east and south coasts, there is a significant reliance on tourism, partly linked to the industrial histories of these areas.

4.3.17 The distinctive character of local architecture and building are mainly found in traditional farm buildings and structures associated with them, and tend to reflect the historic availability of local materials. There are also significant industrial sites, including a UNESCO World Heritage Site.

4.4 Biodiversity[37]

4.4.1 Of the 21,000 km^2 land and freshwater surface area of Wales, about 30% is protected in special sites for wildlife, scenic beauty or geological value.

Protected Areas in Wales

3 National Parks
5 AONBs
14 Heritage Coasts
1 Biosphere Reserve
2 Geoparks
92 SACs
20 SPAs
Over 1,000 SSSIs (about 12% of the country's' surface)

[35] *East Wales Socio-economic analysis - Annex A to the East Wales ERDF Programmes for 2014-20 consultation January 2013*
[36] *See the UK Climate Projections for Wales: http://ukclimateprojections.defra.gov.uk/21772*
[37] *Data derived from JNCC http://jncc.defra.gov.uk/page-1399; and from CCW http://www.ccgc.gov.uk/landscape--wildlife/protecting-our-landscape.aspx; unless stated.*

72 National Nature Reserves (over 25,000 ha of land)
*1 Marine Nature Reserve (over 1,000 ha of sea)**
92% of NNRs by area are also sites of international importance for wildlife
40% of designated habitats and species are considered to be in favourable condition, and over30% are in a process of recovery
11 RSPB reserves
236 Wildlife Trust reserves

** The Welsh Government is in the process of expanding the number and size of Welsh Marine Reserves*

4.4.2 The three National Parks and five Areas of Outstanding Natural Beauty are categorised as IUCN Category V Protected Landscapes, and occupy 24 per cent of Wales' terrestrial space (5,078 km2). In these areas there is an enhanced consideration of environmental matters in the management of development. Of these three, the eastern part of the Brecon Beacons National Park is within the East Wales programme area.

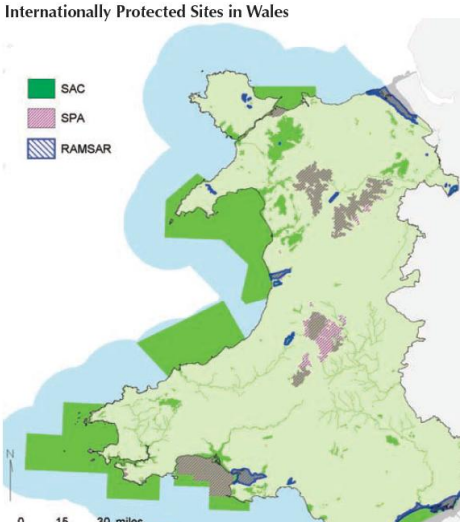

Fig 3: European and Ramsar Sites Source: Special Sites

4.4.3 123,058 Ha is designated under the European Birds Directive as Special Protection Area (SPA), and 628,726 is currently designated under the Habitats Directive as Special Area of Conservation. As figure 2 indicates, much of the designated SAC is marine and estuarine. The Severn and Dee estuaries were fully declared as SACs in 2009. Other important SACs in East Wales include the Berwyn Mountains, parts of the Cambrian Mountains and the catchments of the Wye and Dee rivers.

4.4.4 In common with other countries in Europe, Wales missed its international biodiversity targets in 2010. In 2005, 59% of Biodiversity Action Plan habitats in Wales were in declining condition. Priority habitats classed as stable or improving increased from 30% in 2002 to 36% in 2008. Fifty-four per cent of Biodiversity Action Plan species were assessed as being in 'unfavourable condition' in 2008, but with considerable variation between species groups. For example, 80% of marine mammals and birds were in favourable or recovering condition, while 80% of amphibians, butterflies and fish were recorded as being in unfavourable condition.

Biodiversity Action Reporting System (BARS 2011)
Condition of habitats

Decline across 60% of marine habitats
Decline across 8% of terrestrial habitats*
Decline across 33% of freshwater habitats
Improvement or stability in 80% of terrestrial habitats*
Improvements or stability in 66% of freshwater habitats
Improvement in 83% of Woodland, upland & Enclosed Farmland habitats
Same or accelerated decline in 25% of wetlands and coastal habitats
Apparent slowing decline in lowland grassland and heathland

UK NEA 2011
'Status & Changes in the UK's Ecosystems and their Services to Society':
Chapter 20 Wales
Key Findings

** About 12% are fluctuating/reveal no clear trend*

4.4.5 BAP-related interventions appear to be concentrated in north, south and west Wales. The BARS reporting system[38] has mapped nearly 3,400 actions, and has described nearly 1,700 unmappable actions. These include, for example, interventions by trusts to restore heathland habitats for black grouse (RSPB Berwyn), to restore field margins as corridors (Denbighshire Wildlife Trust), or by local authorities and NRW to remove invasive plant species (upper Severn).

4.4.6 Sixty-one per cent of habitat features and 67 per cent of species features for which SAC's were designated are in unfavourable condition. Distribution in terms of condition status is not known, but it is possible that particular features are more challenging in terms of achieving favourable status, depending for example, on surrounding land uses, interactions with other activities and species, and the general biodiversity condition of surrounding areas.

4.4.7 Whilst East Wales has a limited coastal area relative to West Wales, it is well represented, and therefore worth noting that coastal and marine habitats are under particular pressure, with the majority in stable or declining condition. Specifically, the condition of saltmarsh and coastal lagoons is equivocal or stable, whilst cliffs, dunes and shingle show a weak decline in condition[39]. Marine habitats are mostly stable[40], and there has been a downward trend in some polluting substances in the marine environment[41] . The Dee and

[38] *http://ukbars.defra.gov.uk/planning/actionmap*
[39] *UK NEA 2010 Chapter 20*
[40] *UK MAAS 2010*
[41] *State of the Environment Report 2012*

Severn Estuary habitats are shared with England, and are therefore vulnerable to development pressures from either shore.

4.4.8 Other indicators present a mixed picture, particularly in the case of birds, with some farmland and woodland birds showing marked declines (some species showing a 42.7% decrease in range) and others (16.9%) an increase in populations[42].

4.4.9 Drivers of change in Coastal Margin Habitats include:

- Changing tourism patterns and interests
- Land use demands
- Climate change
- Nitrogen deposition
- Sea-level rise

4.4.10 The National Assembly Sustainability Committee's 2010 report into biodiversity loss[43] lists 19 recommendations for addressing the challenge, including:

- Driving the ecosystem approach into policy and across all government departments in Wales
- Focusing more on biodiversity in the wider landscape rather than dependence on protected sites alone
- Involving the private sector in biodiversity management through the use of incentives and payments for ecosystem services

4.4.11 Invasive species, such as the signal crayfish (Pacifastacus leniusculus), 'killer shrimp' (Dikerogammarus villosus)[44], Himalayan balsam (Impatiens glandulifera), Japanese knotweed (Polygonum cuspidatum), parrot's feather (Myriophyllum aqauaticum), floating pennywort (Hydrocotyle ranunculoides), and Water fern (Azolla filiculoides) are giving rise to concern since they threaten a number of native species, choke waterways and banks, and in some cases damage infrastructure. In coastal waters, Japanese wireweed (Sargassum muticum), New Zealand barnacle (Elminius/ Austrominius modestus) and algae such as Heterosiphonia japonica are also becoming problematic.

4.4.12 Further information on East Wales European protected habitats and species is provided in the Habitats Regulations Assessment carried out in parallel with this report.

[42] *Ibid.*

[43] *Sustainability Committee National Assembly for Wales 'Inquiry into Biodiversity in Wales' 2011*

[44] *http://www.environment-agency.gov.uk/homeandleisure/wildlife/31350.aspx*

4.5 Population and human health

4.5.1 The population of East Wales varies considerably across its constituent authorities[45]. Cardiff (341,000) contains more than twice the population of the next largest authority, Flintshire (150,000). In terms of pure numbers, Monmouthshire contains the smallest population (88,000).

4.5.2 In terms of space, Powys (5,196km^2) is by far the largest authority, which gives its population (131,000) a density of 25 persons per km^2, in contrast to that of Cardiff, whose density is 2,431persons per km^2. The population of the Vale of Glamorgan has a higher density (377 persons per km^2) is considerably more dense than that of the other significant commuter and dormitory area, Flintshire (265 persons per km^2).

4.5.3 The Welsh Government's Sustainable Development Scheme 'One Wales: One Planet (May 2009) defines wellbeing (p19) as:

'...a positive physical, social and mental state; it is not just the absence of pain, discomfort and incapacity. It requires that basic needs are met, that individuals have a sense of purpose, that they feel able to achieve important personal goals and participate in society. It is enhanced by conditions that include supportive personal relationships, strong and inclusive communities, good health, financial and personal security, rewarding employment and a healthy and attractive environment.'

4.5.4 The State of the Environment Report (July 2012) sets outcomes for health and wellbeing and provides detailed information on progress, based on sets of indicators. Its main findings on the condition of health and wellbeing in Wales are summarised here:

- In 2009/10, 50.3% of respondents found it very easy to access parks or open space and a further 35.6% found access fairly easy, a decrease from 89.9% in 2005 to 85.9% in 2009/10.

- 20% of adults reported currently being treated for high blood pressure, 14% for a respiratory illness, 12% for arthritis, 11% for a mental illness, 9% for a heart condition, and 7% for diabetes.

- 29% of adults reported being physically active on 5 or more days in the past week.

[45] *Annex A - socio-economic profile of East Wales - 2014-20 ERDF Programme consultation. January 2013*

- 57% of adults were classified as overweight or obese, including 22% obese. 35% of children were classified as overweight or obese, including 19% obese.

- In 1997, 78.2% of people travelled to work by car. In 2011, this had risen to 80.7% (+2.5%). In 1997, 11.2% of people walked to work. In 2011 this had fallen to 10.3%.

- (-0.9%). Over the same period people using public transport had fallen from 8.8% to 7.5% (-1.3%), and those travelling by bicycle had fallen from 1.9% to 1.4% (-0.5%).

- Having peaked at just over 5,200 per 100,000 self-reported illnesses made worse by work in 2005/6, the figure currently stands at just under 4,000 per 100,000. There were 5,863 reported injuries to employees in 2011, a 4.4% decrease from the previous year.

4.5.5 Although the number of homes has steadily increased since 1986, the rate of housing stock unfitness has continued to fall (Welsh House Condition Surveys and Living in Wales Survey 2004). By 2008 the number had reduced from 19.5% of the 1986 total (199,000 dwellings) to 4.1% (52,100).

4.5.6 The 2004 Living in Wales property survey estimated that only 0.8% of all social housing met the Welsh Housing Quality Standard. By 2008 this figure was about 6%. Although the trend continues to be downwards, as building standards are raised, the 'fitness' bar is likely to be raised, especially as 'unfitness' relates to 11 standards including disrepair, dampness and ventilation. A failure to meet any one of the 11 standards will classify the dwelling as unfit for habitation.

4.5.7 Volunteering is seen as an indicator of social cohesion and as a reflection of people's confidence and willingness to participate and to donate time, and may be a valuable indicator of general well-being. The number of environmental volunteers across a sample of 14 Wales Environment Link member organisations was 36,615 in 2009/10 an apparent increase over previous years. However, 2011/12 has seen a significant reduction to 24,315 volunteers.

4.5.8 A variety of health data sources (see Welsh Government 'Key Health Statistics for Wales' 2012; Wales Health Survey 2011) report issues surrounding lifestyle habits including smoking, alcohol use and obesity. Whilst these are not of direct relevance to the programme, travel to work, the working environment, access to space and recreation, reductions in stress

levels, living conditions and so on are undoubtedly factors that relate to the types of interventions envisaged here.

4.5.9 Of more direct relevance is the Index of Multiple Deprivation[46] data for access to the 'physical environment', which is defined in terms of air quality and risk of flooding. Whilst much of East Wales is considered to be relatively free from flood risk and from exposure to low air quality, there are areas such as the Dee estuary, and parts of the coast where this is problematic (figure 3).

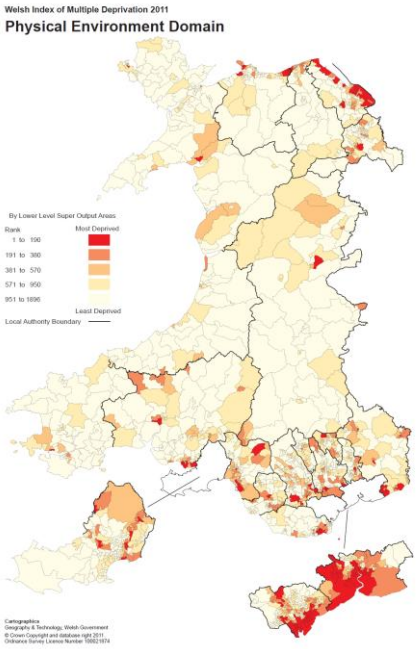

Fig 4. Index of Multiple Deprivation - physical environment

4.5.10 Access to essential services such as education and health are of concern to some remote communities. The trend towards the centralisation of public services in order to deliver financial efficiency will need to consider where new development can best be located. Services must be accessible to as many people as possible, and if a low carbon future is to be envisaged, would need to be accessible by public transport.

4.5.11 Changes in climate leading to more adverse weather conditions may make it impossible to access centralised education/ health services for those living anywhere other than in their immediate vicinity, and may also make it difficult for employees to travel to work if there are long journeys involved.

4.6 Soils and material assets

4.6.1 Globally, soil is under stress from a number of factors, including erosion, loss of organic matter, salination, compaction, contamination, loss of biodiversity, eutrophication and acidification.

4.6.2 Development, agricultural intensification, erosion, pollution and loss of carbon are all potential challenges, with potential impacts on human health, food productivity, biodiversity, ecosystem functions and the economy.

