



South Wales Metro Programme

Strategic Environmental Assessment
Environmental Report

20 November 2017

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Executive Summary

Welsh Government (WG) is currently developing the South Wales Metro Programme. This will comprise a new transport system, providing faster, more frequent and joined-up services using trains, buses, light rail, heavy rail and encouraging active travel to transport hubs.

The Strategic Environmental Assessment (SEA) Directive and the resulting Environmental Assessment of Plans and Programmes (Wales) Regulations require an SEA to ensure that the environmental effects of the South Wales Metro programme are considered.

The Well-being of Future Generations (Wales) Act 2015 requires public bodies to carry out sustainable development and to develop their own well being objectives.

This environmental report represents the third stage (Stage C) of the SEA (following scoping and consultation) and is aligned to the goals and objectives set out in the Act.

South Wales Metro Programme

The geographic extent of the proposed South Wales Metro system extends from Bridgend in the west to Monmouth and Abergavenny in the east and connects the communities to the north from Maesteg, Treherbert, Hirwaun, Merthyr Tydfil, Rhymney, and Ebbw Vale.

SEA Environmental Report

This report uses the objectives defined within the scoping report and further assessment of available baseline data to appraise the Metro and potential alternatives to determine their potential environmental effects. The SEA objectives are shown below:

South Wales Metro Programme SEA Objectives

1. Sustainable use of natural resources and efficient energy use
2. Reduce air pollution related to transport and infrastructure improvements
3. Promote economic development, employment, and learning opportunities and improve access to these areas
4. Reduce pollution risk to water, soils, and land, and improve land quality where possible
5. Reduce transport related effects on water run-off and areas of flood risk
6. Protect and enhance biodiversity and geodiversity
7. Support transition to a low carbon society ensuring transport projects are sustainable and resilient
8. Improve wellbeing of local population through sustainable, integrated multi-modal transport systems that promote active travel
9. Promote sustainable communities through a reliable and safe transport network that provides access for all
10. Protect and enhance existing cultural heritage and landscape features and promote Welsh art, culture, and identity

The environmental report also takes into account consultation responses received following issue of the scoping report. Our responses are outlined in Appendix B.

The environmental report identifies the potential for significant adverse effects (primarily on biodiversity, landscape and cultural heritage) but considers that these are likely to be localised and therefore local mitigation will be required. Positive effects are also likely.

The overall significance of the adverse effects at the regional scale is considered to be Minor, on the basis that suitable mitigation is adopted and that the interventions follow the appropriate guidance in design and operation to limit adverse effects.

Next Steps

The Environmental Report will be issued for formal public consultation, along with the Metro Programme proposal documents, and the Environmental Report will be updated as necessary (SEA Stage D). Consultation will be in line with the provisions in the Well-being of Future Generations (Wales) Act 2015 (including consultation with public service boards), and the EC Directive 2003/35/EC on public participation (see the 'Next Steps' Section in this report for further details on proposed public participation arrangements). Stage E 'Monitoring' will be carried out following adoption of the Metro Programme.

Further Assessment

It should be noted that this environmental assessment does not preclude the need for further environmental assessment as the design of Metro progresses. Indeed, it is recommended that further environmental assessment is completed in order to ensure the practicable solution is found between avoidance of environmentally sensitive locations / methods and constructability and positive effects of the Metro. The further assessment should then also be used to develop appropriate mitigation and compensation as required.

1 Introduction

1.1 Context

Welsh Government (WG) is currently developing the South Wales Metro Programme. This will comprise a new transport system, providing faster, more frequent and joined-up services using trains, buses, light rail, heavy rail and encouraging active travel to transport hubs.

Under the European Directive 2001/42/EC on the assessment of the effects of certain plans and programmes on the environment (the 'Strategic Environmental Assessment (SEA) Directive') and the resulting Environmental Assessment of Plans and Programmes (Wales) Regulations, 2004 a SEA is being completed to ensure that the environmental effects of the South Wales Metro Programme are considered.

This report provides an environmental assessment of the South Wales Metro Programme. The assessment is based on the proposals / interventions as they are currently understood. It is likely that changes will emerge from the tender process and therefore further updates to this SEA may be required, including potential further environmental assessment.

1.2 Structure of this report

This report is structured as follows:

Section 1 sets out the structure of the report, provides an outline of the contents and main objectives of the South. Wales Metro and provides an overview of the SEA process;

Section 2 provides details of the other relevant plans, programmes and strategies that have been taken into consideration as part of the scoping stage (and during this environmental assessment), provides details of the scope of this SEA, provides a summary of the baseline characterisation relating to the SEA topics and a summary of the transport situation in Wales;

Section 3 provides a summary of the key sustainability issues based on the baseline research and the framework of SEA objectives that has been used for the assessment stage of the SEA. It also includes analysis of whether the SEA objectives are compatible with each other;

Section 4 Sets out the objectives of the SEA and provides the assessment framework;

Section 5 describes the methodology used for undertaking the prediction and assessment of effects and describes how alternatives have been considered when completing the SEA.

Section 6 provides details of the assessment of significant effects and introduces mitigation measures and other recommendations

Section 7 provides information on the monitoring measures envisaged for the South Wales Metro;

Section 8 provides details on how to respond to consultation on this Environmental Report and describes the next steps in the SEA process.

Appendices are contained within a separate volume:

Appendix A: includes the review of other policies, plans and programmes;

Appendix B: describes how comments from earlier consultation have been taken into account; and

Appendix C: provides the detailed findings from the SEA assessment process.

Appendix D: Aggregate safeguarding map of south east Wales

Appendix E: Constraints Plans

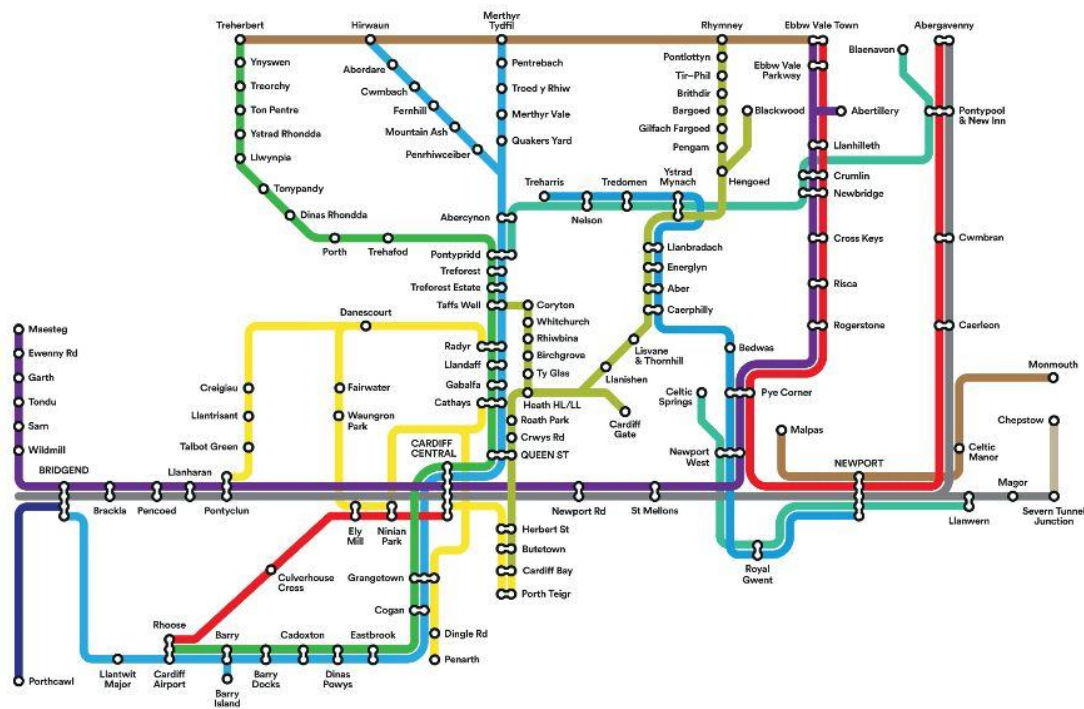
Appendix F: Alignment Matrix

1.3 The South Wales Metro Programme

1.3.1 Introduction

The vision for Metro is a 'new transport system that will transform the way we travel around South Wales. It will provide faster, more frequent and joined-up services using trains, buses, and light rail. Metro will bring benefits to passengers, link communities together, and help transform the economy. It will have a positive social, cultural¹, economic, and environmental effect. It will also shape our region's identity'.

Figure 1: Map of Extent of South Wales Metro Programme



Source: Welsh Government

It is intended that the South Wales Metro (referred to from this point forward as Metro) will operate across the ten Local Authorities which form the Cardiff Capital Region. The region is currently served by rail and bus services but many of the rail services, particularly in the valleys

¹ The vision for the South Wales Metro Programme was developed prior to the Well-being of Future Generations Act. In line with the Act 'cultural' has now been included in the Metro Programme vision.

north of Cardiff or Newport and along the Vale of Glamorgan, are operated with old rolling stock, offering infrequent and relatively slow services. Several bus companies operate local and regional services but there is limited integration of services, ticketing, or passenger information. As a result, many communities have poor connections with the main economic centres within the region and beyond. The primary goal of Metro is to significantly enhance all the public transport modes and offer an attractive, viable alternative to private cars.

The key features of the South Wales Metro Programme are:

Higher service frequencies

Rail services in the Core Valley Network will run at up to four trains an hour. This gives a 'turn up and go' experience for passengers. Metro will also deliver a network where interchange is easy, using vehicles designed for speed and capacity.

Integration

Heavy rail, light rail, bus, and active travel (cycling and walking) – these will be seamlessly joined to give integrated, reliable, and frequent services across the region. This transformation in sustainable urban mobility and increased accessibility will have a profound impact. It will have positive social, cultural, economic, and environmental effects. It will also shape the region's identity.

An extendable network

A vital part of the Metro vision is that the network can grow to make it even more accessible. New stations, new routes, greater frequencies — in the future, the network can extend to bring better public transport to more communities and economic centres, such as linking with Swansea and its surrounding communities. It is a truly regional project.

Enabling development and regeneration

Metro stations will provide better passenger facilities and become a focal point for their communities. Metro also presents an opportunity for developers and local authorities to work in partnership with transport organisations. Together, they can adopt a 'transit-oriented development' approach, directing development and regeneration to Metro transport corridors and their key stations and interchanges.

Metro is likely to comprise some, or all, of these elements:

- An electrified rail system;
- Integrated transport hubs;
- Park-and-ride facilities;
- New (including some on-street) light rail and/or bus rapid transit routes;
- Better integration of services across modes and operators; and
- Active travel interventions such as integration transport links with cycling and walking routes to encourage seamless cycling and walking as part of a journey.

Enhanced services on the Valley Lines are a core part of the project. This scope of Metro includes all the lines in and north of Cardiff, the Vale of Glamorgan line, the Ebbw Valley and Maesteg branches, the Marches line to Abergavenny and the South Wales mainline.

1.3.2 Objectives

The following objectives and outcomes were developed by Welsh Government for the Metro Programme and were published in late 2015/early 2016 as part of a region wide engagement with the public and key stakeholders:

Metro transport objectives

- Deliver a high-quality, reliable, efficient, economically sustainable transport network;
- Improve connectivity, linking communities with all major commercial, social and leisure attractors, enabling the region to function as a single coherent economic entity;
- Improve accessibility to public transport within city and town centres;
- Provide comparable journey times across public and private transport modes, offering realistic travel choices;
- Cater for increasing demand for public transport;
- Reduce the impact of transport on the environment; and
- Encourage active travel and social inclusion initiatives.

Metro transport outcomes

- Reduced generalised journey times through faster, more frequent services and better interchange;
- Increased public transport patronage through provision of more attractive services;
- Reduced operating and maintenance costs through greater efficiencies and higher demand;
- Capacity to meet demand during peak periods and special events;
- Accessibility improvements through coordination of services, Disability Discrimination Act compliance and station design;
- Reduced emissions through lower car use and more efficient, cleaner transit vehicles;
- Direct services between main residential areas and economic centres to improve connectivity;
- Improved quality of service through newer vehicles, better integration, and enhanced services; and
- Better reliability in terms of availability and punctuality of services.

1.3.3 Phases and Interventions

The South Wales Metro Programme will be delivered in several phases. The phases and proposed interventions are listed below. Phase 1 has already been delivered and does not form part of this SEA.

It should be noted that the interventions are at different stages in their development and, therefore, specific detail of each is not known. Further details about the options to be assessed under each of these interventions is provided in Appendix C.

Phase 1 (already delivered):

- Pye station corner;
- Rail and bus stations improvements;
- Bus Corridor schemes on A470;
- Active Travel Park and Ride schemes; and
- New Ebbw Vale Town station with extension and speed improvements to the Ebbw line.

Phase 2:

- Rhymney, Coryton and Bay line enhancements;
- Treherbert, Aberdare and Merthyr enhancements;
- Extra stations and conversion of sections of freight lines for passenger services;
- Enhanced intermodal facilities and associated station improvements; and
- Ebbw Valley Line improvements and spur to Abertillery.

Potential Future Phases:

- Newport Rapid Transit;
- Enhancements to Maesteg line and Vale of Glamorgan.
- On-street operations in Cardiff City Centre;
- Extension of the Bay branch;
- Direct link Cardiff Bay to Cardiff Central;
- Capacity improvements Vale of Glamorgan;
- Capacity improvements – Cardiff Central;
- Heavy rail stations (if not delivered in Phase 2);
- Corridor from Central Cardiff to North West Cardiff development areas;
- Central Cardiff to North East and East development areas Cardiff;
- Caerphilly to Newport;
- Hengoed to Blackwood;
- Coryton to Taffs Well;
- Heads of Valleys and Pontypridd – Pontypool BRT Schemes; and
- Other schemes which may emerge.

1.3.4 South Wales Metro Timetable

Consultation on the Strategic Environmental Impact Assessment (SEA) Environmental Report and the related Habitats Regulations Assessment started in 2016. Following on from this consultation stage, the S. Wales Metro will be further developed and planning process will commence in 2018.

1.4 Strategic Environmental Assessment

1.4.1 Summary

The overarching objective of SEA is “to provide for a high level of protection of the environment and to contribute to the integration of environmental considerations into the preparation and adoption of plans and programmes with a view to promoting sustainable development” (EC, 2001, p100).

SEA extends the assessment of environmental effects from individual projects to the broader perspective of national, regional, and county level plans. It is a systematic process that assists authorities in identifying and assessing the significant environmental effects of a plan or programme.

1.4.2 SEA Process and the purpose of this Environmental Report

SEA is a tool to ensure the integration of environmental considerations into the planning and decision-making process. The SEA of the Metro has been carried out by Mott MacDonald Limited with input from the Welsh Government and statutory consultees. The SEA for the Metro uses the same methodology as that developed for the SEA of the 2015 Wales National Transport Plan. That methodology was developed to comply with several pieces of legislation and guidance including:

- The SEA Directive - European Directive 2001/42/EC on the assessment of the effects of certain plans and programmes on the environment (EC, 2001);
- SEA Regulations for Wales - The Environmental Assessment of Plans and Programmes Regulations 2004. Statutory Instrument 2004 No. 1656; and
- SEA guidance published by the Office of the Deputy Prime Minister, the Welsh Assembly Government, the Scottish Executive and the Department of the Environment for Northern Ireland September 2005 - A Practical Guide to the Strategic Environmental Assessment Directive (ODPM, 2005).

Account was taken of the following good practice guidance documents:

- SEA guidance issued by the European Commission - Implementation of Directive 2001/42 on the assessment of the effects of certain plans and programmes on the environment (EC, 2003); and
- SEA guidance published by the Department for Transport - Strategic Environmental Assessment for Transport Plans and Programmes, Transport Appraisal Guidance (TAG) Unit 2.11 (DfT, 2009).

The SEA guidance A Practical Guide to the Strategic Environmental Assessment Directive (referred to hereafter as the SEA guidance) describes SEA in terms of five main stages:

- Stage A: Setting the context and objectives, establishing the baseline and deciding on the scope;
- Stage B: Developing and refining alternatives and assessing effects;
- Stage C: Preparing the Environmental Report;
- Stage D: Consulting on the draft Plans and Environmental Report; and
- Stage E: Monitoring the significant effects of implementing the plan or programme on the environment.

The SEA Regulations for Wales require that an Environmental Report (ER) is produced which assesses the significant effects of the draft plan or programme and its alternatives. The ER (this report) is based on the proposed scope of Metro as set out in the South Wales Metro Brochure, plus intervention information in accordance with the studies outlined below. This ER provides information to inform the consultation process on the likely environmental effects of implementing the Metro.

In addition to SEA, the Metro is also being subject to other types of assessment during its development, including Health Impact Assessment, Equality Impact Assessment, and Habitats Regulations Assessment. The SEA will inform and be informed by these other processes.

The SEA has integrated the findings of existing assessments and appraisals, where they have already been undertaken. The starting point for the information provided in this report was the information included in the following documents:

- Local Authority Local Development Plans and associated SEA, HRA and constraints plans (various author and dates);
- Local Authority Local Transport Plans (various author and dates);
- Previous Metro studies including:
 - 2013 Impact Study, Welsh Government, 2013;
 - Metro Economic Impacts, Welsh Government, 2013;
 - Metro Intervention Appraisal Report, Welsh Government, 2013;
 - Regeneration and the Metro, Welsh Government, 2013;
- Related studies including:
 - GRIP 2 Screening Assessment – Valley Lines Electrification, Network Rail;
 - Environmental Constraints Study to Inform GRIP 3 scope (Valley Lines Electrification), Network Rail;
 - Great Western Main Line Electrification Project, Environmental Statement: WS Atkins, 2013
- Cardiff City Region Metro Project: Relief Lines Study, Arup, 21 July 2014

1.5 Consultation

The Metro SEA Scoping Report was issued to the statutory consultees (Cadw, Natural Resources Wales and the Local Authorities) in May 2017 for a formal six-week consultation period. The report was also issued to the English Consultation Bodies (Natural England, Environment Agency and Historic England). This Environmental Report comprises 'Stage C' of the SEA process and considers the results of this consultation process.

On completion of this Environmental Report, it will be issued for formal public consultation, along with the Metro Programme proposal documents. Following consultation the Environmental Report will be updated as necessary (Stage D). Consultation will be in line with the provisions in the Well-being of Future Generations (Wales) Act 2015 (including consultation with public service boards), and the EC Directive 2003/35/EC on public participation. Stage E 'Monitoring' will be carried out following adoption of the Metro Programme.

1.6 Compliance with the SEA Directive / Regulations

Schedule 2 of the SEA Regulations² set out the requirements for the information that should be included in an Environmental Report. These requirements are shown in italicised text below, each being followed by a description of where this information can be found in this Environmental Report.

An outline of the contents, main objectives of the plan or programme, and relationship with other relevant plans and programmes:

Section 1.3 of this report sets out the contents and main objectives of the South Wales Metro Programme. The relationship with other relevant international, national and local plans and programmes is summarised across the sub-sections of Section 2 and detail is provided in Appendix A.

The relevant aspects of the current state of the environment and the likely evolution thereof without implementation of the plan or programme:

Section 3 of this report summarises the relevant baseline conditions and current trends which would occur without implementation of the plan or programme.

The environmental characteristics of areas likely to be significantly affected:

Baseline information is provided in Section 3 of this report at a range of different scales where available and appropriate. As the Metro covers a wide area of Wales the majority of the baseline information is at county level. However, for certain topics, e.g. air quality, more detailed information is provided.

Any existing environmental problems which are relevant to the plan or programme including, in particular, those relating to any areas of a particular environmental importance, such as areas designated pursuant to Directives 79/409/EEC (Conservation of Wild Birds) and 92/43/EEC (Habitats Directive):

Section 3 of this report summarises existing environmental issues in Wales. Issues relating to European sites (designated by the above directives) are outlined in Section 3.5 and where applicable are dealt with in more detail in the Habitats Regulations Assessment that has been prepared alongside the SEA.

The environmental protection objectives, established at international, community or national level, which are relevant to the plan or programme and the way those objectives and any environmental considerations have been taken into account during its preparation:

Section 4 and Appendix A outline the environmental objectives relevant for the SEA, and the implications of these objectives for Metro.

The likely significant effects on the environment, including 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 and the interrelationship between the above factors. These effects should include secondary, cumulative, synergistic, short, medium and long-term permanent and temporary, positive and negative effects:

The SEA Framework of objectives presented in Section 3.2 of this report covers all of the topics in the SEA Regulations, and progresses them through SEA objectives. This ensures that all of the issues are considered during the assessment of the South Wales Metro Programme and its Interventions. The likely effects on the environment that have been identified by the assessment area summarised in Section 6 of this report. The detailed assessment is provided in Appendix C, which provides information on the nature of the effects identified and best practice to follow.

The measures envisaged to prevent, reduce and as fully as possible offset any significant adverse effects on the environment of implementing the plan or programme:

Whilst no significant adverse effects have been forecast at a plan level, some have been forecast for individual interventions. Measures have been outlined to mitigate adverse effects (indicative measures included through Section 6 a necessary).

An outline of the reasons for selecting the alternatives dealt with, and a description of how the assessment was undertaken including any difficulties (such as technical deficiencies or lack of know-how) encountered in compiling the required information:

Section 4.2 provides a summary of how alternatives have been considered in the plan making and SEA processes. The difficulties encountered in compiling information are summarised in the 'Data- Gap/Uncertainties' sections in Sections 3.5 to 3.16 and the difficulties encountered in undertaking the assessment are described in Section 6.5 of this report.

A description of measures envisaged concerning monitoring in accordance with Article 10:

Measures envisaged for the monitoring of the environmental effects arising from implementing the Metro are provided in Section 7 of this report.

A non-technical summary of the information provided under the above headings:

The non-technical summary is provided as a separate document to this report.

Consultation:

The results of the consultation of the SEA Scoping Report, and appropriate modifications made, can be found in Appendix B.

2 Environmental Planning Context

2.1 Introduction

The initial stages of SEA involve setting the context and objectives, establishing the baseline and deciding on the scope of the assessment. The SEA guidance advises that in order to get the full benefit of integrating SEA into plan preparation, the background information needed to determine the relevant issues should be collected at the outset. This enables the SEA to inform the identification of issues and alternative options from the early stages of plan or programme development.

The Metro SEA process is now at Stage C 'Preparing the Environmental Report', which comprises:

- Presenting the predicted environmental effects of the plan or programme, including alternatives, in a form suitable for public consultation and for use by decision makers.

2.2 Broad Scope of the SEA

The SEA regulations for Wales stipulate that:

'Where an environmental assessment is required... the responsible authority must prepare, or secure the preparation of, an environmental report... The report must identify, describe and evaluate the likely significant effects on the environment of... implementing the plan or programme; and.... Reasonable alternatives, taking into account the objectives and the geographical scope of the plan or programme. The report must include such of the information referred to in Schedule 2....'

2.2.1 Topics Considered

The topics considered include key transport related issues and are outlined as follows:

- Air Quality;
- Climatic factors, including greenhouse gas emissions and adaptation to the effects of climate change;
- Noise and vibration;
- Biodiversity, fauna and flora;
- Population, including severance and accessibility;
- Human health, including physical fitness, security and safety;
- Soil;
- Water, including quality, quantity and flood risk;
- Material assets, including resource efficiency and waste;
- Cultural heritage and the historic environment, including architectural and archaeological heritage;
- Landscape and townscape, including light pollution; and
- The interrelationships of the above.

As the potential effects of Metro are wide-ranging, each of the above topics is given equal consideration in this Environmental Report.

2.2.2 Spatial Scope

The spatial scope for this SEA is the areas of the 10 Welsh LPAs, plus adjacent LPAs (recognising that transboundary effects may occur). The extent of the assessment also includes areas of England, where effects are identified that may affect the environment or transport patterns outside the border of Wales.

Transboundary effects on further EU member states are not considered likely and are therefore not assessed within this report.

2.3 Policy Context

A review of the plans and programmes relevant to the South Wales Metro Programme has been undertaken. The aim was to determine how the emerging South Wales Metro Programme may be affected by other plans and policies, and demonstrate how the South Wales Metro Programme is incorporating the requirements of the other identified plans and policies.

Table 1 lists current relevant policies, plans and programmes:

Table 1: Relevant Policies, Programmes and Environmental Protection Legislation

1. Air

Convention on Long-range Transboundary Air Pollution (UNECE, 1979)
Thematic Strategy on Air Pollution (European Commission)
EU Directive 1996/62/EC - on Ambient Air Quality Assessment and Management (The Air Quality Framework Directive) and various daughter Directives (Statutory) (1999/30/EC); (2000/69/EC); (2002/3/EC); (2004/107/EC)
EU Directive 2001/81/EC - on national emission ceilings for certain atmospheric pollutants
Environment Strategy for Wales 2006: Air Quality Policy (Welsh Government)
Air Quality (Wales) Regulations 2000 (amended 2002) (Result of the Environment Act)

2. Biodiversity, flora and fauna

EU Biodiversity Strategy to 2020: Our life assurance, our natural capital (2011) (EU Legislation)
EC Directive on the Conservation of Natural Habitats of Wild Fauna and Flora (92/43/EEC)
EC Directive on the Conservation of Wild Birds (2009/147/EC)
Ramsar Convention on wetlands of International Importance (Conference of the Contracting Parties, Ramsar, 1971)
Bern Convention on the Conservation of European Wildlife and Natural Habitats (European Treaty Series, 1979)
Bonn Convention on the Conservation of Migratory Species of Wild Animals (European Treaty Series, 1979)
Convention on Biological Diversity (Conference of the Contracting Parties, Rio de Janeiro, 1992)
Halting the Loss of Biodiversity By 2010 — and Beyond: Sustaining ecosystem services for human well-being (UN Convention on Biological Diversity, 2001)
Environment (Wales) Act 2016
Environmental Protection Act (HM Government, 1990)
Environment Strategy for Wales and State of the Environment (Welsh Government, 2011)
The State of Natural Resources Report (SoNaRR) (NRW, 2016)
Natural Environment White Paper (DEFRA, 2012)
UK Post-2010 Biodiversity Framework (DEFRA, 2012)
Wildlife and Countryside Act (UK Parliament, 1981)
The Conservation of Habitats and Species Regulations (JNCC, 2010) (amended 2011)
Earth Science Conservation in Great Britain: A Strategy (Nature Conservancy Council, 1990)
Space for nature: Landscape-scale action for woodland biodiversity (Woodland Trust, 2002)
UK Forestry Standard: The Governments Approach to Sustainable Forestry (Forestry Commission, 2004)
Protection of Badgers Act (HM Government, 1992)
Planning Policy Wales (Welsh Government, 2016)
Environment Strategy for Wales (2006) and Environment Strategy Action Plan 2008 – 2011 (Welsh Government)
TAN 5 – Nature Conservation and Planning (Welsh Government, 2009)

2. Biodiversity, flora and fauna

TAN 5 – Nature Conservation and Planning – Annex: Nature conservation and planning (Welsh Government, 2009)
Wales Biodiversity Framework (Wales Biodiversity Partnership, 2007)
Woodland for Wales Action Plan (Welsh Government, 2009)
Consultation on the Nature Recovery Plan for Wales (Welsh Government, 2014)
The Action Plan for Pollinators in Wales (Welsh Government, 2013)
Green Infrastructure Action Plan for Pollinators in South East Wales, 2015
Local Biodiversity Action Plans (all LPAs)

3. Climatic factors

Kyoto Protocol on Climate Change (Conference of the Contracting Parties, 1997)
EU Strategy on Climate Change – ‘Limiting Global Climate Change to 2°C’. The Way Ahead for 2020 and Beyond (EU Legislation, 2007)
Directive 2009/28/EC on the promotion of the use of energy from renewable sources and subsequently repealing Directives 2001/77/EC and 2003/30/EC

Environmental Protection Act (HM Government, 1990)
Environment Strategy for Wales and State of the Environment (Welsh Government, 2011)
Climate Change – UK programme (HM Government, 2006)
Climate Change Act (HM Government, 2008)
Low Carbon Transport: A Greener Future - A Carbon Reduction Strategy for Transport (Department for Transport, 2009)
Planning our electric future: a 'White Paper for secure, affordable and low carbon electricity - UK white paper on energy (DECC, 2011)
Policy Document: A Review of Planning and Climate Change (2007)
The Stern Review on the Economics of Climate Change (HM Government, 2007)
The Environmental Assessment of Plans and Programmes (Wales) Regulations (HM Government, 2004)
Environment (Wales) Act (Welsh Government, 2016)

Climate change strategy for Wales (Welsh Government, 2010)
A Low Carbon Revolution- The Welsh Assembly Government Energy Policy Statement (Welsh Government, 2010)
Climate Change Risk Assessment for Wales (Welsh Government, 2012)
Climate Change Strategy for Wales: Adaptation Delivery Plan (Welsh Government, 2010)
Climate Change Strategy for Wales: Delivery Plan for Emission Reduction (Welsh Government, 2010)
Route Weather resilience and Climate Change Action Plans – Wales (Network Rail, 2014)
Welsh Government Policy Statement: Preparing for a changing climate (Welsh Government, 2013)

4. Cultural Heritage

Charter for the Protection and Management of Archaeological Heritage (ICAHM, 1990)
Convention for the Protection of Architectural Heritage of Europe (European Treaty Series, 2009)
The Charter for the Conservation and Restoration of Monuments and Sites (ICOMOS, 1964)
The Charter for the Conservation of Historic Towns and Urban Areas (ICOMOS, 1987)
UNESCO Convention Concerning the Protection of the World Cultural and Natural Heritage (World Heritage Convention, 1972)

Historic Environment (Wales) Act (Welsh Government, 2016)
Heritage Protection Review White Paper (HM Government, 2007)
Protecting our Marine Historic Environment – Making the System Work Better (DCMS/WG/SE/DoENI, 2005)
Ancient Monuments & Archaeological Areas Act (HM Government, 1979)
Historic Environment Strategy for Wales (CADW, 2012)
Review of the Historic Environment in Wales (CADW, 2004)
Traffic Management in Historic Areas (CADW, 2003)
Planning Policy Wales (Welsh Government, 2016)
TAN 24 Historic Environment

5. Landscape

The European Landscape Convention (Council of Europe, 2004)

5. Landscape

Countryside and Rights of Way (CROW) Act (HM Government, 2000)
Brecon Beacons National Park Management Plan (Brecon Beacons National Park, 2015)
Planning Policy Wales (Welsh Government, 2016)
National Parks and Access to the Countryside Act 1949

6. Material Assets

Mainstreaming Sustainable Development into EU Policies (2009) including Johannesburg Declaration on Sustainable Development (2002) and EU Sustainable Development Strategy (2006)
Directives 2006/12/EC and 2008/98/EC on waste– (The Waste Framework Directive)
EU Directive 99/31/EC - Waste to Landfill

Environmental Protection Act (HM Government, 1990)
Environment Strategy for Wales and State of the Environment (Welsh Government, 2011)
Securing the Future – Delivering the UK Sustainable Development Strategy (Sustainable Development Commission, 2006)
The UK shared framework for sustainable development: One Wales one planet (Welsh Government, 2009)
Waste Strategy 2009-2050: Towards Zero Waste (Welsh Government, 2010)
The Waste (England and Wales) Regulations (HM Government, 2011)
Waste (Wales) Measure (Welsh Government, 2010)
Waste and Emissions Trading Act (HM Government, 2003)
TAN 21 - Waste (Welsh Government, 2014)
TAN 8 – Renewable Energy (Welsh Government, 2005)
Planning Policy Wales (Welsh Government, 2016)
Planning (Wales) Act 2015

Vale of Glamorgan Local Development Plan 2011 – 2026 (currently with the Planning Inspector for Examination)
Merthyr Tydfil Local Development Plan 2006 – 2026 (January 2016) (Adopted)
Blaenau Gwent Local Development Plan 2006 – 2021 (November 2012) (Adopted)
Cardiff Local Development Plan 2006 – 2026 (January 2016) (Adopted)
Monmouthshire Local Development Plan 2011 – 2021 (February 2014) (Adopted)
Rhondda Cynon Taf Local Development Plan up to 2021 (March 2011) (Adopted)
Caerphilly Local Development Plan up to 2021 (November 2010) (Adopted) (Note: The Replacement LDP up to 2031 was withdrawn)
Torfaen Local Development Plan (to 2021) (December 2013) (Adopted)
Bridgend Local Development Plan 2006 – 2021 (September 2013) (Adopted)
Newport Local Development Plan 2011 – 2026 (January 2015) (Adopted)

7. Noise and Vibration

EU Directive 2002/49/EC Relating to the Assessment and Management of Environmental Noise - The Environmental Noise Directive (2002)
END Noise Action Plan for Transport – Consultation Report and Plan (2009)
A Noise Action Plan for Wales 2013 – 2018 (2013)
TAN 11 – Noise (Welsh Government, 1997)

8. Population and Human Health

Environmental Protection Act (HM Government, 1990)
Environment Strategy for Wales and State of the Environment (Welsh Government, 2011)
Well-being of Future Generations (Wales) Act 2015 (Welsh Government, 2015)
The Natural Environment and Communities Act (HM Government, 2006)
Partnership for growth: The Welsh Government Strategy for Tourism (Welsh Government)
Tackling Poverty Action Plan 2012-2016 (Welsh Government)
Wales Infrastructure Investment Plan for Growth and Jobs (Welsh Government, 2012)
Wales Infrastructure Investment Plan for Growth and Jobs: Project Pipeline Update (Welsh Government, 2014)
The strategy for older people in Wales 2013 - 2023 (Welsh Government)
Economic Renewal: A New Direction (Welsh Government, 2010)

8. Population and Human Health

Wales Spatial Plan (Welsh Government, 2004)
Planning Policy Wales (Welsh Government, 2016)
Taking Wales Forward (Welsh Government, 2016)
TAN 6 – Planning for Sustainable Rural Communities (Welsh Government, 2010)
TAN 23 – Economic Development (Welsh Government, 2014)
Learner Travel (Wales) Measure (Welsh Government, 2008)

9. Soil

EC Thematic Strategy for Soil protection (European Commission, 2007)
Contaminated Land (Wales) Regulations (Welsh Government, 2006)
Soil: a precious resource (Environment Agency, 2007)
The Welsh Soils Action Plan (Consultation Draft, 2008)
Environmental Protection Act (HM Government, 1990)
Environment Strategy for Wales and State of the Environment (Welsh Government, 2011)

10. Transport

EU Directive 2003/30/EC for the promotion of bio-fuels for transport
European Commission White Paper on the European Transport Policy (EC, 2001)
European Commission White Paper – Roadmap to a Single European Transport Area (2011)
EU Green Paper “Towards a new culture for urban mobility” (2007)
Active Travel (Wales) Act 2013
One Wales: Connecting the Nation. The Wales Freight Strategy (May, 2008)
TAN 18 – Transport (Welsh Government, 2007)
The Wales Transport Strategy (2008)
Trunk Road Forward Programme (2002, update 2004 and 2008)
Smarter Choices: Wales (2007)
Newport Local Transport Plan 2015
South East Wales Valleys Local Transport Plan 2015
Vale of Glamorgan Local Transport Plan 2015
Cardiff Local Transport Plan 2015
Bridgend Local Transport Plan 2015
Monmouthshire Local Transport Plan 2015

11. Water

EC Water Framework Directive (2000/60/EEC)
EU Directive 2007/60/EC on the Assessment and Management of Flood Risks
Groundwater Directive (2006/118/EC)
EU Directive 78/659/EEC - The Freshwater Directive
EU Directive 2006/118/EC – Protection of groundwater
EU Directive 91/676/EEC - The Nitrates Directive
Environmental Protection Act (HM Government, 1990)
Environment Strategy for Wales and State of the Environment (Welsh Government, 2011)
Flood and Water Management Act (HM Government, 2010)
Land Drainage Act (HM Government, 1991)
The Water Environment (Water Framework Directive) (England and Wales) Regulations (HM Government, 2003)
Groundwater Protection: Policy and Practice (GP3) (Environment Agency)
Marine and Coastal Access Act (HM Government, 2009)
Draft Drought Plan 2014 Main Report (Dŵr Cymru, 2014)
Water Resources Act (HM Government, 1991)
A Water Strategy for Wales (Welsh Government, 2014)
Welsh Government (2011) National Strategy for Flood and Coastal Erosion Risk Management in Wales
Planning Policy Wales (Welsh Government, 2016)

11. Water

TAN 14 – Coastal Planning (Welsh Government, 1998)

TAN 15 – Development and Flood Risk (Welsh Government, 2004)

South Wales and Severn Estuary Shoreline Management Plan

Flood Risk Management Plan

- Blaenau Gwent;
- Bridgend;
- Caerphilly;
- Cardiff;
- Merthyr Tydfil;
- Monmouthshire
- Newport;
- Rhondda Cynon Taf;
- Torfaen; and
- Vale of Glamorgan.

Severn River District: River Basin Management Plan

Western Wales River Basin Management Plan

The Bathing Water Directive

A review of the above policies, plans and programmes (PPP) has been completed. Where possible the review is split into the relevant topics and outlined in sections 2.5 to 2.16 of this report. However, a number of the PPP cover issues that do not fit into a single topic area (for example overarching sustainable development). The remainder of this section therefore summarises the general findings of the PPP review that are not outlined in Sections 2.5 to 2.16.

The Government of Wales Act (2006) states that '*Welsh Ministers must make a scheme (the sustainable development scheme) setting out how they propose to promote sustainable development*'.

This is set out in the Welsh Government document 'One Wales: One Planet – The Sustainable Development Scheme of the Welsh Assembly Government', Welsh Government, May 2009.

The overarching principles of this document are:

- Living within environmental limits – by setting out a pathway to using only our fair share of the earth's resources and becoming a One Planet nation within the lifetime of a generation;
- Ensuring a strong, healthy and just society – focus on how a sustainable approach will improve the quality of life and wellbeing of the people of Wales and especially those in our less well-off communities;
- Achieve a sustainable economy – by setting out how we want to transform our economy so that it is low carbon, low waste;
- Promoting good governance – through confirming sustainable development as the central organising principle of the Welsh Assembly Government and through encouraging and enabling others to embrace sustainable development as the central organising principle; and
- Using sound science responsibly – through the use of sustainable development principles, as part of our evidence based approach to policy making.

The annual report ('One Wales: One Planet – The Sustainable Development Annual Report 2013-14' Welsh Government 23rd June 2014) is the sixth annual report on the sustainable development programme and has been reviewed as part of the baseline information assessment set out within this Environmental Report.

The Wellbeing of Future Generations (Wales) Act 2015 is listed above in PPP which relate to Human Health. However, it does have a wider remit and its goals are summarised as:

- A prosperous Wales;
- A resilient Wales;
- A healthier Wales;
- A more equal Wales;
- A Wales of cohesive communities;
- A Wales of vibrant culture and thriving Welsh language; and
- A globally responsible Wales.

2.4 Approach to Baseline Information Review

The SEA Regulations for Wales require that information should be provided on the ‘....*relevant aspects of the current state of the environment and the likely evolution thereof without implementation of the plan or programme*’.

The likely evolution of the environment without the implementation of the plan (future baseline) can be difficult to describe as trend data may not be available. A discussion on the limitations of the data (including availability of baseline trends) is outlined in each of sections 2.5-2.16. It is important to note that any assessment of trends is subject to potentially unforeseen changes in response to changes in legislation or other interventions.

The review of baseline information indicates the potential for environmental effects, which are outlined in sections 2.5 to 2.16, including mitigation measures which may lessen the magnitude of the effects identified.

2.5 Overview of the Transport Situation in South Wales

2.5.1 Transport Planning Context

The long-term vision for transport in Wales is set out in the Wales Transport Strategy (WTS), adopted in 2008, which includes the Wales Freight Strategy (WFS). The WTS aims for a more accessible transport system that is safer and more efficient and one that is better integrated with the environment. Welsh Government also produced TAN 18 – Transport, which promoted the WG objectives for better integration between planning and transport and between different transport modes.

At a lower level, there is the South-East Wales Regional Transport Plan (RTP, 2010), within which achieving sustainable accessibility was a central aim of the plan. A further aim was to ‘promote social inclusion and equality by providing a transport system that is *safe, accessible and affordable to all sections of the community*’. Whilst this programme ended in 2015, it forms the strategic basis of many of the Local Transport Plans (LTP) programmes.

Each local authority in Wales has set out a LTP, superseding the RTP to highlight their key issues and what areas they will target for improvement.

2.5.2 Current and Future State of Transport in South East Wales

In 2015, the total volume of motorised traffic in Wales was 28.4 billion vehicle kilometres (VKM), which is equivalent to 9,184 km per head of the population for the year. Cars accounted for 79% of this total distance. Light vans accounted for 15%, goods vehicles for 4%, motorcycles, buses and coaches for 1% each.

These vehicles travelled predominantly on major roads, with 65% of traffic on motorways or A-roads.

The private car is by far the dominant mode of travel in Wales. Car ownership in Wales increased from 0.97 vehicles per household in 1995 to 1.22 in 2011. 24% of Welsh households do not own a car, with 36% owning 2 or more. These figures are similar to those for the UK as a whole. 8 out of 10 journeys to work are also completed by car.

Over the period 2014-2015, UK registered HGVs transported 42,000,000tons of road freight within Wales, of which the proportions entering Wales and leaving Wales were roughly equal.

The Programme for Government sets out indicators monitoring the percentage of trunk roads that require close monitoring of structural condition. In 2015-16, 4.3% of the motorway network and 5.7% of the trunk road network required close monitoring of structural condition. The percentages were predicted to increase within the following four years as vehicle numbers increase in line with the UK's exit from recession. Within the 10 LPAs where Metro schemes are proposed, the range in percentage of LPA maintained principal roads requiring further investigation was 5.1% to 9.2%.

The dominant bus service in Wales is via commercial providers, providing 72% of services, with subsidised services making up the remaining 28%. In 2012, approximately 4% of people in Wales travelled to work via bus, representing a consistent proportion of between 4% and 5% over the preceding decade. However, the number of bus journeys has fallen consistently in Wales (mirroring the rest of the UK), although the decrease was smaller over the period 2015-16 than preceding years.

Total road freight within Wales has decreased consistently over the period 1990 to 2013. Over the period 2005 to 2015 the proportion of HGVs has decreased, whilst LGVs has increased.

Use of railway services has also increased in Wales with 30 million journeys in 2014 compared to 20 million in 2003, however the proportion of travel by road / car has generally remained the same (69% of personal trips and 80% of commuting), with rail accounting for 2% of trips to work². Welsh Government (State of the Environment Report) provided the modal split between forms of transport over the period 1997 to 2011.

The number of rail passenger journeys in Wales have been increasing over the last decade. There were 30.31 million rail passenger journeys in 2015-16 which either started or ended in Wales, an increase of 3.36% over the previous year³. However, the proportion of rail travel to work remains at circa 2% in the last available dataset (2012), vs car travel at circa 80%.

The total number of passengers using Cardiff International Airport increased by 16% in 2016⁴ to 1.345 million. In 2015⁵, international passengers at Cardiff Airport reached 989,000, an increase of approximately thirty-eight thousand from 2012. Domestic and international passenger numbers have been declining over the longer term. Numbers peaked at just over two million in 2007, but sharply decline by over half to just over a million in 2012 (Figure 2). The onset of the recession saw a number of carriers who operated from the Airport either cease trading or reduced route capacity.

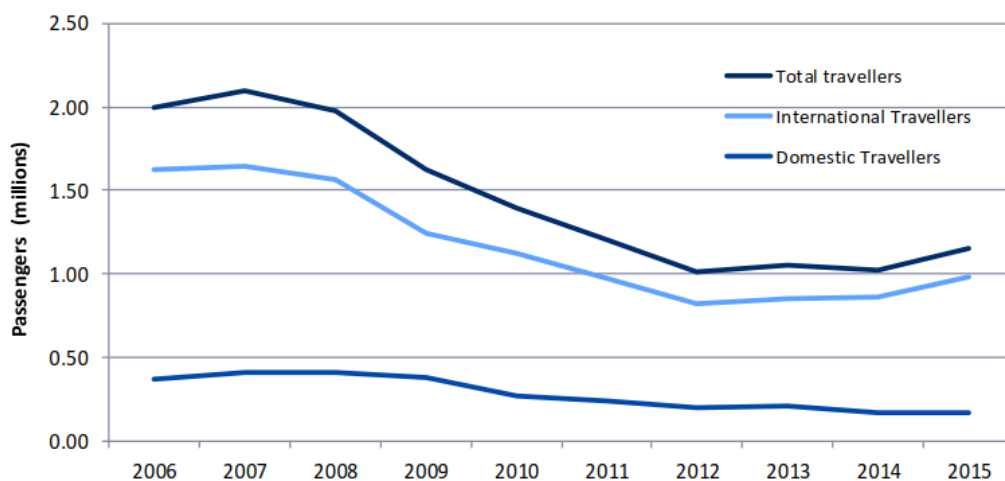
² StatsWales Statistical Bulletin 'Personal Travel in Wales – 2012', November 2013

³ Statistics for Wales 'Statistical bulletin – Rail Transport 2015-16': <http://gov.wales/docs/statistics/2017/170309-rail-transport-2015-16-en.pdf>

⁴ Cardiff Airport Annual Update 2016: <https://www.cardiff-airport.com/uploads/Annual%20update%202016%20-%20ENGLISH%20final.pdf>

⁵ Statistic for Wales 'Statistical bulletin Air Transport in Wales during 2015': <http://gov.wales/docs/statistics/2016/160414-air-transport-2015-en.pdf>

Figure 2: Passenger numbers at Cardiff Airport from 2006 to 2015



During the period 2015-2016, total freight traffic through Welsh ports was 56,400,000tons, of which approximately 71% were goods inwards and 29% goods outwards. In addition, over the same period there were just under 2,600,000 sea passengers (although none within the Metro region).

With regards to active travel, the proportion of cycle users decreased by 5% from 2014, although this still represents a 21% increase over 2007 and reflects a general increasing trend in cycle use since 2005.

2.5.3 Trends

The volume of traffic using our roads is considered likely to increase. Growth forecasts from TEMPro assign a growth factor to Wales of 1.1284 (period 2015 to 2030). Without intervention, the following are likely:

- Traffic will remain dominated by private car;
- Local bus journeys will decrease;
- The upward trend in rail passengers is likely to continue;
- The total number of sea passengers is likely to continue its decreasing trend;
- Road transport will be the dominant mode for freight;
- Freight volumes via sea transport decreased over the period 2003-2014, but there was an increased in 2015 (combined all Wales ports). Previous forecasts (Wales National Transport Plan) predicted an increase in volume to 2025, with significant increase in volume beyond 2025; and
- Network rail forecasts a growth in rail freight up to 2045.

2.5.3.1 Data gaps / uncertainties

- The assumptions behind forecasts for growth in sea freight are not available and do not correspond with current trends;
- Increased passenger volume and frequency of trains may impact on growth in freight volumes; and
- Increasing availability of flexible working may start to have an impact on commute / travel patterns in the next 5 years.

2.5.4 Regional Issues

2.5.4.1 Cardiff

The region's transport network is considered to be under pressure. Nearly 77,900 people commute from outside of the city into Cardiff each day (37% of Cardiff's workforce), of which 80% travel by car. In addition to this, 57% of Cardiff residents commuted by car (2011 data). These vehicle movements create congestion on the highway network.

The region is forecast to grow significantly over the next 25 years, with a forecast increase in Cardiff of approximately one quarter (from 348,000 to 430,000). It is estimated that this expansion will result in a 32% net increase in traffic and 20% increase in the number of people commuting to work.

Investment in new transport capacity, improvements in intra-regional connectivity, improving the reach of public transport and other options are considered within the LTP for Cardiff as measures to reduce congestion. However, the Cardiff LTP recognises that this cannot be achieved within Cardiff in isolation and that developments within adjacent regions also maximise the opportunity to travel by sustainable modes. This is promoted by various documents, including:

- Cardiff Strategic Cycle Network Plan (CCC, 2011); and
- Walkable Neighbourhood Programme (CCC, 2013).

To facilitate sustainable improvement in transport within the Cardiff region, the various transport plans recommended:

- Improvement of the existing cycle network and creation of new connections, improving connectivity to:
 - Ely;
 - St. Fagans;
 - Fairwater;
 - Llandaff;
 - Ty-glas;
 - Heath;
 - Rumney; and
 - Cardiff Metropolitan University campuses.
- Improvement of the bus network, including:
 - Running most high-frequency core services as cross city routes;
 - Interchanging infrequent services at hubs to improve frequency and lower overall travel time;
 - Improve orbital and part-orbital services linking to radial routes;
 - Ensure flexibility in the bus network – particularly ensuring that new developments (strategic areas set out in the LDP) and use of developer contributions to facilitate expansions;
 - Improve transfer between services; and
 - Modify network.
- Walkable Neighbourhoods Plan for Cardiff, comprising:
 - Continuous improvement of facilities and routes for pedestrians and cyclists;

- To prepare maps identifying current and potential future routes for their use; and
- To consider the needs of pedestrians and cyclists on new road improvement schemes.

2.5.5 Blaenau Gwent, Caerphilly, Merthyr Tydfil, Rhondda Cynon Taf and Torfaen

The South-East Wales Valleys Local Transport Plan has been jointly produced by the above LPAs and sets out their priorities for transport schemes over the period 2015 to 2020, plus medium and long-term aspirations (to 2030).

The issues assessment outlined in the SEWVLTP identifies the following issues:

- Existing and planned employment sites are sometimes poorly served by public transport;
- Lack of early morning, evening and Sunday bus provision to employment sites;
- Exclusion of job opportunities for people without cars;
- Linear nature of the valleys means that north-south transport links dominate, with limited cross-connectivity;
- Relocation of key services (i.e. potential health service relocations) could lead to significant increases in travel time;
- Lack of affordable transport for some communities;
- Limited uptake of active travel even for short journeys (associated impact on health (Body Mass Index (BMI)));
- Increased need to travel long distances to access job opportunities;
- Increased congestion on strategic road network;
- Lack of accessible and straightforward ticketing;
- Pollution from traffic has led to the establishment of Air Quality Management Areas (AQMA) in RCT (12 No.) and Caerphilly (2 No.);
- Fears relating to personal safety and security on public transport and when using active travel modes;
- Economic and social disparity between the northern and southern areas of the SE Wales Valleys;
- Congestion and traffic problems caused by the school run; and
- Lack of access to sustainable transport results in car being the dominant mode of travel for tourists.

The short-term programme set out the following priorities:

- Active Travel – improve walking and cycling links to key services and facilities. Improve accessibility within and between communities;
- Road safety education and training;
- Accident prevention – capital schemes targeting sites that have been identified via monitoring of collision data;
- Safe routes in communities – schemes with a focus on providing safe, sustainable routes to schools to encourage a greater use of active modes of travel; and
- Public transport interchange – developing and delivering a standard for signage of transport hubs and provision of accessible information for all users, including those with disabilities.

