

Explanatory Memorandum to the Restricted Roads (20 mph Speed Limit) (Wales) Order 2022

This Explanatory Memorandum has been prepared by the Economic Infrastructure Directorate and is laid before Senedd Cymru in conjunction with the above subordinate legislation and in accordance with Standing Order 27.1

Minister's Declaration

In my view, this Explanatory Memorandum gives a fair and reasonable view of the expected impact of the Restricted Roads (20 mph Speed Limit) (Wales) Order 2022. I am satisfied that the benefits justify the likely costs.

Julie James MS

Minister for Climate Change

21 June 2022

PART 1

1. Description

The Restricted Roads (20 mph Speed Limit) (Wales) Order 2022 is made by the Welsh Ministers under section 81(2) of the Road Traffic Regulation Act 1984. The effect of the Order is to reduce the general speed limit for restricted roads from 30 miles per hour to 20 miles per hour in relation to Wales.

2. Matters of special interest to the Legislation, Justice and Constitution Committee

2.1 The Committee will note that there is a longer period than usual between the making of the Order and its coming into force (17 September 2023). This is because a lengthy period of preparation is required to enable traffic authorities to review their road networks with a view to ascertaining whether they need to make orders under sections 82(2) and/or 84(1)(a) of the Road Traffic Regulation Act 1984 in relation to restricted roads where they consider that the default speed limit of 20 miles per hour would not be appropriate. The process of making such orders generally takes several months and the process can be longer where objections are made. In addition, amendments will be required to the Traffic Signs Regulations and General Directions 2016 to coincide with the coming into force of the proposed Order, to ensure that the new speed limits can be legally enforced.

3. Legislative background

3.1 Section 81(1) of the Road Traffic Regulation Act 1984 provides that it shall not be lawful for a person to drive a motor vehicle on a restricted road at a speed exceeding 30 miles per hour. Subject to the provisions of sections 82 and 84(3) of the Act, a road is a restricted road for the purposes of section 81 of the Act if, in England and Wales, there is provided on it a system of street lighting furnished by means of lamps placed not more than 200 yards apart. Section 81(2) of the Act enables the national authority (being the Welsh Ministers in relation to Wales pursuant to section 142(1) of the Act) by order to increase or reduce the rate of speed fixed by section 81(1), either as originally enacted or as varied under that subsection. Section 81(3)(aa) of the Act provides that such an order, if made by the Welsh Ministers, is to be made by statutory instrument and approved by a resolution of Senedd Cymru. Before the Welsh Ministers make an order under section 81(2) of the Act, they are required by section 81(5) of the Act to consult with the Secretary of State.

4. Purpose and intended effect of the legislation

- 4.1 Once the Order is in force, the general speed limit for restricted roads will reduce from 30 miles per hour to 20 miles per hour in relation to Wales. The provisions of the Act are not otherwise amended by the Order. The traffic authority for a highway (the Welsh Ministers in relation to trunk roads and special roads and the relevant county or county borough council in relation to other roads) will therefore retain the power under section 82(2) of the Road Traffic Regulation Act 1984 to direct that a road which is a restricted road for the purposes of section 81 of the Act shall cease to be a restricted road for those purposes, with the result that the general speed limit for restricted roads would not apply to such a road. In addition, while an order under section 84(1)(a) of the Act imposing a speed limit on a road is in force, that road shall not be a restricted road for the purposes of section 81 of the Act, meaning that the speed limit imposed by that order would apply in such circumstances. Subject to these provisions, the default speed limit for restricted roads in Wales will reduce from 30 miles per hour to 20 miles per hour.
- 4.2 All road users across Wales would be affected by the legislation. It is intended that the legislation will reduce the number of people being killed or seriously injured as a consequence of road traffic collisions in Wales.
- 4.3 The legislation seeks to address the issues of road safety and the effects from vehicles and roads on the environment and communities. It seeks to improve road safety, encourage a shift to more active forms of travel and improve the local economy and environment in Welsh communities.
- 4.4 The legislation will also support the objectives of many Welsh Government strategies including Llwybr Newydd: the Wales Transport Strategy 2021 and the goals set out in other legislation such as the Active Travel (Wales) Act 2013 and the Well-being of Future Generations (Wales) Act 2015.

5. Consultation

5.1 Stakeholder Consultation

An independent steering group consisting of representatives from public, private and voluntary sectors was established in March 2021 and have met on a regular basis to provide stakeholder input on the legislative proposals.

5.2 Formal Consultation

A 12-week consultation ran from 9 July 2021 to 1 October 2021 on the proposed change in legislation. 6,018 online responses were received by the Welsh Government in the consultation period. 47% were in favour of reducing the speed limit and 53% were against. Detailed feedback was also received from a number of organisations in Wales. The majority of these – 22 of 25 – broadly supported the Welsh Government's proposal to reduce the speed limit.

The consultation documents and a summary of the responses are available at:

<https://gov.wales/proposal-reduce-speed-limit-20mph-residential-streets>

5.3 Other consultations

Secretary of State for Transport

The Welsh Ministers are required to consult with the Secretary of State before making the Order, pursuant to section 81(5) of the Road Traffic Regulation Act 1984. The Secretary of State for Transport was consulted on 7 April 2022. The Minister for Roads, Buses and Places responded on behalf of the Secretary of State on 11 May 2022 indicating that she had no comments to make on the proposed order.

Children in Wales: Children and Young People's Focus Group Consultation

A Children and Young People's Focus Group consultation was undertaken by Children in Wales in March 2022.

Traffic Orders and 20mph Public Attitudes Survey

Public Attitudes Survey of 1,000 people was conducted in November 2020 by an independent research company as part of the 2020 Wales Omnibus Survey which involved interviews with a representative quota sample of adults aged 16 and over across Wales. Over eight in ten (81%) supported a reduction in the speed limit to 20mph and fewer than two in ten (17%) against the proposal.

<https://gov.wales/sites/default/files/publications/2021-07/traffic-orders-and-20mph-public-attitudes-survey.pdf>

Focus groups in 1st Phase settlements

Four online focus groups were held with residents from communities involved in the first phase settlements introducing the 20 miles per hour default speed limit.

Informal consultations

Further consultations have also been undertaken with the bus, logistics and taxi and private hire vehicle sectors and their feedback has been covered in the Regulatory Impact Assessment.

PART 2 – REGULATORY IMPACT ASSESSMENT

Contents

1.	<u>Introduction</u>	7
2.	<u>Policy overview</u>	8
2.1	<u>What is the problem under consideration?</u>	8
2.2	<u>Why is government action or intervention necessary?</u>	10
3.	<u>Options</u>	14
3.1	<u>Introduction</u>	14
3.2	<u>Option 1: Business as Usual</u>	14
3.3	<u>Option 2: Reduce the maximum lawful speed of a motor vehicle on a restricted road in Wales to 20mph</u>	15
3.4	<u>Other options considered</u>	16
4.	<u>Competition Assessment</u>	17
5.	<u>Justice Impact Assessment</u>	17
6.	<u>Costs and Benefits</u>	17
6.1	<u>Overview of methodology</u>	17
6.2	<u>Direct Costs of policy</u>	22
6.3	<u>Benefits of policy</u>	24
6.4	<u>Summary of Costs and Benefits</u>	27
6.5	<u>Risks and uncertainties</u>	28
7.	<u>Post implementation review</u>	30
8.	<u>Conclusion</u>	30
	<u>Appendices</u>	30
	<u>A1: Exceptions Process</u>	32
	<u>A2: Competition filter</u>	36
	<u>A3: Justice Impact Assessment</u>	37
	<u>A4: Direct Costs</u>	38
	<u>A5: Economic Benefits</u>	40
	<u>A6: Extended Cost and Benefits Summary</u>	48

1.0 Introduction

- This document is a Regulatory Impact Assessment for the proposed legislation to reduce the default speed limit on restricted roads in Wales from 30mph to 20mph, following the recommendations of the Welsh 20mph Taskforce¹.
- The purpose of a Regulatory Impact Assessment (RIA) is to provide the Welsh Ministers with an assessment as to the likely costs and benefits of complying with relevant Welsh subordinate legislation. This RIA is based on the principles and guidance set out in the Welsh Ministers' regulatory impact assessment code for subordinate legislation² (29 June 2021).
- This document outlines the rationale for the proposal, the objectives of the policy, its likely economic cost and benefits and how it will be monitored.
- The document also supports the broader Integrated Impact Assessment³ for this policy which outlines the development of the policy and how its impacts have been considered.
- The RIA contains the following sections:
 - Section 2 outlines the problems under consideration (road safety, health, and the environment) and how intervention is supported by current government policy, public support, and recent precedents. Section 2 also outlines the policies objectives to reduce road incidents and casualties, encourage more active travel (cycling and walking), and improve the environment and social cohesion within Welsh communities.
 - Section 3 explains current policy and details the preferred policy of reducing the default speed limits in Wales on restricted roads to 20mph from 30mph.
 - Sections 4 and 5 report the implications of the preferred policy on competition and the justice system. The policy is not expected to have a significant impact on either.
 - Section 6 conducts a cost benefit analysis of the policy. This entails the following:
 - Monetisation of the expected benefits of the policy. These include improved road safety, increased levels of active travel and a small improvement in emissions.
 - Set against that are the direct financial costs of implementing the policy and the monetised economic dis-benefits of longer journey times.
 - Significant economic benefits are expected from improved road safety and increased active travel including a financial benefit to the Welsh public from reduced expenditure on emergency services,
 - However, when an indicative estimate of journey time disbenefits is included, the monetised costs outweigh the monetised benefits due to the cumulated effect of a slight lengthening of average journey times on account of lower driving speeds on effected parts of the road network. It should be highlighted that there is significant uncertainty surrounding the overall journey time impact and that, on a per trip basis, the impact is expected to be small (less than 1 minute per trip on average), with 95 percent of trips likely to be affected by less than 2 minutes.
 - We note that at the time of writing it has not been possible to monetise some potential wider economic benefits of the policy such as increased property values, improved social cohesion or enhanced access to goods / services /

¹ See: <https://gov.wales/20mph-task-force-group-report>

² See: [Welsh Ministers' regulatory impact assessment code for subordinate legislation \[HTML\] | GOV.WALES](#)

³ " Welsh Government Integrated Impacts Assessment – 20mph speed limit policy", Draft 2, 13 May 2022.

amenities for certain groups; furthermore, no analysis has yet been carried out as to how journey time increases could be offset by improvements in traffic flow / road network function from slower speeds, or more widespread usage of exceptions. It is possible that inclusion of such aspects would reduce the expected level of economic dis-benefit associated with increased travel time calculated for the policy.

- Section 7 details a plan for how the policy will be monitored pre and post implementation.
- Section 8 summarises the findings in the RIA.
- The findings and estimates embedded in this RIA are indicative and based on information available at the time and extrapolation of the relevant evidence base. Ongoing and post implementation monitoring (as outlined in section 7) will add to this evidence base and enable a more accurate and updated assessment of the implications of this policy over time.

1.1 Context: changes to the strategic framework for Welsh Government appraisal

- This RIA has been commissioned at a moment when the Welsh Government is in the process of revising its transport appraisal guidance 'WeITAG'. One of the reasons for the revision is a recognition that the present appraisal processes may elevate certain appraisal variables that would result in potential negative outcomes when viewed against the policy objectives of the Welsh Government. An example of this would be the Benefit Cost Ratio (BCR) presiding over Health in the appraisal process.
- The UK Treasury Green Book has recently been revised for similar reasons, and Welsh Government's Chief Economist subsequently issued an advisory note 'Aligning the Green Book with Welsh Government Values: Transport', which states [p.1] that: 'A project can only be shown to deliver value for money if it is consistent with the Welsh Government's strategic objectives and values'. This does not negate the need for a project to demonstrate cost-effectiveness. The Chief Economist's note further states [p.3] that: 'for any decision to show value for money, the underlying evidence on costs and benefits must be robust and, on the basis of the decision maker's valuation of the various categories of cost and benefit, it must be the case both that the benefits are judged to exceed the costs, and that there are no better ways to use the associated resources to meet the government's objectives.
- In this context, the revised Treasury Green Book provides the following definition⁴ of how 'value for money' should be viewed: 'Value for Money – (VfM) is a balanced judgment based on the Benefit Cost Ratio which brings together social costs and benefits including public sector costs over the entire life of a proposal, together with decisively significant unquantified deliverables, and un-monetised risks and uncertainties, to deliver a proposal's SMART objectives. The judgement is made in the context of the proposal's role, in supporting government policies and strategies of which it is a part, and it fits with wider public policies.'

⁴ See Treasury Green Book 2022, Glossary Page 131:

https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/1063330/Green_Book_2022.pdf

- The last sentence is indicating that if a proposal does not support a Government objective, it cannot be value for money.
- In the context of this RIA about speed limit policy one of the primary causes of professional concern about potential outcomes from the present approach to appraisal is how journey time should be valued and used to calculate benefit-cost-ratios.
- This concern has been driven by the relationship of journey time importance relative to wider policies that seek to address climate change, health, clean air and the environment. It is evident that valuation of traveller time savings holds potential to either support or undermine high-level government priorities, depending on who the time savings accrue to.
- For these reasons, the draft revised WeITAG guidance specifies that the element of the value-for-money assessment based on journey time increments or decrements should be calculated and presented separately to enable decision-makers to take a view as to the relevance and validity of the journey-time element.
- In the present consideration of the value of 20mph speed limits, a Welsh Government policy that seeks to reduce vehicle speeds on residential roads in order to improve public health and the environment; Welsh Ministers will wish to take a view as to the weight that should be attached to the increase in journey times compared to the benefits of the policy.
- In this RIA we have therefore followed the draft WeITAG requirement to break out and separately present the valuation of journey time changes.

2.0 Policy overview

2.1 What is the problem under consideration?

Road safety

- There is an established^{5,6} relationship between higher driving speeds and increased severity and frequency of casualties caused by road incidents.
- The Welsh Government did not achieve the objective set out in its Road Safety Framework (2013) of a 40 percent reduction in KSI's by 2020⁷.
- While the number of personal injury accidents on roads in Wales has declined since 1993 by around 60%, the number of people killed or seriously injured (KSI) has not declined as much (only 40%) and there has been almost no reduction since 2009⁸, and no reduction on 30 mph roads (Figure 1).
- In 2019, the largest⁹ proportion of serious casualties occurred on roads with a 30mph speed limit, which accounted for 45% of all serious casualties and 28% of all fatalities.