4.6.3 Whilst other measures promoted soil protection, there was no distinctive measure within Europe that aimed specifically to protect the quality and productivity of the soil. The European Commission published a proposal for a

[46] *See wales.gov.uk/topics/statistics/publications/wimd11summary/?*

framework directive on the protection of the soil in 2006[47], and more recently has published a report on the implementation of the Soil Thematic Strategy[48], which was an output of the Sixth European Environmental Action Programme[49].

4.6.4 Soil is a critical area of policy concern, and a number of questions are subject to research in order to be able to address challenges such as sustaining the soil's capacity to sequester carbon, to maintain its micro-organic biodiversity and to sustain its productivity.

4.6.5 Whilst soil types are well understood and have been categorised[50], there are still gaps in understanding its structure and function. Whilst some of these issues relate more to the Wales Rural Development Plan, aspects of the proposed Operational Programme have a bearing. Air pollution, waste, infrastructure, flood risk management and energy demand all have a direct or indirect relationship to the physical, chemical or biological quality of the soil.

4.6.6 The rate at which the soil carbon store is changing in Wales is the subject of some debate, with apparently contradictory results from two major UK surveys; the National Soil Inventory[51] and the Countryside Survey 2007[52]. Issues such as carbon storage, soil compaction[53] and erosion[54] are and have been subject to research.

4.6.7 Concern also revolves around the potential impact of climate change. As the Welsh Government has put it,

'Climate change is also expected to lead to changes in soil composition. A reduction in the carbon content of soil will lead to a reduction in the capacity of the soil to absorb rainfall.[55]'

4.6.8 Soil and land contamination is a concern, especially in post-industrial environments where the cost of remediating polluted land is high. The total

[47] COM (2006) 232 final. Proposal for a directive establishing a framework for the protection of soil and amending Directive 2004/35/EC
[48] COM (2012) 46 final. Report on implementation of the Soil Thematic Strategy and ongoing activities. 2012
[49] EU 6th Environmental Action Programme. http://ec.europa.eu/environment/newprg/index.htm
[50] Avery, B.W. (1980). Soil classification for England and Wales [Higher Categories]. Survey Technical Monograph No. 14, pp67. Harpenden, UK.
[51] Bellamy et al 2005
[52] Emmett et al. 2010
[53] Research Study BD5001: Characterisation of Soil Structural Degradation Under Grassland and Development of Measures to Ameliorate its Impact on Biodiversity and Other Soil Functions. Newell Price and Chambers 2012.Literature Review. Critchley and Kirkham 2011.
[54] See Bellamy and Rickson (2011) Monitoring Soil Erosion in England and Wales. Cranfield University.
[55] Welsh Government National Strategy for Flood and Coastal Erosion Risk Management in Wales. Nov 2011:14

amount of contaminated land in Wales is unknown, although a baseline desk study assessment of contaminated and derelict land in Wales (EAU 1988) indicated 752 potentially contaminated sites covering 3,721 ha and 10,900 ha of derelict land.

4.6.9 As well as soils, the use of Wales' other material resources such as timber and rock are an area which should be considered.

According to the British Geological Survey/Office for National Statistics, the amount of aggregate taken in Wales was (2005):

- Land-based sand and gravel - 64,606,000 tonnes
- Marine dredged landings - 12,996,000 tonnes
- Crushed rock - 102,181,000 tonnes

4.6.10 Wales lacks a plentiful supply of terrestrial sand and gravel, and therefore relies on marine dredged sources to supply a Wales-wide demand. The implication is that Wales needs either to import supplies or to intensify its dredging activity in order to meet a significant increase in infrastructural development or that the level of infrastructure proposed is unsustainable.

4.6.11 Wales' State of the Environment Report (2012) indicates that:

- 45% of construction and demolition waste was reused and recycled in Wales in 2003 and 2005, compared with 52% in England in 2005.

- The percentage of construction and demolition waste used for landfill engineering and restoration in Wales increased from 11% in 2003 to 32% in 2005.

- The percentage of construction and demolition waste spread on exempt facilities in Wales decreased from 35% in 2003 to 17% in 2005.

- Currently no data are available regarding the total amount of aggregates used in Wales. It is estimated that 12.2 million tonnes of construction and demolition waste was produced in Wales in 2005-06. Just under half of this was aggregate waste, i.e. secondary aggregates.

- The percentage of aggregates (excluding construction and demolition waste) used from secondary and recycled sources in Wales has generally increased since 2004 though in 2010 it decreased slightly compared with the previous year.

4.6.12 Timber is a critical natural resource for Wales. The preliminary National Forest Inventory map, based on analysis of 2006 aerial photographs, identifies 304,000 hectares of woodlands in Wales. The Inventory indicates that conifer woodland covers 129,600 hectares of all woodland (43%), and broadleaved 116,000 hectares (38%). Mixed conifer and broadleaved woodland accounts for 12,000 hectares, 4% of woodland area. Other areas (15%) include felled areas, young trees, and shrub.

4.6.13 About 65% of the coniferous woodland is owned by the Welsh Government, whilst a high proportion of broadleaved woodland is privately owned. The timber resource is under-exploited owing to competitively priced imported timber (Jones 2011).

4.6.14 The issue of biomass is important in this context. Europe faces a biomass shortage with demand expected to increase by 50% over the next 10 years[56]. Within the UK alone, the total amount of biomass burnt each year will increase 10 fold from 5 million tonnes to 50 million tonnes once all of the existing and currently proposed biomass power stations come into operation. This sudden and increased demand is causing a surge in imported biomass fuels from 13% to 68% with imports being 3 times greater than the UK's current wood production alone[57].

4.6.15 There is an opportunity to promote the use of timber as a sustainable construction material and, in the context of biomass, as part of reducing the carbon footprint of the construction sector. However, timber processing is a low margin, heavily regulated sector that operates in an international market. Welsh haulage costs compare poorly with those of international producers and are very sensitive to increases in the price of fuel. Locally, the environmental impacts of timber haulage can be considerable.

4.6.16 Land is clearly a matter of interest, particularly the amount of previously developed land available. The general planning policy is to redevelop such 'brownfield' land where feasible rather than establishing new development on 'greenfield' sites, especially where such sites are agriculturally of higher grade.

4.6.17 Although there appear to be no statistics, there is likely to be considerably more brownfield land available in the larger settlements of Cardiff, Newport and Wrexham than in the smaller communities in Powys and Monmouthshire. The latest figures[58] are somewhat dated, but indicate (perhaps unsurprisingly)

[56] *http://www.hortweek.com/news/1060886/Woodfuel-Taskforce-warns-future-report/*
[57] *http://www.forestry.gov.uk/pdf/WoodfuelTaskForceUpdateReport_2011.pdf/$FILE/WoodfuelTaskForceUpdateReport_2011.pdf*
[58] *https://statswales.wales.gov.uk/Catalogue/Environment-and-Countryside/Land*

that the greatest period of land reclamation occurred throughout the 1990's and has since tailed off.

4.6.18 There is only one Green Belt in Wales (between Newport and Cardiff), and the need to contain urban sprawl or locate new industries on urban fringes needs to be balanced against intensifying the already relatively dense urban environment, and to provide higher quality green infrastructure in Wales' larger settlements. There is a wide-range of serious environmental, social and economic challenges to consider such as developing housing to meet demographic changes; ensuring that the environment is resilient to a changing climate; maintaining adequate supplies of water; managing flood risk; securing food and energy supplies; and safeguarding against biodiversity loss. Green infrastructure has a critical role in meeting many of these challenges.

4.7 Air quality

4.7.1 Given the diversity of landscape and land cover, the geology, density of settlements, quality of housing, employment patterns, traffic flow and densities of traffic, the quality of the air is likely to vary across East Wales.

4.7.2 Air quality relates to a number of variables, including carbon monoxide and dioxide, nitrous oxide, particulates, methane, ozone and radon.

4.7.3 In the previous century much of the air pollution problem was associated with the burning of fossil fuels such as coal for heating and industrial purposes, leading to smoke emissions containing high levels of sulphur dioxide. The major threat to clean air is now posed by traffic emissions. Petrol and diesel engines emit a wide variety of pollutants, principally carbon monoxide, oxides of nitrogen, volatile organic compounds and particulates, which are having an increasing impact on air quality, particularly in urban areas[59] (see figure 5).

4.7.4 Air quality in parts of the Valleys area is relatively poor in EU terms[60]. In the past, Wales' weather systems have helped to ameliorate the effects of air pollution, but with increasingly unpredictable patterns of weather there is a possibility of deteriorating quality. A few councils, such as Powys have declared Air Quality Management Areas (AQMA) where air quality

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[59] *For example, Newport local development plan SEA refers to this issue. In the Vale of Glamorgan LDP SEA, the eastern Vale is referred to in this context*

[60] *http://www.businessgreen.com/bg/news/2187762/exclusive-eu-prepares-legal-action-uks-pollution*

consistently exceeded thresholds[61], but East Wales in general has no AQMAs[62].

4.7.5 In contrast to the urban environment, ozone, which is a greenhouse gas, can be a health hazard at ground level, and is more likely to occur in rural environments (figure 5)[63].

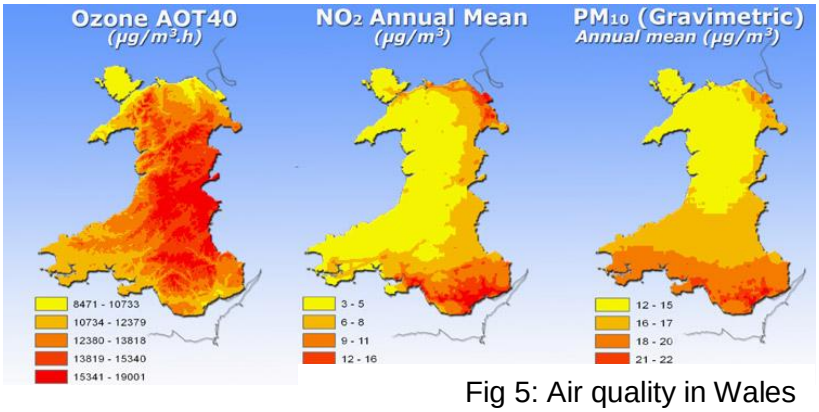

Fig 5: Air quality in Wales

4.7.6 Some parts of East Wales are designated as radon affected areas. Areas where more than 1% of homes exceed the Government Action Level for radon include eastern Powys and the north east, particularly in Flintshire. This will need to be considered in the design of new buildings, and particularly homes.

4.8 Water - resource and quality

4.8.1 The Welsh Government 'State of the Environment Report' (2012) sets outcomes for water resources and provides detailed information on progress that is based on sets of indicators.

4.8.2 Generally, there has been a downward trend in water leakage, from 249 megalitres per day in 200-02, to 202 megalitres per day in 2010-11. However, this represents 23.5% of total water supplied (WG SoE Report 2012; UK NEA 2011).

4.8.3 Overall, average per capita consumption in Wales has remained fairly stable: having risen from 148 litres/day in 2001 to 152 litres/day in 2008-09, in 2010-11 it was 149 litres/day. Where households were metered, consumption was significantly less.

[61] *For example Newtown town centre; a number of AQMAs are also in place in Newport area*
[62] *See Defra AQMA maps for Wales. http://aqma.defra.gov.uk/maps-wales.php?&la_id=409*
[63] *Air Quality Forum: http://www.welshairquality.co.uk/trend.php?t=4*

4.8.4 Not all of the water abstracted in Wales is for home consumption, as there are considerable transfers to English regions. Significant reservoirs, such as the Elan Valley and Vyrnwy supply the English Midlands. According to the Environment Agency (2010)[64], abstractions in Wales were 40% greater in 2007 than in 1995. The major reasons for abstraction related to electricity supply and represented 75% of total Welsh abstractions.

4.8.5 In terms of quality, the picture appears mixed. Bathing waters have achieved a high level of compliance with EC standards since 2002. For five of the last ten years, compliance has been 100%. It is not clear to what extent this success has been weather related – because when there is heavy rainfall in summer sewage discharges to sea mean that the EC standards aren't met. This raises the question as to what will be the impact of increased climate change-induced extreme weather events might be.

4.8.6 For chemical quality, the percentage of river length of good quality has been consistently high at about 95%. However, ecological and biological water quality indicates some areas of concern.

4.8.7 Whilst 67% of coastal waters have been assessed as being of 'good' or 'high' ecological quality, this implies that 33% (i.e. one third of the coastal zone) is *not* of good ecological quality. The picture for overall river length of good biological quality is positive at approximately 87%. However, the ecological status for specific water body types is mixed: 36% of transitional water bodies, 34% of rivers, 56% of canals and 21% of lakes assessed were given 'good' or 'high' ecological status in 2011.

4.8.8 In 2002, (then) Environment Agency Wales identified 1,300 mine sites where discharges to water are known to occur (EAW 2002)[65]. This continues to be a significant source of pollution.

4.8.9 The Welsh Assembly Government's green paper 'Sustaining a Living Wales' (2012) highlights some of the challenges to water resources in Wales (p8):

'Even though Wales receives more annual rainfall than many other parts of the UK this does not mean that we can take a continuous and endless supply of water for granted. In Wales rainfall travels quickly to our rivers and during dry periods our river levels can also drop quickly in response. In addition to causing stresses to the water environment and aquatic habitats and species

[64] *The figures shown in this section are cited in the Wales State of the Environment Report. See http://wales.gov.uk/topics/statistics/headlines/environment2010/100722/?lang=en*

[65] *See Metal mines strategy (2002). Chapter 2 Drivers and Background. See also Science Report SC0301 136/SR4 (2008) Assessment of metal mining-contaminated river sediments in England and Wales.*

in these rivers, this also creates challenges to ensuring security of public water supply and supporting other water abstractions. Currently the Environment Agency estimate that, in approximately 38% of river water bodies in Wales, water is no longer reliably available for new water abstractions.'

4.8.10 Freshwater ecosystems in Wales are subject to a variety of human pressures including pollution, sedimentation, extractive fisheries, invasive/non-native species, and over abstraction. Trends such as population growth, combined with climate-related trends, may significantly impact on the availability of good quality water.

