

Transport Fit for Future Generations

By the Future Generations Commissioner for Wales, in partnership with the Centre for Transport and Society (CTS), University of the West of England, Sustrans and New Economics Foundation.

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Foreword

Wales has a choice to make. It must choose whether or not to spend £1.4 billion on building a new section of M4 motorway (currently under consideration), or to invest in an alternative sustainable transport future.

We know that over 3 million people rely on the country's transport infrastructure daily. Our roads are congested, with harmful impacts to our well-being, health and environment. We can't afford to continue addressing 21st century transport issues with 20th century solutions. Transport and technology are also developing rapidly, and will revolutionise not only how we travel but the ways in which we will live and work in the future. These changes are uncertain and so there is a huge risk in investing all of Wales' borrowing capacity in an old solution, leaving us ill-prepared to respond flexibly as technology and society changes.



A future-fit approach to transport planning should catalyse a green economy, making people, goods and services mobile in ways that do not cost the earth – environmentally and financially.

It should give us travel options that are low-or zero-carbon, mitigate air pollution and promote environmental resilience.

The emphasis must be on the right thing and it should equalise opportunities for all, play a role in supporting healthy lifestyles, improve community cohesion, and create a well-connected Wales for now and for the future.

**Sophie Howe
Future Generations Commissioner for Wales**

As Future Generations Commissioner for Wales, I want to help transport in Wales become truly sustainable, fit for future generations, working for people and planet. The findings and conclusions in this report apply to transport systems which could be designed in any area of Wales, or beyond and we have used practical examples to illustrate the power and benefits the Well-being of Future Generations Act presents here.

When we are spending a huge amount of public money and asking Future Generations to pay back the cost of borrowing, we need to make sure this money is working as hard as possible in contributing positively to society, the economy, the environment, culture and heritage.

We need to seek solutions that make the biggest contribution to improving our health, to improving the economic prospects of all our communities, to meeting our obligations on climate change and to maintaining and enhancing nature. I am keen to help formulate policies and interventions which are in the interest of the future generations I champion.

In addition to solving congestion, our alternative package outlined in this report would better contribute to the well-being goals, the local well-being objectives and the aspirations of Cardiff Capital Region. It would help the Welsh Government and local authorities meet their decarbonisation targets, reduce inequalities and transport poverty, improve physical and mental health and help reduce noise and air pollution. I strongly recommend that the Welsh Government consider the proposals for alternative measures based around public transport and active travel schemes within the report alongside re-directing funding to secure phases 2 and 3 of the South Wales Metro which currently remain unfunded. The package demonstrates how the region could be seeking to build sustainable transport infrastructure that meets the needs of citizens and businesses today and the needs of future generations.

There are numerous cities and countries in the UK and across the world that stand as excellent examples of how public transport and active travel can be made the norm, and how a high-quality, integrated, sustainable mobility system can have a positive impact on people, on the economy, and on the environment. London, Hong Kong, Zurich, Frankfurt, Paris, Seoul, Prague, Vienna: these are some of the places recently listed as exemplar cities, with sustainable mobility at their heart. There is no good reason that Cardiff, Newport, and Wales as a whole cannot rank among these places in the decades ahead.

The idea for an M4 relief road was proposed almost 30 years ago. The Well-being of Future Generations Act didn't exist, we didn't know about Brexit, we didn't have decarbonisation targets and the South Wales Metro was a distant concept. A Public Inquiry was held recently to consider whether the "Black Route" was the most suitable option. The Public Inquiry's scope was focussed on road options and didn't consider wider issues or alternatives to this as the preferred solutions.

After 20 years of devolution in Wales, a new dawn for Welsh politics is breaking; political parties are seeking new leaders at the Welsh Assembly to lead Wales through an uncharted landscape post-Brexit. This calls for progressive politics and forward-looking leadership, leadership which focuses on creating the Wales we want for communities now and one we want to leave behind for future generations.



Sophie Howe
Future Generations Commissioner for Wales

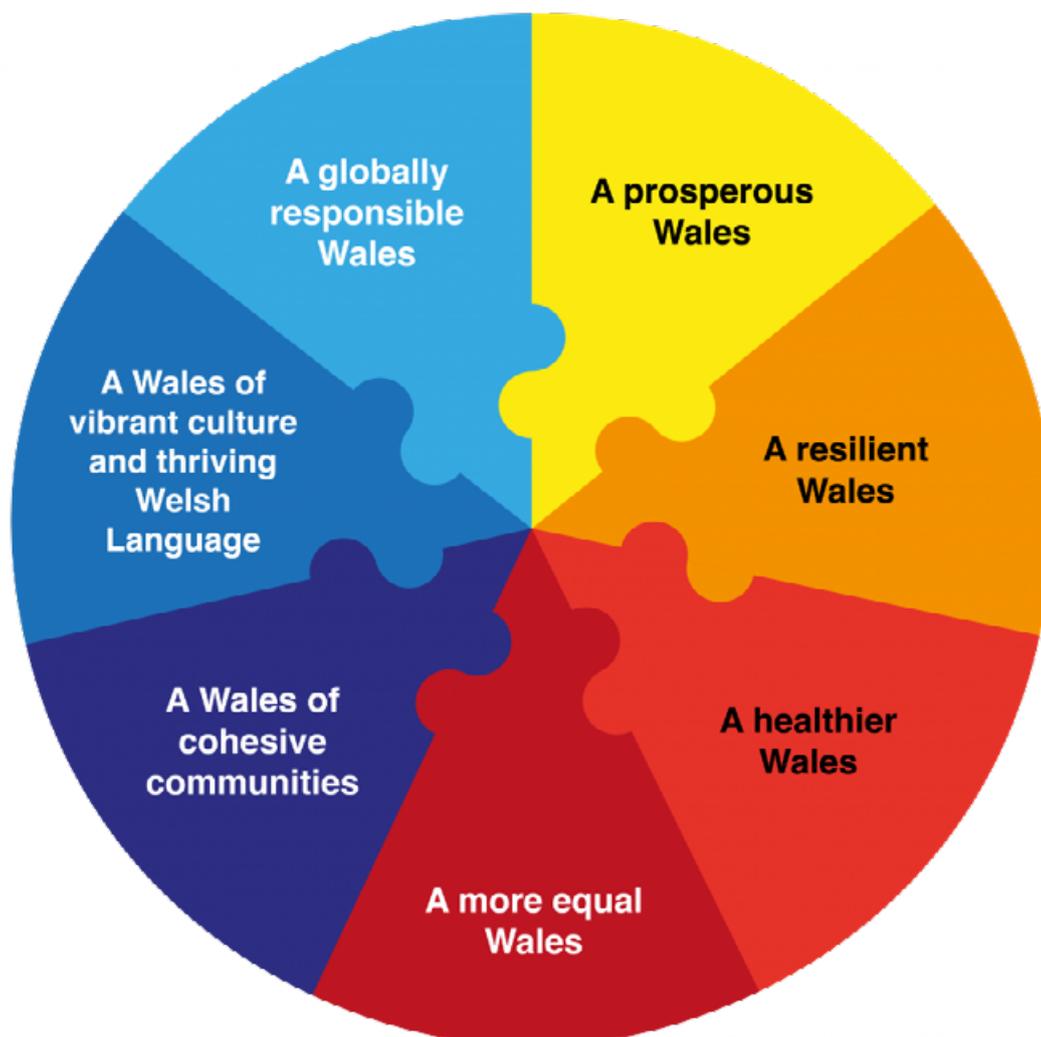
The Well-being of Future Generations Act

The Well-being of Future Generations Act gives us the ambition, permission and legal obligation to improve our social, cultural, environmental and economic well-being.

The Well-being of Future Generations Act requires public bodies in Wales to think about the long-term impact of their decisions, to work better with people, communities and each other, and to prevent persistent problems such as poverty, health inequalities and climate change.

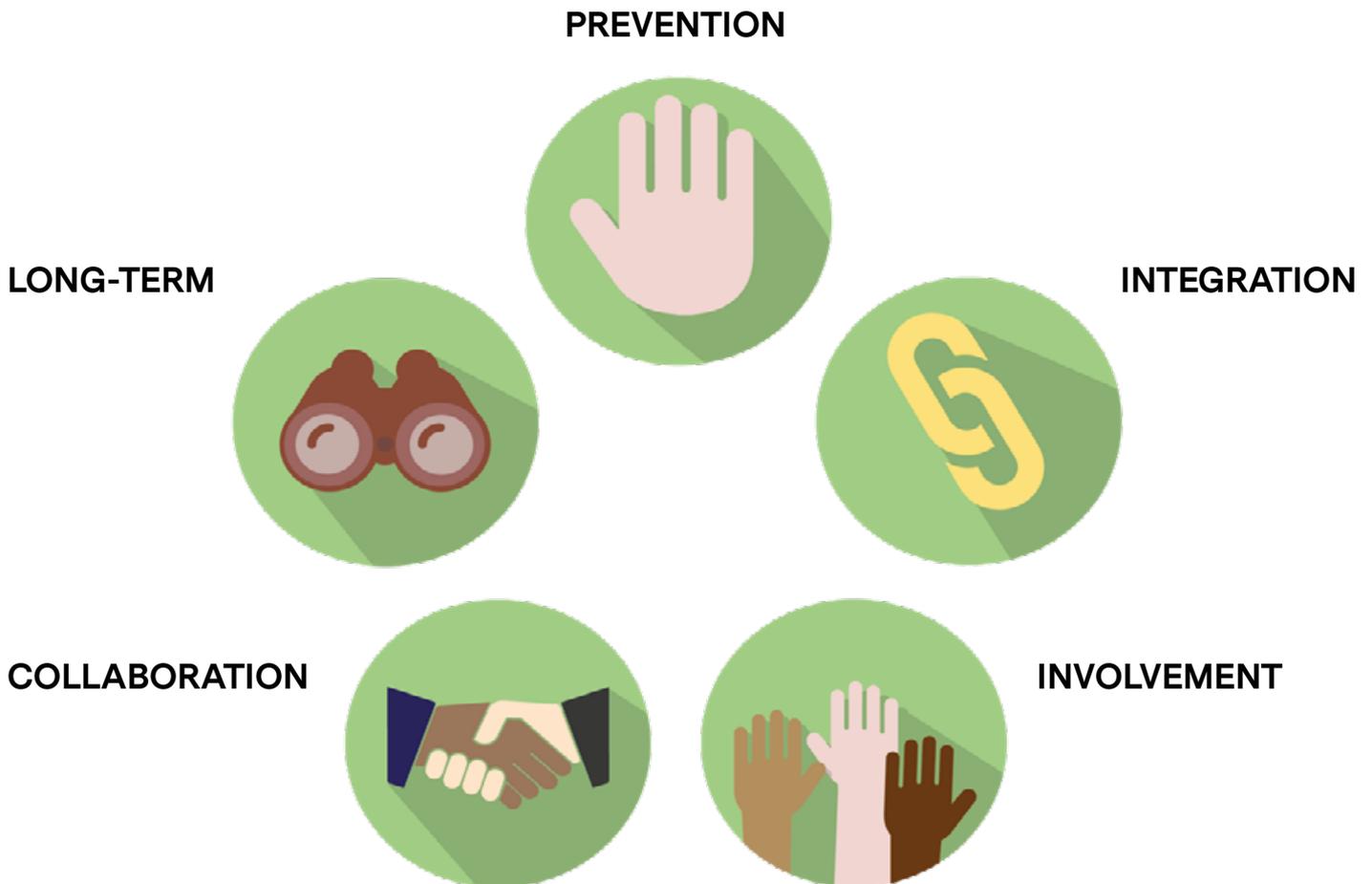
The Act is unique to Wales attracting interest from countries across the world as it offers a huge opportunity to make a long-lasting, positive change to current and future generations. To make sure we are all working towards the same purpose, the Act puts in place seven well-being goals. The Act makes it clear the listed public bodies must work to achieve all of the goals, not just one or two.

The Act establishes Public Services Boards in each Local Authority area. They are required to assess the state of well-being locally, set objectives and produce a plan designed to improve economic, social, environmental and cultural well-being in their local area, maximising their contribution to the well-being goals.



The Well-being of Future Generations Act defines Sustainable Development in Wales as: “The process of improving the economic, social, environmental and cultural well-being of Wales by taking action, in accordance with the sustainable development principle, aimed at achieving the well-being goals.”

The Act sets out five ways of working needed for Public Bodies to achieve the seven well-being goals. This approach provides an opportunity for innovative thinking, reflecting the way we live our lives and what we expect of our public services.



The Future Generations Commissioner for Wales

Sophie Howe’s role is to be the guardian of future generations. This means helping public bodies and those who make policy in Wales to think about the long-term impact their decisions have.

You can find more about our work online – www.futuregenerations.wales

Our Partners

Sustrans



Dr Andy Cope

Dr Cope is Director of Insight at Sustrans UK. He oversees Sustrans' monitoring, evaluation, and research operations and leads on identifying, articulating and maintaining opportunities to enhance the evidence base for sustainable transport. Andy's knowledge of approaches to demonstrating the benefits of sustainable and active travel, from methodological development to information application, has enabled Sustrans to generate and utilise a compelling evidence base, and to advance the understanding of cycling and walking. His areas of expertise include active and sustainable transport, transport policy and links with air quality, public health, well-being and carbon emissions and local economic growth, transport poverty, data collection, analysis and reporting, evaluation and evidence translation.