Each LPA has its own proposed short-term schemes:

- Blaenau Gwent:

- Active travel. National / Valleys Cycle Network, Cwm to Aberbeeg;
- Active travel. National / Valleys Cycle Network. Llanhilleth to Royal Oak;
- Active travel. National / Valleys Cycle Network. Sirhowy Valley Bedwellty Pits to Hollybush; and
- Bus priority corridor improvements. Abertillery to Blackwood to Newport;
- **Caerphilly:**
 - Highway and bus corridor improvement A468 / A469 Pwllpant roundabout;
 - Rail Park and Ride. Ystrad Mynach P&R extension;
 - Active travel. Rhymney Valley Linear Cycle Route (Pengam to Caerphilly), links from Blackwood to Pontllanfraith; Newbridge-Crumlin-Crosskeys, Sirhowy Valley – Pontllanfraith, plus Bargoed Country Park to Bowen Industrial Estate;
 - Bus priority corridor improvements. Abertillery to Blackwood to Newport, Blackwood to Caerphilly to Cardiff;
 - Bus stop enhancement. Caerphilly Basin area, Mid Valley area;
 - Active travel. Caerphilly Basin radial routes, link from Penallta to Ystrad Mynach, links to Bargoed town centre;
 - Rail park and ride. Crumlin;
 - Flexible transport services (Connect2);
 - Highway improvements. A468 Bedwas Bridge roundabout, Piccadilly gyratory (Caerphilly town centre), A467 Newbridge to Crosskeys, Tafws Walk Junction (Caerphilly Town Centre);
 - Active travel. Completion of National Cycle Network Route 46;
 - Bus Rapid Transit Scheme. Pontypridd – Blackwood – Pontypool.
- **Merthyr Tydfil:**
 - New bus station in Merthyr Tydfil;
 - Rail park and ride - Pentrebach railway station;
 - Improvements at key junctions to enhance traffic flow and safety;
 - Active travel. Merthy college to town centre, Swansea road to Baverstocks (cycle link), Town centre to Cyfarthfa Retail Park, Taff Trail (Ffynon Dwyn to Heads of the Valley cycleway at Pant), Taff Trail to Cyfarthfa Park; and
 - Mill Road highway improvements.
- **Rhondda Cynon Taf:**
 - A4059 Aberdare bypass extension to Cynon Gateway, Llantrisant B4595 (junction with Brynteg Lane);
 - Bus Priority Schemes. Pontypridd – Church Village – Talbot Green – Llanharan – Bridgend, Aberdare – Tonypany – Tonyrefail, Aberdare-Mountain Ash-Pontypridd, Porth-Tonypany-Treherbert-Blaencwm / Blaenrhondda, Maerdy – Porth – Pontypridd – Cardiff, Tonypany – Tonyrefail – Talbot Green – Cardiff, Porth-Trebanog-Tonyrefail-Gilfach Goch-Bridgend;
 - Bus Rapid Transit. Pontypridd-Blackwood-Pontypool;
 - Taffs Well (train) Park and Ride;
 - Provision of safe walking and cycling routes around numerous community areas; and
 - Numerous highway improvement schemes.

2.5.6 Newport

The Newport Local Transport Plan (January 2015), identifies a range of issues with the existing transport infrastructure:

- Poor public transport services to key employment, health, education and leisure / shopping sites;
- Dispersed settlement patterns, limited public transport connections to new housing sites;
- Lack of public transport in rural areas, evenings and weekends;
- Peak hour capacity issues on key public transport corridors;
- Lack of awareness of public transport;
- Lack of affordable transport and quality of transport;
- Peak hour capacity issues on inter-regional, regional and local strategic highway routes;
- Road safety and security issues preventing uptake of active travel;
- Lack of cycle facilities; and
- Poor provision for freight vehicles.

Notwithstanding the Metro proposals, Newport developed a number of proposals to ameliorate the aforementioned issues (N.B. the list below comprises only those schemes considered for delivery within the 5 years of the LTP):

- Bus corridor improvements to neighbouring settlements (including but not limited to Blaenavon, Caerphilly, Blackwood, Bristol and interceding settlements);
- Active travel – multiple corridor improvements planned to create the following:
 - Continuous Cardiff to Newport cycle route;
 - Connection between residential and commercial areas in the north east of Newport;
 - Linking settlements along the Northwest Corridor (i.e. Basseleg, Rogerstone, etc); and
 - Traffic free and off road links between existing and new developments on the east of Newport (i.e. Llanwern – Langstone among others);
 - Southern corridor improvements (primarily within city centre); and
 - Northern corridor improvements (connection of northern settlements to the city centre via connections to National Cycle routes 49, 88 and other established routes).
- Road safety improvement schemes;
- Junction alterations to improve traffic flow – including alterations to M4 J28 roundabout;
- Park and Rides – Newport has no active park and rides at present and so a number were proposed including:
 - Llanwern;
 - Malpas / Caerleon; and
 - Coedkernew.
- Air Quality improvement measures; and
- Safe routes in the community schemes (including safe routes to school assessments).

2.5.7 Monmouthshire

Monmouthshire is the most rural county in south east Wales. The population is predominantly centred in the south, western and eastern peripheries of the county. The remaining areas are very thinly populated.

Transport relies heavily on the household car (84.8% of households own a vehicle, compared to 77.1% across Wales). More than 40% of residents commute to work across the county, with traffic being dominantly to Newport, Bristol and Gloucester (in descending order of volume).

When public transport is used, bus is the dominant mode of transport.

The Local Transport Plan identifies the following issues:

- Train services are more expensive than services of equivalent distance on the core Valley Lines;
- Poor public transport services to key employment, health, education and leisure / shopping sites;
- Dispersed settlement patterns, limited public transport connections to new housing sites;
- Lack of public transport in rural areas, evenings and weekends;
- Peak hour capacity issues on key public transport corridors;
- Lack of awareness of public transport;
- Lack of affordable transport and quality of transport;
- Peak hour capacity issues on inter-regional, regional and local strategic highway routes;
- Road safety and security issues preventing uptake of active travel;
- Lack of cycle facilities;
- Negative effects of traffic using unsuitable roads in built-up areas; and
- Lack of provision for freight vehicles.

The following (non Metro related) transport proposals are set out for delivery within the 5yr period of the LTP:

- Active travel mapping;
- Active travel networks (Abergavenny & Llanfoist, Magor & Undy, Caldicot, Chepstow, Usk, Gilwern, Monmouth);
- Traffic and pedestrian improvements in Monmouth and Wyebridge along the Wye;
- Traffic relief, environmental and pedestrian improvements;
- Road safety education, training and publicity;
- Safe routes in community schemes;
- Reduction of speed limits where appropriate;
- Safe routes to schools mapping;
- Better provision of bus information;
- Flexible bus services; and
- Improved bus service quality.

2.5.8 Vale of Glamorgan

The Vale of Glamorgan LTP identified the following issues:

- Lack of rural bus service, plus lack of evening and weekend services in rural areas, plus restrictions in such services in towns and urban areas;
- Limited bus network information (availability), lack of integrated journeys;
- Areas of low car ownership suffer as access to health services by public transport is often poor – exacerbated by consolidation of NHS centres;
- Varied and geographically wide spread population – public transport difficulties;
- High number of short car journeys, indicating poor uptake of active travel modes;
- 45% of employment is outside of the region, therefore significant volume of commuting traffic;
- Congestion on strategic highway network due to high number of car journeys;
- Lack of accessible and seamless ticketing options;
- Highway safety preventing uptake of active travel;
- School run traffic congestion and safety concerns – associated impact on numbers walking to / from school;
- High proportion of inactive lifestyles (including travel);
- AQMAs (Penarth / Eastern Vale);
- Personal safety fears on public transport (crime related);
- Issues with signage, surfacing, obstructions, accessibility for the less mobile;

The following schemes were proposed for delivery within the 5yr life of the LTP:

- Increased connectivity of national cycle network NCNR88;
- Improved connections to Cardiff Airport from Culverhouse Cross, including bus priority;
- Cycle routes (Barry Waterfront – Dinas Powys,
- Various road improvements;
- New link road between Barry Island and Barry Waterfront;
- New link road between A48 and Llantwit Major Rd, Cowbridge;
- Safe routes in communities schemes;
- Road safety engineering improvements;
- Road safety education and training;
- Improvements to the PROW network;
- New bus services (Llantwit Major – Cowbridge – Talbot Green, Bridgend – Llantwit – Rhoose – Cardiff);
- Additional vehicles for the Greenlinks Community Transport service (to provide integrated transport service); and
- Consideration of seeking powers for enforcing of driving offences.

2.5.9 Bridgend

The Bridgend LTP identifies the following issues:

- Poor public transport services to key employment, health, education and leisure / shopping sites;
- Dispersed settlement patterns, limited public transport connections to key sites / services (enhanced dependence on cars), potentially leading to population decline in rural areas;
- Lack of public transport in rural areas, evenings and weekends;

- Change in location of key services likely to increase car travel and potentially isolate some communities;
- Peak hour capacity issues on key public transport corridors;
- Lack of awareness of public transport;
- Lack of affordable transport and quality of transport, restriction of job opportunities to car owners;
- Peak hour capacity issues on inter-regional, regional and local strategic highway routes;
- Road safety and security issues preventing uptake of active travel;
- Lack of cycle facilities;
- Lack of uptake of active travel modes and lack of provision for active travel to schools;
- Employment growth areas not aligned with housing growth areas resulting in increased travel requirements;
- High proportion of car journeys, leading to congestion on strategic highway network;
- Inadequate provision for freight vehicles;
- Lack of sustainable transport access to tourist destinations; and
- Poor provision for freight vehicles.

The LTP identified the following measures to be implemented within the 5yr lifespan of the document:

- Provision of numerous active travel routes;
- Highway improvements;
- Bus corridor improvements;
- Safe routes in communities improvements; and
- Replacement of a number of road bridges to facilitate electrification in line with Metro.

3 Baseline Information

3.1 Approach to Establishing the Baseline

Baseline information provides the basis for predicting and monitoring environmental effects. We have (where possible) reviewed available data with the intent to provide enough information to answer the following:

- How good or bad is the current situation? Do trends show that it is getting better or worse?
- How far is the current situation from any established thresholds or targets?
- Are particularly sensitive or important elements of the receiving environment affected (e.g. vulnerable social groups, non-renewable resources, endangered species, rare habitats)?
- Are the problems reversible or irreversible, permanent or temporary?
- How difficult would it be to offset or remedy any damage?
- Have there been significant cumulative or synergistic effects over time? Are there expected to be such effects in the future?

In order to establish the baseline, we have reviewed the following information:

- Information included in other strategies, plans or programmes (i.e. the Wales National Transport Plan, Local Authority Transport Plans, The Cardiff Capital Region Transport Plan and Local Finance Development Plans amongst others);
- Service providers including data obtained from Welsh Government, Stats Wales, CADW, NRW, Magic.gov, LPA datasets;

In accordance with current guidance, where information is unavailable we have noted the limitations of the available data. If relevant we have then made further recommendations regarding requirements to collect additional data to provide more detailed baseline. The additional data will then be available for use in future detailed assessments.

Where sufficient data is available we have identified trends and used these trends to provide information regarding a potential future baseline (i.e. the baseline that would occur if existing trends continued in the absence of the scheme).

Finally, we have summarised the existing issues in a concluding section for each topic.

The following sections of this report set out the environmental baseline and issues for each topic.

3.2 Air Quality

3.2.1 Relationship with other Plans and Programmes

European Directive 1996/62/EC on Ambient Air Quality sets the framework for dealing with local air pollution by introducing new air quality standards for previously unregulated pollutants, while *Directive 2001/81/EC on National Emissions Ceilings* establishes the ceiling for certain air pollutants. In addition, the *7th EU Environment Action Programme* highlights strategic priorities of the European Commission's environmental policy, amongst others human health - an issue closely related to air pollution which is identified in the action plan.

In the UK, The Air Quality Strategy for England, Scotland, Wales and Northern Ireland Vol 2 defines air quality objectives for a range of pollutants. The Air Quality and Climate Change: A UK Perspective (2007) report by the Air Quality Expert Group highlighted the need to consider the linkages between climate change and air quality mitigation /improvement measures in policy development and to concentrate on measures that result in benefits for both air quality and climate.

In Wales, several policy documents stress the importance of sustainable development, health, safety and reducing the need to travel where practical (e.g. Wales Transport Strategy, Environment Strategy for Wales, Wales Road Safety Strategy and Technical Advice Notes (TANs) 12 and 18) which can yield indirect benefits for local air quality. In addition, the Welsh Air Quality Forum publishes an annual report entitled Air Pollution in Wales which documents the concentration of local air pollutants in further detail.

3.2.2 Baseline Information

In Wales and the UK, air pollution is predominantly caused by high levels of nitrogen dioxide (NO₂) associated with road traffic.

Air pollution problems can pose significant health risks. The 'key' pollutants are considered to be nitrogen dioxide (NO₂) and particulate matter (PM₁₀ and PM₂₅). Exposure to atmospheric pollution is associated with increased mortality (Table 2) and the associated health burden costs the UK approximately £20bn/yr.

Table 2: Atmospheric Pollution and Health Impacts

Pollutant	Avoidable Deaths (UK)	Avoidable Deaths (Wales)	Years of Life Lost (UK)	Years of Life Lost (Wales)
PM ₂₅	29,000	1,300	307,000	13,500
NO ₂	23,500	1,100	277,000	13,200

Source: Air Pollution in Wales, 2015

There are four air quality management areas (AQMAS) within Cardiff (three have been revoked), two in Caerphilly, sixteen in Rhondda Cynon Taf, nine in Newport, and two in Monmouthshire. Merthyr Tydfil Council is currently progressing designation of an AQMA for Twynrodyn Road. There are no AQMAS in Bridgend, Vale of Glamorgan (although in 2013 the Council consulted on a proposed AQMA in Windsor Road, Penarth), Blaenau Gwent, or Torfaen.

Cardiff Council have published an air quality management plan for Ely Bridge which presents a series of options for improving air quality which includes encouraging use of public transport and thereby reducing emissions of nitrogen dioxide, plus improvements to the Ely Bridge carriageway as part of the Arjo Mill redevelopment.

In the 2012 leaflet 'Nitrogen deposition impacts on protected areas in the UK' Joint Nature Conservation Committee (JNCC) identified that *'71% of the area of sensitive semi-natural habitat in the UK is exposed to Nitrogen deposition at levels above which there is likely to be damage, the so-called critical load. 70% of Special Areas of Conservation (SACs) exceed or partly exceed these damage thresholds'*.

Acidification in Wales is a significant environmental issue. Wales is affected due to high rates of acid deposition, combined with soils of relatively low neutralising capacity (Centre for Ecology and Hydrology, 2002). The Biodiversity section of this report illustrates the presence of designated sites in Wales that are at risk of acidification.

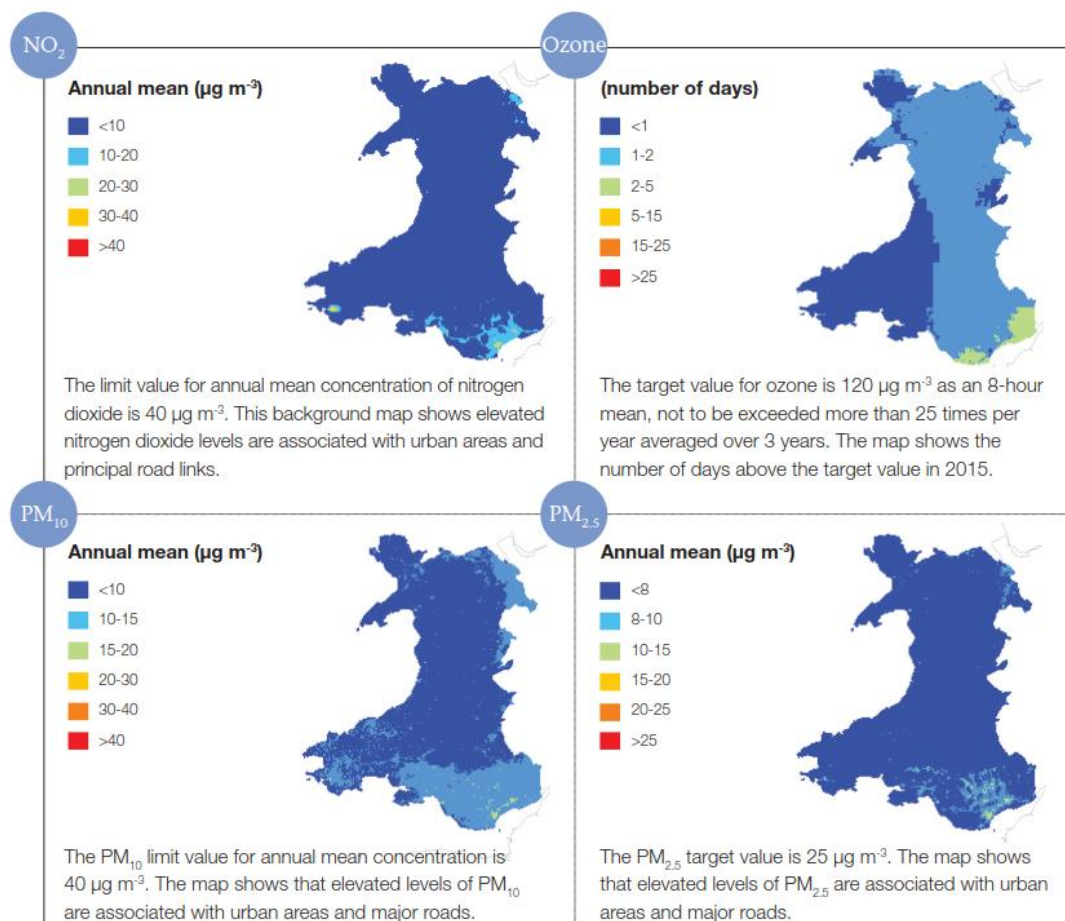
In Wales (and the rest of the UK) the most widely exceeded limit value is the annual mean nitrogen dioxide concentration ($40\mu\text{g}/\text{m}^3$), exceeded at four Welsh monitoring sites in 2015 (Rhondda Mountain Ash, Caerphilly Hafodyrynys, Newport M4 J25 and Swansea Station Court High Street).

In 2015 Local Authority monitored sites recorded ambient concentrations of PM_{10} at moderate levels on 66 days, high on 16 days and very high on 8 days. NO_2 monitoring recorded 86 days with moderate concentrations and 1 day with high concentrations. One day of high SO_2 concentrations was recorded. Finally, 24 days with moderate ozone concentrations were recorded.

Caerphilly Hafodyrynys and Rhondda Mountain Ash also exceeded the AQS Objective for hourly mean NO_2 concentration on more than the permitted 18 occasions in 2015.

Maps of air quality are produced on an annual basis (Figure 3). These indicate that local air quality varies across Wales, with South East Wales generally having poorer air quality.

Figure 3: Maps showing Background Concentrations of Nitrogen Dioxide, Ozone, PM_{10} and $\text{PM}_{2.5}$



Source: Air Pollution Wales, 2015

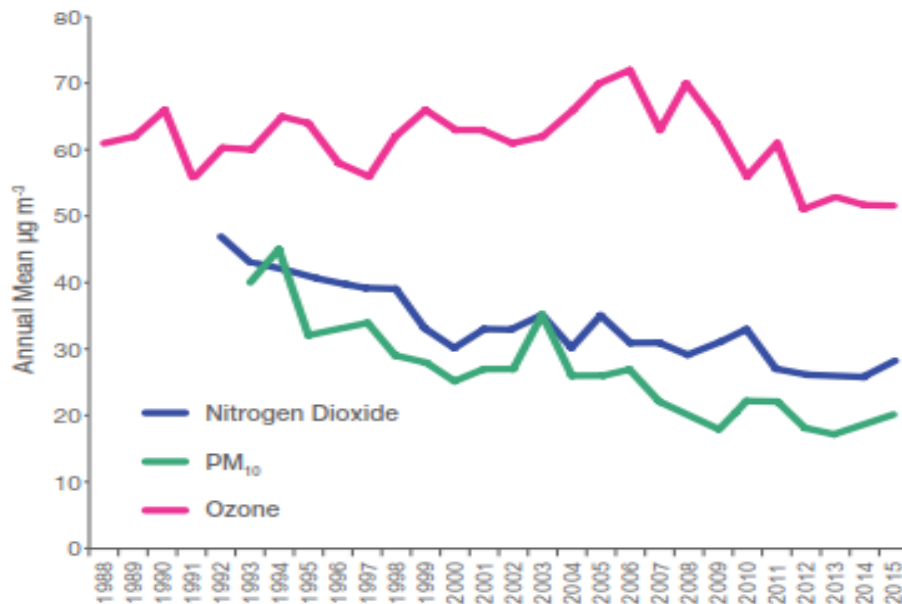
3.2.2.1 Trends and Future Baseline

Data⁶ shows that air quality has generally improved over the period 1993 to 2015. However, detailed analysis has been completed using long running monitoring sites (those in operation since at least 2003). This indicates the following:

- The downward trend in NO₂ concentrations appears to have levelled off after 2000;
- Annual mean PM₁₀ concentrations have generally decreased in recent years at urban background and urban traffic sites;
- Ozone concentrations tend to be highest in rural areas. There is no clear trend in ozone concentrations over the study period. Concentrations vary considerably from year to year because of variation in meteorological factors;
- Several AQMAs have been declared during the monitoring period, with thirty one declared for the above Local Authorities since 2003. The 2012 Welsh Government 'State of the Environment'⁷ report states that the increase in the number of people living in AQMAs indicates a clear deterioration (N.B. the WG assessment is based on a whole of Wales survey, not just the local authorities considered by the proposed Metro development); and
- Large areas of Wales suffer from acidification which is partly attributable to transport related emissions.

Figure 4 shows the long term trend of key ambient pollutants. Figures 5 to 7 show individual pollutants.

Figure 4: Long Term Trend in Ambient Pollutants.



Source for all figures 4-7: Air Pollution in Wales, 2015

⁶ Welsh Government 'Air Pollution in Wales 2015':
http://www.welshairquality.co.uk/documents/reports/507161019_AQ_wales_2015_v12_Press.pdf

⁷ Welsh Government 'State of the Environment', 2012: <http://gov.wales/statistics-and-research/state-environment/?tab=previous&lang=en>

Figure 5: Annual Mean NO₂ Concentrations at Long Running Sites in Wales

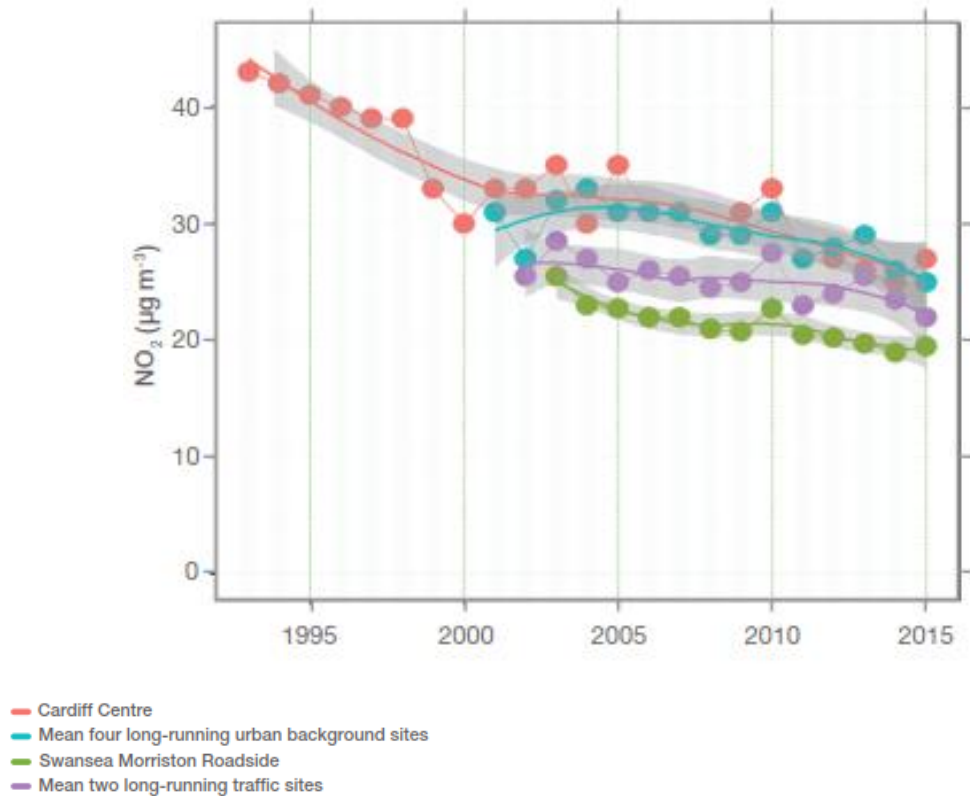


Figure 6: Annual Mean PM₁₀ Concentrations at Long Running Sites in Wales

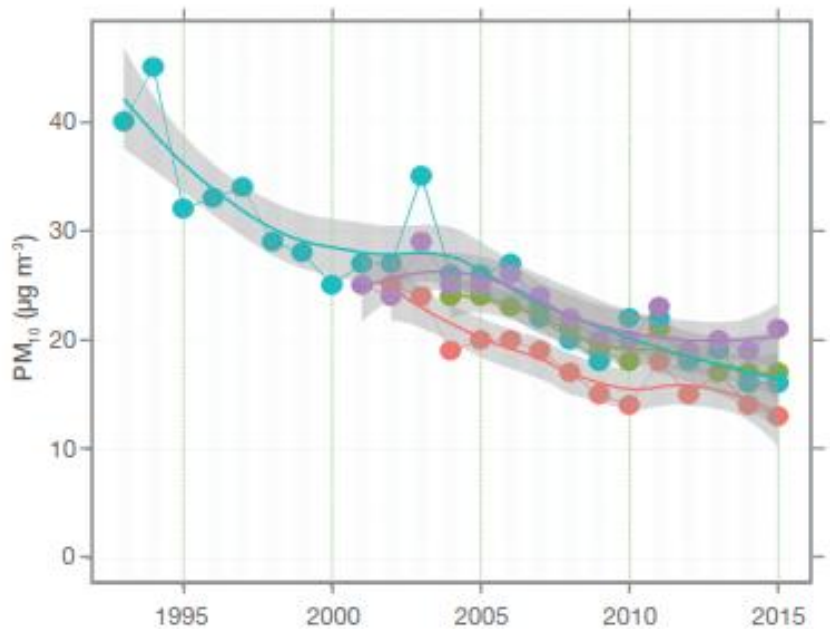
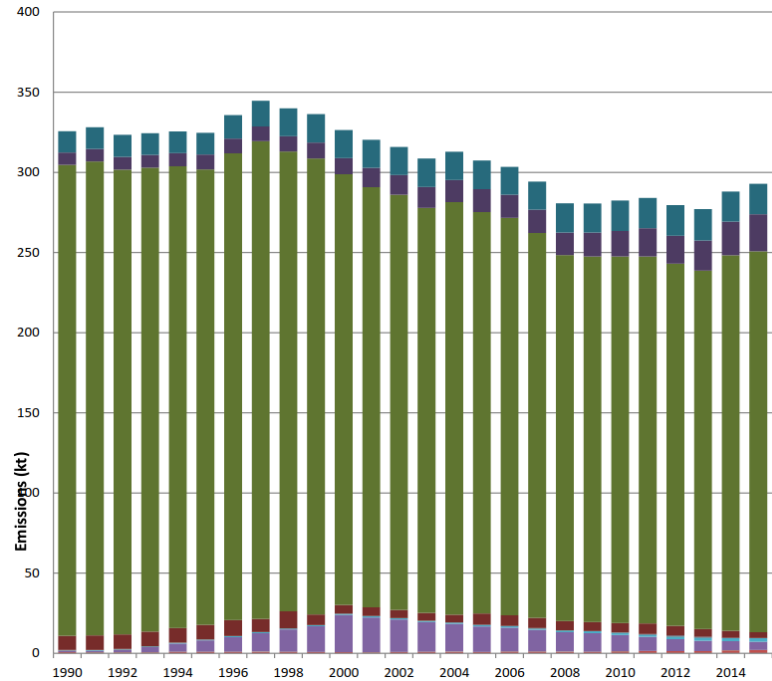


Figure 7: Annual Mean Ozone Concentration at Long Running Sites in Wales



Figure 8: Emissions by Category



Source: UK Informative Inventory Report (1990 to 2015), V1.0.

3.2.2.2 Future Baseline:

New development, regeneration and population growth may lead to increased car journeys and congestion within the area leading to localised air quality effects. Public transport improvements, national air quality targets and European emissions standards for new vehicles should contribute to reducing future air quality impacts from motor vehicles.

- The Cardiff Capital Region City Deal proposes the creation of 25,000 jobs in the Cardiff Capital Region by 2036. Similarly, the Cardiff Local Development Plan sets out a strategy to deliver 40,000 new jobs by 2026 and each of the LPA LDPs sets out aims / ambition to improve the economic prosperity of their regions (i.e. job creation). If unmitigated this will result in significant increase in traffic volumes and emissions and will certainly require large scale investment in infrastructure;
- A review of results since 1993 indicates that air quality is generally improving. However, the reduction in NO₂ emissions has slowed in recent years;
- The reduction in particulate emissions has slowed since 2000;
- Coming alterations to the testing regime for vehicle emissions, is likely to result in a new focus for car manufacturers on achieving reduced emissions in realistic driving conditions. This combined with an apparent phasing out of diesels and focus on small-engine petrol models, plus hybrid and electric vehicles may result in further reduction in NO₂ emissions. Conversely, the impact on CO₂ emissions is not as straightforward to assess;
- Emissions of ammonia have fallen by 9.9% since 1980, but an increase of 1.7% occurred between 2014 and 2015. This refers to the total ammonia emissions across a range of industries and processes. Transport related ammonia has shown a steady decrease since 2000, but increased output from agricultural processes and other sources has resulted in a total increase. With regards to future transport emissions, if diesel remains a popular fuel source for cars, increased use of urea based emissions control fluids may result in increased emissions of ammonia; and
- Growth in car ownership (and overall vehicle ownership) has been consistent since the first datasets, with a trend (post-recession) of 1.4% growth per year over the period 2011-2014. Unmitigated, this trend is likely to result in increased generation of emissions.

3.2.2.3 Data Gaps and Uncertainties

Whilst the number of monitoring locations has expanded greatly in recent years, the inclusion of these in the assessment of results may result in the identification of false trends. Hence the datasets are based on a smaller number of long-running monitoring sites. As the more recent monitoring sites continue to gather data, their results will be incorporated into the ongoing reporting against air quality in Wales.

There is a difference between primary pollutants (those emitted directly to the atmosphere) and secondary pollutants (formed by chemical reaction in the atmosphere). In general:

- Primary pollutants such as NO₂, hydrocarbons, CO and others tend to be highest around their sources and are dominantly located in urban and industrial areas; and
- Secondary pollutants such as ground level ozone and secondary PM₁₀, which are characteristically less dependent on emission patterns and tend to be more strongly influenced by meteorology and atmospheric chemistry. As a result of this, their concentrations tend to vary more from year to year than those of primary pollutants.
- There were numerous exceedances of the Air Quality Strategy objective for ozone. However, this objective is not included in the UK Regulations for local air quality management, since the pollutant cannot be locally controlled (WAQF, 2008). In general, ozone concentrations

tend to be lower in the parts of Wales where NO₂ and PM₁₀ are higher. The south to north gradient in PM₁₀ concentration is due to a combination of the patterns in the concentration of secondary particles and sea salt particles.

- Projected population increases and increases in population density may affect the mobility of pollutants in city and town centres. Climate change and variations in weather are also likely to have an impact on a wider scale.
- Although growth in car ownership has continued, there has been a notable decrease in vehicle miles travelled per car, indicative of a trend towards either reducing journeys, or of alternative modes of transport. This may facilitate further reduction in emissions, despite the increase in vehicle ownership.
- Much of the available data relates to the UK as a whole and is not specific to Wales.
- To assess the effects of transportation on human health more accurately, further information about the number of people living in AQMAs and the proximity of transport routes to AQMAs would be of use.

3.2.2.4 Issues

- Ambient air quality is an issue in Wales, with 32 AQMAs established in the regions affected by Metro;
- Although there is no clear trend, ground level ozone remains a problem in some areas;
- Increasing numbers of vehicles and road traffic are likely to lead to increasing air pollution issues if unmitigated;
- Particulate matter remains an issue within urban areas (N.B. some of these emissions are not preventable via emissions control (i.e. emissions from breakdown of tyres, wear on braking parts, wear of road surfaces) and therefore are likely to directly increase in line with increases in vehicle ownership);
- There is a heavier reliance on the private car in Wales (compared to the rest of the UK), due to the predominantly rural nature of Wales. Whilst this is less true in the Metro region, a number of the LPAs are still predominantly rural;
- Large areas of Wales suffer from acidification, which is partly attributable to transport emissions; and
- Metro has the opportunity to assist in a reduction in atmospheric emissions by encouraging transition to sustainable modes of transport.

3.3 Climatic Factors, Including Greenhouse Gas Emissions and Adaptation to the Effects of Climate Change

The United Nations Framework Convention on Climate Change is an international treaty negotiated in 1992 with over 160 signatories. It sets out the aim for international cooperation to combat climate change. Resulting agreements have included the Kyoto Protocol in 1997 which set reduction targets to developed countries and the Paris Agreement in 2015 which seeks to restrict global temperature rise this century below 2 degrees Celsius above pre-industrial levels.

In 2008 the UK Parliament passed the Climate Change Act which sets legally binding targets to reduce carbon dioxide emissions in the UK by at least 80% by 2050, from 1990 levels. In 2007, the Stern Report was produced which assessed the effect of global warming on the world economy and what the effects of changing to a low-carbon global economy will be. The Department for Transport released their aim for dramatic changes in the emissions from vehicles by 2022, and a vision for a completely different transport system.

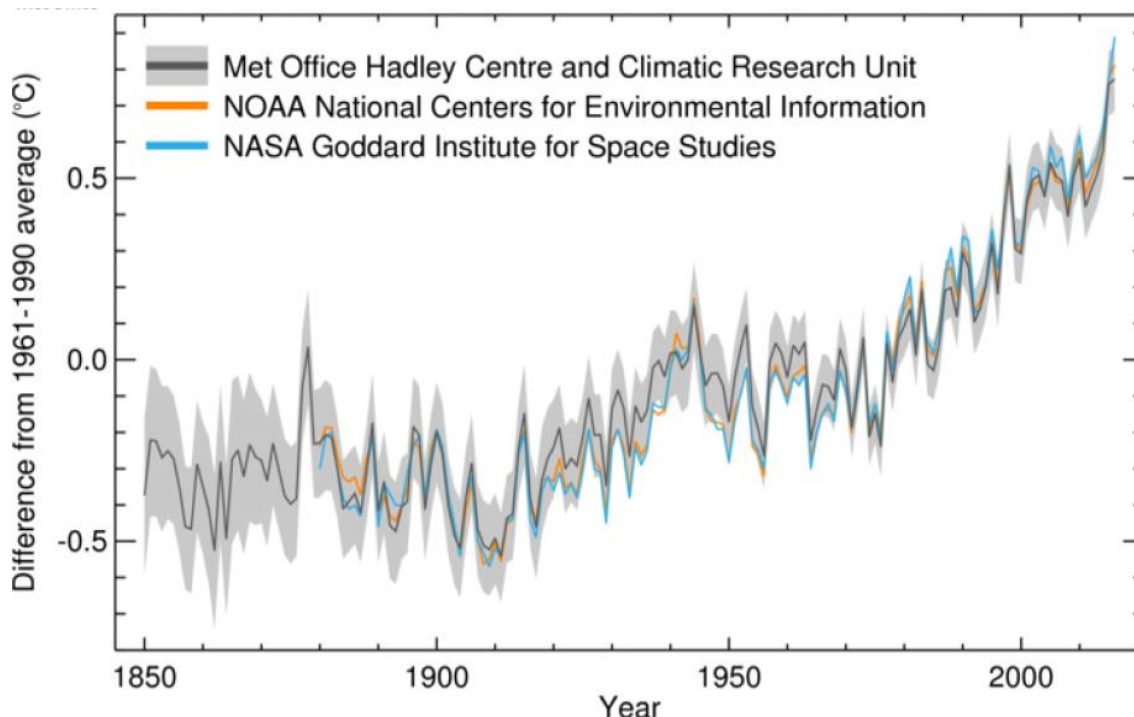
The Climate Change Strategy for Wales (2010) and a Low Carbon Revolution (2010) consider the policy intentions of the Welsh Government in relation to climate change and energy efficiency. The Climate Change Strategy for Wales: Adaptation Delivery Plan (2010) focuses on the adaptation to the changing climate while outlining the climate change impacts that can be expected in Wales.

3.3.1 Baseline Information

3.3.1.1 Current State

Increasing energy consumption and the continuing use of carbon-based fuels (UK and worldwide) are attributed to anthropogenic 'greenhouse effect', leading to climate change. The Intergovernmental Panel on Climate Change (IPCC) has produced a number of reports indicating that 'it is unequivocal that anthropogenic increases in the well mixed greenhouse gases (WMGHGs) have substantially enhanced the greenhouse effect'⁸. The Met Office maintains a database of global average temperatures which show a trend of increasing average temperatures over the period 1850-2016 (Figure 9).

Figure 9: Global Average Temperature Anomaly 1850-2016



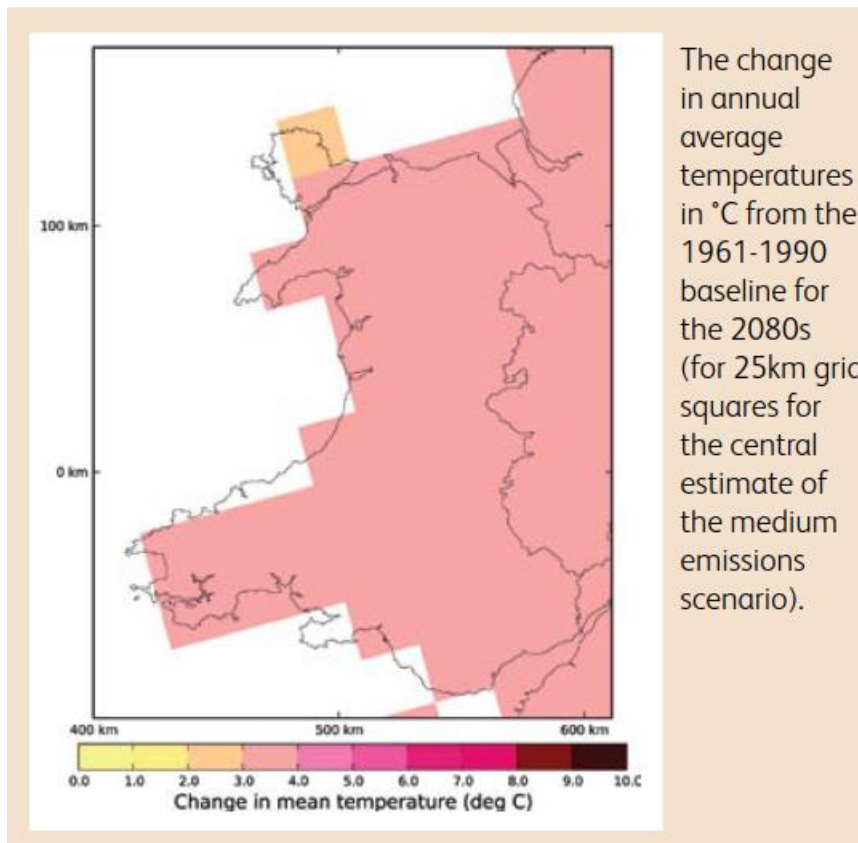
Source: The Met Office, 2016: <http://www.metoffice.gov.uk/research/monitoring/climate/surface-temperature>

Over the last century, Wales has experienced an increase in annual daily mean temperature of 0.7°C, (UK Climate Projections, Defra, 2009). Annual precipitation has decreased in Wales by 0.9%, however there have been notable seasonal changes including a 12.8% increase in spring and a 24% decrease in summer precipitation. Sea levels around the UK have risen by about 10 centimetres during the 20th and 21st century with the rate of sea level rise increasing in recent decades.

⁸ IPCC Climate Change 2013 'The Physical Science Basis': <http://ipcc.ch/report/ar5/wg1/>

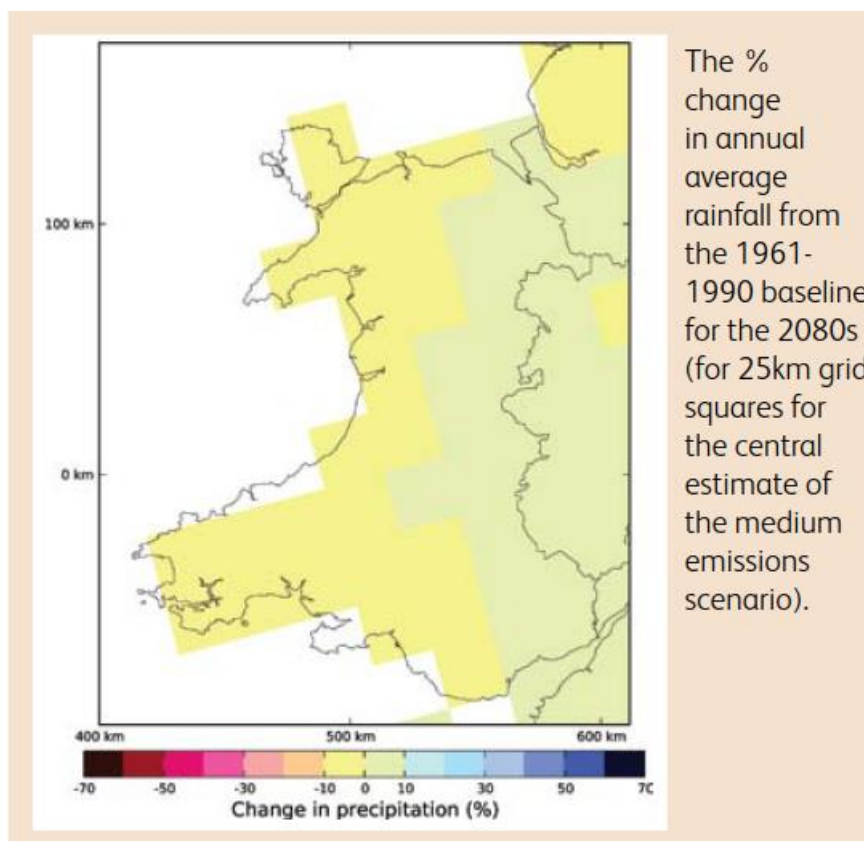
Figures 10 and 11 show the projected change in annual average temperature and annual rainfall to 2080:

Figure 10: Change in Annual Average Temperatures to 2080 (Medium Emissions Scenario)



: Source: 'Climate Change, its impacts for Wales', Welsh Assembly Government: 2009

Figure 11: Change in Rainfall to 2080, Medium Emissions Scenario



Source: 'Climate Change, its impacts for Wales', Welsh Assembly Government: 2009

3.3.1.2 Contribution of Transport Emissions

The 2015 UK Greenhouse Gas Emissions Reports⁹ indicate that the main source of greenhouse gas emissions in the UK is the burning of fossil fuels¹⁰ for power generation, which contributes to 29% of UK emissions. Transport contributes some 24% of UK emissions, with road transport accounting for >92% of these. Of these statistics, Wales contributed to 9% of total emissions in the UK in 2013. The Greenhouse Gas Inventories¹¹ indicate that in 2014 the largest sources of emissions were electricity production (28%), road transport (12%), iron and steel combustion (12%) and livestock (9%). Figure 11 illustrates the major emitters.

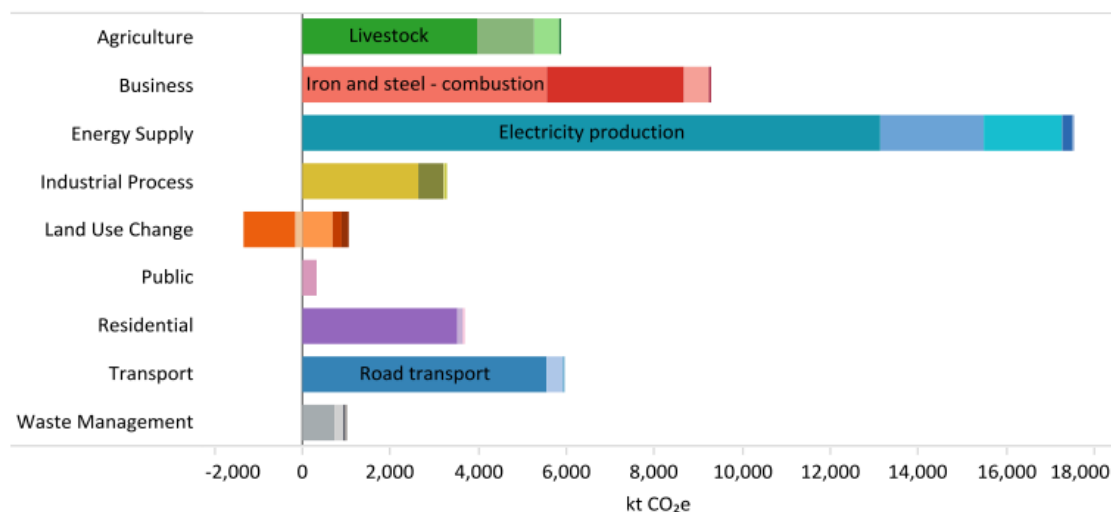
In 2014, energy generation contributed 38% of total Green House Gas emissions in Wales. Business contributed 20%. (predominantly related to manufacturing) Transport emissions accounted for 13%, of which 94% were road transport.

⁹ Department for Business, Energy & Industrial Strategy
https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/604350/2015_Final_Emissions_statistics.pdf

¹⁰ Welsh Assembly Government: <http://gov.wales/docs/desh/policy/091101climateimpactsen.pdf>

¹¹ National Atmospheric Emissions Inventory 'GHG Inventories for England, Scotland, Wales and Northern Ireland: 1990-2014, June 2016: https://uk-air.defra.gov.uk/assets/documents/reports/cat07/1606140853_DA_GHGI_1990-2014_Report_v1.pdf

Figure 12: Total Green House Gas Emissions in 2014, by Category, Wales



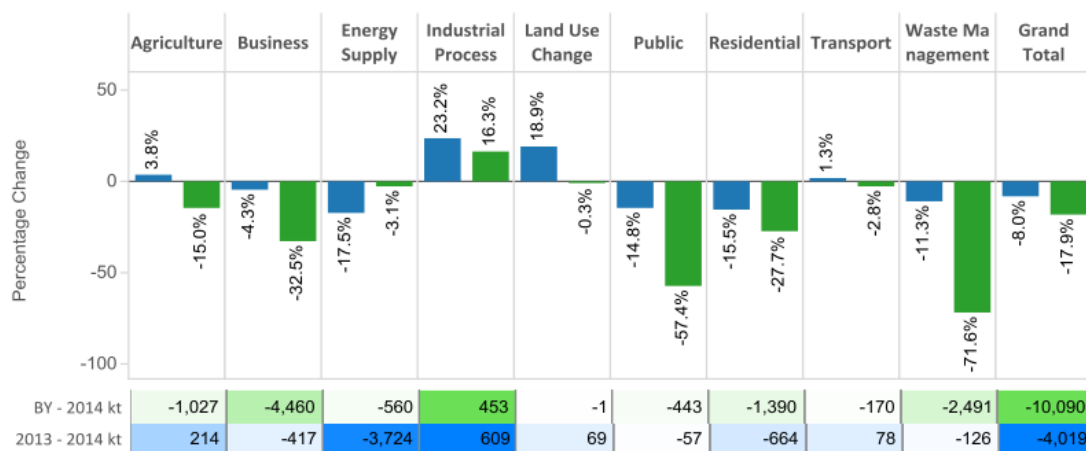
Source: National Atmospheric Emissions Inventory 'Green House Gas Inventories for England, Scotland, Wales and Northern Ireland: 1990-2014, June 2016

3.3.1.3 Trends and Future Baseline

- Over the period 2013-2014 Green House Gas emissions have decreased in Wales by 8%. This is predominantly driven by reduction in the use of coal in power generation and a reduction in emissions from refineries.
- Pertinently (Figure 13), transport sector emissions have only decreased by 2.8% by 2014 (measured from the base year of 1990, although they have fallen since a peak in 2007). This reflects the balance between improvements in transport efficiency vs increases in demand. From 1990 to 2014, road transport has decreased by 0.6%, 'other' by 28.0%, whilst aircraft / airports has increased by 34.9%. Without mitigation, transport emissions are predicted to continue to grow.

Figure 13: Percentage and Absolute Change (kt CO₂) in GHG Emissions by 2013-2014 and Base Year, Wales

The LULUCF Base Year - 2014% change is excluded from the figure if LULUCF emissions changed from a sink to source, or source to sink, across the time series.



Source: National Atmospheric Emissions Inventory 'Green House Gas Inventories for England, Scotland, Wales and Northern Ireland: 1990-2014, June 2016

Climate change may affect transport in various ways. It can lead to:

- Increased risk of flooding from storm surges, rivers or overflowing combined sewers (those carrying both sewage and storm water);
- Increased deterioration of highway infrastructure (e.g. in the form of subsidence); and
- Increased frequency of extreme weather events (e.g. landslides) leading to damage of infrastructure and changes in road safety.

These changes are predicted to occur under all three emissions scenarios (i.e. low, medium, and high greenhouse gas emissions), which are incorporated into the climate change models produced by the Met Office Hadley Centre.

These predicted changes in climate may result in increased water demand in summers which may be exacerbated by reduced rainfall failing to keep reservoirs sufficiently full. Changes in climate may also stress native plants and animals and lead to habitats becoming susceptible to damage.

3.3.1.4 Trends and Future Baseline

- Data collated since 2002 indicates that winters are becoming warmer and summers are becoming hotter.

Welsh Government produced the report 'Climate Change, its impacts for Wales' (Welsh Assembly Government, November 2009¹²) which summarises key findings of the UK Climate Change Projections 2009 (UKCCP09) and outlines the likely impacts for Wales in the low, intermediate and high emission scenarios through to 2080:

- Across Wales average annual temperatures are projected to increase by 3.3°C by 2080;
- In summer, daily maximum temperatures are projected to increase by 4.8°C;
- In winter, daily minimum temperatures are projected to increase by 3.5°C;
- Rainfall is projected to increase in winter on average by 20% and decrease in summer by 19%;
- Occurrences of flooding are likely to increase in frequency and severity; and
- Sea levels around Wales are predicted to rise by between 310mm (low emissions scenario) and 430mm (high emissions scenario) by 2080.

3.3.1.5 Data Gaps / Uncertainties

- Although the greenhouse gas emissions from rail and shipping are declining, it is likely that in the case of shipping, this relates to a decrease in the popularity of this mode;
- Greenhouse gas emissions from transport are also decreasing. However, this is in contradiction to increasing vehicle ownership and likely to be representative of an increasing trend to travel less. Climate change may impact uptake of active travel modes and cause more people to travel by car;
- Due to the unpredictability of climate change effects, more stringent legislation may come into effect sooner than anticipated, resulting in changes to infrastructure at short notice; and
- It is not clear to what extent the estimates of emissions proportions (i.e. partitioning by sector) are reliant on manufacturer's emissions data. In light of recent evidence greater clarity is required in this respect.

¹² Welsh Assembly Government: <http://gov.wales/docs/desh/policy/091101climateimpactsen.pdf>

3.3.1.6 Issues

Transport is the third highest emitting carbon dioxide sector in Wales and is forecast to grow until more sustainable transport systems have been adopted. The following section summarises potential issues relating to climate change and their effect on common modes of transport:

- Road: As well as flooding, an increase in winter rainfall could lead to an increase in accidents, an increase in the incidents of landslips. This is a particular concern in Wales as there are a relatively large number of transport corridors in valleys.
Coastal erosion is also likely to increasingly impact road infrastructure, whilst inland roads could also be increasingly affected by the impacts of bridge scour from rivers.
Increased summer temperatures may have a detrimental effect on road surfaces (although this may be offset by the reduced damage from ice generation due to warmer winters);
- Rail: Network Rail have produced a 'Wales Route Weather Resilience and Climate Change Adaptation Plan' (2014), which highlights the vulnerability of their network to climate change. An increase in likelihood of landslips would have a significant impact on the network. Overhead lines are also sensitive to increased intensity of storms (high winds);
- Sea Transport: The two main (weather related) hazards faced by ports are high winds tidal surges. Ports will be increasingly vulnerable to very high tides (resulting from sea level increase induced by climate change);
- Airports: Increased frequency and intensity of high winds will reduce the ability of airports to provide flights and will increase incidences of in-air turbulence. Increased incidences of other adverse weather conditions (i.e. rainfall / flooding) will also impact this sector;
- Increasing population and increasing car ownership is likely to lead to increasing GHG emissions unless mitigated;
- New infrastructure must be designed to be resilient to changes in climate (extremes of temperature and rainfall for example);
- New infrastructure schemes must not generate excessive levels of GHG and must minimise their contribution to climate change through design (reduced embodied carbon) and operation (low emissions modes); and
- Metro has the opportunity to contribute to a reduction in GHG emissions by facilitating a shift to more sustainable modes of transport. However, any interventions taken forward as part of Metro will need to be designed to comply with current guidance associated with climate change.