4.8.11 The overall statistics conceal pockets where there may be significant problems due to over-abstraction, high levels of diffuse pollution, leakages, domestic over-consumption and low ecological/biological quality. Some areas within the region may require high demands where settlements or industry are concentrated, and pressures may increase as a result of the programme.

4.8.12 The proposed new City Region approach (in Cardiff and Swansea) will increase pressure on water resources which in Spring 2012 were at a critical level. This raises the question of Wales's ability to supply an increased population with water given climate change induced unpredictable supply and increased demand from hot weather.

4.9 Flood Risk

4.9.1 According to the Wales NEA (2011), it is estimated that one in six properties in Wales (600,000 people in 357,000 properties, of which 150,000 are residential) is at risk of flooding. The 2004 Foresight Future Flooding Report[66] estimated that economic risk from flood damage to properties and contents would rise from £70 million in 2004 to £1,235 million in the 2080's in the most likely scenario.

4.9.2 Since 2005-6, 5,700 properties have benefitted from Environment Agency flood alleviation schemes[67]. The role of the planning system in considering the likely impact of climate change on development locations is obvious, and projects or developments brought forward in response to the proposed Operational Programme need to be assessed in this light.

[66] *Foresight Programme (UK Government), (2004). Foresight Future Flooding. www.foresight.gov.uk/OurWork/CompletedProjects/Flood/index.asp*
[67] *Environment Agency response to the Scoping Report*

Flooding issues

- 28% of the Welsh coastline has some form of artificial sea defence works
- In downstream and at-risk areas uptake of the Sustainable Drainage Systems (SuDS) schemes is at a relatively early stage and has so far been patchy across local authority areas in Wales

(UK NEA 2011)

- Over 150,000 residential properties, many commercial and industrial developments, other key infrastructure like power supplies, transport links and schools and colleges, as well as important environmental and historic sites are on land at risk of flooding
- The asset value protected by Wales' 415km of man-made flood and erosion defences is estimated at over £8 billion of assets[68]
- Increased frequency of flooding will have an impact on livestock and could damage crops

Welsh Government:
Climate Change Adaptation Strategy -
consultation document Feb 2007

4.10 Climate issues

4.10.1 Climate change relates to several of the baseline discussed here, including flood risk, water resources, air quality and biodiversity. It is a critical Welsh Government policy issue:

'Tackling climate change is a fundamental part of delivering sustainable development. Climate change is one of the most important challenges facing the world and the Assembly Government has made a commitment to tackling climate change, resolving that the Government and people of Wales will play the fullest possible part in reducing its carbon footprint. Our commitment to action on climate change is based on a scientific imperative to act and to act urgently to reduce greenhouse gas emissions and deal with the consequences of climate change.' [69]

4.10.2 The same document states that:

'The Assembly Government has set out to achieve annual carbon reduction-equivalent emissions reductions of 3 per cent per year by 2011 in areas of devolved competence, which include land use planning. We are also committed to achieving at least a 40% reduction in all greenhouse gas emissions in Wales by 2020 against a 1990 baseline. This will assist in making a significant contribution to the UK Carbon Budgets'

[68] *See also Wales Audit Office 'Coastal Erosion and Tidal Flooding Risks in Wales' 2009. http://www.wao.gov.uk/assets/englishdocuments/Coastal_flooding_eng.pdf*
[69] *Planning Policy Wales Feb 2011 p44*

4.10.3 The SoE Report sets outcomes for minimising the effects of climate change and provides information on progress. The main findings on the progress of climate change mitigation measures in Wales are summarised below:

- The estimated emissions in million tonnes of CO_2 equivalent from transport in Wales in 2010 was 6.1. Wales transport emissions accounted for 5% of the UK total in 2010

- The land use and land use change and forestry' (LULUCF) sector can have both negative and positive impacts on greenhouse gas emissions. In Wales the sector is generally a small net sink of carbon dioxide, and this sink has slightly increased between 1990 and 2009.

- The indication is that there has been a clear improvement in Wales' resilience to the impacts of climate change.

Climate Change

- Carbon dioxide is the main contributor to greenhouse gas emissions in Wales
- Energy industries = 41%
- Manufacturing and construction industries = 24%
- Transport = 15%

Welsh Government 'State of the Environment Report' July 2012

4.10.4 The SoE Report sets outcomes for minimising the effects of climate change and provides information on progress. The main findings on the progress of climate change mitigation measures in Wales are summarised below:

- The estimated emissions in million tonnes of CO_2 equivalent from transport in Wales in 2010 was 6.1. Wales transport emissions accounted for 5% of the UK total in 2010
- The land use and land use change and forestry' (LULUCF) sector can have both negative and positive impacts on greenhouse gas emissions. In Wales the sector is generally a small net sink of carbon dioxide, and this sink has slightly increased between 1990 and 2009.
- The indication is that there has been a clear improvement in Wales' resilience to the impacts of climate change.

4.10.5 Based on the Welsh Government's Climate Change Adaptation Strategy and consultation (2007, Chapter 4), it is likely that the continuing trends in climate change are likely to lead to more extreme weather events with an increase in

temperatures, resulting in hotter, drier spring and summer conditions, which may impact particularly in the East of Wales and across the border in England placing significant pressure on already stressed water resources. Later research by Jennifer Francis of Rutgers University and Stephen Vavrus of the University of Wisconsin-Madison[70], suggests that rapid Arctic climate change is directly linked to amplification of the jet stream movements resulting in the high-impact, extreme weather events already experienced in the U.S. and Europe. This may result in warmer winter conditions, increases in flooding, landslip and soil erosion all having implications on areas of development.

4.10.6 Extreme cold weather may also result from the warming Arctic Ocean and all of these extremes of weather may result in disruptions to productivity, travel to work and access to public services such as schools and hospitals as well as disruptions to the transport infrastructure adversely impacting industry, which will have implications for investment and for economic sustainability.

4.11 Energy consumption

4.11.1 Climate change adaptation is closely linked to the use of energy - its generation, delivery and consumption patterns, and critically its conservation. The Welsh Government's 'Renewable Energy Route Map' (2008) provides indicative data on energy demand, supply and emissions.

4.11.2 The SoE Report (2012) considers energy use and environmental standards in new buildings in Wales. In the case of energy savings from public sector buildings, it says that there has been little overall change in energy consumption since 2005. In 2008, gas accounted for 60% of public sector energy use, electricity accounted for 36%, whilst oil and coal combined accounted for 4% of public sector energy use.

4.11.3 The report points out that estimates of public sector energy use in Wales have been back-calculated from greenhouse gas emissions (GHG) inventory analysis and UK energy statistics. It indicates that these data are experimental estimates and very uncertain, especially as they do not take into account fluctuating conditions.

4.11.4 'A Low Carbon Revolution' - the Welsh Government's Energy Policy Statement (2010) provides some general information about energy consumption in Wales (p9):

[70] *http://www.climatecentral.org/news/arctic-warming-is-altering-weather-patterns-study-shows/*

'Currently, in the UK the average person's daily energy consumption (excluding energy related to food and imported goods) is around 125 kilowatt hours per day per person (kWh/d/p).

Of this 125 kWh/d/p, after taking into account conversion losses, we use a third for heating, a third for transport and a third for electrical power. The average electrical power consumption per person per day in Wales is approximately 22 kWh/d/p, (slightly higher than the UK average of 18 kWh/d/p. To put this into context this is equivalent to every person in Wales leaving twenty-two 40-watt light bulbs on for 24 hours every day.'

4.12 Waste management

4.12.1 The SoE Report's latest findings on waste management (July 2012) are summarised below:

- The total amount of household waste produced per person in Wales has fallen to 467kg in 2010/11
- In 2005-06, the estimated amount of construction and demolition waste produced in Wales was 12.2 million tonnes
- 191,000 tonnes of waste was produced by the public sector in Wales in 2007, of which 46% was recycled off-site or re-used off site; 41% of public sector waste was landfilled in 2007
- The percentage of local authority municipal waste (excluding abandoned vehicles) reused, recycled or composted in Wales increased to 45%
- The percentage of industrial and commercial waste recycled, composted or re-used in Wales decreased from 64% in 2002/03 to 49% in 2007
- 39% of industrial and commercial waste was sent to landfill in 2007 (3.6 million tonnes), increasing from 28% in 2002/03.
- 51% of municipal waste (excluding abandoned vehicles) was sent to landfill in 2010/11 - a decrease from 93% in 2000/01
- 338 companies are Green Dragon certified in 2012; 21 companies achieved the highest rating (Level 5), an increase from 17 in 2011

4.12.2 The trend in the amount of municipal waste reused, recycled or composted is upward. The picture is less clear in regard to industrial and commercial waste, since 2009 has been taken as the baseline and more recent figures are unavailable.

Waste

- 48% of local authority municipal waste was recycled March 2011-12

- The residual household waste produced per person in Wales fell to 56 kilograms per person in January to March 2012, from 65 kilograms per person in January to March 2011.

Statistics Wales
Local Authority Municipal Waste Management, 2012 page 2

- Commercial and industrial waste accounts for around 50% of the total waste ecological footprint), with municipal waste accounting for about 35% and construction and demolition waste accounting for 15%.
- In 2007-08, 10,554 tonnes were reused via Third Sector organisations in Wales – this included 9,602 tonnes of furniture.

Source: Cylch Let's Prove It Report 2008

- Cardboard boxes and containers are the largest component of the business waste making up 15%, or 100,000 tonnes of the total. Kitchen waste made up 13%, or 90,000 tonnes.

WAG - Towards Zero Waste - Consultation on a New Waste Strategy for Wales. April 2009

4.13 Transport

4.13.1 *'Rising concentrations of greenhouse gases are recognised to be causing global climate change. Transport, through the use of fossil fuels, is one of several key activities that produce greenhouse gases, and accounts for around 16% of CO_2 emissions (around 14% of greenhouse gas emissions) in Wales.*[71]'

4.13.2 There has been little change in the main modes of travel to work since 1997 in both Wales and the UK. In 2011 the situation was as follows:

- 81% of the population travelled to work by car, van, minibus or works van
- 12% by walking or cycling and
- 8% used other modes of transport in Wales.
- Almost as many children travel to school by car (33.6%) as by walking (36.4%),
- the numbers travelling to school by bus or coach have reduced since 2002/3, with 23.9% travelling in this way[72]
- bus passenger numbers have fallen from about 118 million in 2009/10 to 113 million in 2010/11,
- rail passenger numbers (for journeys either beginning or ending in Wales) have increased from some 25 million 2008/09 to 27 million in 2010/11.
- Sixty-nine per cent of these journeys were entirely within Wales,

[71] *'One Wales - Connecting the Nation' -The Wales Transport Strategy April 2008 (p5)*
[72] *SoE Report 2012*

- For 39% of these, Cardiff was the destination of rail passenger journeys[73]

Transport Issues

- On the east-west corridor buses account for 85% of public transport
- Out-commuting accounts for many journeys on the east-west network in the north-east
- Approx. 70% of all personal journeys in Wales are made by car
- Average of 47 journeys per person per year are made by bus or coach

East Wales Consultation Document Jan 2013
Annex A

- CO_2 emissions from road transport have steadily increased since 1990, and depending on the forecasting method used, look set to continue to grow. Emissions of other pollutants such as Nitrogen Oxides (NOx) and particulates (PM10) are 58% and 44% lower*

'One Wales - Connecting the Nation -
The Wales Transport Strategy April 2008

4.13.3 Overall, greenhouse gas emissions relating to transport fell by over 4% between 2008 and 2009[74].

4.14 Cultural, architectural and archaeological issues

4.14.1 The Welsh language is a member of the Brythonic branch of Celtic languages, and is the oldest spoken language in Europe. In 2001, the number of Welsh speakers was over 582,000 (21 per cent of the total population) [75]. The 2011 Census results on the Welsh language in Wales were published by the Office for National Statistics on 11 December 2012. These initial results include data at a Wales and local authority level. The number of people who speak Welsh has fallen in the past 10 years, according to the 2011 census. Despite an increase in population the number of Welsh speakers has fallen overall from 582,000 in 2001 to 562,000 in 2011: a two percentage point drop in Welsh speakers - from 21% to 19%.

[73] *Statistical Bulletin. Rail transport October 30 2012*
[74] *Statistics on Monitoring the National Transport Plan March 2012*
[75] *WAG 2010: Wale's Population – a Demographic Overview Cardiff 2010*

4.14.2 The local authorities with the lowest percentage of Welsh speakers were in South East Wales. In Cardiff there was a slight rise, from 11% to 11.1%, and Monmouthshire reported a slightly larger increase in at 9.9%, up from 9.3%.

- 19% of the Welsh population aged over three said they were able to speak the language - able to speak Welsh: 562,016; not able to speak Welsh: 2,393,825
- 11.1% of the population of Cardiff said they could speak Welsh in 2011, a 0.1% increase
- Blaenau Gwent reported the lowest percentage of people who could speak Welsh at 7.8%[76].

4.14.3 It has been thought that migration trends and education might lead to an increase in speakers in less traditional Welsh-speaking areas. But the census suggests otherwise, with just two areas, Monmouthshire and Cardiff, seeing a percentage increase.

4.14.4 The results of the 2011 census data on the Welsh language were released during the writing of this report. There has been a significant decline in the number of Welsh speakers in the rural areas. Natural Resources Wales, the single body which will replace the Environment Agency, Countryside Council for Wales and the Forestry Commission on 1st April is consulting on its Draft Welsh language scheme[77]. Part of this new body's vision is to

"Promote an understanding that the Welsh language, as a part of Welsh culture, is integral to the ecosystem approach to managing the environment in Wales"

The potential impact on the Welsh language is therefore significant consideration within the overall assessment of effects.

4.14.5 East Wales contains a rich heritage of historic buildings, including vernacular and agricultural buildings, as well as industrial, ecclesiastical and historic military structures and sites. The historic works at Blaenavon are a UNESCO Cultural World Heritage Site.

4.14.6 It is important that East Wales' historic building stock and its character is maintained to a high standard, and this includes wherever possible its setting. Retro-fitting historic buildings to an adequate environmental standard is likely to prove highly costly, not least the need to ensure that hardware and insulation does not conflict with the integrity if such buildings.