⁵ Elvik, R. (2013). A re-parameterisation of the Power Model of the relationship between the speed of traffic and the number of accidents and accident victims. *Accident Analysis & Prevention*, 50, 854-860.

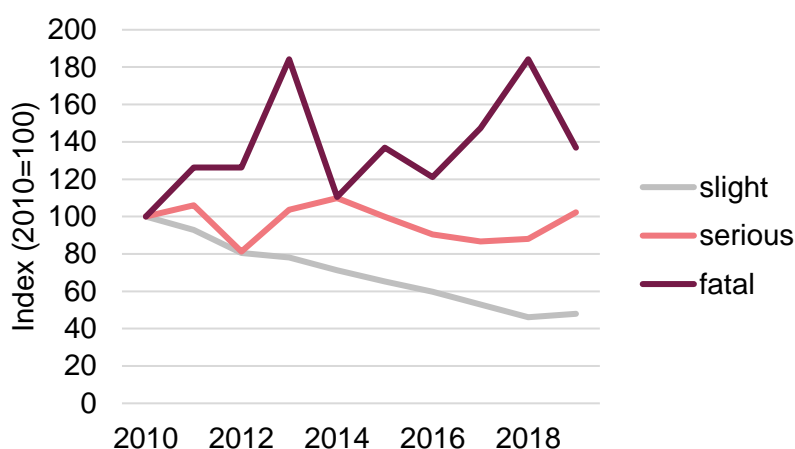
⁶ Rosen, Stigson, H., Sander, U. (2011). Literature Review of pedestrian fatality risk as a function of car impact speed, *Accident, Analysis and Prevention* 43(1): 25-33.

⁷ See: [Review of the Road Safety Framework for Wales \(a40prc-publicinquiry.co.uk\)](https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/440000/Review_of_the_Road_Safety_Framework_for_Wales_a40prc-publicinquiry.co.uk)

⁸ See: <https://stats.wales.gov.wales/Catalogue/Transport/Roads/Road-Accidents/accidents>

⁹ See: [Welsh 20mph Task Force Group Final Report. 2020.](https://www.gov.wales/government/consultations/welsh-20mph-task-force-group-final-report-2020)

Figure 1: Road casualties on 30mph roads in Wales



Source: Reported Road Accidents System, Welsh Government.

Note: The above figure plots the number of incidents recorded on 30mph Welsh roads per year relative to 2010. In 2010 there were 19 fatalities, 485 serious and 2,504 slight casualties. Last observation is 2019.

Health and Environment

- Vehicles use damages health and the environment directly through exhaust and non-exhaust (particulate) emissions and noise pollution, and indirectly when higher driving speeds dissuade people from using other more environmentally friendly and physically active forms of travel.
- In 2019, the Minister for Environment, Energy and Rural Affairs, Lesley Griffiths AM declared a climate emergency in Wales.¹⁰ The Welsh Government is committed to net zero-emissions by 2050. In 2018 transport was responsible for 17% of Welsh greenhouse gas emissions – 62% from private car use, 19% from Light Goods Vehicles and 16% from bus and Heavy Goods Vehicles¹¹.
- Air pollution from vehicles, including NO₂ and particulate emissions, is one of Wales' biggest health challenges, shortening life spans and damaging quality of life.¹²
- Traffic noise, which is louder at higher speeds, can affect quality of life and contribute to poorer health outcomes including behavioural or psychological problems¹³. There is evidence that reduced noise by lowering speed limits to 20mph can make a beneficial contribution to health.
- In the National Travel Attitudes Survey¹⁴ safer roads and the need for drivers to be more considerate and drive at slower speeds are consistently cited as the most important factors preventing people from cycling. Likewise, in a 2018 survey¹⁵ for the National Assembly of Wales conducted by the Economy, Infrastructure and Skills Committee; road safety was the most commented on reason preventing members of the Welsh public from cycling or cycling more.

¹⁰ See: <https://gov.wales/welsh-government-makes-climate-emergency-declaration>

¹¹ See: [Lwybr Newydd: the Wales Transport Strategy 2021 \[HTML\] | GOV.WALES](https://gov.wales/lwybr-newydd-the-wales-transport-strategy-2021)

¹² Searl A. (2004) A Review of the Acute and Long-Term Impacts of Exposure to Nitrogen Dioxide in the United Kingdom. Institute of Occupational Medicine.

¹³ Guski, R., Schreckenberg, D., & Schuemer, R. (2017). WHO Environmental Noise Guidelines for the European Region: A Systematic Review on Environmental Noise and Annoyance. *International Journal of Environmental Research and Public Health*, 14(12), 1539

¹⁴ <https://www.gov.uk/government/statistics/national-travel-attitudes-study-wave-5/national-travel-attitudes-study-wave-5>

¹⁵ <https://senedd.assembly.wales/documents/s72954/Active%20travel%20Summary%20of%20survey.pdf>

- There is a large body of evidence linking physical activity with improved physical and mental health. UK Guidelines published by the Department of Health & Social Care state that every week, adults should accumulate at least 150 minutes of moderate intensity activity; or 75 minutes of vigorous intensity activity, yet only about half¹⁶ the adult Welsh population achieve this. This places a large disease burden on the NHS as well as reduced quality of life as a result of illness and premature death, not least attributable to coronary heart disease which is the leading cause of premature death across the UK.

Cohesive communities (viable, safe, and well-connected communities)

- By reducing the actual and perceived feeling of safety for pedestrians and cyclists, higher driving speeds undermine the connectedness of communities and can amplify inequalities.
- The British Crime Survey finds that speeding traffic was rated as the most serious problem of 16 social problems. Males and females both rated speeding traffic as the greatest problem in local communities – resulting in a perceived lack of safety. This rating also held true whether respondents were young, middle aged, or old.
- There is evidence that socio-economically deprived areas suffer more than affluent areas in terms of road incidents. Road traffic related injuries, particularly for child pedestrians, are among the greatest of all health inequalities, with much higher rates in children from families led by parents in unskilled employment or from deprived neighbourhoods. In helping to reduce road incidents in such areas, the 20mph policy will help contribute towards reducing existing and avoidable economic inequalities in society.
- Surveys of children’s school travel mode repeatedly¹⁷ indicate that across the UK the top concern of parents/guardians is fear of motor traffic. This leads to more people driving their children to school reducing levels of childhood exercise and opportunities for social interaction.
- The Welsh Government’s 2017-18 National Survey for Wales showed 16% of the population aged over 16 saying they felt lonely - with younger people more likely to report feeling lonely than older people.

2.2 Why is government action or intervention necessary?

2.2.1 Current government policy

- Welsh Government intervention to improve road safety, enhance the local environment, increase active travel, and build cohesive communities is consistent with current Welsh Government policy. Key areas of policy alignment are set out in the sections that follow.
- **Well-being of Future Generations (Wales) Act 2015:** The Act seeks to improve the social, economic, environmental, and cultural well-being of Wales¹⁸ and asks public bodies to set policy to achieve seven goals:
 - A prosperous Wales that is innovative, productive, and low carbon.
 - A resilient Wales that supports a biodiverse natural environment.
 - A healthier Wales.

¹⁶ National Survey for Wales 2019-20. <https://gov.wales/sites/default/files/statistics-and-research/2020-07/adult-lifestyle-national-survey-wales-april-2019-march-2020-390.pdf>

¹⁷ National Travel Survey: [Travel to School factsheet](#) (publishing.service.gov.uk)

¹⁸ See: [well-being-of-future-generations-wales-act-2015-the-essentials.pdf \(gov.wales\)](#)

- A more equal Wales.
- A Wales of cohesive communities.
- A Wales of vibrant culture and thriving Welsh language.
- A globally responsible Wales.
- **Future Wales, The National Plan 2040:** This is Wales’ national development framework which sets the direction for development in Wales to 2040. Priorities include sustaining and developing a vibrant economy, achieving decarbonisation and climate resilience, developing strong ecosystems, and improving the health and well-being of our communities¹⁹.
- **Llwybr Newydd- The Wales Transport Strategy 2021 (WTS)**²⁰ includes the ambition that by 2040 roads and streets are safer for all users and fewer people are killed or seriously injured using them. The policy requires that the road network gives greater priority to public transport and active travel, including cycle lanes and footways. The strategy also targets 45% of journeys to be made by public transport, walking, and cycling by 2040.
- **The Road Safety Framework for Wales** states any death or serious injury on Welsh roads should be avoidable and includes the ambition of a “continued reduction in the number of people killed and seriously injured on Welsh roads, with the ultimate aspiration of no fatalities”²¹.
- **The Active Travel (Wales) Act 2013**²² requires the Welsh Ministers and local authorities to take reasonable steps to enhance the provision made for walkers and cyclists and promote active travel journeys.
- **The Environment (Wales) Act 2016** sets a legally binding target of reducing emissions by a minimum of 80% by 2050 and places a duty on the Welsh Ministers to set a series of interim targets (for 2030 and 2040) and carbon budgets. The budgets will set limits on the total amount of emissions emitted in Wales over a five-year period, and act as a steppingstone to ensure regular progress is being made towards the long-term target.
- **The Clean Air Plan for Wales- Healthy Air, Healthy Wales** sets out the Welsh Government’s commitment and long-term ambitions to improve air quality. It is connected to a suite of policies and actions which, across different thematic areas, will make positive differences to health and well-being, the natural environment, ecosystems, and biodiversity, while also supporting vibrant, sustainable, and fair communities, and national prosperity²³.
- **Connected Communities** is the Welsh Government’s strategy for tackling loneliness and social isolation and building stronger social connections. Connected Communities prioritises increasing opportunities for people to connect and therefore is committed to supporting the creation of a high-quality transport system within Wales, in addition to place making and the creation of sustainable places.

2.2.2 Public support

- Evidence from a number of representative surveys in recent years has indicated broad public support for 20mph limits both in Wales and elsewhere, although the recent public consultation undertaken in 2021 for the Welsh Government’s 20mph policy indicated more mixed results.

¹⁹ See: [Update to Future Wales - The National Plan 2040 \(gov.wales\)](#)

²⁰ See: The Wales Transport Strategy, 2021. [Llwybr Newydd A New Wales Transport Strategy 2021: full strategy \(gov.wales\)](#)

²¹ See: [Review of the Road Safety Framework for Wales \(gov.wales\)](#)

²² See: <https://www.legislation.gov.uk/anaw/2013/7/section/1/enacted>

²³ See: [40794 The Clean Air Plan for Wales \(gov.wales\)](#)

- When asked²⁴ in 2020 about Welsh Government plans to reduce the speed limit to 20mph in residential communities, 80 percent of survey respondents responded in favour of the proposal. However, the summary of responses to the public consultation that ran in 2021²⁵ found only 47% of 6,000 responses in favour of the proposal. The difference is likely to be the result of the different sampling approaches for each survey – the 2020 opinion survey sample was structured to be representative of the general population, while the sample for the public consultation in 2021 was self-selecting.
- Since 2006 the National Travel Survey²⁶ has found a significant majority of the adult population in England is in favour of 20mph limits on residential streets. Over the period 2006-2019 those responding in favour has fluctuated between 75 and 69 percent, with only 10 percent of respondents opposed to 20mph limits in 2019.
- Research²⁷ commissioned by the UK government on 20mph speed limits concluded 20mph limits are supported by the majority of residents and drivers.
- The General Assembly of the United Nations and World Health Organisation²⁸ endorse 20mph or 30km/h speed limits where people mix with motor vehicles, unless strong evidence exists that higher speeds are safe.

2.2.3 Precedents

- 20mph speeds limits are becoming increasingly widespread in residential areas in the UK.
- Nearly half²⁹ of all Local Authorities by population have implemented some wide area 20mph zones, ranging from shire counties to unitary authorities and metropolitan boroughs. In England 20 million people live in such authorities.
- Several towns have adopted a “Total 20” approach which sets 20mph as the default mandatory speed limit for all residential roads (with certain exceptions) without the cost or complexity of physical calming. This approach sets a new “societal norm” for vehicle speeds. Portsmouth was the first town in the UK to introduce this in 2007. This has been followed by wide area implementations in Oxford, Bristol, Warrington, London Borough of Islington and latterly Lancashire County Council
- A recent and highly relevant precedent is the Scottish Borders³⁰ which approved 20mph limits across towns and villages in the region in 2021 following a trial period in 2020. The trial found that there was a successful reduction in speed and that 20mph limits are cost effective in lowering traffic speeds and flow, increasing active travel, and reducing casualties. Looking at 115 sites, the Scottish Borders trial mainly focused on how 20mph speed limit can affect driver behaviour. The study found a decrease in mean speed of just over 3mph³¹, with the majority of vehicles travelling more slowly. The reduction in speed, and therefore the expected casualty savings, increased in line with the ‘before’ speed. As a result of the trial within the Scottish Borders, the Scottish Government is now committed³² to expanding 20mph limits to support active travel and to align with global best practice.

²⁴ Traffic Orders & 20mph Public Attitudes Survey. November 2020 Wales Omnibus Study. Beaufort Research.

²⁵ See: <https://gov.wales/proposal-reduce-speed-limit-20mph-residential-streets-summary-responses-html>

²⁶ See: https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/810908/national-travel-attitudes-study-2019-wave-1.pdf

²⁷ See: https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/757307/20mph-headline-report.pdf

²⁸ See: <https://www.who.int/news/item/22-03-2021-campaign-launched-to-make-30-km-h-streets-the-norm-for-cities-worldwide>

²⁹ See: https://www.20splenty.org/20mph_a_blueprint

³⁰ See: <https://scottishborders.moderngov.co.uk/documents/s61106/Item%20No.%2012%20-%2020mph%20report%20Council%20-%20Dec%202021.pdf>

³¹ See: https://www.scotborders.gov.uk/news/article/4202/permanent_20mph_plans_approved

³² See: <https://www.gov.scot/publications/scottish-government-and-scottish-green-party-shared-policy-programme/pages/responding-to-the-climate-emergency/>

2.2.4 What are the policy objectives and intended effects?

- Policy interventions in line with the recommendations from the 'Welsh 20mph Task Force Group Final Report' (July 2020) would seek to achieve a number of objectives, outlined below. Each of these aspects will be analysed and monitored as the 20mph policy is implemented. (Details of the proposed monitoring of the policy is discussed in section 7 of this document).