3.4 Noise and Vibration

3.4.1 Relationship with other Plans and Programmes

There are a number of EU Directives in place which control noise from transport sources. EU Directive 2002/49/EC relating to the assessment and management of environmental noise – the Environmental Noise Directive – is the latest European legislation. Its aim is to define a common approach across the European Union to avoid, prevent or reduce the harmful effects of environmental noise from road, rail, air traffic and industry. By 2007, strategic noise maps were required and by 2008 action plans were developed for how to reduce environmental noise where necessary with new road noise maps being developed in 2012.

A noise action plan for Wales 2013–2018 dated December 2013 has been produced. This document highlights the Welsh response for managing all noise issues from the Welsh government, its agencies and local authorities. The Noise topic covered by this report covers:

- Noise action planning process;
- Why noise matters;
- Noise and new development;
- Tranquil green space in the built environment;
- Road noise management;
- Railway noise management;
- Industrial noise management;
- Noisy neighbourhoods;
- Other forms of noise i.e. military etc.; and
- Cardiff and Penarth, Newport, Swansea and Neath Port Talbot agglomerations.

3.4.2 Baseline Information

3.4.2.1 Current State

A Noise Action Plan for Wales 2013-2018 (Welsh Government) provides information on population exposure to noise.

Table 3: Population exposure using the day-evening-night noise indicator L_{den}

Noise Source	Number of people exposed to these noise levels				
	55 – 59 dB	60 – 64 dB	65 – 69 dB	70 – 74 dB	>75 dB
Major roads	232,500	113,900	76,300	44,600	4,000
All mapped roads	275,400	164,200	129,000	50,300	4,000

Source: A Noise Action Plan for Wales 2013-2018 (Welsh Government, December 2013)

Table 4: Population exposure using the night-time noise indicator L_{night}

Noise Source	Number of people exposed to these noise levels				
	55-54 dB	55 – 59 dB	60-64 dB	65 – 69 dB	>70 dB
Major roads	160,600	86,900	54,800	5,100	1,400
All mapped roads	204,600	147,700	63,100	5,200A	1,400

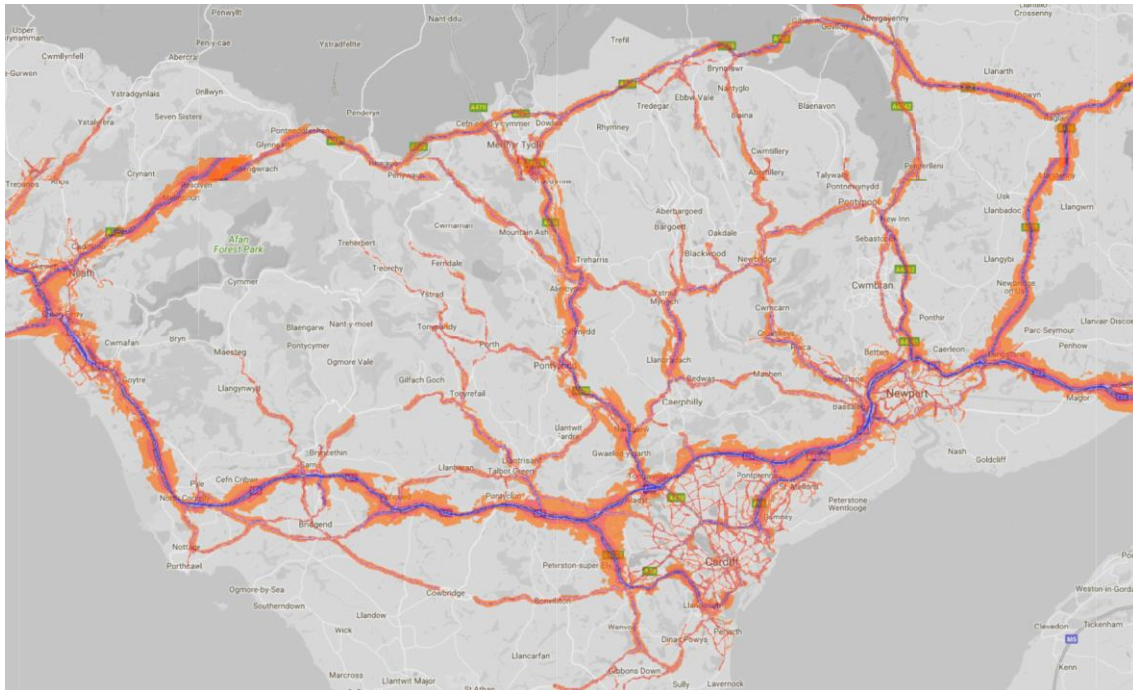
Source: A Noise Action Plan for Wales 2013-2018 (Welsh Government, December 2013)

3.4.2.2 Trends and Future Baseline

- Noise mapping¹³ shows that elevated noise levels are focussed primarily around motorways and trunk roads, plus urban 'rat runs' (based on calculated noise levels provided to Welsh Government). Noise outputs along roads are significantly reduced at night;

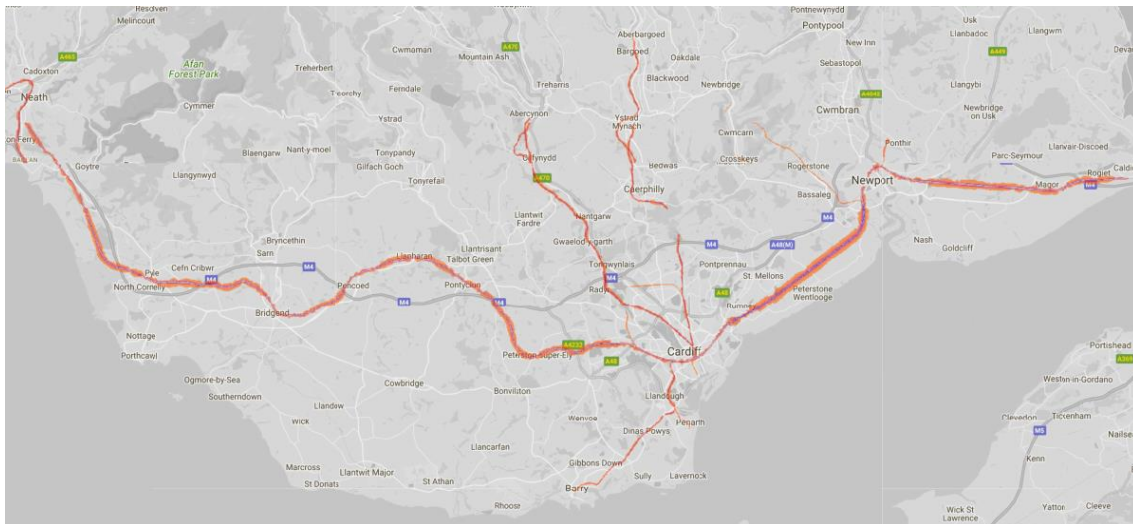
¹³ Noise maps and priority areas taken from the Wales Noise Map Viewer <http://extrium.co.uk/walesnoiseviewr.html>

Figure 14: Wales Noise Map – Roads and Priority Areas



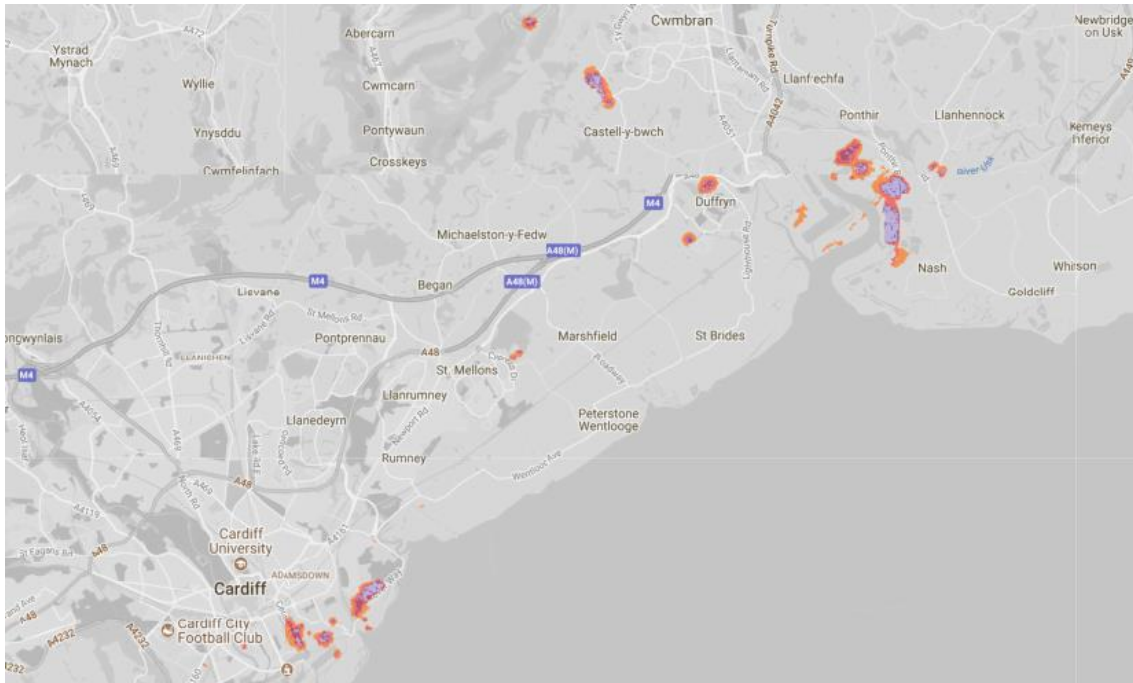
- Noise levels around main railway lines have also been calculated and the results are shown below;

Figure 15: Wales Noise Map - Rail



- There appears to be a limited contribution of heavy industry to noise emissions, focussed primarily on small areas of Cardiff and Newport;

Figure 16: Wales Noise Map – Industrial Sources



- A review of the Wales Noise Map indicates that there are 71 Priority Areas for roads (focussed mainly around the M4 corridor) and 15 Priority Areas for rail (predominantly focussed along the south Wales main line). There are 30 designated Quiet Areas, contained within Penarth, Cardiff and Newport.

Figure 17: Wales Noise Map – Priority Areas, Road and Rail



- No trend has been identified. However, the Review of Strategic Noise Maps, indicated that some roads within the Metro area recorded an increase in traffic of greater than 40% (comprising the A473, Newport section of the A48 (southern distributor road), the A469 near to Merthyr Tydfil and short sections of other roads). With such increased traffic, noise levels are likely to increase (N.B. there may be some compensatory effect as vehicles generally become better silenced and inherently quieter technologies (i.e. electric) in proportion. However, tyre noise is the dominant source of transport related noise impacts, therefore advances in reduction of engine noise are unlikely to contribute significantly to reduction in overall noise output);
- There are ongoing works to electrify rail lines. This combined with modernisation of rail stock may result in a decrease in noise levels;
- Although the total number of noise complaints has increased, the number of noise complaints due to road traffic is low;
- There is an opportunity for Metro to reduce noise associated with public transport by adoption of more sustainable modes which are often quieter.

3.4.2.3 Data Gaps and Uncertainties

- No data is available regarding vibration;
- Noise maps have not yet been released for 2016/17
- The noise mapping is based on calculated outputs, not actual monitoring and these calculations are focussed on strategic areas, therefore some areas of local concern may have been missed;
- No data is available regarding the status of noise Priority Areas over time (i.e. are they increasing in number, are actions working etc); and
- Trend to impose lower speed limits in urban areas may result in a decrease in traffic related noise complaints.

Given the above, we propose to complete monitoring to provide detailed baseline data along Metro corridors in order to provide a more detailed assessment during detailed design.

3.4.2.4 Issues

- Transport infrastructure can cause disturbance for nearby residents such as noise and vibration, light, and visual effects;
- Road traffic (tyre noise) is the predominant source of transport related noise impacts (BRE, 2002);
- Noise levels in Cardiff, Newport, along the south Wales Main Line and along trunk roads within the Metro region are relatively high. This includes a number of designated quiet areas in Cardiff; and
- 60% of the population in England and Wales hear road noise and 30% state that they are affected by it. However, transport noise is more of an urban issue which is illustrated by the fact that noise levels in rural areas are around 10 dB lower than in urban areas (Defra, 2009).

3.5 Biodiversity, Fauna and Flora

3.5.1 Relationship with other Plans and Programmes

International agreements have been made to deal with the continuing loss of biodiversity and set out approaches for how to slow down and eventually prevent further loss. European Commission Directives have been set to conserve natural habitats of wild flora and fauna as

well as wild birds. The Ramsar, Bonn and Bern Conventions aim to protect wetlands, migratory species and wildlife. More recently, the EU Biodiversity Strategy was set out in 2011 to halt the loss of biodiversity and ecosystem services in the EU by 2020. These international directives and agreements can be seen cascading down into UK and local legislation.

In the UK, such legislation as the Wildlife and Countryside Act (1981) is a result of the EC Directive on the Conservation of Wild Birds (1979/409/EEC) (now 2009/147/EC) and aims to protect native species as well as control the release of non-native species and enhance further protection to designated sites. Specific legislation such as the Protection of Badgers Act (1992) consolidates and improves previous legislation. The Wales Biodiversity Framework provides a common point of reference for organisations and individuals in Wales to comply with the Environment Strategy for Wales, which signifies the importance of biodiversity conservation in Wales.

The Natural Environment and Rural Communities (NERC) Act is designed to help achieve a rich and diverse natural environment and thriving rural communities through modernised and simplified arrangements for delivering Government policy. It is about conserving and enhancing places and nature and helping people to enjoy them – taking a wider view, pursuing environmental management which encompasses access and recreation, and aiming where possible to achieve economic and social outcomes alongside conservation goals.

The Environment (Wales) Act, 2016 (and specifically Section 6) places a duty on public authorities to ‘seek to maintain and enhance biodiversity’ so far as it is consistent with the proper exercise of their functions.

State of Natural Resources Report (SoNaRR). The report sets out the state of Wales’ natural resources. It assesses the extent to which natural resources in Wales are being sustainably managed, and recommends a proactive approach to building resilience. The report links the resilience of Welsh natural resources to the well-being of the people of Wales.

The Welsh Government released TAN 5 (2009) which provides guidance on how the land use planning system should contribute to protecting and enhancing biodiversity and geological conservation. This technical advice note brings together advice on sources of legislation relevant to various nature conservation topics which may be encountered by Local Authorities.

3.5.2 Baseline Information

3.5.2.1 Current State

The internationally designated sites within the UK are designated under the Ramsar Convention, the EC Birds Directive (Special Protection Areas (SPA)) and Habitats Directive (Special Areas of Conservation (SAC)). which together form the Natura 2000 network. Table 5 presents the International and European designated sites within the South Wales Metro Programme area.

Table 5: International and European Designated Sites

Site Name	Site Type	Local Authority Area
Severn Estuary (Wales)	Ramsar	Cardiff / Vale of Glamorgan / Monmouthshire / Newport
Severn Estuary (Wales)	SPA	Cardiff / Vale of Glamorgan / Monmouthshire / Newport
Severn Estuary (Wales)	SAC	Cardiff / Vale of Glamorgan / Monmouthshire / Newport

Site Name	Site Type	Local Authority Area
Cardiff Beech Woods	SAC	Cardiff
Aberbargoed Grasslands	SAC	Caerphilly
Coedydd Nedd a Mellt	SAC	Rhondda Cynon Taf
Cwm Cadlan	SAC	Rhondda Cynon Taf
Blaen Cynon	SAC	Rhondda Cynon Taf
Glaswelltiroedd Cefn Cribwr / Cefn Cribwr Grasslands	SAC	Bridgend
Blackmill Woodlands	SAC	Bridgend
Kenfig / Cynffig	SAC	Bridgend / Vale of Glamorgan
Dunraven Bay	SAC	Vale of Glamorgan
Usk Bat Sites / Safleoedd Ystlumod Wysg	SAC	Monmouthshire
Coed Y Cerrig	SAC	Monmouthshire
Sugar Loaf Woodlands	SAC	Monmouthshire
Wye Valley and Forest of Dean Bat Sites / Safleoedd Ystlumod Dyffryn Gwy a Fforest y Ddena	SAC	Monmouthshire
Wye Valley Woodlands / Coetiroedd Dyffryn Gwy (Wales)	SAC	Monmouthshire
River Usk / Afon Wysg	SAC	Monmouthshire / Newport
River Wye / Afon Gwy (Wales)	SAC	Monmouthshire
Cwm Clydach Woodlands / Coedydd Cwm Clydach	SAC	Monmouthshire

Source: <http://MAGIC.defra.gov.uk>, Local Authority LDPs and websites, Natural Resources Wales¹⁴

There are many nationally designated sites; Sites of Special Scientific Interest (SSSIs) which are afforded statutory protection at a national level on grounds of their wildlife and/or geology. These designations ensure the appropriate protection and management are afforded to the sites to ensure that they are preserved for future generations. Table 6 presents the number of SSSIs designated in each Local Authority area.

Table 6: SSSI Designations by Local Authority

Local Authority	Number of SSSIs
Blaenau Gwent	3
Bridgend	15
Caerphilly	13
Cardiff	13
Merthyr Tydfil	5
Monmouthshire	49
Newport	12
Rhondda Cynon Taf	17
Torfaen	4
Vale of Glamorgan	27

Source: Local Authority LDPs and websites

Each Local Authority designates a number of local nature reserves which are selected for their importance on a local scale. There are a total of 40 local nature reserves across the ten local

¹⁴ Natural Resources Wales <https://naturalresources.wales/conservation-biodiversity-and-wildlife/find-protected-areas-of-land-and-seas/designated-sites-search/?lang=en>

authorities involved in the South Wales Metro. There are also numerous Sites of Importance for Nature Conservation (SINCs), which are a non-statutory local authority designation.

Within the Metro region, there are also numerous disperse areas of ancient woodland (NRW mapping, data.gov.uk¹⁵)

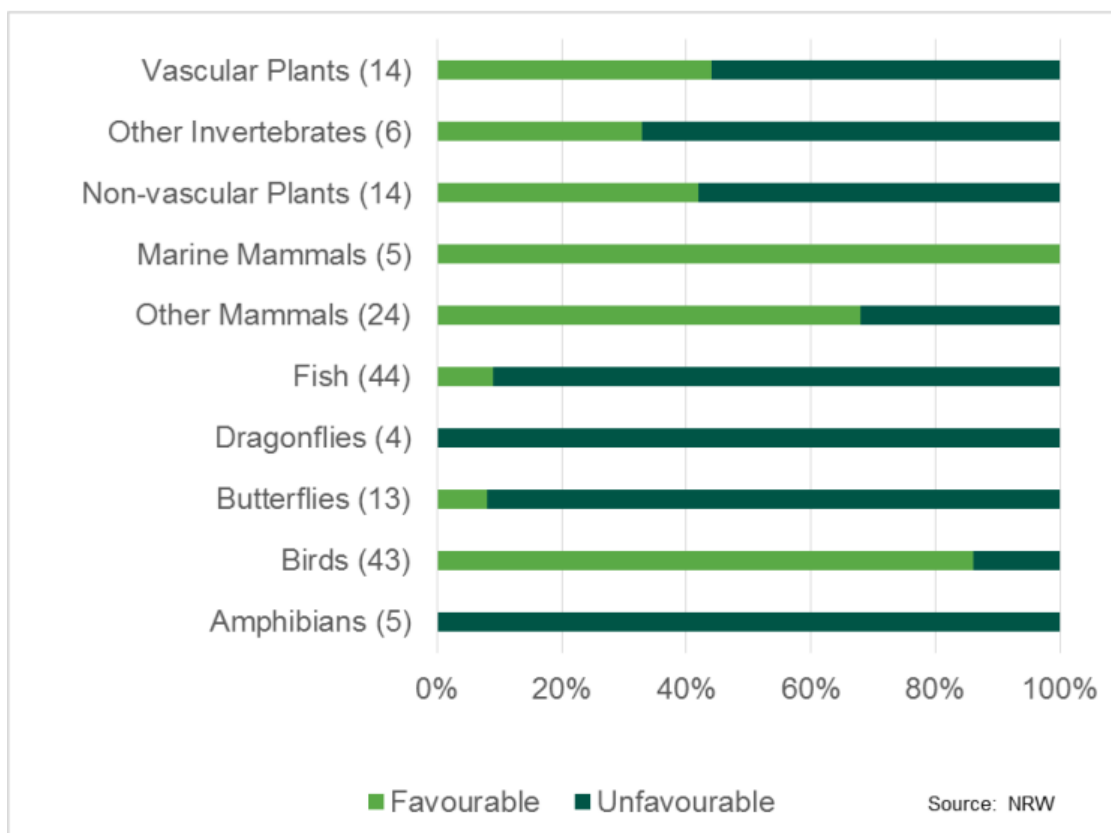
In 1994 the UK Government, after extensive consultation regarding issues raised at the Convention on Biological Diversity, launched the UK Biodiversity Action Plan (UKBAP). The plan discussed issues relating to conservation of the UK's biodiversity, and drew together a programme of activity and commitment. Wales has since developed an individual strategy prioritising the most relevant species and habitats in Wales. The Welsh BAP provides a list of 557 species and 54 habitats of principal importance in Wales. The purpose of this list is to guide decision-makers such as public bodies, including local and national statutory authorities, in implementing their duties under Section 40 of the Natural Environment and Rural Communities Act 2006 "to have regard" to the conservation of biodiversity in all their activities. Each local authority's BAP identifies habitats and species of particular importance to that authority.

The Welsh Government's 'State of the Environment' report is no longer being updated and was last released in 2012. We have reviewed the information set out within the NRW document 'State of Natural Resources Report' (SoNaRR), 2016 to identify the baseline:

- Trends of extent and population for terrestrial, freshwater and marine species vary – with some species increasing and some decreasing. For example, both increases and decreases can be seen in birds, bats and many pollinator species;
- All species are affected by changes in habitat quantity and quality. Fragmentation and eutrophication create particular problems for many species;
- Native wildlife may be increasingly at risk from pests, pathogens, invasive species and extreme weather;
- The figure below shows the current condition of a number of species:

¹⁵ NRW Ancient Woodland Inventory (<https://data.gov.uk/data/map-preview?url=http%3A%2F%2Ffile.gov.wales%2Fservices%2Fwms%2Fnrw%3F&n=53.51306700&w=-5.77774100&e=-2.60886500&s=51.24082900>), accessed 31/07/2017

Figure 18: Status of Habitats and Species, SoNaRR, 2016



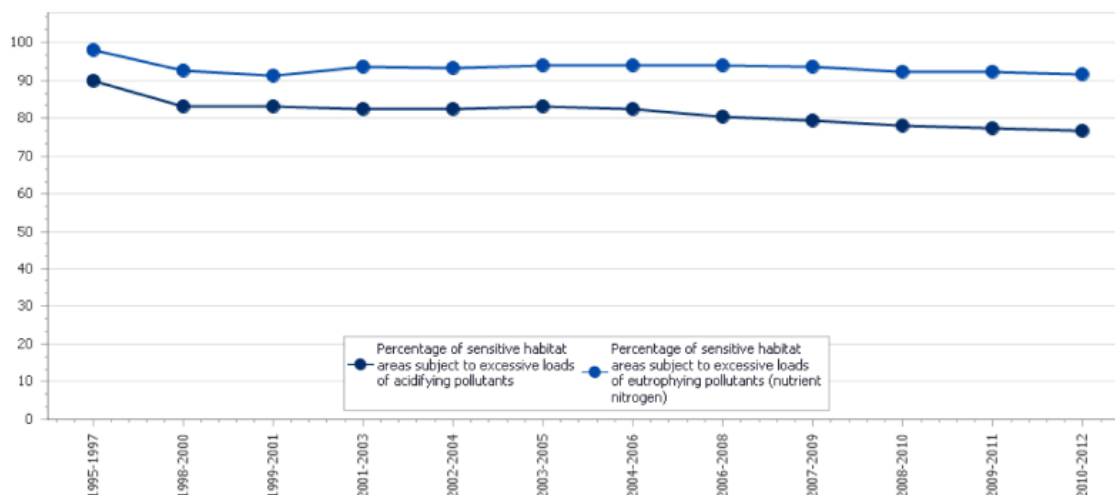
- The SoNaRR 2016 concludes that the overall condition of SAC and SPA features was mostly unfavourable, with the exception of birds and mammals of which 86% and 68% (respectively) were in favourable condition.

3.5.2.2 Trends

In Wales, the interim Section 7 list of the Environment (Wales) Act has 557 species and 55 habitats of principle importance. These were originally selected based on the level of threat they face, the level of responsibility in Wales for their populations and whether remedial action could be taken to improve their status. The following facts were apparent:

- Of 67 invertebrate species assessed, 21% were declining, 25% were improving and the remaining 54% showed little change;
- Of the 78 vertebrate species assessed, 37% were declining and the outlook was improving for 21%;
- Of the 55 assessed species of fungi and lichens, 29% were declining, 27% were improving; and
- Of the 49 bryophyte species, 47% were declining and 24% were improving; and
- For SPAs and SACs 55% and 75% of species and habitat feature were in unfavourable condition. SSSI data were not widely available and however, the evidence suggests that the majority of features for habitats and species are in unfavourable condition;
- Wales sustainable development indicators show the below trends with regards to acidification and eutrophication; and

Figure 19: Acidification and Eutrophication Trends in Sensitive Habitats



: StatsWales 'Sustainable Development Indicators' 2015¹⁶

- There has been major habitat loss and fragmentation. As a consequence, connectivity is expected to have declined.

3.5.2.3 Data Gaps / Uncertainties

- There is no data indicating what the overall percentage change in habitat area (or change in percentage of designated sites in favourable / unfavourable condition) has been over the monitoring period;
- For reasons of practicality, data focuses on protected sites and therefore is likely to underestimate the decrease in habitat quality (protected sites are normally managed to specifically protect / improve their quality, so for non-protected sites which aren't managed in the same way, such changes are likely to be of greater magnitude);
- There is a lack of data on invasive non-native species (INNS); and
- The response to climate change is uncertain. Some species are more tolerant of extremes and increases in temperature, therefore the proportion of species is likely to alter significantly.

3.5.2.4 Issues

- Some SACs, SPAs and SSSIs are in an unfavourable condition;
- Acidification of soils and vegetation resulting in part from transport emissions remains an issue (albeit improving slowly);
- Transport related infrastructure projects have potential to affect biodiversity and ecosystem resilience (including connectivity);
- Infrastructure (particularly linear infrastructure projects like transport / power schemes) have potential to exacerbate the spread of INNS;
- Future development may lead to a reduction in the favourable conservation status of some species and habitats; and
- Habitats and species are likely to continue to be protected through European and UK legislation. However, future development may put pressure on ecologically sensitive areas.

¹⁶ StatsWales 'Sustainable Development indicators' <https://statswales.gov.wales/Catalogue/Sustainable-Development/Sustainable-Development-Indicators>

When the UK leaves the EU there may be a reduction in the protection afforded to current European designated sites or species.

3.6 Population, including Severance and Accessibility

3.6.1 Relationship with other Plans and Programmes

The Tackling Poverty Action Plan 2012 – 2016 sets out how the Welsh Government aim to tackle poverty and build resilient communities. In 2015, The Welsh Government set out the Well-being of Future Generations (Wales) Act 2015 which focuses on improving the social, economic, environmental, and cultural well-being of Wales. The Act ensures that public bodies need to make sure that when making their decisions they consider the impact they could have on people living in their lives in Wales in the future. It also puts sustainability on the forefront of local authorities and public bodies such as the National Health Service and NRW, which allows a synergistic approach to sustainable growth for the population of Wales.

The Welsh Infrastructure Investment Plan for Growth and Jobs provides the context for national government infrastructure investment.

3.6.2 Baseline Information

3.6.2.1 Current State

Population

The population of the ten Local Authorities based on 2011 census returns was 1,481,832 with a projected growth by 2036 to 1,642,189 (Table 7) with the vast majority of the projected growth occurring in Cardiff. As of the 2011 consensus, the population of the ten Local Authorities accounts for approximately 48.1% of the total population of Wales. Population centres within the valley authorities are clustered along the valley floors which is where the main transportation networks are located with rail services particularly following the valleys.

Table 7: Population

Local Authority	2011	2036
Cardiff	345,442	458,544
Caerphilly	178,782	182,334
RCT	234,373	235,439
Merthyr Tydfil	58,851	62,434
Bridgend	139,410	151,023
The Vale of Glamorgan	126,679	133,727
Blaenau-Gwent	69,812	65,209
Torfaen	91,190	92,204
Monmouthshire	91,508	90,334
Newport	145,785	170,941
Total	1,481,832	1,642,189

Source: Welsh Government (<https://stats.wales.gov.wales/Catalogue/Population-and-Migration/Population/Projections/Local-Authority/2011-Based/PopulationProjections-By-LocalAuthority-Year>)

Cardiff has by far the greatest population density with 2,535 people per km² compared to Caerphilly with 650/km², Rhondda Cynon Taf with 560/km², Merthyr Tydfil with 530/km²,

Bridgend with 537/km², The Vale of Glamorgan with 378/km², Blaenau-Gwent with 629/km², Torfaen with 721/km², Monmouthshire with 104/km² and Newport with 742/km².

The projected growth in population of Cardiff will place significant strains on infrastructure and there may be pressure to relieve some of this growth by encouraging greater development in the surrounding Local Authorities which will necessitate improved transportation systems.

The age profiles for the ten local authorities are very similar (Table 8) with Cardiff having a greater proportion of 15-29 year olds and fewer people aged 45 and over. This is due to the presence of a significant student population in Cardiff.

Table 8: Age Distribution

Age Group	0-14	15-29	30-44	45-64	65-74	75-
Cardiff	17.40 %	26.80%	20.00%	22.00%	7.10%	6.60%
Caerphilly	17.80 %	18.50%	18.90%	26.60%	10.50%	7.70%
Rhondda Cynon Taf	17.50 %	19.80%	18.50%	25.80%	10.50%	8.00%
Merthyr Tydfil	17.40 %	19.60%	18.20%	26.80%	10.00%	7.90%
Bridgend	17.00 %	18.10%	20.10%	27.10%	9.90%	8.00%
The Vale of Glamorgan	17.50 %	17.40%	19.10%	27.70%	9.80%	8.50%
Blaenau-Gwent	16.70 %	19.30%	19.40%	26.60%	10.00%	7.90%
Torfaen	17.60 %	18.90%	18.30%	27.10%	9.50%	8.50%
Monmouthshire	16.50 %	15.20%	17.50%	30.00%	11.00%	9.80%
Newport	18.90 %	20.20%	19.80%	24.90%	8.60%	7.70%

Source: Welsh Government

Population Needs Assessment

In accordance with the Social Services and Well-being (Wales) Act 2014, each LPA has completed an assessment of the care and support needs of their residents. The results indicate that:

- Cardiff and Vale of Glamorgan Population Needs Assessment (PNA): The population of Cardiff is very ethnically diverse compared to the rest of Wales. The PNA identified persistent inequalities, concluding that a man living in the more deprived areas of the region could expect to live 21-24 fewer years in good health than someone living in one of the least deprived areas;
- The Gwent Region PNA (encompassing Blaenau Gwent, Caerphilly, Monmouthshire, Newport and Torfaen) identified the following:
 - Blaenau Gwent – benefits from accessible green spaces but is an area with high levels of unemployment. The population of Blaenau Gwent is predicted to decrease significantly (6.6%);

- Caerphilly – has a widely dispersed population (50 small towns and villages). The economy is growing and has good transport links to Cardiff, but still has significant levels of unemployment and poor health;
- Monmouthshire – has the lowest level of unemployment in Gwent but pockets of deprivation are evident. The population of Monmouthshire is forecast to decrease;
- Newport – The second largest number of people from ethnic minorities after Cardiff and a growing population; and
- Torfaen – a population showing slow growth (1.1%).
- Overall, the region predicts a significant increase in the percentage of population >65yrs, with corresponding impacts on health care provision and transport requirements.
- Cwm Taf PNA (Encompassing Merthyr Tydfil and Rhondda Cynon Taf) – the economy appears to be increasing, but at a significantly slower rate than the Wales average. Projected population increase forecasts indicated a forecast decrease in Merthyr Tydfil and a slight increase in Rhondda Cynon Taf.

Economy

Economic Activity

Economic activity in South East Wales is very much centred on Cardiff and Newport which are major sources of employment for people living in the surrounding Local Authority areas. The following table shows gross value added by Metro region (2013 data):

Table 9: Economic Activity (gross value added (GVA) per person)

Area	Gross Value Added per Person (£/hr worked)
Cardiff and the Vale of Glamorgan	28.3
Central Valleys	26.0
Gwent Valleys	25.5
Bridgend and Neath Port Talbot	26.0
Monmouthshire and Newport	27.4
Wales	25.1

Source: National Assembly Wales

- The unemployment rate in Wales as a whole is 6.2% compared to the UK average of 5.4% and economic inactivity rate is 24.2% compared to the UK average of 22.1%. Each of the LPAs within the Metro region stated that transport infrastructure was a contributing factor in unemployment (i.e. lack of access to jobs);
- Gross disposable household income in Wales is £15,302 compared to the UK average of £17,965;
- The largest employment sector in Wales is within the public sector which employs 31% of the labour force compared to the UK average of 25%. Retail, hotels, transport, and wholesale accounts for 24% (UK 26%), finance and business 17% (UK 26%) and manufacturing 12% (UK 12%);
- Productivity in Wales is generally below that of even the poorer regions in England (

Finally, the WG report 'Regional Economic and Labour Market Profile – South East Wales' (January 2017) indicates the following:

- Compared to Wales, SE Wales has a lower employment rate, higher unemployment, economic inactivity and claimant count rates;

- GVA per head and earnings are both higher, whilst Gross Disposable Household Income (GDHI) per head is lower;
- With regards long term trend, the labour market in SE Wales has seen similar changes to that for Wales since 2001.

Deprivation

The Welsh Government publishes (in the Welsh Index of Multiple Deprivation¹⁷) indices of deprivation for each Local Authority. Each authority is divided into smaller units which are assessed against a range of metrics to record multiple deprivation. The percentage of assessment areas within the most deprived 50% of Wales are:

- | | |
|-------------------------|-----|
| ● Cardiff | 46% |
| ● Caerphilly | 67% |
| ● Rhondda Cynon Taf | 72% |
| ● Merthyr Tydfil | 81% |
| ● Bridgend | 57% |
| ● The Vale of Glamorgan | 37% |
| ● Blaenau-Gwent | 85% |
| ● Torfaen | 57% |
| ● Monmouthshire | 21% |
| ● Newport | 57% |

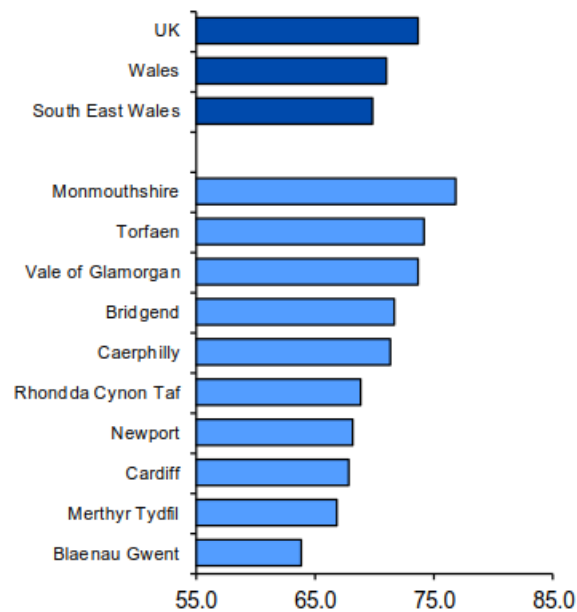
Deprivation relating to employment

- Within Cardiff, the most deprived areas are dominantly around the southern fringe of the region. Cardiff has 12 LSOAs amongst the 10% most deprived in Wales. However, Cardiff also has 129 LSOAs amongst the 50% least deprived in Wales and there are significant north-south divides apparent;
- Within the Vale of Glamorgan, the most deprived areas are centred around Barry. VOG contains 5 LSOAs amongst the 10% most deprived in Wales (6.3% of those within the authority);
- Within Bridgend, the largest distribution is in the north of the county. 9.1% of the LSOAs within Bridgend are in the 0-10% most deprived in Wales;
- Within RCT (20.8%), Merthyr Tydfil (25.0%), Caerphilly (16.4%) and Blaenau Gwent (23.4%) there are a high proportion of areas which are deprived;
- Isolated areas of high deprivation are present in northern Monmouthshire;
- The figure below provides an indication of the employment rate within the Metro LPAs:

¹⁷ Welsh Index of Multiple Deprivation <http://wimd.wales.gov.uk>

Figure 20: Employment Rates in the Metro Region

Chart 2: Employment rate, year to September 2016 (a)



(a) People in employment as a percentage of the population aged 16-64.

Figure 21: Claimant Levels, South East Wales, 2016

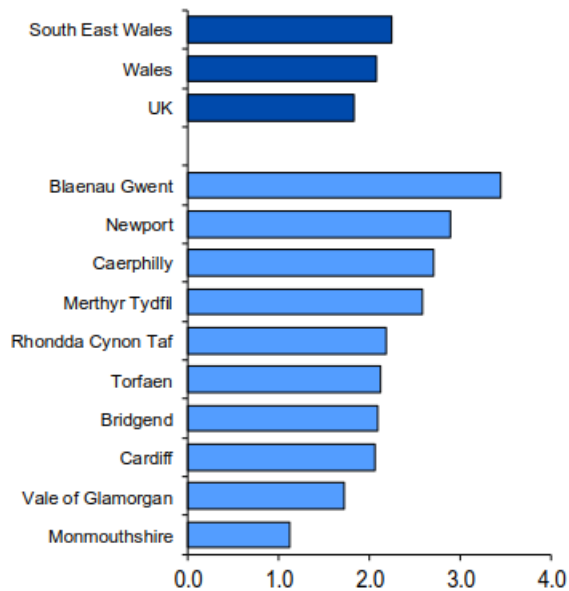
Table 3 Employment levels

	<i>People aged 16 and over (numbers in thousands)</i>						
				<i>Change in latest levels over:</i>		<i>Percentage change in latest over:</i>	
	2001	Year to Sep 2015	Year to Sep 2016	2001	Year to Sep 2015	2001	Year to Sep 2015
South East Wales	592.9	680.9	686.0	93.1	5.1	15.7	0.7
Bridgend	56.1	63.2	64.1	8.0	0.8	14.3	1.3
Rhondda Cynon Taf	90.2	105.6	104.8	14.6	-0.8	16.2	-0.8
Merthyr Tydfil	20.5	26.5	25.6	5.2	-0.8	25.3	-3.1
Caerphilly	67.7	76.4	82.9	15.2	6.5	22.5	8.5
Blaenau Gwent	26.5	30.1	28.3	1.8	-1.8	6.9	-6.0
Torfaen	38.4	41.1	43.0	4.7	2.0	12.2	4.8
Vale of Glamorgan	54.5	59.7	59.3	4.8	-0.4	8.8	-0.7
Monmouthshire	39.6	44.6	44.7	5.1	0.1	13.0	0.2
Newport	60.3	65.9	64.3	4.1	-1.6	6.7	-2.4
Cardiff	139.3	167.8	169.0	29.7	1.1	21.3	0.7
Wales	1,238.6	1,399.8	1,416.4	177.8	16.6	14.4	1.2
United Kingdom	27,433.1	31,017.7	31,394.7	3,961.6	377.0	14.4	1.2
Next update: March 2017							

Source: Labour Force Survey (LFS)/Annual Population Survey (APS), ONS

- The figures below provide an indication of benefit claimants in the SE Wales regions (as of December 2016, monthly snapshot), which is illustrative of the significant intra-regional disparity within the Metro area:

Figure 22: Claimant count rate, December 2016



(a) Excludes Universal Credit claimants. Percentages of the resident population aged 16-64.

Figure 23: Claimant Levels, Southeast Wales, 2016

	<i>Numbers in thousands</i>						
				<i>Change in latest</i>		<i>Percentage change in</i>	
	Dec 1999	Dec 2015	Dec 2016	Dec 1999	Dec 2015	Dec 1999	Dec 2015
South East Wales	27.7	23.1	21.5	-6.2	-1.6	-22.4	-7.1
Bridgend	2.5	1.8	1.9	-0.7	0.1	-26.0	2.8
Rhondda Cynon Taf	4.4	3.5	3.3	-1.2	-0.2	-26.1	-7.0
Merthyr Tydfil	1.5	1.0	1.0	-0.5	0.0	-33.8	-3.0
Caerphilly	3.2	3.5	3.1	-0.1	-0.5	-4.5	-14.0
Blaenau Gwent	2.0	1.6	1.5	-0.5	-0.1	-25.0	-7.4
Torfaen	1.5	1.5	1.2	-0.3	-0.2	-21.0	-16.6
Vale of Glamorgan	2.2	1.4	1.3	-0.8	-0.1	-38.3	-5.9
Monmouthshire	1.1	0.6	0.6	-0.5	0.0	-42.4	0.0
Newport	2.9	2.7	2.7	-0.2	0.0	-7.7	-1.7
Cardiff	6.4	5.4	5.0	-1.4	-0.4	-22.0	-7.9
Wales	58.7	42.0	39.7	-19.0	-2.3	-32.3	-5.4
United Kingdom	1,140.6	733.1	753.2	-387.4	20.1	-34.0	2.7
Next update: Feb 2017				Source: Jobcentre Plus Administrative Systems			

(a) Data are not seasonally adjusted. This experimental series counts the number of people claiming Jobseeker's Allowance plus those who claim Universal Credit who are out of work and replaces the number of people claiming Jobseeker's Allowance as the headline indicator of the number of people claiming benefits principally for the reason of being unemployed. Further information on the roll out of universal credit can be found at: <http://dwp-stats.maps.arcgis.com/apps/Viewer/index.html?appid=1713828f61dc4c01a98eb9df1dcc5ab9>

: Office of National Statistics

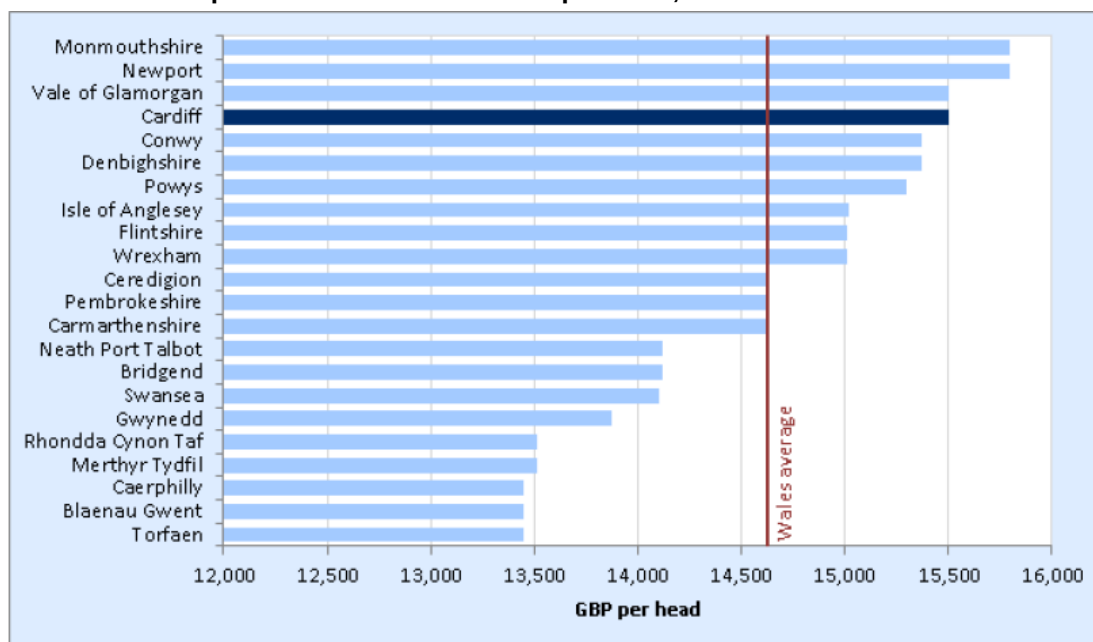
Deprivation relating to income

N.B. where wage data is stated below, it refers to gross wages, as of 2016 (provisional data provided by StatsWales).

- Cardiff contains 41 LSOAs (19.2%) within the 10% most deprived in Wales, centred around the southern periphery. The average weekly wage in Cardiff is £622;
- The Vale of Glamorgan contains 4 LSOAs (5.1%) which are among the 10% most deprived in Wales. These are centred around Barry. The average weekly wage in VOG is £619;
- Newport contains 19 LSOAs which are amongst the 10% most deprived in Wales. These are located in the centre of the regio., The average weekly wage in Newport is £553;
- Monmouthshire has no LSOAs within the top 10% in Wales. The average weekly wage in Monmouthshire is £555;
- Bridgend has 8 LSOAs (9.1%) within the 10% most deprived in Wales. These are mainly located in the north of the region. The average weekly wage in Bridgend is £604;
- Rhondda Cynon Taf contains 23 LSOAs (14.9%) within the 10% most deprived in Wales, located in the mid-north of the region. The average weekly wage in RCT £563;
- Merthyr contains 6 (16.7%) of the 10% most deprived LSOAs in Wales. The average weekly wage in Merthyr Tydfil is £577;
- Caerphilly contains 11 LSOAs (10%) within the 10% most deprived in Wales. The average weekly wage in Caerphilly is £573;
- Torfaen contains 6 LSOAs (10%) within the 10% most deprived in Wales. The average weekly wage in Torfaen is £531;
- Blaenau Gwent contains 8 LSOAs (17%) within the 10% most deprived in Wales. The average weekly wage in Blaenau Gwent is £502; and

Gross disposable household income varies significantly across the Metro regions, with Torfaen, Blaenau Gwent, Caerphilly, Merthyr Tydfil, RCT and Bridgend all below the Welsh average, whilst Cardiff, Newport, VOG and Monmouthshire are all significantly above the Welsh average.

Figure 24: Gross disposable household income per head, 2012



Source: Regional Accounts, Office for National Statistics

Source: StatsWales

Workless Houses

The local area summaries for each of the LPAs contain (amongst other data), trends showing the percentage of children aged 0-15 who are living within workless houses. This is broken down by LPA:

- Bridgend: generally close to the Wales average, displaying no discernible trend over the monitoring period (2004 – 2013);
- Cardiff: close to the Welsh average, commencing at 2.2% below the Welsh average in 2004 and being 0.9% below the Welsh average in 2013;
- Vale of Glamorgan: consistently below the Welsh average;
- Rhondda Cynon Taf: Consistently above the Welsh average over the period 2008 to 2013;
- Merthyr Tydfil: Consistently above the Welsh average over the monitoring period;
- Caerphilly: Consistently above the Welsh average, but decreasing over the monitoring period;
- Blaenau Gwent: significantly greater than the Welsh average. No discernible trend;
- Torfaen: Generally above the Welsh average, with the exception of 2010-2012;
- Monmouth: Significantly below the Welsh average; and
- Newport: Consistently above the Welsh average.

Deprivation relating to access to services

- Again, in Cardiff the relatively more deprived areas are located around the southern periphery, but Cardiff has no LSOAs amongst the 10% most deprived in Wales. There is less disparity evident for this indicator, as some relatively affluent areas are relatively deprived in terms of access (i.e. Lisvane and Creigiau);
- Large areas of the Vale of Glamorgan relatively significantly deprived, with the worst affected areas along the northern boundary (VOG has 4 LSOAs within the 10% most deprived in Wales);
- In Bridgend, areas of deprivation are disperse and the area is not as badly affected as the Vale of Glamorgan (Bridgend has no LSOAs within the 10% most deprived in Wales), but 48.9% of the LSOAs in Bridgend are within the 10-50% most deprived in Wales;
- Within RCT (20.8%), Merthyr Tydfil (25.0%), Caerphilly (16.4%) and Blaenau Gwent (23.4%) there are a high proportion of areas which are deprived; and
- Within Caerphilly there are 5 LSOAs ranked within the 10-20% most deprived in Wales, generally located towards the north of the region;
- Merthyr Tydfil has 1 LSOA in the 0 to 10% most deprived in Wales and 13.9% of LSOAs are in the 10-20% most deprived;
- Rhondda Cynon Taf has 1 LSOA in the 0 to 10% most deprived in Wales and 14 (9.1%) in the 10% to 20% most deprived;
- 12 LSOAs with Monmouthshire are within the 0 to 10% most deprived in Wales, accounting for 21.4% of those in the local authority; and
- The report 'Understanding productivity variations between Wales and England' (University of West of England, D.J. Webber, A. Plumridge and M. Horswell (2016) states that '*an important part of the.....productivity gap between Wales and London can be explained by differences in accessibility..... Reductions in the minimum travel time to core cities... will permit greater abilities of Wales-based firms to compete more effectively in their markets as reduced travel time will save on costs*'.

3.6.2.2 Trends and Future Baseline

With regards to WIMD data, as the data is an expression of relative deprivation, not true deprivation it is not possible to quantify trends. However, the following comments are considered reasonable:

- With the exception of Monmouthshire, Blaenau Gwent and Merthyr Tydfil, all the LPAs expect their populations to increase;
- There is significant regional inequality across a number of the LPAs (i.e. significant differences in relative deprivation within each LPA and from one LPA to another). For example:
 - Cardiff has the highest (gross) weekly average wage of all the Metro regions, yet also the highest proportion of LSOAs within the 10% most deprived in Wales with regards to income. This indicates the potential for wage data to be skewed by a number of significant higher earners;
- The more rural LPAs suffer deprivation in wide areas with regards to access to services;
- Isolation is likely to lead to increasing deprivation in affected communities (i.e. those communities where access to transport is limited). This includes both isolation due to existing transport infrastructure and isolation due to an increasing proportion of elderly population;

- If access to transport and employment opportunities is not improved in line with project increases in population, poverty deprivation indices are likely to increase across the valleys and rural regions of the Metro area;
- An aging population is present across the Metro region (all LPAs are projecting an increase in the proportion of the population >65yrs);
- An increasing population will need significant investment in transport infrastructure;
- Given projected limited growth in economies outside of Cardiff it's likely that a number of regions outside of Cardiff will continue to be commuter regions, placing an increasing burden on transport infrastructure; and
- A number of the LPAs contain higher than average proportion of workless houses, with no evidence of decreasing trend over time.

3.6.2.3 Data Gaps and Uncertainties

- The data on employment is not clear with regards to assumptions made on student populations. Cardiff has a high proportion of students and this may skew the employment data (Cardiff shows a high proportion of non-working population, but also a relatively low proportion of claimants, which would in part be explained by a large student population);
- Whilst data indicates that average (gross) weekly wages have increased over time (1997-2016) it is not clear what this implies with regards 'real – world' wages (i.e. in terms of rises against cost of living increases). Disposable income has also been assessed but this is not a strict measure and the definitions used do not explain whether this is income net of significant costs or merely after tax.

3.6.2.4 Issues

- A growing population and growing economy will place increasing pressure on the transport network and improvements and maintenance will be required to meet demand;
- Conversely, a shrinking population (as evidenced by stats for Merthyr Tydfil) is likely to lead to isolation of the remaining vulnerable population (unless accompanied by investment in accessible transport mechanisms);
- Growing populations also require further developments, which can eventually require further infrastructure to connect the new communities;
- Increasing commuting will (without investment) increase journey times and lead to increasing deprivation with regards access to services;
- An aging population will put significant strain on transport and health infrastructure;
- Transport infrastructure can cause disturbance for nearby residence by mechanisms including noise, vibration, light and visual effects;
- There is a link between communities which have low levels of access to a car and high long term unemployment figures;
- Each of the LPAs within the Metro area contain a number of communities with high levels of inaccessibility, where access to employment and key services is challenging;
- Access to education and health services is also affected by the presence / absence of transport infrastructure;
- A number of the LPAs highlighted limited uptake of active travel options due to issues including perceived safety aspects; and
- Lower than average wages and high unemployment within the regions will require any revisions to public transport to deliver strategic connections to employment sites and to be priced to facilitate uptake by relatively less well-off populations. There is the opportunity for

Metro to reduce inequalities by providing links to employment sites and provision of a cost-effective, fast transport system.

3.7 Human Health, including Physical Fitness, Security and Safety

3.7.1 Relationship with other Plans and Programmes

The UK air Quality Strategy aims to reduce transport related effects on health at a national scale. The Road Safety Framework for Wales (2013) sets out the Welsh Governments priorities for road safety.