[76] *Census 2011/ONS*
[77] *http://www.ccw.gov.uk/about-ccw/consultations/draft-welsh-language-scheme.aspx*

4.14.7 In 2007, Cadw commissioned a baseline report on listed Buildings at Risk in Wales. This brought together data from most of the local authority registers. The 2009 summary report[78] estimated that of the 29,896 listed buildings in Wales, 2,882 are 'at risk', and 5,145 are 'vulnerable', owing to the rate of decline of their fabric and character. The report indicates that North West and Central Wales have a particularly high number of 'at risk' buildings.

Fig 6: Historic landscapes

4.14.8 Fifty-eight areas of Wales have been identified for placing on the historic landscapes register for Wales maintained by Cadw, CCW, and the International Council of Monuments and Sites (ICOMOS). There are also over 100,000 archaeological sites listed by the four Welsh Archaeological Trusts, some of which are impressively set[79] [80].

4.14.9 Two of the four Landscape Partnership schemes are in East Wales: the Clwydian Hills and Blaenavon. These schemes aim to support the conservation and enhancement of these special landscapes:

Cultural, Architectural & Archaeological Heritage

- In both 1996 and 2003, nearly 80% of scheduled ancient monuments were reported to be stable, and about 10% are improved or greatly improved
- There was an increase in superficial disturbance, generally from invasive vegetation and scrub encroachment, probably due to the less intensive agri-environmental schemes. This was offset by the reduction in the disturbance sometimes caused by intensive agriculture.

Cadw: Position Statement 2007

Listed buildings at risk, 2007 and 2008

- The percentage of the sample of listed buildings in Wales that were classed as 'at risk' has fallen slightly from 10.2% in 2007 to 9.6% in 2008.
- The percentage of the sample of listed buildings that were classed as 'vulnerable' has fallen slightly from 17.5% in 2007 to 17.3% in 2008.
- The percentage of the sample of listed buildings that were classed as 'not at risk' has increased slightly, from 72.4% in 2007 to 73.2% in 2008.

Handley Partnership/Cadw

[78] *Buildings at Risk in Wales". Handley Page partnership for Cadw. (2009).*
[79] *See www.archwilio.org.uk*
[80] *www.ccgc. gov.uk/landscape/wildlife/protecting-our-landscape/ historic-landscapes/wales-historic-landscapes.aspx*

4.15 Landscape

4.15.1 The landscapes of Wales are remarkably varied for such a small nation. The underlying geology, and the variety of land use and land cover result in a number of distinctive landscapes that can be identified at both an extensive and at a local level.

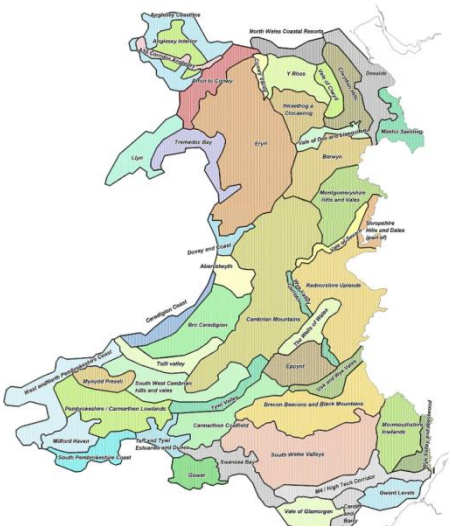

Fig 7: Landscape character areas. Source:

4.15.2 Some areas, such as the Clwydian Hills, the Brecon Beacons and the Wye Valley, are well-known for certain characteristics, and have been named, written about, appreciated and visited for centuries, and it is perhaps no surprise that each of these areas is a protected landscape. Others, such as the Tanat Valley or the Radnorshire Hills are less widely known but are nonetheless well known and appreciated locally. Within these larger areas, distinctive landscapes can be identified and described, reflecting their glacial history, their topography, the underlying geology and hydrology and their historic land uses.

4.15.3 These distinctive areas have been broadly mapped (figure 6), and are known as landscape character areas. The purpose of mapping these areas is to enable a description of each area's distinctive character, rather than to attempt to identify one landscape as being 'superior' to another.

4.15.4 The Countryside Council's LANDMAP programme[81] has developed a system for assessing the condition and quality of Wales' landscape from five dimensions, known as 'aspect areas'. These are cultural, geological, historic, landscape habitat and visual and sensory.

4.15.5 What the LANDMAP programme reveals is the extent of outstanding landscape attributes beyond the protected landscapes of Wales (figures 7 to 11). Whilst such an assessment has a degree of subjectivity, it has been rigorously tested among landscape professionals and the public and has a high degree of consensus and quality control.

4.15.6 The red areas indicate outstanding landscape attributes, and the amber areas are of high quality.

[81] *See http://www.ccgc.gov.uk/landscape--wildlife/protecting-our-landscape/landmap.aspx*

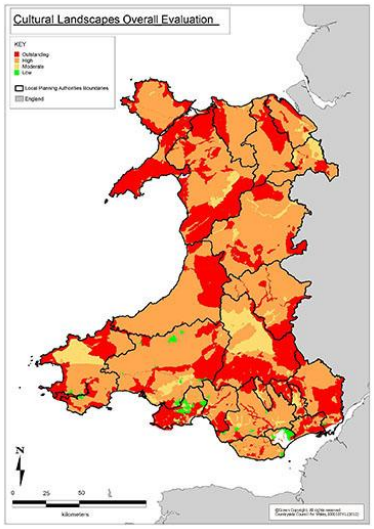

Fig 8: Cultural

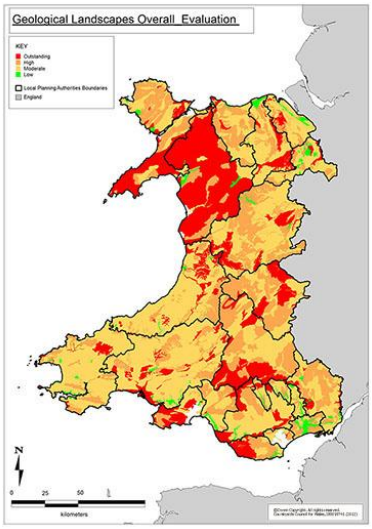

Fig 9: Geological

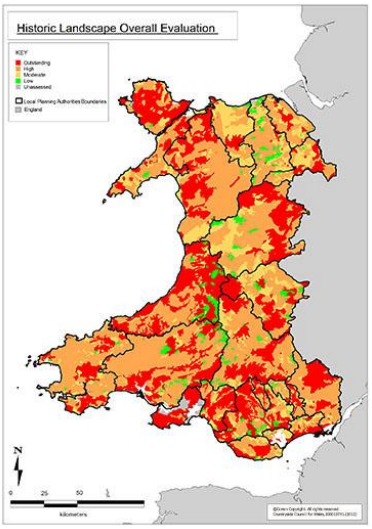

Fig 10: Historic

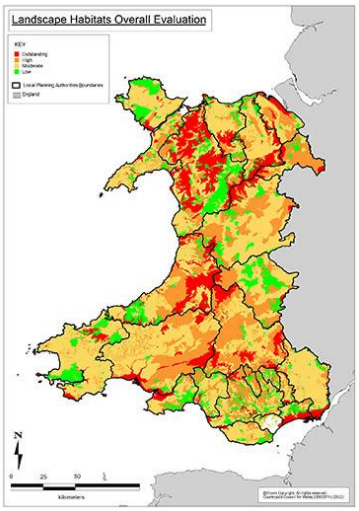

Fig 11: Landscape habitat

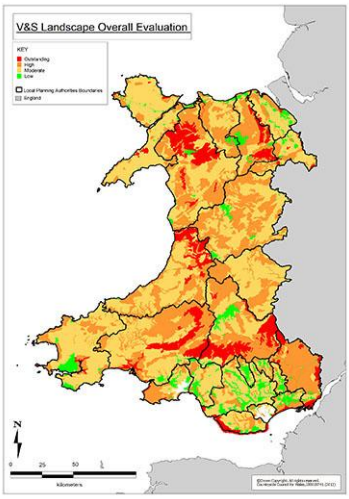

Fig 12: Visual and sensory

4.16 Interactions

4.16.1 These issues should not be considered in isolation from each other, or from the wider social and economic contexts. Impacts on any of these themes will have adverse or positive effects on others to a greater or lesser extent, and such impacts are almost entirely anthropogenic. Decisions that affect the landscape, biodiversity or historic and cultural heritage of Wales will impact on its economy through losses in tourism income or a reluctance to relocate to or invest in degraded, unattractive regions. Conversely, a failure to invest in, say sympathetic economic development will result in losses in income or the inability to increase income, and a lack of funds for conservation and for social purposes.

4.16.2 There will be changes to biodiversity, with (some would argue) gains and some losses, but this is unpredictable as is the overall net impact. Habitat and species gains and losses relate to wider ecosystems that may become stressed as a result. A change in composition of plant or tree species to ones which are more resilient to change may lead to a change in invertebrate numbers and types; new predatory or invasive bird and mammal species from the Continent or Mediterranean may impact on other more vulnerable species.

4.16.3 If current climate trends continue, there will be habitat change, with wetter habitats in some areas and perhaps drier conditions elsewhere. It is possible that changes will occur in the uplands, with some abandonment or reductions in agricultural productivity. This in turn may result in a higher demand for imported food. In this document however we do not offer a detailed analysis of how much food produced in Wales is consumed in Wales – in future we may consume more indigenously grown food and export less. Lamb, for example is currently imported and exported in large quantities. There may be changes in woodland, hedgerow and river bankside management systems to mitigate the effects of runoff.

4.16.4 Increases in flooding events may result in severe effects on settlement patterns, agricultural productivity and other activities. There may be increases in numbers working from home or in local SMEs as a result of increasing unwillingness to travel, with perhaps a breakup of large distribution networks. Improvements to ICT will be beneficial in this regard, but there may be more isolationist working, with its own stresses.

4.16.5 Such warmer, wetter conditions may facilitate increases in water borne diseases, affecting humans, livestock and wildlife. There may be increases in other diseases also e.g. blue tongue; Schmallenberg virus; Lyme disease and Ash dieback. Such interactions are described in a wide range of literature and research, and are probably well understood where they currently occur.

4.16.6 Whilst this is speculative, the ecosystem approach highlights the need to consider the wider context, and to approach programme level decision making at a landscape rather than at a site level.

4.17 Summary of issues

4.17.1 This section summarises the key issues that relate to East Wales. In most cases, these issues have implications for the proposed Programme, which are discussed in sections 5.2 and 5.3 and in Appendix 5.

Biodiversity	About **60% of SACs**, and a number of Biodiversity Action Plan species and habitats are in

	unfavourable condition, especially on the coast. Pressures can come from visitor numbers on some sites, changes in weather patterns, development, over- or undergrazing, pollution, nutrient enrichment and eutrophication, sediment deposits, invasive species, inappropriate planting, over abstraction and overfishing.

Population and human health	Some areas lack easily accessible **open space**. Stress related illnesses from **poor living and working conditions**, as well as **unemployment**; heat and **fuel poverty**; poor diets leading to **obesity**; illnesses and injuries at work; and poor social/private rented **housing standards** are contributory factors in health problems in Wales. In some areas, **poor air quality** may be a contributory factor.
Soil quality and structure	Development, changes in agriculture (especially intensification) and climate change contribute to a **loss in soil carbon and structure**. There have been **changes in hydrology** and **erosion** due to changes in rainfall patterns and agriculture. The need to maintain best quality agricultural land in the face of development pressure may result in losses of less productive land which may be valuable for carbon sequestration.
Minerals and aggregates	Wales has a relatively limited range of terrestrial minerals and aggregates, sand and gravel is extracted from marine areas. About **50% of waste aggregate is currently recycled.**
Timber	About **43% of all woodland is coniferous plantation**, mainly owned by Welsh Government. There will be a **significant demand for imported biomass** fuel and also for good quality building timber.
Water quality	**Pollution from flooded mines** continues to present a challenge. **Diffuse pollution** from other sources including agriculture is exacerbated by changing weather patterns with sudden flooding. There is a **potential threat to coastal water quality** as a result of increases in storm events. Currently, **about 33% of coastal waters are not of 'good' ecological quality**, and the pattern for terrestrial water bodies is mixed.
Water availability	About **23.5% of water supply is lost to leakages**; there has been a **significant increase in abstracted water**, mainly for electricity supply. About **38% of river waters are not reliable for**

	new abstractions - there may be an increased demand due to population growth.
Flood risk	**28% of the Welsh coastline has sea defence infrastructure**; about **1 in 6 properties is at risk from flooding** - this will be significantly higher locally - the **economic cost of flooding** is estimated at more than **£200 million per annum.** River flows are predicted to reduce overall, but with sudden rapid flows related to turbulent weather. In some areas, **natural flood systems have been developed or artificially drained for agriculture.**

Climate	A number of changes in weather patterns are predicted, including **summer water shortages**; **increases in amounts** and **intensity** of **winter rainfall**, with **milder winters**; **hotter, drier summers**; **increases in sudden storms**. These will result in rapid **build-up of river and drainage systems**; increases in storm induced **coastal erosion and subsidence**; ecosystem changes with some **species and habitat losses and gains**
Energy consumption	**Gas** accounts for **60% of public sector energy** use. About **33% of domestic energy use is for heating** and about **33% for lighting/installations**. A target has been set by Welsh Government to reduce average per person carbon emissions by 33% by 2020.
Waste	The amount of **municipal waste recycled, reused or composted has increased from 18% in 2003/4 to 48% in 2011/12**. Having peaked in 2005/6, the **total amount of waste generated has decreased since 2000 by about 95,000 tonnes per annum.**
Transport	**81% of the population travels to work by motor vehicle**, and 12% by walking or cycling. There has been a **fall of about 5 million bus passengers** (2010/11) since 2009/10, and an **increase of about 2 million rail passengers** in the same period. There are conflicting statistics on transport related emissions.
Culture, architecture and archaeology	**Over 25% of Wales' listed buildings are either 'at risk' or 'vulnerable'**. Local authority monitoring may be inadequate owing to a lack of resources. Whilst nearly all of Wales' ancient monuments are stable or improving, climate change and changes in agricultural us may create new challenges. **Historic buildings and their settings, and the wider landscape, are under pressure from**

	development. The number of people who can speak Welsh has **decreased slightly** since 2001, although the number who can understand but not speak Welsh has increased slightly.