2.2.4.1 Reduce injuries on the road network.

- There is moderate to strong evidence³³ that lower speeds result in fewer collisions and in reduced severity of collisions and injuries.
- Success of the policy rests largely on the measured reduction in the number of people killed or seriously injured on Welsh roads which move from 30mph to 20mph.

2.2.4.2 Encourage a change in travel behaviour, with people feeling confident, safe, and secure enough to increase their use of active travel modes

- A measured increase in cycling and walking related to this policy will be a marker of success. Evidence from pilot schemes in Bristol and Edinburgh reported positive results, finding small increases in walking and cycling after implementation of 20mph speed limits^{34,35}.

2.2.4.3 Improve the environment and economy of local communities by reducing the negative externalities associated with vehicle use.

- Lower speeds should³⁶ result in less non-exhaust particulate pollution (PM2 & PM10) associated with less brake wear, tyre wear and road abrasion. Increased levels of active travel, in contributing towards reduced car usage, will also help reduce pollution / emissions.
- Given current combustion engine technologies the direct impact of the policy could at first increase³⁷ NO₂ and particulate exhaust emissions; however the indirect impact from increased levels of active travel could result in less overall exhaust emissions. As the stock of vehicles transitions to zero emissions technology the exhaust emissions impact becomes less salient.
- An improved and safer environment that encourages more cycling and walking combined with lower levels of noise pollution³⁸ is likely to increase social interaction within communities, leading to reduced loneliness and improved social cohesion. It could also lead to higher land values and retail spending^{39 40}. A measured increase in footfall in retail and hospitality service areas would be indicative of success of the policy in this area.
- To date, noise has not been quantified despite an increasing interest in promoting 20 mph speed limits as an effective way to reduce noise exposure and indications that traffic related

³³ Davis, A. 2018. The state of the evidence on 20mph speed limits with regards to road safety, active travel and air pollution impacts. A literature review of the evidence

³⁴ <https://uwe-repository.worktribe.com/output/875541>

³⁵ https://archive2021.parliament.scot/S5_Rural/Research_evidence_20mph_bill.pdf

³⁶ Williams, D., North, R. 2013. An evaluation of the estimated impacts on vehicle emissions of a 20mph speed restriction in central London, Prepared for the City of London on behalf of the central London local authorities, London: Imperial College.

³⁷ Ricardo-AEA (2014). [Production of Updated Emission Curves for Use in the National Transport Model](#).. Report to Department of Transport.

³⁸ Davis, A. 2018. The state of the evidence on 20mph speed limits with regards to road safety, active travel and air pollution impacts. A literature review of the evidence.

³⁹ National Bicycle and Pedestrian Clearinghouse. The Economic and Social Benefits of Off-Road Bicycle and Pedestrian Facilities; National Bicycle and Pedestrian Clearinghouse: Washington, DC, USA, 1995.

⁴⁰ [Rajé, F., & Saffrey, A. \(2016\). The value of cycling. Cycling Embassy.](#)

noise and air pollution have similar public health impacts. To gather evidence and a better understanding on the impacts of traffic speed and noise on health outcomes in the context of the 20mph Implementation programme in Wales for 2023, a literature review will be conducted. It will seek to gauge likely levels of health impacts and strength of the evidence (robustness).

3.0 Options

3.1 Introduction

- This part of the RIA sets out the different options associated with the policy – each option reflecting different possible courses of action for the Welsh Government. This includes “Business as Usual” – reflecting retention of the status quo – and the option to reduce the default speed limit on restricted roads to 20mph – the primary focus of the proposed policy.
- The analysis of the costs and benefits of the policy (presented in section 6 of this RIA) is based on a comparison of the policy’s implementation compared to the status quo, to gauge the extent of impacts.
- Details of what each option entails are explained in the sections that follow.

3.2 Option 1: Business as Usual

- Current policy in Wales is for local authorities to reduce speed limits on their own using powers under The Road Traffic Regulation Act 1984.⁴¹ Section 81(1) of the Act states that it is unlawful to drive a motor vehicle on a restricted road at a speed exceeding 30mph. A restricted road is defined in Section 82 of the Act and is usually a road with a system of street lighting where lamps are placed not more than 200 yards (183m) apart.
- Local highway authorities can set local speed limits on restricted roads which are different to 30mph, for example changing the limit to 20mph. In recent years the Welsh Government has encouraged local authorities to change limits to 20mph, previously providing grant funding to support local authority roll-out of 20mph zones. However, since 2020, following its acceptance of the 20mph Taskforce recommendations for a national default 20mph speed limit⁴², the Welsh Government has no longer been accepting grant funding applications from local authorities for new 20mph zones.
- The 20mph Taskforce Group was assembled following First Minister Mark Drakeford’s May 2019 announcement that it was Welsh Government policy to set a national default 20mph limit for urban and village streets.⁴³ This was on the back of minimal progress of rolling out 20mph areas in Wales, with only around 2% (See Table 1) of road by distance set at a speed limit of 20mph by 2020.
- The Welsh Government continuing to advocate for change through local authorities (without roll-out of a national 20mph policy) would represent continuation of the current business as usual (BAU) approach. Without new funding this would be unlikely to result in any significant expansion of 20mph zones in local authority areas; even where funding has

⁴¹

See:

[https://www.legislation.gov.uk/ukpga/1984/27/section/82#:~:text=82%20What%20roads%20are%20restricted,E%2BW%2BS&text=\(a\)in%20England%20and%20Wales,more%20than%20200%20yards%20apart%3B&text=\(b\)that%20%5BF3the_restricted%20road%20for%20those%20purposes](https://www.legislation.gov.uk/ukpga/1984/27/section/82#:~:text=82%20What%20roads%20are%20restricted,E%2BW%2BS&text=(a)in%20England%20and%20Wales,more%20than%20200%20yards%20apart%3B&text=(b)that%20%5BF3the_restricted%20road%20for%20those%20purposes)

⁴² See: <https://gov.wales/sites/default/files/publications/2021-06/response-to-the-recommendations-made-in-the-20-mph-task-force-group-report.pdf>

⁴³ <https://www.localgov.co.uk/Welsh-first-minister-backs-20mph-speed-limit/47362>

been in place historically, the expansion of 20mph zones has been limited (as discussed above). **Therefore, for the purposes of this RIA analysis, the assumed BAU baseline for comparison is no further expansion of 20mph limits in Wales over the assessment period.**

3.3 Option 2: Reduce the maximum lawful speed of a motor vehicle on a restricted road in Wales to 20mph

- Option 2 – the preferred option presented in this RIA – is **to reduce the maximum lawful speed of a motor vehicle on a restricted road in Wales to 20mph.**
- This approach will follow the recommendations of the Welsh 20mph Taskforce and will require subordinate legislation under Section 81(2) of the Road Traffic Regulation Act 1984. The policy will also require the Highway Code to be amended, probably in the form of a Wales addendum.
- This policy will significantly increase the share of roads in built up areas with a 20mph speed limit (see Table 1). Currently only 2 percent of roads by distance have a 20mph speed limit but under the 20mph policy this is estimated to increase to 38 percent.
- Exceptions: It would not be appropriate to place a speed limit of 20mph on all existing 30mph roads. On well-engineered routes that are principal corridors for movement, where there is little frontage development or community activity and where pedestrians and cyclists do not need to mix with motor vehicles it will often be appropriate to retain a 30mph speed limit. An exceptions process⁴⁴ forms part of the 20mph policy, through which local authorities (as the highways authority in their area) can determine the routes that need to be made exceptions to the default limit of 20mph. In such cases a speed limit order will be required. As with all speed limits, 30mph exceptions could be part time if the local authority considers this to be appropriate. The exceptions process will be conducted before the proposed introduction of the 20mph policy in 2023. It is assumed this process will be comprehensive and therefore a one-off cost associated with implementation.
- Enforcement: GoSafe⁴⁵ (the Welsh Road Casualty Reduction Partnership) carries out speed limit enforcement in Wales using fixed and mobile speed cameras. GoSafe and their agreed objectives support⁴⁶ the Welsh Government policy intention to introduce a default 20mph speed limit by working with the Welsh Government and partners on developing an enforcement plan.
- A proactive marketing and communication strategy will be implemented in line with the role out of the new policy to educate the public and enforce the new behavioural norm of driving at 20mph.

⁴⁴ See appendix A1 for more detail.

⁴⁵ See: <https://gosafe.org/about-us/the-partnership/>

⁴⁶ See: <https://gov.wales/20mph-task-force-group-report>

Table 1: Estimated Road Length (KM) by Speed Limit in Wales

Speed Limit (mph)	Today	20mph Policy
20	870 (2%)	13,405 (38%)
30	13,085 (37%)	550 (2%)
40	825 (2%)	825 (2%)
50	450 (1%)	450 (1%)
60	19,208 (55%)	19,208 (55%)
70	578 (2%)	578 (2%)
Total	35,016 (100%)	35,016 (100%)

Source: Transport for Wales

Note: This has been estimated using a GIS tool developed by TfW to identify all restricted roads and potential exceptions based on the criteria in Appendix A1.

3.4 Other options considered

- No other options are being analysed in detail in this RIA. However, it is important to note that within Option 2 (20mph as the default speed limit) there is potential variability in the scope of exceptions, i.e. retention of 30mph on certain routes, which local authorities could apply to their local road networks over time. For instance, exceptions may on the one hand be expanded should local authorities identify significant adverse impacts on journey times that can be addressed effectively; on the other hand, fewer exceptions may be applied if local authorities deem additional safety benefits or improved functioning of the road network from slower speeds on key route sections.
- As noted previously, the Welsh Government has accepted⁴⁷ the recommendations of the 20mph Taskforce to implement 20mph as the default national speed limit on restricted roads, and the 20mph programme has been included in the Programme for Government 2021 to 2026.⁴⁸ In light of these policy developments, funding for 20mph zones through Welsh Government grants is no longer being offered to local authorities.
- Given the lack of current funding for 20mph expansions and uncertainty around future progress of 20mph expansions it is deemed appropriate to assume as part of the baseline BAU (see section 3.1 above) that there would be no further expansion of 20mph across Wales. This forms the baseline assumption, against which the costs and benefits of the new 20mph policy can be assessed (see section 6).
- One alternative would be to compare the policy to a more incremental 'opt in' policy that resembles policy in Wales prior to the Taskforce report (2020). However, that policy had only achieved a small expansion of 20mph zones relative to the preferred option (see Table 1). From an administrative and legislative standpoint, the 20mph Taskforce judged it most efficient to start from a default 20mph speed limit and then identify exceptions as opposed

⁴⁷ See: <https://gov.wales/sites/default/files/publications/2021-06/response-to-the-recommendations-made-in-the-20-mph-task-force-group-report.pdf>

⁴⁸ <https://gov.wales/sites/default/files/publications/2022-01/programme-for-government-update-december-2021.pdf>

to the current (and opposite) policy position. Furthermore, a locally led option was not deemed to fit with the strategic vision for a national approach leading to a change in national behaviours and values. Therefore, considering both the findings and recommendations of the Taskforce, and the flexibility in the policy afforded by exceptions process (Appendix A1), no other options have been given formal consideration in this RIA.

4.0 Competition Assessment

- The competition filter has been completed for the Bus, Freight and Taxi industries with answers to the set questions reported in Appendix A2.
- This filter tests whether there is a risk of a significant detrimental effect on competition within the industry for sectors affected by the policy.
- The filter suggests there is low risk of detrimental effects on competition in these industries.
- No significant competition issues were raised by these industries during the consultation process in the IIA⁴⁹.

5.0 Justice Impact Assessment

- The opinion of the Welsh Government is that a formal Justice Impact Assessment is not required for this policy.
- Twelve factors are considered in determining this opinion (see Appendix A3) of which only one of twelve is potentially relevant to this legislation but is not expected to be significant.
- The 20mph legislation could have a slight impact on the number of applications to the courts related to speeding tickets. This relates to a potential increase in speeding offences due to public misunderstanding or failure to adhere to the new policy. On a 20mph road prosecution is recommended for offences at 35mph where as a 35mph offence on a 30mph road fall within the range of speeds appropriate for speed awareness courses
- However only a small share (around 2%) of speeding offences recorded during the enforcement pilot in Llanelli North were at or exceeded 35mph, the guidance for prosecution. 92% of offences were in the speed range appropriate for speed awareness courses (less than 32mph). These numbers are in line with existing distribution of offences in 20mph and 30mph zones in Wales.
- Police and GoSafe will adopt an approach to educate rather than to prosecute in the early stages of implementation.
- A national and local awareness campaign will accompany the implementation of the policy to inform the public about the policy change which over time is expected to lead to a greater compliance with 20mph speed limits and fewer speeding tickets.

6.0 Costs and Benefits

6.1 Overview of methodology⁵⁰

⁴⁹ The Integrated Impact Assessment documents the public consultation undertaken in connection to this policy.

⁵⁰ See Appendix A3 for more detail.