George Macklon

George Macklon has been part of Sustrans' Research and Monitoring Unit since mid-2012. Initially working to help develop the programme of cycle counter data collation in the Unit, he has subsequently worked across a number of areas, including the monitoring and evaluation of infrastructure programmes such as Connect2. George has also worked on a range of research topics, including the possibility of using Strava data to model cycling usage, long term changes in use in cycling across Scotland and the UK and estimating annual usage on the National Cycle Network.



Anjali Badloe

Anjali Badloe has worked in Sustrans Research and Monitoring Unit (RMU) since 2015, and has managed the monitoring and evaluation of a diverse portfolio of 20 behaviour change and infrastructure projects across the UK. This includes, the implementation of quantitative and qualitative measures of travel behaviour, health and wellbeing, economic and environmental outcomes. Anjali has a strong background in economics and quantitative analysis, including statistical analysis and regression modelling. As a result, she has led the development of RMU's economic appraisal methodology for active travel schemes, and has expertise in the forecasting of the economic benefits of proposed infrastructure developments.

Centre for Transport and Society, University of the West of England



Dr William Clayton

Dr Clayton is a Senior Lecturer in the Centre for Transport & Society at the University of the West of England, Bristol (UWE). He is a member of the teaching team on UWE's BA Geography, MSc Transport Planning, and MSc Transport Engineering and Planning programmes. He is also involved in a number of research projects on sustainable transport, autonomous (driverless) vehicles, cycling, public transport, new mobile technologies and travel, transport mapping, and transport evaluation. He has published over 50 journal articles, conference papers and reports over the last few years.



Dr Ben Clark

Dr Clark is a Senior Lecturer in the Centre for Transport & Society with a background in transport planning practice. His recent research has centred on understanding travel behaviour change, by applying a life course perspective. His areas of expertise include transport planning, travel behaviour change, transport modelling, designing for movement (traffic engineering), mixed methods approaches to research and life-course perspective applied to travel behaviour.



Professor John Parkin

Having worked for consulting engineers before joining academia, Professor Parkin is now Professor of Transport Engineering at the University of the West of England and Deputy Director of the Centre for Transport and Society. He has been involved in all stages of the promotion of transport schemes including policy formulation, modelling and forecasting, operational analysis and economic appraisal, design and construction, and evaluation. He has experience across all modes of transport and have a particular specialism in cycling. He represents the Institution of Civil Engineers on the Department for Transport Cycle Proofing Group, is a member of the Institution of Civil Engineers Transport Expert Panel, chairs the Chartered Institution of Highways and Transportation Individual Route Assessment Panel and is a member of its Membership and Skills Strategy Board.

NEF Consulting



Elizabeth Cox - Associate Director, NEF Consulting

Elizabeth Cox is an experienced economist who has led NEF's UK and international research on localities and local economies over the past 13 years. Her work ranges from conducting policy reviews, research design, developing impact frameworks for social impact investors and social businesses to developing practical approaches to implement policies such as community-based regeneration approaches. Prior to working at NEF, Elizabeth was a research Fellow at Aberdeen University, and a policy advisor in the Ministry of Agriculture, Guyana.



Dr Alex Chapman - Consultant, NEF Consulting

Alex is a consultant with experience in qualitative and quantitative research, project evaluation and policy analysis. Alex has worked with tools such as Multi-Criteria Analysis, Social Cost-Benefit Analysis, System Dynamics Models, and advanced Integrated Climate Models, applying them to issues spanning the triple bottom line (society, environment, economy). Alex has experience in environmental governance and management in the UK including conducting local climate change impact assessments and working on nature-based flood risk management. In addition to a PhD from the University of Southampton Alex has previous experience on DFID funded development projects and at the Asian Development Bank.

£1.4 billion could fund...

= 14 miles of new M4 motorway

= Metro phases 2 & 3

= investment in cycling and walking to cover the whole of Wales twice over

= Swansea Bay Tidal Lagoon

= to bring all homes in Wales up to required energy efficiency standards

= 205,800 state pensions or 420,000 job seeker's allowances for a year

= 36,400 nurses or 16,800 hospital doctors for one year

= 56 new secondary schools

= 23,240 new social homes or 70,000 shared ownership homes

= electrify about 175 miles of train lines



Executive Summary

Wales must decide and provide the future it wants. To build a sustainable transport system for the future we first need to decide what type of future we want as a society, and then build for this.

The Well-being of Future Generations (Wales) Act 2015 is world-leading legislation in that it places sustainable development at the heart of what we do in Wales. The Act gives us the ambition, permission and legal obligation to improve what we do, and how we do it, for current and future generations. It applies to everything public bodies do – from conception of an idea to making major policy decisions on services or infrastructure. It's about changing the way we think, plan and act to help shape a better economy, society and environment for the future.

The Welsh Government's proposal is based on the system of 'predict and provide'. Our evidence shows it should be based on a 'decide and provide' model. This means that policy and public spending should be clearly contributing to the aspiration of the Wales we want rather than being limited to existing policy thinking. The vision of the Wales we want is set out in the Well-being of Future Generations Act and we must therefore choose actions that will deliver this vision.

This report considers the current proposal for building new road infrastructure, and proposes alternatives unlocking investment in public transport and active travel, that offer people and communities better public transport links, walking/cycling accessibility, joined-up networks and services providing attractive, accessible mobility options. It's intended to inspire decision makers and demonstrate the multiple benefits that could be unlocked by favouring an integrated transport system fit for current and future generations.

Overview of findings

The uncertainty that is introduced to transport planning and policy-making by globalisation, economic instability, climate change, technological innovation and changing consumer preferences, means that there are substantial benefits to be gained by taking a more flexible approach to transport planning which allows policy-makers to shape a positive future rather than trying to respond to an apparently predicted future – one which in the case of the M4 proposals predicts increased traffic based on current rather than future scenarios. This uncertainty also presents opportunities – particularly in relation to developments in new vehicle and fuel technologies, developments in Internet connectivity and digital technology, and emerging changes in demographic trends.

It is challenging to make reliable forecasts about the future benefits of large infrastructural schemes in this context of change. To build the foundations of a fully integrated sustainable transport network for south Wales, investment has to be prioritised into infrastructure that enables people to make more positive travel choices in the future. Wales is currently at risk of failing to meet its own carbon emissions reduction targets (IWA, 2018), and if the current situation persists, future generations are set to be left a legacy of the negative impacts of car dependence: climate change, an inactive population, poor air quality, congestion, noise pollution, and unequal access to jobs, education, and services.

Our analysis provides a critique and offers a development of the original public transport options appraisal conducted by the Welsh Government in 2013. It shows that:

1. There are limitations to the modelling undertaken by the Welsh Government

The public transport options analysed in 2013 did not represent a comprehensive alternative transport package, nor a comparable investment to that of the new road infrastructure options.

Whilst thorough, the modelling does not take account of public transport infrastructure not currently agreed upon, thereby excluding any potential longer-term developments in high-quality public transport infrastructure in the region. It also excludes a substantial proportion of the proposed South Wales Metro scheme which is now being developed.

Transportation currently accounts for 14% of our carbon emissions in Wales and in order to meet carbon reduction targets it would be inconceivable that the Government would not in the next 10 years invest in further public transport to achieve the target of 43% reduction in transport emissions by 2030¹. Indeed diversion of funding planned for the M4 relief road could be used to invest further and faster in public transport and active travel.

The Decarbonisation Plan and carbon budget currently being set are intrinsically linked both to the strategic decision as to whether the proposed investment in the M4 is in line with what will be required and also to the technical analysis of future demand for increased road capacity. A decision on the M4 should therefore not be taken until a clear plan for decarbonisation has been set and a full analysis of the implications for future carbon budgets has been undertaken.

2. The Black Route would exacerbate many of the societal and environmental challenges facing Wales

Our analysis shows the Black Route would exacerbate many of the challenges facing Wales, including carbon emissions, physical and mental health, noise and air pollution, inequality and transport poverty. It also contradicts Well-being Objectives established in Local Well-being Plans in and around the proposed Black Route (Cardiff, Newport and Monmouthshire).

With regard to traffic and congestion, predictions from the M4 Corridor around

¹ Transport sector emissions have reduced by 3% since the 1990 baseline

Newport Transport Model² indicate that the proposed new section of motorway would be associated with an increase in motorway traffic of approximately 42,000 vehicles per day in 2037. At the same time, limited journey time savings could be completely negated if surrounding traffic increases, as expert studies suggest it is likely to.

3. The Black Route is weak on the criteria set out in the Well-being Future Generations Act

We have re-designed criteria to assess the Black Route and an alternative transport package, following the revised Welsh Transport Appraisal Guidance (WelTAG) approach. The new criteria takes into account the Well-being of Future Generations Act, local well-being objectives and Welsh Government's national commitments on decarbonisation, health and inequality.

Our comparative, multi-criteria analysis demonstrates that a comprehensive alternative transport package would significantly outscore the Black Route on both the Government's long-standing criteria for transport evaluation (WelTAG 2017), and the criteria mandated by the Well-being of Future Generations (Wales) Act 2015.

For the Black Route to be established as the preferential option in this new model, an inordinate weighting (20 times) must be placed on the single criterion representing the small individual time savings (called Travel Economic Efficiency) of between 2.5 and 5 minutes³.

² which are subject to uncertainty

³ <http://bailey.persona-pi.com/Public-Inquiries/M4-Newport/C%20-%20Core%20Documents/1.%20Proofs/1.2.2%20Bryan%20Whittaker%20Summary.pdf>; potentially increasing to 7-11.5 minutes by 2051

An alternative transport solution?

We offer a package of integrated transport solutions as an alternative to travelling by car, to help solve congestion and make a better contribution to Wales' Well-being Goals.

We set out 3 case study ideas of public transport schemes to complement the South Wales Metro at a cost of approximately £460m. This could be complemented by additional active travel measures (in the 3 local authorities) at a cost of £118m.

The total cost of our package would be approximately £578m, delivering an integrated system of public transport and active travel infrastructure to complement the planned Metro phases 2 and 3, at a fraction of the proposed £1.4bn investment on the Black Route.

In addition to solving congestion, our alternative package would better contribute to the well-being goals, the local well-being objectives and the aspirations of Cardiff Capital Region. It would help the Welsh Government and local

Authorities meet their decarbonisation targets, reduce inequalities and transport poverty, improve physical and mental health and help reduce noise and air pollution.

Our findings lead us to conclude that, when compared with investing £1.4bn on a range of sustainable transport options, the Black Route fails to deliver against many well-being goals and fails to offer the multiple benefits current and future generations deserve in Wales while also exacerbating many of the challenges we face.

Our findings show that the South Wales Metro, if fully realised, represents an excellent foundation for further development of an integrated, attractive, accessible, and realistic transport system in South Wales. Welsh Government should be seeking opportunities to build on this foundation and continue to integrate the public transport and active travel networks in the region, prioritising investment into infrastructure that enables people to make more positive travel choices such as public transport and active travel, supporting a shift away from private car use.



1. BUILDING A TRANSPORT SYSTEM FIT FOR FUTURE GENERATIONS



1.1 What's being proposed?

Welsh Government plans to spend approximately £1.4 billion on building a new 14-mile section of M4 motorway to the south of Newport, to relieve congestion in the area. The idea was proposed almost 30 years ago, and a Public Inquiry was held recently to consider whether the “Black Route” was the most suitable option. The Public Inquiry’s scope was focussed on road options and didn’t consider wider issues or alternatives to this as the preferred solution.

The current era in which policy-making and delivery is taking place is characterised by uncertainty. As a result, decisions should be **visionary and flexible**, rather than based on predictions of current trends based on how we live our lives at the moment. Just over a decade ago smart phones and 5G technology were not in existence and yet they have fundamentally transformed the way we live and work; a similar revolution in transportation could follow this pattern of technological development leading to the need for a new model of mobility. Longer term changes in demographics and societal activities mean that overall, **there is reduced travel demand per head of population today** – with 16% fewer trips being made than in 1996 and 10% fewer miles travelled than in 2002⁴.

The Commission on Travel Demand found that assumptions underpinning the current approach to travel planning neglect key recognised and measurable societal and technological developments, and ignore evidence on reduced travel demand and car ownership. They conclude that greater attention needs to be paid to **developing travel demand estimates that are relevant to the emerging shape of society, and recognise that the way people travel affects quality of life, public health and the environment.**

⁴ Marsden, G. et al. (2018) All Change? The future of travel demand and the implications for policy and planning, First Report of the Commission on Travel Demand

This report is based on research undertaken by partners⁵, and is set within the context of an urgent need to address the unsustainability of the current transport system in South East Wales, which remains dominated by private car travel. The challenges are highlighted in a recent report by the Institute of Welsh Affairs (IWA)⁶:

*“Wales risks failing to meet its own targets on carbon emissions unless it changes its over-reliance on the car. Transport in Wales is dominated by the car more than in any other region or nation in the UK. Most emissions emanate from the private car. **The car is also a key barrier to more people using the less polluting and more sustainable modes: active travel and public transport.**”*

Bus services in Wales are in serious long-term decline.** Rail serves only a very small part of the country and, whilst growing, has less than a fifth of the passenger journeys of buses. Despite the Active Travel (Wales) Act 2013, **walking and cycling levels are generally static or declining.** Given that the sale of new petrol and diesel cars is to be banned from 2040, **there is a clear need for managed change in Wales’ transport system”.