4.18 Ecological footprint

4.18.1 Ecological footprint is an indicator of the total environmental demand that is made on the planet. It is presented in terms of global hectares (gHa), which represents the amount of land required both to deliver the demands of a population in terms of food, water, fibre and fuel, natural resources and spiritual and recreational opportunities, and to absorb the impacts of that population in terms of pollution and waste. It is associated with the concept of 'ecosystem services'. Housing, travel and food are the main criteria used in the calculation, and both direct and indirect consumer impacts are assessed.

4.18.2 Wales' ecological footprint had risen at a rate of about 1.3% between 1990 and 2003, in line with a growth in Gross Added Value (GVA)[82]. Had this trend continued, it would have been likely that by 2020 Wales ecological footprint would have been 20% higher than it was in 1990. The current footprint is under review[83], but in the light of the economic downturn, this may have been reversed since 2008.

4.18.3 The most recent calculation (2006)[84] is that Wales' ecological footprint is about 4.4 gha, which is a significant reduction from the 2003 average figure of 5.16 gha.

4.18.4 West and north-west Wales would appear to have higher than average footprints, whilst the Valleys appear to have a footprint below the Welsh average. This is likely to be a reflection of energy demands, travel needs and the dispersed delivery of services[85] .

4.18.5 The intention of the Welsh Government is to reduce the national ecological footprint to 1.88 gha per person within the lifetime of a generation[86].

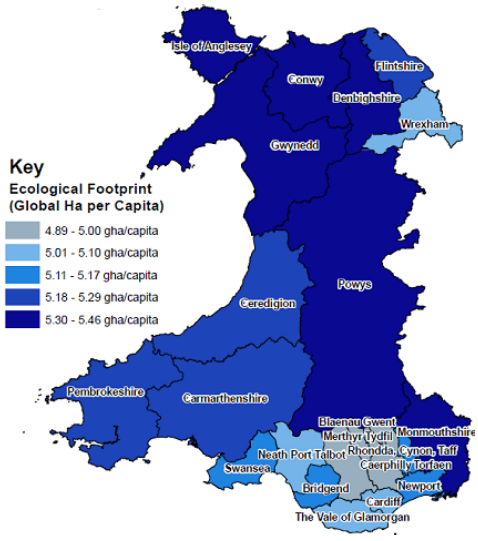

Fig 13: Wales' ecological footprint. Source Dawkins et al

[82] *E. Dawkins, A. Paul, J. Barrett, J. Minx and K. Scott (2008). Wales' Ecological Footprint: Scenarios to 2020. Stockholm Environment Institute*
[83] *http://www.government-online.net/calculating-wales-ecological-footprint/*
[84] *One Wales One Planet. Annual Sustainable Development Report 2009-10*
[85] *See http://www.resource-accounting.org.uk/downloads/wales/wales*
[86] *ibid.*

5 COMPATIBILITY - SEA AND PROGRAMME OBJECTIVES

5.1 Comparing objectives - a basic matrix test

5.1.1 It perhaps goes without saying that at this level an assessment of this nature is largely an informed forecast based on the professional judgement of the assessor. It is impossible to state with certainty what the specific effects of any policy or strategy will be. The best that can be achieved is a considered opinion based on detailed analysis, discussion with professional peers, and consensus.

5.1.2 The matrix test set out below is based on a more detailed analysis of each Specific Objective set against the SEA objectives (shown in table 3) and indicators. This analysis can be seen in Appendix 5. The results of the detailed analysis have been collated and are shown in the following section.

5.1.3 The SEA objectives are set out in section 2.3.7. For ease of reference, the 13 ‘headline’ objectives are:

1. Protect places, landscapes and buildings of historic, cultural and archaeological value

2. Protect and enhance landscapes, seascapes, townscapes and the countryside

3. Protect and enhance biodiversity

4. Protect and improve the region's water quality

5. Protect the water resource and ensure its sustainable use

6. Guard against land contamination, encourage reuse of existing buildings and of previously developed land of low ecological quality

7. Minimise the requirement for energy generation use, promote efficient energy use and increase the use of energy from renewable resources

8. Minimise waste increase re-use, recycling and recovery rates

9. Minimise the need to travel; provide alternatives to car use

10. Limit and adapt to climate change

11. Protect and improve air quality

12. Improve physical and mental health and reduce health inequalities

13. Improve public access to land

5.1.3 In table 5, we set each Specific Objective against each of the 13 SEA objectives, with relevant comments on the score we have applied.

Table 5: Presentation of compatibility matrices[87]

PRIORITY AXIS 1 - RESEARCH AND INNOVATION		
1 To increase the success of Welsh research institutions in attracting competitive and private research funding.		
1	**O**	No obvious link.
2	**O?**	Very weak link, e.g. development – subject to planning considerations.
3	**O**	No obvious link.
4	**O**	No obvious link' unless specific to water quality.
5	**O**	No obvious link.
6	**O?**	Very weak link. Re-use of previously used land/buildings?
7	**O**	No obvious link.
8	**O**	No obvious link.
9	**✓?**	Weak positive link – support for research into alternative travel modes?
10	**✓?**	Focus on research into climate change adaptation?
11	**✓?**	Focus on research into air quality improvement?
12	**✓?**	Potential positive, assuming a link to the Life Sciences and Health sector Grand Challenge Area.
13	**O**	No obvious link.
PRIORITY AXIS 1 - RESEARCH AND INNOVATION		
2 To increase the level of innovation undertaken across all sectors of the Welsh economy, in particular within Welsh SMEs, leading to a growth in productivity.		
1	**✓×**	Potential enhancements linked to tourism sector. Possible impacts of inappropriate development on sensitive sites.
2	**✓×**	As above.
3	**✓×**	As above.
4	**O**	No obvious link.
5	**O**	No obvious link.
6	**✓?**	Weak link. Re-use of previously used land/buildings?
7	**✓**	Assuming a focus on climate change, positive linked to Axis 3.
8	**✓?**	Potential for research + SME growth into recycling/re-use of waste
9	**×?**	Growth in productivity may lead to increase in travel.
10	**✓**	Assuming a focus on climate change, positive linked to Axis 3.
11	**✓**	As above.
12	**O**	No obvious link.
13	**O**	No obvious link.

[87] *An explanation of the symbols is in Table 4 at para. 2.6.5*

PRIORITY AXIS 1 - RESEARCH AND INNOVATION		
3 To increase the successful translation of research and innovation processes into new and improved commercial products, processes and services, in particular through improved technology transfer from HEIs.		
1	?	Depends on the scale, type and location of commercial products, processes and services.
2	×?	Depends on the scale, type and location of commercial products, processes and services. Potential impacts from development arising from expansion of successful enterprises.
3	×?	As above.
4	O	No obvious link. Depends on the product/process.
5	O	No obvious link. Depends on the product/process.
6	✓?	Weak link. Re-use of previously used land/buildings?
7	✓×	Potential for increased application of energy conservation/renewables. But also potential for increased energy demand.
8	?	Depends on application of high standards of waste management. Potential growth area?
9	×?	Growth in productivity may lead to increase in travel.
10	✓?	Depends on the scale, type and location of commercial products, processes and services. Focus on renewables/energy sectors may be positive.
11	✓?	As above.
12	O	No obvious link. Depends on the product/process – potential for employment opportunities?
13	O	No obvious link.
PRIORITY AXIS 1 - RESEARCH AND INNOVATION		
4 To increase the success of Welsh research institutions in attracting competitive and private research funding (related to low carbon research and innovation).		
1	?	Depends on the scale, type and location of commercial products, processes and services. Visual impact may be an issue.
2	?	As above.
3	✓?	Potential for reduced impact of atmospheric pollution on sensitive sites/species.
4	✓?	Low carbon economy will benefit water quality, linked to development of processes/services.
5	O	No obvious link specific to low carbon research.
6	O	As above.
7	✓	Positive link to reduction/efficiency in energy use/development of renewables.
8	✓?	Research into energy generation from waste?
9	✓?	Research into efficient travel modes?
10	✓	Link to climate change adaptation.
11	✓	As above.
12	✓?	Link between research into improved air quality and human health.
13	O	No obvious link.

PRIORITY AXIS 1 - RESEARCH AND INNOVATION		
5 To increase the successful translation of low Carbon research and innovation processes into new and improved commercial products, processes and services, in particular through improved technology transfer from HEIs.		
1	**?**	Depends on the scale, type and location of commercial products, processes and services. Visual impact may be an issue.
2	**?**	As above.
3	✓**?**	Potential for reduced impact of atmospheric pollution on sensitive sites/species.
4	✓**?**	Low carbon economy will benefit water quality, linked to development of processes/services.
5	**O**	No obvious link, but increased availability of better quality water may be a slight positive?
6	**O**	As above. Availability of previously used land for commercial development?
7	✓	Positive link to reduction/efficiency in energy use/development of renewables.
8	✓**?**	Commercialisation of energy generation from waste?
9	✓**?**	Potential for commercial development of low carbon travel modes?
10	✓✓	Strong link to climate change adaptation.
11	✓✓	As above.
12	✓	Improvements in air quality > increased human health.
13	**O**	No obvious link.

PRIORITY AXIS 2 - SME COMPETITIVENESS		
1 To increase the amount of finance available to SMEs for both business start-up and for business expansion.		
1	**O**	No obvious link.
2	**O?**	No obvious link. Potential impacts from expansion? Subject to planning processes/project EIA.
3	**O**	No obvious link.
4	**O**	No obvious link.
5	**O**	No obvious link.
6	**O?**	No obvious link. Possible re-use of redundant land/buildings.
7	**✓?**	Potential to ensure that start-up/expansion is linked to energy efficiency
8	**✓?**	Potential to ensure that start-up/expansion is linked to efficient management of waste & use of recycling
9	**×?**	Expansion may lead to increase in travel. To be considered via planning policies.
10	**✓?**	Potential to ensure that start-up/expansion is linked to appropriate measures to mitigate climate effects. Depends on type of activity.
11	**✓?**	Potential to ensure that start-up/expansion is linked to appropriate measures to manage emissions. Depends on type of activity.
12	**✓?**	Any project supporting employment opportunities is likely to have a positive effect, especially on mental health and wellbeing.
13	**O**	No obvious link.
PRIORITY AXIS 2 - SME COMPETITIVENESS		
2 To increase the number of SME start-ups through the provision of information, advice and guidance and support for entrepreneurship.		
1	**O**	No obvious link.
2	**O**	No obvious link.
3	**O**	No obvious link.
4	**O**	No obvious link. Advice could include optimal environmental measures.
5	**O**	No obvious link. Advice could highlight optimal environmental quality.
6	**O**	No obvious link. Depends on type of guidance.
7	**O**	No obvious link. Advice could include optimal environmental measures.
8	**✓?**	Potential to provide advice on waste management/recycling.
9	**O**	No obvious link. Depends on type of guidance.
10	**✓?**	Potential to provide advice on climate change adaptation measures.
11	**✓?**	Potential to provide guidance about emissions, air quality. Depends on activity.
12	**✓?**	Any project supporting employment opportunities is likely to have a positive effect, especially on mental health and wellbeing.
13	**O**	No obvious link.

PRIORITY AXIS 2 - SME COMPETITIVENESS		
3 To increase SME productivity through the provision of advice and guidance, in particular through encouraging ICT exploitation.		
1	**×?**	Depending on location, type and scale of ICT infrastructure, there might be a slight visual impact in sensitive areas.
2	**O**	No obvious link.
3	**O**	No obvious link.
4	**O**	No obvious link. Advice could include optimal environmental measures.
5	**O**	No obvious link. Advice could highlight optimal environmental quality.
6	**O**	No obvious link. Depends on type of guidance.
7	**O?**	No obvious link. Advice could include optimal environmental measures. Minimal increase in energy demand will be offset by reductions in the need to travel.
8	**✓?**	Small positive arising from increased use of e-data?
9	**✓?**	Depends on type of guidance. Increased use of ICT should result in reductions in travel. But may be offset by expansion in international markets?
10	**✓?**	Potential to provide advice on climate change adaptation measures. Reduced need to travel will contribute to reductions in carbon emissions.
11	**✓?**	Potential to provide guidance about emissions, air quality. Reductions in travel should improve local air quality in areas of congestion.
12	**✓?**	Any project supporting employment opportunities is likely to have a positive effect, especially on mental health and wellbeing. Potential for reductions in travel-related stress.
13	**O**	No obvious link.
PRIORITY AXIS 2 - SME COMPETITIVENESS		
4 To increase the growth of those SMEs with growth potential, in particular through accessing new markets (both domestic and international).		
1	**?**	Depends on the scale, type and location of SMEs.
2	**×?**	Depends on the scale, type and location of SMEs. Potential impacts from development arising from expansion of successful enterprises.
3	**×?**	As above.
4	**O**	No obvious link. Depends on the type of SME.
5	**O**	No obvious link. Depends on the type of SME.
6	**✓?**	Weak link. Re-use of previously used land/buildings?
7	**✓×**	Potential for increased application of energy conservation/renewables. But also potential for increased energy demand.
8	**?**	Depends on application of high standards of waste management. Potential growth area?
9	**×?**	Growth in productivity may lead to increase in travel, especially for export purposes. Depends on type of SME.
10	**✓?**	Depends on the scale, type and location of SME. Focus on renewables/energy sectors may be positive.
11	**?**	Focus on renewables/energy sectors may be positive, but the likelihood of increased travel in order to secure markets may have a negative effect on air quality, especially around airports and ports.
12	**✓?**	Depends on the SME – potential for employment opportunities associated with mental health and wellbeing effects.
13	**O**	No obvious link.