- The analysis of costs and benefits is based on the assumed implementation of the 20mph policy (“Option 2” as defined in section 3.3 above), compared to a baseline reflective of a Business-as-Usual approach (“Option 1” as defined in section 3.2 above).
- Indicative Costs have been estimated for initial set-up activities by the Welsh Government, Transport for Wales, local authorities, and operators.
- Set-up and recurrent costs have been estimated using the professional judgement of Welsh Government officials, Transport for Wales and consultants commissioned to support the preparation of this RIA. Figures presented are necessarily indicative at this stage, given full implementation of the policy and related surveys, analysis and completion of the exceptions process is still ongoing. Where relevant, estimates have been cross-checked by equating the costs to an approximate equivalent Full Time Equivalent (FTE) staff resource, and references have been made from published documentation where appropriate. For more details see Appendix A4.
- A key guiding principle for demand modelling and economic assessment is proportionality. This refers to striking a balance between the level of detail and the cost of the modelling, considering factors such as the required functionality, data availability, and robustness and resource and time constraints. The 20mph policy is the first of its kind based on the size and heterogeneity of the areas affected. The lack of historical evidence from any similar scale initiative in the UK has meant that a top-down approach has been taken in appraising the economic benefits and dis-benefits in this document, with a number of simplifying assumptions and high-level estimates. It has not been practicable to quantify some areas of economic/social benefit/dis-benefit, such as potential optimisation of traffic flow / road network function, increased property values or enhanced access to goods / services / amenities (see section 6.1.5). More detailed analysis of the policy’s economic benefits and costs based on applied experience post-implementation is expected as part of the ongoing monitoring of the policy once it has been fully implemented (this is discussed in section 7).
- The cost-benefit analysis presented in this RIA makes assumptions based on relevant data and studies related to the policy and monetises those judgments by combining them with publicly available values from the Department for Transport’s Transport Analysis Guidance (TAG) toolkit⁵¹. Given this approach, where appropriate a range of estimates is discussed around the central estimate of the economic benefits and dis-benefits. For more details see Appendix A5.
- Cost and benefits are considered relative to the baseline BAU scenario outlined in section 3.1. For example, replacing a 30mph sign with a 20mph sign is an additional cost but the maintenance of the sign is not because the 30mph sign requires the same level of maintenance.
- Costs are on a forward-looking basis and assume the policy is enacted in 2023. Sunk costs such as the costs associated with compiling this RIA or the work of the 20mph Taskforce are excluded.
- Cost and benefits are considered over a 30-year period and discounted using standard Green Book discount rates of 3.5% for non-health related impacts and 1.5% for health-related impacts⁵². It is considered that, due to longer-run uncertainty over vehicle use, electrification, and further improvements in transportation technology, extending the analysis of impacts of this policy beyond 30 years is expected to be of limited value;

⁵¹ See: <https://www.gov.uk/guidance/transport-analysis-guidance-tag>

⁵² See: <https://www.gov.uk/government/publications/the-green-book-appraisal-and-evaluation-in-central-government>

therefore, the appraisal period is limited to 30 years post-implementation of the policy (2023-2052).

- Values are discounted from 2022 and presented in 2022 constant prices. Future economic benefits are increased in future years in line with forecasts for increases in GDP per capita (circa 1.4% a year).

6.1.1 Calculation approach – speed decreases and related road casualty reductions

- To estimate the economic benefits from the reduction in road casualties associated with the policy, a forecast is made for future incidents (fatal, serious, slight) in Wales using data recorded for these incidents on 30mph roads from 2010-2019 and made available through Stats Wales. This data is extrapolated into the future using estimates for future trip growth and future (non-speed) improvements in road safety.
- A power law⁵³ maps the relationship between incident frequency and severity, and vehicle speed. This is applied to estimate the effect of the reduction in average free flow speed for fatal and serious casualties, and average speed for slight casualties. (Please refer to Appendix A5 for a more detailed explanation of how this applies).
- The reduction in speed is calibrated based on the difference in observed free-flow speeds in Great Britain by speed limit. These speeds are 31mph and 26mph for 30mph and 20mph zones respectively. For this RIA, these speeds have been mapped to an average speed difference using a formula based on average delays per mile on local roads (46 seconds)⁵⁴. This implies a reduction in average speed on policy-relevant roads in Wales from 22.2mph to 19.5mph. These estimated speeds are in line with those recorded in the pilot areas for this policy and other studies of 20mph implementations.
- The economic benefits are monetised using values from TAG⁵⁵.

Table 2: Assumed vehicle speeds (mph)

Scenario	Free Flow Speed	Average Speed
BAU	31	22.2
20mph policy	26	19.5

Note: Free flow speed is the speed of vehicles while moving and unencumbered by congestion. Average speed takes into account congestion and yielding to other traffic which assumes that every mile takes 46 seconds longer than the implied by the free flow speed.

6.1.2 Calculation approach – increased active travel

- Trip growth estimates for the BAU baseline scenario (without the 20mph policy) are calibrated using the scenario⁵⁶ produced for the Welsh Government in line with its mode share target. This exercise maps planned investments in active and sustainable travel to the Welsh Government’s 2040 target of 45 percent of trips being made by active or

⁵³ Elvik, R. (2013). A re-parameterisation of the Power Model of the relationship between the speed of traffic and the number of accidents and accident victims. *Accident Analysis & Prevention*, 50, 854-860.

⁵⁴ <https://www.gov.uk/government/statistical-data-sets/average-speed-delay-and-reliability-of-travel-times-cqn>

⁵⁵ See TAG data book Table A 4.1.1: <https://www.gov.uk/guidance/transport-analysis-guidance-tag>

⁵⁶ <https://www.transportforqualityoflife.com/u/files/210115%20Modal%20share%20targets%20for%20Wales%20FINAL.pdf>

sustainable travel by 2040. Based on current budget proposals⁵⁷ it is assumed that up to 50 percent of this mode shift is achievable, and that trip volumes grow with the Welsh Government's population forecast⁵⁸. It is assumed the mode shift in line with the 2040 target modelling is in part contingent on the 20mph policy, and that baseline projections take this into account by lowering the direct mode shift to cycling and walking by between 5 and 15 percent of the total achievable increase in cycling and walking.

- This judgement is based on other studies⁵⁹ alongside feedback from the Welsh⁶⁰ public and means that without the 20mph policy there are, as a central estimate, 10 percent less directly generated new cycling and walking trips (see Table 3).
- Note the model assumes the majority (circa 90%) of new cycling or walking trips are diverted from existing trips using other modes. Therefore, the overall share of walking trips is largely unaffected, as 23 percent of new cycling trips are diverted from walking trips.
- Increased levels of active travel under the policy create economic benefits in terms of decongestion, air quality, greenhouse gas reductions, individual health, and productivity impacts. These benefits have been calculated using the Department for Transport's (DfT) active mode appraisal toolkit⁶¹.

Table 3: Active Travel

Policy		Mode Share		Trip per Person per Year		Total Trips per Year (millions)	
		2030	2050	2030	2050	2030	2050
Baseline	Cycling	3.5%	5.0%	35	51	112	170
	Walking	25.8%	25.3%	257	258	830	864
20mph	Cycling	3.7%	5.4%	37	55	119	183
	Walking	25.8%	25.4%	258	259	832	868

Note: Note mode shares for cycling and walking grow under both scenarios due to planned investments in active travel by Welsh government derived following modelling and analysis by Transport for Quality of Life and Arup and are based on conservative assumptions. The baseline assumes 10 percent less new cycling and walking without the 20mph policy.

6.1.3 Calculation approach – road journey time impact

- The RIA analysis must also account for potential journey time increases associated with the 20mph policy, and the related economic dis-benefit.
- The calculations undertaken rely on data relating to total annual vehicle miles travelled in Wales by road and vehicle type.

⁵⁷ <https://gov.wales/sites/default/files/publications/2021-12/2022-2023-draft-budget-narrative.pdf.pdf>

⁵⁸ <https://stats.wales.gov.wales/Catalogue/Population-and-Migration/Population/Projections>

⁵⁹ https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/757307/20mph-headline-report.pdf

⁶⁰ <https://gov.wales/traffic-orders-and-20mph-public-attitudes-survey>

⁶¹ See: https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/888754/amat-user-guidance.pdf

- Based on the share of miles of road affected by the policy (Table 1) and inputs from Transport for Wales (TfW) regional transport models an estimate of what share⁶² of those miles will switch from 30mph to 20mph speed limits is then combined with the reduction in average speed outlined in section 6.1.1, to derive an increase in overall journey times across Welsh roads. We assume average speeds in urban areas are not affected during peak⁶³ hours as they are largely determined by stopping points at queues and intersections and not driving speeds between those stopping points.
- These increased journey times are then monetised using TAG parameters for value of time⁶⁴, occupancy per vehicle⁶⁵ and estimated proportions of travel time for work, commuting and other purposes by vehicle type⁶⁶. Distance travelled to grow/decline⁶⁷ is assumed to grow/decline in line with growth in car trips, which incorporates population growth and future modal shares.

6.1.4 Calculation approach – emissions impacts

- The benefits and dis-benefits from exhaust and non-exhaust emissions related to the policy have been estimated.
- Exhaust emissions are calculated using speed emissions curves from TAG⁶⁸ and increase (at lower speeds) with a reduction in average speed. Initially this increase is about 5% when averages speeds decrease to 19.5mph from 22.2mph. Due to evolving engines standards and increased uptake of zero emissions vehicles this falls to 2.5% by 2052.
- Non-exhaust emissions account for more than 90 percent of particulate emissions and the impact of lower speeds has been estimated based on modelling⁶⁹ by Imperial College London. This modelled an 8% reduction when speed limits are reduced from 30mph to 20mph.
- Allowances in the calculations have been made for the changes in the composition of the fleet of vehicles over time in Wales using a forecast⁷⁰ from the National Atmospheric Emissions Inventory. The changes in emissions are applied to estimates of base levels of emissions from DEFRA and pro-rated by the Welsh share of vehicle miles affected by the policy. The emissions benefits and dis-benefits are finally monetised using values from TAG⁷¹.

Other benefit calculations

- Other likely benefits have not been included quantitatively in the cost benefit analysis due to lack of data, uncertainty over the evidence base or methodological uncertainty over accurate quantification from extrapolation of the evidence base.
- These benefits include the following:

⁶² Note this accounts for a modelled estimate of what existing 30mph roads will be subject to an exception.

⁶³ Weekdays 7:00-9:00 and 16:00-19:00.

⁶⁴ See TAG Table A 1.3.1

⁶⁵ See TAG Table A 1.3.3

⁶⁶ See TAG Table A 1.3.4

⁶⁷ The car usage scenario grows with population but also considers future mode shift based on current Welsh Government policy. This results in a 5% reduction in vehicle miles driven by 2040 from 2022. The Welsh Government is in the process of developing a National Transport Delivery Plan which sets out how it will go about achieving targets in the Wales Transport Strategy and Net Zero Wales.

⁶⁸ See TAG Table A 3.5

⁶⁹ Williams, D., North, R. 2013. An evaluation of the estimated impacts on vehicle emissions of a 20mph speed restriction in central London, Prepared for the City of London on behalf of the central London local authorities, London: Imperial College.

⁷⁰ See: <https://naei.beis.gov.uk/data/ef-transport>

⁷¹ See TAG Table A 3.2.1

- Improved functioning of the road network / smoother traffic flow / reduced congestion as a consequence of slower speeds. For example, the ability of vehicles to move in and out of parking bays or change lanes more efficiently at lower speeds.
- While many benefits from increased active travel have been included such as reduced mortality and decongestion. Broader benefits such as the day to day benefit of increased physical and mental⁷² health from increased exercise remain unquantified. Furthermore if increased levels of active travel disproportionately remove car trips that affect stop-start congestion during peak periods such as school runs⁷³, the decongestion benefits from increased active travel could be larger.
- Noise: it was considered that the evidence base was not conclusive enough to form a monetary judgment for the policy. However, we note that the Welsh Government has recently commissioned additional research and analysis of likely noise-related impacts of the policy, to be performed pre- and post-policy implementation, to gain a better understanding of the relevant impacts.
- Increased retail spending, resulting from improved access (particularly amongst those with mobility challenges). At this point in time however good quantitative evidence on which to calibrate this benefit remains lacking⁷⁴
- Increased property values (and the resultant land value uplift) are also not included as a credible methodology could not be assembled to monetise these benefits given available data and pre-existing studies, and available resources.
- Once the 20mph policy has been fully implemented, it is expected that a wider range of data will become available. This will enable an analysis of the policy's broader impacts, including in relation to the aspects outlined above. (The proposed monitoring of the policy's impacts post-implementation is discussed in section 7 of this RIA).

6.2 Direct Costs of policy

⁷² Mikkelsen, K., Stojanovska, L., Polenakovic, M., Bosevski, M., & Apostolopoulos, V. (2017). Exercise and mental health. *Maturitas*, 106, 48-56.

⁷³ More children were found to be walking to school in Bristol post the introduction of 20mph. See: Pilkington, P., Bornioli, A., Bray, I., Bird, E. 2018 The Bristol Twenty Miles Per Hour Limit Evaluation (BRITE) Study, Bristol: University of the West of England.

⁷⁴ See: <https://www.livingstreets.org.uk/media/3890/pedestrian-pound-2018.pdf>

Table 4: Direct Financial Costs of 20mph Policy (2022 – 2026, current prices)

Direct Costs (£m)	Welsh Government	Local Authorities	Business	General Public	Total
Capital	£0.0	£29.1	£0.0	£0.0	£29.1
Transitional	£32.5	-£29.1	£0.0	£0.0	£3.5
Recurring	£0.0	£0.0	£0.0	£0.0	£0.0
Total	£32.5	£0.0	£0.0	£0.0	£32.5

Note: The values shown are approximate and are intended to provide only indicative forecasts. Values are discounted present values over a 30-year appraisal period from 2022 presented at 2022 prices. Capital costs refer to one-off expenditure on an asset such as land, buildings, machinery/equipment and the development of an IT system or software, where that asset is expected to be utilised in more than one year. Transitional costs are one-off costs which relate to the implementation of the policy. Recurring costs are those which are incurred on a frequent (typically annual) basis. See Appendix A4 for a more detailed breakdown.