The uncertainty that is introduced to transport planning and policy-making by globalisation, economic instability, climate change, technological innovation and changing consumer preferences, means there are substantial benefits to be unlocked from a more **flexible approach to transport planning** which allows policymakers to **shape the future** rather than trying to respond to an apparently certain predicted future.

“There is a need therefore to refrain from a ‘predict and provide’ approach...any notion of the prediction being ‘accurate’ is illusory. It is therefore not a matter of predicting the future but more consciously shaping the future in a way

⁵ University of the West of England, Bristol; Sustrans UK; and New Economics Foundation Consulting

⁶ Decarbonising Transport in Wales (IWA, 2018)

that resurrects an important quality of planning itself, namely to explore the question of how to develop a better future...moves us from 'predict and provide' to 'decide and provide'⁷.

This report considers alternative transport scenarios for South East Wales; but also has wider implications for connectivity across the whole region. It seeks to demonstrate what a transport system fit for future generations could look like and how Wales could go about developing such a sustainable system for current and future generations anywhere in Wales. It looks at how we can use transport infrastructure development to influence future travel patterns and build a sustainable system of mobility for future generations, as opposed to only responding to the current problem of road traffic congestion. It brings to life the aspiration and requirements of the Well-being of Future Generations Act.

1.2 Is road building fit for future generations?

The road building approach is set within an outdated paradigm of responding to traffic and congestion by simply building more roads. This “predict and provide” approach has been shown time and again not to work (e.g.: SACTRA, 1994; Purnell et al., 1999; Taylor et al., 2006; Goodwin, 2006; TfQL, 2017; CPRE, 2017).

Evidence consistently demonstrates **that capacity increases on highway infrastructure generate more motorway trips**, and generally, **new capacity simply fills up over time**, often leading to further congestion on the entire corridor/network. As Goodwin⁸ (2006) illustrates for 80 years - every eight years on average [1925, 1937, 1958, 1963, 1968, 1985, 1987, 1988, 1994, 1996, now 2006] - there has been the same experience, the same conclusions. **The evidence has been consistent, recurrent, unchallenged by serious countervailing evidence but repeatedly forgotten.**

⁷ Lyons, G and Davidson, C (2016) Guidance for transport planning and policymaking in the face of an uncertain future. Transport Research Part, vol. 88, p.112

⁸ “Induced Traffic Again. And again. And again.” Professor Phil Goodwin, 2006

Despite the large and consistent body of evidence, successive governments, and the bodies that advise them, have repeatedly found it convenient to forget or deny that **new roads generate more traffic** independently of changes arising from growth in population or the economy.

An analysis of traffic modelling around the Newport area by University of West of England shows the impacts of the proposed M4 relief road around the Newport area⁹:

- Although the model predicts that in 2037 the Brynglas Tunnels would carry around 89,000 vehicles without the new motorway, reducing to 61,000 vehicles per day with the inclusion of the relief road, given that a further 70,000 vehicles per day are predicted to be using the new section of motorway, motorway traffic overall with the new motorway is predicted to increase from 89,000 to 131,000 vehicles¹⁰ – a total increase of 42,000 vehicles per day.
- Similarly, the model predicts journey time savings for through traffic of between 2.5 minutes in the opening year¹¹.

The model predictions (which are subject to uncertainty) **suggest that the proposed expansion to the M4 would be associated with an increase in motorway traffic of 42,000 vehicles per day.** Evidence from previous trunk road schemes indicates that **projected reductions in congestion on the existing road network are often eliminated over time** due to the effects of induced traffic.

⁹ Note that this summary is based on an assessment of secondary evidence presented in reports prepared in support of the public inquiry (including the local model validation report (Welsh Government 2015), the traffic forecasting report (Welsh Government 2016), and the transport proof of evidence (Whittaker 2016). The primary data used as inputs and outputs from the modelling and appraisal exercise have not been reviewed. Any quantifications noted here are therefore provisional and subject to further analysis and should be interpreted accordingly.

¹⁰ See Welsh Government (2016) M4 Corridor around Newport: Revised Traffic Forecasting Report. Welsh Government: Cardiff. Paragraph 10.3.5.

¹¹ See Welsh Government (2016) M4 Corridor around Newport: Revised Traffic Forecasting Report. Welsh Government: Cardiff. Paragraph 10.6.5.

Expert Evidence: Road building does not solve congestion

In order to investigate the credibility of the claims being made for the new roads programme, the Campaign to Protect Rural England commissioned consultants at Transport for Quality of Life to produce an independent report¹. Reviewing over 80 official evaluations of road schemes, as well as carrying out four detailed case studies of older road schemes, this research examined if road-building:

- delivered the congestion relief promised
- damaged the landscape as much as feared
- boosted local economies as hoped

The new Transport for Quality of Life research shows that road schemes:

- Induce traffic, that is, generate more traffic – often far above background trends over the longer term
- Lead to permanent and significant environmental and landscape damage
- Show little evidence of economic benefit to local economies

Evidence from the 13 cases analysed in detail for traffic impact concluded that road schemes generate more traffic. On average, traffic grew 47% more than background levels, with one scheme more than doubling traffic within 20 years.

None of the four schemes assessed² in the longer-term showed the promised reduction in congestion; all put pressure on adjoining roads. As for economic impact, of 25 road schemes justified on the basis that they would benefit the local economy, only five had any direct evidence of economic effects at all. Even then there was no evidence the road was responsible for them, or hadn't simply moved economic activity from elsewhere.

As regards the longed-for congestion relief, median journey times hardly changed, with savings of 90 seconds during peak periods.

What was sacrificed for these marginal gains? 69 out of 86 road schemes examined had an adverse impact on the landscape – not just obliterating views but destroying ancient woodland and mature hedgerows. More than half damaged an area with national or local landscape designations for landscape, biodiversity or heritage.

¹ CPRE (2017) Report: <https://www.cpre.org.uk/resources/transport/roads/item/4543-the-end-of-the-road-challenging-the-road-building-consensus>

² The four road schemes assessed were completed between 13 and 20 years ago: the A34 Newbury Bypass, M65 Blackburn Southern Bypass, A46 Newark – Lincoln dualling and A120 Stansted to Braintree dualling.

To build a sustainable transport system for the future we first need to decide what type of future we want as a society, and then build for this.

Experience from the Newbury bypass showed that congestion was back to its original level within 5 years of it being built:

Newbury Bypass: The Experience Five Years On

For anyone in Newbury driving to work the experience is now as bad as it was before the bypass was built. As discussed earlier, peak congestion was one of the key justifications for the road presented by the Department of Transport in evidence to the Public Inquiry.

Taylor et al., 2006, p. 5

Taken together, studies into past road building schemes and the present analysis of the modelled impacts of the proposed M4 relief road scheme strongly suggest that the

motorway network around Newport can expect a considerable increase in vehicle traffic if the scheme is completed, which is unlikely to support Wales' target for emission reductions in the transport sector.

This raises the question of what the people of South East Wales want their local area to look like in the decades ahead. If the desired future is one of more roads, more motorway traffic, and more congestion, then road building will provide this. Alternatively, if the desired future is an accessible and sustainable transport system, then investment focused on building better public transport and active travel infrastructure is the best approach to achieve this, whilst seeking to improve the well-being of current and future generations (as required by the Well-being of Future Generations Act).

The Fallacy of Small Journey Time Savings

Journey time savings for drivers appear to be considered the greatest single financial benefit of road schemes in the cost-benefit analysis. However, the research suggests that **median journey time savings probably have little if any effect for each driver in practice, with only 1.5 minutes saved during peak periods and 1 minute during the inter-peak/off-peak.** There is extensive literature critiquing how these small changes, which **in practice have little, if any, effect for individuals,** shape official cost-benefit analysis.

In any event, these are just the savings travelling along a particular road scheme, rather than for door-to-door journeys. **Where road schemes generate traffic these savings will be cancelled out, or even negated, if they lead to greater congestion on the surrounding road network.**

Campaign to Protect Rural England, 2017 (p. 9)

What price are we prepared to pay for 2.5 – 5 minute savings in journeys on the M4 around Newport?



1.3 Transport poverty

Transport poverty is exacerbated by policy-making geared towards motorised travel as the main means for accessing employment and services, as it excludes people who don't have access to a car or adequate alternative transport options. The situation is worsened in rural areas, where jobs and services are widely dispersed, and by rising/volatile fuel price trends.

The most recent Welsh Government data on car ownership showed 24% of households in Wales did not own a car/van in 2011/12¹².

Fig 1: The map below shows the percentage of households with no car across South East Wales



Census data (from 2011) on household car ownership for Cardiff, Monmouthshire and Newport tells us:

- **Cardiff:** On average 29% (42,860) of households with no cars or vans, with some wards in the city centre being as high as 43 and 53%
- **Newport:** 27.9% (17, 651) of households with no cars or vans, with some wards in the city centre being as high as 41 and 50%
- **Monmouthshire:** 15.2% (5, 993) of households with no cars or vans;
- **Vale of Glamorgan:** 19.4% (10,735) of households with no cars or vans.

Research¹³ estimates that 50-60% of the population face transport poverty in Newport, 40-50% in Cardiff and 30-40% in Monmouthshire. Across the South East Wales region 30% of households lack access to a car¹⁴. Some of society's most vulnerable groups – including children, older people and people in low-income groups – are most likely to be affected by the negative effects of increased

12 Welsh Government (2013) People and Licensing and Vehicle Ownership, 2012 – Statistical Bulletin. Available at: <https://gov.wales/docs/statistics/2013/131022-people-vehicle-licensing-vehicle-ownership-2012-en.pdf>

13 Sustrans (2012) Access Denied: Transport poverty in Wales. Available at: https://www.sustrans.org.uk/sites/default/files/images/files/Access%20Denied_eng.pdf

14 South East Wales Regional Transport Alliance (2010). Regional Transport Plan. Available at: https://www.valeof-glamorgan.gov.uk/Documents/Living/Planning/Policy/SEWTA_Regional_Transport_Plan.pdf

road traffic in the UK, while having least access to transport themselves¹⁵.

Research has shown that a solution to **addressing transport-related social exclusion is investment in high-quality active travel and public transport provision** to create a more equal, affordable and accessible range of travel options for Welsh society.

¹⁵ <http://www.sd-commission.org.uk/pages/fairness-in-a-car-dependent-society.html>

Equal access to affordable public transport is key to achieving effective, sustainable mobility in cities of all sizes. More choices for short and long-distance travel will help – with innovative transit hub development – to reduce the challenges of navigating the urban sprawl. **An imperative for urban design is to make walking, cycling and taking a bus or riding rail transit more attractive than sitting in traffic.**

This needs to be done while also getting people to where they need to go and improving the perception of ‘transit-dependent’ riders. **Convincing upper-income citizens to use public transport, as they do without a second thought, or stigma, in London, Paris, New York and Hong Kong, is critical to increasing usage and lowering emissions.** To achieve this goal, the look and branding of transport systems is critical; for example, introducing sleeker, futuristic looking electric transit vehicles and naming new systems to highlight their efficiency and modernity.

Diane Legge: Mobility Expert – Urban Planning¹

¹ Arcadis (2017) Sustainable Cities Mobility Index 2017: Bold Moves. Available from: mobilityindex.arcadis.com.

1.4 Current uncertainty and future trends

Evidence from a number of sources demonstrates there’s significant uncertainty about the persistence of current “transport norms” in the coming decades. Recent academic literature highlights the uncertainty faced in the context of **accelerating technological development and changing population demographics and trends**. For example, long-term data trends show driving license holding amongst younger people has currently levelled off, which could mean that a decoupling is occurring in the link between levels of car use and economic output. The coming decades are likely to see a continuation and intensification of this uncertainty (Lyons and Davidson, 2016). It’s suggested that we’re moving **away from the current regime of private vehicle ownership and use, towards collective mobility (public transport, shared vehicles) and virtual (digital) connectivity as the norms**.

This uncertainty means it’s **challenging to make reliable traffic forecasts to inform whether building new road infrastructure is the “right” thing to do**. A range of uncertainties which should be considered include:

Future technology trends

It’s predicted that in the coming decades a significant proportion of the vehicle fleet will shift to Autonomous Vehicles (AVs). Predictions range from longer-term adoption: 40-60% of the vehicle fleet by 2050¹⁶; to medium-short-term adoption: 90% of all vehicle trips by 2030¹⁷, with more predictions in between¹⁸.

¹⁶ Litman, T., 2017. Autonomous vehicle implementation predictions. Victoria, Canada: Victoria Transport Policy Institute.

¹⁷ Hars, A. (2014) Autonomous Vehicle Roadmap: 2015–2030. Driverless Future website. Available from: <http://www.driverless-future.com/?p=678>

¹⁸ For example: Bansal, P. and Kockelman, K.M. (2017) Forecasting Americans’ long-term adoption of connected and autonomous vehicle technologies. Transportation Research Part A: Policy and Practice, 95, pp.49-63. Alexander, D., Gartner, J. (2014) Self-driving Vehicles, Advanced Driver Assistance Systems, and Autonomous Driving Features: Global Market Analysis and Forecasts. Available from: <https://www.navigantresearch.com/research/autonomous-vehicles>

Although their impacts and the likely timeline of their deployment are highly speculative at present, AVs have the potential to significantly reduce traffic and congestion. This challenges current assumptions that underpin the arguments for new road building schemes.