PRIORITY AXIS 2 - SME COMPETITIVENESS		
5 To address market failures in the availability of finance, in particular risk capital, for Welsh SMEs to undertake innovation and commercialise R&D.		
1	**O**	No obvious link.
2	**O**	No obvious link.
3	**O**	No obvious link.
4	**O**	No obvious link.
5	**O**	No obvious link.
6	**O**	No obvious link. Depends on financial targets.
7	**O?**	No obvious link.
8	**✓?**	Potential to support SMEs relating to waste management/recycling.
9	**O**	No obvious link.
10	**✓?**	Potential to provide finance to support expansion into climate change adaptation markets.
11	**✓?**	Potential to support R&D linked to air quality. Depends on activity.
12	**✓?**	Employment opportunities promote positive mental health and wellbeing.
13	**O**	No obvious link.

PRIORITY AXIS 3 - RENEWABLE ENERGY AND ENERGY EFFICIENCY		
1 To increase the number of small-scale renewable energy schemes established.		
1	**O**	No direct positive effect likely. There may be some visual impact linked to the use of hardware.
2	**×?**	Not likely to positively promote this objective without parallel measures.
3	**O?**	Small hydro schemes need to be appropriately located. Potential for impacts on protected species associated with buildings?
4	**O**	No obvious link.
5	✓	Potential to use water capture and recycling systems together with natural heating/cooling systems, as well as hydro.
6	✓	Some potential for encouraging the re-use of existing buildings by retrofitting. Use of ground source heating systems in otherwise redundant land?
7	✓✓	Significant potential to address this objective.
8	✓	Potential for reducing demand for carbon based fuels - reduction on waste by-products.
9	**O**	No obvious link.
10	✓✓	Potential for significant contribution to this objective.
11	✓✓	Achieving zero carbon energy systems will improve air quality.
12	✓	Potential to reduce health inequalities especially in urban contexts.
13	**O**	No obvious link.
PRIORITY AXIS 3 - RENEWABLE ENERGY AND ENERGY EFFICIENCY		
2 To increase the energy efficiency of the existing Welsh housing stock, particularly in areas of fuel poverty.		
1	✓**?**	Some local positives linked to reductions of carbon emissions.
2	✓**?**	As above.
3	**O?**	No obvious link.
4	**O?**	Potential to reduce acidity in watercourses?
5	**O**	No obvious link.
6	**O**	No obvious link.
7	✓✓	Potential for significant contribution to this objective.
8	**O?**	No obvious link. Potential for temporary increase in waste by-products linked to retrofitting? Opportunity to use waste for energy generation?
9	**O**	No obvious link.
10	✓✓	Potential for significant contribution to this objective.
11	✓✓	Increasing efficiency will improve air quality by reducing demand.
12	✓	Potential to reduce health inequalities especially in urban contexts.
13	**O**	No obvious link.

PRIORITY AXIS 4 - CONNECTIVITY		
1. Increasing urban mobility to and from key urban and employment centres to increase access to jobs.		
1	**O**	No obvious link.
2	✓**?**	Potential for reduction in urban car use will generally enhance amenity.
3	**O**	No obvious link.
4	**O**	No obvious link.
5	**O**	No obvious link.
6	✓**?**	Opportunity to relocate employment opportunities to more accessible transport hubs?
7	✓	Potential for reduction in urban car use will generally promote this objective.
8	**O**	No obvious link.
9	✓×	Depending on implementation and on other measures.
10	✓×	Depends on the type of measures.
11	✓×	As above.
12	✓	Improved access to employment opportunities will help to reduce health inequalities.
13	**O**	No obvious link.
PRIORITY AXIS 4 - CONNECTIVITY		
2. To increase the access of Welsh businesses to high speed ICT networks in peripheral areas and strategic sites to support increased levels of productivity and business growth.		
1	**O**	Slight possibility of visual impacts but otherwise none.
2	**O**	As above.
3	**O**	No obvious link.
4	**O**	No obvious link.
5	**O**	No obvious link.
6	**O**	No obvious link.
7	**O**	No obvious link.
8	**O**	No obvious link.
9	✓✓	High-speed broadband and fast mobile networks may significantly reduce the need to travel.
10	✓✓	Reductions in the need to travel will contribute to this objective.
11	✓	Positive, insofar as decreased traffic volumes, especially in urban settlements, will help improve air quality.
12	✓✓	Access to high speed networks is likely to contribute significantly – improving access to disadvantaged communities, reducing stress in workers.
13	✓**?**	Potential for improved information on access opportunities.

Table 6: Synthesis of assessment matrices

Testing compatibility between the proposed Operational Programme and SEA objectives														
SEA Objectives	Priority Axes and Specific Objectives													
	PRIORITY AXIS 1: Research and Innovation					PRIORITY AXIS 2: SME Competitiveness					PRIORITY AXIS 3: Renewable Energy and Energy Efficiency		PRIORITY AXIS 4: Connectivity	
	1	2	3	4	5	1	2	3	4	5	1	2	1	2
1	O	✓×	?	?	?	O	O	×?	?	O	O	✓?	O	O
2	O?	✓×	×?	?	?	O?	O	O	×?	O	×?	✓?	✓?	O
3	O	✓×	×?	✓?	✓?	O	O	O	×?	O	O?	O?	O	O
4	O	O	O	✓?	✓?	O	O	O	O	O	O	O?	O	O
5	O	O	O	O	O	O	O	O	O	O	✓	O	O	O
6	O?	✓?	✓?	O	O	O?	O	O	✓?	O	✓	O	✓?	O
7	O	✓	✓×	✓	✓	✓?	O	O?	✓×	O	✓✓	✓✓	✓	O
8	O	✓?	?	✓?	✓?	✓?	✓?	✓?	?	✓?	✓	O	O	O
9	✓?	×?	×?	✓?	✓?	×?	O	✓?	×?	O	O	O	✓×	✓✓
10	✓?	✓	✓?	✓	✓✓	✓?	✓?	✓?	✓?	✓?	✓✓	✓✓	✓×	✓✓
11	✓?	✓	✓?	✓	✓✓	✓?	✓?	✓?	?	✓?	✓✓	✓✓	✓	✓
12	✓?	O	O	✓?	✓	✓?	✓?	✓?	✓?	✓?	✓	✓	✓	✓✓
13	O	O	O	O	O	O	O	O	O	O	O	O	O	✓?

KEY				
	Positive/strong positive		Possible/slight negative	
	Possible/slight positive		Negative/strong negative	
	Neutral		Positive and negative aspects	

5.2 Risk analysis – probability and significance

5.2.1 Of the 182 elements compared, 72 are thought to be likely to have a strong or qualified positive effect, and 84 are likely to be neutral overall. Setting aside the nine elements that appeared too indeterminate to arrive at a conclusion, 10 elements were thought to have some potential negative effects, and no elements are likely to have a strong negative effect, depending on scale, siting and type of proposal or enterprise. In seven cases, the effects could be both positive and negative, amounting to 17 potentially negative effects arising from the Specific Objectives of the OP as it currently stands. It is worth pointing out that in most cases the negative effects are mitigated or offset by positive effects within the same intervention.

5.2.2 The analysis below (table 6) focuses only on the negative effects of seven Specific Objectives - in most cases these are reduced or offset by positive effects within interventions that set out to achieve the objectives.

5.2.3 Regulations on standards for waste and recycling, water, emissions and air quality, as well as on buildings, will apply, as will regulations linked to avoidance, mitigation, compensation and enhancement for biodiversity effects. National and local planning policy, together with appropriate assessment and environmental impact assessment will also apply at project level.

Table 7: Potential negative effects arising from OP Specific Objectives

		SEA Objective	Likely?	Significant?	Comment
PRIORITY AXIS 1 – RESEARCH AND INNOVATION	**SPECIFIC OBJECTIVE 2** To increase the level of innovation undertaken across all sectors of the Welsh economy, in particular within Welsh SMEs, leading to a growth in productivity.	**1, 2, 3, 9**	**Possible**	**Moderate** **May be locally high depending on type of expansion and sensitivity of local site**	There is some risk of local impacts on sensitive sites in the built environment from successful and economically important SMEs seeking to expand their productivity. This may require relocation, which has implications for travel, as well as for redundant buildings. Whilst this is a matter for local planning policy, the support given to SMEs needs to take into account the implications of expansion. Growth in productivity may have implications in terms of travel. This may in part be addressed by improvements in high-speed networks, however international markets will demand travel in most cases.

PRIORITY AXIS 1 – RESEARCH AND INNOVATION	SEA Objective	Likely?	Significant?	Comment
SPECIFIC OBJECTIVE 3 . To increase the successful translation of research and innovation processes into new and improved commercial products, processes and services, in particular through improved technology transfer from HEIs.	**2, 3, 7, 9**	**Probable**	**Moderate/ locally high, depending on the type of enterprise**	Since the purpose of the objective is to promote successful commercialisation, effects arising from expansion in productivity are inevitable. The extent to which these are likely to be significant will depend on the type of products, processes and services envisaged, as well as some measure of what constitutes success in terms of new enterprises. Where such enterprises are energy intensive and may require significant levels of travel or delivery, there may be associated impacts. The planning system will determine development proposals locally. Government policy will be a significant factor in determining such proposals.

PRIORITY AXIS 2 – SME COMPETITIVENESS	SEA Objective	Likely?	Significant?	Comment
SPECIFIC OBJECTIVE 1 . To increase the amount of finance available to SMEs for both business start-up and for business expansion.	**2, 9**	**Unlikely by itself**	**Low**	As above, there is always some risk that successful SME's will wish to expand, which may have an impact on the local environment, and may generate some increase in travel, not least in order to expand markets. .

PRIORITY AXIS 2 – SME COMPETITIVENESS	SPECIFIC OBJECTIVE 3 . To increase SME productivity through the provision of advice and guidance, in particular through encouraging ICT exploitation.	SEA Objective	Likely?	Significant?	Comment
		1	**Possible**	**Low/ locally moderate, depending on the type of ICT infrastructure and its design**	The risk is the possible visual impact of infrastructure in sensitive landscapes or in historic sites. Locally, such issues will be resolved via the planning system, ensuring that appropriate Landscape and Visual Impact Assessment (LVIA) studies are carried out. There may a small risk of threat to birds and bats, depending on scale, siting and type of infrastructure proposed.

PRIORITY AXIS 2 - SME COMPETITIVENESS	SPECIFIC OBJECTIVE 4 To increase the growth of those SMEs with growth potential, in particular through accessing new markets (both domestic and international).	SEA Objective	Likely?	Significant?	Comment
		2. 3, 7, 9	**Probable**	**Moderate/ locally high, depending on the type of enterprise**	The growth of businesses seeking international markets into which to export is likely to increase the demand to travel during the Operational Programme period, even with parallel measures in place such as ICT. This can be mitigated by using public transport and car sharing wherever possible, but may be unfeasible internationally. Where possible alternatives to road freight should be encouraged. There is some risk that in needing to increase productivity, successful enterprises will increase their demand for both energy and for spatial expansion. Limiting and adapting to climate change will not be achieved unless other measures are introduced, including ecological design, reduced car use, energy awareness and appropriate technology, as well as an increase in renewable energy use.

PRIORITY AXIS 3 – RENEWABLE ENERGY AND ENERGY EFFICIENCY	SEA Objective	Likely?	Significant?	Comment
SPECIFIC OBJECTIVE 1 To increase the number of small-scale renewable energy schemes established.	**2, 3**	**Possible**	**Locally moderate/ high**	The main concern relates to the cumulative landscape and visual impact that may result from the proliferation of farm- and community scale wind turbines. Such proposals will be determined through the normal planning process, applying LVIA and EIA where appropriate. There may be a minor, but probably negligible negative impact from micro-hydro schemes. Appropriate assessment may be necessary where such schemes are likely to impact on European sites.

PRIORITY AXIS 4 - CONNECTIVITY	SEA Objective	Likely?	Significant?	Comment
SPECIFIC OBJECTIVE 1 To increase urban and labour mobility to and from key urban and employment centres.	**9, 10**	**Possible**	**Low, possibly regionally moderate**	If the explicit purpose is to increase accessibility through the improvement of public transport facilities and infrastructure, and through the improved provision of ICT to peripheral regions, any negative effect is likely to be negligible. If, however, part of the mix is to develop or to improve the road network in order to alleviate bottlenecks, there may result an increase in car and lorry volumes unless some parallel measures are put in place to reduce incentives to use cars.

5.3 Conclusion

5.3.1 Overall, we have identified 17 potentially negative effects across six of the 13 SEA objectives, namely: 1, 2, 3, 7, 9 and 10. Seven of the fourteen OP Specific Objectives raised concerns in varying degrees. These are the focus of the discussion in table 6 above.

5.3.2 Close attention will be needed in developing the final programme to ensuring that these potential negative effects are considered further. It will be critical to ensure that statutory measures are applied in order to avoid and mitigate, and where this is not possible, to appropriately compensate for any negative effects. Given WG's aspirations to lead on sustainable development, it anticipated that high standards would be applied in order to promote environmental enhancement.

6 ALTERNATIVES

6.1 Selection and discussion of alternatives to the proposed Operational Programme

6.1.1 The SEA Directive requires a discussion of reasonable alternatives to the proposed Programme, and why they are not considered to be the best option. The Directive does not specify what is 'reasonable' but does state (in paragraph 5.12) that a discussion of alternatives should include *'...the likely evolution of the current state of the environment without the implementation of the alternative'.* The Directive does not specify whether 'alternatives' means alternative programmes, or different alternatives *within* the proposed Programme.

6.1.2 The purpose of analysing alternatives is to determine whether the proposal offers the optimal option in terms of sustainable development. The priorities and themes are not prioritised in any way, since the underlying rationale is that they are mutually reinforcing and therefore equally critical for achieving the overall programme objectives.

6.1.3 It might be possible to consider a variety of scenarios, such as an 'economic growth first' scenario as opposed to, say an 'environment first' or a 'food security first' scenario, as is common in many policy forecasting studies, but that would be inappropriate, since the EU and the Welsh Government have both indicated that the scenario they seek is a 'sustainable development' scenario in which social, environmental and economic priorities are balanced. There is thus no definitive 'first', since it is not the intention to seek 'trade-offs'.