- Table 4 outlines the main costs associated with the policy, compared to the baseline BAU scenario. The total direct financial cost is estimated at £32.5 million which is expected to be spent⁷⁵ over the period 2022-2027 but is mostly incurred in fiscal year 2022-23. The direct financial cost of the policy falls almost entirely on the Welsh Government which is funding the capital works carried out by the local authorities through grants. (This is why local authorities show a negative transitional expenditure in the table due to the policy).
- It is not envisaged that any further direct costs will be incurred by the Welsh Government or other parties beyond the fiscal year 2027.
- The costs shown in Table 4 comprise a number of elements – more detail of which is set out in Appendix A4.
- Capital costs associated with the policy relate to the cost of implementing and removing signs and road markings. These costs total £29.1 million and include a 22% optimum bias adjustment in line with Green Book supplementary guidance⁷⁶ for capital expenditure. Signage cost includes the costs of the materials, engineering works and overheads. Approximately 30,000 replacement signs and 5,000 posts will be needed where restricted roads intersect with other road speed limits. Approximately 2,300 new signs including repeater signs will be needed to mark out exceptions that will stay at 30mph. 5,000 signs around school areas will need replacing.
- Traffic Regulation Orders (TRO) will need to be issued for roads that will remain at 30mph. Modelling by TfW suggests there will be on average 15 exceptions per local authority. The assumed cost is £2,500 per TRO, which includes the administrative costs of drafting the TRO. The total cost of this process is expected to be around £1 million over fiscal years 2022-23 and 2023-24.
- TfW plans to conduct pre- and post-implementation monitoring and evaluation for which £0.45m has been allocated (see Section 7 for further details). This figure includes

⁷⁵Expenditures on this policy cannot be paid out of the Welsh Consolidated Fund and need for it be authorised by a budget resolution. See Legislation Handbook on Assembly Bills.

⁷⁶ Green book guidance recommends explicitly incorporating for the tendency of cost estimates to be overly optimistic. The recommended upper bound for capital expenditure is 44%, 22% represents half this upper bound. See: <https://www.gov.uk/government/publications/green-book-supplementary-guidance-optimism-bias>

procurement of external monitoring services and Welsh Government staff costs related to analysis and reporting.

- A national and local communications campaign will run alongside the implementation of the policy. An allowance of £1.6 million has been made for this in line with recommendations from the 20mph Taskforce and pricing guidance from Golley Slater group limited.
- An allowance has been made for Welsh Government staff costs associated with the management and implementation of the policy. This is estimated at £0.4m and covers administrative responsibilities relating to the policy pre-implementation and post-implementation.
- No allowance has been made for costs associated with enforcement of the policy as no substantive changes in enforcement policy are expected at this time (see Section 5).
- No assumption or allowance has been made for any direct costs to commercial business such as taxi firms, bus companies and logistics companies though some concerns were raised in the consultation⁷⁷ process. An analysis by CitySwift of three bus routes indicates that increased running times on some bus routes across Wales could potentially lead operators to adjust their operations so that they can mitigate any increased operating costs. While no direct cost allowance has been made, the potential cost associated with investments to maintain service levels are captured through the productivity impact from increased journey times in the next subsection.
- This policy does not directly affect the Welsh or broader UK tax and benefit system. The policy is also not expected to have a significant aggregate or distributional impact on economic activity. Therefore, no significant effect is expected on the broader UK tax and benefit system⁷⁸ and devolved and partially devolved taxes.

6.3 Benefits of policy

Table 5: Economic Benefits

Wider Economic Benefits (£m)	Welsh Government	Local Authorities	Business	General Public	Total	Low	High
Road Safety	£57.5	£0.0	£0	£1,333	£1,391	£480	£2,494
Journey Times	£0.0	£0.0	-£1,625	-£4,726	-£6,351	-£8,884	-£2,745
Cycling and Walking	£0.0	£0.0	£0	£505	£505	£189	£947
Emissions	£0.0	£0.0	£0.0	£4.5	£4.5	£2	£8

Note: The values shown are approximate and intended to provide only indicative forecasts. Values are discounted present values over a 30-year appraisal period from 2022 presented at 2022 prices. See Appendix A5 and A6 for a more detailed summary.

- Table 5 outlines the monetised economic benefits associated with the 20mph policy, projected over a 30-year period from 2022-2051, and presented in discounted terms. Taking the aggregated impact of the different economic benefits / dis-benefits, based on the

⁷⁷ See Integrated Impact Assessment.

⁷⁸ A small reduction in indirect taxation (£1.2 million) over 30 years is included in the net benefit calculation of increased Cycling and walking.

methodology outlined in section 6.1, the total monetised economic benefits are expected to be negative i.e. a dis-benefit. This is due to the impact of increased journey times due to lower average speeds, which outweighs economic benefits in other categories.

- The principal economic benefits / dis-benefits are discussed further below, with a more detailed breakdown of calculation elements presented in Appendices A5 and A6.
- We note that some potentially significant areas of economic benefit from reduced noise pollution, increased local retail spending and land values, and increased community cohesion have not been monetised for this RIA due to limitations in the historical and pilot evidence available as well as time constraints. It is expected that further analysis of such benefits will be possible once additional data becomes available following implementation of the policy (see section 7). There are also likely to be more benefits associated with active travel than those currently embedded in DfT's active travel toolkit in terms of general physical and mental wellbeing.
- The principal economic benefit identified through this initial RIA analysis relates to improved road safety from lower speeds on affected roads:
 - Modelling provides a central estimate of £1.4 billion in economic and financial benefits over the 30-year period to 2052. It is important to note that uncertainty surrounding this estimate means the range of reasonable values could fall anywhere between £0.5 billion and £2.5 billion.
 - These values are driven by a reduction over 30 years of between 40 and 440 deaths and a reduction in serious⁷⁹ injuries of between 1,800 and 3,900.
 - Included within these benefits are financial savings for police, hospital and ambulance costs of between £29 million and £121 million (discounted values) over the 30-year appraisal period, with a central estimate of £57.5 million of savings.
- The main economic dis-benefit relates to increased journey times from lower average vehicle speeds:
 - Cumulated across journeys and over time this could bring a substantial economic dis-benefit, with a central estimate of £6.4 billion (discounted) over 30 years.
 - This dis-benefit is split between households commuting and travelling for leisure activities (£4.7 bn) and potential productivity losses of persons travelling for business reasons (£1.6 bn) e.g. delivery drivers.
 - There is significant uncertainty around this estimate with a range generated by parameter and assumption uncertainty of minus £2.7-£8.9 billion. This uncertainty relates to assumptions around the share of vehicle miles (10%-20%) affected by the policy and standard guidance from DfT over uncertainty around the estimates of value of time (+-25%). The higher (less negative) end of the range assumes urban miles on restricted roads are not affected during the interpeak period as well as the peak periods. The lower (more negative) end of the range assumes a higher share of vehicle miles travelled on restricted roads, more in proportion to their share of road infrastructure. As discussed in section 6.5 it should be noted there will likely be some trade-off between journey times effects and the other benefits from the policy as slower vehicle speeds are key to delivering safety benefits which then unlock the further benefits of increased active travel, improved communities and environment.

⁷⁹ Serious injuries range in seriousness from deep cuts to paralysis.

- It is important to note that the current estimation is calculated on the basis of slower average vehicle speeds across all journeys, a simplifying assumption derived from initial analysis by Transport for Wales. This does not account for the potential offsetting effects of improved road network functioning / traffic flow / junction capacity that could accrue from lower speeds. These impacts have not yet been analysed / quantified.
 - It should also be noted that this dis-benefit accrues from the application of standard constant values of time over which there is active professional debate⁸⁰. There has also long been academic debate around the application to small time savings⁸¹ where the benefit of small time savings may be perceived to be small or negligible relative to larger time savings. This being said current TAG guidance stipulates the use of a constant value of time regardless of the sign or size of the time saving (see further discussion in section 6.5).
 - Overall, the top-down journey time disbenefits in Table 5 are consistent with a time penalty of just over 1 minute per person per day or slightly less than 1 minute per trip. Table 6 provides an indicative estimate of the distribution of journey time impacts by trip based on the top-down analysis reported in Table 5 and shows that 95% of trips may be affected by less than 2 minutes, with only a small fraction (0.3%) affected by more than 5 mins. Thus it is likely that a substantial amount (74%) of the journey time disbenefits reflect journey time increases for trips of less than 2 minutes.
- Through improved actual and perceived improvements in road safety the 20mph policy is expected to encourage a shift to more active travel in Wales, delivering between £190 million and £950 million in economic benefits from improved health outcomes, decongestion and associated environmental improvements. This corresponds to an extra 4 to 6 cycling trips per person per year and 1 to 2 walking trips per person per year attributable to the 20mph policy by 2040.
 - A small environmental improvement resulting from lower non-exhaust particulate (PM2 and PM10) emissions can be expected from the policy. Lower driving speeds should result in lower tyre, road and brake abrasion reducing particulate pollution in communities. We note that this benefit is somewhat but not entirely offset by increased exhaust emissions of Nitrogen Dioxide (NO₂) from fossil fuel powered vehicles at lower speeds.

⁸⁰ It is expected that a forthcoming 2022 update of WELTAG will remove the requirement for benefit cost ratios (BCR) for many projects in favour of an integrated well-being appraisal that puts greater emphasises on well-being and the environment. Reflecting the heretofore dominant role of time savings in transport appraisal, where a BCR is required, WELTAG is expected to require the calculation of a BCR with and without the value of time monetised.

⁸¹ Daly, A., Tsang, F., & Rohr, C. (2014). The value of small-time savings for non-business travel. *Journal of Transport Economics and Policy (JTEP)*, 48(2), 205-218.

Table 6: Time Distribution of Journey Time Disbenefits

Journey Time Increase	Share of trips	Share of miles	Disbenefits (£m)	Disbenefits (%)
0-2 mins	95.3%	12.8%	- 4,672	73.6%
2-5 mins	4.4%	4.0%	- 1,469	23.1%
5 mins plus	0.3%	0.6%	- 210	3.3%
Total	100.0%	17.4%	- 6,351	100.0%

Note: Table estimates time affected per car/van trip using trip data from DfT's 2019 National Travel Survey adjusted for Wales Urban/Rural topology. The exercise is based on the assumptions embedded in the central estimate of the top-down journey time disbenefit exercise and relies on per trip estimates of vehicle miles affected that take into account trip distance and time of travel. See appendix A5 for more details.

6.4 Summary of Costs and Benefits

- Table 7 summarises all the monetised costs and benefits.
- Due to the cumulative effect of increased journey times for road vehicles, the policy could result in monetised costs that outweigh the monetised benefits with Table 7 reporting a significant negative NPV.
- Table 7 also breaks out the journey time disbenefits from the other benefits and reports an NPV excluding them. As advised by the Welsh Government, doing as such is expected to be consistent with a forthcoming update to WELTAG guidance that will focus on aligning transport policy appraisal with the priorities and targets set out in the Wales Transport Strategy. When journey time disbenefits are excluded the policy reports a significant positive NPV.
- It is important to note that a number of further potential benefit areas have not been quantified at the present stage.
- While these unquantified benefits could be large, they would be unlikely to fully offset the journey time dis-benefits in the central estimate, where journey time disbenefits are included. For example, consider a tripling of the central estimates of the non-journey time benefits to account for unquantified benefits that would bring total economic benefit to £5.7bn; this would not be enough to overcome the central estimate (including journey time benefits) of the journey time disbenefits (-£6.4bn). If the journey time disbenefits were more towards the lower end of the estimated range it is possible that unquantified benefits could close the NPV loss gap. These benefits would likely add to the already significant positive NPV (central estimate excluding journey time disbenefits)
- The majority of the direct costs of the policy are capital costs related to implementation of new signage. These costs fall almost entirely on the Welsh Government.
- The direct costs of implementing the policy are outweighed by potential cost savings (financial cash benefits) arising from the policy because of reduced police, ambulance and medical costs associated with increased road safety. This means that the central expectation is for this policy to make a positive contribution to the public purse.
- The largest economic benefits pertain to the reduction in fatalities or serious injuries from road traffic incidents. The policy could also deliver significant health and environmental benefits through encouraging a mode shift away from vehicles towards cycling and walking.

Table 7: Summary of Monetised Costs and Benefits

Summary (£m)	Welsh Government	Local Authorities	Business	General Public	Total
Direct Cost					
Capital	£0.0	£29.1	£0.0	£0.0	£29.1
Transitional	£32.5	-£29.1	£0.0	£0.0	£3.5
Recurring	£0.0	£0.0	£0.0	£0.0	£0.0
Total	£32.5	£0.0	£0.0	£0.0	£32.5
Wider Economic Benefits					
Financial	£57.5	£0.0	£0.0	£40.6	£98.1
Economic: Journey Time	£0.0	£0.0	-£1,625	-£4,726	-£6,351
Economic: Other	£0.0	£0.0	£0.0	£1,802	£1,802
Total	£57.5	£0.0	-£1,625	-£2,908	-£4,450
Total excl. Journey Time	£57.5	£0.0	£0.0	£1,843	£1,900
Net Present Value	£24.9	£0.0	-£1,625	-£2,883	-£4,483
<i>BCR</i>					<i>0.30</i>
Net Present Value excl. Journey Time	£24.9	£0.0	£0.0	£1,843	£1,868
<i>BCR excl. Journey Time</i>					<i>58.4</i>

Note: The values shown are approximate and intended to provide only indicative forecasts. Values are discounted present values over a 30-year appraisal period from 2022 presented at 2022 prices. Capital costs refer to one-off expenditure on an asset such as land, buildings, machinery/equipment and the development of an IT system or software, where that asset is expected to be utilised in more than one year. Transitional costs are one-off costs which relate to the implementation of the policy. Recurring costs are those which are incurred on a frequent (typically annual) basis. Financial economic benefits are those benefits that are expected to result in a direct financial outlay, other benefits are implicit benefits such as value of time or value of emissions.

6.5 Risks and uncertainties

- There are a number of areas of uncertainty associated with the analysis presented in this RIA and the related assumptions informing the economic assessment outlined in the preceding sections. These include the following:
 - A national 20mph policy across the whole of Wales represents a far more significant policy change than most 20mph policies implemented in recent decades, which have been focused on small urban zones. Therefore there is uncertainty around the extent to which data / experiences from these areas can be extrapolated to national level. For example, extrapolating the active travel experiences of Bristol or Edinburgh.
 - There is uncertainty about how successful the policy will be in actually reducing speeds. The uncertainty embedded in the ranges discussed in section 6.2 relate to parameter uncertainty, and not uncertainty surrounding the efficacy of the policy. If enforcement and communications are unsuccessful in creating the necessary behavioural change then the economic benefits from the policy will be significantly reduced; for example, if free flow speeds were to reduce by only 2.5mph (1.3mph reduction in average speed) instead of the assumed 5mph (31mph to 26mph), less

than half the level of economic benefit from improved road safety would be realized. However, in the context of the analysis above this is more than offset by the reduction in the dis-benefit from reduced journey times, and the overall net economic impact for the policy actually improves. Table 8 illustrates this trade-off.