Alternative fuel vehicles and tax regime changes

The Institute for Fiscal Studies conducted a study ¹⁹ which shows that as electric vehicles form a larger proportion of the UK fleet, tax revenue from fuel and Vehicle Excise Duty will be significantly reduced, leaving a large hole in an important source of revenue for the UK Government. At some point soon, a new tax regime will need to be considered, which could be a new form of vehicle tax, or more likely **road user charging**. Both could **act as constraints to further growth in vehicle traffic, which again, challenges one of the core functions of a new road scheme**. Evidence shows that tolls and road pricing measures are highly effective

19 Institute for Fiscal Studies (IFS) (2012) Fuel for Thought: The what, why and how of motoring taxation. Report for the RAC Foundation. Available from: https://www.racfoundation.org/assets/rac_foundation/content/downloadables/fuel_for_thought-johnson_et_al-150512.pdf

means of managing road space. The removal of the toll on the Severn Bridge will bring additional challenge in this respect.

Dynamic road user charging

Road space is generally perceived to be free at the point of use (i.e. the costs of fuel and fuel duty are not really ‘felt’ by the user before and during the trip). There are **compelling economic arguments that road capacity ought to be dynamically priced** such that **road users pay the full ‘marginal social cost’ of their journey**. Under a dynamic road pricing regime, the cost to the user would take into account their contributions to congestion and other externalities such as air and noise pollution, as well as the extent of their use of the road asset (priced by distance). A common form of this might be, for example, **peak-hour tolls, in which people travelling on the road under the most congested conditions are charged more to cover the increased social costs of their trips**.



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Platooning

This refers to systems through which chains of vehicles form behind a lead vehicle, with automation technology taking over to control the speed, direction and vehicle spacing. Simulation studies have indicated that lane capacities could be increased **from typically 2,000 vehicle per lane hour to as much as 9,000 vehicles per lane hour**²⁰. The Department for Transport is currently preparing for the first road trial of platooning in the UK, which will use heavy goods vehicles. An £8.1million investment has been made in this trial, and self-driven truck platoons are expected on UK roads by the end of 2018²¹ with potential benefits including reducing congestion and cost of fuel for hauliers. Although it's by no means certain that such technologies will become widely adopted in private vehicles, and simulation studies are themselves subject to uncertainty, **such lane capacities would be able to accommodate the predicted 89,000 vehicles per day through the Brynglas Tunnels.**

Although difficult to predict the impact of future technology, it's necessary to consider the potential impact of autonomous or electric vehicles on roads, changes in fuel/tax regimes, charging and platooning on future travel habits and road congestion as these could alleviate the congestion problem without the need to build more road capacity.

20 Fernandes, P. and Nunes, U. (2012) Platooning with IVC-enabled autonomous vehicles: Strategies to mitigate communication delays, improve safety and traffic flow. IEEE Transactions on Intelligent Transportation Systems, 13(1), pp.91-106.

21 Department for Transport (2017) Lorry technology trials could slash fuel costs and congestion. Press release. Available from: <https://www.gov.uk/government/news/lorry-technology-trials-could-slash-fuel-costs-and-congestion>.

2. WHAT ARE THE ALTERNATIVE SOLUTIONS TO BUILDING ROADS?



2.1 Additional traffic management options

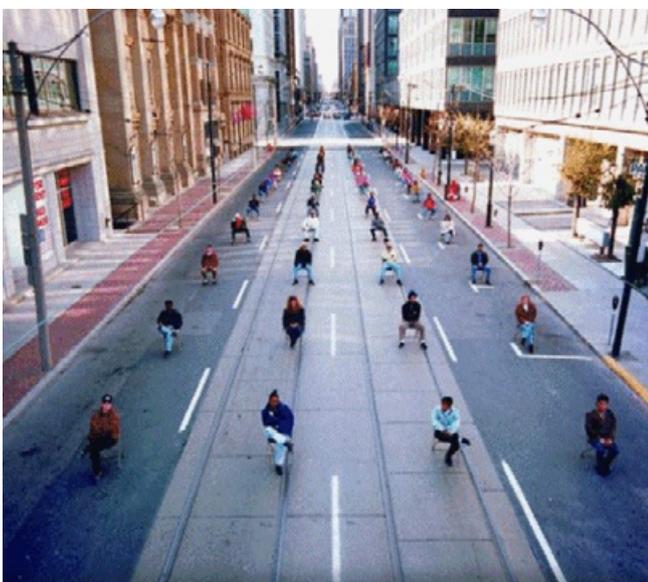
In order to relieve congestion on the existing M4, our analysis has considered further opportunities for traffic management strategies, especially on constraints such as the Brynglas Tunnels. The maximum potential for traffic reduction within the tunnels has been estimated at 10,000 vehicular trips per day (11% of the predicted total traffic volumes in 2037)²². This is a significant contribution to resolving congestion when coupled with measures allowing people to use the alternative transport options described below, instead of driving.

We recommend the following traffic management strategies should be considered to help relieve congestion:

Smart Motorway

This is the use of technology to actively manage the flow of traffic; it helps keep traffic flowing freely, increasing capacity without having to widen the road. A Highways Agency evaluation of the first section of smart motorway, deployed along the M42 in 2006, indicated that journey time reliability improved by 22% and collisions involving injuries reduced by 50%. Variable speed limits are already employed on some sections of the M4 around Newport.

²² The model indicates that about 12% of trips travelling through the Brynglas Tunnels (without the new motorway) is local traffic (joining and leaving the M4 between junctions 23 and 29). This is equivalent to approximately 10,000 vehicular trips per day given the 2037 forecast of 89,000 vehicles per day using the tunnels.



Courtesy Toronto Transit Commission

Junction management

This involves installing traffic signals on motorway slip roads to actively control the rate at which traffic joins a motorway to prevent congestion. Observed benefits include: increases in traffic flow of between 1 to 8%; increases in traffic speeds downstream of the ramp metered junction of between 3.5 and 35%; and average journey time savings of 13%.

High Occupancy Vehicle (HOV) lanes

These are lanes dedicated specifically to vehicles with more than one occupant. This can include shared cars and public transport vehicles (most commonly bus lanes). The aim is to encourage more vehicle sharing and reduce the number of people travelling alone in their cars, which is a significant waste of road space.

Studies have shown that the reallocation of road space away from single occupancy vehicles can have the effect of reducing traffic levels without impacting adversely on levels of congestion. For example, the M4 bus lane into London had positive impacts on levels of congestion and journey times - the scheme improved journey times by three minutes for bus users and one minute for car users, whilst no adverse effects were observed on peak traffic or the surrounding network (see: TRL, 2005).

Car Clubs and pool cars

The idea of car clubs is not new – they provide a fleet of vehicles in an area for members to use on a short-term basis, either via a subscription or individual hire arrangement. These schemes are important to mention here in the context of an alternative transport package as they are able to provide people with access to a car without the need to own a private vehicle. This means that rather than cars sitting unused for 95% of their life-cycle (as is the average with private ownership) they are shared between different users. Car clubs are important as a part of an alternative solution for facilitating particular journeys to which the car is well-suited (for example, travelling to areas without suitable public or active travel alternatives, or

to transport heavy loads). A comprehensive, accessible car club or car pool means that people retain car access for trips that need it, whilst unnecessary routine car journeys that can be made by alternative means are reduced. There is a huge amount of evidence about the growing international popularity of car clubs, with recent figures showing that the number of car-sharing users across the world has increased dramatically, from 0.35 million in 2006 to 4.94 million in 2014²³.

Freight management strategies

Data for the Brynglas Tunnels indicates that the tunnels carried 7,500 daily Heavy Goods Vehicle

23 Prieto, M., Baltas, G. and Stan, V. (2017) Car sharing adoption intention in urban areas: What are the key sociodemographic drivers? *Transportation Research Part A: Policy and Practice*, 101, pp.218-227

movements in 2014 (equivalent to 15,000 cars, assuming HGVs have the equivalent impact on capacity as 2 cars). When considering what volume of road freight could be transferred to alternative modes, it could be suggested that 10 additional rail freight services could reduce HGV movements through the Brynglas Tunnels by 10% (about 750 vehicles per day, equivalent to 1,500 cars)²⁴. However, to fully understand potential for modal transfer to rail requires a detailed assessment of capacity available on the South Wales mainline (during the day and at night). Given the coastal setting of the corridor, further opportunities for domestic maritime freight should also not be discounted.

24 Based on Arup (2014) estimates that a single freight train removes 76 HGVs from the road

Reduce road space, reduce traffic

Traffic increase is driven by various factors, a major factor being road-space availability, and it has been shown that traffic levels in an area can go down under circumstances where highway capacity is reduced or where serious efforts are made to make alternative transport options more attractive.

Taylor et al., 2006, p. 5



2.2 Public transport

“I’ll be honest, transport where I live is quite poor. Despite there being a train in the town that runs to the centre there is no way for locals to get around. It’s a really lively community with a school, community centre and public house with everyone knowing each other but it’s difficult to stay connected with the rest of South East Wales especially as a young person looking to find work beyond local boundaries in addition to socialising. Without a doubt we need more connections with Cardiff’s more central locations with affordable transport which would be no issue since Gwaelod is a place full of families and individuals looking for transport.”

Lived experience: Elin, 17 years old, Gwaelod y Garth

In addition to managing traffic to optimise travel on road networks, following the transport hierarchy means that reducing the demand for transport should be prioritised; followed by encouraging more sustainable modes of transport and improving the efficiency of existing modes of transport over increasing the capacity of the transport system²⁵. A significant proportion (40%) of traffic using the M4 around Newport is local traffic, undertaking relatively short journeys. If these journeys were moved onto local public transport routes or active travel this would help relieve congestion, improving journey times for longer journeys from West Wales through to England and beyond.

“What’s going to happen if both of us can’t drive anymore? We’d become reliant on buses. Our nearest bus goes every hour. For us to catch that bus it’s a 2.5 mile walk...there’s virtually no night transport, so you’d have a devil of a problem getting back [in the evening].”

Henry, Pembrokeshire

Source: Older People’s Commissioner for Wales report - http://www.olderpeoplewales.com/Libraries/Uploads/The_Importance_and_Impact_of_Community_Services_within_Wales.sflb.ashx

During the Welsh Government’s consideration and analysis of possible solutions for congestion on the M4 corridor, they undertook public transport analysis and modelling, including:

²⁵ <http://www.sd-commission.org.uk/pages/fairness-in-a-car-dependent-society.html>

- The M4 Corridor Enhancement Measures (M4CEM) programme - The Public Transport Overview report²⁶ (2013) provides a thorough overview of the potential for public transport improvements such as bus services, increased rail capacity and rail-based Park & Ride, to contribute to traffic reductions on the M4 corridor around Newport;
- The M4 Corridor around Newport (M4CaN) report (2014) which provides an update of the above in the context of some of the elements of the South Wales Metro and is the most current examination of the short-medium term future impacts of public transport investment on traffic using the M4 corridor around Newport;
- The public transport modelling included in the traffic analysis

Whilst these were detailed examinations, the public transport option analysed in 2013 **did not represent a comprehensive alternative transport package**; elements which would have been necessary to develop an efficient integrated public and active transport system were absent. The public transport option considered **was not a comparable investment** to that of the Black Route (i.e. it involved ca. £1bn less investment). The original proposal for a public transport option in M4CEM (2013) came at a cost of around £330 million resulting

²⁶ <http://bailey.persona-pi.com/Public-Inquiries/M4-Newport/C%20-%20Core%20Documents/4.%20Scheme%20Development%20and%20Alternatives/4.3.16%20-%20Welsh%20Government%20M4%20Corridor%20Enhancement%20Measures%20Public%20Transport%20Overview%20Update%202013.pdf>

in approximately 2 million car trips being avoided on the M4 and 4.5 million trips being avoided elsewhere. There is no modelling of the potential impacts of considerable additional funding for public transport measures.

On the basis of Welsh Government's appraisal, public transport enhancement measures were dismissed as they were not considered to be a reasonable alternative to the draft Plan (Black Route). They conclude: *"The draft Plan is cognisant of potential future public transport enhancement measures and these are considered to be complementary to a motorway solution. The public transport enhancement measures are being progressed separately by a group set up by the Welsh Government to examine proposals for a Cardiff Capital Region Metro system"*²⁷. This suggests that a joined up approach may be lacking.

Having reviewed these reports, we argue they are demonstrably **limited, both in their current inclusions, and in their ambitions**. Specifically:

- The M4CEM report concludes that public transport can play a **supporting role** in facilitating travel in the region, but that significant upgraded road capacity is also needed. However, when road building is "supported" by public transport improvements, this is most often to the detriment of public transport. Essentially, **if you make driving more attractive to people (by building more road capacity), this makes public transport less attractive; entrenches travel habits and perpetuates excessive private car use.**

The M4CEM and M4CaN reports are **limited in their scope**, and do not attempt to model the potential contributions of public transport infrastructure **beyond that which was already under consideration**:

- The M4CEM report develops an illustrative public transport scenario from short-medium term infrastructural programmes that have been described in successive strategy documents and provides a "high level

appraisal" of the potential future impacts of these on key routes in the region. The report refers to 'metro' as a concept but did not consider these plans in detail. **The report does not consider the long-term potential of public transport investment in the region**, noting: *"A longer term regional strategy would require considerable investment, and is not currently within the scope of this project which focuses on measures with direct relevance to the M4 at Newport."* (M4CEM, p. 17).

