Telford & Wrekin Co-operative Council

Protect, care and invest to create a better borough

TravelTelford

Telford & Wrekin Transport Plan

Carbon Assessment

2027-2041

Draft for consultation

1. Executive Summary

1.1 Overview

This report sets out **how the Telford & Wrekin Transport Plan (TWTP) could influence transport-related carbon emissions**. It reviews the extent and limits of influence of the types of local measures included in Local Transport Plans (LTPs) and outlines how LTPs sit in the context of action that other stakeholders need to take to reduce emissions.

The report also **outlines the key drivers of transport-related emissions** and the ways in which the **proposed TWTP policies and supporting measures may impact upon the drivers**. It includes a high-level assessment of the emissions impacts of the schemes included in the first Delivery Plan (2027 to 2030) and outlines the types of change likely to be needed for future TWTP Delivery Plans to have more impact on emissions.

1.2 The role of LTPs in decarbonisation

Transport decarbonisation is widely recognised as a major challenge that requires action from national and local government, industry and the public. If transport emissions are not reduced sufficiently to close the identified emissions gap, other sectors will need to increase their already challenging decarbonisation rates to meet carbon reduction commitments and contribute to limiting climate change.

The relevance and influence of local transport measures, and therefore LTPs, varies between aspects of decarbonisation. For instance, national government and industry action is needed to drive the uptake of zero emissions vehicles (ZEVs) that is anticipated to deliver much of the required emissions reduction. LTPs can play a supporting role through charging infrastructure provision, raising awareness and encouraging uptake.

LTPs also have a supporting role for other measures to decarbonise freight and trips passing through the authority. Decarbonisation for these trip types needs to be driven by national, regional and sectoral action as travel decisions are informed by influences beyond the authority area.

In contrast, **LTPs have greatest potential to directly influence emissions from car and van trips to, from and within their authority.** Significant emissions reductions from local car and van travel will also involve action from individuals, organisations and other sectors, such as planning measures. However, **LTPs have a core role with the potential to set out the framework and measures to widen travel choices and change travel behaviour**, reducing carbon whilst also delivering other benefits, such as air quality, accessibility and congestion improvements.

LTPs also have important role in setting the framework for ensuring that the **whole lifecycle carbon (WLC) impacts of the infrastructure and equipment required for measures are considered, managed and optimised** from the outset

These potential areas of LTP influence align with the fact that the Transport Decarbonisation Plan identified an **important role for local authorities in developing place-based decarbonisation measures**. Aligned with this, the DfT's LTP Guidance requires local authorities to use the Quantifiable Carbon Guidance (QCG) to assess and understand the impact of proposed LTP measures and report on WLC impacts in the LTP outcome framework. This report responds to that requirement for the TWTP.

1.3 Potential impact of the TWTP on carbon

At this stage, the **net impact of the TWTP on carbon emissions is uncertain** as measures have not been developed in sufficient detail to enable a full assessment of impacts across the whole TWTP time period. A high-level assessment of the impacts of the first Delivery Plan (2027 to 2030) has been made, as more information is available for the measures proposed. However, it is **not yet known how user emissions savings will balance with user increases and infrastructure emissions** over the period to 2041.

Potential impact on user emissions

The **direction of impact of the TWTP on transport user emissions is uncertain**. Whilst the TWTP includes a wide range of policies that could reduce emissions, it also includes policies that could increase emissions.

Emissions increases will be caused by policies and measures that cause increased road travel, whilst supporting other goals, particularly under the unlocking potential guiding principle. The scale of impact will depend on the level of increase in traffic, the speed changes and the proportion of freight traffic. Further emissions may also be caused by policies and measures that reallocate road space and thereby increase congestion.

In contrast, **several of the TWTP policies and supporting measures have the potential to reduce emissions,** particularly those to support the transforming travel choices and improving accessibility guiding principles.

However**, for some measures the TWTP's influence will be limited**. For instance, many Avoid measures to reduce travel depend heavily on action from other stakeholders, such as planning authorities improving local service provision. The emissions impacts of TWTP measures would be hard to differentiate and are likely to be modest.