- The journey time increase in the cost benefit analysis lacks adequate data concerning the share of vehicle miles actually affected by the policy. As such a relatively crude approach to deriving these values has been applied (see Appendix A5) which could benefit from validation from a more bespoke modelling exercise. For example, more bespoke modelling was applied by TfW to four selected routes for the Taskforce report. These indicated journey time increases ranged from 0.3% to 6.7%; in contrast, a decrease in average speed from 22.2mph to 19.5mph would indicate a 9% increase in journey time on average on affected roads. CitySwift found a 5%, 8% and 12% increase in journey times on the bus routes they analysed that would be affected by the policy.
- Given the current scope of analysis there is a risk of upward bias. It is possible that the reduction in default speed limits could result in improvements in road safety with a much smaller impact on journey time. This could occur if the policy was successful in reducing vehicle speeds in situations most likely to result in road casualties but otherwise had only a small effect on average speed. For example, this could occur if a larger than assumed share of vehicle miles driven were unaffected by the policy, either due to pre-existing congestion, improved traffic flow or wider / more targeted use of the exceptions process. Holding the £1.4bn in road safety benefits in the central estimate constant, an increase in journey times on affected roads limited to 3% (-0.7mph average speed difference) would be required to achieve a net present value of £0.00 or benefit cost ratio of 1.0.
- Another important caveat to this estimate is the nature of the journey time impact, as individual journeys will on average only be affected by one minute and most journeys affected by less than 2 minutes. When time savings are likely to be small there is greater uncertainty about the opportunity cost of that time. The valuation of small time savings has long been an area of debate. A discussion of this is included in a review of the value of time by ITS Leeds in 2010⁸² for DfT, including studies that found the value of small time saving to be smaller or even zero for less than 5 minutes. Nevertheless UK and international practice calls for the use a constant value of time when appraising journey time savings. Reviews⁸³ including the ITS 2010 review have tended to find insufficiently robust empirical evidence to formally adjust values for small time savings and recommend the application of one constant value.
- While a continued improvement in road safety is embedded in the baseline of this analysis uncertainty over future technological improvements in road safety make forecasting the effect on road incidents of a reduction in speed inherently uncertain. For example, technological improvements and the adoption of autonomous vehicles could reduce the relative frequency and severity of crashes at higher speeds relative to lower speeds, and this is not reflected in this analysis. Optimistic predictions of the deployment of autonomous vehicles have so far not come to fruition, however, the appraisal period for this analysis has been limited to 30 years

⁸² See page 76 of:

https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/251995/updating-vtts-phase-1-dft-006.pdf

⁸³ See: https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/470231/vtts-phase-2-report-issue-august-2015.pdf, Batley, R., Bates, J., Bliemer, M. *et al.* New appraisal values of travel time saving and reliability in Great Britain. *Transportation* 46, 583–621 (2019). <https://doi.org/10.1007/s11116-017-9798-7>

(to 2052), reflecting the fact that beyond this timeframe, uncertainty in relation to the above parameters limits the usefulness of any analysis further into the future.

Table 8: NPV & BCR Sensitivity to Average Speed Change

	Average Speed Difference (mph)	Journey time change (%)	Journey time change (min per person per day)	NPV	BCR
Central estimate	-2.7	9%	1.1	-£4,484	0.30
Half Central Estimate	-1.3	4%	0.6	-£1,991	0.38
30mph to 20mph	-5.8	24%	3.0	-£13,937	0.18
0.5 mph avg. Diff	-0.5	2%	0.2	-£527	0.61

Note: Table shows sensitivity of the benefit cost ratio to different changes in average speed. Lower differences in average speed reduce journey time dis-benefits and the benefits of improved road safety. Journey time change (%) relates to the difference in annual journey times spent on roads affected by the policy. The central estimate pertains to free flow speeds of 31mph and 26mph respectively and an average speed of 22mph pre policy implementation. The half central estimate pertains to free flow speeds of 31mph and 28.5mph. The 30mph to 20mph scenario to free flowspeeds of 30mph and 20mph, and the 0.5mph pertains to free flow speeds of 31mph and 30mph. NPV stand for net present value. BCR stands for benefit cost ratio.

7.0 Post implementation review

- Following the recommendations of the Welsh 20mph Task Force, TfW and the Welsh Government have worked with a number of local authorities to implement 20mph speed limits in eight⁸⁴ settlements (Phase 1 of the 20mph programme) during 2021/22 ahead of the proposed national roll-out in mid-2023.
- Data is being collected from these first phase settlements, and this will continue post national roll-out. Monitoring from additional areas will then be added to these datasets to provide wider geographic coverage, as detailed in TfW’s Monitoring and Evaluation Plan⁸⁵.
- Monitoring will focus on measurable key performance indicators:
 - Reduction in vehicle speeds (assessed using speed monitoring devices).
 - Reduction in the number of personal injury casualties on the road network, including pedestrians and cyclists (recorded in national databases).
 - Increased cycling and walking (recorded using camera surveys).
 - Increased footfall in retail and hospitality areas (recorded using camera surveys).
 - Improved attitudes concerning road safety and pedestrian/vehicle interaction (focus groups and national surveys).
 - Air quality and emissions changes (assessed using installed roadside monitoring devices).

⁸⁴ Abergavenny, Monmouthshire; Buckley; Flintshire, Cardiff (North), Cardiff; Cilfrew, Neath Port Talbot; Llanelli (North), Carmarthenshire; Severnside (Caerwent, Caldicot, Magor, Undy), Monmouthshire; St Brides Major, Vale of Glamorgan; St Dogmaels, Pembrokeshire.

⁸⁵ “National Default 20mph – Monitoring and Evaluation Plan (Draft)”, Transport for Wales, 17 February 2022

- There are five proposed stages of evaluation:
 - Phase 1 Baseline: Data collection completed in the Phase 1 settlements during 2021/22, prior to the introduction of the 20mph speed limit.
 - Phase 1 Monitoring: Data collection post implementation in the Phase 1 settlements (2021/22 and 2022/23) but before national 20mph speed limit implementation.
 - National Baseline: Data collection in Phase 1 control areas and in additional areas across Wales before national 20mph speed limit implementation.
 - National monitoring: Data collection from July 2023 onwards.
 - Outcome evaluation: The comparison of the outturns against the baseline locations.
- Transport for Wales will be responsible for reporting against the key indicators set out in this Monitoring and Evaluation Plan. Data will be analysed and uploaded to a dashboard on a quarterly basis.
- An interim report on the impacts of Phase 1 will be prepared based on data collected up until six months after national 20mph implementation, with publication three months later.
- While the data dashboard will continue to be updated on a quarterly basis, formal reporting will then take place annually.

8.0 Conclusion

- This Regulatory Impact Assessment has been undertaken to assess proposed legislation to change the default speed limit on restricted roads in Wales from 30mph to 20mph.
- The legislation is in line with existing Welsh Government policy including the objectives and ambitions in Llwybr Newydd- The Wales Transport Strategy.
- The evidence indicates the policy and 20mph policies in general have public support and there are number of precedents of successful implementation of 20mph policies in other jurisdictions.
- The objective of the legislation is to improve road safety, encourage a shift to more active forms of travel and improve the local economy and environment in Welsh communities.
- This policy follows on from the recommendations of the 20mph Taskforce assembled in 2019 on the direction of Lee Waters, then Deputy Minister for Economy and Transport. As such this RIA has not considered alternate options to the policy, which in any event would be difficult to define given the flexibility of the policy afforded by the exceptions process.
- The consultation process and competition filter indicate this policy is not likely to have a detrimental effect on competition.
- The policy is not judged to have a significant impact on the justice system. The numbers of speeding offences resulting in a court appearance is not expected to grow significantly, and the planned national marketing campaign to accompany the policy's roll-out will encourage adherence to the policy.
- A preliminary analysis of the economic benefits and costs of this policy has been undertaken, based on a 30-year appraisal period post policy implementation (2023 – 2052). Initial results indicate the following (all values expressed in 2022 prices and discounted terms):

- The direct financial cost of the policy is estimated to be around £33 million of which £29 million pertains to capital costs during the period 2022-2023 associated with the policy's implementation.
- Improved road safety resulting from a reduction in average speeds could result in a positive financial return to government from the policy over 30 years of around £25 million, due to cost savings associated with reduced emergency services and hospital treatment, with savings of ca. £58 million.
- The policy could also create substantial wider economic benefits due to improved road safety (£1.4bn), environmental and health benefits from more active travel (£0.5bn) and further heretofore unquantified benefits from more vibrant and connected local economies.
- However, set against this is the potential for dis-benefits to businesses and households from increased journey times. Based on the current assessment, when included, the value of such dis-benefits (£6.4bn) could outweigh the other positive economic benefits, though the range around those journey time disbenefits is wide (£2.8bn-£8.9bn) and around three quarters of those disbenefits are likely to be attributable to trips with journey time impacts of less than 2 minutes.
- Overall an indicative central estimate of the monetised net present value of the policy is calculated to be a negative £4.54bn.
- Excluding the journey time disbenefits the net present value of the policy is a positive £1.9bn.
- In real terms the central estimate (including journey time benefits) of the policy trades off a journey time cost of 1 min per journey against an average annual reduction of 9 fatalities, 98 serious injuries and 219 slight injuries, and an average annual increase in cycling and walking trips of around 11 million.
- It is important to note that there are a number of wider benefits such as reduced noise pollution, broader impacts health impacts from active travel, increased social interactions, retail spending and land values that are not included in this calculation. Moreover the increases in individuals' travel time are likely to be small and so there is uncertainty about the opportunity cost of that time.
- The exceptions process creates scope to further reduce the impact on journey times while maintaining safety benefits.
- Once the 20mph policy has been fully implemented, it is expected that a wider range of data will become available through monitoring activities (see section 7). This may enable analysis of the policy's broader impacts to be undertaken, which could improve the overall assessment of economic benefits delivered by the policy.
- If the "Business as Usual" position was maintained (as outlined in Section 3.1 above), the number of road collisions on restricted roads would be unlikely to reduce over a timeframe consistent with Welsh Government policy. In addition, because road safety is one of the top issues⁸⁶ preventing people from cycling, active travel targets pledged in line with the National Plan 2040 would also be at risk.

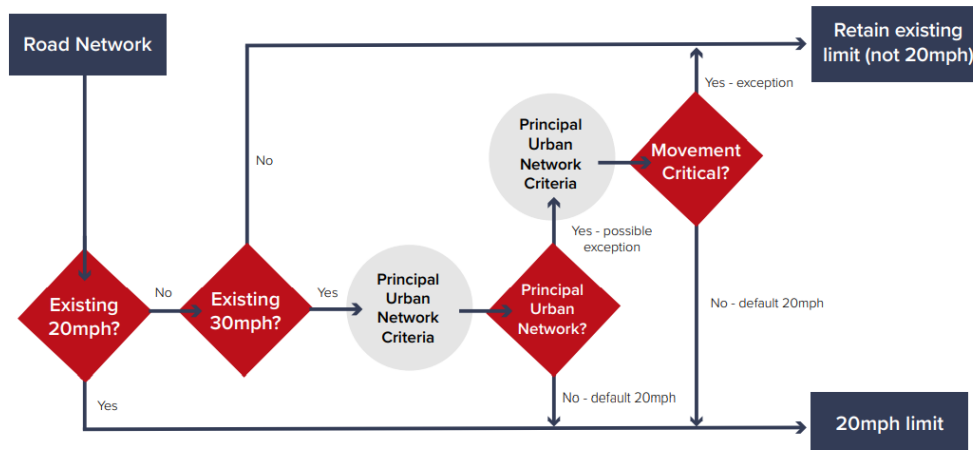
⁸⁶ National Travel Survey <https://www.gov.uk/government/statistics/national-travel-attitudes-study-wave-5/national-travel-attitudes-study-wave-5>

Appendices

A1: Exceptions Process

The process by which exceptions should be identified by highways authorities is outlined in figure A1.

Figure A.1: Exception process.



Source: Task Force Group Final Report

The starting point of the exceptions process will be the road network across a local authority area. Local authorities will have the opportunity to undertake effective consultation with local members of the general public and key stakeholders and will be able to identify sections of highway that potentially are exceptions to the 20mph default limit for restricted roads.

As shown in the process map depicted above, at the first decision point all existing 20mph limits and zones are identified, including any that are part-time. These should normally be retained as 20mph limits without the need for further review. As a minimum it will only be necessary for local highway authorities to consider roads that are currently subject to 30mph limit. It is assumed that existing speed limits of above 30mph will remain unchanged, although it may be necessary to introduce short lengths of higher speed limits where high speed roads lead directly into 20mph limit areas. Exceptions are more likely to be found in rural areas of Wales.

A two-stage sieving process is then proposed:

- A set of criteria will be developed to identify the 'Principal Urban Network' (PUN), as a subset of the 30mph roads in a local authority area, on the basis that the 20mph limit should normally be applied to all other roads.
- The PUN in an area will then be assessed in greater detail to determine which sections, if any, should be made exceptions from the default 20mph limit.