- The M4CaN report **explicitly limits** the analysis of public transport impacts in the region to any infrastructure that is currently planned or underway as a part of the South Wales Metro (SWM) scheme. **There is no consideration of the impacts of any future public transport infrastructure, which is not yet already conceived of and agreed upon, demonstrating a clear lack of long-term thinking – long term thinking which is required by the Well-being of Future Generations Act.**
- The report also excludes all future South Wales Metro elements (particularly phase 3 due to them being remote from the M4 corridor) with the exception of rail schemes and the proposed Llanwern Park and Ride scheme: *"As a result of the modelling methodology used only the effects of rail and strategic Park and Ride schemes will be considered."* (M4CaN, p. 25). This means, for example, extensive new **bus-based schemes such as Bus Rapid Transit (BRT) corridors planned for the SWM Phase 3 aren't considered in their analysis.**
- This also appears to contradict the ambitions of Transport for Wales and the Cardiff Capital Region City Deal, suggesting Welsh Government will not be prioritising investment on further improvements to public transport in this region despite over £700 million committed to the South Wales Metro.

²⁷ M4CAN, 2014 - Strategic Appraisal of Alternatives Considered During Consultation

These points (summarised in Table 1) demonstrate that Welsh Government’s analysis is very limited in terms of its ability to fully quantify the potential of public transport to contribute to travel in the region over the coming decades.

Table 1: Summary of public transport options considered for the Newport area

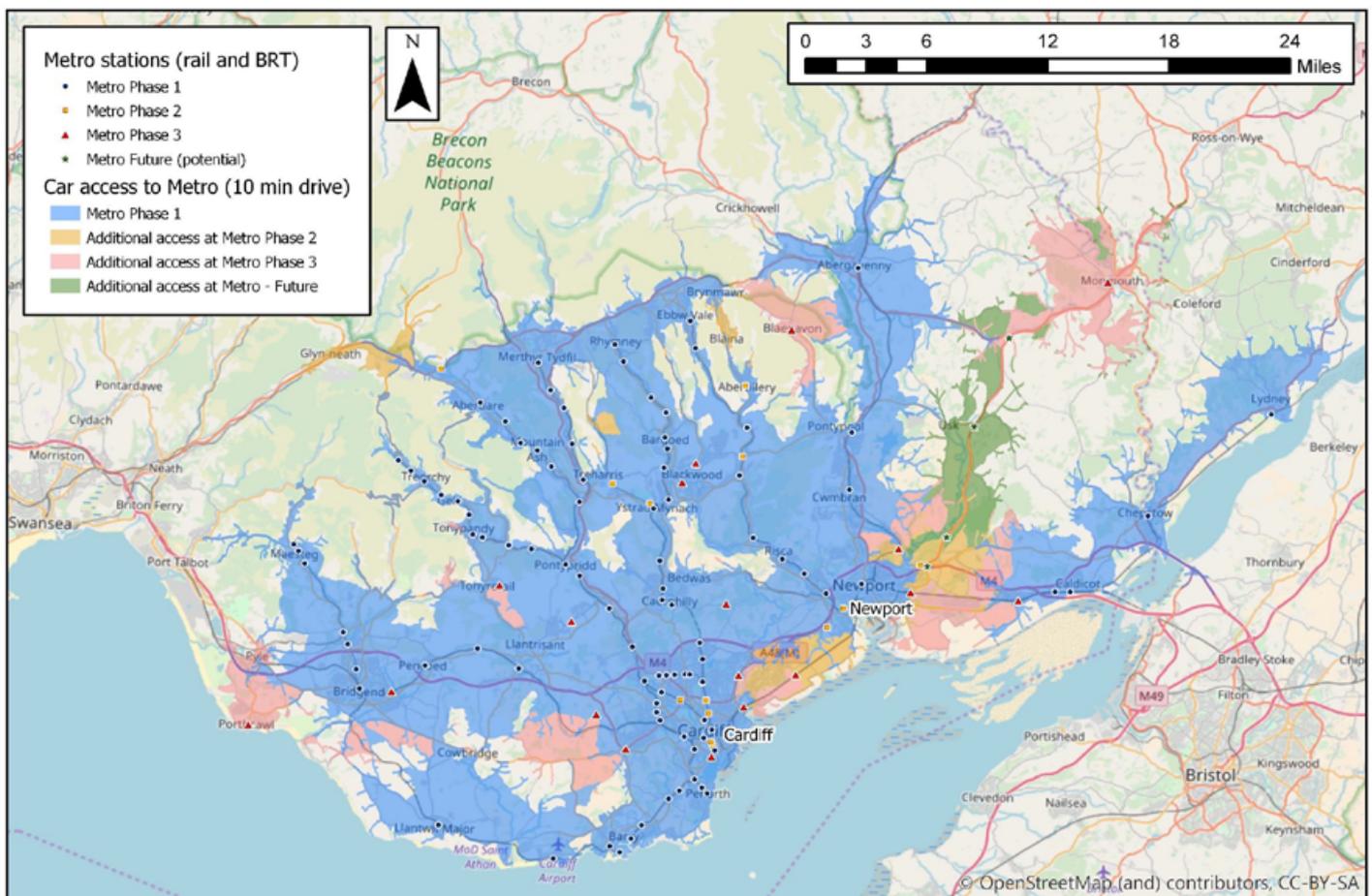
	M4 Corridor Enhancement Measures (CEM) Programme	M4 Corridor around Newport (M4CaN) - updated public transport report	New infrastructure and service improvements included in the South Wales Metro (SWM) plan
Purpose	Presents a number of options that aim to address problems of capacity, resilience, safety and sustainability on the M4 corridor between Magor and Castleton	Understanding the potential effect of a major upgrade in public transport arising from a ‘South Wales Metro’ on traffic volumes on the M4 corridor around Newport	<ul style="list-style-type: none"> • An electrified rail system • Integrated transport hubs • Park and Ride facilities • New light rail routes • New bus rapid transit routes • Better integration of services across modes and operators • Active travel interventions
Public Transport measures considered	<ul style="list-style-type: none"> • Bus Rapid Transit services, mainly on radial routes, across Newport and Cardiff; • New local railway stations in Newport and Cardiff; • Park & Ride facilities to enable car drivers to switch to rail across the M4 corridor around Newport; • Increased frequency of InterCity and local commuter railway services on the SWML and Valley Lines; and • specific provision for improving the attractiveness of interchange between modes/services 	<ul style="list-style-type: none"> • Existing public transport services including bus and rail; • SWM Phase 1 • Great Western Route Modernisation and Valleys • Lines electrification (SWM Phase 2) • New Park & Ride facility at Llanwern • Welsh Marches Line and the Great Western Main Line Relief Line Services 	<p>Phase 1:</p> <ul style="list-style-type: none"> • Station improvements (Ebbw Vale & Pye Corner) <p>Phase 2:</p> <ul style="list-style-type: none"> • Modernising core Valley Lines infrastructure and wider South Wales Rail network • More frequent, reliable and faster services <p>Phase 3:</p> <ul style="list-style-type: none"> • Additions/extensions to the existing network • BRT schemes linking Newport, Monmouth and the Valleys • New (light) rail lines in and around Cardiff, and a link between Rhymney Valley Line and Newport
Levels of investment	£300 million	Data not provided	Estimated £1.8-2 billion; £734 million already committed

In addition, the public transport analysis focusses only on public transport in the context of problem links of the M4, **introducing a number of assumptions and caveats to the analysis, and excluding a large proportion of proposed new public transport infrastructural development** unless it can be directly linked to travel on that stretch of road.

However, transport networks and their effects are interlinked; the **M4 corridor sits inextricably entwined within the broader transport networks of South East Wales**, so it's artificially limiting to suggest an integrated public transport and active travel network will have no additional effect on M4 traffic.

The public transport reports also **make no attempt to envision a more sustainable public transport future for the region, and lack ambition in considering the role public transport can play in the region in the coming decades.** This goes back to the first point made in this report - which is that we have to design and build the future transport systems that we want. **If the people of South East Wales want to begin to move towards a more sustainable, healthier and efficient transport system, then the solution is to continue to build upon the solid foundation that the South Wales Metro scheme will provide, and develop public transport and active travel in the region much further.**

Fig 2: Map showing high coverage of region with access to public transport hubs within a 10 minute drive, looking at the 3 current phases of the Metro as well as potential additional improvements (see section on South Wales Metro plus below):



South Wales Metro public transport hubs with 10 minute car access

Case-study – Trimet, Portland, Oregon (Bob Hastings)

“In Portland and the State of Oregon we realized nearly 50 years ago that we couldn’t build our way out of congestion and to try and do so would ruin our environment at the cost of our very existence. So we bound our governance models, policies, and regulatory bodies to delivering an integrated approach. Air, water, natural resources must be protected in order to sustain all forms of life, and anything human made needs to reflect that understanding. We recently doubled down on our state wide funding for transportation to be inclusive of all forms of mobility. We’ve not built or greatly expanded our highways since the late 1970’s, and our population has tripled and our air and water quality has significantly improved. We also understand that access to transit and active transport is both a health and equity issue. Our shift from a resource extraction base economy to a more balanced and sustainable one needs the full suite of transportation options. Having more tools to select from allows for right sizing the tool for the problem were trying to solve. It also means we have to have all representatives around the table to design the most appropriate solution”.

<https://trimet.org/sustainability/>

Case-study – Mobility as a Service (from Gwent Future Scenarios report by Ash Futures)

Since 2016, Helsinki residents have been able to use an app called [Whim](#), heralded as the world’s first [Mobility as a service](#) (MaaS) offering, to plan and pay for all modes of public and private transportation within the city - be it by train, taxi, bus, carshare, or bikeshare. MaaS offers users the promise of better journeys across intelligent transport systems that utilise technology to combine modes of transport seamlessly. ‘Users’ can be individual travellers or businesses moving goods. The UK government is looking at MaaS in detail; and Whim has been launched in the West Midlands.



Transforming Transport – For People, For Places, For Wales Alignment to the Well-Being of Future Generations Act

A globally responsible Wales

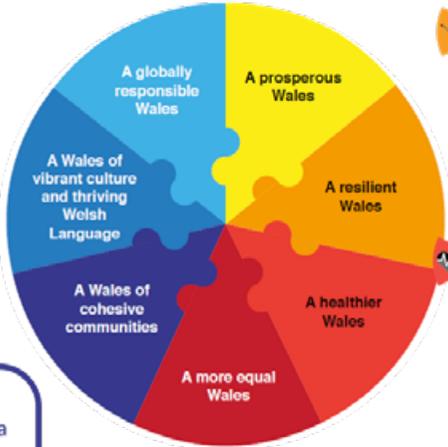
- Energy for stations and the overhead wires will come from 100% zero carbon energy, with at least 50% sourced in Wales
- Supporting sustainable, socio-economic development through our procurement approach
- Develop 1500 additional park and ride spaces across Wales to encourage rail travel
- Investing £738m to electrify the Central Metro network

A prosperous Wales

- Create 600 new jobs, investing in 30 apprenticeships every year
- Moving the Keolis UK headquarters and Global Rail Division to Wales
- Building a new Amey design office in Wales
- 95% of journeys will be made on brand new trains
- We will increase capacity by 65%
- We will create a true 7-day railway with new Sunday and Bank Holiday services

Wales of vibrant culture and thriving Welsh language

- Promoting the continued revival of the Welsh language through bilingual customer information, a contact centre and supporting the National Eisteddfod
- Fund all staff who want to learn Welsh and support them to learn
- Providing access to Wales' vibrant culture and natural heritage working with Visit Wales to develop a new rail and tourism strategy



A resilient Wales

- Encouraging use of public transport e.g. via integrated journey planning tools promoting onward travel and off-peak/advanced fares
- More than 50% of new trains will be assembled in Wales
- Investing £194m in building new and upgrading existing stations

Wales of cohesive communities

- Employing Customer and Community Ambassadors to encourage a greater sense of community around the rail network
- Improve business opportunities for local SME's/TSE's based in Wales
- Doubling the number of Community Rail Partnerships, with 90% of stations to be adopted

A healthier Wales

- Promoting active travel, new cycle storage and safe, well-lit walking routes to encourage people to make healthier choices
- Community Ambassadors working with local communities, encouraging and training people to use the rail network
- Mental health awareness training for all staff

A more equal Wales

- Developing a new fares structure to ensure price is not a barrier to using the network
- Become an accredited Living Wage employer by 2021 to be cascaded through our supply chain
- During off-peak, cheaper fares will be introduced including, under 16s being able to travel free with a paying adult, and the age limit for half fares will be increased from 16 to 18 across Wales
- Close working with Disability groups to improve accessibility and set up a new accessibility panel for ongoing input



2.3 South Wales Metro plus

A recent Welsh Government report on the case for rail investment²⁸ identifies and quantifies long-term and systematic under-investment in Welsh rail infrastructure compared to the UK as a whole. The Wales Route, which covers 11% of the network, has received just over 1% of the enhancement budget (£198m out of an England and Wales total of £12.2bn). Enhancements improve the capability, capacity and reliability of the rail network, and so the limited investment in Wales contributes to fewer and less attractive services, resulting in a lower modal share for rail and higher subsidies per passenger. This case for increased investment in rail in both North and South Wales will address both the Welsh Government's economic ambitions and broader environmental and well-being objectives.

Transport for Wales has recently been established to drive forward the Welsh Government's vision of a "high quality, safe, integrated, affordable and accessible transport network that the people of Wales are proud of". They are creating a transport network fit for the future that contributes to the long-term sustainability of Wales and those communities connected to us. Their priority is to deliver a Metro for South East Wales (SWM) - this revitalised network will see new services and rolling stock, innovative solutions, and a massive programme of station investment. Over the next 5 years they will invest £738m to transform the valley lines to Treherbert, Aberdare, Merthyr Tydfil, Rhymney and Coryton, electrifying 172 km of track and upgrading infrastructure to enable improved journey times and more trains every hour.