Healthier lifestyles and reduction of health inequality aims are set out in Wales Sustainable Development Scheme, Health Challenge Wales and the promotion of cycling and walking by land use planning set out in TAN 18.

3.7.2 Baseline Information

3.7.2.1 Current State

Transport / Emissions Related Health Impacts

Air Pollution Wales (2015), indicates that 2,400 deaths occurred in Wales as a result of air pollution. The main excess concentration of pollutants are caused by traffic, power generation and heavy industries.

In 2015 Local Authority monitored sites recorded ambient concentrations of PM₁₀ at moderate levels on 66 days, high on 16 days and very high on 8 days. NO₂ monitoring recorded 86 days with moderate concentrations and 1 day with high concentrations. One day of high SO₂ concentrations was recorded. Finally, 24 days with moderate ozone concentrations were recorded.

A review of Welsh Air Quality data (www.welshairquality.co.uk) indicates that NO₂ and PM₁₀ concentrations are highest in the main urban areas (Cardiff, Newport and Penarth / Barry). The annual average NO₂ (2015 mapping) exceeds the 40µg/m³ limit in areas including central Cardiff, small areas of Newport centre and an isolated location in Bridgend County.

There is no data to assess the linkage between identified areas of lower air quality and distribution of respiratory illness.

Caerphilly Hafodyrynys and Rhondda Mountain Ash also exceeded the AQS Objective for hourly mean NO₂ concentration on more than the permitted 18 occasions in 2015.

Figures 25 and 26 (DEFRA, 2014) outlines the recommended actions and health advice linked to the different index bands that make up DEFRA's Daily Air Quality Index. This is numbered 1-10 and divided into four bands (Low=1-3, Moderate=4-6, High=7-8 and Very High=9-10) and covers ozone, NO_x, SO₂, PM_{2.5} and PM₁₀.

Figure 25: Pollutant Effects

Pollutant	Health effects at very high levels
Nitrogen dioxide Sulphur dioxide Ozone	These gases irritate the airways of the lungs, increasing the symptoms of those suffering from lung diseases.
Particles	Fine particles can be carried deep into the lungs where they can cause inflammation and a worsening of heart and lung diseases.
Carbon monoxide	This gas prevents the normal transport of oxygen by the blood. This can lead to a significant reduction in the supply of oxygen to the heart, particularly in people suffering from heart disease.

Figure 26: Health Advice

Recommended Actions and Health Advice

Air Pollution Banding	Value	Accompanying health messages for at-risk individuals*	Accompanying health messages for the general population
Low	1-3	Enjoy your usual outdoor activities.	Enjoy your usual outdoor activities.
Moderate	4-6	Adults and children with lung problems, and adults with heart problems, who experience symptoms , should consider reducing strenuous physical activity, particularly outdoors.	Enjoy your usual outdoor activities.
High	7-9	Adults and children with lung problems, and adults with heart problems, should reduce strenuous physical exertion, particularly outdoors, and particularly if they experience symptoms. People with asthma may find they need to use their reliever inhaler more often. Older people should also reduce physical exertion.	Anyone experiencing discomfort such as sore eyes, cough or sore throat should consider reducing activity, particularly outdoors.
Very High	10	Adults and children with lung problems, adults with heart problems, and older people, should avoid strenuous physical activity. People with asthma may find they need to use their reliever inhaler more often.	Reduce physical exertion, particularly outdoors, especially if you experience symptoms such as cough or sore throat.

: Both DEFRA, 2014

The Noise Action Plan for Wales identified noise issues along a number of strategic transport corridors (road and rail) across Wales, together with isolated noise issues around industrialised areas (see Noise and Vibration section of this report for further details). Excessive noise may contribute to ill health and general wellbeing issues.

General Health

The UK average life expectancy is 81.5 years compared to a Welsh average of 77.5 years. Within the ten Local Authorities' life expectancy for both males and females is mostly below the Welsh average, the few exceptions are The Vale of Glamorgan and Monmouthshire for both males and females and Cardiff for females (see Table 10).

Table 10: Life Expectancy (years)

Area	Males	Females
England	79.5	83.2
Wales	78.5	82.3
Cardiff	78.2	82.7
Caerphilly	77.6	81.5
Rhondda Cynon Taf	76.4	81.0
Merthyr Tydfil	77.4	81.1
Bridgend	77.0	80.6
The Vale of Glamorgan	79.6	83.4
Blaenau-Gwent	75.7	79.9
Torfaen	77.6	82.1
Monmouthshire	80.1	83.9
Newport	77.9	82.1

Source: Welsh Government

Whilst life expectancy has been increasing across the Metro region (based on the Local Area Summary Statistics for 2014), the highest causes of death in Wales remain diseases of the circulatory system (27.2%), cancer (27.0%) and diseases of the respiratory system (16.1%).

Lifestyle

- 19% of adults in Wales reported smoking at least occasionally. However, the percentage of 15-16yr olds who smoked has been dropping steadily since the period 1996 – 2000.
- 40% of adults in Wales reported consuming alcohol above the recommended daily limit on at least one day in the previous week. Again, the percentage of 15-16yr olds who drank, dropped between 2009 and 2013.
- In 2015-16, there were 18,613 assessments for substance misuse treatment. The main substance of concern was alcohol.
- Nearly one third of adults (31%) reported being physically active on 5 or more days the previous week.
- 20% of adults reported being treated for high blood pressure and approximately 8% reported being treated for a heart condition. N.B. it is not certain what proportion of these conditions were lifestyle related.
- 7% of adults reported being treated for diabetes (N.B. it is not certain what proportion is potentially lifestyle related).
- 59% of adults were classified as overweight or obese.

With regards to children:

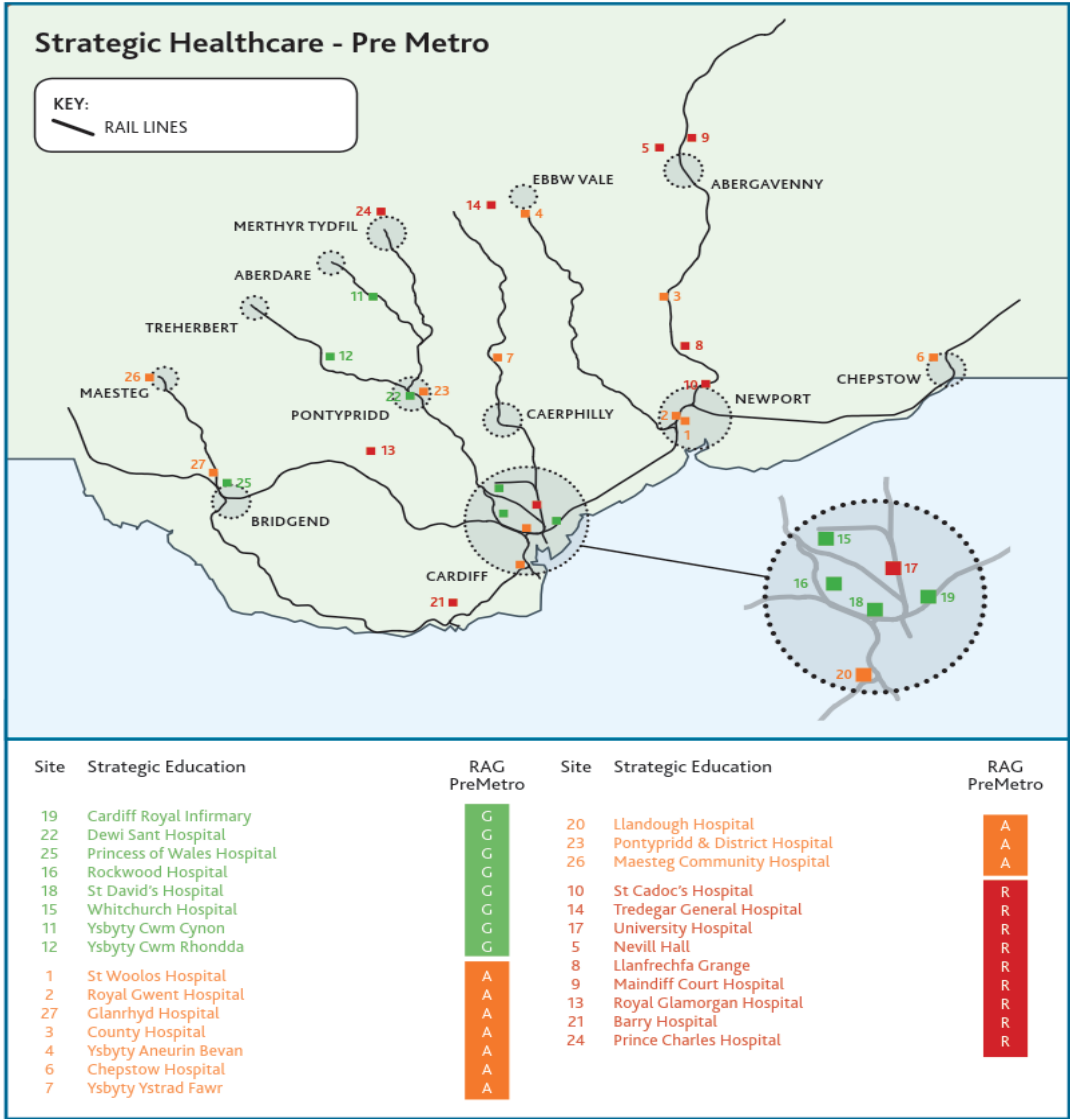
- 94% of children were reported to have very good or good general health
- 19% of children were reported as having a long-standing illness, including 7% with a limiting long-standing illness.
- There has been little change in the reported health of children over the monitoring period.

Access to Health Services

- In 2016, 85% of GP practices were open for daily core hours (08:00 to 18:30) or within 1hr of the daily core, Monday to Friday. This is an increase of 3% from 2015. However, 39% of people 'found it difficult to make a convenient GP appointment';
- 1 in 8 people reported contact with a health visitor, district nurse or community nurse;

- 1 in 10 people reported contact with a chiroprapist;
- 1 in 8 people reported contact with a physiotherapist; and
- WIMD data indicates significant inequality across the Metro region with regards access to services, indicating that access to healthcare is likely to be an issue for some groups. The figure below shows major healthcare facilities within the Metro region, showing that access to healthcare within the valleys is likely to be limited for some at the extremes of the region. The distribution of education sites is also similar.

Figure 27: Access to Healthcare - Existing



: A Cardiff Capital Region Metro: Impact Study, October 2013 – produced on behalf of Minister for Economy, Science and Transport

Policies and Strategies with Implications for Health Related Travel

The LPAs have each set out 'Care Closer to Home' or similar strategies which aim to reduce isolation of elderly and infirm by providing more care closer to the areas where these groups reside. If successful, this would improve access to healthcare and reduce the requirement for health related travel.

Transport and Safety – Including Crime

Rail

There was a 50% reduction in the number of rail incidents in 2015, compared with the previous year – representing a figure 14.3% lower than the 2011-2013 average (Table 11).

Table 11: Train Incidents Wales, 2011 to 2015

	2011	2012	2013	2014	2015
Collisions	0	0	0	0	0
Derailment	0	3	2	1	2
Obstructions	16	11	11	17	4
Fires	0	1	3	4	4
Missiles	2	0	0	6	4
Total	18	15	16	28	14

Source: Statistics Wales, 2016

One fatality was reported in 2015, which was due to trespassing.

Information about rail crime has also been assessed by Statistics Wales using data provided by the British Transport Police (BTP) database 'CRIME'. The total recorded notifiable offences increased by 43 (4%) in 2015-16. The largest categories of recorded offences were: violence against the person (293), theft of passenger property (238) and public disorder (156). Over the period 2015-2016 there were increases in recorded incidents of violent offences (23 per cent), sexual crime (18 per cent), and decreases in public disorder (10%) and motor vehicle crime (11%). The level of recorded theft of railway property and drug crime has fallen.

In 2015-16 there was an 11 per cent reduction in the number of non-notifiable offences when compared to 2014-15. The largest category was the less serious line route offences (629) which represented 47% of all non-notifiable offences. Less serious line of route offences and less serious fraud reported slight increases, whereas less serious public order offences and other less serious offences reported slight decreases in 2015-16 when compared to the previous year's figures.

Road

Police recorded road accidents were highest in Southeast Wales, although this may have been because of the higher number of vehicles in the area. No information is available by local authority regarding the number of accidents per vehicle on the road.

Figure 28: Recorded Fatal Traffic accidents in South Wales (sourced from StatsWales)

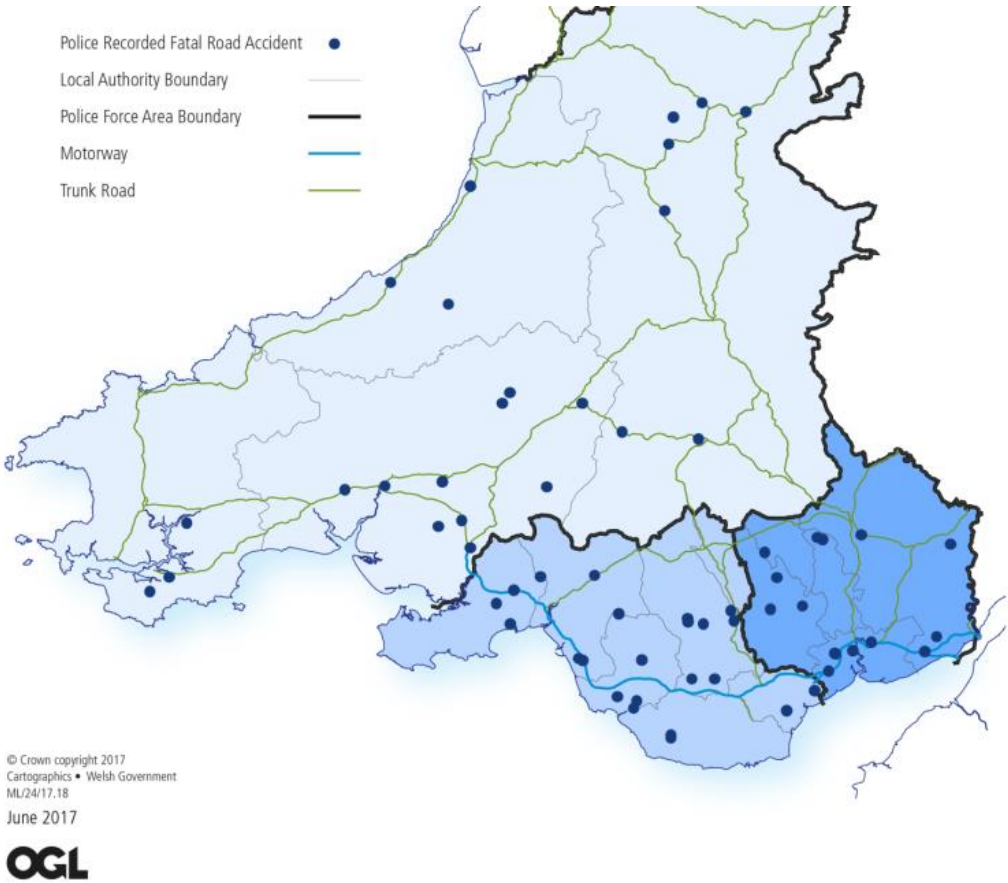
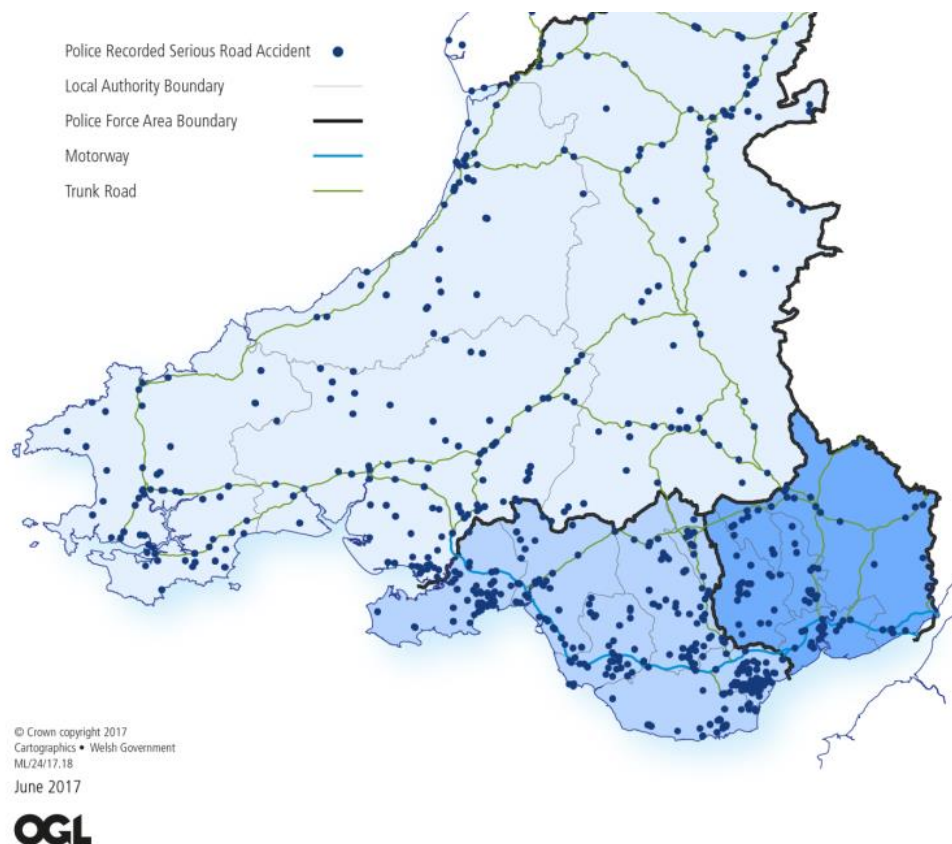
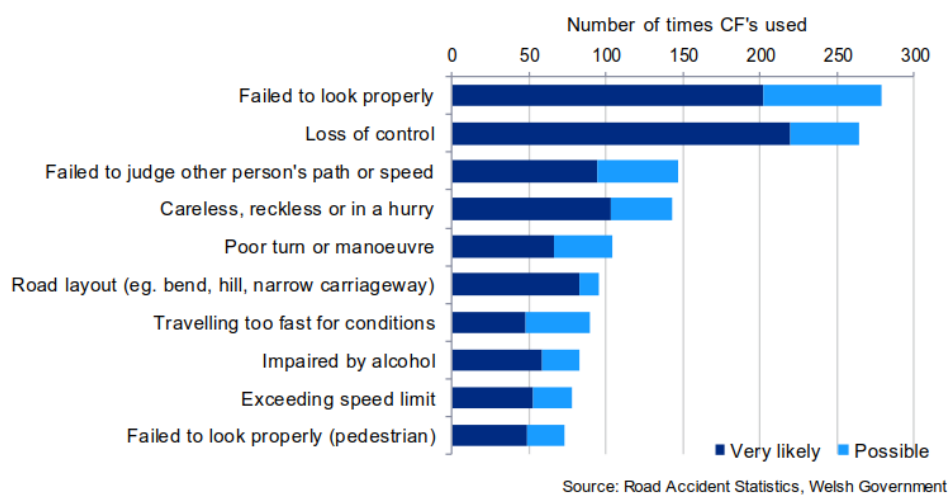


Figure 29: Police Recorded Serious Road Accidents



The 10 most likely accident causes (set out by reporting officer's confidence) are shown below:

Figure 30: Cause of accidents with reporting officers confidence



: StatsWales

The distribution of locations with high accident concentrations was mapped. An extract showing the Metro area is presented below:

Figure 31: Accident Concentrations



: Welsh Government Statistical Bulletin – Accident Cluster Sites and Fatal Road Accidents on the Welsh Trans-European Network, 2013-2015

With regards to non-motorised casualties, there has been a decrease in the overall number of pedestrian casualties (measured over the period 2004 to 2015 for all Wales) and a decrease in the number of pedal cyclist accidents.

Active Travel

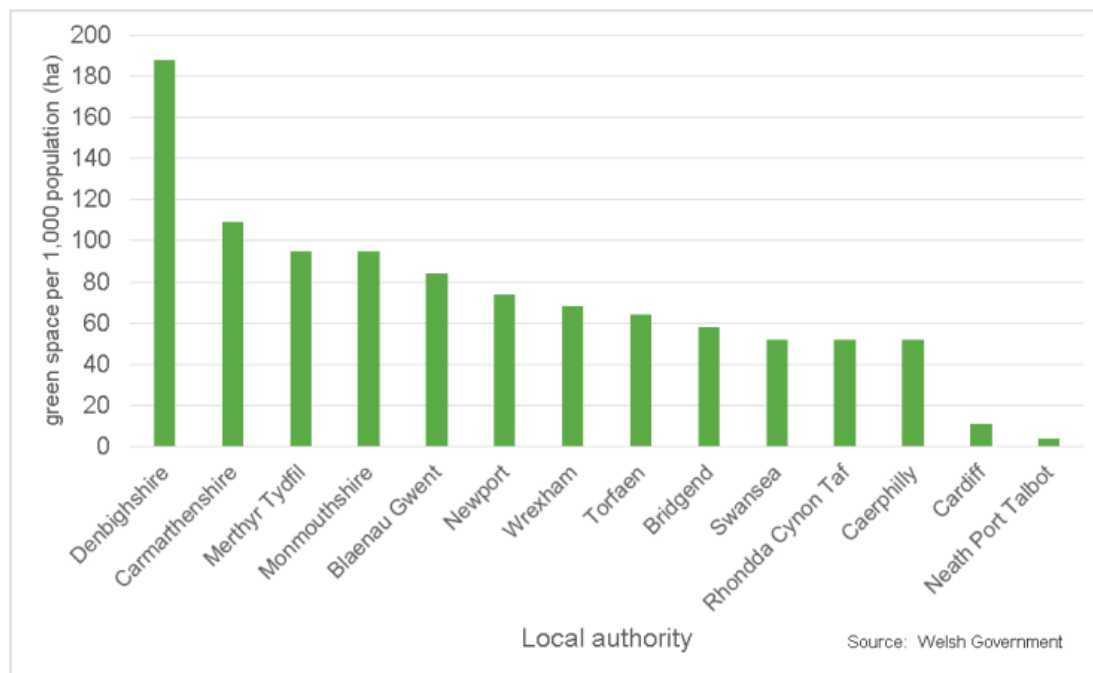
A review of the LDPs and LTPs indicates that the majority of LPAs have issues with regards to low uptake of active travel modes. This is due to diverse reasons including:

- Fear / lack of safety;
- Lack of awareness;
- Lack of integration with the wider public transport network; and
- Lack of connectivity (contributing to a lack of safety via i.e. incomplete cycle routes terminating near busy roads).

Access to Beneficial Space

Each of the LPAs has a varying proportion of accessible green space. Cardiff has by far the lowest proportion of accessible green space of each of the Metro LPAs. This reflects the predominantly urban nature of the Cardiff region, whilst the other LPAs encompass large amounts of green space.

Figure 32: Green Space Area by Local Authority



3.7.2.2 Trends and Future Baseline

- Statistics for Wales¹⁸ indicates that in the year 2015-2016 14% of adults reported currently being treated for a respiratory illness – most commonly asthma. The occurrence of respiratory illness increased with age and were more common in the more deprived areas. Adults who report being treated for a respiratory illness has shown little change since 2003-04. However, an aging population (as forecast across the Metro region) is likely to result in an increase in the number of people requiring treatment for respiratory illness);
- Life expectancy at birth has been steadily increasing throughout the study period;
- Obesity is steadily increasing;
- There has been a decrease in smoking rates since 2003-04;
- There has been little change in physical activity (using the physically active for at 30 minutes on 5 or more days in the previous week guideline), rates fluctuate from year to year¹⁹;
- The number of road traffic accidents has been steadily decreasing since 2004;
- With regards to rail: Information about rail crime has also been assessed by Statistics Wales using data provided by the British Transport Police (BTP) database 'CRIME'. The total recorded notifiable offences increased by 43 (4%) in 2015-16. The largest categories of recorded offences were: violence against the person (293), theft of passenger property (238) and public disorder (156). Over the period 2015-2016 there were increases in recorded incidents of violent offences (23 per cent), sexual crime (18 per cent), and decreases in public disorder (10%) and motor vehicle crime (11%). The level of recorded theft of railway property and drug crime has fallen.

In 2015-16 there was an 11 per cent reduction in the number of non-notifiable offences when compared to 2014-15. The largest category was the less serious line route offences (629)

¹⁸ Statistics for Wales 'Welsh Health Survey 2015: Health Status, Illnesses and other conditions': <http://gov.wales/docs/statistics/2016/160601-welsh-health-survey-2015-initial-headline-results-en.pdf>

¹⁹ Statistics for Wales 'Welsh Health Survey 2015: Health related lifestyle results': <http://gov.wales/docs/statistics/2016/160601-welsh-health-survey-2015-health-related-lifestyle-en.pdf>

which represented 47% of all non-notifiable offences. Less serious line of route offences and less serious fraud reported slight increases, whereas less serious public order offences and other less serious offences reported slight decreases in 2015-16 when compared to the previous year's figures.

- Theft of and from vehicles appears to be decreasing;
- The population of the area is predicted to increase. As the population grows transport infrastructure will come under increasing pressure leading to an inefficient network that could deter investment and effect economic growth;
- Health issues in the region are likely to continue although active lifestyle and healthy eating campaigns may help reduce this trend;
- Provision of infrastructure and affordable housing will be a key focus in order to prevent increasing inequality and poverty related impacts. Provision of modernised transport infrastructure (i.e. Metro) may facilitate commuting and job seeking;
- Disruptions to transport infrastructure and slow moving traffic may increase if unmitigated and this is likely to have a corresponding impact on air quality, noise and health for surrounding populations;
- Increasing development is likely to result in a reduction in green space and consequent loss of health benefits associated with the ability of individuals to access green space. This is likely to be more of an issue within the Cardiff region than the other Metro regions and mitigation should be factored in to developments;

3.7.2.3 Data Gaps / Uncertainties

- No transport related health data was available (i.e. there is no data proving a correlation between particular transport issues and health impacts);
- No data was available to determine whether elevated concentrations of respiratory or cardiovascular diseases relate to areas of high pollution or correlate in any way with transport infrastructure;
- No trend data was available with regards to the availability of access to green space over the monitoring period (it was a snapshot only);
- Trend information with regards to bus users perception of their personal security was not available.

3.7.2.4 Issues

- A growing population will put increasing pressure on the transport network and improvements and maintenance will be required in order to meet demand;
- Growing populations also require further developments, which can eventually require further infrastructure to connect the new communities;
- Transport infrastructure can cause disturbance for nearby residents such as noise and vibration, light, and visual effects;
- Uptake of active travel is not widespread. Increased commuter numbers and corresponding increase in traffic may have adverse impacts with regards to perceived personal safety and reduce uptake of active travel modes;
- Increased uptake of active travel is required as part of a general prioritisation of healthier lifestyles;
- Transport generates emissions which may contribute to ill health;
- Transport generates noise, which may contribute to ill health / poor wellbeing;

- Transport infrastructure associated with Metro will need to make provision to mitigate loss of green space and allow continuity of access to green space where possible;
- Poverty related inequality is apparent within the Metro region and any revision / alteration of existing transport infrastructure will need to take this into account in order to prevent isolation of poorer communities;
- An increasingly elderly population will require particular measures in order to prevent issues with regards to access to healthcare; and
- Transport infrastructure will need to have due consideration for future increase in numbers and corresponding impact on safety.

3.8 Soil

3.8.1 Relationship with other Plans and Programmes

The European Commission framework directive Thematic Strategy for Soil Protection (2007) highlights the importance of soil within our environment and how it is essential that it is protected. The directive introduces the protection of soil functions across the EU. The Welsh Soils Action Plan (Consultation Draft, 2008) identifies priority threats to Welsh soils and outlines necessary mitigation and prevention measures to be considered in soil management.

3.8.2 Baseline Information

3.8.2.1 Current State

The geological area encompassing the Local Authorities of Cardiff, Caerphilly, Rhondda Cynon Taf, Merthyr Tydfil, Blaenau Gwent and Torfaen crosses the South Wales coalfield which is a syncline exposing progressively younger rocks towards the middle with the oldest Devonian strata forming the southern and eastern boundaries

Lower Devonian rocks formed approximately 398 to 416 million years ago are exposed to the north of Cardiff and in parts of Newport Monmouthshire, Blaenau-Gwent, and Torfaen. These are sedimentary rocks comprising mudstone, siltstone, and sandstone. Following this is the Upper Devonian formed approximately 359 to 385 million years ago, composed of sandstone and conglomerate.

After this there are increasingly younger Carboniferous strata comprising Dinantian limestone with sandstone and mudstone formed approximately 326 to 359 million years ago; followed by the Pennine Lower and Middle and South Wales Upper Coal Measures Formations. These range in age from 313 to 307 million years ago during the Carboniferous period. They are made up of mudstone, siltstone, sandstone, coal, and ironstone.

These Devonian and Carboniferous rocks were subjected to uplift and erosion prior to a younger sequence of Triassic sediments being deposited which partially covers the southern parts of Cardiff, the Vale of Glamorgan, Bridgend, and Newport. The Triassic rocks comprise mudstone, sandstone, and conglomerate.

Along the southern coastal area of the Vale of Glamorgan, is the Lias Group, formed during the Jurassic and Triassic periods approximately 172 to 204 million years ago. This group is a sedimentary bedrock, composed of mudstone, siltstone, limestone, and sandstone.

Within the local authority of Torfaen, the majority of the bedrock is formed of Lower Devonian Rocks. However, within the middle of the local authority is the Wenlock Rocks and Ludlow

Rocks. These sediments were formed approximately 419 to 428 million years ago during the Silurian Period and comprise mudstone, siltstone, and sandstone.²⁰

Superficial deposits cover the solid geology comprising Glacial Till (a poorly sorted mixture of clay, silt, sand and gravel) and glacial sands and gravels which were deposited over the landscape during the last glaciation. The coastal plain around Cardiff is covered by Tidal Flat Deposits comprising silts, sands, and gravels. Cutting through these sediments within the river valleys is Alluvium (clays, silts, and sands) formed by erosion as the present day river system developed.

The Coal Measures have been exploited for iron, coal, and clay over many years. The limestone outcrop at Taffs Well has also been exploited. The current railway network is the remnant of a far more extensive network that was built to allow coal to be brought down from the mining districts in the north to Cardiff, Newport, and Barry docks for export. The railway corridors are variously underlain by Made Ground comprising a variety of materials but generally comprising waste rock from coal mining and industrial process wastes such as slag and ash.

The South Wales Valleys area has been subject to intensive industrial exploitation of natural resources since the late 1800s from extraction of iron ore, coal, and limestone. These mineral resources have then been used by industry to manufacture materials such as iron and steel, chemicals, to process textiles and were used in many other contaminative processes.

The existing railway infrastructure was largely in place by the 1890s with the Coryton branch constructed by the 1920s. The network of railways was built to provide transport links from the coal fields in the north to the ports of Cardiff, Newport, and Barry. Where the existing railway lines are built on embankment it is likely that these earthworks have been built using materials that were locally available at the time such as colliery spoil and clinker derived from burning coal. These materials can contain concentrations of contaminants that could pose unacceptable risks to sensitive receptors such as controlled waters. However, the age of these deposits is likely to mean that any mobile contamination has already been flushed through by percolating rainfall. The nature of the proposals to reuse existing track means that materials beneath the railway tracks will not be disturbed to any great extent, with some minor excavation for foundations required.

Operation of the existing rail services will also have left a legacy of contamination within the underlying railway ballast that supports the track from spillages of fuel and leaks from engines which will percolate through the ballast to either be picked up by drainage systems beneath the track or infiltrate directly into the underlying ground.

In general terms, the major effects on soil include soil loss, contamination and compaction. These may arise from:

- Erosion;
- Air pollution and runoff;
- New developments;
- Climate change;
- Quarrying; and
- Acidification (Wales is the worst affected region in the UK with more than 40% of the total area of SSSIs potentially damaged by freshwater acidification (Ferrier, 2003).

²⁰ British Geological Survey <http://mapapps.bgs.ac.uk/geologyofbritain/home.html>

3.8.2.2 Trends and Future Baseline

It is not possible to comment with accuracy on trends due to the lack of available information. However, the following statements are considered reasonable:

- As the population increases it is likely that more brownfield land will be remediated and developed providing an overall benefit to society. Increased flooding through climate change may strip top soils from land and cause sedimentation of rivers. Acidification may become worse due to traffic growth and increased emissions from power generation;
- Results from The Countryside Survey in 2007²¹ indicated that soil pH increased in less acidic soils across Great Britain over the period 1998-2007, with no significant change in the pH of other soil types. This was thought to be consistent with the expected benefit of reductions in sulphur emissions;
- Development (if unmitigated) is likely to sterilise soil resources by covering or reducing the quality of remaining soils (i.e. by compaction or leaching);
- Development (if unmitigated) may sterilise mineral reserves by covering; and
- Increased runoff from impermeable areas may result in further erosion of soil resource.

3.8.2.3 Issues

- Landtake required for development of new transport infrastructure which may include greenfield land, brownfield land, and loss of agricultural land (Grade 3a and above is a major issue in the UK and will be considered as part of the assessment process). Development could also cause loss of topsoil and open contamination pathways;
- Large areas of Wales are vulnerable to acidification;
- Wales possesses considerable quantities of peatland and organic soils which are large carbon stores. Work in these areas may release significant quantities of carbon;
- Transport infrastructure schemes have potential (if unmitigated) to sterilise significant areas of soil resource; and
- Increased runoff from impermeable infrastructure developments have potential to increase erosion of adjacent soil resource.

3.9 Water, including Quality, Quantity and Flood Risk

3.9.1 Relationship with other Plans and Programmes

At an international level, water resources is an issue that has been subject to a number of directives in order to maintain water quality, quantity and reduce flood risk. In Europe, the Water Framework Directive required member states to achieve 'good ecological status' of inland water bodies by 2015, while the Nitrates Directive requires member states to identify surface or groundwaters that are, or could be high in nitrate. The WFD objectives will be taken into consideration when assessing the South Wales Metro Programme.

In 2007, the UK suffered severe flooding with over 55,000 homes being affected. This resulted in the Flood and Water Management Act 2010. Part of the Act designates Local Authorities as Lead Local Flood Authorities (LLFAs) and provides the responsibility to coordinate flood risk management strategies for their authority boundaries. Although at the moment it is non-statutory, many LLFAs have sustainable urban drainage (SUDs) guidance for any new

²¹ Countryside Survey, 2007 'Soils Report from 2007':
http://www.countrysidesurvey.org.uk/sites/www.countrysidesurvey.org.uk/files/CS_UK_2007_TR9-revised%20-%20Soils%20Report.pdf

developments in their authoritative boundary, with a number of authorities pushing for their guidance to be statutory in the near future.

Technical Advice Note 15 – Development and Flood Risk aims to direct new developments away from areas prone to flooding. The Land Drainage Act requires that a watercourse be maintained by its owner in such a condition that the free flow of water is not impeded. The riparian owner must accept the natural flow from upstream and if the riparian owner fails to carry out their responsibilities under the Act, they can face enforcement penalties from the local authority.

The Environmental Permitting (England and Wales) Regulations 2016 (EPR 2016) have been extended to include Flood Defence Consenting, which came into force on 6th April 2016. The amended regulations introduce Flood Risk Exclusions and Flood Risk Exemptions, which mean that certain activities will be permitted in, over, under or adjacent to a main river without change and without needing a permit, providing certain conditions are met. All remaining activities will require a bespoke Flood Risk Activity Permit (previously a Flood Defence Consent). NRW issue Flood Risk Activity Permits to manage flood risk by controlling works and development activities by others.

A section of the South Wales Metro will run near the Cardiff Bay area, therefore coastal erosion and risk management will be important to understand and prepare for any potential impacts of a changing climate on the Metro system. The Welsh Government's National Strategy for Flood and Coastal Erosion Risk Management in Wales (2011) and Adapting to Climate Change: Guidance for Flood and Coastal Management Authorities in Wales (2011) provide guidance relevant to the national transport plan. Shoreline Management Plans are also of relevance given the proximity of transport infrastructure to the coastline.

The three River Basin Management Plans that cover Wales (Dee, Severn and Western Wales Catchment areas) ensure that statutory agencies, private organisations, public sector bodies and individuals work together to address all aspects of water management within each catchment. The draft plans have been produced as one of the requirements of the EU's Water Framework Directive.

The Water for People and the Environment: The Water Resources Strategy for Wales 2009 sets out the Environment Agency's proposed approach to managing the country's water resources. The 2009 Strategy provides a plan for the management of water resources in A Water Strategy for Wales Consultation Document (2014). Dŵr Cymru Welsh Water: Water Resources Management Plan 2015 – 2040 (2014) and Dee Valley Water: Water Resource Management Plan (2013) provide a long-term plan from 2015-2040 to ensure sustainable water use and management.

Groundwater provides approximately 30% of the drinking water in England and Wales. Source Protection Zones have been established to protect known groundwater sources such as well, boreholes and springs, based on the potential travel time of contamination to the abstraction point.

In 2013 Natural Resources Wales consulted on what were considered to be the most important issues that challenge the current and potential future uses and benefits of the water environment in each RBD. These significant water management issues are described in the RBMP documents as follows:

- Changes to the natural flow and level of water – taking too much water from rivers, canals, lakes and groundwater, means less water flowing and altering water levels can affect habitats;

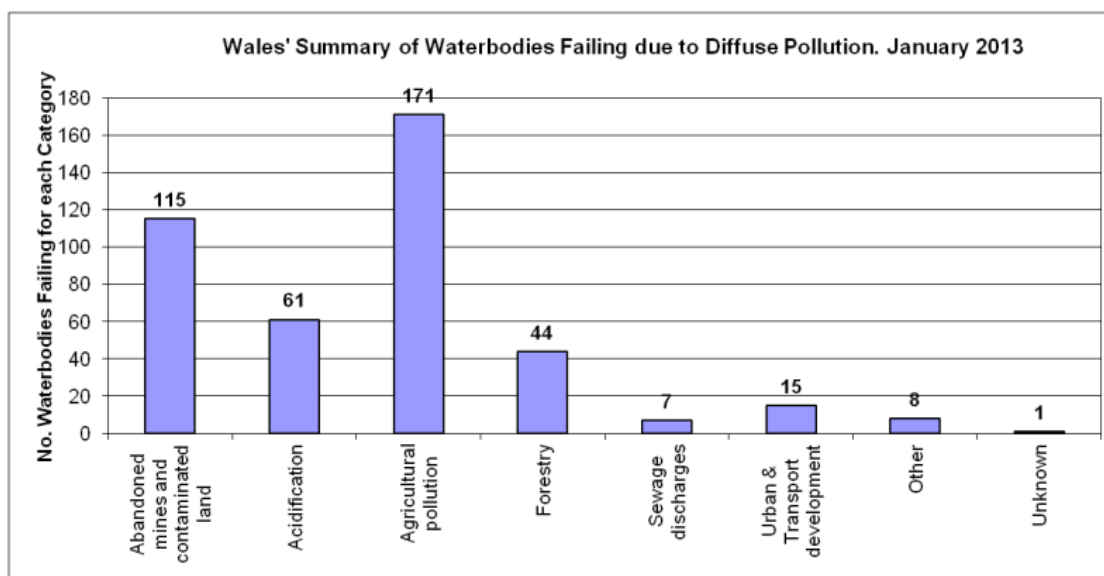
- Negative effects of non-native invasive species – the effect on the health of the natural environment of plants and animals from outside the UK introduced to UK waters;
- Physical modifications – changes made by people to rivers, lakes and estuaries, for example flood defences and weirs, and changes to the natural river channels for land drainage and navigation. These modifications alter natural flow levels, may cause excessive build-up of sediment, barriers to migration and the loss of habitats;
- Pollution from mines – contaminated water draining from mines, most of which are now abandoned;
- Pollution from rural areas – the effects of poor agricultural practice and rural land management on the water environment (also known as 'diffuse rural pollution'), causing sediment, nutrient and pesticide run-off;
- Pollution from towns, cities and transport – rainwater running over hard surfaces and carrying pollutants into waters, chemicals from contaminated land, and sewage from houses 'misconnected' to surface water drains rather than sewers (also known as 'diffuse urban pollution'); and
- Pollution from waste water – waste water can contain large amounts of nutrients (such as phosphorus and nitrates), ammonia, faecal bacteria and other damaging substances.

3.9.2 Baseline Information

3.9.2.1 Current State

- Source Protection Zones have been established to protect groundwater sources. 10 are located within the Metro area.
- As at January 2013, a minimum of 35% of failing waterbodies are failing due to diffuse pollution issues;

Figure 33: Cause of Failure of Waterbodies, January 2013

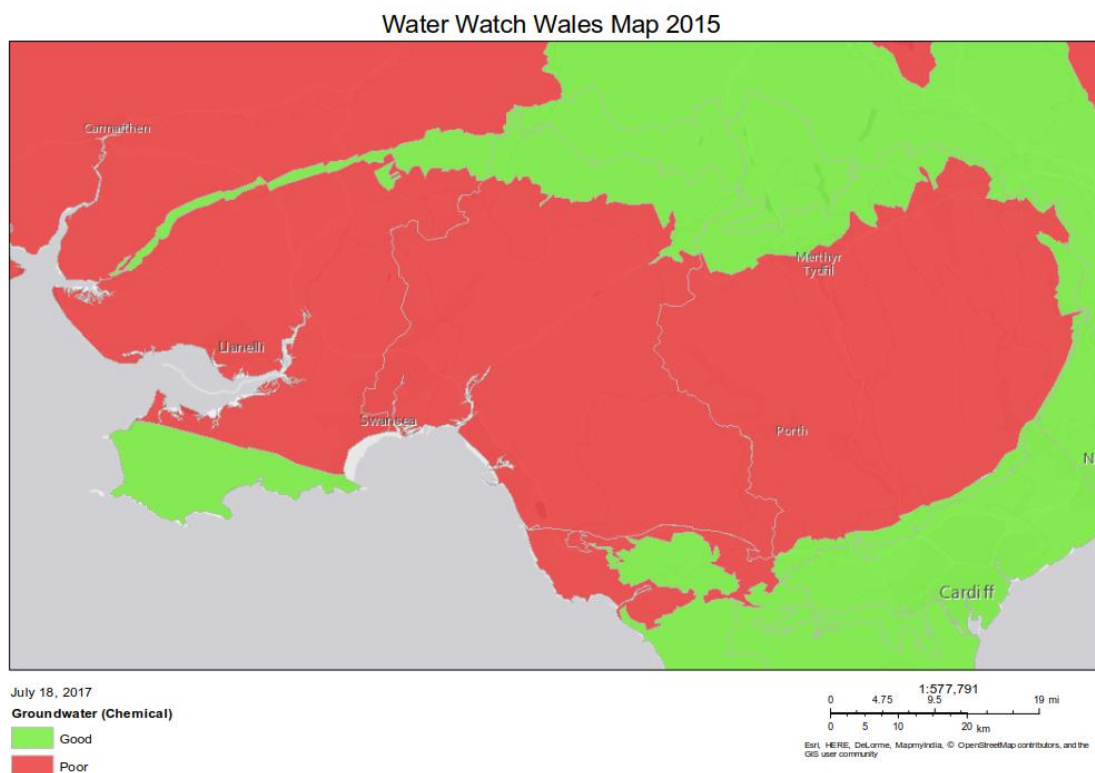


: The State of Natural Resources Report, SoNarr, 2016

- Approximately 750 farm holdings are subject to pollution controls under the Nitrate Action Programme;

- Groundwater in the Metro Region is predominantly poor quality. This encompasses Merthyr Tydfil, Ebbw Vale, Rhondda Cynon Taf, parts of Bridgend, small areas of the Vale of Glamorgan, Torfaen, most of Caerphilly and small areas of Monmouthshire. Cardiff and Newport are predominantly outside of the Coal Measures and show good water quality. There has been no change in the qualitative status of the groundwater bodies over the monitoring period (2009 – 2015);

Figure 34: Groundwater Qualitative Status, 2015



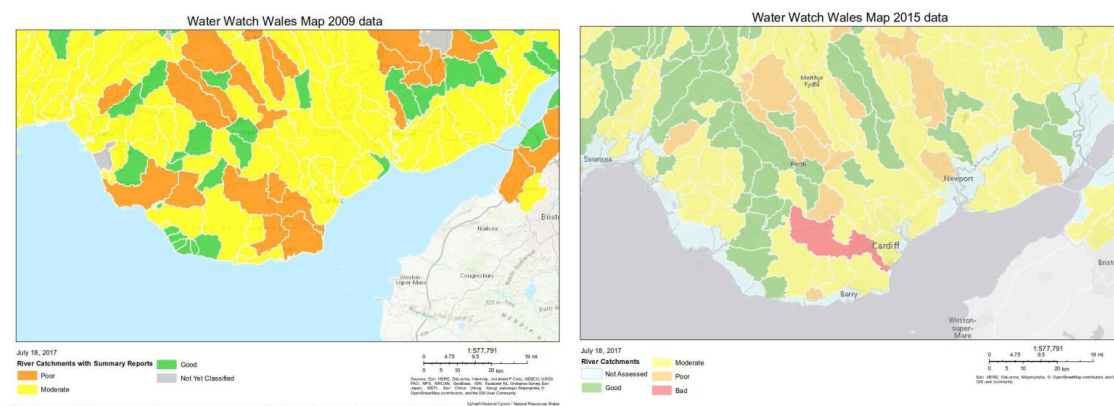
: Water Watch Wales, accessed July 2017

- Wales has a legacy of agriculture and heavy industry (risk of historic contamination). Assessment of diffuse pollution issues indicated that as of 2013, 13% of watercourses were failing to reach 'good' status due to diffuse pollution. As an example, Wales has over 1,300 abandoned metal mines, which are thought to impact over 200km of rivers²². Abandoned mines are the principle cause of waterbodies in Wales failing to achieve Water Framework Directive standards. NRW further state that:

²² Metal Mine Water Pollution in Wales, Environment Agency Wales: <http://naturalresources.wales/water/quality/metal-mine-water-pollution-in-wales/?lang=en>

- Many waterbodies are classified as 'artificial or heavily modified' under the WFD for uses such as flood protection and urbanisation;
- Physical modifications are present, which can present barriers to fish migration; and
- Chemical products of combustion are an issue whose diffuse nature makes them difficult to assess.
- The figure below shows the overall status of surface waterbodies within the SW Metro area and changes between 2009 and 2015:

Figure 35: Status of Surface Waterbodies, 2009 - 2015



: Water Watch Wales, accessed July 2017

The above pictures indicate that there has been a general increase in the number of river catchments achieving good status (although a number of surface waterbodies north of Newport were downgraded to Moderate) and the River Ely waterbody was downgraded from Poor to Bad.

- With regards to the whole of Wales, over the period 2009 to 2015, there has been an increase in the length of rivers in Wales classified as bad (+15.7km), a decrease in the length of river classed as poor (-460.2km), a decrease in the length classified as moderate status (-877.2km) and an increase in the length of river classified as good (1,018.6km). This appears to indicate a general improvement in river quality over the monitoring period (N.B. there was no information on chemical / overall status in the 2009 WFD summary data, therefore ecological status has been used as a proxy. The number of waterbodies in Wales that have deteriorated in overall classification since 2009 is 12;
- With regards to chemical status, NRW consider it 'unlikely that there has been a decrease in status for existing standards since 2009';
- An additional 156 waterbodies were monitored for chemical status by 2015, therefore determining increases or decreases in water quality over this period is not possible;
- Information from Hydrological Outlook UK (<http://www.hydoutuk.net>, accessed July 2017) indicates that the majority of rivers and groundwater aquifers in the UK were likely to be at or above normal levels (for the following 3 months), whilst rivers and groundwater aquifers in the southwest were likely to be below normal levels. Water Watch Wales indicates that all the groundwater waterbodies in the Metro region were at good quantitative status.
- Dŵr Cymru Welsh Water are the regulated water company responsible for ensuring safe supplies of drinking water are available within the South Wales region. Dŵr Cymru have

published a water resources management plan²³ covering the period 2015 to 2040 which predicts the study area will be in water deficit by 2040, due to a combination of factors such as reductions in the volume of water that can be abstracted from rivers, climate change and increased demand from projected population growth. Dŵr Cymru anticipates that this deficit can be resolved by implementing a leakage reduction programme.

- In 2015, Wales experienced the wettest December on record²⁴. However, widespread flooding was not evident at this time. £116m has been invested in flood and coastal risk management between April 2014 and March 2016.
- Following extensive coastal flooding in 2013 and 2014, NRW made 47 recommendations to reduce the risk of similar events in the future. 39 of the recommendations were in place by March 2016;
- 19% of rivers and 37% of lakes were assessed as being either at risk or probably at risk of acidification. The risk was predominantly associated with upland areas²⁵;
- The River Basin Management Plan overview Annex contained the following information:
 - Approximately 2% of the area of Wales is designated as Nitrate Vulnerable Zones. During 2009-2015 there has been a widespread but moderate improvement in nitrate concentrations in river water. However in groundwater the results are mixed with some areas experiencing deterioration from historic nitrate inputs (i.e. slow flow of historic nitrates through the aquifer)²⁶;
 - Four freshwater and 2 coastal and estuarine waterbodies are designated as nutrient sensitive zones. NRW continue to monitor and participate in the management of these waterbodies to reduce nutrient loading;
 - All 102 bathing waterbodies met the required standard in 2014, with 90 meeting the higher standard;
 - 47% of surface water Drinking Water Protected areas are at risk from pesticides and 33% are at risk from colour. A smaller number are at risk from eutrophication;
 - Concentrations of phosphorus in Welsh rivers have been falling since 1990, supported by major reductions in phosphorus inputs from sewage treatment works through investment by the water industry to meet EC directives. However, despite this progress, phosphorus remains a common cause of water quality failures in Wales, with 20% of monitored rivers, 32% of monitored lake water bodies currently exceeding the phosphorus standard for good status;
 - Pressure and risk associated with the presence and movement of Invasive Non Native Species (INNS) is increasing;
 - Compliance with bacterial standards has improved significantly since the 1990s in designated bathing waters. Compliance with ammonia and dissolved oxygen standards has improved during the last 20 years, primarily due to investment by water companies;
- The StatsWales 'Sustainable Development Indicators'²⁷ show that there had been a marginal decrease in the area of sensitive habitats with excessive loads of acidifying pollutants, but that the area subject to excessive loads of eutrophying pollutants has plateaued. However, this data hasn't been updated since 2012.

²³ Dŵr Cymru 'Water Resources Management Plan': <http://www.dwrcymru.com/en/Environment/Water-Resources/Water-Resource-Management-Plan.aspx>

²⁴ NRW 'Flood and Coastal Erosion Risk Management in Wales, 2014-2016'

²⁵ NRW 'Water Framework Directive Acidification risk assessment Key Findings' D. Johnston, 2014

²⁶ NRW 'River Basin Management Plan Overview Annex, December 2015'

²⁷ StatsWales Sustainable Development Indicators <https://statswales.gov.wales/Catalogue/Sustainable-Development/Sustainable-Development-Indicators/sensitivehabitats exceedingcriticalloadsforacidificationandeutrophication>

3.9.2.2 Data Gaps / Uncertainties

- Recent data regarding the number and type of water pollution events was not available;
- Transport related information was not available;
- Due to the increased number of watercourses being monitored for chemical status it is not possible to determine trends in watercourse quality for this aspect; and
- There is no data which sets out the amount of transport infrastructure at risk of flooding.

3.9.2.3 Issues

- There is a risk of encountering pollution either directly related to rail / road operation, or due to historic pollution (landfill, industrial or other);
- The transport network is a source of diffuse pollution to groundwater and rivers from pollution (via mechanisms such as runoff, flow to combined sewers, accidents and spills);
- The transport system is likely to be more at risk from flooding as the effects of climate change become more apparent;
- Transport related emissions are a known contributor to acidification;
- Transport related runoff has contributed to failure of surface waterbodies to meet WFD objectives;
- Transport infrastructure can increase runoff and increase downstream flood risk (unless appropriately designed);
- Increasing numbers of vehicles may lead to deterioration of water quality with regards pollution (acidification and N-deposition); and
- Increasing development (area and density) may cause an increase in the likelihood of flooding if unmitigated.