The criteria for defining the PUN may include routes that meet one or more of the following criteria:

- Trunk Roads
- Primary Route Network
- A and B Classified Roads

- Abnormal Load Routes
- Motorway Diversion Routes
- Dual Carriageways
- Important Bus/Coach Routes

The PUN in an area will then be assessed in greater detail. The proposed approach to determine which sections, if any, should be made exceptions from the default 20mph limit will consider both 'Movement' and 'Place' factors for each section of the network, including the following:

- Frontage Land Use (e.g. residential, retail, education, civic, community)
- Local Community (e.g. population, deprivation)
- Road Safety and Public Health (e.g. recorded casualties, noise, air quality)
- Sustainable travel (e.g. Active Travel Route, walk/cycle flows, bus services)
- Motor traffic (speed limit, speed, volume, composition)
- Road layout (geometry, cycling provision, crossings)

A2: Competition filter

Table A2: The competition filter test			
Question/Industry	Local Bus Markets	Freight/Logistics	Taxi
Q1: In the market(s) affected by the new regulation, does any firm have more than 10% market share?	Yes	Yes	Yes
Q2: In the market(s) affected by the new regulation, does any firm have more than 20% market share?	Yes	Yes	No
Q3: In the market(s) affected by the new regulation, do the largest three firms together have at least 50% market share?	Yes	No	No
Q4: Would the costs of the regulation affect some firms substantially more than others?	No	No	No
Q5: Is the regulation likely to affect the market structure, changing the number or size of firms?	No	No	No
Q6: Would the regulation lead to higher set-up costs for new or potential suppliers that existing suppliers do not have to meet?	No	No	No
Q7: Would the regulation lead to higher ongoing costs for new or potential suppliers that existing suppliers do not have to meet?	No	No	No
Q8: Is the sector characterised by rapid technological change?	No	Yes	Yes
Q9: Would the regulation restrict the ability of suppliers to choose the price, quality, range or location of their products?	No	No	No

Where fewer than half the questions have the answer “Yes”, this suggests the proposed policy is unlikely to have a significant detrimental effect on competition. This is the case with the proposed 20mph policy.

As new information comes to light, this result should be checked and re-confirmed by re-applying the filter test.

A3: Justice Impact Assessment

A legislative proposal may impact on the justice system if they involve one of more of the following items listed in Table A3 below.

Based on the initial assessment of justice impacts of the proposed 20mph policy summarised in the table below, it is concluded that the policy's likely impact on the justice system will be slight in regard to only one of the items listed, and therefore a full Justice Impact Assessment will not be necessary for the policy.

Table A3: Justice Impact

Item	Relevant	Likely Impact
1) Creating or amending a criminal offence	No	
2) Creating or amending a new civil sanction or fixed penalty	No	
3) Creating a civil order or injunction, breach of which may lead to further proceedings or criminal sanctions	No	
4) New, or amendments to, sentencing/penalty guideline	No	
5) New, or amendments to, court or tribunal procedure rules	No	
6) Result in, create or increase applications to the courts or tribunals, including judicial review	Yes	Slight
7) Establish a new tribunal jurisdiction	No	
8) Require an appeals mechanism	No	
9) Require enforcement mechanisms for civil debts, civil sanctions or criminal penalties	No	
10) Result in an increase in the number of adult offenders being committed to custody or probation	No	
11) Result in an increase in the number of children and young people entering the criminal justice system, or the numbers of children and young people in custody	No	
12) Result in an increase in the length of custodial sentences	No	

A4: Direct Costs

Transport for Wales (TfW) has estimated the direct costs related to the proposed 20mph policy, which are summarised in the table below.

Table A.4 (Source: Transport for Wales & Arup calculations)

Item	Estimated amount (excl. Bias)	Notes	Optimism Bias Adjustment	Estimated amount (incl. bias)
Communications	£1.5m	£1m is for Welsh Government Campaign and Rollout and £0.5m is for Local Authority Rollout. Estimates in line with recommendations from the 20mph Taskforce and pricing guidance from Golley Slater group limited.	10%	£1.6m
Gateway signs	£4.5m	Initial estimates for the number of new 20mph signs that will be required at gateway locations for each local authority are based on the number of roads that enter settlements (or built-up areas) from surrounding non-built up areas. This method allows for both settlement size, with larger settlements generally having more roads entering them, and the number of settlements to be taken into account. Information on roads has been taken from the OS MasterMap Highways data layer. Information on built-up areas has been taken from the ONS built-up areas data layer, which includes cities, towns and villages where development occupies at least 20 hectares (approx 500m x 500m of development). Where roads intersect built-up areas then it is assumed that 20mph signage will be required. New signs are assumed to cost £62 and new posts £235. An allowance of 50 percent of capital costs has been made for overheads related to the installation such as site preparation.	22%	£5.5m
Road markings	£18.5m	30mph road markings at gateway are assumed to exist and need replacing at 4,700 locations. The cost of removal and replacement of these road markings has been informed by Welsh Government highway engineers and is assumed to be £2,800 per location. A further 40 percent overhead has been assumed for administrative costs and preparation of the sites.	22%	£22.6m
Existing 20mph signs and school signs	£0.9m	Existing 20mph zones and school zones will have signage removed or replaced. This is estimated to be 5,000 signs at a	22%	£1.1m

Item	Estimated amount (excl. Bias)	Notes	Optimism Bias Adjustment	Estimated amount (incl. bias)
		cost of £120 per sign with a further 40 percent overhead assumed.		
Exceptions	£0.9m	The TfW exceptions map indicates the need to issue 330 TROs at an assumed cost of £2500 per TRO. Exceptions zones will also need 2,310 repeater signs installed at an assumed cost of £25 per sign and an assumed overhead of 50 percent.	22%	£1.1m
Monitoring	£0.4m	TfW has estimated procurement costs for monitoring of air quality and pedestrian camera surveys. This includes artificial intelligence camera surveys, undertaken by a specialist survey company and the installation and maintenance of air quality sensors. A 25% overhead for Welsh Government staff costs related to analysis and report writing is included in this estimate.	10%	£0.4m
Government staff costs	£0.4m	Staff costs associated with managing and implementing the policy. Based on budget for fiscal year 2022-23 with allowance for 25% of fiscal year 2022-23 costs for fiscal year 2023-24 and 5% for 2024-25. Does not include government staff time for monitoring.	0%	£0.4m
Total	£27.1m			£32.4

A5: Economic Benefits

Road Safety

To estimate the benefits from improved road safety a forecast of future incidents is conducted out to 2052 for slight, serious, and fatal injuries as defined by in Stats 19. The baseline forecast incorporates the following assumptions:

1. That the frequency of slight injuries continues to decay in line with factors from TAG COBALT⁸⁷, which reduces the frequency of incidents by around 2 percent per year until 2038, thereafter no further improvement is assumed
2. That the frequency of fatal and serious incidents remains unchanged in the baseline (Business as Usual), reflecting the general lack of progress in serious incident reduction in Wales in the previous decade.
3. That the number of incidents grows in line with the number of car trips.
4. The starting point of the forecast for slight incidents is the number of incidents on 30mph roads in Wales in 2019.
5. The starting point for serious and fatal incidents is the average annual number of these incidents between 2015 and 2019 on 30mph roads in Wales.

The impact of reduced speeds is estimated using a power law. Specifically, the power law estimates from Elvik (2013)⁸⁸ for urban/residential roads (see Table A5-1). This estimates the reduction in incidents using the following formula:

$$\text{counterfactual incidents} = \text{baseline incidents} * \left(\frac{\text{newspeed}}{\text{old speed}} \right)^\alpha \quad (\text{eq A5.1.1})$$

Where α is a selected exponent from Table A5-1 below. For serious and fatal incidents, the new speed is assumed to be 26mph and old speed is assumed to be 31mph based on observed free flows speeds under different speed limits in Great Britain⁸⁹. For slight injuries we use the difference in average speed which is assumed to be just 3mph (22mph to 19mph), this reflects the fact a number of slight injuries are likely to occur around junctions and in more congested traffic where the reduction in free flow speed is less salient. This approach his consistent with the approach of Ito et al (2014)⁹⁰.

Table A5-1: The Power Law (Source: Elvik, 2013)

Type	α
Fatal	2.6 (0.3,4.9)
Serious	1.5 (0.9,2.1)
Slight	1 (0.6,1.4)

Note: 95% confidnece interval shown in brackets.Values taken from Table 1 of Elvik (2013) for urban/residential roads

⁸⁷ Cost and Benefit Analysis Light Touch (COBALT) is the Department for Transport's ('DfT') software tool for forecasting road accident impacts. See: <https://www.tagsoftware.co.uk/COBALT>

⁸⁸ Elvik, R. (2013). A re-parameterisation of the Power Model of the relationship between the speed of traffic and the number of accidents and accident victims. Accident Analysis & Prevention, 50, 854-860.

⁸⁹ See: <https://www.gov.uk/government/collections/speeds-statistics>

⁹⁰ James, P., Ito, K., Banay, R. F., Buonocore, J. J., Wood, B., & Arcaya, M. C. (2014). A Health Impact Assessment of a proposed bill to decrease speed limits on local roads in Massachusetts (USA). International journal of environmental research and public health, 11(10), 10269-10291.

Applying this approach yields the casualty reductions on 30mph roads outlined in Table A5-2 below. These reductions are then monetised using values shown in Table A5-3. The value of improved road safety takes into account direct costs associated with incidents such as medical and police costs. It also considers people’s willingness to pay to avoid injury and death and the value of lost economic output from casualty sufferers.

Table A5-2: Casualty reductions on 30mph roads

Injury type	Average casualties	Average reduction per year (2023-2052)		
	2015-2019	Central	Low	High
Fatal	28	9	1	15
Serious	453	98	62	130
Slight	2,844	219	198	299

Note: Table shows average annual casualties by injury type on Welsh 30mph roads and a forecast for average annual reductions in those injuries over the period 2023-2052. The range of estimates is generated using the 95% confidence intervals for the power coefficients α .

Table A5-3: Values of casualty prevention (source TAG⁹¹)

Average value of prevention per casualty by severity and element of cost £ (2010 prices and 2010 values)				
Casualty type	Net Output	Willingness to pay*	Medical & ambulance	Total
Fatal	107,798	1,544,006	925	1,652,729
Serious	20,765	151,148	12,579	184,492
Slight	2,195	11,064	931	14,191
Average, all casualties	6,551	52,349	2,905	61,804

Journey Time

The journey time impact within this RIA calculates the extra time taken to travel by motor vehicle on roads affected by the policy. It is assumed that average speeds on the affected roads fall from 22.2 miles per hour to 19.5 miles per hour which is consistent with a reduction in free flow speed from 31mph to 26mph and accounting for an average delay of 46 seconds per mile (see equation A5.1.2).

$$average\ speed = \frac{60}{\frac{60}{free\ flow\ speed} + \frac{delay}{60}} \quad (eq\ A5.1.2)$$

The difference in speeds is then applied to distances driven on affected roads to derive an increase in time spent driving these distances. This is then monetised using TAG parameters for values of time⁹² while accounting for occupancy per vehicle⁹³ and proportions of travel time for

⁹¹ See: <https://www.gov.uk/guidance/transport-analysis-guidance-tag>

⁹² See TAG Table A 1.3.1.

⁹³ See TAG Table A 1.3.3

work, commuting and other purposes by vehicle type⁹⁴. See equation A5.1.3 where v pertains to vehicle type and p to purpose:

$$\text{journey time cost}_{v,p} = vBkm_{v,p} * \left(\frac{1}{\text{new speed}(kmPh)} - \frac{1}{\text{old speed}(kmPh)} \right) * \text{occupancy}_{v,p} * \text{value of time}_{v,p} \text{ (eq A5.1.3)}$$

Table A5-4: TAG parameters for Value of Time⁹⁵ (2010 prices)

Mode	Factor Cost	Perceived Cost	Market Price	Occupancy	Work	Commute	Other
Car	14.86	14.86	17.69	1.16	8.6%	17.7%	73.7%
Light Van	10.52	10.52	12.52	1	88.0%	12.0%	0.0%
Goods vehicles	12.13	12.13	14.43	1	100.0%		
Buses and Coaches	8.42	8.42	10.02	13.2	1.5%	13.5%	85.0%
Motorcycles	14.86	14.86	17.69	1	8.6%	17.7%	73.7%
Commuting	8.36	9.95	9.95	1.15			
Other	3.82	4.54	4.54	1.91			

Note: Data shows billions of vehicle kilometres

The distances driven on different Welsh roads by vehicle type in 2019 is displayed in Table A5-5 below, including an estimate for the share of distance travelled affected by the policy. The share of the distances affected is assumed to be in line with the road lengths affected by speed limit, as outlined earlier in this document (see Table 1, section 3.2 of this document) but adjusted for the relative frequency of use of different road types as indicated by the South East Wales Transport Model (See Table A5-6).

Motorways and rural A-roads are assumed to be unaffected. Urban A-roads, urban Trunk roads and urban minor roads are affected in proportion to the ratio of the share of roads changing speed limit under the policy (12,535km) and total amount of roads with a speed limit between 20mph and 40mph (14,780km). Rural minor roads are affected in proportion to ratio of the relative share of roads changing speed limit under the policy (12,535km) and total amount of roads with a speed limit between 20mph and 60mph (34,438km). Minor roads affected by the policy are assumed to be driven on with a relative frequency of that of minor and local roads relative to B roads (see Table A5-6), capturing the fact that restricted roads are likely to be used less intensively than other roads. We further assume urban roads are unaffected by the policy during peak times as in those times queuing and road intersections are the likely proximate determinant of trip lengths not speed in between them. In the low estimate we further assume that urban vehicle miles are unaffected during the inter-peak period. For the high estimate we conservatively assume affected roads are driven on with the same frequency as unaffected roads. Overall, around 17.5 percent of vehicle miles driven are affected by the policy in the central estimate (See Table A5-5), which compares to 36% of roads affected by distance in terms of road infrastructure (See Table 1).

Distances driven are assumed to grow in line with car trips growth forecasts. Overall, the extra time spent on driving these distances increases by 22 million hours in 2023 which translates into a 9 percent increase in overall journey times on these roads or 67 seconds per person per day in Wales.

⁹⁴ See TAG Table A 1.3.4

⁹⁵ See Tag Table A

Table A5-5: Distance traveled by road and vehicle type

Welsh 2019 traffic (bVkm)	Motorway	A-urban	A rural	Trunk urban	Trunk rural	Minor	Total	Total affected
All	3.84	2.66	5.51	0.80	6.79	12.51	32.11	5.61
Cars and Taxis	2.93	2.22	4.40	0.65	5.20	9.65	25.05	4.44
Light vans	0.57	0.34	0.85	0.12	1.11	2.43	5.42	0.97
Goods vehicles	0.31	0.05	0.18	0.03	0.40	0.18	1.16	0.10
Buses and Coaches	0.01	0.03	0.04	0.00	0.03	0.10	0.21	0.05
Motorcycles	0.01	0.01	0.04	0.00	0.05	0.15	0.27	0.05
Pedal cycles	0.00	0.01	0.02	0.00	0.00	0.16	0.19	0.05
Share of miles driven affected (central)	0.0%	56.0%	0.0%	56.0%	0.0%	29.4%	17.5%	
low	0.0%	26.9%	0.0%	26.9%	0.0%	18.4%	10.1%	
high	0.0%	56.0%	0.0%	56.0%	0.0%	34.7%	19.6%	

Source: Stats Wales

Note: Data shows billions of vehicle kilometres. Note approximately 50% of vehicle miles driven on minor roads are in built up urban areas.