The Well-being of Future Generations Act was central to the process for procuring the delivery partner for the new Metro, and the benefits of this investment have been mapped against the seven national well-being goals (p. 32).

Our findings show that the South Wales Metro, if

²⁸ <https://beta.gov.wales/sites/default/files/publications/2018-07/the-rail-network-in-wales-the-case-for-investment-summary.pdf>

fully realised, represents an excellent foundation for further development of an integrated, attractive, accessible, and realistic transport system in South Wales. Welsh Government should be prioritising funding to ensure that Phases 2 and 3 of the Metro – which could potentially cost a further £1bn – are delivered, seek opportunities to build on this foundation and continue to integrate the public transport and active travel networks in the region.

Below are **three case-study**²⁹ ideas of additional public transport schemes which could be developed to complement the Metro in the future and ensure greater levels of modal shift away from cars. These potential public transport solutions, with approximate costs, have yet to be considered by Welsh Government in the context of addressing congestion on the M4. Costs for schemes on a similar scale have been estimated by Welsh Government within their M4CEM analysis of possible future schemes.

The aim of these case studies is to provide food for thought in terms of what is possible for the region in the context of additional funding for public transport, and to contribute to the conversation about the development of sustainable transport infrastructure in the decades ahead.

1. Further enhancements to the rail links in region

Patronage figures demonstrate that the Valleys lines into Cardiff Queen Street are very popular, and there is an opportunity to increase the number of people using these lines for travel to Newport. In the future, it could be possible to build on the foundations of the planned rail improvements in the South Wales Metro scheme and improve the frequency and connectivity of these lines so that they more directly serve Newport, either through improved interchange in Cardiff, or direct connections to Newport. Indeed, the South Wales Metro includes at least

²⁹ These are not proposals that are being considered currently, but could be developed further by Transport for Wales

one upgrade to link the Ebbw Vale valley line directly to Newport.

Improving connectivity, interchange, and frequency of services between the Valleys and Newport area would be a challenging infrastructural task, particularly considering that the Cardiff-Newport mainline is already operating near capacity. However, as the benefits for the region could be significant, it warrants examination of how this might be possible through line capacity upgrades between Newport and Cardiff Central (e.g. in a similar fashion to that currently underway on the Bristol mainline, which is undergoing an upgrade from two to four tracks, doubling capacity to support mainline and local services, at a cost of £33million³⁰).

2. Link and Ride service between Newport and Monmouth

Link and Ride is similar to Park and Ride, but instead of one large car park on the edge of a town/city, there are a series of small car-parks at key points along an express bus/coach route. This is potentially a cost-effective way of providing a viable alternative for people travelling from Monmouth to interchange with a high-quality public transport alternative, on a route which is not served by rail. This would enhance the current proposed BRT service along the same corridor included in the Metro Phase 3 plan.

3. Express commuter coaches connecting Cardiff, Newport, and the West of England region

This system would consist of high-quality express coaches providing accessibility for commuters at peak times. An express coach interchange would be constructed on the eastern side of the Severn Bridge. Express commuter coach services are already operating with great success in other locations, e.g. the Kings Ferry service in London, which connects commuters in Kent into Central London on coaches with leather seating, Wi-Fi, and refreshments. This could facilitate trips to Newport and Cardiff from the Bristol and Bath region.

We estimate that the total cost of above three proposals would be in the region of £460 million; this equates to a third of the investment suggested for the M4 Black Route.

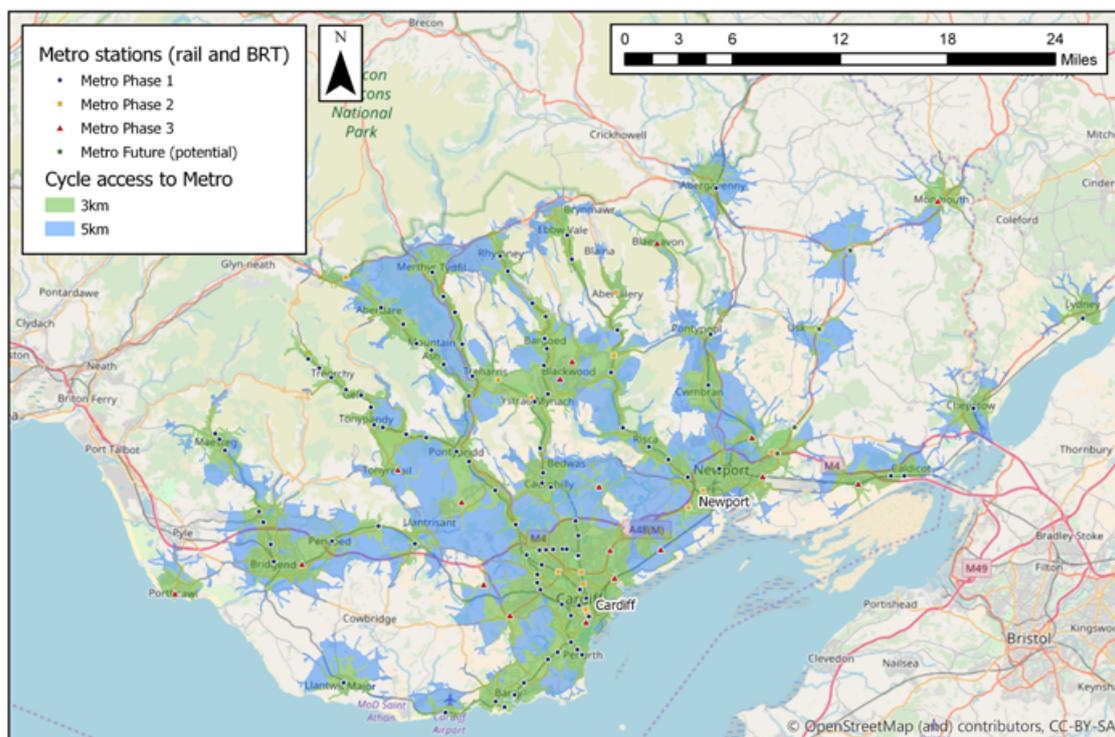
³⁰ http://www.taylorwoodrow.com/news-and-downloads/news_article.asp?articleid=96



2.4 Active travel

Along with improvements to public transport infrastructure, further integration with walking and cycling infrastructure could encourage even greater modal shift whilst improving people's health and well-being. An analysis of **Active Travel opportunities** in the region show that when considering Newport, Cardiff and Monmouthshire together, a 'maximally deliverable' investment programme of £118 million, which could be delivered over the next ten years, could lead to an increase in the number of cycling and walking trips of 84% and 20% respectively, delivering a further 29 million walking trips and 6.1 million cycling trips.

Fig 3: Map showing access to current and future train stations by cycling (3km and 5km):



Cycle access to South Wales Metro public transport hubs

In relation to cost-benefit analysis, using UK Government's Transport Analysis guidance (WebTAG) to estimate the economic impact of this additional investment in Active Travel results in benefits of over £1bn over the next 20 years - a benefit to cost ratio of 6.4-7.4:1 which is much higher than the 2:1 ratio expected from building the Black Route. In fact UK Government Department for Transport³¹ recognises that cycling schemes can achieve more for less with benefit-to-cost ratios in the range of 5:1 to 19:1, far greater than road schemes.

The majority of these benefits (c.80%) are realised from the improvements to health that result from increased levels of active travel, with the remainder a result of the impact of active travel on journey ambience and a reduction in the number of car trips being made. The additional investment would also lead to approximately 19,000 fewer car trips in the three local authorities every day, and avoid 36 premature deaths each year from reducing levels of physical inactivity, and reduce commuting traffic in Newport by around 25%.

31 https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/509587/value-of-cycling.pdf

In addition to the economic benefits, there is a weight of evidence which suggests that investment in active travel can have a mutually beneficial relationship with investment in public transport networks such as the South Wales Metro. This will maximise the impact on congestion reduction of both types of investment.

Table 2: Summary of Active Travel investment programmes for Newport, Cardiff and Monmouthshire and economic benefit

	Newport	Cardiff	Monmouthshire
Total cost over 10 years (£m)	£33	£65	£20
Cost per person per year	£22	£17	£21
Additional walking trips (estimated % increase)	9 million (25%)	13 million (15%)	7.2 million (30%)
Additional cycling trips (estimated % increase)	1.6 million (93%)	3.7 million (84%)	840,000 (73%)
Economic benefit (£m)	£286	£521	£202
Benefit cost ratio	7.0:1	6.4:1	7.4:1

Expanding the investment programme in Active Travel out to the whole Cardiff Capital Region would cost approximately £290 million but would result in economic benefits of £2.5bn over 20 years, delivering a 19% and 82% increase in walking and cycling trips respectively. A similar level of increase could be delivered across the whole of Wales with an investment of £600m, delivering £5bn of benefits over 20 years.

Case study: Portland, Oregon

Portland, Oregon has achieved a bike modal share of 7.2% - 17,000 commuters travel to work by bike, thanks to over 319 miles (and rising) of cycle lanes. Over the years, this infrastructure has cost the city around \$60m (£39.7m) – the same cost of constructing 1 single mile of urban freeway.



Local authorities in the region are already setting ambitious targets for active travel. For example, Cardiff Council's Green Paper on Travel and Clean Air sets out an ambitious vision focusing on 'what a fairer, cleaner, healthier, prosperous and more convenient city could look like'³². The Green Paper is ambitious on active travel, setting out an intention for Cardiff to become one of the best places in Europe for active travel. The paper includes the following specific actions to develop walking and cycling in Cardiff:

- Develop Active Travel Zones in the city centre and in neighbourhoods
- Comprehensive Cycle Superhighway & Primary Cycle Route Network
- Total City 20mph zone

The Green Paper also sets out intentions to address air quality through traffic restrictions and vehicle charging, by implementing Clean Air Zones, introducing parking levies/charges and setting active travel targets for the public sector and business.

Cardiff Council has produced two Network Maps (for walking and cycling) and its Integrated Network Maps³³ includes a schedule of hundreds of proposed walking and cycling schemes. It's also developing proposals for five Cycle Superhighways to support and promote cycling for all ages and abilities.

In Spring 2018, a successful bike rental scheme (Nextbike) was introduced in the city, with 250 bikes available at 25 docking stations. Since its launch, more than 15,000 people have registered with over 48,000 rentals. With just 250 bikes available, weekly rental figures (e.g. 5,900 rentals for one week in July 2018) demonstrate the appetite and demand for investment in cycling. Due to its success, the scheme will double to 500 bikes at 50 stands by the end of August 2018.

³² City of Cardiff Council (2018) Cardiff's Transport and Clean Air Green Paper (p. 4)

³³ <https://www.cardiff.gov.uk/ENG/resident/Parking-roads-and-travel/Walking-and-cycling/ActiveTravel/Pages/default.aspx>

Together, the total cost of additional public transport improvements (presented here) with investment in active travel, to complement the South Wales Metro amounts to approximately £578m, representing 41% of the investment suggested for the M4 (Black Route). The savings here provide an opportunity to allocate funding to delivering the planned, but as yet un-financed, phases of the metro.

The choice?

Spending £1.4 billion on 14 of miles new motorway

or

Spending £1.4 billion to part-fund Metro phase 2 & 3 plus additional public transport improvements + active travel infrastructure across the region.

Our findings support the need to prioritise spending £1.4 billion on delivering a comprehensive South Wales Metro along with the ideas presented above in the case studies coupled with active travel opportunities.

We strongly recommend the ideas should be considered by Welsh Government, alongside plans for the Metro phases 2 and 3, to demonstrate how the region could be seeking to build sustainable transport infrastructure that meets the needs of citizens and businesses today and the needs of future generations.

'We need to lower our reliance on the motor car as a way of not only improving the environment we live in, but also of bringing us closer together. We also need to change the urban spaces so that they are built around people first - not motor cars.'

Lived experience: from Future Generations Commissioner's Sensemaker survey (April 2017)



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3. DO WELSH GOVERNMENT'S ROAD BUILDING PLANS SUPPORT LOCAL WELL-BEING OBJECTIVES AND NATIONAL PRIORITIES ON DECARBONISATION, INEQUALITY, PHYSICAL AND MENTAL HEALTH?



Welsh Transport Appraisal Guidance (WelTAG, 2008) contains a list of criteria against which the impacts of a scheme should be appraised when assessing the transport case. These are the criteria against which the different alternatives – a public transport option (M4CEM, 2013) and the Black Route (M4CAN, 2014) – were previously (separately) appraised and scored.

These assessments did not contain information on all the anticipated impacts, sufficient to consider how each option would contribute to all of the well-being goals. Further, the public transport option was subsequently dismissed for its poor performance in reducing traffic congestion, despite its net score against the WelTAG criteria being equal to that of the Black Route.

New Guidance was published in 2017, which reflects the Well-being of Future Generations Act, and states that the impact assessment conducted for the transport case should make “consideration of how each option contributes to all of the well-being goals”. WelTAG 2017 does not prescribe a new list of criteria to replace those from WelTAG 2008; instead it just states that “social, cultural, environmental and economic impacts” should be considered and recommends the use of the Future Generations Framework to guide thinking.

The consulting arm of the New Economics Foundation (NEF) has undertaken a review of the options appraisal processes conducted in 2013 and 2014 and identified a number of issues and inconsistencies between the scoring of the public transport option and the Black Route, which we believe provide reasonable cause for a review and re-appraisal.