3.10 Material Assets, including Resource Efficiency and Waste

3.10.1 Relationship with other Plans and Programmes

The World Summit in Johannesburg, 2002, and the 6th EU Environment Action Programme highlighted the need for greater resource efficiency, waste reduction and the promotion of renewable energy to make sustainable development feasible.

On the UK national level, the Waste Regulations (2011) implement the revised Waste Framework Directive. This requires a new permit waste hierarchy permit; introduces a two-tier system for waste carrier and broker registration; makes amendments to hazardous waste controls and definition; excludes some categories of waste from waste controls, notably animal by-products. Waste (Wales) Measure (2010) makes provision to reduce the amount of waste and litter in Wales and contributes to the development of more effective waste management arrangements in Wales.

Finally, Hidden Infrastructure outlines issues and solutions related to water supply, waste management, waste water treatment and flood protection for new and existing developments.

In Planning Policy Wales and the Environment Strategy for Wales, the promotion of renewable energy, minimisation of non-renewable resources and the aim to maximise resource efficiency are highlighted. More specifically, the Waste Strategy for Wales sets a target for the reuse and recycling of construction and the demolition of waste by 85% by 2010, while three regional waste plans deal with waste related issues on a regional level.

Towards Zero Waste (Wales' overarching waste strategy) takes a resource focused approach, incorporating sustainable consumption and production, and promotes reprocessing infrastructure and recycle markets. The Construction and Demolition Sector waste plan outlines waste minimisation targets, which will be adopted for the physical interventions in the Metro.

TAN 8 on Renewable Energy sets a target for electricity to be generated from renewables, whereas TAN 12 on Design highlights the importance of good design which makes the best use of natural resources. Finally, TAN 21 Waste and MTAN 1 Aggregates encourage the re-use and recycling of construction and demolition waste in order to reduce the demand for primary resources.

3.10.2 Baseline Information

3.10.2.1 Current State

Car ownership in Wales increased from 0.97 vehicles per household in 1995 to 1.22 in 2011²⁸. 24% of Welsh households do not own a car with 36% owning 2 or more. These figures are similar to those for the UK as a whole. Use of railway services has also increased in Wales with 30 million journeys in 2014 compared to 20 million in 2003, however the proportion of travel by road / car has generally remained the same²⁹.

Each of the LPAs proposes a number of new developments that are likely to require use of materials in terms of additional transport infrastructure or improvements to existing transport infrastructure.

Transport is still predominantly reliant on fossil fuels. However, a number of rail electrification projects are ongoing within south Wales.

Each LPA has set out mineral safeguarding areas within their LDPs. These are shown on the BGS map (aggregate safeguarding) in Appendix D. Development in these areas should be avoided where possible.

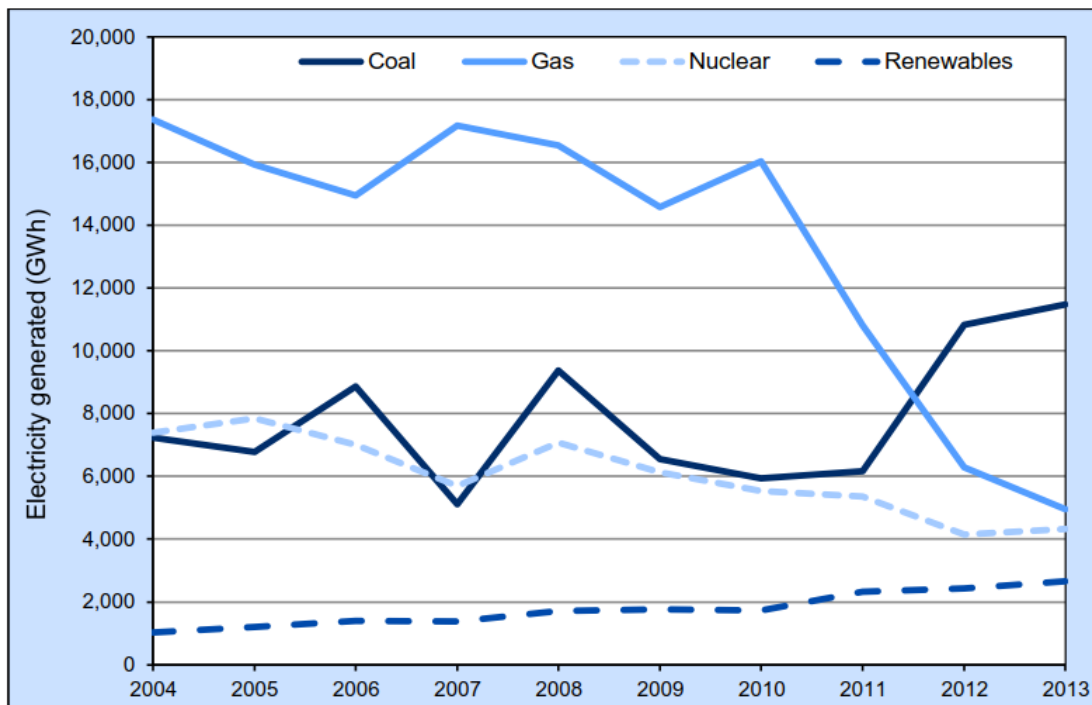
3.10.2.2 Trends and Future Baseline

- Each of the LDPs propose a number of housing and other infrastructure developments, implying a certain amount of material usage;
- Car ownership is increasing. However, the number of people learning to drive is currently lower than previous years indicating a potential future decrease in the rate of car ownership;
- Infrastructure projects will continue to be required, new transport infrastructure and replacement / improvement of existing infrastructure will require use of materials;
- At present, electrification of rail would still ultimately use power generated from fossil fuels. However, the amount of energy generated from renewable resources is increasing and (in 2013) was more than double that generated in 2004;

²⁸ Welsh Government Statistical Bulletin 'Car Ownership and Licensing, 2012'

²⁹ Welsh Government 'Welsh Transport Statistics' 2012

Figure 36: Power Generation in Wales, 2013



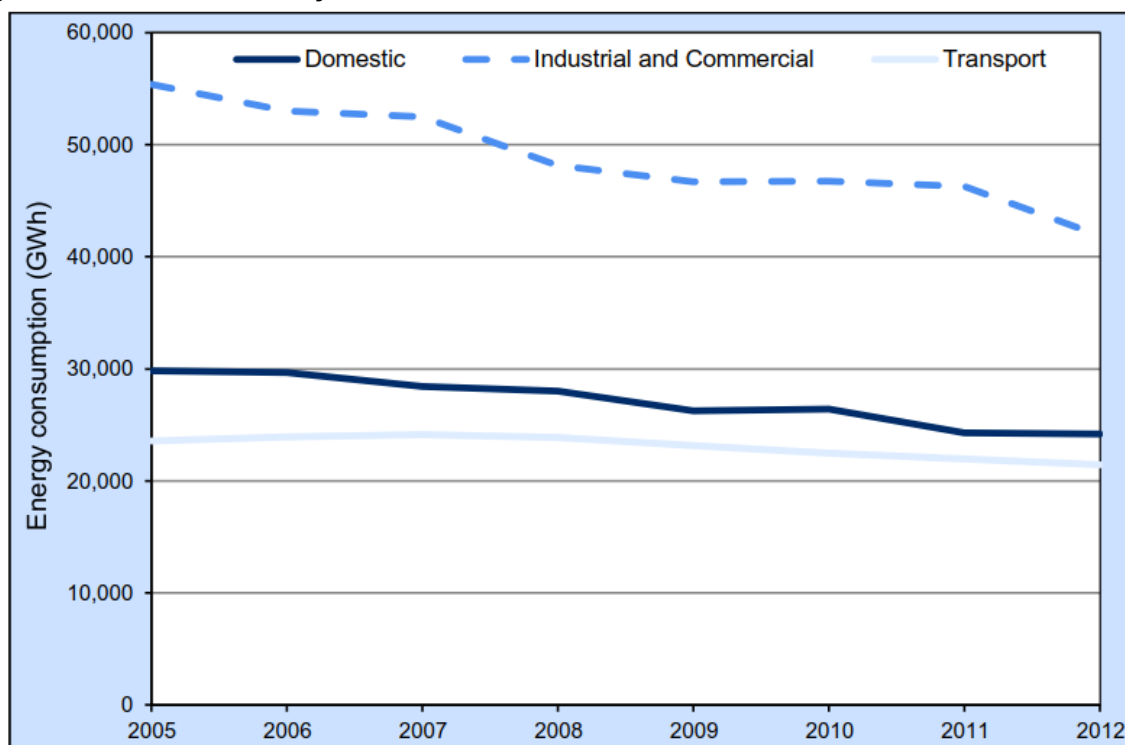
Source: Department of Energy & Climate Change (DECC)

(a) Oil is not shown as values are too low for meaningful display on the above scale (see Table 1).

: Energy Generation and Consumption for Wales, Welsh Government, 2013.

- Total electricity generated in Wales has decreased over the period 2004 – 2013. However, there has been an increase in the amount of electricity generated by coal (from 1,950GWh in 2005 to 2,246GWh in 2012). This is likely to substantially decrease in the short term;
- The total energy consumption in Wales has fallen from circa 110,000GWh in 2005 to 89,820GWh in 2012; and
- There have been significant falls in the energy consumption by the domestic and industrial / commercial sectors. However, the fall in energy consumption by the transport sector is not so pronounced.

Figure 37: CO₂ Emissions by Sector



Source: Department of Energy & Climate Change (DECC)

: Energy Generation and Consumption for Wales, Welsh Government, 2013

- The Wales Sustainable Development Indicators show that during 2013, facilities in Wales managed a total of 7.9 million tons of waste. There has been an increase in the proportion of waste that is recycled over the period 1998-2008. It is the ambition of Welsh Government to be recycling at least 70% of waste by 2025;

There has been a decrease in the volume of waste being disposed of at landfill over the period 2001 to 2012 (from >44.15m/t/yr to 2.16m/t/yr)³⁰;

- There has been a corresponding increase in the volume of waste being sent for treatment instead of to landfill (21 new treatment facilities were brought on line in Wales during 2012);
- 17,352,000 tons³¹ of minerals were extracted in Wales in 2014 (including coal and marine aggregates). No data was available regarding trends in overall aggregate usage (virgin / recycled) in Wales. However, with increasing numbers of development it is reasonable to state that aggregate usage is likely to increase without mitigation; and

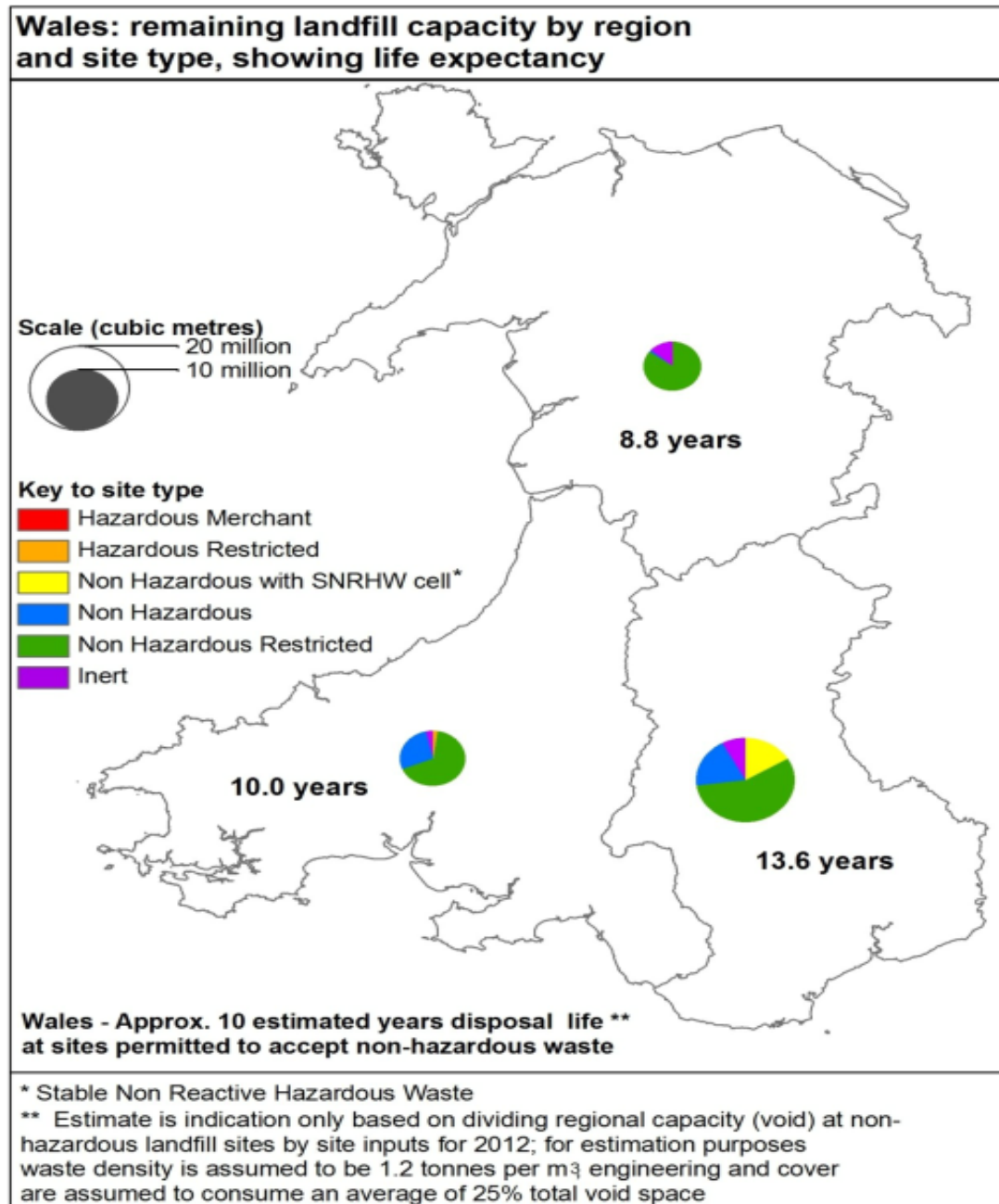
At the end of 2013³² there were 31.3 million m³ of available landfill capacity and approximately 10.7yrs of landfill life left (based on 2013 input rates). Volumes increased from 35.56million m³ in 2004, to 41.16million m³ in 2007, falling to 35.6million m³ in 2013.

³⁰ NRW 'Wales Waste Data', 2012, RPS

³¹ NRW 'SoNaRR', 2016

³² NRW 'Wales Waste Data' 2013, RPS

Figure 38: Remaining Landfill Capacity



Source: Wales Waste Data 2013, NRW

3.10.2.3 Data Gaps / Uncertainties

- Information regarding the use of sustainable energy by transport sector is not available;
- No data was available regarding trends in virgin mineral use;
- No data was available regarding areas of mineral resources which are considered sterilised by development; and
- Information on the proportion of waste generated by the transport sector is not available.

3.10.2.4 Issues

- Increased infrastructure and increased use of such transport infrastructure is likely to increase maintenance and may increase waste generation and materials use;
- Landfill capacity is decreasing. New transport infrastructure should be designed to be zero waste where possible, including being designed to be fully recyclable at end of life;
- Landfill capacity is decreasing. As much material as possible should be re-used, recycled or diverted from landfill via other means during construction and operation of Metro
- Use of virgin materials should be minimised in order to encourage re-use of existing materials and further assist diversion from landfill;
- As far as reasonably practicable, development should not sterilise mineral resources; and Energy usage is a significant factor in the overall material footprint of the transport sector. New transport infrastructure should be designed to be compatible with renewable energy sources where practicable – and to be low emission where not.

3.11 Cultural Heritage and the Historic Environment, including architectural and archaeological heritage

3.11.1 Relationship with other Plans and Programmes

ICOMOS is a non-governmental international organisation dedicated to the conservation of the world's monuments and sites. It is responsible for the Charter for Conservation and Restoration of Monuments and Sites (1964) and the Charter for Conservation of Historic Towns and Urban areas (1987). In 1972, the UNESCO World Heritage Convention was significant in linking together in a single document the concepts of nature conservation and the preservation of cultural properties.

In Wales, Planning Policy Wales sets the conservation of the historic environment and cultural heritage as one of several policy objectives. Parts of the Wales Spatial Plan identify the role of the historic environment in sustainable communities. The Historic Environment Strategy for Wales (2012) establishes a framework for action based on four priorities: building towards a Heritage Bill; implementing Cadw's Tourism Heritage project; delivering Cadw heritage interpretation and learning programmes and delivering Cadw's conservation programme for monuments and for new designations.

3.11.2 Baseline Information

3.11.2.1 Current State

The Historic Environment Record (HER) is maintained by the Glamorgan-Gwent Archaeological Trust for the study area. In addition, the National Museum of Wales and the Royal Commission on the Ancient and Historical Monuments of Wales maintain databases of archaeological finds and national monuments.

The Register of Landscapes of Special Historic Interest in Wales contains information regarding the historic landscapes in Wales and has been reviewed as part of this assessment.

The HER records a variety of structures including historic factories, churches, railway stations and other railway related infrastructure as well as artefacts relating to the canals and tramways that were once an important part of the transport infrastructure of the region. Away from Cardiff and the developed valley floors the HER also records medieval and pre-medieval evidence of habitation within the region. Records of archaeological finds are generally rare along the railway

routes reflecting the lack of any significant development in these areas since the railway lines were first constructed. Most records relate to major developments that have taken place since the late 20th century and range from paleolithic to medieval in age. The national monuments record is the national collection of information about the historic environment of Wales from the earliest cave dwellings to 21st century windfarms and records a wide variety of structures including residential property, places of worship, and notable commercial and industrial sites.

Statutory responsibility for listed buildings rests with each local authority. The Welsh Ministers are responsible for compiling the statutory list of buildings of special architectural or historic interest under the Historic Environment (Wales) Act 2016. Listed buildings are classified under one of three Grades; I, II* or II, depending on their significance, with Grade I assessed as highest significance. Table 12 presents the number of listed buildings in each Local Authority.

Table 12: Listed Buildings

Local Authority Area	Number of Listed Buildings
Blaenau Gwent	53
Bridgend	359
Caerphilly	413
Cardiff	Circa 1,000
Merthyr Tydfil	209
Monmouthshire	2,200
Newport	429
Rhondda Cynon Taf	366
Torfaen	255
Vale of Glamorgan	740

Source: Local Authority LDPs and websites

Scheduled Ancient Monuments are protected under the Historic Environment (Wales) Act 2016 which modifies the protection afforded under the previous Ancient Monuments and Archaeological Areas Act 1979. Responsibility for scheduling any monument lies with the Welsh Ministers and Cadw is the organisation which oversees management of these. Table 13 presents the number of Scheduled Ancient Monuments in each Local Authority.

Table 13: Scheduled Ancient Monuments

Local Authority Area	Number of Scheduled Ancient Monuments
Blaenau Gwent	13
Bridgend	60
Caerphilly	47
Cardiff	28
Merthyr Tydfil	48
Monmouthshire	169
Newport	67
Rhondda Cynon Taf	87
Torfaen	26
Vale of Glamorgan	110

Source: Local Authority LDPs and websites

Conservation Areas are designated by each local authority as a means of affording protection to preserve special areas of historical and archaeological importance. Within such areas

development can be restricted to preserve the characteristics of the area. Table 14 presents the number of Conservation Areas in each Local Authority.

Table 14: Conservation Areas

Local Authority Area	Number of Conservation Areas
Blaenau Gwent	2
Bridgend	15
Caerphilly	16
Cardiff	27
Merthyr Tydfil	8
Monmouthshire	31
Newport	15
Rhondda Cynon Taf	16
Torfaen	6
Vale of Glamorgan	39

Source: Local Authority LDPs and websites

Under the Historic Environment (Wales) Act 2016 Welsh Ministers must compile and maintain a comprehensive register of parks and gardens of historic interest in Wales. The purpose of this is to assist owners, local planning authorities and others to look after the sites in an informed way. Table 15 presents the number of registered historic parks and gardens in each Local Authority.

Table 15: Registered Parks and Gardens

Local Authority Area	Number of Registered Parks and Gardens
Blaenau Gwent	1
Bridgend	5
Caerphilly	4
Cardiff	19
Merthyr Tydfil	2
Monmouthshire	44
Newport	11
Rhondda Cynon Taf	5
Torfaen	2
Vale of Glamorgan	18

Source: Local Authority LDPs and websites

The Blaenavon Industrial Landscape was inscribed as a 'cultural' World Heritage Site of 'Outstanding Universal Value' by UNESCO in December 2000. Blaenavon is recognised as a landscape that gives context to the many monuments, buildings, and features within it and tells of the new industrial society created through the production of iron and coal extraction, during the early formative years of the Industrial Revolution. The landscape designation extends over parts of Torfaen and Monmouthshire³³

3.11.2.2 Trends and Future Baselines

- There has been a rise in the number of scheduled ancient monuments which are 'stable' or 'improved' from nearly 85% to nearly 90%. The overall percentage of scheduled ancient monuments which have deteriorated has reduced from 15% in 1989 to 10% of sites visited in 2004; and

³³ Torfaen Local Development Plan (December 2013)

- Historic assets are likely to continue to be protected through existing legislation. However, development could put pressure on heritage assets and their setting.

3.11.2.3 Data Gaps / Uncertainties

More transport related data would be an advantage for the assessment, such as the number and location of listed bridges, historic routes and other historic structures within and in proximity to the transport network. In addition, the number of buildings at risk due to transport would be beneficial (Cadw, 2004).

Information collected at the beginning and towards the end of the Metro implementation programme could potentially contribute to filling the knowledge gap about historic structures at risk from transport.

3.11.2.4 Issues

- Negative effects could arise if transport infrastructure causes loss or damage to the fabric of any historic asset or its setting, including historic landscapes;
- Any heritage assets encountered during Metro works should be recorded in line with an archaeological written scheme of investigation (for any areas where it is not possible to avoid heritage assets).

3.12 Landscape and Townscape, including Light Pollution

3.12.1 Relationship with other Plans and Programmes

The European Landscape Convention was adopted in 2000 and came into effect in 2004. It aims to protect landscapes across Europe while organising cooperation on landscape issues. The Countryside Rights of Way Act was brought into force in 2000 and implemented the statutory 'right to roam' element as well as a review towards public rights of way.

The Environment Strategy for Wales highlights the importance of maintaining and enhancing the unique character of the Welsh landscape. TAN 12 and TAN 14 set out that:

- An objective of good design is to sustain and enhance character in landscape and townscape; and
- TAN 14 states that nature and landscape conservation in the coastal one requires particular attention.

3.12.2 Baseline Information

3.12.2.1 Current State

Within the Metro area, the Brecon Beacons National Park was established in 1957 and extends towards south of Brecon towards Merthyr Tydfil and Pontypool. The National Park Management Plan lays out 20-year strategies and 5-year actions while creating a framework from which the park management and guiding principles can be taken.

The Wye Valley AONB extends north from Chepstow immediately along the eastern extent of the Metro area.

The Glamorgan Heritage Coast is a protected landscape running for approximately 14 miles from Ogmore by Sea to Aberthaw.

Each local authority has designated a number of special landscape areas, to protect areas that are considered to be important to the overall landscape, history, culture, biodiversity and geology of the LPA. There are 66 SLAs in the Metro region.

The LANDMAP database also contains information on the Cultural, Geological, Historic, Landscape Habitats and Visual and Sensitivity landscape designations. A full and detailed assessment of all the landscape classifications across the Metro region has not been completed to date and given the (hundreds) significant number of different designations it is considered inappropriate to provide a list herein.

The study area is largely urban with the large population centres of Cardiff and Newport surrounded by a thin more rural belt as the topography rises steeply over the limestone and sandstone ridges to the north with the valleys communities occupying densely developed valley bottoms with sparsely developed uplands between. To the east, the landscape is flatter within the valleys of the Rivers Usk and Wye with market towns and villages in a rural setting.

Outside the urban areas, the countryside is predominantly agricultural in character with woodlands occupying the valley sides and open moorland on the tops. Some coal extraction from open cast mines is being undertaken between Merthyr Tydfil and Rhymney. The upland areas between valleys tend to be protected as designated sites or as locally important sites for nature conservation, likely as a result of the lack of intensive development.

Cadw, in partnership with Natural Resources Wales and the International Council on Monuments and Sites (ICOMOS UK), have compiled a Register of Landscapes of Special Historic Interest in Wales. Table 16 presents the registered landscapes of historic interest in each Local Authority.

Table 16: Historic Landscapes

Local Authority Area	Historic Landscapes
Blaenau Gwent	Brynmawr/Clydach Gorge Blaenavon
Bridgend	Kenfig Merthyr Mawr Warren
Caerphilly	Gelligaer Common
Cardiff	Gwent Levels
Merthyr Tydfil	Gelligaer Common The main settlement of Merthyr Tydfil
Monmouthshire	Blaenavon Gwent Levels Lower Wye Valley
Newport	Gwent Levels
Rhondda Cynon Taf	Rhondda
Torfaen	Blaenavon
Vale of Glamorgan	Llancarfan Merthyr Mawr, Kenfig and Margam Burrows

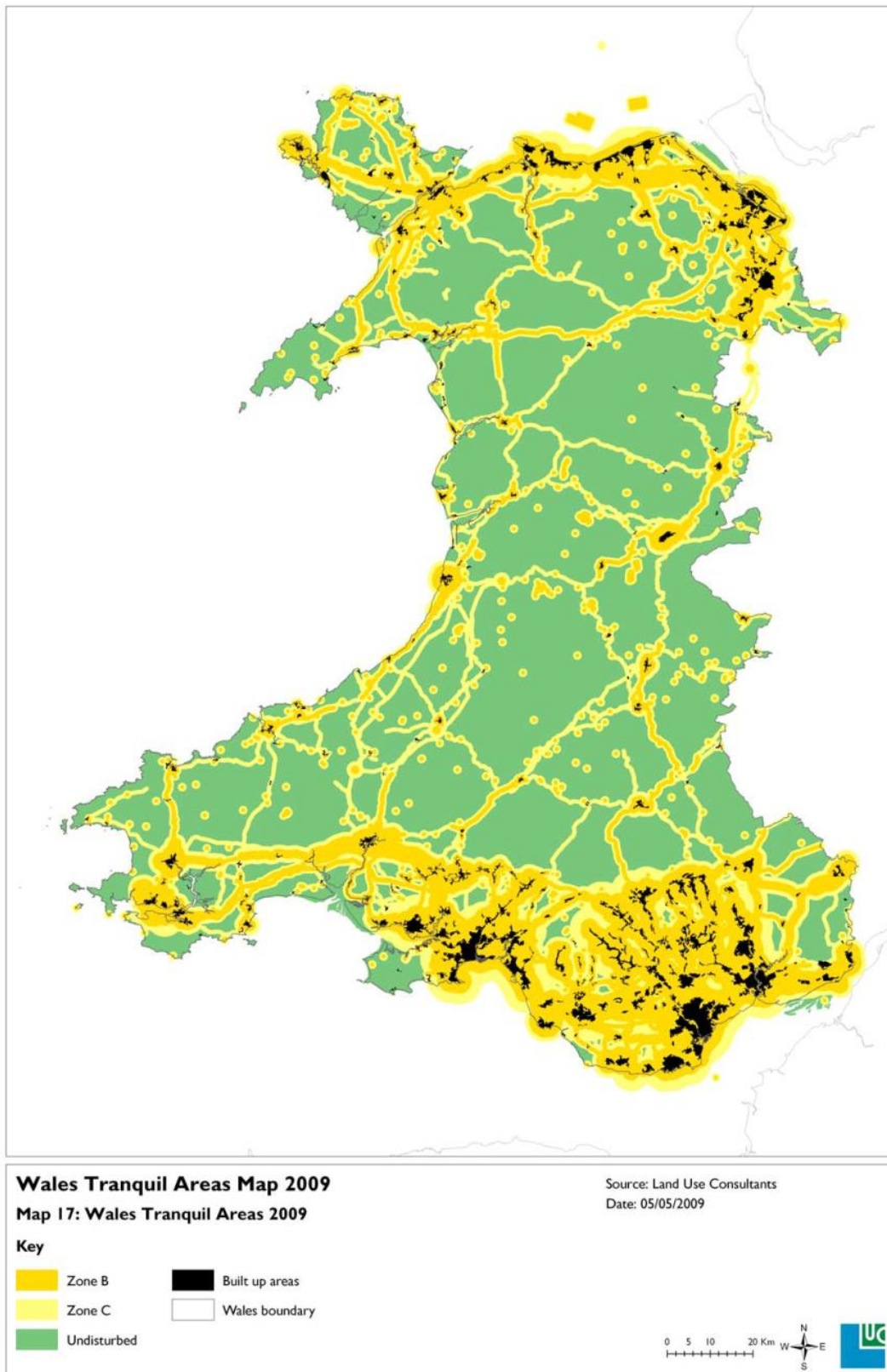
Source: Local Authority LDPs and websites

Special Landscape Areas (SLA) are a local designation made by the Local Planning Authority in the LDP for selected areas of countryside which have 'Special Landscape Area' status, and which have additional protection to 'normal planning policies' for the protection of the countryside. There are a total of sixty-two SLA's across the ten Local Authorities involved in the Metro scheme.

The Brecon Beacons National Park is now certified as an International Dark Sky Reserve as it possesses an exceptional or distinguished quality of starry nights and nocturnal environment, with limited effects from light pollution.

In 2009, the total amount of Tranquil Areas in Wales was over 11,600km² which is just under 55% of the total area of Wales (CCW, 2009). Between 1997 and 2009, the extent of Tranquil Areas across Wales decreased by nearly 1,500km² of land. This is over 6% of the total land area of Wales. Two of the largest Tranquil Areas cover over 1,000km² which are part of the Berwyn Mountains and the southern part of the Cambrian Mountains.

Figure 39: Wales Tranquil Areas Map 2009



Source: Countryside Council for Wales, Wales Tranquil Areas Map, 2009, Final Report.

There are approximately 20,500 miles of public rights of way. 460,000 hectares of access land (defined under Part 1 of the Countryside and Rights of Way Act 2000), leading to one fifth of Wales being mapped as accessible to walkers.

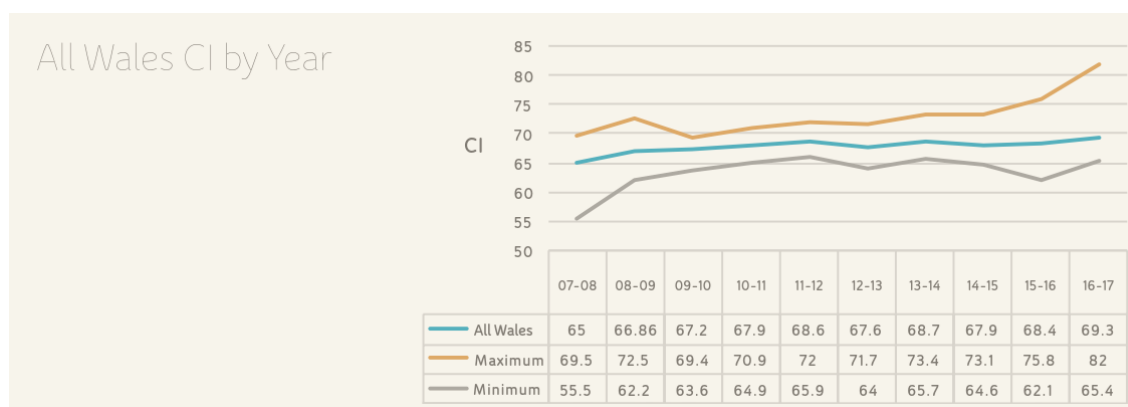
There are approximately 1,200 miles of National Cycle Network and 370 miles of mountain bike trails.

3.12.2.2 Trends and Future Baseline

Environmental nuisances such as fly tipping, graffiti, dog-fouling and fly posting can also have an adverse effect on landscape and townscapes. Welsh Government maintain records of such data using Stats Wales:

- SoNaRR indicates that national landscape change to 2015 has been small overall, with some substantial local changes.
- During 2015-16 Local Authorities in Wales reported 36,259 fly-tipping incidents³⁴, representing an annual increase of 14%. The highest increase was seen in Merthyr Tydfil (67%);
- The Keep Wales Tidy survey³⁵ reported an All Wales Cleanliness Index (CI) for 2016-17 of 69.3, representing the highest figure since commencement of surveys in 2007-08 and is consistent with an improving trend over the survey period (Figure 15);

Figure 40: All Wales Cleanliness Index by Year



Source: Keep Wales Tidy, All Wales LEAMS Report 2016-17

- There is no discernible trend in street cleanliness through the survey period;
- Noise concerns over the period 2005 to 2010 increased in four local authorities. Although it is likely that the number of tranquil areas will decrease, Welsh Government are designating 3 quiet areas in agglomerations of south Wales which will benefit from increased noise protection. Noise Action Plans have also been drawn up for Cardiff & Penarth, Newport and Swansea & Neath Port Talbot³⁶;
- Metro may reduce noise pollution by reducing traffic movement, whilst the provision of adequate refuse facilities at stations and transition points may contribute to an improvement in cleanliness;

³⁴ Statswales: <https://statswales.gov.wales/Catalogue/Environment-and-Countryside/Fly-tipping/recordedflytippingincidents-by-localauthority>

³⁵ Keep Wales Tidy, All Wales LEAMS Report, 2016-17: <https://www.keepwalestidy.cymru/Handlers/Download.ashx?IDMF=4fada00b-343c-416b-a813-b50fb01d7292>

³⁶ Welsh Government 'A noise action plan for Wales 2013-2018':

- Light pollution increased between 1993 and 2000. With further development, this trend is likely to continue;
- 1,500km² of tranquil landscapes were lost in the 12 years prior to 2009 (SoNaRR, 2016);
- There is no data available regarding the trend of area of protected landscapes over time. However it is likely that increasing development will put pressure on landscapes and (if unmitigated) may lead to a reduction in the area of valuable landscapes;
- There are risks to landscape from pests, pathogens and invasive species as set out in the biodiversity section of this report; and
- There is no trend data with regards to PRoW lengths. However, increasing extents of development may adversely impact the extent of PRoW and other rights of way.

3.12.2.3 Data Gaps / Uncertainties

- Limited information was available regarding light pollution; and
- No data was available regarding the change in area of protected landscapes over time.

3.12.2.4 Issues

- Effects on the landscape will depend on the location, nature and scale, and design of transport infrastructure. Development in sensitive landscape areas will need to have consideration to the landscape character value and setting of the area as it could lead to a loss of tranquillity;
- Development should aim to reduce (or at least to prevent increase) of noise in designated 'Quiet Areas';
- New transport infrastructure can have negative effects on landscape and townscape if not appropriately designed;
- Adequate provision to maintain cleanliness of the Metro environment should be incorporated; and
- Transport infrastructure may contribute to a loss of tranquillity (both in terms of noise and light pollution).

3.13 Environmental Characteristics of Areas Likely to be Significantly Affected

The SEA Regulations require that Environmental Reports include 'the environmental characteristics of areas likely to be significantly affected' by the respective plan or programme.

This SEA has therefore considered all the interventions that are proposed in the Metro project and has identified the environmental characteristics of the areas that may be affected by the project.

We have produced a series of drawings, illustrating the environmental characteristics and identifying potential constraints to development. This includes:

- European designated sites, SSSIs and other ecological information;
- Designated landscapes, AONBs, National Parks, Heritage Coast;
- Historic assets, world heritage sites, SAMs, Historic Landscape, Historic Parks and Gardens;
- Groundwater and surface water protection areas, flood risk areas;
- AQMAS;
- Noise and tranquillity mapping; and
- Local designations have been included where appropriate.

The information gathered has been presented in the Environmental Report and has been used to inform the assessment of effects of the Metro interventions and to identify potential cumulative effects.

4 SEA Objectives and Assessment Framework

4.1 Introduction

The document 'A Practical Guide to the Strategic Environmental Assessment Directive' states that *'While not specifically required by the Directive, SEA objectives are a recognised way of considering the environmental effects of a plan or programme and comparing the effects of alternatives. They serve a different purpose from the objectives of the plan or programme, though they may in some cases overlap with them. SEA objectives are used to help show whether the objectives of the plan or programme are beneficial for the environment, to compare the environmental effects of alternatives, or to suggest improvements. For example, improving biodiversity may be an objective of both a plan or programme and an SEA, but the plan or programme may also have an objective of protecting specific wildlife sites which may be tested against the objective of whether they improve biodiversity'*.

The development of SEA objectives is an iterative process. The set of objectives for this SEA have been developed based on the SEA Directive topics, Well-being of Future Generations (Wales) Act 2015 goals, Welsh Government well-being objectives, baseline information, and key issues for the South Wales region (see alignment matrix in Appendix F for links between the well-being goals and objectives and the SEA objectives). The indicators will be used as the basis for monitoring proposals to monitor the implementation of the South Wales Metro Programme. Monitoring will be focused where negative environmental effects are identified. It should be noted that not all the indicators identified will be used for monitoring. Monitoring proposals and specific indicators chosen will depend on the results of the assessment

4.2 SEA Objectives

The framework of SEA objectives and sub-objectives is listed in Table 17, along with the associated issues identified from the review of baseline information and relevant PPPs in Section 2. The SEA objectives were reviewed in light of the consultation responses received on the Scoping Report, further baseline information or the identification of additional plans and programmes for review.

Table 17: SEA Framework

SEA Topic	Issues Identified	South Wales Metro Programme SEA Objective	Assessment Guidance (for guidance other areas may be added during the assessment process)	Key Indicators
Material Assets, Climatic Factors	- Landfill capacity is decreasing - Transport sector has a significant energy usage footprint. New infrastructure should be compatible with renewable energy sources and / or low emission - Use of virgin materials should be minimised in order to preserve a finite resource - Development should not sterilise mineral resources where possible	Sustainable use of natural resources and efficient energy use	- Materials selected according to their suitability, durability, whole life cycle costs and embodied carbon - Material sourced locally and responsibly - Use of recycled aggregates and materials with recycled content - Energy efficiency measures - Use of existing transport infrastructure - Re-use of excavated material on-site and divert waste from landfill - Use of the waste hierarchy, prioritising reduction of waste generated	% of materials sourced from v route. % materials responsibly sourced % materials by volume reclaimed % of existing structures and m used on-site % energy consumption and ca result of incorporated energy % of excavated material reuse % of waste diverted from land % of waste by disposal method % reduction of waste through construction
Climatic Factors, Air	Ambient air quality is an issue in Wales. (NO _x , PM ₁₀₋₂₅) plus CO ₂ , which are the relevant emissions from transport	Reduce air pollution related to transport and infrastructure improvements	- Effects on carbon or other greenhouse gas emissions - Effects on local air quality including NO_x, PM₁₀ and PM_{2.5}	- Number of exceedances of air during construction and operation - Improvements to existing AQMA AQMAs on existing timescale: effects of modal shift to Metro reduction in CO₂, N, NH₃ emissions cleaner train technology to co improvements to AQMAs.
Population	- Numerous LSOAs within the Metro region are in the 10% most deprived in Wales for a number of indicators - Extensive rural areas and urban communities are present with a lack of access to suitable public transport	Promote economic development, employment, and learning opportunities and improve access to these areas	- Facilitate economic growth - Encourage inward investment and business to the area - Employment and learning opportunities, or access to employment and learning opportunities - Facilitate the regeneration of sites along the routes and the surrounding areas	- Number of sites developed for use around route corridor - Number of jobs created direct operation % workforce from local business
Soil, Water	- Acidification of soils (and by extension protected sites) remains a problem - There is a legacy of historic pollution in the south Wales area due to its industrial heritage - Groundwater quality is poor across large areas of the Metro region	Reduce pollution risk to water, soils, and land, and improve land quality where possible. (Note that this ambition shall not conflict with the fauna and flora which may have established. If remediation can be competed sensitively to preserve the natural environment then it should be completed. Otherwise such remediation should only be progressed for reason of overriding human health or environmental risk).	- Use of brownfield or greenfield land - Land quality improvements - Effects on groundwater and/or surface water quality and WFD objectives - Effects on high quality agricultural land - Effects on soil structure	% of brownfield land re-used/ Programme - Improvements in groundwater improvement in Metro discharges - Impact on WFD status of near the baseline status (by measure discharges) % of BMV agricultural land lost

SEA Topic	Issues Identified	South Wales Metro Programme SEA Objective	Assessment Guidance (for guidance other areas may be added during the assessment process)	Key Indicators
Water	- A number of the Metro interventions are located in areas of flood risk - Quantitative status of groundwater aquifers is good and should be preserved - Transport related runoff has contributed to failure of surface waters to meet WFD objectives	Reduce transport related effects on water run-off (quality and quantity) and areas of flood risk	- Effects on run-off rates - Building on a floodplain or within a high-risk area - Effects on flood risk - Water quality - Quantitative status of waterbodies - Reduce water usage in construction and operation	% of surface runoff managed by urban drainage systems during % of infrastructure in Flood Zone - Operational run-off rates % of runoff undergoing treatment - status of receiving waters %, of existing discharges brought into compliance along Metro corridors - Water use in construction and operation % sites designed to acceptably manage downstream risks (acceptable)
Biodiversity, Flora, Fauna	- Some designated sites are in an unfavourable condition - Acidification and eutrophication remains an issue - Infrastructure schemes have potential to exacerbate the spread of INNS - Future development may put pressure on ecologically sensitive areas and the favourable status of fauna and flora	Protect and enhance biodiversity and geodiversity	- Effects on ecological or geological sites and habitats - Effects on protected or non-protected species - Enhance or create green infrastructure - New habitat creation and/or enhancement of existing habitat - Access to ecological and geological sites - Ecological resilience - Acidification and nutrient loading of designated sites	- Amount of new habitat created as part of the Metro Programme - Number of green infrastructure features approved/created as part of the Metro Programme % of ecological features lost or degraded - Local significance (site level) - County significance - National significance - For each of the above, also the number of designated sites lost and the percentage of the total designated site lost and flagged as such in the forecast percentage is >5% required at outline and detailed stages to avoid potential losses. % habitat created or improved as part of the Metro corridors (improvement measures ecosystem services measures) - Reduction in nutrient deposition as a result of modal shift to Metro. Measure the reduction in nutrient deposition using Metro instead of car (su) - Percentage of monitoring visits completed (i.e. monitoring of new planting)
Climatic Factors	- Infrastructure schemes should be designed to be resilient to the effect of climate change - Infrastructure schemes should not generate excessive levels of GHG and should have low embodied carbon	Support transition to a low carbon society ensuring transport projects are sustainable and resilient	- Materials chosen to be resilient to climate change effects - Consideration of climate change effects and incorporation of appropriate design solutions - Zero-low carbon technologies and renewable energy sources	- Number of climate resilience features % of existing infrastructure with climate resilience features - Number of delays and delay costs due to climate events

SEA Topic	Issues Identified	South Wales Metro Programme SEA Objective	Assessment Guidance (for guidance other areas may be added during the assessment process)	Key Indicators
Population, Human Health	- Uptake of active travel is not widespread. An increase is desirable for a number of health outcomes - Transport related air quality may contribute to poor health - Transport can contribute to ill health via other means such as noise - Transport infrastructure may reduce area of green space available	Improve wellbeing of local population through sustainable, integrated multi-modal transport systems that promote active travel	- Resilience, flexibility, and reliability of transport - Transport related health and nuisance issues - Encourage use of public transport - Improve physical wellbeing through encouraging walking and cycling as part of multi-modal systems - Enhance the above by providing access to green space - Improve mental wellbeing through providing efficient multi-modal transport (reduction in noise, access to services and healthcare)	- Number of pedestrians/cyclists - Number of journeys by Metro - Community deprivation (measured by IMD) % of deprived communities with access to public transport % transport routes with connections to other modes % Metro corridors with active travel routes resulting from Metro
Noise and vibration	- Many priority areas are located along Metro corridors - Noise modelling indicates noise issues along strategic road and rail corridors in the Metro region - Noise pollution may contribute to adverse wellbeing	Improve wellbeing of local population through sustainable, integrated multi-modal transport systems that promote active travel	- Transport related health and nuisance issues - Improve mental wellbeing through reduction in noise	- No. improvements to Priority Areas % of Metro corridors surveyed against baseline - No. of noise improvement measures implemented on existing and new corridors
Population, Human Health	- Link between communities with low car access and long term unemployment - An aging population will put a strain on transport infrastructure - Rural connectivity is poor - High unemployment within the regions is combined with lower than average wages compared with the UK	Promote sustainable communities through a reliable and safe transport network that provides access for all	- Transport system that is inclusive with access for all - Access from deprived areas to key services, goods, and employment opportunities - Access to public transport in rural communities - Community access to key services and facilities (e.g. recreation, sport, health, education) - Reliability of the transport network - Capacity and connectivity on the transport network - Provide an attractive and safe user experience - Facilitate modal shift	% population within 30 minutes of key services and healthcare facilities % of step-free access - Journey time reliability compared to other modes - Change in congestion on local roads % modal shift
Cultural Heritage, Landscape	- Development should prevent increase of noise in Quiet Areas - Development should prevent deterioration in cleanliness - Development should prevent damage to heritage assets or effects on setting, including the setting of historic landscapes - Light pollution may increase with additional development;	Protect and enhance existing cultural heritage and landscape features and promote Welsh art, culture, and identity	- Effects on fabric or setting of historic assets - Effects on archaeological resources (including unknown archaeology) - Effects on conservation areas or other historic landscape/townscape areas - Tranquillity and openness of the countryside - Quality of the public realm and open spaces - Promotion of the Welsh identity and language	- Number of designated and non-designated heritage assets affected (positive and negative) - Area of historic landscape character that has changed as a result of the Programme - Number of landscape enhancement measures implemented within the Programme (public realm, etc.) - Number of archaeological assessments completed (monitored through the Programme) - Noise levels along Metro corridors

SEA Topic	Issues Identified	South Wales Metro Programme SEA Objective	Assessment Guidance (for guidance other areas may be added during the assessment process)	Key Indicators
				• %lighting along Metro routes sensitive • % landscape features lost as • % historic landscape features • Number of key views affected negative

4.3 Compatibility of SEA Objectives

The 'Practical Guide to the Strategic Environmental Assessment Directive' states that '*The objectives of the plan or programme will need to be tested against the SEA objectives to identify both potential synergies and inconsistencies. This information may help in developing alternatives during the development of the plan or programme and may in some cases help to refine the objectives of the plan or programme itself. Where a plan or programme has several objectives it may also be helpful to test them against each other, as inconsistencies may give rise to adverse environmental effects*'.

The following table assesses the compatibility of the Metro SEA objectives against both other objectives and the relevant plans / policies.

The following key has been used to illustrate the sustainability objectives compatibility.

+	Objectives are compatible
-	Objectives are potentially incompatible
o	Objectives are not related
/	Uncertainty over relationship

Whilst it is difficult to assess the level of compatibility at this early stage in the project (i.e. when a number of options / interventions are not defined and therefore the exact alignments or options are unclear) it is possible that limited incompatibility may result:

- 'Improve connectivity, linking communities'... may clash with 'protect and enhance biodiversity...' depending on the alignment and the extent of new connections. In the absence of defined routes and defined mitigation, this remains a potential incompatibility and will therefore require further assessment as the scheme progresses to detailed design. Further assessment will ensure that appropriate mitigation is built into the scheme where required. This may require a review of options for achieving each objective such that the option with the least impact is selected.

Table 18: Objectives Compatibility Matrix

SEA Objectives	South Wales Metro Objectives						
	Deliver a high-quality, reliable, efficient, economically sustainable transport network	Improve connectivity, linking communities with all major commercial, social and leisure attractors, enabling the region to function as a single coherent economic entity	Improve accessibility to public transport within city and town centres	Provide comparable journey times across public and private transport modes, offering realistic travel choices	Cater for increasing demand for public transport	Reduce the impact of transport on the environment	Encourage active travel and social inclusion initiatives
Sustainable use of natural resources and efficient energy use	+	0	0	0	0	+	+
Reduce air pollution related to transport and infrastructure improvements	+	0	+	+	+	+	+
Promote economic development, employment, and learning opportunities and improve access to these areas	+	+	+	+	+	+	+
Reduce pollution risk to water, soils, and land, and improve land quality where possible	+	0	0	0	0	+	0
Reduce transport related effects on water run-off and areas of flood risk	+	0	0	0	0	+	0
Protect and enhance biodiversity and geodiversity	+	-	0	0	0	+	0
Support transition to a low carbon society ensuring transport projects are sustainable and resilient	+	+	+	+	+	+	+
Improve wellbeing of local population through sustainable, integrated multi-modal transport systems that promote active travel	+	+	+	+	+	+	+
Promote sustainable communities through a reliable and safe transport network that provides access for all	+	+	+	+	+	0	+
Protect and enhance existing cultural heritage and landscape features and promote Welsh art, culture, and identity	+	+	+	+	+	+	+

5 Assessment Methodology

5.1 Approach to the SEA

The approach to the SEA of the Metro has been to provide an expert judgement based system of prediction and assessment that is transparent and auditable, guided by the SEA objectives. It has also taken into account the findings of other assessment activities, for example those related to:

- Habitats Regulations Assessment;
- Strategic Environmental Assessments (SEAs) of the Wales National Transport Plan; and
- Other SEAs e.g. Local Development Plans, Local Transport Plans.

Taking account of these other assessments has helped in the determination of the cumulative effects that may result from the implementation of the South Wales Metro Programme in combination with the effects from the other plans, programmes and projects.

Broadly, the assessment includes:

- Identifying the environmental effects of the Metro; and
- Assessing effects for their significance.

5.1.1 Identifying Likely Environmental Effects

Effect identification (or prediction) involves identifying the environmental changes that would occur if the plan or programme were to go ahead, compared to there being no plan. The SEA objectives and sub-objectives in Table 17 have been used to help in this process.

5.1.2 Assessing the Significance of Effects

Effect assessment involves assessing whether a predicted effect is likely to be significant. The most effective way to assess significance is through the use of criteria. Significance criteria have been designed for the SEA which take into account issues such as:

- Temporal scale of effects (short, medium or long term; permanent or temporary);
- Reversibility of effects;
- Magnitude and spatial extent of effects;
- Value and vulnerability of the area likely to be affected;
- Secondary, synergistic and cumulative effects; and
- Cross-boundary nature of effects.

Significant adverse effects are defined as effects which would exacerbate existing problems and which are irreversible. These are represented by a major adverse effect rating and red colour coding in the assessment tables.

Significant positive effects are defined as those effects which would resolve an existing issue or maximise opportunities, represented by a major positive rating and dark green colour coding in the assessment tables. Each of the assessment matrices are shown in Appendix C of this report.

5.2 Alternatives

5.2.1 Background

The South Wales Metro is an inter-regional transport scheme in the optioneering stages. The scheme is proposed to provide faster, more frequent and joined up services using trains, buses and light rail. Development of the interventions has been an iterative process, focussing on alleviation of issues identified in previous studies, including:

- Road congestion (particularly M4 around Newport, J32-34 and on the A470 north of Cardiff);
- Rail capacity issues south of Pontypridd and Caerphilly and lines with limited capacity or frequency constraints (Maesteg / Ebbw Valley / Merthyr);
- Rail capacity constraints between Cardiff Central and Queen Street;
- Lack of connectivity in the valleys for those communities not on the rail network;
- Limited public transport connectivity between lower RCT and Cardiff;
- Lack of rail connectivity in many parts of Cardiff and Newport;
- Urban congestion;
- Limited integration between rail and bus services;
- Difficulty accessing services and employment opportunities due to lack of available, affordable transport;
- Continuing growth in rail passenger numbers; and
- Lack of rail connectivity within Cardiff bay.

With these goals in mind, a number of options have been developed. No detailed environmental study has been completed to date – although surveys are ongoing at the time of writing of this report.

5.2.2 Defining Alternatives

In accordance with Article 5(1) of the SEA directive (2001/42/EC) an SEA must identify, describe and evaluate reasonable alternatives, taking into account the objectives and the geographical scope of the plan or programme.

The exact option and / or combination of options is not yet defined; hence this assessment has been completed for each of the interventions, using the high level data reviewed as part of the SEA process. The assessment of the wider Metro scheme (including all potential options) is illustrated on the tables in Appendix C.