Table A5-6: Road use distribution

Road type	Relative frequency	Time period	Share of trips
Motorway	5.16	Night (00:00-04:00)	0.06
A Road	1.32	AM Peak (07:00-09:00)	0.16
B Road	0.58	Inter-peak (10:00-16:00)	0.28
Local & Minor	0.33	PM Peak (16:00-19:00)	0.18
Total	1.00	Evening (19:00-23:00)	0.08
		Weekend (07:00-19:00)	0.24

Source: Transport for Wales

Note: LHS of table shows the relative mile travelled per mile of road, by road type. RHS shows the relative share of trips by period.

Journey Time Impact Distribution

The distribution of journey times impacts is calculated based on an extrapolation of DfT's 2019 National Travel Survey. This survey which is based on English data is adjusted to be more representative of Wales by recalibrating the urban/rural weighting to reflect the distribution in Wales and removing trips from London. Table A5-7 displays the distribution of trips by distance and estimate of the miles affected which assumes that the longer the trip, the more miles travelled on the strategic road network where the policy will have no effect. This is calibrated based on data from England's strategic road network⁹⁶. It is also assumed trips during peak periods are unaffected in line with the top-down scenario. The exercise is calibrated to achieve the same share of miles affected by the policy as the top-down analysis. The distributional analysis is indicative

⁹⁶ https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/448276/strategic-road-network-statistics.pdf

and designed to give a feel for the likelihood of a significant share of trips being significantly affected by the policy. As the time penalty for a slow down in average speed from 22.2 to 19.5 mph is only 22 seconds per mile very few trips are long enough to be significantly affected by the policy.

Table A5-7: Road use distribution

Trip Distance	Share of Trips	Avg. Share of Trip Miles Affected
Under 1 mile	7.3%	24.8%
1 to under 2 miles	19.0%	24.8%
2 to under 3 miles	15.0%	23.8%
3 to under 5 miles	18.5%	23.8%
5 to under 10 miles	19.1%	22.1%
10 to under 15 miles	8.2%	18.8%
15 to under 25 miles	6.6%	18.8%
25 to under 35 miles	2.3%	18.8%
35 to under 50 miles	1.6%	14.5%
50 to under 75 miles	1.0%	14.5%
75 to under 100 miles	0.5%	10.2%
100 to under 150 miles	0.5%	10.2%
150 to under 200 miles	0.2%	7.2%
200 miles +	0.1%	7.2%
Total	100.0%	17.5%

Source: DfT National Travel Survey, National Highways and Author Calculations

Cycling and Walking

The calculation of cycling and walking benefits is summarised as follows:

- 1) Establish a forecast of cycling and walking with the 20mph policy by year out to 2052.
- 2) Lower cycling and walking trips by 10 percent (range of 5-15 percent), replacing those trips with trips using other modes or no trip.
- 3) Take the difference in cycling and walking trips and pass to DfT active mode appraisal toolkit which monetises the difference in trips.

Future increases in cycling and walking are assumed to be in part contingent on improved road safety due to the 20mph policy. The Welsh Government is investing in active travel and is targeting 45 percent of all trips to occur by public transport, cycling or walking by 2040.⁹⁷

The analysis presented in this RIA leverages modelling prepared for the Welsh Government by Transport for Quality of Life (TQL)⁹⁸ to establish a baseline forecast for cycling and walking in Wales. This modelling forecasts modal shares in response to investment in active travel and public transport in Wales. The RIA uses the TQL bottom-up analysis that calls for £2.5 billion in investments in active travel. The Welsh Government is currently planning to spend £220 million in outlays on active travel by 2024-25 including £100 million in 2024-25. Therefore, it is assumed that

⁹⁷ The Wales Transport Strategy 2021. Available at: https://gov.wales/sites/default/files/publications/2021-03/llwybr-newydd-wales-transport-strategy-2021-full-strategy_0.pdf

⁹⁸ See: <https://www.transportforqualityoflife.com/u/files/210115%20Modal%20share%20targets%20for%20Wales%20FINAL.pdf>

only half of the necessary investments in active travel are made and only half the direct⁹⁹ mode shift in the modelled TQL scenario is achievable.

The above scenario gives us an increasing trend in cycling and walking as a baseline. To estimate the impact of the 20mph policy we lower the effectiveness of the investments in active travel by 5 to 15 percent with 10 percent as our central estimate. This results in 5 to 15 percent less directly generated cycling and walking trips.

The above is conservatively calibrated based on the experience of other areas that have adopted 20mph limits. For example, the share of those cycling to work in Bristol increased¹⁰⁰ from 11% to 15% following 20mph implementation (circa 35% increase) and the number people who walked to work increased from 17.5% to 18.9% (circa 8% increase). Following 20mph implementations in Edinburgh there was a 7% increase in journeys by foot and 5% increase in cycling¹⁰¹. In consulting on this policy one in three Welsh adults said that 20 mph speed limits would make them more likely to walk more, while around one in five (22%) said that they would be more likely to cycle more¹⁰². Finally in a study of multiple cities in Europe, Mertens (2017)¹⁰³ find that 20mph limits increase the likelihood of cycling by a factor of 7 holding other neighbourhood and demographic characteristics constant.

The mode shares of cycling and walking under the 20mph policy and varying contingencies are displayed in Table A5-8. Overall numbers of trips grow in line with population growth of circa 0.2% a year on average to 2052.

Table A5-8: Cycling and Walking Mode Share

Mode Share		2022	2030	2040	2050
20mph	Cycling	1.9%	3.7%	5.5%	5.4%
	Walking	25.6%	25.8%	25.9%	25.4%
Baseline (10%)	Cycling	1.9%	3.5%	5.1%	5.0%
	Walking	25.5%	25.8%	25.8%	25.3%
Baseline (5%)	Cycling	1.9%	3.6%	5.2%	5.2%
	Walking	25.5%	25.6%	25.4%	25.4%
Baseline (15%)	Cycling	1.9%	3.4%	4.8%	4.8%
	Walking	25.5%	25.5%	25.2%	25.2%
Memo: TQL	Cycling	1.9%	5.5%	25.6%	NA
	Walking	25.6%	25.9%	8.9%	NA

Note: The 20mph scenario uses 50% of the direct mode shift embedded in the TQL scenario. The Baseline scenarios use 48% and 43% for the low (5%) and high (15%) scenario respectively. Mode share changes reflect direct changes in response to investment and trip diversion factors which map where the new trips come from, either existing trips from other modes or new trips. These diversion factors are taken from the TQL scenario which is displayed in the final rows.

Finally, the extra trips attributable to the 20mph policy are inputted into the DfT's active mode appraisal toolkit¹⁰⁴ which uses TAG parameters to monetise the benefits of increased active travel.

⁹⁹ The word direct refers to the direct trips generated (either new trips or existing trips from other modes) due to specific cycling or walking investments.

¹⁰⁰ See: <https://uwe-repository.worktribe.com/output/875541>

¹⁰¹ See: https://archive2021.parliament.scot/S5_Rural/Research_evidence_20mph_bill.pdf

¹⁰² See: <https://gov.wales/sites/default/files/publications/2021-07/traffic-orders-and-20mph-public-attitudes-survey.pdf>

¹⁰³ Mertens, L., Compernelle, S., Deforche, B., Mackenbach, J. D., Lakerveld, J., Brug, J., ... & Van Dyck, D. (2017). Built environmental correlates of cycling for transport across Europe. *Health & place*, 44, 35-42.

¹⁰⁴ See: https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/888754/amat-user-guidance.pdf

These benefits include decongestions benefits, air quality, reduced greenhouse gases, health, and reduced absenteeism. Around 80 percent of the benefits are due to improved health.

Emissions

Changes in exhaust emissions are modelled using TAG formulas¹⁰⁵ that map speeds to emissions by vehicle type and modelling on non-exhaust¹⁰⁶ emissions by Imperial College London. The calculations proceed as follows:

- 1) The percentage difference in NO2 and PM10 emissions by year and vehicle type is calculated when travelling at 19.5mph versus 22.2mph (see Table A5-9).
- 2) The difference in PM2 is extrapolated from PM10 emissions using TAG¹⁰⁷ factors.
- 3) The average percentage difference for each emissions type is calculated using vehicle shares which are forecasted for Wales by the National Atmospheric Emissions Inventory¹⁰⁸.
- 4) These percentage differences are applied to an estimate of the tonnage of emissions in Wales from road transport and pro-rated by the share of vehicle miles affected by the policy (See Table A5-10).
- 5) Finally, the difference in emissions is monetised using TAG values¹⁰⁹.

Table A5-9: Emissions differences

	Emissions Difference			Share of Vehicles	
	NO2	PM10	PM2	2022	2052
Petrol Car	3.6%	-7.7%	-4.9%	44.2%	33.0%
Diesel Car	5.9%	-7.3%	-4.6%	36.7%	10.7%
Petrol Van	3.6%	-7.7%	-4.9%	0.2%	0.1%
Diesel Van	2.4%	-7.2%	-4.6%	14.7%	12.4%
Bus	13.9%	-7.2%	-4.5%	1.0%	0.8%
HGV	15.6%	-7.2%	-4.5%	1.2%	0.9%
HGV Artic.	15.8%	-7.1%	-4.5%	0.4%	0.3%
Electric	0.0%	-8.0%	-8.0%	0.8%	36.6%

Note: Emission difference is for the 2025 engine mix, the projection incorporates evolving engine standards as in TAG table A 3.5. The vehicle type distribution is taken directly from the National Atmospheric Emissions Inventory forecast. PM emissions are 91% non-exhaust calculated based on TAG Table A 3.2.3. PM2 emissions are derived from PM10 emissions based on conversion factors in TAG Table A 3.2.4.

Table A5-10: Road Transport Emissions

¹⁰⁵ See TAG Table A 3.5

¹⁰⁶ Non-exhaust emissions account for more than 90 percent of particulate emissions and the impact of lower speeds has been estimated based on modelling¹⁰⁶ by Imperial College London which modelled an 8% reduction.

¹⁰⁷ See TAG Table A 3.2.4

¹⁰⁸ See: <https://naei.beis.gov.uk/data/ef-transport>

¹⁰⁹ See TAG Table A 3.2.3

	UK tonnes (2020)	Welsh share of traffic	Affected roads by distance	Welsh 30 mph emissions base (tonnes)	
PM10	16,863	5.6%	23.3%	PM10	220
PM2	10,391			PM2	136
NOx	196,492			NO2	2565

Note: Emissions Welsh share of traffic is estimated from DfT Road Traffic Statistics. UK Emissions Statistics from DEFRA Atmospheric Emissions Reports.

A6: Extended Cost and Benefits Summary

Table A.6.1: Detailed Summary of Monetised Cost and Benefits

Item	Type	Welsh Government	Local Authorities	Business	General Public	Total	Low	High
Direct Costs (£m)								
Signage	Capital		£29.1			£29.1	£23.8	£34.3
TRO's	Transitional		£1.0			£1.0	£0.8	£1.2
Communications	Transitional	£1.1	£0.5			£1.6	£1.5	£1.8
Monitoring	Transitional	£0.4				£0.4	£0.4	£0.5
LA Grants	Transitional	£30.6	-£30.6			£0.0	£0.0	£0.0
Staff costs (Project management)	Transitional	£0.4	£0.0			£0.4	£0.4	£0.4
Wider Economic Benefits (£m)								
Road Safety: Accident Costs	Financial	£57			£41	£98	£49	£206
Road Safety: Willingness to Pay	Economic				£1,175	£1,175	£383	£2,121
Road Safety: Economic Output	Economic				£117	£117	£47	£206
Journey Time: Productivity	Economic			£1,625		£1,625	-£702	£2,273
Journey Time: Value of Time	Economic				-£4,726	£4,726	£2,043	£6,611
Cycling and Walking: Environmental	Economic				£2	£2	£1	£3
Cycling and Walking: Health	Economic				£366	£366	£137	£686
Cycling and Walking: Other	Economic				£137	£137	£52	£259
Emissions	Economic				£4	£4	£2	£8
Summary (£m)								
Direct Costs								
Capital		£0.0	£29.1	£0.0	£0.0	£29.1		
Transitional		£32.5	-£29.1	£0.0	£0.0	£3.5		
Recurring		£0.0	£0.0	£0.0	£0.0	£0.0		
Total		£32.5	£0.0	£0.0	£0.0	£32.5		
Wider Economic Benefits								
Financial		£57	£0	£0	£41	£98		
Economic		£0	£0	£1,625	-£2,923	£4,548		
Total		£57	£0	£1,625	-£2,883	£4,450		
Net Present Value								
Net Present Value excl. Journey Time								
<i>Memo: BCR</i>								
Net Present Value excl. Journey Time								
<i>BCR excl. Journey Time</i>								
		£25	£0	£1,625	-£2,883	£4,483		
		£25	£0	£0	£1,843	£1,868		
								58.4

Note: The values shown are approximate and intended to provide only indicative forecasts. Values are discounted present values over a 30-year appraisal period from 2022 presented at 2022 prices. Capital costs refer to one-off expenditure on an asset such as land, buildings, machinery/equipment and the development of an IT system or software, where that asset is expected to be utilised in more than one year. Transitional costs are one-off costs which relate to the implementation of the policy. Recurring costs are those which are incurred on a frequent (typically annual) basis. Financial economic benefits are those benefits that are expected to result in a direct financial outlay, other benefits are implicit benefits such as value of time or value of emissions. Range of estimates in generated through 95 percent confidence intervals of key parameters.