As already highlighted, the public transport option analysed in 2013 did not represent a comprehensive alternative transport package, nor a comparable level of investment to that of the Black Route. Neither option has been assessed or scored against criteria which align to the seven well-being goals set out in the Well-being of Future Generations Act or the

Welsh Government’s 46 national indicators of well-being.

When viewed comparatively, there is a strong argument that the public transport option was underscored on two criteria which are key to the well-being of future generations, particularly supporting the goals for a more Resilient, Healthier and Equal Wales:

- The two options were given equal scores for their contribution to the physical fitness of the public, despite the black route increasing motorway traffic by close to 50% and the public transport option encouraging forms of active transport.
- The two options were given equal scores (+) for their contribution to climate change mitigation despite the black route resulting in an emission of more than 500,000 tonnes of carbon dioxide equivalents during construction which will not be removed from the atmosphere until at least 2072, leading to a net contribution to UK emissions in 2030 (456,000 CO₂e additional tonnes) and 2050 (197,000 CO₂e additional tonnes).

Having identified that the public transport options considered by the Welsh Government were limited both in scope and ambition, NEF has re-examined the appraisal and scoring process that was undertaken on the Black Route and the public transport alternative, in light of the Well-being of Future Generations Act and subsequent updated WelTAG guidance introduced in 2017.

The alternative transport options we recommend (presented in Section 2 of this report) have been assessed against both WelTAG 2008 criteria and new criteria that should be used as part of WelTAG 2017 based on the Act’s well-being Goals. The alternative transport option we appraise reflects both a comparable investment to the Black Route, and the true range of interventions which could be implemented as part of a comprehensive integrated transport package.

Using the Future Generations Framework, NEF has developed a broader set of criteria to consider the redesigned alternative (public and active) transport options and compared these to Welsh Government's preferred option (the black route). These additional criteria include³⁴:

Table 3: Well-being criteria

	WelTAG 2008 criteria (used in WG appraisal)	WelTAG 2017 Well-being criteria - additions to primary criteria	WelTAG 2017 Well-being criteria - additions to sub-criteria
Environment	Noise		
	Air quality		
	Climate change mitigation	Climate change adaptation	
	Landscape		
	Biodiversity	Healthy and resilient ecosystems	Accessibility of the natural environment
	Heritage		
	Water environment		
	Soils		
Social	Transport safety		
	Personal security		
	Permeability (ease of movement through area)		Access to services and amenities
	Physical fitness/health	Mental health and well-being	
	Social inclusion	Provision and access to training and education	Provision and access to jobs for local people
	Equality, diversity and human rights	Implications for socio-economic inequality	
Cultural		Access to sport, art and recreation	Impacts on features of cultural heritage
Economy	Transport economic efficiency Economic Activity and Local Impact Analysis (EALI)	Compatibility with local well-being objectives	Support for local economy and innovation

³⁴ For further discussion of the proposed criteria please refer to the full report from NEF Consulting

A comparative multi-criteria analysis and scoring of the two options was conducted following the WelTAG approach. As shown in the table below the results show that an investment made in alternative transport options, at a level equivalent to that proposed for the Black Route, would score higher than the Black Route both overall and on a large majority of criteria.

Table 4: Indicative scoring on additional criteria derived from the Well-being of Future Generations Act

PRIMARY CRITERIA		
Criteria	Black Route	Alternative Transport Package
Healthy and resilient ecosystems	-	N
Climate Change Adaptation	-	+
Compatibility with local well-being objectives	---	+++
Implications of public mental health and well-being	N	+++
Implications for socioeconomic inequality	--	++
Provision of and access to training and education	+	++
Provision and access to sport, art and recreation	+	+++
SECONDARY CRITERIA (potentially functioning as sub-criteria under WelTAG 2008 criteria or those above)		
Support for local economy and innovation	+	+
Accessibility of the natural environment	N	++
Access to services and amenities	+	++
Provision and access to jobs for local people	++	+
Impact on features of cultural heritage and sense of place/belonging	-	+

The primary criterion upon which the black route outscores our alternative transport option is that of Transport Economic Efficiency³⁵, which particularly aims to capture the economic value generated by the travel time savings made by the M4 users. For the Black Route to outscore our alternative transport option we estimate that this criterion would need to be weighted more than 20 times higher than any of the other criteria. A recent evidence review states that although transport can have a positive impact on the local economy, the role of transport in stimulating growth is not as clear-cut as assumed by many decision makers³⁶; they found very little evidence linking road building or road improvement schemes to access to jobs

or job creation, and although road projects can positively impact local employment effects are not always positive and a majority of evaluations show no (or mixed) effects on employment.

The performance of the Black Route is particularly weak (comparatively) on the criteria set out in the Well-being of Future Generations Act, specifically on the compatibility of the plans with local well-being objectives (as defined in local well-being plans), and on decarbonisation, impact on inequality and mental health.

Our findings lead us to conclude that, when compared with investing £1.4bn on a range of sustainable transport options, the Black Route

35 The Transport Economic Efficiency (TEE) appraisal criterion captures the economic benefits derived by individuals and businesses from travel-time savings. The government assigns a benefit per hour of travel-time saved (e.g. £40 per hour per person) and this benefit, in the case of the Black Route, makes a major positive contribution to the scheme's benefit-cost ratio, which ultimately determines its viability. See: <https://www.gov.uk/transport/transport-modelling-and-appraisal>

36 <http://www.whatworksgrowth.org/policy-reviews/transport/evidence-review>

fails to deliver against many well-being goals. Specifically, a resilient Wales, a healthier Wales, a more equal Wales, and a globally responsible Wales.

3.1 Local well-being objectives

The well-being objectives set by Cardiff, Newport, and Monmouthshire PSBs all indicate a preference for active travel, engagement with the outdoors, and greater access to the health benefits of outdoor exercise and recreation:

- Newport³⁷ has an objective to: “Create an environment where public transport, walking and cycling is prioritised”. They also have objectives around sustainable economic growth, and healthy, safe and resilient environments with ‘strong, resilient communities’ and ‘sustainable travel’ as cross-cutting interventions.

- Cardiff has an ambitious target for: “A 50:50 modal split will be needed by 2021 (50% of journeys to be by sustainable transport) and an

even more challenging 60:40 modal split by 2026. Meeting these ambitious targets will require investment in public transport systems, cycling infrastructure and cleaner vehicles, alongside support for behaviour change, supported by major employers and public services”.

- Monmouthshire has an objective to “Enable active travel and sustainable transport to improve air quality and give other health benefits.”

By encouraging a modal shift to the car (as suggested by the government’s predictions of a 42,000 increase in daily motorway trips over the counterfactual), the Black Route directly contradicts these local well-being objectives.

In addition, better transport and improved connectivity is critical for the future success of the Cardiff Capital Region. Their vision for ‘Connecting the Cardiff Capital Region’ is supported by ten strategic objectives, which include: improving connectivity across the

³⁷ <http://onewportlsb.newport.gov.uk/documents/One-Newport/Local-Well-being-Plan-2018-23-English-Final.pdf>



region, improving access to employment and services, increasing the proportion of journeys made by sustainable modes of transport, and reducing the environmental impacts of transport (including greenhouse emissions, air pollution and noise).

Improving access to stations is one of seven priority interventions in the draft transport strategy of the newly formed Cardiff Capital Region Transport Authority. It supports their aim of improving access to the rail network and shift car users off the most congested highway routes by providing a minimum of 5,000 park-and-ride spaces to relieve congestion on the A470 corridor, the A4042/A472 corridor, the M4/A48 corridor to the east of Newport and the M4/A48 corridor to the west of Cardiff. They're also proposing improved active travel routes to key stations and improvement to public transport interchanges³⁸.

Welsh Government's well-being objectives, aligned to Prosperity for All, include:

- Support people and businesses to drive prosperity
- Drive sustainable growth and combat climate change
- Deliver modern and connected infrastructure
- Build healthier communities and better environments

The Government's argument clearly relates to presumed benefits to the economy – *'supporting people and business to drive prosperity'* although as we note above this is not clear cut either in the extent to which road infrastructure supports economic growth and whether benefits support **all** people (see analysis below relating to inequality) when compared to investment in public transport. However the Well-being of Future Generations Act requires public bodies including the Government to consider all of their well-being objectives in an integrated way.

³⁸ Local Transport Today, 751

Section 5 (2)

(b) the need to take an integrated approach, by considering how—

(i) the body's well-being objectives may impact upon each of the well-being goals;

(ii) the body's well-being objectives impact upon each other or upon other public bodies' objectives, in particular where steps taken by the body may contribute to meeting one objective but may be detrimental to meeting another;

The arguments in this report raise significant questions as to whether the proposals for the M4 relief road could be considered to be 'modern and connected infrastructure', the extent to which they are detrimental to delivering sustainable growth and combatting climate change and building healthier communities and better environments in particular.

The alternatives we suggest we believe will assist Welsh Government in meeting more of their well-being objectives.



3.2 Decarbonisation

The Environment (Wales) Act 2016 requires the Welsh Government to reduce emissions of greenhouse gases by at least 80% in 2050, against the 1990 baseline, and set interim targets and five-yearly carbon budgets.

Since 1990 emissions in Wales have only decreased by 14% which places significant challenge on Wales achieving 66% reduction in the next 32 years. This is made more challenging due to the **high proportion of large point source emitters** with the traded sector making up **nearly 60% of Welsh emissions**, a much higher proportion than the UK average (29%)³⁹. This means Wales has to work harder to reduce emissions in the remaining 40% which includes emissions from buildings and transport.

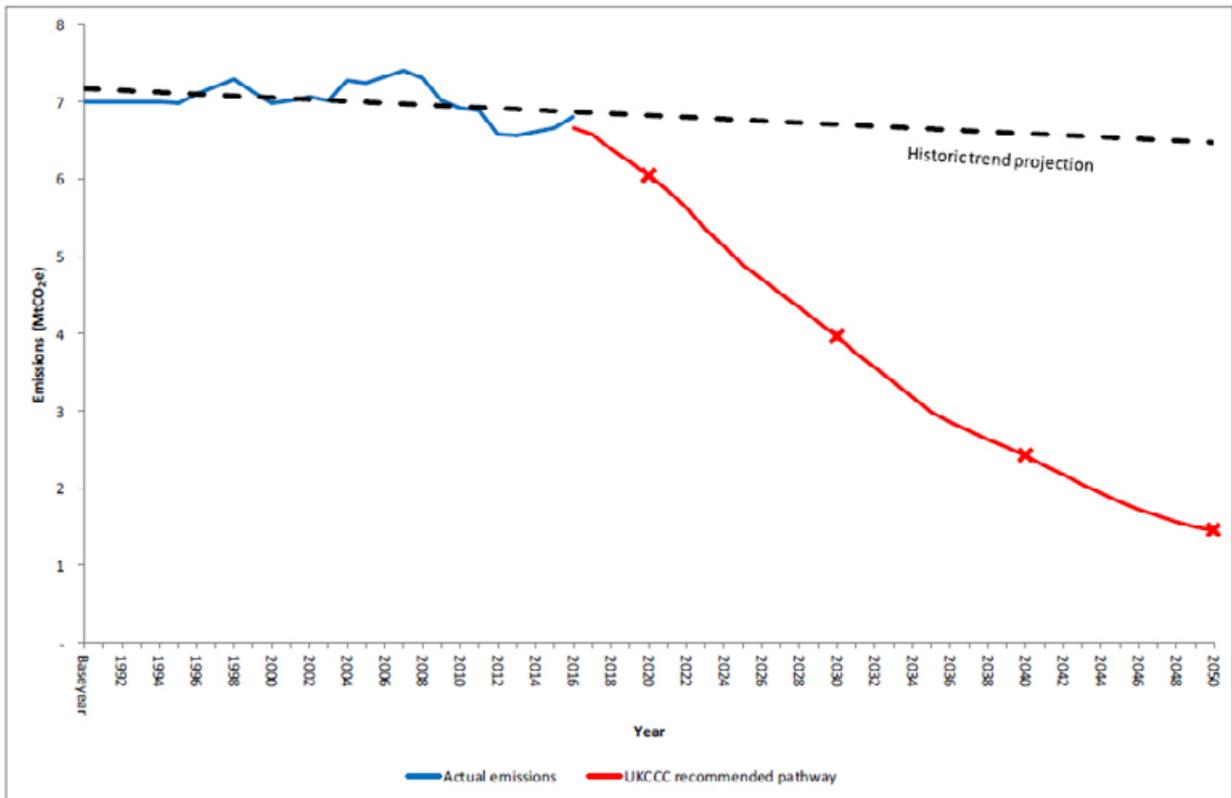
Transport accounted for 14% of Welsh emissions in 2016 (11.9% due to emissions from cars, trucks and buses) and is Wales' third

³⁹ Greenhouse gas inventory data: http://naei.beis.gov.uk/reports/reports?report_id=958

largest carbon emitting sector, following the power and industry sectors. Although vehicles are increasingly efficient, emissions have only declined by 3% since the 1990 baseline. The UK Climate Change Committee show that transport emissions would have to reduce by 79% in the next 32 years. Given that emissions in this sector declined by only 3% in the last 28 years the Government will have to taken a significant change of direction in the way transport infrastructure is planned and developed. **The car is also a key barrier to more people using the less polluting and more sustainable modes:** active travel and public transport; there is an urgent need to implement measures that decarbonise transport in Wales by reducing the need to travel through improved planning processes that reduce car dominance, increasing active travel and improvements to public transport⁴⁰.