5.2.3 Links between Metro SEA and other Environmental Impact Assessment

This SEA does not preclude the need for interventions identified during the development of the Metro scheme to be subject to future environmental assessment (the level of which shall be determined at the appropriate time subject to availability of sufficient detail). If progressed such interventions may themselves undergo EIA and indeed further SEA.

6 Assessment of Significant Effects

6.1 Introduction

This stage of the SEA involves the prediction and assessment of the effects that are likely to result from the implementation of the interventions that make up the South Wales Metro Programme. Particular emphasis is placed on the identification and assessment of the significant effects, rather than all the minor effects that may result. The assessment uses the methodology outlined in Section 5 in which a range of effects are considered for each Metro intervention, including secondary, cumulative, synergistic; short, medium and long term; temporary and permanent; and positive and negative.

Many of the interventions outlined in the Metro proposals may have potential effects on the environment which, in isolation, appear to be minor. However, if all the potential effects of the Metro were considered together, the overall effect on the environment could be significant. Therefore, the assessment of cumulative effects for the Metro focuses on identifying the total effect of both direct and indirect effects on environmental receptors associated with each of the SEA topics.

The results of the assessments for the SEA topics are summarised in the following sub-sections. The full assessment of likely environmental effects of Metro, including information on the nature of the effects identified, can be found in Appendix C.

The assessment tables comprise an assessment of the interventions which are understood to be most likely at present (i.e. they are effectively the current preferred option). However, tendering is ongoing and there is scope for the tenderers to propose alternatives (which may impact not only the mode of transport but the geographical alignment). Therefore, it is possible that the interventions may change. To that end, an assessment of other options (those currently less likely) has also been completed to provide an overview of potential effects associated with potential future phases of Metro implementation.

6.2 Summary of Predicted Effects

6.2.1 Assumptions and Clarifications

Where Light Rail is proposed, it is assumed (in the absence of other information) that this will be electric (mains supply, via OLE).

It is assumed that mitigation will be applied (for example protected species licensing, archaeological investigations) as required for each of the intervention measures and that the appropriate guidance will be followed in design and construction to mitigate environmental effects.

The cumulative effect of known developments (i.e. committed LDPs) has already been assessed in the relevant LPA SEAs and (as above) on the proviso that mitigation is applied within each of the developments set out in the LDPs it is considered that the potential for cumulative effects is limited. In fact, Metro is likely to facilitate delivery of the LDPs with a reduced impact (i.e. facilitating job creation by improving commuting conditions, reducing reliance on cars and resulting in an overall improvement in air quality as an example). Therefore, the completion of Metro may reduce the magnitude of impacts associated with

completion of the LDPs. This is on the further proviso that Metro is developed in full cognisance of relevant associated plans within the LDPs (i.e. LTPs) and does not prevent completion of (for example) fully connected cycle routes and footways in achieving Metro aims.

Synergistic effects with other developments are unlikely, with the exception of the transport plans which aim to reduce congestion and encourage sustainable travel via other interventions not within the Metro scheme. This could increase the magnitude of positive effects associated with Metro. Conservatively this possibility has not been included within the impact assessment of this Environmental Report and therefore synergistic effects are not discussed below.

Indirect effects resulting from Metro are likely to be limited and therefore are not discussed below. As design progresses indirect effects may become apparent and therefore this report will be revised if appropriate.

Do nothing has been discarded as an option and therefore is not discussed below.

6.2.2 Air Quality

The options outlined within Metro proposals to date should encourage a modal shift away from the private car towards more sustainable modes of transport such as bus, rail, light rail / tram.

6.2.2.1 Construction Effects

In the short-term the impact is likely to be negligible, reflecting the potential impact of construction emissions, which will be mitigated using standard practice for construction sites (i.e. EA PPGs, CIRIA guidance or other appropriate measure). Given that it is unlikely for a large number of schemes to be completed simultaneously (i.e. low potential for cumulative effects), the effect of the construction is likely to be localised, temporary and of low magnitude.

6.2.2.2 Operational Effects

As a result of a switch to low / zero emission transport, the interventions should result in minor permanent positive cumulative effects on air quality in the medium to long term. This may be negated by increased development and population growth (as set out in the LDPs) but remains unlikely to result in cumulative adverse effects in association with the other committed developments.

6.2.2.3 Mitigation / Enhancement – Related Policy and Guidance

The Active Travel Act requires that in the creation, maintenance and improvement of highways, reasonable steps must be taken to enhance the provision made for walkers and cyclists. With conversion of Heavy Rail to Light Rail it may be possible to open up some of the former HR corridors to walkers / cyclists and further encourage sustainable travel in the Metro region. Similarly, the BRT routes will be designed in accordance with the Act to provide opportunities for active travel uptake where feasible.

6.2.3 Greenhouse Gas Emissions

Individually, the majority of options set out in the Metro proposals have the potential to cause a minor reduction in GHG emissions. Cumulatively, the effect is likely to be greater. However, in the absence of a definitive scheme it has conservatively been assumed that the magnitude of reduction in GHG emissions is likely to be minor. This reflects unknowns regarding the extent of electrification and likely uptake of sustainable transport modes following construction.

We have considered the possibility of construction causing indirect GHG emissions (i.e. loss of CO₂ stored within soils), but the greater majority of the interventions are either on existing transport corridors, within previously developed areas or along historic transport corridors where soil cover is likely to be negligible. This is therefore unlikely to result in a significant effect in its own right and is therefore not discussed in detail below.

6.2.3.1 Construction Effects

In the short-term the impact is likely to be negligible, reflecting the potential impact of construction emissions, which will be mitigated using standard practice for construction sites (i.e. EA PPGs, CIRIA guidance or other appropriate measure). Given that it is unlikely for a large number of schemes to be completed simultaneously (i.e. low potential for cumulative effects), the effect of the construction is likely to be temporary and of low magnitude.

6.2.3.2 Operational Effects

As a result of a switch to low / zero emission transport, the interventions should result in minor permanent positive cumulative effects on GHG emissions in the medium to long term. This may be negated by increased development and population growth from other developments (as set out in the LDPs) but remains unlikely to result in cumulative adverse effects in association with the other committed developments.

6.2.3.3 Mitigation / Enhancement – Related Policy and Guidance

The Active Travel Act requires that in the creation, maintenance and improvement of highways, reasonable steps must be taken to enhance the provision made for walkers and cyclists. With conversion of Heavy Rail to Light Rail it may be possible to open up some of the former HR corridors to walkers / cyclists and further encourage sustainable travel in the Metro region. Similarly, the BRT routes will be designed in accordance with the Act to provide opportunities for active travel uptake where feasible.

6.2.4 Climatic Factors

A large number of the Metro interventions are located in areas which are at risk of flooding. This would have negative effects against this objective. However, the greater majority are existing transport corridors and (for example) transferring from HR to LR would not result in an increased risk from climatic factors such as flooding. Associated infrastructure such as stations and park and ride developments would necessarily be nearby and therefore such development would need to consider resilience measures, together with measures to prevent increasing the risk of flooding downstream of the development sites.

Interventions around Creigiau, Pontyclun and Llantrisant propose the reopening of historic rail corridors. These have not been in operation for some time (they are effectively undeveloped) and therefore any new development in these areas would need to take into account the effect of increased runoff on sites which are downstream of these areas.

A number of the interventions run within a few hundred metres of coastline. However, they are compatible with the relevant Shoreline Management Plans and therefore unlikely to require deviations from the proposals therein.

The assessment below assumes that any revisions to infrastructure and any new infrastructure will be designed to the appropriate level of climate change resilience and to prevent downstream effects on existing developments.

6.2.4.1 Construction Effects

Construction effects are likely to be negligible given the relatively short duration of the works when considered against the timescales associated with climate change.

6.2.4.2 Operational Effects

All new infrastructure is to be designed with the degree of climate change resilience required by the current legislation. Given this, the effect of Metro interventions is considered likely to be negligible.

Given that new infrastructure is required to be designed to appropriate standards with regards flooding (including an allowance for climate change) the likelihood of cumulative effects with other developments is considered negligible. This is also likely to be true for the cumulative effects of the various Metro interventions which are disperse and unlikely to combine to a significant degree.

6.2.4.3 Mitigation / Enhancement – Related Policy and Guidance

Interventions will be delivered in line with the recommendations set out in the Climate Change Strategy for Wales, Route Weather resilience and Climate Change Action Plans for Wales (Network Rail) and the updated DMRB guidance which includes consideration of climate change on highway design.

6.2.5 Noise and Vibration

Generally, positive effects are predicted given the aim of Metro to reduce traffic levels via a modal shift to more sustainable modes of transport (and in the case of electrification, quieter modes of transport).

In the absence of defined information regarding the mode of operation, noise output of selected trains / buses / replacement technology, the following assumptions have been made:

- Good practice construction measures will be used to reduce noise and vibration;
- New HR will utilise upgraded (i.e. quieter diesels) – if not, then suitable acoustic screening will be provided to prevent an increase in noise;
- All LR is electric and therefore quieter than existing HR;
- Where on-street LR running is proposed, the reduction in vehicular traffic will result in a net decrease of noise;
- Mitigation will be adopted in sensitive areas (to be determined following the completion of baseline noise surveys / modelling) to reduce the effects of noise;
- Full noise and vibration surveys will be completed in sensitive areas and along the extent of new (and re-opened historic) routes in order to ensure that mitigation requirements are identified and that such mitigation is incorporated into the final development.

6.2.5.1 Construction Effects

Assuming that current good practice measures are adopted to reduce noise emissions and vibration, construction effects are considered likely to be minor, temporary adverse. Cumulative effects are unlikely given the low likelihood of a significant number of interventions being constructed simultaneously.

6.2.5.2 Operational Effects

BRT routes are considered likely to encourage a modal shift away from the car, which will balance the increase in noise resulting from increased frequency of bus movements. Similarly, increased frequency of train movements (which may result in increased noise) is likely to be balanced by upgraded diesels / electrification which will generate less noise.

However, there is likely to be a greater magnitude of effect at locations where the re-opening of historic rail lines is proposed (i.e. where baseline noise levels are likely to be lower and people / habitats will not have acclimated to rail noise) and elsewhere, where enhanced frequency of diesel operation is proposed.

Overall, it is considered that the operation of Metro interventions will result in a minor, permanent positive effect on noise and vibration.

There is limited potential for cumulative effects associated with other developments. Metro is likely to have a positive effect and other developments will be required to provide associated mitigation to prevent adverse effects from noise output. There is potential for employment sites to develop which cause increased commuting. However, the potential for increased noise associated with this should be mitigated by the provision of sustainable modes of transport as part of the Metro scheme. The cumulative effects of Metro schemes are likely to improve noise levels along the strategic corridors set out in the Noise Management Plan for Wales. However, the degree of significance cannot be established until the scheme is defined.

6.2.5.3 Mitigation / Enhancement – Related Policy and Guidance

Where these areas overlap with the Metro intervention alignments there is an opportunity for Metro to install mitigation measures (noise protection, lower speed limits or other appropriate) at the Priority Areas identified in the Noise Action Plan for Wales.

Mitigation measures will be developed as required as the scheme progresses.

6.2.6 Biodiversity

Metro as currently proposed is predominantly within existing transport infrastructure corridors. However, the construction of new stations, dualling of single track rail lines, park & ride development, delivery of BRT along B and A-class roads, combined with re-opening of historic rail corridors and the forming of construction access roads will necessitate a degree of land-take.

The land take of any Metro option is not known and therefore this assessment assumes that the land take will be the minimum required to complete construction and also that appropriate mitigation will be applied (for example provision of compensatory habitat planting, reinstatement of vegetation etc) in the development of those options for which mitigation is likely to be required.

6.2.6.1 Construction Effects

Localised adverse effects are likely if unmitigated. Appropriate surveys must be completed prior to development and mitigation agreed with the relevant authority. The design of the scheme and construction areas should take into account the presence of sensitive sites (habitat and species) along a number of proposed routes (including existing routes). If avoidance is not possible, mitigation will be required.

This may take the form of (for example and non-exhaustive)

- Pre-commencement planting of compensatory habitat;
- Translocation of protected species; and
- Lighting and noise reduction measures.

Overall, construction effects are considered likely to be minor, temporary adverse on the basis that suitable mitigation will be applied.

Localised significant adverse effects may occur due to implementation of interventions requiring BRT along minor roads (Cardiff – Cardiff Gate), re-opening of historic rail lines around Creigiau and HR extension to Abertillery (due to associated vegetation clearance). However, the adoption of appropriate mitigation and compensatory planting should enable these effects to be reduced to acceptable levels.

The mitigation will be determined as the design progresses (at this stage, in the absence of land take and design information it is not possible to quantify the effects accurately and this assessment is likely to be conservative).

6.2.6.2 Operational Effects

Localised adverse effects are likely if unmitigated and therefore mitigation will be required for certain number of the Metro interventions.

Equally, if Metro does successfully deliver a shift to more sustainable modes of transport positive secondary effects on biodiversity may result from:

- Reduction in vehicle collisions with wildlife;
- Improvement in air quality (assisting status of habitat affected by acidification and Nitrogen deposition);

There are potentially significant effects from dualling projects which may have effects on the fringes of ancient woodland bordering the line. These may be counterbalanced somewhat by reduced likelihood of acidification and nutrient deposition. The effects are likely to be localised (i.e. not significant beyond a local scale) and potentially revised alignments could prevent clearance of these features. This aspect will require further assessment and review during detailed design.

Overall, the operational effects of Metro are considered likely to be Minor permanent adverse (assuming that where habitat clearance is required that compensatory planting and / or habitat creation is agreed and implemented), with potential positive indirect effects as set out in the bullets above. The provision of compensatory habitat planting or biodiversity improvement measures (for example wildflower establishment along roads and verges) should be implemented to ensure that the key points outlined in the HRA are achieved:

- Habitat connectivity – Ensure that the rail track and roadside habitat is maintained and no severance of habitat occurs for more than 10m of vegetation without prescriptive mitigation (which would be detailed as the scheme design progresses and appropriate survey information becomes available); and
- Working near water – The main impact anticipated will be disturbance to otters using the river corridor and pollution incidents. Ensure that the Construction Environmental Management Plan (CEMP) includes construction best practice for pollution prevention. Ensure that all ecological surveys include checking of the watercourse for the presence of otters and other protected species during project design and construction to ensure that there is minimal disturbance.

With regards to cumulative effects, the various LDPs have completed HRAs establishing that the effects of the proposed developments are unlikely to be significant. Assuming therefore that

mitigation outlined in the LDPs is applied and that the effects remain low significance, the potential for cumulative effects with Metro are limited. Cumulative effects of Metro interventions are not likely due to the disperse nature of the schemes and the assumption that appropriate mitigation will be applied as required.

6.2.6.3 Mitigation / Enhancement – Related Policy and Guidance

The Trunk Road Estate Biodiversity Action Plan (TREBAP) aims to contribute to the conservation, and where possible, enhancement of biodiversity on the road network across Wales for which the Welsh Government is responsible.

DMRB Vol 11 provides direction for the effective Assessment of Implication on European Sites (HD 44/09), and DMRB Volume 11 Section 3 Part 4 emphasises the importance of the design process and mitigation options available to minimise adverse environmental effects.

Interventions which use the existing road network (BRT and on-street LRT) have the opportunity to incorporate biodiversity enhancement measures. This is also true of new station developments / redevelopments and new park and ride sites. When the exact location and scale of these sites is determined, associated enhancement / mitigation can be detailed.

There is the potential for Metro LR and HR routes to undertake a programme of vegetation planting and management with the aim to enhance biodiversity and establish vegetation which will require less maintenance therefore reducing both long-term costs and disturbance of established ecology (i.e. reduced requirements for vegetation clearance reduces disturbance of ecology which has established in the interim).

6.2.7 Population, including Severance and Accessibility

Metro is likely to have positive effect on connectivity. Improving access to public transport as well as improving the connectivity of public transport modes will improve access to key services and to opportunities.

In the absence of a defined scheme and prior to a detailed demographic assessment along each route, the following assumptions have been made:

- Public transport systems resulting from the implementation of Metro will be competitively priced to prevent isolating of poorer communities / groups; and
- Information regarding how to access and use the new Metro system will be distributed across the region in a wide range of formats to encourage uptake of the new system in 'hard to reach' groups / communities (i.e. elderly, ethnic minorities, disperse rural communities).

Assuming that the above is correct, the effect of Metro is likely to be most keenly felt amongst those communities / groups who do not currently have access to cars.

6.2.7.1 Construction Effects

It is likely that temporary disruption will occur during construction. These effects are likely to be temporary, minor negative adverse. On the basis that good practice is followed and that appropriate information is disseminated regarding alternative access to transport during construction the effects are not likely to be significant.

6.2.7.2 Operational Effects

Operational effects are considered likely to be permanent, major positive, facilitating access to services and employment opportunities and preventing isolation of elderly communities in the Metro region.

6.2.7.3 Mitigation / Enhancement – Related Policy and Guidance

Provision of maps and brochures and targeted advertising in advance of implementation of each intervention may encourage uptake.

BRT and on-street LRT shall be designed in accordance with the Active Travel Act to incorporate the requirements of pedestrians and cyclists.

6.2.8 Human Health

Active travel measures are not detailed in the Metro scheme at present hence the effects of active travel interventions have not been assessed. However, Metro does aim to integrate the public transport system with active travel and therefore indirect positive effects can be anticipated (active travel is a key strategy in each of the LPAs LTPs and the development of a Metro which is fully integrated with these measures will assist in achievement of the LTPs active travel schemes).

There is the opportunity for Metro to contribute to an improvement in air quality, a reduction in noise, reduction in traffic and improved access to healthcare.

6.2.8.1 Construction Effects

If unmitigated, the construction of Metro is likely to have temporary adverse effects on human health (well-being) associated with increased noise and construction traffic. However, assuming that good practice construction measures are followed it is considered such effects would be minor temporary adverse.

6.2.8.2 Operational Effects

Operation of Metro is considered likely to result in:

- Improved air quality;
- Reduction in noise;
- Reduction in traffic;
- Improved access (amongst other services) to healthcare;
- Improved access to active travel opportunities.

The above are considered likely to contribute to an improvement in wellbeing in the affected communities. The overall effect is difficult to quantify in the absence of a defined scheme, therefore the magnitude is determined to be minor at this stage (minor, permanent, beneficial effect).

6.2.8.3 Mitigation / Enhancement – Related Policy and Guidance

Opening up of LR routes to active travel mode could increase community uptake of active travel measures, contributing further to an improvement in health.

Remediation of Priority Areas (as determined by the Noise Management Plan for Wales) as Metro develops in these areas may enhance noise reductions, contributing to further improvement in wellbeing.

Future-proofing of Metro against anticipated increase in demand, combined with control measures to prevent further increases in traffic in urban areas may contribute further to wellbeing of urban communities.

Providing connections to green space from key Metro hubs will improve access to green space for affected communities and potentially contribute to improvements in wellbeing.

6.2.9 Soils

The vast majority of Metro interventions are located within existing or historic infrastructure corridors therefore limited effect on soils is anticipated.

6.2.9.1 Construction Effects

Minor negative effects are likely during construction, reflecting the limited area of soilscape affected by Metro proposals. The effects can be mitigated further by provision of Soil Resource Surveys and Soil Management Plans for affected sites, together with provision to ensure that soil is either re-used or made available for use elsewhere, to prevent sterilisation of a valuable resource.

Adoption of a Construction Environmental Management Plan (CEMP) is likely to reduce the risk of construction caused pollution such that the overall effects are likely to be negligible.

6.2.9.2 Operational Effects

The majority of the development will have a negligible effect on soil resource as set out above. However, completion of Metro may improve air quality and contribute to an improvement in soil quality due to reduced acidification.

6.2.9.3 Mitigation / Enhancement – Related Policy and Guidance

In addition to the implementation of soil management strategies and ensuring that soil remains available for use, consideration should be given to aligning any new routes away from organic and CO₂ rich peaty soils to minimise secondary generation of GHG.

There may be opportunities to remediate historic contamination located along the Metro routes as part of the construction.

6.2.10 Water

The development of Metro is likely to have a limited effect on water.

6.2.10.1 Construction Effects

The construction of Metro (if managed appropriately) is likely to have negligible effect on water (both qualitative and quantitative status). Provided that good practice environmental measures are adhered to during construction an overall negligible effect is anticipated.

6.2.10.2 Operational Effects

In line with the construction effects, negligible direct effects are anticipated on water from the operation of Metro. However, indirectly improvements in air quality may result in further improvements of water quality due to reduced pollutant loading. The removal of diesel trains

from the system and replacement with electric or cleaner diesel may also result in reduced diffuse pollutant loading to aquifers and surface waters.

6.2.10.3 Mitigation / Enhancement – Related Policy and Guidance

There is potential to remediate contaminated sites along the Metro alignment as part of the construction works, contributing to an overall improvement in water quality.

Building in water conservation measures to new infrastructure will contribute to maintaining quantitative status of underlying aquifers and adjacent surface waters.

Updating of existing drainage and water treatment infrastructure in line with Metro infrastructure development may contribute to a reduction in diffuse pollutant loading to aquifers and surface waters.

6.2.11 Material Assets

Construction of Metro will inevitably result in the use of materials and energy. This will be countered by the shift towards sustainable modes of transport which is the key aim of Metro.

As Metro follows either existing transport corridors or historically developed corridors, the sterilisation of mineral resources is unlikely to be an issue and therefore is not considered further.

6.2.11.1 Construction Effects

Construction of Metro will result in the use of materials and energy. The use of existing transport corridors will reduce the requirement for materials and energy. Recycling of materials and use of locally available materials will limit the use of energy and limit embodied CO₂. Use of secondary aggregates will assist in the reduction of overall consumption.

Given the above, the effect of Metro is considered Moderate, permanent adverse.

6.2.11.2 Operational Effects

The operation of Metro is intended to result in a more efficient use of energy over the current system and reducing reliance on the car as the dominant mode of transport will further assist in the reduction of overall resource use.

Given the above, the net effect of Metro is considered likely to be minor positive permanent effect.

6.2.11.3 Mitigation / Enhancement – Related Plans and Policies

In line with sustainable development guidance set out in documents such as 'Towards Zero Waste' the following mitigation measures are proposed:

- Use of recycled aggregates where possible;
- Re-use of existing materials and infrastructure where possible;
- Forging links with other local construction / demolition sites to make use of secondary materials as they become available; and
- Incorporation of renewable energy measures into developments (i.e. small scale solar and wind, more efficient heating / cooling measures).

The above list is by no means exhaustive and it is considered that the Metro development would benefit from the creation of a full and detailed sustainability strategy as the scheme progresses and more details are known.

6.2.12 Cultural Heritage

In the absence of design information, the following assumptions have been made in the assessment of impact:

- OLE towers may potentially cause adverse effects on the setting of listed buildings, scheduled ancient monuments and historic landscapes. Therefore, it is considered that (where the potential for such effects is identified), measures will be taken to reduce the effect. This may comprise running on inverted 3rd rail, 3rd rail instead of OLE or battery storage. In this manner, the overall magnitude of effect would be reduced;
- On-street running routes will be designed to prevent direct impact to listed buildings and scheduled monuments. No / minor works to listed buildings will be required to deliver the works;
- BRT routes will be detailed to avoid effects on listed buildings and scheduled monuments; and
- Where on-street running is proposed, effects on the setting will be considered and OLE will not necessarily be the preferred solution (as set out above). With the exception of permanent structures such as OLE the potential effects of on-street running are likely to be relatively minor.

Significant numbers of listed buildings and numerous scheduled monuments are located in the study area. There remains the potential for significant effects, key areas of concern will be:

- New infrastructure in urban areas, where there may be high concentrations of listed buildings and where mitigation may be difficult; and
- New spurs / re-opening of historic spurs.

6.2.12.1 Construction Effects

The majority of Metro interventions run in existing transport infrastructure corridors or within historic corridors. Where extensions are proposed in new corridors, they are (given appropriate landscaping as part of detailed design) are considered unlikely to result in significant effects. Disruption / effects to the setting of structures during construction will be temporary.

The effects of direct impact on previously unknown (buried) archaeological assets will be mitigated via a programme of prior investigation and recording of assets, with localised mitigation as required.

Overall the effect of construction is considered likely to be minor, adverse, permanent.

6.2.12.2 Operational Effects

Urban areas within the Metro area commonly contain significant clusters of listed buildings and other heritage assets (parks and gardens, scheduled monuments amongst others). The development of any infrastructure will therefore need to consider the impact on these structures and other heritage assets.

Additionally, major adverse effects may result from extension of Ebbw Line to Abertillery and re-opening of historic lines elsewhere (if unmitigated). However, given adoption of appropriate

landscaping it is considered that the effects could be mitigated such that the overall effect would be localised and minor.

Assuming that new infrastructure will be designed to prevent direct contact with heritage assets and that appropriate additional mitigation will be implemented it is considered that improvements in air quality and reduction in congestion and noise are likely to contribute positively to the setting of archaeological assets, therefore the overall effect of the operational Metro is considered likely to be minor, positive permanent. This is on the proviso that appropriate mitigation as outlined above is adopted in order to prevent adverse effects on the setting of assets.

6.2.13 Landscape and Townscape

Potential adverse effects on the landscape may result from visual effects, with the added potential for reduced tranquillity in areas where new transport routes are proposed (or re-opening of historic routes).

6.2.13.1 Construction Effects

Construction effects are likely to be temporary given that appropriate landscaping will be implemented to screen new features from existing views and that sensitive material palletes will be used to blend in with townscapes as required.

The effect on tranquillity during construction will be temporary and may be mitigated appropriately by adherence to current good practice measures. Overall the effects of construction of Metro are considered likely to be temporary minor adverse.

6.2.13.2 Operational Effects

The operational effects of Metro are likely to be positive - Metro aims to reduce the volume of traffic. This will improve tranquillity and as a by-product may improve pedestrian safety, resulting in more opportunity for communities to enjoy landscapes in the Metro region;

The overall effect of Metro is therefore considered likely to be minor positive and permanent.

6.2.13.3 Mitigation / Enhancement – Related Policy and Guidance

As above, effects on the landscape will be mitigated by an appropriate landscape scheme and the use of select material / finishing palettes. There is possibility to enhance the contribution of the scheme by 'locking in' reductions in traffic and delivering further community amenity.

6.3 Potential Cross-Boundary and Trans-Boundary Effects of the SW Metro

The SEA regulations require determination of whether a plan is likely to result in significant environmental effects in areas outside of the area covered by the plan. Effects that could result in England have been considered due to the established transport links that exist. No potential significant transboundary effects have been identified in other Member States.

The interventions set out in Metro have potential to affect traffic flows in England. For example, the Mainline relief schemes will facilitate easier cross-border travel by sustainable modes and it is hoped will contribute to a reduction in traffic in communities on both sides of the Severn.

6.4 Mitigation

The adverse effects that have been identified in this SEA are all related to individual interventions (i.e. the effects are likely to be localised), primarily new rail spurs, opening up of

historic routes or significant road improvements associated with provision of BRT along existing minor roads.

There are potential significant adverse effects on biodiversity, heritage and landscape assets, plus increased noise (along re-opened historic routes) although given the use (almost entirely) of existing transport infrastructure corridors the effects are likely to be localised.

Given the above it will be at the intervention level that mitigation will need to be designed, following completion of further environmental assessments as more design information becomes available. The completion of environmental assessments will be the key source of information for the development of robust mitigation measures. The design and implementation of any scheme should take into consideration the principles of:

- Green Infrastructure (and the various associated LPA Green Infrastructure documents; and
- Sustainable Management of Natural Resources.

The proposed scheme should also consider appropriate maintenance regimes to ensure the success of (for example) compensatory planting, water treatment and other measures that are either required to establish over time or which require maintenance and monitoring.

6.5 Difficulties Encountered in the Assessment

The wide range of options and lack of detail around modes of delivery (i.e. OLE, 3rd rail, inverted 3rd rail, BRT (as bus), BRT (as guided bus)) and numerous other options being considered is combined with a lack of information on land take. This contributes to a lack of sound information on aspects such as:

- the appearance (i.e. effect on visual and heritage aspects)
- biodiversity effects (land take, clearance requirements).

To date there has been no detailed environmental appraisal of each intervention therefore this assessment is based on an overview of the Metro area and known constraints, consulting publicly available data sources. Whilst it is considered that this does not affect the relevance of the overall conclusions, the significance of individual interventions may vary from that considered in this SEA once detailed environmental assessments are completed.

7 Monitoring

7.1 Monitoring of Significant Environmental Effects

SEA regulations require the identification of monitoring measures for each of the significant effects identified in the assessment.

Given the identified uncertainty, monitoring measures have been considered and proposed to cover all identified effects, regardless of significance. The benefits of this approach include:

- Identification of trends and trigger points which determine when action must be taken to reduce or offset any potential adverse effects of Metro;
- To determine whether Metro has had any unforeseen environmental effects; and
- Provision of baseline data for future SEAs.

7.2 Monitoring Measures

The proposed measures are set out in the table below. These measures are based on the scheme information available at the time of writing and are likely to require update as understanding of the effects develops with time and in response to consultation comments received.

Any amendments to the proposed monitoring will be documented in the SEA Statement, which will be published alongside the final Metro proposals. The Statement will confirm the final arrangements for monitoring significant environmental effects of Metro.

Table 19: Monitoring Framework

Topic	Indicator	Responsibility	Timeframe
Material Assets, Climatic Factors	• % of materials sourced from within a 50 mile radius of the route – alternatively, Carbon Miles associated with materials required for Metro interventions. • % materials responsibly sourced • % materials by volume reclaimed or recycled. • % of existing structures and materials to be retained and used on-site • % energy consumption and carbon emissions reduction as a result of incorporated energy saving measures • % of excavated material reused on site • % of waste diverted from landfill • % of waste by disposal method • % reduction of waste through efficient design and construction	TfW	Annually
Climatic Factors, Air	• Number of exceedances of air pollution limits recorded during construction and operation • Improvements to existing AQMAs	TfW	Annually
Population	• Number of sites developed for commercial and residential use around route corridor • Number of jobs created directly from construction and operation • % workforce from local businesses/contractors • % population within 30 minutes travel time of major services or employment centres	TfW	Annually

Topic	Indicator	Responsibility	Timeframe
Soil, Water	• % of brownfield land re-used/improved by the Metro Programme • Improvements in groundwater quality • Impact on WFD status of nearby watercourses compared to the baseline status • % of BMV agricultural land lost • Volume of soil either re-used within Metro or made available for other developments in the region	TfW	Annually
Water	• % of surface runoff managed at source through infiltration during operation • % of infrastructure in Flood Zones 2 or 3 • Operational run-off rates • % of runoff undergoing treatment and corresponding WFD status of receiving waters	TfW	Annually
Biodiversity, Flora, Fauna	• Amount of new habitat creation/enhanced as part of the Programme • Number of green infrastructure developments approved/created as part of the Programme • % of ecological features lost as a result of the Programme • % habitat created or improved from the baseline within 500m of the Metro corridors	TfW	Annually
Climatic Factors	• Number of climate resilience features included • % of existing infrastructure with improved climate resilience • Number of delays and delay duration	TfW	Annually
Population, Human Health	• Number of pedestrians/cyclist users • Improvements to Noise Action Planning Priority Areas • Number of journeys by Metro per person per annum • Community deprivation (measured through IMD) • % of deprived communities within 500m of a public transport mode • % transport routes with connecting access to green space • % Metro corridors with active travel links and % new active travel routes resulting from Metro	TfW	Annually
Population, Human Health	• % population within 30 minutes of employment, recreational and healthcare facilities • % of step-free access • Journey time reliability compared to baseline conditions • Change in congestion on local roads surrounding the route corridor • % modal shift	TfW	Annually
Cultural Heritage, Landscape	• Number of designated and non-designated heritage assets affected (positive and negative) by the Metro Programme • Area of historic landscape characterisation type(s) which have changed as a result of the Metro Programme • Number of heritage assets protected, recorded or damaged during construction of Metro • Number of landscape enhancements that can be included within the Programme (public art, tree planting etc.) • Number of archaeological assets damaged during construction (monitored through a watching brief).	TfW	

Topic	Indicator	Responsibility	Timeframe
	- Noise levels along Metro corridors and within Quiet Areas %lighting along Metro routes designed to be environmentally sensitive		
Water	% of development in flood zone (and which flood zone - Design runoff rates %, length or area of existing infrastructure brought up to current flood protection standards as a result of Metro - Water use during construction and operation	TfW	Annually
Climatic Factors, Material Use	% recycled materials / re-used materials incorporated into Metro - Volume of materials saved via design interventions - Number of sustainable (.e. water / energy saving) measures incorporated - Other sustainability measures (i.e. green rooves etc) recorded as number - Energy usage during construction and operation	TfW	Annually

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8 Next steps

This section of the report sets out the subsequent stages of the SEA:

- Stage D: Consultation with the public and statutory bodies; and
- Stage E: Monitor the effects of Metro on the environment.

Each of these stages is described below.

8.1 Stage D: Consultation with the public and statutory bodies

The SEA regulations set specific requirements for consultation with Statutory Environmental Bodies, the public and other potential stakeholders. This Environmental Report is available for all of these parties so that they can provide a response to the contents. Copies of the report, can be made available electronically on request.

8.2 Further assessment

Following completion of consultation, it is considered that further assessment of some of the Metro interventions will be required. This is due to either ongoing changes / design progress or as a result of consultation responses and changes in policy / guidance during the lifetime of the project.

8.3 Adoption of SW Metro Proposals

A SEA Statement will be published when Metro is adopted. The purpose of this statement is to outline how the environmental assessment and consultation has influenced the scheme.

8.4 Monitoring the significant effects of the SW Metro

The SEA directive includes a requirement for monitoring of the significant effects of plans and programmes. The development of a monitoring strategy will allow the actual effects of the scheme to be tested against the predicted effects. Trends will enable problems to be identified and resolved and will enable baseline information to be gathered for future schemes.

A. Review of other Policies, Plans and Programmes

Table 20: Review of Plans and Policies

Plan Title	Plan Description and Key Relevant Objectives/Targets	Implications for the South Wales Metro Programme
Air		
Convention on Long-range Transboundary Air Pollution (UNECE, 1979)	Since 1979 the Convention on Long-range Transboundary Air Pollution (CLRTAP) has addressed some of the major environmental problems of the UNECE region through scientific collaboration and policy negotiation. The convention involves 50 parties and includes protocols which identify specific measures to be taken by parties to cut their emissions of air pollutants. Consider the requirements of the convention in the development of interventions. Affected issues: air quality	Consider the requirements of the convention in the development of interventions Affected issues: air quality
Thematic Strategy on Air Pollution	This sets environmental and health quality objectives to be obtained by 2020 while also specifying emission reductions for SO ₂ , NO _x , VOCs and ammonia	Consider the requirements of the strategy in the development of interventions. Affected issues: air quality
EU Directive 1996/62/EC - on Ambient Air Quality Assessment and Management (The Air Quality Framework Directive) and various daughter Directives (Statutory) (1999/30/EC); (2000/69/EC); (2002/3/EC); (2004/107/EC)	EU Directives legally bind all Member States to an overall objective regarding the assessment and management of ambient air quality through the establishment of mandatory air quality standards and limits for selected air pollutants. This Directive, along with the daughter Directives, address individual and specific groups of pollutants including sulphur dioxide, nitrogen dioxide, particulate matter, lead and ozone (which are pollutants governed by pre-existing ambient air quality objectives) and benzene, carbon monoxide, polyaromatic hydrocarbons, cadmium, arsenic, nickel and mercury. Consider the requirements of the EU Directive in the development of interventions in order to mitigate negative effects on ambient air quality, and improve and maintain good air quality	Consider the requirements of the EU Directive in the development of interventions in order to mitigate negative effects on ambient air quality, and improve and maintain good air quality Affected issues: Air quality
EU Directive 2001/81/EC - on national emission ceilings for certain atmospheric pollutants	This Directive sets the limits on total national emissions from four pollutants – sulphur dioxide, nitrogen oxides, volatile organic compounds and ammonia. Key points raised from the Directive include: • EU countries had to ensure that, by 2010, emissions of the four pollutants were below the ceilings set out in the legislation and remained below in subsequent years • Each country had to draw up a national programme by 1 October 2002 to meet these targets. These were to contain the policies and measures to be taken and their likely impact. If necessary, they were to be updated in 2006 • The programmes were and still are to be made available to the public and environmental and other organisations	Consider the requirements of the EU Directive in the development of interventions in order to support the aim that national emission ceilings for atmospheric pollutants related to transport are not exceeded Affected issues: Air quality
Environmental Protection Act 1991	The Environmental Protection Act 1990 establishes in England, Scotland and Wales businesses' legal responsibilities for the duty of care for waste, contaminated land and statutory nuisance	Consider the requirements of the Act in the development of interventions Affected issues: air quality, health and wellbeing
Air Quality Wales Standards Regulations 2010	Transposes Air Quality Directive into UK Law (applicable to Wales only)	Consider the requirements and objectives of the standards in the development of interventions Affected issues: air quality, health and wellbeing
Air Quality and Climate Change: a UK perspective (2007)	Report regarding the two key environmental concerns for the government	Consider interactions between air quality improvement measures and climate change impacts and vice versa Affected issues: air quality, climate change

Plan Title	Plan Description and Key Relevant Objectives/Targets	Implications for the South Wales Metro Programme
The Air Quality Strategy for England, Scotland, Wales and Northern Ireland (July 2007)	This Air Quality Strategy sets out air quality objectives and policy options to further improve air quality in the UK from today into the long term. As well as direct benefits to public health, these options are intended to provide important benefits to quality of life and help to protect our environment	Consider the requirements and objectives of the strategy in the development of interventions Affected issues: air quality, health and wellbeing
Environment Strategy for Wales 2006: Air Quality Policy	The Environment Strategy for Wales is aimed at reducing air pollution and increasing life expectancy while taking into account most of the vulnerable people and increasing ecological protection	Consider the objectives and measures set out in the strategy in the development of interventions Affected issues: air quality and human health
Biodiversity, Flora and Fauna		
Bern Convention on the Conservation of European Wildlife and Natural Habitats (1979)	The convention led to agreements that the member states of Europe should recognise the essential role played by wild flora and fauna in maintaining biological balances and be aware that the conservation of natural habitats is a vital component of the protection and conservation of wild flora and fauna	Consider the conservation of biodiversity in the development of interventions. Affected issues: biodiversity
Bonn Convention on the Conservation of Migratory Species of Wild Animals (1979)	This convention aims conserve terrestrial, marine and avian migratory species throughout their range. It is an intergovernmental treaty, concluded under the aegis of the United Nations Environment Program	Consider the Bonn Convention's aims in the development of interventions in order to try to avoid or minimise land-use related impacts on migratory species and their habitats Affected issues: biodiversity
Convention on Biological Diversity, Rio de Janeiro (1992)	A multilateral treaty focusing on: • Conservation of biodiversity; • Sustainable use of its components; and • Fair and equitable sharing of benefits arising from genetic resources	Consider the Convention on Biological Diversity in the development of interventions in order to facilitate the protection and enhancement of biodiversity Affected issues: biodiversity
Halting the Loss of Biodiversity By 2010 — and Beyond: Sustaining ecosystem services for human well-being	The European Community and its Member States are contracting parties to the UN Convention on Biological Diversity and EU Heads of State and Government undertook in 2001 to halt the decline of biodiversity in the EU by 2010 and to restore habitats and natural systems. In 2002, they also joined some 130 world leaders in agreeing to significantly reduce the rate of biodiversity loss globally by 2010. In May 2006, the European Commission adopted a communication on 'Halting Biodiversity Loss by 2010 – and Beyond: Sustaining ecosystem services for human wellbeing'	Consider the Communication in the development of interventions in order to promote biodiversity and avoiding/reducing habitat fragmentation Affected issues: biodiversity
Natural Environment White Paper (2012)	The Natural Environment White Paper recognised that a healthy natural environment is the foundation of sustained economic growth, prospering communities and personal wellbeing. It sets out how the value of nature can be mainstreamed across our society by facilitating local action; strengthening the connections between people and nature; creating a green economy and showing leadership in the EU and internationally	Consider the aims of the White Paper to foster a healthy natural environment Affected issues: biodiversity, health and well-being
The State of Natural Resources Report (SoNaRR) 2016	The report sets out the state of Wales' natural resources. It assesses the extent to which natural resources in Wales are being sustainably managed, and recommends a proactive approach to building resilience. The report links the resilience of Welsh natural resources to the well-being of the people of Wales	Consider the findings and recommendations of SoNaRR in the development of interventions

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	The report looks at how pressures on Wales' natural resources are resulting in risks and threats to long-term social, cultural, environmental and economic well-being, as set out in the Well-Being of Future Generations (Wales) Act 2015	Affected issues: biodiversity, health and well-being, water, air, landscape
UK Post-2010 Biodiversity Framework (2012)	The Framework covers the period from 2011 to 2020, and was developed in response to two main drivers: the Convention on Biological Diversity's (CBD's) Strategic Plan for Biodiversity 2011-2020 and its 5 strategic goals and 20 'Aichi Biodiversity Targets'	Consider the framework in the development of interventions in order to protect and enhance biodiversity Affected issues: biodiversity
Wildlife and Countryside Act 1981	The Act makes it an offence (subject to exceptions) to intentionally kill, injure, or take, possess, or trade in any wild animal listed in Schedule 5, and prohibits interference with places used for shelter or protection, or intentionally disturbing animals occupying such places. The Act also prohibits certain methods of killing, injuring, or taking wild animals. The Act requires surveying authorities to maintain up to date definitive maps and statements, for the purpose of clarifying public rights of way	Consider the Act in the development of interventions Affected issues: biodiversity and geodiversity
The Conservation of Habitats and Species Regulations (2010) (amended 2011)	The Conservation of Habitats and Species Regulations 2010 apply in the terrestrial environment and in territorial waters out to 12 nautical miles. The EU Habitats and Wild Birds Directives are transposed in UK offshore waters by separate regulations. The new regulations do not make any substantive changes to existing policies and procedures other than the establishment of the Marine Management Organisation (MMO). The MMO takes on certain licensing functions from Natural England to ensure consistency with the approach in the Marine and Coastal Access Act 2009. The objective of the Habitats Directive is to protect biodiversity through the conservation of natural habitats and species of wild fauna and flora. The Directive lays down rules for the protection, management and exploitation of such habitats and species	Consider the Regulations in the development of interventions in order that all international sites and protected species are safeguarded in accordance with the regulations Affected issues: biodiversity
Space for nature: Landscape-scale action for woodland biodiversity (Woodland Trust, 2002)	Measures to assess opportunities for future action relevant to all habitats and species, existing habitats and landscape	Consider the Plan in the development of interventions Affected issues: biodiversity, landscape, soil
Protection of Badgers Act (1992)	The Protection of Badgers Act makes it a serious offence to kill, injure or take a badger, or to damage or interfere with a sett unless a license is obtained from a statutory authority	Consider measures necessary to comply with the Act Affected issues: biodiversity
TAN 5 – Nature Conservation and Planning (2009)	This technical advice note provides guidance on how the land use planning system should contribute to protecting and enhancing biodiversity and geological conservation	Consider TAN 5 in the development of interventions in order to support delivery of biodiversity objectives The development of interventions should seek to avoid adverse impacts on designated areas, such as SSSIs, SPAs, SACs and others Affected issues: biodiversity and geodiversity
Wales Biodiversity Framework (Wales Biodiversity Partnership, 2007)	The Wales Biodiversity Framework explains the roles, remits and processes essential to biodiversity conservation and enhancement in Wales. Its value lies in that it provides a common point of reference on biodiversity for all organisations and individuals in Wales, whether Government department or local nature enthusiast	Consider the Framework in the development of interventions Affected issues: biodiversity, landscape, soil

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Woodland for Wales Action Plan (WG, 2009)	This action plan sets out an ambition for how woodlands and trees could contribute even more to the people of Wales. It provides a basis across four strategic themes such as responding to climate change, woodlands for people, a competitive and integrated forest sector and environmental quality	Consider the Action Plan in the development of interventions in order to protect and enhance woodland areas. Affected issues: biodiversity, landscape, health and wellbeing, soil
Consultation on the Nature Recovery Plan for Wales (2014)	The Welsh Government consulted on developing a Nature Recovery Plan which would enhance biodiversity, that is, the variety and abundance of the natural world. The Welsh Government believed that the proposals would help reverse the decline in biodiversity across the whole of Wales, on our land and rivers and at sea	Consider the Plan in the development of interventions in order to minimise any effects on biodiversity Affected issues: biodiversity, landscape, soil
The Action Plan for Pollinators in Wales (2013)	This plan aims to reduce, and reverse, the decline in wild and managed pollinator populations. Pollinators include bees, some wasps, butterflies, moths and hoverflies, some beetles and flies. Pollinators are an essential part of our environment. Honeybees are the main managed pollinator of crops and also provide a crop (honey) themselves Wild pollinators, which include bumblebees and butterflies, are also important pollinators for crops like fruit and oil seed rape, for clovers, which help to improve pastures for livestock grazing and wild flowers. They contribute to the diversity of plant species, habitats and wildlife. This provides food, makes Wales a better place for people to enjoy and visit and contributes to our economy	Consider the Action Plan in the development of interventions in order to minimise any effects on biodiversity Affected issues: biodiversity
Green Infrastructure Action Plan for Pollinators In South East Wales (2015)	Seeks to address the decline of pollinators by identifying baseline conditions, measures to benefit pollinators and the preparation of a series of management action plans.	As above. Affected issues: Biodiversity
Local Biodiversity Action Plans – All LPAs	These documents describe the biodiversity resource of each LPA, including how the LPAs will assess planning applications which could have an impact on biodiversity interests, information which must be provided by regulators and the legislative framework within which each LPA operates. More specifically, the documents set out the status of protected species and habitats within each LPA, together with targets for improving, maintaining or managing.	Consider the action plan in the design and implementation of any mitigation measures to ensure that considerations regarding LPA proposed actions are incorporated.
Climatic Factors		
United Nations Climate Change Conferences (1995 – Present)	Annual conferences held in the framework of the United Nations Framework Convention on Climate Change. The conferences are responsible for some of climate change science's biggest commitments, such as the Kyoto Protocol (1997) and the Paris Agreement (2015)	Consider the Framework and Kyoto Protocol in the development of interventions to contribute to reducing emissions from transport Affected issues: climatic factors
EU Strategy on Climate Change – 'Limiting Global Climate Change to 2°C. The way ahead for 2020 and beyond.	The Commission suggests that the EU should adopt targets to reduce greenhouse gas emissions. It calls for the EU to set the target in international negotiations of reducing greenhouse gas emissions in developed countries by 30 % (compared to 1990 levels) by 2020. Until an international agreement is made, and without prejudice to the position it will take in these negotiations, the EU should immediately make the resolute and independent commitment to reduce its own emissions by at least 20 % by 2020. At the March 2007 European Council, Member States also strongly backed these targets	Consider climate change emission strategies that take account of the predicted challenges and changes of the changing climate Affected issues: climatic factors

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Directive 2009/28/EC on the promotion of the use of energy from renewable sources and subsequently repealing Directives 2001/77/EC and 2003/30/EC	This directive, which amends and repeals earlier Directives 2001/77/EC and 2003/30/EC, creates a common set of rules for the use of renewable energy in the EU so as to limit greenhouse gas (GHG) emissions and promote cleaner transport. It sets national binding targets for all EU countries with the overall aim of making renewable energy sources account by 2020 for 20% of EU energy and for 10% of energy specifically in the transport sector (both measured in terms of gross final energy consumption, i.e. total energy consumed from all sources, including renewables)	Consider renewable energy sources in the development of interventions Affected issues: climatic factors
Environment Strategy for Wales and State of the Environment 2011	The Environment Strategy is the Welsh government's long term strategy for the environment of Wales, setting the strategic direction for the next 20 years (to 2026). It provides the framework within which to achieve the government's vision for the environment of Wales. The Strategy has five main environmental themes: • addressing climate change • sustainable resource use • distinctive biodiversity, landscapes and seascapes • local environment • environmental hazards For each of these subjects, the Strategy explains the issues and where we are now. It sets out the environmental outcomes we want to achieve and the associated indicators and timelines for delivery	Consider the objectives of the strategy in the development of interventions Affected issues: climatic factors, resources, biodiversity, landscape, health.
Climate Change – UK Programme (2006)	The project should assist in lowering carbon emissions and help combat climate change. Also, significant infrastructure projects should be assessed in terms of their resilience to climate change and this will need to be considered as part of the SEA.	Consider the Programme in the development of interventions in order to contribute to emission reduction and adaptation Affected issues: climatic factors
Climate Change Act 2008	As the key UK document on Climate Change it contains a very broad range of issues covering the UK's strategy for climate change, actions to reduce emissions and adaptation to climate change. The UK's legally binding target under the Kyoto Protocol to reduce its greenhouse gas emissions to 12.5% below 1990 levels by 2008-2012 and its domestic goal of a 20% reduction in carbon dioxide emissions below 1990 levels by 2010. Emissions reductions are focussed in the following sectors: Energy supply; Business; Transport; Domestic; Agriculture, forestry and land use; and Public sector	Consider the Climate Change Act 2008 in the development of interventions in order to contribute to emission reduction and adaptation Affected issues: climatic factors
Low Carbon Transport: A Greener Future - A Carbon Reduction Strategy for Transport (DfT, 2009)	In 2008 the UK Government passed the Climate Change Act. It was the first legislation in the world to create a legally binding framework to tackle climate change. The Act sets the legally binding target of an 80% cut in greenhouse gas emissions by 2050, and sets a carbon budgeting system that caps emissions over five year periods. It also provides UK governments with powers regarding preparing for climate change impacts. The two key aims of the Act are to: • Improve carbon management, helping the transition towards a low-carbon economy in the UK; and • Demonstrate UK leadership internationally, signalling commitment to taking our share of responsibility for reducing global emissions in the context of developing international negotiations	Consider the Carbon Reduction Strategy in the development of interventions in order to contribute to emission reduction Affected issues: climatic factors
Planning our electric future: a 'White Paper for secure, affordable	Actions to deliver cuts in emissions in line with meeting UK obligations under carbon budgets 2022	Consider the White Paper in the development of interventions in order to contribute to emission reduction

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and low carbon electricity - UK white paper on energy (2011)		Affected issues: climatic factors
Policy Document: A Review of Planning and Climate Change (2007)	This sets out the Government's commitment to transform the UK's electricity system to ensure that our future electricity supply is secure, low-carbon and affordable	Consider the report's recommendations in the development of interventions in order to contribute to emission reduction Affected issues: climatic factors
The Stern Report (2007)	To deliver sustainable development, and in doing so a full and appropriate response on climate change, regional planning bodies and all planning authorities should prepare, and manage the delivery of, spatial strategies that: • Make a full contribution to delivering the Government's Climate Change Programme and energy policies, and in doing so contribute to global sustainability; • In providing for the homes, jobs, services and infrastructure needed by communities, and in renewing and shaping the places where they live and work, secure the highest viable resource and energy efficiency and reduction in emissions; • Deliver patterns of urban growth and sustainable rural developments that help secure the fullest possible use of sustainable transport for moving freight, public transport, cycling and walking; and, which overall, reduce the need to travel, especially by car; • Secure new development and shape places that minimise vulnerability, and provide resilience, to climate change; and in ways that are consistent with social cohesion and inclusion; • Conserve and enhance biodiversity, recognising that the distribution of habitats and species will be affected by climate change; • Reflect the development needs and interests of communities and enable them to contribute effectively to tackling climate change; and • Respond to the concerns of business and encourage competitiveness and technological innovation in mitigating and adapting to climate change	Consider the Review in the development of interventions in order to contribute to emission reduction Affected issues: climatic factors
Climate change strategy for Wales (2010)	Transposes the requirements of Directive 2001/42/EC into UK Law as applicable to Wales. As well as setting out how the Welsh Government will meet its target for emission reduction and proposed action on climate change adaptation, this document provides the Welsh Government's contribution to the UK Government report on policies and proposals to meet the carbon budgets required by the UK Climate Change Act	Consider the Strategy in the development of interventions in order to contribute to emission reduction Affected issues: climatic factors
A Low Carbon Revolution- The Welsh Assembly Government Energy Policy Statement (2010)	This policy statement sets out Welsh Government ambitions for low carbon energy in Wales. The statement builds on the results of consultations on the Renewable Energy Route Map and the Bioenergy Action Plan for Wales. It draws on the work of the Wales Climate Change Strategy, the National Energy Efficiency and Savings Plan, the Green Jobs Strategy and the Ministerial Advisory Group on Economy and Transport's report on "The Energy Sector". This statement also reflects the UK policy position, the work of the UK Climate Change Commission and the UK National Policy Statements on Energy and Renewables. This statement objectives are: • Maximise energy savings and energy efficiency; • Move to resilient low carbon energy production; • Ensure that the transition to low carbon maximises the economic renewal opportunities	Consider the Policy Statement in the development of interventions Affected issues: climatic factors
Environment (Wales) Act (2016)	The Environment (Wales) Act aims to achieve significant economic, social and environmental benefits for Wales. The key parts of the act that are relevant to the South Wales Metro Scheme are that Welsh Ministers' are granted	Consider the emission reduction targets set out in the Act in the development and