6.1.4 Assuming this, there are a number of constraints in terms of alternative programmes, including:

- Time - the programme is subject to a six year timescale. Whilst it may be possible to manage the pace of proposals within this time period, it is likely that most will not be realised within, say the first two years. It is therefore not reasonable to discuss timescales beyond the remaining four year window.
- Funding - this has yet to be finalised and allocated. Although negotiations have yet to be completed, the indications at the time of this report are that the budget is likely to be reduced, perhaps significantly[88,89]. It would therefore not be reasonable to discuss alternatives in terms of any likely increase in funding.

[88] *http://www.bbc.co.uk/news/world-europe-21377378, accessed 08/02/2013*
[89] *http://wales.gov.uk/newsroom/businessandeconomy/2013/130125eu/?lag=en&skip=1&lang=en, accessed 08/02/2013*

- Deployment of funds - discussion of alternatives on this is constrained by size of the compulsory spending element, which is 80%. Any deployment of the 20% flexible element over six years is likely to be relatively limited in its effects.
- Policy - it would not be reasonable to consider alternatives that are not consistent with EU, UK and Wales policies.

6.1.5 It is worth considering a continuation of the previous programme as an alternative. Whilst there are broad similarities - the promotion of sustainable businesses, ICT and renewables, there is a significant emphasis in the proposed programme on climate change management (as far as the proposed Programme can significantly contribute to this objective) and low-carbon living. The thrust of the proposed Programme is perhaps more oriented towards sustainable economic growth than the existing one, which does not necessarily imply that there has been any reduction in environmental priorities.

6.1.6 It is a requirement to consider what might be the state of the environment without programme implementation, and this 'do nothing' option is therefore one of the alternatives selected.

6.1.7 Table 7 therefore considers the likely effect on the SEA objectives of each of the options:

1 Do nothing
2 Continue the previous programme
3 Implement the proposed programme.

6.1.8 It should be noted that the scoring for option 2 was taken directly from the 2006 SEA. The criteria used for that assessment differ from the criteria used in this one, and the basis for scoring may therefore have been different. Whilst most of the objectives in this SEA can be linked to those of the 2006 SEA, they do not necessarily correspond directly, in which case the score used is a 'best guess' based on a reading of the 2006 SEA.

Table 8: Options assessment

SEA Objective	1	2	3	Comment
1. Protect places, landscapes and buildings of historic, cultural and archaeological value	**×?**	**✓?**	**O?**	Opportunities for enhancement of historic sites and buildings through enhanced funding and advice on design.
2. Protect and enhance landscapes, seascapes, townscapes and the	**×**	**✓?**	**O?**	Opportunities for enhancement of historic sites and buildings through

countryside				enhanced funding and advice on design.
3. Protect and enhance biodiversity	×?	✓?	O?	Without funding and promotion, it is possible that the current programme will be less effective than the previous programme. Option 1 will result in continued pressures. Possibility of funding linked to RDP?
4. Protect and improve the region's water quality	×	✓?	O	There is a need to focus on water quality to remediate current challenges. Doing nothing would result in continued reductions in quality. No evidence that the previous programmes have addressed this adequately. Link to RDP funding?
5. Protect the water resource and ensure its sustainable use	×?	✓?	✓O	Whilst the Programme is limited in how far it can address this objective, appropriate design and advice will have some positive effect.
6. Guard against land contamination, encourage reuse of existing buildings and of previously developed land of low ecological quality	×	?	✓	Significant opportunity to promote this objective via targeted funding and CCT guidance; careful project selection.

7. Minimise the requirement for energy generation use, promote efficient energy use and increase the use of energy from renewable resources	×?	×✓?	✓✓	Significant opportunity to contribute to this objective. Priority C is a key element.
8. Minimise waste increase re-use, recycling and recovery rates	×	✓?	✓?	Whilst this is a matter of social behaviour, the programme can provide opportunities to promote this objective through targeted funding/CCTs
9. Minimise the need to travel; provide alternatives to car use	×	?	×✓?	Appropriate selection of schemes to avoid increased car use and to promote alternatives. The programme is limited in influencing societal behaviour
10 Limit and adapt to climate change	×?	×✓?	✓✓	Priority C specifically aims to address this, although the contribution it will make is limited. Depends on selection of projects.
11. Protect and improve air quality	×?	✓?	✓?	The Programme aims to reduce emissions as far as

				possible. Enhanced funding will ensure that projects will minimise effects.
12. Improve physical and mental health and reduce health inequalities	✗	✓?	✓O	There is an opportunity to address some of the well-being issues described. Improvements to air quality, building design and travel will promote this.
13. Improve public access to land	?	?	O	Not likely to be a significant factor.

6.1.9 This options discussion assumes that the future Budget for the East Wales Programme remains at more or less the same level as that of the existing one. If there is a reduction, it would require funds to be transferred across from the Programme for West Wales and the Valleys, which are substantially higher. The effect would be to reduce the effectiveness of that programme to deliver its objectives, and a consequent reduction in the potential to meet key climate change and ecological footprint targets. However, not transferring funds would result in the proposed Programme for East Wales reprioritising its interventions in order to optimise economic efficiencies and the effectiveness of its fund. This may inhibit the potential for realising environmental opportunities.

7 ASSESSMENT OF THE PROPOSED PROGRAMME

7.1 Summary of findings

7.1.1 The purpose of the Programme is to promote sustainable economic development, by which is meant economic development that does not compromise environmental or social priorities. In trying to ensure an appropriate balance, it is inevitable that some tensions will arise, and the Programme will need to carefully target its priorities to optimise economic opportunities and at the same time to optimise environmental and social benefits.

7.1.2 The alternatives considered above are based on a number of unknowns and assumptions, but the conclusion is that the proposed programme provides an opportunity to deliver significant environmental benefits, provided that funding is carefully considered and goes for maximum benefit not just to the economy but seeks environmental and social positive outcomes as well.

7.1.3 It should be noted that economic growth can lead to an increase in energy and material use, and potentially waste. The issue is therefore a management one rather than one of principle. However, if the envisaged interventions were not to occur at all, there would be greater uncertainty about the environmental outcomes. The Programme aims to address two of the three key indicators of Wales' ecological footprint, namely household energy demand and travel.

7.1.4 There are some potential risks, and some of the effects, both positive and negative, may not become immediately apparent. Some effects may be immediate, direct and positive, such as supporting projects that will ameliorate air pollution or minimise the demand for energy. Others may be less immediate, indirect and negative, and may include the transportation of marine-borne organisms on the hulls of vessels into new sites as a result of port development, or the impacts of demand for expansion of successful operations on sensitive sites.

7.1.5 There is considerable convergence between the themes promoted by the proposed Programme and those promoted by the Welsh Government's own programmes, based as they are on furthering sustainable development. Without the programme it is arguable that significant and urgent interventions would not take place, and some of these aim to address the Welsh Government's targets to reduce carbon emissions, to improve air quality and to reduce Wales' ecological footprint.

7.1.6 In conclusion, the proposed Programme offers an opportunity to promote positive effects on the environment, particularly on energy conservation,

carbon reduction, waste management, re-use of redundant land and local health and well-being issues.

7.1.6 The environmental sustainability Cross-Cutting Themes reflect the environmental objectives of the 2007-13 Operational Programme. Since the objectives and the interventions of the proposed Programme are different in certain aspects, the scope of the guidance on CCTs may need to be revisited and revised, as will the criteria and indicators for monitoring the environmental effects of the proposed Programme (see section 8).

8 MONITORING

8.1.1 The SEA Guidance defines significant effects as positive, adverse, foreseen and unforeseen. The methods and scope for gathering information either directly or indirectly are not defined. There is no requirement, for instance, to aggregate or collate potentially relevant data from other monitoring sources under other laws or programmes[90].

8.1.2 There are three key challenges related to monitoring the environmental effects of the Programme. Firstly, the data is dispersed across a number of statutory and non-statutory bodies. The bringing together of three statutory bodies into Natural Resources Wales will facilitate the centralising of a significant amount of environmental data related to the Programme's implementation. Nonetheless, it would be helpful for WEFO to ensure some co-ordination between collating the data needed to address the Programme's objectives and that needed to address the environmental objectives in this report.

8.1.3 The second issue is that it in many cases environmental effects may be impossible to attribute solely to the Programme. The Welsh Government has a legal duty to promote sustainable development, and its Programme for Government is based on sustainable development principles. A wide range of parallel actions are likely to deliver on these objectives. It is impossible at this level to determine the synergies and tensions between the Programme and other government interventions that might determine particular environmental outcomes.

8.1.4 For example, whilst it is possible to calculate an output, such as the reduction in emissions from a particular sponsored project, the overall *outcome* in terms of a reduction in emissions in a particular area is likely to be influenced by a number of other factors. This makes it difficult to report genuine environmental gains (or losses) in a way that can be meaningfully attributed to the Programme.

8.1.5 The third challenge is a logistical one. Different measures are needed for different environmental targets, and they often require different measurement timescales incorporating different skills in capturing and analysing data. The costs entailed are significant, and therefore adequate monitoring may be subject to economic constraints.

8.1.6 Monitoring, and especially programme evaluation, should therefore be approached with these challenges in mind.

[90] *(COWI/AS Denmark 2009 p133).*

8.1.2 Table 8 summarises the key monitoring bodies for the SEA objectives identified above. WEFO itself will monitor a number of outputs and outcomes related to the objectives, as indicated. University departments are also commissioned to carry out monitoring on behalf of the agencies. Organisations such as the Health and Safety Executive are responsible for monitoring workplace safety issues. The Forestry Commission monitors the state of Wales' woodlands and the condition of tree species, including threats from diseases. Local councils undertake monitoring of the effects of their spatial planning policies as required by the Planning and Compensation Act 2004, as well as a number of environmental and health topics including air quality and waste.

Table 9: Monitoring

SEA Objectives	Monitoring implications
1. Protect places, landscapes and buildings of historic, cultural and archaeological value	Cadw - monitors condition of historic buildings; archaeological trusts - monitor condition of sites; Royal Commission on Historic and Ancient Monuments - maintains database
2. Protect and enhance landscapes, seascapes, townscapes and the countryside	Local planning authorities - monitor building standards; conservation areas; development management; maintain EIA databases
3. Protect and enhance biodiversity	Countryside Council for Wales/NRW monitor condition of sensitive sites/species; Wildlife NGOs monitor condition of BAP species and habitats; maintain databases; Appropriate Assessment case studies
4. Protect and improve the region's water quality	Environment Agency (EA) monitors ecological and chemical condition of river systems; bathing water quality; maintains databases. Water companies monitor chemical quality.
5. Protect the water resource and ensure its sustainable use	Water companies/EA monitor availability of water; losses. Flood risk databases.
6. Guard against land contamination, encourage reuse of existing buildings and of previously developed land of low ecological quality	Local planning authorities monitor land availability including 'brownfield land' and maintain databases
7. Minimise the requirement for energy generation use, promote efficient energy use and increase the use of energy from renewable resources	WEFO - Additional capacity of renewable energy production WEFO - Number of energy users connected to smart grids WEFO - Number of households with improved energy consumption classification WEFO - Decrease of primary energy consumption of public buildings WEFO - Energy saved
8. Minimise waste increase re-use, recycling and recovery rates	Local authorities monitor municipal waste including recycled waste
9. Minimise the need to travel; provide alternatives to car use	WEFO - Public transport services created or improved WEFO - Total length of new railway line (including TEN-T) WEFO - Total length of reconstructed or upgraded railway line (including TEN-T) WEFO - Additional households with broadband

	access of at least 30 Mbps
10 Limit and adapt to climate change	WEFO - Estimated decrease in GHG
11. Protect and improve air quality	EA and local authorities issue permits and monitor air quality; maintain databases
12. Improve physical and mental health and reduce health inequalities	The Public Health Observatory monitors health and wellbeing issues and maintains databases
13. Improve public access to land	WEFO - Footpath or cycleway created or reconstructed

8.1.3 The analysis above suggests some relevant data are likely to be available in respect of each of the environmental objectives but that further work may be needed to refine these before programme implementation.

11 REFERENCES

Avery, B.W. (1980). Soil classification for England and Wales [Higher Categories]. Survey Technical Monograph No. 14, pp67. Harpenden, UK.

Bellamy, P., and Rickson, J. (20011). Monitoring Soil Erosion in England and Wales. NSRI Cranfield University. Summary.

Cadw, Welsh Assembly Government (2007): The Welsh Historic Environment. WAG Cardiff

Cadw, Welsh Assembly Government (2009): Buildings at Risk in Wales. Handley Partnership for WAG Cardiff

COWI AS Consulting (Denmark). (April 2009). Study concerning the report on the application and effectiveness of the SEA Directive (2001/42/EC). Final report

DTZ/EPRC (2006): Summary of Lessons Learned from Previous Programmes in Wales, the UK and the EU. DTZ

DTZ/Royal Haskoning (2006): West Wales and the Valleys ERDF Convergence Programme 2007-13. Strategic Environmental Assessment Environment Report. Draft report. Royal Haskoning Exeter

DTZ Consulting (2007): Ex Ante Evaluation of the 2007-13 ERDF Convergence Programme. Final Report March 2007. DTZ Cardiff

Ecologic Institute/Institute for European Environmental Policy/Central European University (2011): Assessment of the 6th Environment Action Programme. Final Report. DG Env.1/SER/2009/0044. Brussels

Ecotec (2006): Cross Cutting Themes Research Project (Objectives 1 & 3). Final Report. April 2006. Ecotec Cardiff

ENDS Report (2011): 'A Small Country with Big Ambitions' ENDS Report 442 pp43-45 November 2011

Environment Agency (2010) Water Resources in England and Wales – current state and future pressures. [online] Available at: <http://publications.environment-agency.gov.uk/PDF/ GEHO1208BPAS-E-E.pdf> [Accessed: 15.12.12].