⁴⁰ Institute of Welsh Affairs (IWA) (2018) Re-energising Wales. Decarbonising Transport in Wales. Available at: <http://www.iwa.wales/news/2018/06/re-energising-wales-decarbonising-transport-wales-report/> (p.46)

Fig 4: Transport sector emissions (1990 - 2020)



Transport emissions in Wales		Emissions
Reduction to date (1990 - 2016)	-3%	6.8 MtCO ₂ e
Modelled 2020 reduction	-14%	
Modelled 2030 reduction	-43%	
Modelled 2040 reduction	-65%	
Modelled 2050 reduction	-79%	Approx. 1.8 MtCO ₂ e

To achieve this ambitious level of emission reduction, the Welsh Government's current consultation on a "Low Carbon Pathway for Wales"⁴¹ includes the following actions for the transport sector:

1. **Develop a charging network that encourages early take-up of electric vehicles (EVs) and explore the merits of other measures, including access to bus lanes and free municipal parking;**
2. **Reduce the carbon footprint of taxis and buses to zero within 10 years to achieve the aim in the Economic Action Plan;**
3. **Double the percentage of adults making cycling journeys at least once a week and increase the percentage of people making walking journeys at least once a week by 25% from the 2016 baseline;**
4. **Explore the relationship between speed limits and greenhouse gas emissions, with a view to considering environmental factors in speed limit reviews.**

The UK Committee on Climate Change is the nationally recognised expert committee on climate change and are tasked with advising the Welsh Government on setting carbon budgets for Wales. In their recent assessment of Wales' progress and future plans for meeting carbon reduction targets they recommend that the Welsh Government should **increase uptake of public transport and especially active travel, and strengthen the electric vehicle charging network** and tackle other non-financial barriers (e.g. through parking, use of priority lanes, raising awareness and public procurement).

In their recent report the IWA claim that Wales needs a radical new approach to transport if it's to achieve its target. It recommends Welsh transport planning should be ambitious: Active Travel Action Plans linked to a national Transport Decarbonisation Plan; spending for active travel at £17-£20 per head; targeted investment in developing active travel communities; and

41 Greenhouse gas inventory data: http://naei.beis.gov.uk/reports/reports?report_id=958

improved integration of active travel with public transport in the South Wales Metro area⁴².

Building the Black Route will result in an emission of 500,000+ tonnes of carbon dioxide equivalents which will not be removed from the atmosphere until at least 2072, making a net contribution to UK emissions in 2030 (456,000 CO₂e additional tonnes) and 2050 (197,000 CO₂e additional tonnes).

It's not clear how the Black Route helps Wales achieve its targets of 43% and 79% reduction in transport emissions by 2030 and 2050 respectively, whilst the public transport alternative we offer would lead to a net reduction in emissions over the next 30 years.

3.3. Inequality

The M4CAN equality impact assessment gives a positive score for the Black Route on inequality, despite stating that "Half of households in the bottom income bracket do not own a car, compared to a national average of 25%" and "This figure is even higher for individuals on benefits: nearly two-thirds of people claiming income support or jobseeker's allowance do not have access to a car". Car ownership, the ability to drive, and to afford to drive, are exclusive to poorer sections of society indicating that the Black Route will only exacerbate transport poverty.

In the case of the Black Route almost none of the direct benefits accrue to local people who do not use a car: 26% of the population in the area will receive no direct benefit from the new road due to living in a household without a car, whilst approximately a further 12% of the population will receive a reduced benefit as they are classed as "non-drivers".

The economic case for the Black Route investment depends upon monetised personal (or "consumer") travel time savings, which are

42 Institute of Welsh Affairs (IWA) (2018) Re-energising Wales. Decarbonising Transport in Wales. Available at: <http://www.iwa.wales/news/2018/06/re-energising-wales-decarbonising-transport-wales-report/> (p.46)



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estimated at £850-£883 million. The National Travel Survey (for England) demonstrates that lower income groups in society drive considerably shorter distances both in general and for work. To look at the estimated distribution of individual (consumer) travel time savings (valued at £605 million) for non-commuter travel across income quintiles, shows the top income quintile receive almost three times the benefits received by the lowest income quintile. In monetary terms this equates to benefits of £173 million accruing to the top 20% of earners, compared with £64 million to the bottom 20%.

Data in the National Travel Survey of Great Britain (2009) on distance travelled for commuting purposes by different income groups can be used to estimate how the individual (consumer) travel time savings benefits for commuting are distributed across income levels. Again the top quintile receive nine times the benefits received by the lowest quintile. In monetary terms this equates to benefits of £97 million accruing to

the top 20% of earners, compared with £10 million to the bottom 20%.

Combining these two estimates for an overall estimate of the distribution of the individual/consumer travel-time benefits across income quintiles, NEF's research shows the top income quintile receive 3.6 times the benefits received by the bottom income quintile from the Black Route – 31.5% compared to 8.8%. In monetary terms this equates to benefits of £269 million accruing to the top 20% compared to £74 million to the bottom 20% of earners.

In comparison, the majority of benefits of the alternative transport scheme accrue within the local area where the intervention is implemented, and those benefits are accessible to every group in the community and are of proportionately higher value to poorer groups. The benefits of the Black Route are strongly biased towards already well-off groups, undermining arguments it would enhance equality and social inclusion in the South Wales region.

3.4 Physical and mental health

The use of motorised vehicles for travel has created air quality problems across all cities. It contributes to around 2,000 deaths per year in Wales (6% of total deaths), and is caused by nitrous dioxide (NO₂), ozone and particulate matter (PM₁₀ or PM_{2.5}), of which the primary mobile source is road transport.

Many areas in Wales have breached air pollution limits set by the European Union. The Welsh Government has recently announced a £20m Air Quality Fund to 2021 to accelerate compliance with these limits and improve air quality and is seeking consultation for the introduction of Clean Air Zones to reduce public and environmental exposure to airborne pollutants. Immediate measures have been introduced at key locations where there are exceedances, including 50mph speed limits at two locations in the South East:

- M4 between Junctions 41 and 42 (Port Talbot)
- M4 between Junctions 25 and 26 (Newport)

There is strong evidence that air pollution in Wales needs to be addressed, and political support for doing so by restricting the use of the car and encouraging active travel as an alternative.

There are substantial health benefits from increasing the amount of physical activity in Wales through increased walking and cycling, key to addressing childhood obesity which based on 2015/16 figures is reported at 28% in boys and 26% in girls, with only 51% of Welsh children being active every day⁴³.

Increasing urban active travel improves public health by increasing physical activity (as well as the associated decreases in noise and air pollution). A study (using Welsh population and incidence data for traffic injuries) investigated the potential impact on the NHS Wales budget of increased walking and cycling found that for a doubling of average walking distance and eight-fold increase in cycling distance,

⁴³ Chief Medical Officers' findings for Wales

approximately £517 million could be released from the NHS Wales budget over a 20 year period, given reduced disease burden and road traffic injuries.

Public transport is vital to reduce physical and mental health problems among older people. Transport is often seen as a lifeline to being able to access key services and amenities, especially for those living in rural communities. With the population of those aged 75 and over predicted to increase by 60% by 2035⁴⁴, the need for adequate public transport becomes ever greater. Public transport is crucial to the maintenance of public health, inclusion in society and the prevention agenda; whilst active transport use amongst older people can help reduce the effects of obesity and cardiovascular risk⁴⁵.

Evidence from Jarret et al. (2012⁴⁶) suggests that 2.5 hours per week of moderate physical activity reduces the incidence of depression in the population by around 4.1% per year. By encouraging a modal shift towards the car (creating 42,000 new motorway trips per day), the Black Route reduces the activity levels of the population and works against the well-being goal which aspires to improving mental health and well-being in Wales. Conversely an alternative transport option, investing in infrastructure to promote walking and cycling, would deliver several million more walking and cycling trips per year supporting physical and mental health and well-being.

⁴⁴ <https://gov.wales/docs/dpsp/publications/psgd/140120-psgd-full-report-env2.pdf>

⁴⁵ http://www.olderpeoplewales.com/Libraries/Uploads/The_Importance_and_Impact_of_Community_Services_within_Wales.sflb.ashx

⁴⁶ Jarrett, J., Woodcock, J., Griffiths, U. K., Chalabi, Z., Edwards, P., Roberts, I., & Haines, A. (2012). Effect of increasing active travel in urban England and Wales on costs to the National Health Service. *The Lancet*, 379(9832), 2198-2205

'The impact of a car focussed system is everywhere from the pollution, the noise, the time wasted in traffic or on poorly integrated alternatives, the impact on individual's health from pollution but also from not undertaking physical activity. It is a climate issue. And it is a social issue...It is an area which cries out for consideration through the lens of the wellbeing of future generations to switch us away from a trapped way of thinking.'

Lived experience: from Future Generations Commissioner's Sensemaker survey (April 2017)

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4. CONCLUSIONS



Our analysis provides a critique and a development of the original options appraisal conducted by the Welsh Government in 2013. It shows that:

1. There are limitations to the modelling undertaken by the Welsh Government

The public transport options analysed in 2013 did not represent a comprehensive alternative transport package, nor a comparable investment to that of the new road infrastructure options that we propose. Whilst thorough, the modelling does not take account of public transport infrastructure not currently conceived or agreed upon, thereby excluding any potential longer-term developments in high-quality public transport infrastructure in the region. It also excludes a substantial proportion of the proposed South Wales Metro scheme which is now being developed. Transport currently accounts for 14% of our carbon emissions in Wales, with a target of 43% reduction in transport emissions by 2030. We argue that investment should be prioritised in public transport and active travel to achieve this target, and a decision on a new road should not be taken until a clear plan for decarbonisation has been agreed.

2. The Black Route would exacerbate many of the societal and environmental challenges facing Wales

Our analysis shows the Black Route would exacerbate many of the challenges facing Wales, including carbon emissions, physical and mental health, noise and air pollution, inequality and transport poverty. It also contradicts Well-being Objectives established in Local Well-being Plans in and around the proposed Black Route (Newport, Cardiff and Monmouthshire), and is strongly biased towards wealthier and car-owning groups, undermining arguments it would enhance inequalities in the South Wales region.

It would increase carbon emissions at a time when Wales has challenging targets of 43% and 79% reduction in transport emissions by 2030 and 2050 respectively, and contribute to noise

and air pollution at a time when biodiversity is in crisis.

It would also reduce activity levels of the population by encouraging a modal shift to the car, bringing negative implications for mental and physical health and well-being in Wales.

With regard to traffic and congestion, our analysis of the traffic modelling inquiry evidence shows that the proposed expansion to the M4 would facilitate an increase motorway traffic on the M4 corridor around Newport of 42,000 additional vehicles per day by 2037 (above the predictions for traffic levels without the expansion). At the same time, limited journey time savings could be completely negated if surrounding traffic increases, as expert studies suggest it is likely to.

3. The Black Route is particularly weak on the criteria set out in the Well-being Future Generations Act

We have re-designed criteria to assess the Black Route and an alternative transport package, following the WelTAG 2017 approach. The new criteria takes into account the Well-being of Future Generations Act, local well-being objectives and Welsh Government's national commitments on decarbonisation, health and inequality.

Our comparative, multi-criteria analysis demonstrates that a comprehensive alternative transport package would significantly outscore the Black Route on both the Government's long-standing criteria for transport evaluation (WelTAG 2017), and the criteria mandated by the Well-being of Future Generations (Wales) Act 2015.

For the Black Route to be established as the preferential option in this new model, an inordinate weighting (20 times) must be placed on the single criterion representing the small individual time savings (called Travel Economic Efficiency) of between 2.5 and 5 minutes.

We recommend a sustainable, alternative transport solution.

We offer a package of integrated transport solutions as an alternative to travelling by car, to help solve congestion around Newport but can be transposed to any part of Wales, to make a better contribution to Wales' Well-being Goals. We set out 3 case study ideas of public transport schemes to complement the South Wales Metro at a cost of approximately £460m. This could be complemented by additional active travel measures (in the 3 local authorities) at a cost of £118m.

The total cost of our package would be approximately £578m, delivering an integrated system of public transport and active travel infrastructure to complement the planned Metro phases 2 and 3, at a fraction of the proposed £1.4bn investment on the Black Route.

In addition to solving congestion, our alternative package would better contribute to the well-being goals, the local well-being objectives and the aspirations of Cardiff Capital Region. It would help the Welsh Government and local authorities meet their decarbonisation targets, reduce inequalities and transport poverty, improve physical and mental health and help reduce noise and air pollution.

Our findings lead us to conclude that, when compared with investing £1.4bn on a range of sustainable transport options, the Black Route fails to deliver against many well-being goals and fails to offer the multiple benefits current and future generations deserve in Wales while also exacerbating many of the challenges we face.

Our findings show that the South Wales Metro, if fully realised, represents an excellent foundation for further development of an integrated, attractive, accessible, and realistic transport system in South Wales. Welsh Government should be seeking opportunities to build on this foundation and continue to integrate the

public transport and active travel networks in the region, prioritising investment into infrastructure that enables people to make more positive travel choices such as public transport and active travel, supporting a shift away from private car use.





Office of the Future Generations Commissioner for Wales
Market Chambers
5-7 St Mary's Street
Cardiff
CF10 1AT

02921 677 400
www.futuregenerations.wales
contactus@futuregenerations.wales