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	the powers to put in place statutory emission targets, including at least an 80% reduction in emissions by 2050 and carbon budgeting to support their delivery.	delivery of the South Wales Metro Programme Affected issues: climatic factors
Climate Change Risk Assessment for Wales (2012)	Sets out three aims to achieve a low carbon reality: • Maximise energy savings and energy efficiency; • Supply the population with electricity from low carbon sources; • Ensure that this transition maximises economic renewal opportunities for practical jobs and skills	Consider the risks from climate change to the transport system in South Wales and take action/respond/ develop adaptation measures where appropriate, in the development of interventions Affected issues: climatic factors
Climate Change Strategy for Wales: Adaptation Delivery Plan (2010)	This document sets out the specific policies and programmes that the Welsh Government expects to implement in delivering their Adaptation Framework (in Chapter 15 of the Climate Change Strategy)	Consider the Adaptation Delivery Plan in the development of interventions in order to contribute to effective adaptation Affected issues: climatic factors
Climate Change Strategy for Wales: Delivery Plan for Emission Reduction (2010)	The Delivery Plan for Emissions reduction sets out the policies and programmes that will help us meet the target of 3% per year in areas of devolved competence	Consider the Delivery Plan in the development of interventions in order to contribute to emission reduction Affected issues: climatic factors
Route Weather resilience and Climate Change Action Plans – Wales (Network Rail, 2014)	Weather events can cause significant disruption to the operation of train services and can damage rail infrastructure. A move to a warmer climate and a variance in the pattern of precipitation across the year. Wales Route has developed a Weather Resilience and Climate Change Adaptation (WRCCA) plan based on assessments of weather-related vulnerabilities, identification of root causes of historical performance impacts and an understanding of potential future impacts from regional climate change projections	Consider the Adaptation Plans in the development of interventions in order to contribute to adaptation Affected issues: climatic factors, transport, economy
Welsh Government Policy Statement: Preparing for a changing climate (2013)	In this Policy Statement, we set out the challenge of a changing climate and the Welsh Government response, including how we will implement relevant provisions of the Climate Change Act 2008. Climate change is one of the greatest environmental, economic, and social challenges facing the planet. The robust scientific case for human-induced climate change underpins the Welsh Government's commitment to lead action on tackling climate change. Measuring carbon footprints is becoming mainstream, and many public sector bodies, businesses and individuals are taking action to reduce their greenhouse gas emissions	Consider the Policy Statement in the development of interventions in order to contribute to adaptation Affected issues: climatic factors
Cultural Heritage		
Charter for the Protection and Management of Archaeological Heritage (1990)	Charter for the Protection of and Management of Archaeological Heritage, adopted by ICOMOS in 1990. The archaeological heritage is a fragile and non-renewable cultural resource. Land use must therefore be controlled and developed in order to minimise the destruction of the archaeological heritage. Policies for the protection of the archaeological heritage should constitute an integral component of policies relating to land use, development, and planning as well as of cultural, environmental and educational policies. The policies for the protection of the archaeological heritage should be kept under continual review, so that they stay up to date. The creation of archaeological reserves should form part of such policies. The protection of the archaeological heritage should be integrated into planning policies at international, national, regional and local level. Active participation by the general public must form part of policies for the protection of the archaeological heritage. This is essential where the heritage of indigenous peoples is involved. Participation must be based upon	Consider the Charter in the development of interventions Affected issues: cultural heritage

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	access to the knowledge necessary for decision-making. The provision of information to the general public is therefore an important element in integrated protection	
Convention for the Protection of Architectural Heritage of Europe (2009)	Structures along the line may be listed and preservation will have to be considered	Consider the Convention in the development of interventions. Affected issues: cultural heritage, landscape
The Charter for the Conservation and Restoration of Monuments and Sites (1964)	International Charter for the Conservation and Restoration of Monuments and Sites, adopted by ICOMOS in 1965. Requirements include: Essential that monuments are maintained on a permanent basis; The conservation of monuments is always facilitated by making use of them for some socially useful purpose; A monument is inseparable from the setting in which it occurs. The moving of all or part of a monument cannot be allowed except where the safeguarding of that monument demands it or where it is justified by national or international interest of paramount importance; Additions cannot be allowed except in so far as they do not detract from the interesting parts of the building, its traditional setting, the balance of its composition and its relation with its surroundings; and The sites of monuments must be the object of special care in order to safeguard their integrity and ensure that they are cleared and presented in a seemly manner	Consider the Charter in the development of interventions Affected issues: cultural heritage, landscape
The Charter for the Conservation of Historic Towns and Urban Areas (1987)	Charter for the Conservation of Historic Towns and Urban Areas, adopted by ICOMOS in 1987. The charter concerns historic urban areas, large and small, including cities, towns and historic centres or quarters, together with their natural and man-made environments. Beyond their role as historical documents, these areas embody the values of traditional urban cultures	Consider the Charter in the development of interventions Affected issues: cultural heritage, landscape
UNESCO Convention Concerning the Protection of the World Cultural and Natural Heritage (World Heritage Convention) (1972)	The purpose of this Convention is the identification and protection of the world's cultural and natural heritage, places of 'Outstanding Universal Value'. It defines the kind of natural or cultural sites which can be considered for inscription on the World Heritage List and sets out the duties of parties in identifying potential sites and their role in protecting and preserving them. The States Parties are encouraged: - To integrate the protection of the cultural and natural heritage into regional planning programmes, to set up staff and services at their sites; - To undertake scientific and technical conservation research; and - To adopt measures which give this heritage a function in the day-to-day life of the community	Consider the Convention in the development of interventions Affected issues: landscape, cultural heritage, biodiversity and geodiversity
Historic Environment (Wales) Act 2016	The Act intended to give more effective protection to listed buildings and scheduled monuments, enhance existing mechanisms for the sustainable management of the historic environment, and introduce greater transparency and accountability into decisions taken on the historic environment	Consider the requirements of the Act in the development of interventions Affected issues: cultural heritage
Heritage Protection Review White Paper (2007)	This is a white paper for England and Wales with some UK-wide elements. The paper sets out a vision of a unified and simpler heritage protection system which will have more opportunities for public involvement and community engagement	Consider the White Paper in the development of interventions Affected issues: cultural heritage
Protecting our Marine Historic Environment – Making the System Work Better (DCMS/WG/SE/DoENI, 2005)	The report provides a detailed analysis of responses to the consultation on the marine historic environment, and sets out how the Review will be taken forward	Consider the White Paper in the development of interventions

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		Affected issues: cultural heritage, marine environment
Ancient Monuments & Archaeological Areas Act 1979	Sites and monuments of national importance are included on a 'schedule', maintained by Cadw: Welsh Historic Monuments. With a few exceptions, the consent of the Welsh Government, through Cadw, is needed for all works to a scheduled ancient monument	Consider the Act in the development of interventions where appropriate Affected issues: cultural heritage
Historic Environment Strategy for Wales (2012)	Establishes a framework for action based on four priorities: building towards a Heritage Bill; implementing Cadw's Tourism Heritage Tourism project; delivering Cadw heritage interpretation and learning programmes; and delivering Cadw's conservation programme for monuments and for new designations	Consider the Strategy in the development of interventions. Heritage legislation will emerge during the lifetime of the plan. Affected issues: cultural heritage
Review of the Historic Environment in Wales (Cadw, 2004)	Following the conference on the historic environment in Wales held in 2002, the review The document breaks down into three broad sections: • The idea of the historic environment. • The potential of the historic environment. • The main implications for current policy and organisational arrangements of our conclusions on the nature of the historic environment. We have called this Realising the potential	Consider the Review in the development of interventions Affected issues: cultural heritage
Traffic Management in Historic Areas (Cadw, 2003)	This guidance outlines ways in which traffic engineering and highway improvements can be sensitively designed in historic areas. Consideration is given to traffic management, footways and carriageways, materials, signing and street furniture, lighting, access and traffic calming	Consider the Policy in the development of interventions including on street running and Bus Rapid Transit Affected issues: cultural heritage
TAN 24, The Historic Environment, May 2017	Provides guidance on how the planning system considers the historic environment during development plan preparation. Provides specific guidance on particular heritage designations and their consideration in applications.	Consider the policy in the development of Metro interventions.
Landscape		
The European Landscape Convention (2004)	The European Landscape Convention promotes protection, management and planning of European landscape and organises European cooperation on landscape issues. The aim is to promote integration of the landscape dimension in international relations, at national, regional and local levels	Consider the Convention in the development of interventions. Affected issues: landscape, cultural heritage, biodiversity and geodiversity
Countryside and Rights of Way (CRoW) Act 2000	The Act was introduced in 2000 with the intention to give greater freedom for people to explore open countryside and contains provisions to introduce a new statutory right of access for open-air recreation to mountain, moor, heath, down and registered common land. It also includes a power to extend the right to coastal land by order, and enables landowners voluntarily to dedicate irrevocably any land to public access	Consider the Act in the development of interventions Affected issues: population, biodiversity and geodiversity
Brecon Beacons National Park Management Plan	National Parks are landscapes of national and international importance and their designation gives them the highest status for the conservation of status for the conservation of landscape and scenic beauty. The Plan will develop a research and management agenda: • To protect and manage the natural environment.; • To protect and manage the historic environment of the National Park; • To recognise and enhance the role of farming in managing the Park's landscapes including maximising the benefits available from Welsh Assembly agri-environment funding schemes;	Consider the Plan in the development of interventions Affected issues: landscape, biodiversity and geodiversity, cultural heritage

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	- To protect and manage the park's woodlands; - To manage the impact visitors are having on the Park's landscapes and take action to minimise it – particularly on wildlife and their habitats.	
Planning Policy Wales 2016	Planning Policy Wales sets out the land use planning policies of the Welsh Government. With regards to transport the Welsh Government aims to extend choice in transport and secure accessibility in a way which supports sustainable development and helps to tackle the causes of climate change by encouraging a more effective and efficient transport system, with greater use of more sustainable and healthier forms of travel, and minimising the need to travel. This will be achieved through integration: - Within and between different types of transport; - Between transport measures and land use planning; - Between transport measures and policies to protect and improve the environment; and - Between transport measures and policies for education, health, social inclusion and wealth creation.	Consider the requirements of Planning Policy Wales and the interaction between transport and land use, environment, and social and economic aspects Affected areas: Population, health, climatic factors
National Parks and Access to the Countryside Act 1949	Makes provision for National Parks and the establishment of a National Parks Commission. Gives LPAs powers for the establishment and maintenance of nature reserves, creation, maintenance and improvement of public paths PRoW variations for securing access to open country	Provide access to open space via rights of way where possible in interventions.
Material Assets		
Mainstreaming Sustainable Development into EU Policies (2009) including Johannesburg Declaration on Sustainable Development (2002) and EU Sustainable Development Strategy (2006)	This document sets out a single coherent strategy on how the EU will meet long-standing commitments to sustainable development. This document presents a renewed version of the 2001 EU Sustainable Development Strategy (SDS). The aim of the SDS is to identify and develop actions to enable the EU to achieve continuous improvement of quality of life both for current and for future generations, through the creation of sustainable communities able to manage and use resources efficiently and to tap the ecological and social innovation potential of the economy, ensuring prosperity, environmental protection and social cohesion	Consider the Strategy in the development of interventions Affected issues: all
Directives 2006/12/EC and 2008/98/EC on waste– (The Waste Framework Directive)	The Waste Framework Directive (WFD) requires Member States of the EU to establish both a network of disposal facilities and competent authorities with responsibility for issuing waste management authorisations and licenses. Member States may also introduce regulations which specify which waste recovery operations and businesses are exempt from the licensing regimes and the conditions for those exemptions. An important objective of the WFD is to ensure the recovery of waste or its disposal without endangering human health and the environment. Greater emphasis is also placed on the prevention, reduction, re-use and recycling of waste. The revised Directive 2008/98/EC sets the basic concepts and definitions related to waste management and lays down waste management principles such as the "polluter pays principle" or the "waste hierarchy"	Consider the Directive in the development of interventions Affected issues: material assets
EU Directive 99/31/EC - Waste to Landfill	The Directive aims at reducing the amount of waste landfilled, to promote recycling and recovery and to establish high standards of landfill practice across the EU and, through the harmonisation of standards, to prevent the shipping of waste from one Country to another. The objective of the Directive is to prevent or reduce as far as possible negative effects on the environment from the land-filling of waste, by introducing stringent technical requirements for waste and landfills. The Directive also intends to prevent or reduce the adverse effects of the landfill of waste on the environment, in particular on surface water, groundwater, soil, air and human health. It defines the different categories of waste	Consider the Directive in the development of interventions Affected issues: material assets

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	(municipal waste, hazardous waste, non-hazardous waste and inert waste) and applies to all landfills, defined as waste disposal sites for the deposit of waste onto or into land. Reduction of the amount of biodegradable municipal waste sent to landfill to 75% of the total generated in 1995 by 2006, 50% by 2009 and 35% by 2016	
Environment Strategy for Wales and State of the Environment 2011	The Environment Strategy is the Welsh government's long-term strategy for the environment of Wales, setting the strategic direction for the next 20 years (to 2026). It provides the framework within which to achieve the government's vision for the environment of Wales. The Strategy has five main environmental themes: • addressing climate change • sustainable resource use • distinctive biodiversity, landscapes and seascapes • local environment • environmental hazards For each of these subjects, the Strategy explains the issues and where we are now. It sets out the environmental outcomes we want to achieve and the associated indicators and timelines for delivery	Consider the Strategy in the development of interventions Affected issues: all
Securing the Future – Delivering the UK Sustainable Development Strategy (2006)	The Strategy for sustainable development aims to "...enable all people throughout the world to satisfy their basic needs and enjoy a better quality of life without compromising the quality of life of future generations." Guiding principles: • Living within environmental limits • Ensuring a strong, healthy, and just society • Achieving a sustainable economy • Promoting good governance • Using sound science responsibly UK priorities for immediate action: • Sustainable consumption and production; • Climate change and energy; • Natural resource protection and environmental enhancement Sustainable communities	Consider the Strategy in the development of interventions Affected issues: all
The UK shared framework for sustainable development: One Wales one planet (2009)	Welsh Government's strategy for delivering the UK sustainable development strategy in Wales	Consider the framework in the development of interventions Affected issues: all
Waste Strategy 2009-2050: Towards Zero Waste	Sets out milestones over the next half-century. By 2025 there will be a significant reduction in waste, and we will manage any waste that is produced in a way that makes the most of our valuable resources. By 2050, the aim is to have reduced the impact of waste to within our environmental limits. Residual waste will have been eliminated and any waste that is produced will all be recycled	Consider the Strategy in the development of interventions Affected issues: material assets
The Waste (England and Wales) Regulations 2011	The legislation is likely to affect businesses which produce, import or export, carry or transport, keep or store, treat or dispose, or broke or deal in waste (including hazardous waste)	Consider the Directive in the development of interventions Affected issues: resources

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Waste (Wales) Measure 2010	The measure covers significant waste issues such as mandatory charges for retail carrier bags and the option to ban or restrict certain materials from landfill. The measure also sets targets for the percentage of waste that local authorities recycle or compost	Consider the Measure in the development of interventions Affected issues: resources
Waste and Emissions Trading Act 2003	The Act is intended to help the UK meet its European obligations under the Landfill Directive and gives statutory footing to penalties in the world's first economy wide emissions trading scheme	Consider the Act in the development of interventions where appropriate Affected issues: waste management
TAN 8 – Renewable Energy (2005)	This note provides advice on areas including renewable energy technologies, design and how renewable energy should be accounted for as part of development plans, development management and monitoring processes	Consider the Advice Note in the development of interventions Affected issues: climatic factors, landscape, material assets
TAN 21 - Waste (2014)	This note explains the interactions between the national waste strategy, particularly the CIM Sector Plan and the national planning policy. This guidance note provides advice on how the land use planning system should contribute towards sustainable waste management and resource efficiency, reflecting the new waste management drivers at a European Union and Wales level	Consider the Advice Note in the development of interventions Affected issues: material assets
Planning (Wales) Act 2015	The Planning (Wales) Act 2015 gained Royal Assent on 6 July 2015. It intends to create a planning system in Wales 'fit for the 21st Century' by addressing five key objectives: • A modernised framework for the delivery of planning services • Strengthening the plan-led approach • Improved resilience • Frontloading and improving the development management system • Enabling effective enforcements and appeals	Consider the Act in the development of interventions Affected issues: all
Vale of Glamorgan Local Development Plan 2011 – 2026 (currently with the Planning Inspector for Examination)	Objective 3 of the Vale of Glamorgan LDP simply states 'Reduce the need for Vale of Glamorgan residents to travel to meet their daily needs and enabling them greater access to sustainable forms of transport'. The LDP seeks to increase the use of sustainable transport and reduce congestion within the authority. The LDP also ensures that the appropriate infrastructure is provided as part of development proposals to enhance the opportunities for the adoption of sustainable travel patterns	Consider the LDP in the development of interventions Affected issues: all
Merthyr Tydfil Local Development Plan 2006 – 2026 (January 2016) (Adopted)	Sets land use planning objectives for the reporting period. The LDP describes Merthyr Tydfil as the principal town within the county with 80% of the population. Accessibility by public transport is highlighted as a key constraint to employment with existing rail services suffering in terms of timetabling, frequency of service, reliability and integration with other transport modes. A key issue identified is the need to develop sustainable transport links with the surrounding valley settlements along the A465 Heads of the Valleys road corridor. Proposals for new transport, cycling, and pedestrian facilities will be favourably considered where they: • Ensure improvements to the frequency, speed and extent of bus and rail services; • Improve the integration between transport modes • Improve access to the countryside; • Ensure an increased amount of attractive, safe and easy-to-use routes; • Reduce the impacts of vehicular transport on residential areas;	Consider the LDP in the development of interventions Affected issues: all

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	• Reduce traffic congestion; • Assist sustainable regeneration; or • Facilitate social inclusion. The LDP places restrictions on development that would adversely affect heritage assets and the natural environment, allowing development only where there is an overriding need and no harm is demonstrated	
Blaenau Gwent Local Development Plan 2006 – 2021 (November 2012) (Adopted)	The LDP has set three objectives that relate to transport across the authority: • By 2021, the provision of sustainable modes of transport, particularly public transport, walking and cycling, will have increased and the frequency of the public transport system improved; • All developments have been built in accordance with the design guidance, are sustainable, safe by design, and appropriate to their context and have helped improve the quality of the physical and natural environment; • New development has minimised further climate change contributions and, where appropriate, mitigated or adapted to its predicted effects. This has been achieved by: - Maximising the use of land; - Promoting the re-use and restoration of derelict land and building; - By focusing development away from areas vulnerable to flooding; - By reducing energy consumption through improved design and locating development close to hubs and public transport routes; and - By increasing the supply of renewable energy	Consider the LDP in the development of interventions Affected issues: all
Cardiff Local Development Plan 2006 – 2026 (January 2016) (Adopted)	Sets land use planning objectives for the reporting period. Key transportation trends and issues • Traffic on Cardiff's roads grew by 9% between 2002 and 2012. • 56% of Cardiff's residents travel to work by car. • Nearly 77,900 people commute into Cardiff each day by all modes (37% of Cardiff's workforce). The 2001 Census indicates that approximately 80% of commuters travel to Cardiff by car. • Travel on rail services has increased considerably - the use of Cardiff Central and Queen Street Stations has risen by 82% between 2001 and 2011. • Cycle use has increased 10% between 2001 and 2011 but bus use has fallen slightly over the same period. • Cardiff International Airport is located within the Vale of Glamorgan providing the closest international links to Cardiff. • The operational port in Cardiff performs an important role in terms of freight movement. In terms of transportation the LDP seeks "To establish Cardiff as a sustainable travel city by reducing the need to travel, increasing the use of sustainable travel modes and networks (particularly walking and cycling), decreasing private car use and improving the city's key transport hub based at the adjacent central bus and train stations." A key policy of the LDP relating to sustainable transport sets out the following goals: Development in Cardiff will be integrated with transport infrastructure and services in order to:	Consider the LDP in the development of interventions Affected issues: all

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	- Achieve the target of a 50:50 modal split between journeys by car and journeys by walking, cycling and public transport. - Reduce travel demand and dependence on the car; - Enable and maximise use of sustainable and active modes of transport; - Integrate travel modes; - Provide for people with particular access and mobility requirements; - Improve safety for all travellers; - Maintain and improve the efficiency and reliability of the transport network; - Support the movement of freight by rail or water; and - Manage freight movements by road and minimise their impacts. In terms of the environment the LDP seeks to protect bio-diversity by maintaining existing green corridors and sets in place policies to protect the historic environment	
Monmouthshire Local Development Plan 2011 – 2021 (February 2014) (Adopted)	The LDP sets out the Council's vision and objectives for the development and use of land in Monmouthshire, together with the policies and proposal to implement them over a 10-year period to 2021. Transport policies within the LDP include: Policy MV5 Improvements to Public Transport Interchanges and Facilities – proposals for new or improved public transport facilities, especially at railway and bus stations, will be permitted subject to detailed planning considerations. Such facilities should make provision for modal interchange between walking, cycling, buses and motor vehicles	Consider the LDP in the development of interventions Affected issues: all
Rhondda Cynon Taf Local Development Plan up to 2021 (March 2011) (Adopted)	Sets land use planning objectives for the reporting period. The LDP has a core policy of encouraging development of the northern part of the county which will be achieved in part by promoting accessibility by securing investment in new roads, public transport improvements, walking and cycling. It is recognised that growth and investment requires enhancements to transport infrastructure. The LDP places restrictions on development that would adversely affect heritage assets and the natural environment, allowing development only where there is an overriding need and no harm is demonstrated	Consider the LDP in the development of interventions Affected issues: all
Caerphilly Local Development Plan up to 2021 (November 2010) (Adopted) (Note: The Replacement LDP up to 2031 was withdrawn)	Sets land use planning objectives for the reporting period. The Replacement LDP was withdrawn in July 2016 following adverse reaction to the designation of land to the south of Caerphilly for residential development. The previously adopted LDP (to 2021) was adopted in 2010 and remains current. This LDP identifies 30,000 people commuting outside Caerphilly County for employment (30% to Cardiff) and also identifies a significant commuter flow across the valleys. The LDP identifies the north of the county as a key strategic growth area which will require improved transport infrastructure to succeed. In terms of transport infrastructure, the LDP seeks to implement improvements to the existing transport infrastructure that: - Address social exclusion by increasing accessibility to employment, services and facilities throughout the County Borough and/or - Assist in regenerating the Heads of the Valleys Regeneration Area through creating and improving transport links to the settlements in the Northern and Southern Connections Corridors, and/or - Reinforce the role and function of settlements, and/or	Consider the LDP in the development of interventions Affected issues: all

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	- Reduce the level of traffic movements and/or congestion, within any identified air quality management area, and/or - Promote the most efficient use of the transport network. In addition new development is expected to demonstrate: - Reductions in the need for travel - Discourage the use of private cars over other transport modes; - Avoid increasing traffic to unacceptable levels The LDP also seeks to protect and enhance the existing natural and historical environment through maintaining existing designations and preventing development that would adversely affect protected sites	
Torfaen Local Development Plan (to 2021) (December 2013) (Adopted)	The policy aims to deliver sustainable development through promoting sustainable transport choices. Developments that promote a sustainable transport hierarchy by way of improved accessibility through public transport, walking & cycling provision, more efficient use of the existing highway network, adequate parking provision and new road building, where necessary, will be supported.	Consider the LDP in the development of interventions Affected issues: all
Bridgend Local Development Plan 2006 – 2021 (September 2013) (Adopted)	The LDP sets out the Council's objectives for the development and use of land in Bridgend County Borough over the plan period to 2021, and its policies to implement them. The LDP contains numerous policies including those on transport planning and protecting and enhancing the environment Strategic policy SP3 Strategic Transport Planning Principles states that land-use transportation solutions will be required to deliver a more effective, efficient, and accessible transport systems according to the following principles: - Improves public transport links between the Primary Key Settlement of Bridgend and the main settlements of the County Borough, and links with Cardiff and Swansea; - Develops the roles of Bridgend and Maesteg as 'Transport Hubs'; - Favours development which is located close to public transport facilities; - Reduces congestion, the need to travel, and reliance on the private car; - Reduces the negative impact of road freight transport; - Improves road safety; - Makes better use of the core, strategic and local highway network; - Encourages rail freight movement within the County Borough; - Provides appropriate standards of car parking; - Maximises the potential for sustainable transport infrastructure and services; and - Provides strategic lorry parks at appropriate locations in the County Borough	Consider the LDP in the development of interventions Affected issues: all
Newport Local Development Plan 2011 - 2026 (January 2015) (Adopted)	The LDP contains a spatial strategy and strategic policies that provide the overall direction for the Plan and broad locations for development. Key relevant strategic policies include: - SP1 Sustainability – requires proposals to make a positive contribution to sustainable development; - SP14 Transport Proposals – supports transport proposals that provide traffic-free walking and cycling; encourage use of public transport; improve road safety, improve quality of life; assist the local	Consider the LDP in the development of interventions Affected issues: all

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	economy; assist urban regeneration, provide access to new development areas, relieve traffic congestion, result in other environmental improvements; SP15 Integrated Transport – states that integrated transport will be pursued in line with the national and regional transport strategies. The LDP also contains general policies and topic specific policies on areas such as environmental protection and sustainable transport	
Noise and Vibration		
EU Directive 2002/49/EC Relating to the Assessment and Management of Environmental Noise - The Environmental Noise Directive (2002)	The aim of the Environmental Noise Directive (END) defines a common approach across the European Union with the intention of avoiding, preventing or reducing on a prioritised basis the harmful effects, including annoyance, due to exposure to environmental noise. It involves: - Informing the public about environmental noise and its effects; - Preparing of strategic noise maps for: large urban areas (referred to as 'agglomerations' in the END and in this document), major roads, major railways and major airports as defined in the END; and - Preparing action plans based on the results of the noise mapping exercise. Such plans will aim to manage and reduce environmental noise where necessary, and preserve environmental noise quality where it is good	Consider how to avoid, reduce and mitigate environmental noise in the development of interventions Affected issues: noise and vibration
A Noise Action Plan for Wales 2013 – 2018 (2013)	As required by the EU Directive, the Welsh Government has produced this action plan laying out how the different forms of noise are being managed across Wales and by whom, and provides summaries of evidence to support noise policy and examples of positive initiatives that have taken place in Wales to date. As part of this mandatory action plan, the Welsh Government details policy and practice for: - Noise and new development; - Tranquil green space in the built environment; - Road noise management; - Railway noise management; - Industrial noise management; - Other forms of noise (including air and maritime transport) The Environmental Noise Directive says that noise action plans should be drawn up for built-up areas with over 100,000 people living in them. There are 3 such areas in Wales: - Cardiff and Penarth - Newport - Swansea and Neath Port Talbot. The last 3 chapters of the plan are devoted to these three large urban areas	Consider how to avoid, reduce and mitigate environmental noise in the development of interventions Affected issues: noise and vibration
TAN 11 – Noise (1997)	Guidance on how the planning system can be used to minimise the adverse impact of noise without placing unreasonable restrictions on development. It also highlights control processes as well as noise exposure categories for different types of activity which should be taken into account during the consideration of proposals for residential development	Consider how to avoid, reduce and mitigate environmental noise in the development of interventions Affected issues: health and well being
Population and Human Health		

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Well-being of Future Generations (Wales) Act 2015	The Act is about improving the social, economic, environmental, and cultural well-being of Wales. It sets out seven well-being goals: • A prosperous Wales • A resilient Wales • A healthier Wales • A more equal Wales • A Wales of cohesive communities • A Wales of vibrant culture and thriving Welsh language • A globally responsible Wales	Consider the Act in the development of interventions Affected issues: All
The Natural Environment and Communities Act 2006 (NERC Act)	The Natural Environment and Rural Communities Act is designed to help achieve a rich and diverse natural environment and thriving rural communities through modernised and simplified arrangements for delivering Government policy. It is about conserving and enhancing places and nature and helping people to enjoy them – taking a wider view, pursuing environmental management which encompasses access and recreation, and aiming where possible to achieve economic and social outcomes alongside conservation goals.	Consider the Act in the development of interventions Affected issues: All
Partnership for growth: The Welsh Government Strategy for Tourism	Policy is to increase the use of public transport for journeys to and within Wales. This project will help to facilitate this aim	Consider the Partnership in the development of interventions Affected issues: economy, health and wellbeing, material assets
Tackling Poverty Action Plan 2012-2016	Sets out how the Welsh Government are balancing the need to tackle the impacts of poverty now, with the need to tackle the issues which will cause people to be in poverty in the future. Supplements the delivery of the statutory Child Poverty Strategy and builds on complementary strategies such as the Fuel Poverty Strategy. Details what the Welsh Government is already doing to tackle poverty and sets out the plan of additional tasks to address the key objectives: To prevent poverty; To help people to improve their skills and enhance the relevance of their qualifications; To mitigate the impact of poverty.	Consider the Action Plan in the development of interventions as transport is an important aspect of helping people to take up job opportunities and earn an income Affected issues: population, health and wellbeing, material assets, transport
Wales Infrastructure Investment Plan for Growth and Jobs, Welsh Government (2012) Wales Infrastructure Investment Plan for Growth and Jobs: Project Pipeline Update (2014)	The Wales Infrastructure Investment Plan (WIIP) provides the context for national government infrastructure investment, ensuring that its future capital investment is used to deliver the maximum benefits to Wales	Consider the WIIP in the development of interventions Affected issues: population, health and wellbeing, material assets, transport
The strategy for older people in Wales (2013 – 2023)	This third phase of the Strategy focuses on ensuring that older people in Wales have the resources they need to deal with the challenges and opportunities they face. The plan focusses on the three priorities for the Strategy for Older People. These priorities are that older people in Wales have the social, environmental and financial resources to age well	Consider the Strategy in the development of interventions Affected issues: health and wellbeing, population
Economic Renewal: A New Direction (2010)	Sets out a new programme from the Welsh Government to develop a new direction for economic renewal. Sets out plans to shape the conditions in which the dynamic economy function and the role the government and wider public sector can play in promoting success in the private and third sectors	Consider the Plan in the development of interventions

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		Affected issues: population, health and wellbeing, material assets.
Taking Wales Forward (2016)	This programme sets out the planned improvement to the Welsh economy and public services over the next 5 years	Consider the objectives of the programme in the development of interventions
TAN 6 – Planning for Sustainable Rural Communities (2010)	TAN 6 provides advice on areas including sustainable rural communities and economics, rural affordable housing, rural enterprise dwellings, one planet developments, sustainable rural services and sustainable agriculture	Development of interventions should consider the need for agricultural and rural developments Affected issues: soil, biodiversity and geodiversity, economy
TAN 23 – Economic Development (2014)	This Technical Advice Note provides advice on various aspects relating to this area including developing high level economic planning objectives, assessing the economic benefits of new development, economic development and the rural economy, how economic development should be considered through the Local Development Plan process and determining employment land supply	Consider the Advice Note in the development of interventions Affected issues: biodiversity and geodiversity, economy, landscape
Learner Travel (Wales) Measure (Welsh Government, 2008)	This measure sets out school the travel policy for Wales. It includes the delivery of improvements for learners through increasing entitlement to transport for young children	Consider the measures in the development of interventions
Soil		
EC Thematic Strategy for Soil protection 2007	The European Commission's Thematic Strategy for Soil Protection consists of a Communication from the Commission to the other European Institutions, a proposal for a framework Directive (a European law), and an Impact Assessment. It explains why further action is needed to ensure a high level of soil protection, sets the overall objective of the Strategy and explains what kind of measures must be taken. It establishes a ten-year work programme for the European Commission. The proposal for a framework Directive (COM (2006) 232) sets out common principles for protecting soils across the EU. Within this common framework, the EU Member States will be in a position to decide how best to protect soil and how use it in a sustainable way on their own territory The objectives of the Thematic Strategy are to: • establish common principles for the protection and sustainable use of soils; • prevent threats to soils, and mitigate the effects of those threats; • preserve soil functions within the context of sustainable use; and • restore degraded and contaminated soils to approved levels of functionality	Consider the Strategy in the development of interventions in order to protect soils by avoiding or minimising processes of erosion, loss of organic matter, soil compaction, salinisation, landslides and contamination through changes in the transport network Affected issues: Soil, material assets, human health, biodiversity, flora and fauna
Contaminated Land (Wales) Regulations 2006	Enacts Part 2A of the Environmental Protection Act 1990	Consider the requirements of the Regulations in the development of the interventions Affected issues: water, health, biodiversity

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Soil: a precious resource (2007)	This document identifies NRW's priorities, sets out NRW's role and describes future relevant actions. Among the overarching objectives of NRW in relation to soil protection are: • Raising awareness of the importance of soil as natural resource that requires the same level of protection as water and air; • Emphasise the environmental importance of the links between soil, air and water and taking this into account when managing soil; • Sustainable soil management; and • Prevention of soil pollution	Consider the document in the development of interventions in order to consider soil resources in terms of soil pollution and sustainable soil management
The Welsh Soils Action Plan (Consultation Draft, 2008)	As one of the commitments from the Environment Strategy for Wales, the Welsh Government is developing a Welsh Soils Action Plan. This identifies the priority threats to Welsh soils as: • Climate Change • Soil Sealing • Contamination, including Acidification and Eutrophication • Soil Erosion • Degradation of Soil Structure • Decline in Organic Matter • Soil Loss to Extraction It proposes a series of actions to combat or mitigate these threats	Delivery of intervention to consider how to support the actions of the Draft Soils Action Plan Affected issues: soil, biodiversity
Transport		
EU Directive 2003/30/EC for the promotion of bio-fuels for transport	The directive aims to promote the use of bio fuels or other renewable fuels for transport purposes. Member states should aim to provide 2% of all petrol in the form of bio fuels by 2005 increasing to 5.75% by 2010	Consider the role of bio fuels in South Wales and its potential to reduce greenhouse gas emissions Affected issues: transport, climatic factors, landscape
European Commission White Paper – Roadmap to a Single European Transport Area (2011)	The European Commission adopted a roadmap of 40 concrete initiatives for the next decade to build a competitive transport system that will increase mobility, remove major barriers in key areas and fuel growth and employment. At the same time, the proposals will dramatically reduce Europe's dependence on imported oil and cut carbon emissions in transport by 60% by 2050. By 2050, key goals will include: • No more conventionally-fuelled cars in cities; • 40% use of sustainable low carbon fuels in aviation; at least 40% cut in shipping emissions; • A 50% shift of medium distance intercity passenger and freight journeys from road to rail and waterborne transport; • All of which will contribute to a 60% cut in transport emissions by the middle of the century	Consider these goals which will protect and improve the environment and curb greenhouse gas emissions Affected issues: population, health and wellbeing, climatic factors
European Commission White Paper on the European Transport Policy (EC, 2001)	With its Transport Policy White Paper, the Commission proposed an Action Plan aimed at bringing about substantial improvements in the quality and efficiency of transport in Europe. It also proposed a strategy designed to gradually break the link between constant transport growth and economic growth in order to reduce the pressure on the environment and prevent congestion while maintaining the EU's economic competitiveness.	Consider these objectives and measures which will protect and improve the environment and curb greenhouse gas emissions

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	Approximately 60 measures are set out to develop a transport policy for Europe's citizens. Amongst others 'towards sustainable mobility': Transport in Europe must, as a matter of priority, be compatible with environmental protection. To this end, the Commission proposed a wide range of measures to develop fair infrastructure charging which takes into account external costs and encourages the use of the least polluting modes of transport, to define sensitive areas, in particular in the Alps and Pyrenees, which should be eligible for additional funding for alternative transport, and to promote clean fuels. The principal measures suggested in the White Paper include: • Revitalising the railways; • Improving quality in the road transport sector; • Striking a balance between growth in air transport and the environment; • Transport and the environment; • Turning inter modality into reality; • Improving road safety; • Adopting a policy on effective charging for transport; • Recognising the rights and obligations of users; • Developing high-quality urban transport; and • Developing medium and long-term environmental objectives for a sustainable transport system	Affected issues: population, health and wellbeing, climatic factors
EU Green Paper "Towards a new culture for urban mobility" (2007)	The European Commission adopted the Green Paper "Towards a new culture for urban mobility" in September 2007. This consultation document opened a debate on the key issues of urban mobility: free-flowing and greener towns and cities, smarter urban mobility and urban transport which are accessible, safe and secure for all European citizens. European towns and cities face five challenges which need to be met as part of an integrated approach. Issues and options are considered around the themes of: • Towards free-flowing towns and cities • Towards greener towns and cities • Towards smarter urban transport • Towards accessible urban transport • Towards safe and secure urban transport	Consider the issues raised and how the actions that arise from the Green Paper can be incorporated into the Programme. Affected issues: climatic factors, health and wellbeing
Active Travel (Wales) Act (Welsh Government, 2013)	Places obligations on local authorities to increase provision for walking and cycling. The Welsh Government is committed to enabling more people to undertake and enjoy the benefits of active travel. The Government want to encourage people to leave their cars behind and use active travel where it is suitable for them to do so. The Active Travel (Wales) Act 2013 requires local authorities in Wales to produce active travel maps and deliver year on year improvements in active travel routes and facilities. The planning system has an important role to play in promoting active travel journeys and securing new and improved active travel routes and related facilities	Consider the requirements of the Act in developing interventions Affected issues: population and health and well being
One Wales: Connecting the Nation. The Wales Freight Strategy (May, 2008)	The 'Wales Freight Strategy' sets out high-level aims and policies for freight transport, and identifies a series of 'steps' towards their delivery. A high priority is placed on freight transport playing its part in ensuring a sustainable environment.	Support delivery of the strategy

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	Many of the 49 steps set out in the strategy contain elements that are aimed at reducing the overall environmental impact of freight transport, through modal shift or efficiency measures, in particular the contribution of freight transport to greenhouse gas emissions	
TAN 18 – Transport (Welsh Government, 2007)	Includes advice on transport related issues when planning for new development including integration between land use planning and transport, location of development, parking and design of development	Consider the advice note and interventions which will encourage use of sustainable transport modes Affected issues: health & well-being, population, air quality, noise
The Wales Transport Strategy (Welsh Government, 2008)	The Welsh Government is committed to improving regional and national transport, and improving accessibility. Implementation of the Welsh Government's Transport Strategy will help to achieve more integrated transport services. The Wales Transport Strategy will be linked to the Wales Spatial Plan and provide the context for Regional Transport Plans (RTPs).	Deliver the outcomes set out in the Strategy Affected issues: air quality, climatic factors, population, human health.
National Transport Finance Plan (Welsh Government, 2015)	The Welsh Government's National Transport Finance Plan set out a timetable of delivery, estimated expenditure required to deliver the schemes, and sources of funding for the Welsh Government's key transport projects, to support their economic and social priorities.	Consider the NTFP in development and implementation of the Programme.
Trunk Road Forward Programme (2002, update 2004 and 2008)	The aim of the Welsh Government's 2002 Trunk Road Forward Programme was to improve the economic and social conditions in Wales, through increasing efficiency and accessibility in all areas, while working in line with the Welsh Government's Sustainable Development scheme at the time	Support the Programme
Smarter Choices: Wales (2007)	Policy document that proposes how efficient and sustainable ways of travel can be promoted. Intended for consideration by local authorities and other partners throughout Wales. Transport professionals in the public, private and voluntary sectors in Wales will use this to support their work in developing Smarter Choices techniques and schemes. Provides guidance on initiatives, raising awareness and promotion of: • Residential, school and workplace travel plans; • Public transport; • Healthy modes such as cycling and walking; • Smarter cars, including car clubs and car sharing; • Technology and Marketing, reducing the need for travel; • Tourism; and • Freight	Consider this guidance and interventions which will encourage use of sustainable transport
Vale of Glamorgan Local Transport Plan 2015	This LTP seeks ways to secure better conditions for pedestrians, cyclists, and public transport users and to encourage a change in travel choices away from the single occupancy car. The LTP also seeks to tackle traffic congestion by securing improvements to the strategic highway corridors for commuters who may need to travel by car as well as providing better infrastructure for freight. It also addresses the key road safety priorities for the Vale.	Consider the priorities of the LTP in the development of interventions Affected issues: health, population, climatic factors, air, biodiversity
Cardiff Local Transport Plan 2015	This LTP identifies the key transport issues relevant to Cardiff, the high level interventions needed to address these and the specific priorities for the local authority to deliver in the plan period (the LTP Five Year Programme 2015 – 2020). The Plan also outlines the Council's medium and longer term aspirations up to 2030. The LTP will be the primary reference for bids for annual capital funding from the Welsh Government for transport	Consider the priorities of the LTP in the development of interventions Affected issues: health, population, climatic factors, air, biodiversity

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	infrastructure. The proposed programme outlined in the LTP includes walking and cycling infrastructure, bus network and junction improvements, Cardiff Capital Region Metro schemes, 20mph limits and road safety schemes	
South East Wales Valleys Local Transport Plan	Sets out the local authorities priorities for transport schemes in the five year period 2015 to 2020, and their medium and longer term aspirations up to 2030. The LTP focuses on targeting investment in transport that will support the following Welsh Government priority areas: • Support economic growth and safeguard jobs across Wales, but with a particular focus on the City Regions, Enterprise Zones and local growth zones • Reduce economic inactivity by delivering safe and affordable access to employment sites across Wales • Maximise the contribution that effective and affordable transport services can make to tackling poverty and target investment to support improvements in accessibility for the most disadvantaged communities Encourage, safer, healthier and sustainable travel	Consider the priorities of the LTP in the development of interventions Affected issues: health, population, climatic factors, air, biodiversity
Bridgend Local Transport Plan 2015	This Local Transport Plan will cover Bridgend County Borough geographical area and address issues relating to local transport and it will facilitate economic growth	Consider the priorities of the LTP in the development of interventions Affected issues: health, population, climatic factors, air, biodiversity
Monmouthshire Local Transport Plan 2015	Monmouthshire is the most rural county in south east Wales, with a population of 91,300 people and a total land area of 850 km ² . With a population density of 107 people per km ² it is ranked 15th most populated county in Wales. About 40,000 people live in the densely populated south centred around Chepstow, Caldicot and Magor & Undy in the Lower Wye and Severnside areas. Overall more than 60% of the population lives in the six main hubs of Abergavenny, Chepstow, Caldicot, Monmouth, Magor & Undy and Usk. All of these lie at the southern, western and eastern periphery of the county, the centre and north are very thinly populated	Consider the priorities of the LTP in the development of interventions Affected issues: health, population, climatic factors, air, biodiversity
Newport Local Transport Plan 2015	The plan aims to cover: • Economic growth: Support economic growth and safeguard jobs across Wales, but with a particular focus on the Cardiff Capital Region, • Access to employment: Reduce economic inactivity by delivering safe and affordable access to employment sites • Tackling poverty: Maximise the contribution that effective and affordable transport services can make to tackling poverty and target investment to support improvements in accessibility for the most disadvantaged communities in the region • Sustainable travel and safety: Encourage safer, healthier and sustainable travel • Access to services: Connect communities and enable access to key services	Consider the priorities of the LTP in the development of interventions Affected issues: health, population, climatic factors, air, biodiversity
Water		
EC Water Framework Directive (2000/60/EEC)	Requires all Member States to achieve 'good ecological status' of inland water bodies by 2015, and limits the quantity of groundwater abstraction to that portion of overall recharge not needed by ecology	
EU Directive 2007/60/EC on the Assessment and Management of Flood Risks	This Directive requires Member States to assess if all watercourses and coast lines are at risk from flooding, to map the flood extent and assets and humans at risk in these areas and to take adequate and coordinated measures to reduce this flood risk	Consider the Directive in the development of interventions in order to ensure

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		adequate preparations for flood risk assessment and planning are facilitated Affected issues: water, material assets, health, biodiversity, cultural heritage, landscape
EU Directive 78/659/EEC - The Freshwater Directive	The Freshwater Directive seeks to protect freshwater bodies identified by member states as water suitable for sustaining fish populations. It requires that certain designated stretches of water (rivers, lakes or reservoirs) meet quality standards that should enable fish to live or breed in the designated water, although this will also depend on physical conditions. The Directive identifies two categories of water; those suitable for: • Salmonid fish (salmon and trout) - these are generally fast flowing stretches of river that have a high oxygen content and a low level of nutrients; and • Cyprinid fish (coarse fish - carp, tench, barbel, rudd, roach) - these are slower flowing waters, that often flow through lowlands. • The Directive sets different standards for salmonid and cyprinid waters.	Consider the Directive in the development of interventions. Affected issues: water and flood risk, biodiversity
EU Directive 2006/118/EC – Protection of groundwater	This Directive is designed to prevent and combat groundwater pollution and deterioration. Its provisions include: • Criteria for assessing the chemical status of groundwater; • Criteria for identifying significant and sustained upward trends in groundwater pollution levels, and for defining starting points for reversing these trends; • Preventing and limiting indirect discharges (after percolation through soil or subsoil) of pollutants into groundwater.	Consider the Directive in the development of interventions. Affected issues: water and flood risk, biodiversity
EU Directive 91/676/EEC - The Nitrates Directive	The Nitrates Directive aims to protect water quality across Europe by preventing nitrates from agricultural sources polluting ground and surface waters and by promoting the use of good farming practices. The Directive identifies two water polluted or at risk of pollution and designates these areas as 'Nitrate Vulnerable Zones' (NVZs). The Directive sets a Code of Good Agricultural Practice to be implemented by farmers on a voluntary basis and establishes the need for establishment of actions to be implemented by farmers within NVZs on a compulsory basis. The Directive requires member states to report on their national monitoring every four years	Consider the Directive in the development of interventions Affected issues: water and flood risk, biodiversity
Flood and Water Management Act 2010	The purpose of the Flood and Water Management Act 2010 is to implement Sir Michael Pitt's recommendations following the widespread flooding of 2007 when more than 55,000 homes and businesses were flooded. The Act requires better management of flood risk, and places new responsibilities to local authorities, as Lead Local Flood Authorities, to co-ordinate flood risk management in their area	Consider the requirements of the Act in the development of interventions Affected issues: water and flood risk, biodiversity, climatic factors
Land Drainage Act	The Land Drainage Act 1991 (Amended 1994) requires that a watercourse be maintained by its owner in such a condition that the free flow of water is not impeded. The riparian owner must accept the natural flow from upstream but need not carry out work to cater from increased flows resulting from some types of works carried out upstream, for example new infrastructure	Consider the requirements of the Act in the development of interventions Affected issues: water
The Water Environment (Water Framework Directive) (England and Wales) Regulations 2003	Transposes the Water Framework Directive into UK law	Consider the requirements of the Regulations in the development of interventions

Plan Title	Plan Description and Key Relevant Objectives/Targets	Implications for the South Wales Metro Programme
Groundwater Protection: Policy and Practice (GP3)	Sets a national framework for managing water resources	Affected issues: water Consider the requirements of the framework in the development of interventions
Marine and Coastal Access Act 2009	The Marine and Coastal Access Act 2009 gained Royal Assent on 12th November 2009 and provides the legal mechanism to help ensure clean, healthy, safe, productive and biologically diverse oceans and seas by putting in place a new system for improved management and protection of the marine and coastal environment	Affected issues: water Consider the requirements of the Act in the development of interventions Affected issues: water and flood risk, biodiversity
Draft Drought Plan 2014 Main Report (Dŵr Cymru, 2014)	These documents summarise the actions water companies will consider implementing during drought conditions to safeguard essential water supplies to customers and to minimise the environmental impact. Details the different drought triggers and summarises the impact of drought permits on specific water resources. The following actions are required in a drought event: - Operational - Communication - Demand side - Leakage - Supply side - Drought permit/orders At all times, not just in times of drought, water companies should adhere to their statutory duties for designated sites	Consider the Plan in the development of interventions. In order to minimising CO2 emissions and adapt to climatic effects Affected issues: water, climatic factors
Water Resources Act 1991	The Marine and Coastal Access Act 2009 gained Royal Assent on 12th November 2009 and provides the legal mechanism to help ensure clean, healthy, safe, productive and biologically diverse oceans and seas by putting in place a new system for improved management and protection of the marine and coastal environment	Consider the Act in the development of interventions Affected issues: Water
A Water Strategy for Wales (2014) Consultation Document	Sets out how water resources should be managed to support communities and business, help drive green growth, ensure resource efficiency, and enhance the resilience and diversity of natural resources in Wales and help tackle poverty. The strategy proposes a more integrated approach to the management of water, in line with the overarching natural resource management approach	Consider the Strategy in the development of interventions Affected issues: Water
Welsh Government (2011) National Strategy for Flood and Coastal Erosion Risk Management in Wales	Provides the framework for flood and erosion risk management by: reducing the consequences for individuals, communities, businesses and the environment from flooding and coastal erosion; raising awareness of and engaging people in the response to flood and coastal erosion risk; providing an effective and sustained response to flood and coastal erosion events; and prioritising investment in the most at risk communities. Reducing the consequences for individuals, communities, businesses and the environment from flooding and coastal erosion; - Raising awareness of and engaging people in the response to flood and coastal erosion risk; - Providing an effective and sustained response to flood and coastal erosion events; - Prioritising investment in the most at risk communities.	Consider the Strategy in the development of interventions Affected issues: water, climatic factors, material assets

Plan Title	Plan Description and Key Relevant Objectives/Targets	Implications for the South Wales Metro Programme
South Wales and Severn Estuary Shoreline Management Plan	- Implementing these objectives will be the responsibility of everyone involved in or affected by flood and coastal erosion risk management, from the Welsh Government to the Welsh Risk Management Authorities and the people of Wales themselves The Shoreline Management Plan provides a large scale assessment of the risks associated with coastal processes and present a long term policy framework to reduce these risks to people and the developed, historic and natural environment in a sustainable manner. An SMP should provide the basis for policies for a length of coast and set the framework for managing risks along the coastline in the future. The objectives of an SMP need to be in line with the Government's strategy (Defra 2005) for managing risks from floods and coastal erosion and should: - Set out the risks from flooding and erosion to people and the developed, historic and natural environment within the SMP area; - Identify opportunities to maintain and improve the environment by managing the risks from floods and coastal erosion; - Identify the preferred policies for managing risks from floods and erosion over the next century; - Identify the consequences of putting the preferred policies into practice; - Set out procedures for monitoring how effective these policies are; - Inform others so that future land use, planning and development of the shoreline takes account of the risks and the preferred policies; - Discourage inappropriate development in areas where the flood and erosion risks are high; and - Meet international and national nature conservation legislation and aim to achieve the biodiversity objectives (see the glossary)	Consider the Management Plan in the development of interventions Affected issues: water, coastal development
Severn River District: River Basin Management Plan	Provides the plan for updating the current Severn River Basin Management Plan. Summarise progress so far and proposed new measures. Outlines the current state of the water environment, summarises the impacts of actions from the current plan, the current challenges to the river basin and proposed new measures and ambitions of the new plan, including local actions. Includes national level ambitions/proposed new measures for: - Protected areas; - Physical modifications; - Managing pollution from sewage and waste water; - Managing pollution from towns, cities and transport; - Changes to natural flow and levels of water; - Managing invasive non-native species (INNS); - Managing pollution from rural areas; - Managing pollution from mines; and - Manage the impacts of acidification. Key objectives:	Consider the Management Plan in the development of interventions Affected issues: water

Plan Title	Plan Description and Key Relevant Objectives/Targets	Implications for the South Wales Metro Programme
	- Prevent deterioration in water body status; - Achieve the objectives for protected areas; - Aim to achieve good overall status for surface and ground waters	
Flood Risk Management Plan (FRMP) - Blaenau Gwent - Bridgend - Caerphilly - Cardiff - Merthyr Tydfil - Monmouthshire - Newport - Rhondda Cynon Taff - Torfaen - Vale of Glamorgan	Each LLFA has prepared and released their Flood Risk Management Plan which highlight the hazards and risks from flooding from rivers, the sea, surface water, groundwater and reservoirs, and set out how Risk Management Authorities work together with communities to manage flood risk. The FRMP's must contain: - A map showing the flood risk area; - Objectives for the purpose of managing flood risk; - Proposed measures for achieving those objectives; - A description of the way implementation measures will be monitored; and - A report of the consultation.	Consider the Management Plans in the development of interventions. Affected issues: water
Climate Change allowances for Planning Purposes CL-03-16, 2016	Sets out allowances for climate change for use in Flood Consequences Assessment	To be used in the design of Metro interventions and FCA's.
Western Wales River Basin Management Plan	Provides the plan for updating the current Severn River Basin Management Plan. Summarise progress so far and proposed new measures. Outlines the current state of the water environment, summarises the impacts of actions from the current plan, the current challenges to the river basin and proposed new measures and ambitions of the new plan, including local actions. Includes national level ambitions/proposed new measures for: - Protected areas; - Physical modifications; - Managing pollution from sewage and waste water; - Managing pollution from towns, cities and transport; - Changes to natural flow and levels of water; - Managing invasive non-native species (INNS); - Managing pollution from rural areas; - Managing pollution from mines; and - Manage the impacts of acidification. Key objectives: - Prevent deterioration in water body status; - Achieve the objectives for protected areas; Aim to achieve good overall status for surface and ground waters	Consider the Management Plan in the development of interventions Affected issues: water

Plan Title	Plan Description and Key Relevant Objectives/Targets	Implications for the South Wales Metro Programme
Directive 2006/7/EC of the European Parliament and the Council, Concerning the management of bathing water quality (15 th Feb 2006)	Lays down provisions for the monitoring and classification of bathing water quality, management of bathing water quality and the provision of information to the public on bathing water quality	To be considered alongside other water quality legislation in the design of interventions.