European Commission DG Environment (undated): Guidance on the Implementation of Directive 2001/42. Brussels

European Commission (2005): Communication on the Thematic Strategy on the Sustainable Use of Natural Resources. COM (2005) 670 final. Brussels

European Commission (2011): Communication on the Roadmap to a Resource Efficient Europe. COM (2011) 571 final. Brussels

European Commission (2011): Communication on a Resource Efficient Europe - Flagship initiative under the Europe 2020 strategy. COM (2011) 21 final. Brussels

European Commission (2011). 7th Environmental Action Plan Roadmap. DG Env.F.2. Brussels

European Commission (2011): Proposal for a Regulation of the European Parliaments and the Council. Laying down common provisions on structural funds and repealing Council Regulation No 1083/2006. COM (2011) 615 final/2 Brussels

European Commission (2011): Monitoring and evaluation of European Cohesion Policy - European Regional Development Fund and Cohesion Fund - Concepts and Recommendations. Guidance document. Brussels

European Commission (2012): Commission Staff Working Document. Elements for a Common Strategic Framework 2014 to 2020. SWD (12) 61 final. Brussels

European Union (2001): Directive 2001/42/EC on the Assessment of the Effects of Certain Plans and Programmes on the Environment. C5-0118/2001. Luxembourg

European Union (2006): Consolidated Versions of the Treaty on European Union and of the Treaty Establishing the European Community. C321 E/1. Brussels

European Union (2006): Council Regulation laying down general provisions on structural funds and repealing Regulation (EC) No 1260/1999. (EC) No 1083/2006 Brussels

Eurostat (2009): Sustainable development in the European Union. 2009 monitoring report of the EU sustainable development strategy. Luxembourg

Health and Safety Executive: Health and Safety in Wales Statistics 2011. http://www.hse.gov.uk/statistics/regions/wales.pdf

Institute for Welsh Affairs: Re-thinking environmental management in Wales. Conference report 2012

Jones, D. (2011): Review of the Welsh Timber Resource. January 17 2011. Building Research Establishment Ltd. LCBE Cardiff University.

National Assembly for Wales (2001): Technical Advice Note 21: Waste. November 2001. NAW Cardiff

National Assembly for Wales (2006): Environmental Protection in Wales. Watson, K. September 2006. NAW Cardiff

National Assembly for Wales (2009): Hassall. C. Environment Strategy and Action Plan - progress made research paper. July 2009/ Paper 09/024. NAW Cardiff

National Assembly for Wales, Sustainability Committee (2011): Enquiry into Planning in Wales. January 2011. NAW Cardiff

National Assembly for Wales, Sustainability Committee (2011): Enquiry into Biodiversity in Wales. January 2011. NAW Cardiff

National Assembly for Wales (2012): Enterprise and Business Committee. Draft legislative proposals for EU Structural Funds 2014-2020. February 2012. NAW Cardiff

National Ecosystems Assessment (2011): Chapter 20: Status and Changes in the UK's Ecosystems and their Services to Society: Wales. World Conservation Monitoring Centre Cambridge

National ERDF handbook for England - Convergence and Competitiveness Programmes 2007-13 (date 24 Sept 2012)

Newman, C. (2012): Article on household waste data. Online. Resource 57 December 27 2012.
http://www.resource.uk.com/article/Latest/Zero_Waste_Race_local_authority_residual_table#.UMtLs2-pDa4

Old Bell 3 (2005): Mid Term Evaluation Update for the Objective 1 Programme. Final Report. Old Bell 3 Ludlow

Old Bell 3, Dateb, Atom PR, Himsworth, K., and CRG Research (January 2011): The Effectiveness of Implementation in the 2007-13 Structural Funds Programming Period. Final Report. Old Bell 3 Ludlow

Persson, Åsa and Måns Nilsson, Towards a framework for SEA follow-up: Theoretical issues and lessons from policy evaluation, in Journal of Environmental Assessment Policy and Management Vol. 9, No. 4 (December 2007) pp. 473-496. Imperial College Press

Plantlife (2012): Forestry Recommissioned - Revitalising the woodlands of Wales. May 2012.
On line http://www.plantlife.org.uk

Regional Environmental Centre (ed). (undated): Handbook on the Implementation of EC Environmental Legislation. REC Szentendre Hungary.

Statistics for Wales (First release June 28 2012 - SDR 104/2012)): Local Authority Municipal Waste Management Jan- March 2012. Statswales Cardiff

SURF Nature (2012): Handbook on Financing Biodiversity in the Context of the European Fund for Regional Development (ERDF). SURF Nature Partnership. Cardiff

Thomas , D.S. (2012): All-Wales Programme Monitoring Committee (PMC) ERDF and ESF Programmes 2007-13 Environmental Sustainability Cross-Cutting Theme: Annual Progress Report. WEFO Cardiff

Utley. J.I. & Shorrock, L.D. (2007): Domestic Energy Fact File. Department of Energy and Climate Change/Energy Saving Trust/Building Research Establishment Ltd.

Welsh Assembly Government (2002): Technical Advice Note 19: Telecommunications. August 2002. WAG Cardiff

Welsh Assembly Government (2004): Technical Advice Note 15: Development and Flood Risk. July 2004. WAG Cardiff

Welsh Assembly Government (2005): Technical Advice Note 8: Planning for Renewable Energy. July 2005. WAG Cardiff

Welsh Assembly Government (2006): Environment Strategy for Wales 2006-2026. WAG Cardiff

Welsh Assembly Government (undated): Achieving our Potential 2006-2013. Tourism Strategy for Wales. Mid-term review. WAG Cardiff

Welsh Assembly Government (2007): Responding to Our Changing Climate. Consultation on a climate change adaptation action plan for Wales. WAG Cardiff

Welsh Assembly Government (2007): Technical Advice Note 18: Transport. March 2007. WAG Cardiff

Welsh Assembly Government (2008): Renewable Energy Route Map for Wales (consultation paper). February 2008. WAG Cardiff

Welsh Assembly Government (2008): Environment Strategy Action Plan 2008-2011. WAG Cardiff

Welsh Assembly Government (2008): One Wales: Connecting the Nation. The Wales Transport Strategy. April 2008. WAG Cardiff

Welsh Assembly Government (2008): People, Places, Futures. The Wales Spatial Plan. 2008 update. July 2008. WAG Cardiff

Welsh Assembly Government Spatial Planning Unit, Countryside Council for Wales, Wales Environment Link, Environment Agency Wales (2009): Framework for the South East Wales Networked Environment Region. WAG Cardiff

Welsh Assembly Government (2009): Woodlands for Wales - 50 year plan for Welsh Woodlands. March 2009. WAG Cardiff

Welsh Assembly Government (undated): Welsh Woodlands - their extent, nature and character. WAG Cardiff

Welsh Assembly Government (2009): One Wales: One Planet. Towards Zero Waste Consumption. Consultation on a New Waste Strategy for Wales. April 2009. WAG Cardiff

Welsh Assembly Government (2009): One Wales: One Planet. The Sustainable Scheme of the Welsh Assembly Government. May 2009. WAG Cardiff

Welsh Assembly Government (2009): Technical Advice Note 12: Design. July 2009. WAG Cardiff

Welsh Assembly Government (2009): Technical Advice Note 5: Nature Conservation and Planning. September 2009. WAG Cardiff

Welsh Assembly Government (2009): European Structural Funds 2007-2013 Strategic Framework. Climate Change. December 2009. WAG DESH Cardiff

Welsh Assembly Government (2009): European Structural Funds 2007-2013 Strategic Framework. Community Economic Development. December 2009. WAG Cardiff

Welsh Assembly Government (2009): European Structural Funds 2007-2013 Strategic Framework. Enterprise. December 2009. WAG DET Cardiff

Welsh Assembly Government (2009): European Structural Funds 2007-2013 Strategic Framework. Sustainable Regeneration. Central Spatial Plan Area. December 2009. WAG Cardiff

Welsh Assembly Government (2009): European Structural Funds 2007-2013 Strategic Framework. Sustainable Transport. December 2009. WAG/WLGA Cardiff

Welsh Assembly Government (undated): Ecosystems - What are we on about? (supporting paper for consultation on ' A Living Wales'). WAG Cardiff

Welsh Assembly Government (2010): Woodlands for Wales Action Plan 2010-2015. WAG Cardiff

Welsh Assembly Government (2010): A Low Carbon Revolution - Energy Policy Statement. March 2010. WAG Cardiff

Welsh Assembly Government (2010): Technical Advice Note 6: Planning for Sustainable Rural Communities. July 2010. WAG Cardiff

Welsh Assembly Government (2010): Consultation document - A Living Wales - a new framework for our environment, our countryside and our seas. August 2010. WAG Cardiff

Welsh Assembly Government (undated 2010): Towards a New Natural Environment Framework. Background Document. WAG Cardiff

Welsh Assembly Government (2010): Climate Change Strategy for Wales. October 2010. WAG Cardiff

Welsh Assembly Government (2011): Woodlands for Wales Indicators Revised. March 2011. WAG Cardiff

Welsh Assembly Government (2011): A Living Wales Statement of Next Steps and Principles' Progress Report. February 2011. WAG Cardiff

Welsh Assembly Government (2011): A Living Wales - Summary of Consultation Responses. March 2011. WAG Cardiff

Welsh Assembly Government (2011): Planning Policy Wales, Edition 4. February 2011. WAG Cardiff

Welsh Assembly Government (2011): Letter to all Chief Planning Officers relating to the publication of Planning Policy Wales Edition 4 February 2011. February 28 2011. WAG Cardiff

Welsh European Funding Office (undated): West Wales and the Valleys Objective 1 Programme. Final Implementation Report. WEFO Cardiff

Welsh European Funding Office (2010): West Wales and the Valleys ERDF Convergence 2007-13. Operational Programme. WEFO Cardiff

Welsh European Funding Office (2011): West Wales and the Valleys ERDF Convergence Programme 2007-13. Annual Implementation Report 2011. Draft v5. WEFO Cardiff

Welsh European Funding Office (2012): European Structural Funds Programmes 2014-2020. Reflections Exercise. Synthesis Report. Final Report May 2012. WEFO Cardiff

Welsh European Funding Office (2012): Guidance. Cross-cutting themes - environmental sustainability. Business Support. March 2012. WAG/WEFO Cardiff

Welsh European Funding Office (2012): Guidance. Cross-cutting themes - environmental sustainability. Community economic development. March 2012. WAG/WEFO Cardiff

Welsh European Funding Office (2012): Guidance. Cross-cutting themes - environmental sustainability. Developing young people and increasing employment. March 2012. WAG/WEFO Cardiff

Welsh European Funding Office (2012): Guidance. Cross-cutting themes - environmental sustainability. E-solutions. March 2012. WAG/WEFO Cardiff

Welsh European Funding Office (2012): Guidance. Cross-cutting themes - environmental sustainability. Energy. March 2012. WAG/WEFO Cardiff

Welsh European Funding Office (2012): Guidance. Cross-cutting themes - environmental sustainability. Environment for Growth. March 2012. WAG/WEFO Cardiff

Welsh European Funding Office (2012): Guidance. Cross-cutting themes - environmental sustainability. Improving skills levels and the adaptability of the workforce. March 2012. WAG/WEFO Cardiff

Welsh European Funding Office (2012): Guidance. Cross-cutting themes - environmental sustainability. Innovation, R&D and Technology. March 2012. WAG/WEFO Cardiff

Welsh European Funding Office (2012): Guidance. Cross-cutting themes - environmental sustainability. Key document. March 2012. WAG/WEFO Cardiff

Welsh European Funding Office (2012): Guidance. Cross-cutting themes - environmental sustainability. Making the Connections. March 2012. WAG/WEFO Cardiff

Welsh European Funding Office (2012): Guidance. Cross-cutting themes - environmental sustainability. Materials efficiency. March 2012. WAG/WEFO Cardiff

Welsh European Funding Office (2012): Guidance. Cross-cutting themes - environmental sustainability. Physical regeneration. March 2012. WAG/WEFO Cardiff

Welsh European Funding Office (2012): Guidance. Cross-cutting themes - environmental sustainability. Practical guide to promoting environmental sustainability. March 2012. WAG/WEFO Cardiff

Welsh European Funding Office (2012): Guidance. Cross-cutting themes - environmental sustainability. Sustainable Transport. March 2012. WAG/WEFO Cardiff

Welsh Government (2011): A Written Statement on the Natural Environmental Framework A Living Wales. June 15 2011. Welsh Government Cardiff

Welsh Government (2011): National Strategy for Flood and Coastal Erosion Risk Management in Wales. November 2011. Welsh Government Cardiff

Welsh Government (2011): One Wales: One Planet. Discussion Paper - Sustainable Development Bill. November 2011. Welsh Government Cardiff

Welsh Government (2011): Meeting Sphere - your chance to shape the proposed Sustainable Development Bill. December 2011. Welsh Government Cardiff

Welsh Government (2012): Sustaining a Living Wales - a Green Paper on a new approach to natural resource management in Wales (consultation document). January 2012. Welsh Government Cardiff

Welsh Government (2012): Wales Natural Environment Framework - update of the evidence base underpinning the framework. January 24 2012. Welsh Government Cardiff

Welsh Government (2012): Sustaining a Living Wales. A Green Paper on a new approach to natural resource management in Wales. Consultation document. January 2012. Welsh Government Cardiff

Welsh Government (2012): Climate Change Strategy for Wales. First annual progress report. March 2012. Welsh Government Cardiff

Welsh Government (2012): Summary - National Strategy for Flood and Coastal Erosion Risk Management in Wales (April 2012). Welsh Government Cardiff

Welsh Government (2012): Proposals for a Sustainable Development Bill. Consultation document. May 2012. Welsh Government Cardiff

Welsh Government (2012): State of the Environment - Statistical Bulletin July 25th 2012 (SB 66/2012. Welsh Government Cardiff

Welsh Government (2012): State of the Environment Report. Welsh Government Cardiff

Welsh Government (2012): Wales Infrastructure Investment Plan for Growth and Jobs. Welsh Government Cardiff

World Commission on Environment and Development (1987): *Our Common Future.* Oxford. Oxford University Press