B. Response to Consultation

Comments from Caerphilly Council:

- 1) Please provide clarification on the approach to baselining – a standardised assessment process is difficult given that the scope of the baseline differs from topic to topic:

A: we have provided the baseline using available and relevant data, setting out those aspects of the baseline environment which may be affected by the proposed Metro. The extent of such information necessarily varies by topic depending on:

(a) Availability of information

(b) Relevance to Metro

- 2) Some topics contain baseline which sets out potential impacts of Metro. This is considered inappropriate.

A: Agreed, we have attempted to address this such that only the issues section of each topic contains likely implications of Metro.

- 3) The Population and Human Health topic is light on baseline information and contains transport information that is inappropriate.

A: This topic has been expanded. It should be noted that there is not a significant amount of information available regarding the detail of the Metro as the greater number of options are still undergoing assessment and HIA and EQIA assessments are ongoing – hence the baseline information is relatively light and (in keeping with SEA process) the assessment is not a detailed study, but a strategic overview. We have endeavoured to provide baseline relevant to the Metro region.

With regards to the comment about inclusion of inappropriate transport data, we feel that this data is relevant both in terms of availability / access to public transport (and in turn services, employment, healthcare) but also in terms of existing transport safety, which has relevance to human health.

- 4) There is concern over the inclusion of the Noise and Vibration topic as it is not one of the standard SEA topics and there is limited baseline information provided.

A: We have expanded, but there is limited baseline information available on this topic. The Noise Management Plan for Wales is considered sufficient in terms of establishing the context (i.e. that there are noise issues along specific locations, highlighted by established priority areas) and enabling a discussion of the potential effects of Metro in this context. This topic has not been removed.

- 5) Overall the baseline seems to be setting out a baseline for issues that Metro will have a potential impact on, but the purpose should be to establish the state of the environment as a whole, then identifying issues that should be addressed.

A; The baseline is now more comprehensive. However, we disagree that the aim of the SEA should be to establish the state of the environment as a whole. This is not the case. The SEA guidance states that the information to be given is:

...b) The relevant aspects of the current state of the environment...

d) Any existing environmental problems which are relevant to the plan or programme

Attempting to include the entirety of the environmental baseline is neither relevant nor required and would result in lengthy reporting of issues that have no relevance on Metro.

- 6) The scoping report does not identify issues, rather commentaries of what potential impacts might arise:

A: The baseline covers existing issues and future trends sets out the likely progression of the environment over time (without Metro). The issues section is then necessarily a review of those issues that may arise from implementation of Metro, either immediately or in the future (using the future baseline). An example would be the inclusion of transport data in the Population section, which identifies that transport can have an impact on human health via (e.g. traffic safety, air quality etc).

- 7) The baseline should be added to and should include the whole range of environmental matters rather than just those that Metro could have an effect on.

A: With consideration, the SEA is not the tool for detailed assessment of the entire environmental baseline. This would result in unnecessarily unwieldy documents from which it would be hard to draw meaningful conclusions. Note that the SEA guidance states that the SEA directive's requirements are 'the relevant aspects of the current state of the environment' and 'any existing environmental problems which are relevant to the plan or programme'. We therefore consider the current approach valid and in compliance with the SEA guidance.

- 8) Inclusion of list of plans policies etc in the report and in the Appendices seems repetitive.

A: We feel that it provides a useful summary and will be retained.

- 9) The review of plans and policies would benefit from including references to higher and lower tier documents.

A: We believe that this is likely to cause confusion.

- 10) There appears to be a lack of progression between issues, objectives and indicators.

A: Noted. We will add an issues column to the framework table to clarify how the issues relate to the objectives.

- 11) It is unclear what level of plans, programmes and policies are being addressed in this review.

A: We were asked to set out a topic based assessment. The reports / plans / policies have not been tiered. However, it is an assessment of relevant policies, from International to Local.

- 12) It seems unnecessary to include the list of reviewed PPP in the document when the appendix sets out the review

A: See previous response on this matter.

- 13) It is unnecessarily repetitive to set out what areas the Metro covers in each chapter.

A: Agreed. The report has been largely re-written. This is no longer the case.

- 14) The symbology used on the SEA strategy charts are confusing. Reducing the size of the points would make it easier to understand.

A: We have used this chart on numerous occasions and not previously experienced issues with consultees.

- 15) No reference has been made to the linkage between increased economic development and increased transport requirements. Cardiff is proposing 40,000 jobs up to 2026 which will significantly increase commuting...

A: Agreed. The City deal states 25,000 jobs and the LDP states 40,000. We have clarified this in the relevant location. However, the report clearly makes the link between increased population and increased emissions and it is not considered necessary to link this to economy per se as there are other reasons why the population may increase.

- 16) It is unclear what a future baseline is.

A: This denotes the baseline which would result if Metro was not implemented and which would occur at some point in the future. This is a requirement of the SEA regulations.

- 17) Correct the reference to Table 4.

A: The report has been comprehensively re-organised. This no longer applies.

- 18) The table of designated sites could usefully be expanded to include sites that lie outside of the region but are within the scope of the HRA.

A: This is covered in the HRA and does not require repetition within the SEA. For clarity, the SEA Environmental Report does take into account the conclusion of the HRA (including possible effects on those designated sites outside of the Metro region).

- 19) No reference is made to SINCS

A: This is a Strategic Environmental Assessment. It is not the correct vehicle for addressing in detail more than 40 sites which are of purely local significance and therefore only likely to be sensitive to direct impacts. We do not have sufficient detail on the scale of works, exact alignments or other relevant scheme details to make such an assessment.

- 20) No reference is made to ancient woodlands.

A: The environmental report takes into consideration potential effects of the development on ancient woodlands. Similar considerations apply in this respect as for SINCS / LNRs as stated above.

- 21) The current state section purely lists Natura 2000 sites and numbers of SSSIs and LNRs. No mention is made of their current state and trends.

A: There is no data available regarding trends, particularly regarding locally designated sites. The Wales State of Environment report is no longer updated and SoNaRR doesn't address this. The SEA is not the vehicle for completing a detailed assessment of the status of each SSSI, LNR, or other designated site.

We don't consider it relevant to develop baseline regarding the status of every designated site. To a large degree, the background trend (without Metro) is irrelevant in this case. The effect of Metro on designated sites is likely to be limited to areas of vegetation clearance and new lines (disturbance via noise / lighting). Acknowledging that the sites are present and establishing the location of the sites along the Metro corridors is sufficient. To that end, we have provided

general information regarding the status of habitats and fauna where available, which is sufficient to draw fitting conclusions regarding the potential effects of Metro on biodiversity.

22) 5.3.2.2 – trends quoted should be in the baseline

A: The trends show the movement over time – not the static baseline.

23) and 5.3.2.4 there is no basis to draw these issues

A: Agreed. The report has been largely re-written. This no longer applies.

24) 5.4.2.3 the issues section doesn't identify specific issues

A: We feel that climate change has such broad reaching potential effects that the issues cannot be specific. This section identifies a number of potential effects of Metro on climate change. This section also identifies how Metro will need to be designed to minimise the effects of climate change on Metro.

25) Any works relating to the Metro will become part of the historic envelope...confusing sentence

A: Agreed – this is confusing. The report has been re-organised and largely re-worded therefore this is no longer the case.

26) 5.6.1 There is no reference to ancient woodlands or trend information

A: See previous comment regarding ancient woodland. There is no trend information available. We could infer a decline in ancient woodland using information from the Woodland Trust, but there are no statistics to back this up and no recent trend information. We have assessed the NRW ancient woodland mapping and will include a reference to ancient woodland within the report.

27) 5.6.2.1 The correct title is Register of Landscapes of Special Historic Interest in Wales

A: Agreed. This has been corrected.

28) Gelligaer Common should be referenced against Caerphilly also

A: Agreed. This has been corrected.

29) There is no reference to the loss or gain of areas under landscape protection

A: No such information is available to us. However, in this case the baseline information is sufficient to draw conclusions regarding the issues and potential effects of Metro.

30) 5.6.2.3 There are no specific issues identified.

A: The landscape section has been expanded

31) 5.7 This section is based solely around transport infrastructure. Other issues should be considered.

A: This section has been reworded. It now provides a more general outline of waste / material usage legislation and a more general baseline. However, the transport infrastructure material use is directly relevant. Drawing conclusions regarding other industries would be tenuous and

does not add particular value in terms of ability to draw reasonable conclusions from the baseline information.

32) 5.7.1 is repetitive

A: This has been amended

33) 5.7.2.1 The Cardiff LDP outlines more housing than that quoted

A: This has been amended.

34) The Caerphilly LDP has been withdrawn

A: This has been amended.

35) The reasons for the differing population distribution should be explained in the text (i.e. Cardiff has a greater proportion of young people due to the university).

A: There are 2 university cities / towns adjacent to Cardiff which do not show the same distribution – it is more likely due to an increasing availability of jobs in Cardiff. The relevance is that all of the LPAs show an aging population (i.e. significantly higher proportions of people in older age groups than younger).

36) Table 16 – is this necessary?

A: This section has been reworded.

37) Table 1 and the preceding paras are transport related and repeat information set out in the material section.

A: Transport safety is a relevant component of population assessment as it has a direct impact on the uptake of active travel, ability to commute, seek employment, access services (including healthcare) and isolation of communities.

38) There is little comment on human health or poverty.

A: We have outlined WIMD data. However, we have expanded these sections in order to provide further information.

39) 5.8.2.2 a number of transport related trends have been included.

A: As per our response to comment 37 – these are safety related and therefore relevant to human health.

40) 5.9.2 The baseline commentary appears more robust than preceding topics.

A: It is similar to other topics, with the exception of noise and vibration, which has limited information to provide a baseline, there being no noise and vibration monitoring network and no readily available statistics regarding the same.

41) 5.10 – Noise and Vibration is not an identified SEA topic.

A: We have included this at the request of WG and it is directly relevant to transport schemes.

42) There is no evidence regarding vibration

A: No data is available. It is feasible (as has been outlined in the issues section) to draw conclusions from the noise map and priority areas, sufficient to draw conclusions.

43) Query relating to how the SEA objectives relate to issues and topics.

A: We have added a column to address this.

44) The objectives should quantify the aim so that they can be directly measured.

A: We feel it is not possible at this stage in the scheme. Once the preferred options, equipment and remaining outstanding design information is defined it should be possible to set some realistic targets.

At this stage, defining targets would likely lead to re-writes or to setting unduly easy targets. This is true for each of the comments made on Appendix A1 which we have addressed below (we note the numerous comments regarding quantification of objectives, which we have addressed with our previous responses. For the sake of brevity we respond below only regarding the remaining comments):

- AQ – is monitoring purely within the location of Metro? *Yes. We wouldn't propose to monitor elsewhere as the monitoring is for the effects of Metro – not other schemes.*
- AQ – neither of the indicators relate to the objective. *Incorrect. Exceedances of limits during construction and operation is clearly related to Metro (i.e. a transport and infrastructure improvement as per the objective). Further, improvements to existing AQMAs is also directly linked to Metro as all the AQMAs are transport emissions related.*
- Biodiversity – is % ecological features lost the net loss? *No – we propose in fact to measure total loss and total gain. We can then translate it to net loss if required.*
- Biodiversity – how are increases in ecological value measured? *Using ecosystems services. Or EIA type indicators.*
- Climatic factors – Is sustainable use of resources a climatic factor? *Yes, it is linked to embodied carbon.*
- Climatic factors – should reduce air pollution be restricted to just improvements or to all transport related emissions? *To improvements only.*
- Climatic factors - Support transition to a low carbon society ensuring transport... is this an objective? *We have further defined this in the environmental report.*
- Climatic factors – No. of delays and delay duration needs to be defined. *This shall be defined.*
- Cultural heritage – Area of historic landscape characterisation which has changed.. *This indicator requires definition. A landscape type change would be change to the descriptor under the register.*
- Landscape – *comment and response as above.*
- Population and human health – number of pedestrians / cyclist users – I doubt this information is collected. *It is collected at specific locations and via surveys.*
- Population and human health – no. journeys by Metro needs to be defined in terms of what modes are being considered. *Disagree. The only relevant metric is journeys by Metro. Not which mode of Metro.*
- Soil – the objective should be split to address the 2 issues. *Land quality and risk are intrinsically linked.*
- Soil – the indicator should consider whether brownfield land is created. *All development is creation of brownfield land. This is not a relevant indicator.*
- Soil – how does % of BMV agricultural land lost relate to the objective. *It is directly relevant to improving land quality, reflecting potential loss of high quality agricultural land.*

- Noise and vibration – this topic has no objectives or indicators. *These will be provided.*
- Water – the objective should be split to address the 2 issues. *With consideration, risk and quality are linked.*
- Water – should Flood Zones 2 and 3 refer to C1 and C2? *Correct. This shall be updated.*

Comments from NRW:

Are there any additional plans or programmes at the international, national, regional, or local level which have been excluded from Appendix A, which you think are relevant to the South Wales Metro Programme and SEA?

We recommend that following are also included:

N.B. Where we have not commented we have included the plans as per NRW request.

- Monmouthshire Green Infrastructure plan (Supplementary Planning Guidance)
- LBAPS the relevant Local Authorities
- Risk management framework provided in CLR11 - Model procedures for the management of land contamination, when dealing with land affected by contamination *We do not consider that this is relevant at this stage. We are not actually providing, designing or implementing either investigation, remediation or mitigation measures at present. For purposes of the SEA it is considered appropriate to highlight the potential presence of contaminated land along Metro corridors and register it as a risk. Later, (i.e. at the stage of design or further environmental assessment) we agree that it would be appropriate to follow the principles set out in this document.*
- Environment Agency's Guiding Principles for Land Contamination for the of information required to assess the risks to controlled waters. *We do not consider that this is relevant at this stage. We are not actually providing, designing or implementing either investigation, remediation or mitigation measures at present. For purposes of the SEA it is considered appropriate to highlight the potential presence of contaminated land along Metro corridors and register it as a risk. Later, (i.e. at the stage of design or further environmental assessment) we agree that it would be appropriate to follow the principles set out in this document.*
- The groundwater protection advice on www.gov.uk (Reference is made to GP3 which has recently been superseded). *We do not consider that this is relevant at this stage. We are not actually providing, designing or implementing either investigation, remediation or mitigation measures at present. For purposes of the SEA it is considered appropriate to highlight the potential presence of contaminated land along Metro corridors and register it as a risk. Later, (i.e. at the stage of design or further environmental assessment) we agree that it would be appropriate to follow the principles set out in this document..*
- TAN24 Historic Environment & Best Practice Guidance documents
- Conservation Principles (Cadw) *This document sets out management principles, not impact assessment and is not considered relevant at this stage. During design and further environmental assessment this document will be considered.*
- Register of Landscapes of Historic Interest in Wales *This was already reviewed and referenced within the report. This forms part of baseline information review, not PPP and referencing within the report is sufficient for baselining.*
- National Parks & Access to the Countryside Act 1949

- Wye Valley AONB Management Plan *Part of the baseline information review and will be referenced within the report, not as part of the PPP.*
- TAN12 Design *Not relevant at this stage, however will rightly be reviewed and followed during design of Metro.*
- LANDMAP – All Wales Landscape Character Approach (NRW) – *does this refer to ‘An approach to Landscape Character Assessment’? If so, then we will add this.*
- National Marine Character Areas & local seascape assessments *It is difficult to foresee what impact this scheme could have on these designations. The relevant area would be MCA 29 which is unlikely to be impacted.*
- Severn Estuary Strategy *Having reviewed this document we are unclear regarding the relevance.*
- SoNaRR (the review of SoNARR should include landscape considerations as well as biodiversity) *Agreed*
- Adapting to Climate Change: Guidance for Flood and Coastal Erosion Risk Management Authorities in Wales. Welsh Government, December 2011. *This document applies to the consideration of ‘climate change within the development of all flood and coastal erosion risk management (FCERM) projects or strategies’ the document is therefore not relevant to Metro which is neither an FERM project or strategy.*
- Guidance on climate change allowances for planning purposes, and Flood Consequence Assessments: Climate change allowances.
CL-03-16 dated 23rd August 2016. Welsh Government, 2016.
- The Environmental Permitting (England and Wales) (Amendment) (No.2) Regulations 2016 (in respect of the requirement for Flood Risk Activity Permits)
- Strategy Appraisal Report (StAR) for Severn Estuary Flood Risk Management Strategy: Second submission to LPRG issued Large Projects Review Group on 30th April 2014 *Having reviewed the SEFRMS we are unclear as to the relevance. There appear to be no proposals for those parts of the estuarine coastline which fall within the Metro region. We have reviewed the Shoreline Management Plan for the area and consider this sufficient, given that the documents are linked.*
- Western Wales RBMP
- Bathing Waters Directive

In addition, given the likely timescales for a scheme such as this we recommend consideration be given to the contents of *Natural Resources Policy (NRP)* as well as the relevant planned *Area Statements* for South East and South Central Wales to be produced by NRW. *This is not relevant at present. The plans are not current (and may not be for some time, and potentially not in their present form). However, if the plans are current at the time when Metro is enacted or during commencement of further studies (environmental or otherwise) we will review and include these documents.*

Do you agree with the review of the current key environmental issues in the Programme area?

Biodiversity, Flora and Fauna

We note that in Section 5.3.1 there is no mention of the Environment (Wales) Act, 2016 and the duty under Section 6 of the Act. Section 6 places a duty on public authorities to 'seek to maintain and enhance biodiversity' so far as it is consistent with the proper exercise of those functions. In so doing, public authorities must also seek to 'promote the resilience of ecosystems'. The duty replaces the Section 40 duty in the Natural Environment and Rural Communities (NERC) Act, 2006, in relation to Wales, and applies to those authorities that fell within the previous duty. *Noted. We will add this reference.*

We also note that locally important Sites of Importance for Nature Conservation are not mentioned. We advise that any assessment should consider the likely impact on these locally important sites. These sites are Local Authority designations and require consideration during the planning process. *Noted. We will add reference to SINC. Note that the SEA is not the vehicle to complete a detailed assessment of individual designated sites so any assessment at this stage is a broad overview of likely effects.*

It should be noted that the UKBAP has now been superseded in Wales by the *Nature Recovery Plan for Wales* and as stated above, the NERC act duty is now covered in Wales by the provisions in S6 and 7 of the *Environment (Wales) Act, 2016*. *Noted.*

Air

Section 5.2 concentrates on human health only. There is no mention of designated sites or protected habitats. Consideration should be given to the link between air pollutants and designated sites and protected habitats. The section alludes to nitrogen exceedance (JNCC 2012 leaflet) but further detail would be helpful. Section 5.3.2.4 states that designated sites are in unfavourable condition, this is partly due to air pollution and the Report should reflect this point. In Section 5.2.2.4 we suggest that nitrogen deposition and acid deposition should be included, as well as NO₂. *Noted. However, we don't know which sites are in poor condition due to air quality therefore specific conclusions will not be possible. With regards N deposition and acidification comment has been made in the updated report.*

Groundwater

Reference to Source Protection Zones is needed, as these may fall within the area of the Metro. In addition, we would like to see continued references to the risk posed to controlled waters (surface and groundwater) from existing historic sources of contamination, as well as potential new sources of pollution. *Reference to Source Protection Zones has been added. Repeated references to risk of historic contamination is unnecessary. The risk is acknowledged.*

Water

We note that the information for Section 5.11 has been sourced from an all Wales report. In doing so, agriculture, heavy industry and diffuse pollution are cited as issues, together with metal mines, however most of these issues are not relevant to the area where the majority of physical infrastructure is to be located. Much of the scheme is located in the South Wales Valleys where the issues are:

- Many water bodies are classified as 'artificial' or 'heavily modified' under the Water Framework Directive (WFD) for uses such as flood protection and urbanisation. For these the ecology will need to be maximised by *mitigation measures* in order to attain Good Ecological 'Potential' (as opposed to status).
- Physical modifications are present such as man-made weirs and culverts due to industrialisation and urbanisation. They can present barriers to fish migration that prevent fish from migrating upstream to their spawning grounds. This pressure on fish recruitment is compounded by degraded habitat and pressure on water quality from sewage, combined sewer overflows, misconnections, industrial sites and estates, all of which could also impact upon the wider ecology. New developments / infrastructure, and the predicted impacts of climate change, can increase these pressures.
- Chemicals products of combustion. Their diffuse nature makes them difficult to address. Reducing emissions and sustainable drainage systems will improve the situation and have wider benefits to people and the environment. The metro system could lead to beneficial or detrimental impacts dependant on the choices made (not just fuel leakage as mentioned in section 5.11.2.4 but also from products of combustion and road runoff). The Report should also recognise the different risks associated with construction and operation of any new infrastructure.

The Report should be amended to reflect the above. *Agreed – metal mining shall be removed. However, agriculture remains a risk along the numerous rural Metro corridors and will remain.* Section 5.11.2.4 recognises the potential for new transport infrastructure to have impermeable surfaces which could increase flood risk, but it should also make reference to the potential impacts on water quality particularly from the potential to add additional surface water into combined sewers, and also from runoff containing transport related chemicals. *This reference is already included – see 'the transport network is a source of diffuse pollution to groundwater and rivers from pollution being mobilised via percolating rainwater'*

Do you think the environmental, social, and economic baseline data collected for the Programme area is appropriate and relevant?

In Section 5.11, there is no mention of groundwater baseline quality only WFD data. It is recognised that NRW monitor surface water quality, but we also monitor groundwater quality and levels. Baseline data refers to Wales wide WFD information, as the project is taken forwards, we expect this to become more site specific. *It is referenced in the last paragraph above Table 21 and within Table 21 itself. With regards to the second point. Agreed. As the project progresses, detailed surveys will be completed and information will become more project specific and less strategic.*

Is any environmental, social, and economic baseline information currently missing?

Biodiversity, Flora and Fauna

There is a lack of information relating to local biodiversity issues (SINC sites) and Protected Species. *Partly agree. We will add reference to SINC sites. However, this report will not complete a detailed assessment of the status of all SINC sites. Such a detailed analysis is the remit of the further environmental assessments which will be required as the scheme progresses. With regards to protected species, there is information reflecting the general status and trend of protected species sufficient to draw conclusions regarding the potential effect of Metro. Providing specific information regarding the potential species which may be present along each Metro corridor is not required at this stage and would require significant survey effort.*

Air

Consideration should be given to including current background data which can be accessed on Air Pollution Information System (APIS) for each designated site. *Not required at this stage. The baseline acknowledges that some of the sites are likely to have poor air quality (reflected by acidification) and therefore sets the scene for potential future improvements related to Metro. Providing detailed air quality measurements at each protected site is not relevant and sufficient information is provided by the assessment of general trends in air quality in Wales, providing an understandable background emissions scenario for the Metro region.*

Cultural Heritage

We suggest consideration of the Register of Landscapes of Historic Interest in Wales, list of Registered Landscapes and Historic Landscape Characterisation in this Section. The list of Registered landscapes is currently included under the Landscape Section but it would sit better here. *We will duplicate it here.*

Landscape

Section 5.6.1 should include consideration of the Wye Valley AONB Management Plan & Landscape Character Assessment/SPG *Agreed.*

Section 5.6.2 should include consideration of the following:

- Brecon Beacons National Park & Landscape Character Assessment/SPG
- LANDMAP – ALL 5 ASPECT AREA layers

- Local Landscape Character Assessments
- Local Seascape Assessments
- Glamorgan Heritage Coast

Agreed.

Sections 5.6.2.2 & 3 need to refer to LANDMAP and SoNaRR with regard to trends and future baselines. They should also reference the National Park/AONB Management Plans, Landscape Character Assessments, Special Landscape Area and Seascape Assessment info as appropriate. *Agreed.*

Is the SEA Framework including SEA objectives and associated assessment criteria and indicators suitable for the South Wales Metro Programme?

We would have expected to see Targets (ideally measurable ones) to go with the Key Indicators, or as a minimum the anticipated Trend for each Indicator. In that way, it would be easier to assess if the objectives are being achieved, and if there are negative environmental effects, it would help in assessing their significance. *The accompanying text sets out the trend. However, at present it is not possible to quantify the objectives given that the scheme interventions (in particular; mode, power requirements and resultant emissions) are not accurately defined. As more scheme information is made available it will become possible to quantify the objectives.*

We would also have expected to see reference to the data sources for the Key Indicators, in order to provide confidence that data is / will be available for each of the Indicators. *We do not agree that this is required. The majority of the data is available via regulatory authority monitoring and new monitoring systems will need to be implemented for the remainder (i.e. No. metro journeys etc).*

Biodiversity, Flora, Fauna

Whilst the indicator regarding habitat creation and enhancement is welcomed, it is imperative that the primary objective should be avoidance of impact and loss to existing habitats and features and whilst it appears that an attempt to assess this is present in the indicator: “ % of ecological features lost as a result of the Programme “ This is a concern as it fails to differentiate between ‘features’ of local, National or International

importance. The scheme may only result in a loss of 10% of features, however, these could all be large areas of internationally important habitat and any assessment would therefore fail to recognise the severity of impact appropriately. We recommend further thought be given to this indicator to better reflect the quality and significance of these features and we recommend a further indicator is added that quantifies habitat and species loss/impact in terms of area and significance etc. *Agreed. We will define this objective further.*

Air

The Report should recognise that when assessing air pollution impacts on designated sites and protected habitats, it will be necessary to consider the appropriate nutrient nitrogen critical loads, acid critical load, nitrogen oxide critical level (long term & short term), sulphur dioxide critical level (long term & short term) and ammonia critical levels. *We acknowledge*

that these are issues which will require consideration at detailed assessment stage. However, this is not required at SEA level – the important aspect is to ascertain the likelihood of significant overall impact. Detailed input information (i.e. scheme design certainty) would be required for quantification of any of the other issues. Also, please note that we would not expect to see assessment of Sulphur Dioxide in a transport scheme as there would be no significant source from vehicular emissions.

Cultural Heritage, Landscape

We suggest the assessment guidance should also include the following:

- Effects on landscape character & visual amenity
- Effects on Registered Historic Landscapes
- Effects on Designated Landscapes (National Park & AONB, Heritage Coast)
- Effects on Special Landscape Areas
- Effects on invasive species & indicator of area of invasive species removed (or put under biodiversity) *All agreed. Note we will add an objective on invasive species removal. However, we have no information on the area of invasive species to include within the baseline.*

Does the wording of any of the proposed SEA objectives need to be changed, added, or removed?

Soil, Water

With regard to the objective to “Reduce pollution risk to water, soils, and land, and improve land quality where possible”, it is unclear exactly what this means and therefore, we have some reservations about what the effect of this may be for biodiversity. It has become apparent over the last decade or two that the biodiversity present on much of the brownfield land of the South Wales Valleys is an exceptional and important resource, and refuge for many species suffering decline in the more traditionally managed, wider countryside. We have seen extensive biodiversity losses as a result of, albeit well intentioned, remediation schemes etc over the last 20 or 30 years and this should be taken into account when considering ‘land improvement’.

Agreed. We consider that the wording of the objective should remain the same, but we will add the following clarification ‘where possible takes into consideration the need for prior ecological assessment of sites to be remediated and the requirement to prevent harm to sensitive habitats or species where possible. Consultation will be required with both NRW and the relevant LPA prior to engaging on any remediation works’.

We note that the ultimate decision to remediate (or not) will be based on risks to health, or waters due to contaminated land and that this may override the need to preserve sensitive ecological aspects. Appropriate design of remediation (or post completion restoration) will consider this issue and provide suitable habitat to compensate for any losses (temporary or otherwise).

Water

We recommend a more positive and ambitious approach to this objective, which seeks to enhance the water environment, rather than solely attempt to minimise impact as it is currently drafted. Opportunities should be sought to both improve flood risk, water quality and quantity wherever possible e.g. through well designed sustainable drainage schemes, which can deliver benefits to the water environment, biodiversity and flood risk. The scheme should seek to deliver multiple benefits wherever possible, rather than just seek to minimise impact. *Agreed. The Environmental Report includes a number of additional indicators to bring out a positive aspect to this objective.*

We suggest the following is added as Assessment Guidance section:

Avoid locating infrastructure within the floodplain i.e. Flood Zones 2 or 3 and/or within a high flood risk area by applying the precautionary framework set out in TAN 15. *We understand and agree with the aim of this. However, for large areas of Metro this is not likely to be possible. Extensive areas of Metro (i.e. existing road / rail infrastructure or historic corridors) are located in Flood Zones 2 or 3 and therefore associated infrastructure (new stations, park and ride facilities) will necessarily be close to or in the flood zone. FRA will be completed as required.*

Air

We suggest inclusion of NO_x in the Assessment Guidance section. *Agreed. Included.*

Do the draft SEA indicators provide a relevant measure for the SEA objective? If not can you suggest appropriate alternatives?

Specifically for the water quality and air quality objectives, we are concerned about following indicators:

- Improvements to existing AQMAs
- Improvements in groundwater quality
- Impact of WFD status of nearby watercourses compared to the baseline status

How will it be possible to determine if any impact on these Indicators is as a direct, or even indirect, result of the Programme? How will changes be demonstrated? *We understand the concern regarding these indicators. We propose the following approach:*

- AQMA improvements. Monitored using a layered approach
 - *Monitor status of AQMAs within Metro region directly (i.e. using AQ monitoring data); and*
 - *Monitor reduction in car journeys by survey of Metro passengers. Quantify the reduction in emissions which would result and apply to AQMA baseline air quality data.*
 - *Monitor reduction in emissions by new Metro infrastructure (i.e. reduced emissions via electrification or more efficient diesels) and apply results to baseline AQMA*

This approach should enable approximate quantification of reduction in emissions due to Metro. Applying this data to the baseline (pre-Metro) status of AQMAs in the region should enable a proxy assessment to be completed. We are also gathering baseline AQ data at a number of Metro locations which will be useful in this assessment.
- Improvements in groundwater quality:
 - *Direct monitoring of quality via the NRW monitoring network; and*
 - *Monitoring of discharge quality via Metro corridors.*

- *Impact of WFD status on surface water bodies:*
 - *As per the approach to groundwater.*

Furthermore, with regard to the water quality indicators listed above, it is unclear why they have a different focus for groundwater, as opposed to surface water. For groundwater, the Indicator is concerned with 'improvements' but the surface water (watercourses) Indicator considers 'impact'. *Noted. Will edit for consistency.*

In respect of flood risk, we would have expected to see an Indicator to reflect the fact that flood risk needs to be acceptable as per TAN15 (including no increase in flood risk elsewhere). We suggest this is given further consideration. We also suggest a further indicator in respect of % infrastructure in known / recorded historic flood risk (all sources) areas. *Agreed. This will be updated to reflect that the risk of flooding will require FRA and that the risk of downstream effects needs to be considered. We do not propose to add the indicator illustrating how much infrastructure is present within the flood risk areas because (as the majority of development is along existing transport corridors) there is no flexibility in location of the new transport infrastructure.*

For the final biodiversity, flora, fauna Indicator, clarity should be provided on how it is intended to measure 'value'. *This will be defined. It can be measured using Ecosystems Services assessment.*

In respect of landscape Key Indicators, we suggest the following:

- % landscape features lost as a result of the programme
- % historic landscape features lost
- Number of key views affected (adversely or enhanced) *All Agreed.*

Other Comments

After the text on Page 62 "*Afon Wysg (River Usk) is sourced from...*", we recommend the following paragraph is included to cover flood risk regulation on Main Rivers.

Main River Regulation (Flood Risk)

The Environmental Permitting (England and Wales) Regulations 2016 (EPR 2016) have been extended to include Flood Defence Consenting, which came into force on 6th April 2016. The amended regulations introduce Flood Risk Exclusions and Flood Risk Exemptions which mean that certain activities will be permitted in, over, under or adjacent to a main river without charge and without needing a permit, providing certain conditions are met. All remaining activities will require a bespoke Flood Risk Activity Permit (previously a Flood Defence Consent).

NRW issue Flood Risk Activity Permits to manage flood risk by controlling works and development activities by others. Further information on what a flood risk activity is can be found at <https://naturalresources.wales/permits-and-permissions/flood-risk-activities/?lang=en>

Noted. We will add this paragraph.

With regard to the note underneath Table 22 – we question why the objectives are not in priority order, as assigning them a priority may prove helpful when trying to evaluate the significance of the effects of different options. *The objectives all have equal weighting. We will clarify the note to reflect this.*

We note the objective on Page 4 of the Report to ‘*Deliver a high-quality, reliable, efficient, economically sustainable transport network*’. We suggest this objective is amended to remove the reference to the economy, in the context of sustainability i.e. *Deliver a high-quality, reliable, efficient and sustainable transport network*’. *We understand this point, but any Metro system implemented will be required to be economically viable and therefore this will remain as currently worded. If not viable it runs the risk of being shut down or significantly scaled back and therefore encouraging a reversion to mass car use.*

Furthermore, in the context of sustainability, we would emphasise that the design and implementation of any scheme should seek to deliver multiple benefits through implementation of Green Infrastructure (GI) principles and the Sustainable Management of Natural Resources (SMNR) and must focus, in line with the EIA hierarchy, on the avoidance of impacts wherever possible. In addition, the long-term management of any mitigation, compensation measures will be key to their success. These principles need to be reflected in the Report. *We agree – but note that this is more relevant to design and implementation stage than the SEA. We will reference this guidance / principles in the mitigation section, for incorporation into design and operation of the Metro.*

C. Assessment Tables

Note: The following tables correspond to the alignments and options as set out on the constraints plans. The 'preferred option' is not defined at this stage. However, for the purposes of our assessment it is considered to be those options on the constraints plans which are stated as being either:

- Included in Phase 2: or
- Possible inclusion in Phase 2 or later.

Those options which require further study or are discontinued from future study have also been assessed (contained in the table below the cumulative effects section). These are not included in the preferred option but the potential effects have been assessed in recognition of the likelihood of changes to proposals which are likely to emerge as the tendering process nears completion and design progresses.

	1. Natural Resources & Energy Use			2. Reduce Air Pollution			3. Economic Development, Employment & Learning			4. Reduce Pollution Risk to Water, Soils and Land			5. Water Run-Off and Flood Risk			6. Biodiversity and Geodiversity			7. Transition to a Low Carbon Society			8. Improve Wellbeing of Local Population			9. Promote Sustainable Communities			10. Cultural Heritage and Landscape Features					
Option	ST	MT	LT	ST	MT	LT	ST	MT	LT	ST	MT	LT	ST	MT	LT	ST	MT	LT	ST	MT	LT	ST	MT	LT	ST	MT	LT	Summary					
Do Nothing (No change from current running options)	0	0	0	0	-	-	0	-	-	0	0	-	0	0	0	0	-	-	0	0	0	0	-	-	-	-	-	-	0	0	0	Continued use of diesel contributing to poor air quality Continued discharge of toilet waste to tracks Longer term decline in economic/employment/education opportunities No change from existing pollution risk No opportunity to improve land quality. Land quality will deteriorate over time Future effect on wellbeing from an inefficient, older transport system causing delays Current transport network not fully serving the existing community. No change would not support promotion of sustainable communities. No improvement would reduce reliability and safety of existing transport network over time	
Rhymney Package Rail improvements Cardiff Queen Street to Cardiff to Rhumney. Light Rail conversion Ystrad Mynach to Trelewis. Light Rail Station Wedal Road and Crwys Road. Park and Ride Cardiff Gate	-	+	+	0	++	++	0	0	+	0	+	+	0	0	0	0	0	0	-	+	+	-	0	+	+	+	+	+	+	-	-	0	Essentially electrification in the form of Light rail or Heavy rail. Likely to involve installation of gantries, signal alteration, works to bridges and tunnels, replacement of rolling stock. New stations along existing and potential Park and Ride at Cardiff Gate near to existing business park. New rolling stock, Alteration to platforms, points and signalling, installation of OLE. Long term reduction in maintenance due to lower weight of rolling stock. Electrification contributing to improved air quality. Greater frequency of service: Improved connectivity to services and opportunities Reduction of pollution risk No change in runoff / flood risk Confined to existing infrastructure alignment therefore negligible impact on biodiversity and geodiversity. Initial CO ₂ emissions associated with construction followed by reduction in emissions from baseline Improved wellbeing from increased capacity and access to services. Initial noise and disruption from construction, followed by reduction in noise due to newer stock and electric running Improved regularity of services will promote a more sustainable community. Potential to improve reliability and safety of transport network Potential minor impact to setting from OLE gantries, although location along existing infrastructure is likely to limit the magnitude of the effect. Listed building consent likely to be required.
MTA Lines Package: Light Rail Conversion of existing Heavy Rail lines, Cardiff Queen Street to Merthyr / Treherbert / Aberdare	-	+	+	0	++	++	0	0	+	0	+	+	0	0	0	0	0	0	-	+	+	-	0	+	+	+	+	+	+	-	-	0	Essentially electrification in the form of Light rail and Heavy rail. Likely to involve installation of gantries, signal alteration, works to bridges and tunnels, replacement of rolling stock New rolling stock, Alteration to platforms, points and signalling, installation of OLE. Long term reduction in maintenance due to lower weight of rolling stock. Following initial emissions associated with construction, electrification will contribute to improved air quality.

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[illegible]

Newport – Celtic Manor, Celtic Manor – Monmouth and Newport – Malpas (also includes Cross Valleys BRT)																														Construction of new infrastructure Decrease in vehicle emissions Negligible effect on runoff Improved connectivity to services and opportunities Reduced risk of pollution by reducing number of cars travelling via on street routes Limited effect on biodiversity and soils due to use of existing corridors and limited infrastructure requirements Improved wellbeing from more efficient service. Potential short – med term disruption associated with on-street running until people adjust Improved regularity of services will promote a more sustainable community. Potential to improve reliability and safety of transport network. Potential for broader reaching services compared to heavy rail options Use of existing roads will result in negligible effects on landscape and cultural heritage.		
Dualling of existing lines Cardiff Bay to Cardiff Queen Street, Heath to Coryton, Radyr – Taffs Well, Abercynon – Aberdare, Porth – Treherbert, Troed-y-Rhiw-Pentrebach, Bargoed - Rhymney	--	0	0	+	+	+	+	+	+	++	++	0	0	0	0	+	+	--	--	--	+	+	+	+	+	+	-	0	0	Installation of additional line adjacent to existing along key corridors to allow enhanced frequency running. Use of additional materials. Increased frequency of service likely to encourage modal shift facilitating overall reduction in car journeys Initial construction emissions followed by reduction in emissions due to modal shift No additional connectivity however, greater ability to travel at a range of times Negligible effect on runoff Potential moderate effect on biodiversity clearance of fringe of ancient woodland along Radyr – Taffs Well,Porth, Ystrad Ronda, Abercynon -Penrhiwceiber and Fernhill – Cwmbach. The clearance may be significant ant a local level (on a worst case basis in the asbesnece of detailed surveys). Minor adverse effect on geodiversity due to increased land take Potential reduction in carbon emissions due to modal shift Shift of communities to sustainable transport modes Potential minor effect on landscape and heritage due to removal of screening vegetation during construction. It is assumed that this can be replaced post construction and therefore the overall impact will be negligible post construction. Overall potential noise increase likely to be minor due to increased frequency but understood to be 4t/ph so brief noise issue only		
In Combination																														Cannot be appropriately assessed at this stage, effects to be assessed at Environmental Impact Assessment stage		
Rhymney package Less Likely Options (Park andRide Rhymney, Ystrad Mynach, Bargoed, Pengam, Llanbradach and Cardiff Gate. Light Rail to Cardiff Gate, Bus Rapid Transit to Cardiff Gate, New Light Rail stations Wedal Rd, Crwys Rd. Station upgrade Ystrad Mynach,. and Re-opening of Heavy Rail alignment as Light Rail plus on-street Hengoed to Blackwood.	--	+	+	0	+	+	0	0	+	0	+	+	0	0	0	-	-	0	-	+	+	-	0	+	+	+	+	+	-	-	0	Combination of 6 No. Park and Ride facilities, new light rail (electric) to Cardiff Gate, Bus improvement measures to Cardiff gate, New Stations in Cardiff and re-opening of historic rail line (plus on street running) Hengoed to Blackwood. Use of additional materials. Increased frequency of service likely to encourage modal shift facilitating overall reduction in car journeys Initial construction emissions followed by reduction in emissions due to modal shift Increased connectivity. Potential improvement of known parking and congestion around (for example) Cardiff Gate; Increased magnitude of effects on biodiversity due to potential extensive clearance works associated with BRT corridors to Cardiff Gate and effectively new LR

[illegible]

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D. Aggregate Safeguarding Map – South East Wales

SOUTH EAST WALES
DDE-DDWYRAIN CYMRU

Aggregates Safeguarding Map of Wales
Diogelu Agregau: Map o Gymru

Aggregates Safeguarding
Diogelu Agregau

Scale 1:100 000
Cradfa 1:100 000

Compiled by: A.J. Humpage, C.E. Wrighton and T.P. Bate
Project Leaders: A.J. Humpage, J.M. Markewicz and A. Bennett
Digital Cartography: A.A. Spencer and E. Smith, British Geological Survey, September 2012

Contributed to by: A.J. Humpage, C.E. Wrighton and T.P. Bate
Reviewed by: A.J. Humpage, J.M. Markewicz and A. Bennett
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This map is one of a series of maps commissioned by the Welsh Government and the Natural Resources Wales (NRW) to show the distribution of aggregate resources in Wales. It is part of the 'Aggregates Safeguarding Map of Wales' series. The map is based on data from the British Geological Survey and the Natural Resources Wales (NRW) and is intended for informational purposes only. It does not constitute a guarantee of accuracy or a statement of opinion. The map is subject to change without notice. The map is produced by the British Geological Survey, Natural Environment Research Council, Llywodraeth Cymru Welsh Government, 2012.

Category 1 Aggregates Safeguarding Areas
Arddaloedd Diogelu Agregau Categori 1

- Sand and Gravel
- Tywod a Graenig
- High Specification Aggregate - Sandstone and Igneous Rocks
- Agreg Mawrbydd Uchel - Tywodfaen a Chraigau Ignodd
- High Specification Aggregate - Carboniferous Limestone
- Agreg Mawrbydd Uchel - Caefffaen Carboniferolig

Category 2 Aggregates Safeguarding Areas
Arddaloedd Diogelu Agregau Categori 2

- Sand and Gravel
- Tywod a Graenig
- Sandstone (stipple denotes quartzitic sandstone with potential for silica sand and silica rock)
- Tywodfaen (y ddwblwyl yn tywodfaen cearwyl a photensial am dywod silica a chraig silica)
- Limestone
- Caefffaen

Administrative Areas
Arddaloedd Gweinyddol

- Mineral Planning Authority: Unitary Authority
- Awdurdod Cynulliad Meirion: Awdurdod Undebol
- Mineral Planning Authority: National Park Authority
- Awdurdod Cynulliad Meirion: Parc Cenedlaethol

Notes

The purpose of this map is to show the areas where aggregate mineral resources are at risk from exploitation. The map is based on data from the British Geological Survey and the Natural Resources Wales (NRW) and is intended for informational purposes only. It does not constitute a guarantee of accuracy or a statement of opinion. The map is subject to change without notice. The map is produced by the British Geological Survey, Natural Environment Research Council, Llywodraeth Cymru Welsh Government, 2012.

Disclaimer

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Aggregates Safeguarding

The map shows the distribution of aggregate mineral resources in South East Wales. The map is color-coded to represent different geological formations and aggregate resources. The map includes a legend, a title block, and a disclaimer. The legend identifies various geological formations and aggregate resources. The title block provides information about the map's purpose and the organizations involved. The disclaimer states that the map is for informational purposes only and does not constitute a guarantee of accuracy.

E. Constraints Plans

F. Alignment Matrix

Table 21: Objective Alignment Matrix

Links to Welsh Government Well-being objectives	Links to Welsh Government 'Taking Wales Forward' Cross Cutting Strategies	Links to Well-being Goals	SEA Directive Topics	Key Themes from the well-being goals and objectives to be covered in the SEA objectives	Proposed South Wales Metro Programme SEA Objectives
Support the transition to a low carbon and climate resilient society	- Prosperous and Secure - Ambitious and Learning - Healthy and Active - United and Connected	- A prosperous Wales - A more equal Wales - A globally responsible Wales - A resilient Wales - A Wales of cohesive communities - A healthier Wales	- Climatic Factors - Material Assets - Population - Human Health	- Low carbon economy - Climate resilient society and infrastructure - Active Travel	Support transition to a low carbon society ensuring transport projects are sustainable and resilient
Connect communities through sustainable and resilient infrastructure	United and Connected	- A prosperous Wales - A more equal Wales - A globally responsible Wales - A resilient Wales - A Wales of cohesive communities - A healthier Wales - A Wales of vibrant culture and thriving Welsh Language	Material Assets		
Manage, use and enhance Wales' natural resources to support long-term wellbeing	- Prosperous and Secure - Ambitious and Learning - Healthy and Active - United and Connected	- A prosperous Wales - A resilient Wales - A Wales of cohesive communities - A healthier Wales - A globally responsible Wales	- Climatic Factors - Water - Air - Soil - Biodiversity, Flora, Fauna - Material Assets	Natural resources	- Protect and enhance biodiversity and geodiversity - Reduce transport related effects on water run-off and areas of flood risk - Reduce pollution risk to water, soils, and land, and improve land quality where possible

Links to Welsh Government Well-being objectives	Links to Welsh Government 'Taking Wales Forward' Cross Cutting Strategies	Links to Well-being Goals	SEA Directive Topics	Key Themes from the well-being goals and objectives to be covered in the SEA objectives	Proposed South Wales Metro Programme SEA Objectives
					• Sustainable use of natural resources and efficient energy use
• Improve prosperity for all across Wales, helping people into employment and sustaining jobs	• Prosperous and secure • Ambitious and Learning • United and connected	• A prosperous Wales • A more equal Wales • A resilient Wales • A Wales of cohesive communities • A globally responsible Wales	• Population • Human Health	• Employment • Prosperity • Economic development • innovation	• Reduce air pollution related to transport and infrastructure improvements • Promote economic development, employment, and learning opportunities and improve access to these areas
• Foster conditions for sustainable economic development and employment, whilst stimulating innovation and growth for a modern low carbon economy.	• Prosperous and Secure • Ambitious and Learning • United and Connected	• A prosperous Wales • A more equal Wales • A resilient Wales • A globally responsible Wales • A Wales of vibrant culture and thriving Welsh Language	• Climatic Factors • Population • Human Health		
• Position Wales as an internationally focussed, ambitious country engaged and connected to the wider world	• Prosperous and Secure • United and Connected	• A prosperous Wales • A more equal Wales • A globally responsible Wales • A resilient Wales • A Wales of cohesive communities • A healthier Wales • A Wales of vibrant culture and thriving Welsh Language	• Population		
• Facilitate high quality, responsive and better integrated public services, to those that need them most;	• Ambitious and Learning • Healthy and Active • United and Connected	• A more equal Wales • A Wales of cohesive communities	• Material Assets • Population • Human Health	• Public services • Healthy lifestyles and workforce • Active Travel	• Improve wellbeing of local population through sustainable, integrated multi-modal transport

Links to Welsh Government Well-being objectives	Links to Welsh Government 'Taking Wales Forward' Cross Cutting Strategies	Links to Well-being Goals	SEA Directive Topics	Key Themes from the well-being goals and objectives to be covered in the SEA objectives	Proposed South Wales Metro Programme SEA Objectives
enabling citizens to be an equal partner					systems that promote active travel
Help people live healthy and independent lives and support a healthy workforce	- Prosperous and secure - Healthy and Active	- A prosperous Wales - A more equal Wales - A resilient Wales - A Wales of cohesive communities - A healthier Wales	- Population - Human Health		
Create conditions to give every child the best start in life	- Prosperous and Secure - Ambitious and Learning - Healthy and Active - United and Connected	- A prosperous Wales - A more equal Wales - A resilient Wales - A Wales of cohesive communities - A healthier Wales - A Wales of vibrant culture and thriving Welsh Language	- Population - Human Health		
Improve education outcomes for all and reduce the gap in outcomes for different groups	- Prosperous and secure - Ambitious and Learning	- A prosperous Wales - A more equal Wales - A resilient Wales - A Wales of cohesive communities - A healthier Wales - A Wales of vibrant culture and thriving Welsh Language	- Population - Human Health	- Education - Welsh culture and language	Protect and enhance existing cultural heritage and landscape features and promote Welsh art, culture, and identity
Create the conditions for people to learn and use the Welsh Language with their families, in their communities and in the workplace	- Prosperous and secure - Ambitious and Learning - United and connected	- A prosperous Wales - A more equal Wales - A globally responsible Wales - A Wales of cohesive communities - A Wales of vibrant culture and thriving Welsh Language	- Population - Human Health		

Links to Welsh Government Well-being objectives	Links to Welsh Government 'Taking Wales Forward' Cross Cutting Strategies	Links to Well-being Goals	SEA Directive Topics	Key Themes from the well-being goals and objectives to be covered in the SEA objectives	Proposed South Wales Metro Programme SEA Objectives
Promote and enhance the culture and heritage of Wales	- Prosperous and Secure - Ambitious and Learning - United and Connected	- A prosperous Wales - A more equal Wales - A globally responsible Wales - A Wales of cohesive communities - A Wales of vibrant culture and thriving Welsh Language	- Cultural Heritage - Population - Human Health		
Support, safe, cohesive, and resilient communities	- Prosperous and Secure - Ambitious and Learning - Healthy and Active - United and Connected	- A prosperous Wales - A more equal Wales - A resilient Wales - A Wales of cohesive communities - A healthier Wales - A Wales of vibrant culture and thriving Welsh Language	- Population - Human Health	- Sustainable communities - Housing	Promote sustainable communities through a reliable and safe transport network that provides access for all
Improve access to secure, safe, efficient and affordable homes	- Prosperous and Secure - United and Connected	- A prosperous Wales - A more equal Wales - A globally responsible Wales - A resilient Wales - A Wales of cohesive communities - A healthier Wales - A Wales of vibrant culture and thriving Welsh Language	- Material Assets - Population - Human Health		