Similarly, although an important component, TWTP measures to support EV uptake would play a relatively limited role in the overall range of action needed to accelerate uptake. Other influences, particularly national action on vehicle fleet, are more important.

TWTP mode shift measures would have a more direct impact on emissions. However, where implemented incrementally and in isolation, as has been typical nationally, the resulting emissions reductions are likely to be limited. This is because, whilst the measures will improve capability and opportunity to use sustainable modes, they will not necessarily provide motivation. As highlighted by the COM-B model, motivation is a critical component of achieving mode shift.

Achieving the motivation for significant mode shift would require concerted parallel action to change the relative perceived costs and convenience of sustainable modes and car use (such as parking management and/or changes to pay per use cars).

Without these wider measures, car owners are likely to continue to consider car to be the cheapest, most convenient option for most trips. This means they will have limited motivation to change habits, shift mode and reduce car use and emissions.

Effectiveness will also depend on the extent to which **measures reflect the varied characteristics of different area types and the implications for travel choices.** Mode shift is most likely in urban areas where higher population densities and concentrated travel patterns often make public transport and active travel options more viable, whilst congestion can make car travel less convenient. The dispersed nature of travel in rural areas typically makes public transport less attractive.

The net impact of the TWTP on user emissions will depend on the balance, scale, intensity and timescales of policies and measures implemented. The high level assessment of the first Delivery Plan indicates that it will deliver only limited emissions savings through mode shift, which are likely to be offset by increased emissions from road capacity improvements. Overall, the annual estimated user emissions impact is between 0.5% reduction and 0.5% increase by 2030, depending on the net balance of impact the highway improvements on traffic conditions. The net emissions impact for future TWTP Delivery Plan periods will depend on the nature and extent of measures implemented.

Potential impact on non-user emissions

Whilst the direction of impact on user emissions is uncertain, for other lifecycle stages it is clear. **TWTP measures will inevitably generate capital and operational emissions** from new and updated infrastructure, fleet and equipment. This will increase the likelihood of the TWTP causing a net emissions increase when taking a WLC view. Capital and operational emissions may offset any user savings achieved.

The high level assessment of the first Delivery Plan indicates that infrastructure emissions generated from proposed measures could equate to 0.5% to 1% of annual user emissions. The impact of future Delivery Plans will depend on the nature, extent of the infrastructure, fleet and equipment intensity of measures implemented. Scheme-specific factors such as the choice of route will also be important.

Implementing the policies supporting the TWTP fit for the future guiding principle will help to **limit these emissions by applying carbon management**. The management process will help reduce emissions through approaches such as making best use of existing infrastructure (rather than building new) and using low carbon materials and processes, applying circular economy principles and maintaining and managing existing assets.

1.4 Future action

This review of the potential emissions impact of the TWTP has highlighted **the challenge of achieving significant carbon emissions savings through local transport measures**. The first Delivery Plan is estimated to cause both emissions increases and decreases with net estimated impacts equating to less than 1% of annual user emissions.

For future Delivery Plans to deliver a significant reduction in user emissions and contribute to **closing the emissions gap would require a wide range of integrated measures**, with a focus on measures that support road travel reduction. Emissions reductions would also depend on aligned wider economic and planning policies in Telford and Wrekin, alongside stronger national action to accelerate transport decarbonisation.

The **scale of action needed to meet close the emissions gap is most likely to be achieved if a clear and shared priority to reduce road travel and emissions is established** across local and national government. This would support coordinated, rapid action to support more sustainable travel choices, including Avoid and Shift measures. The scale and pace of decarbonisation of fleet needed (Improve measures) will also require significant action by industry as well as central government.

Framing action within a widely supported vision would help maximise effectiveness while ensuring that improvements to road travel do not inadvertently offset emissions savings. Without this shared direction, the potential for positive emissions outcomes will be significantly diminished.

Given the uncertainty over future direction and context, the TWTP's estimated **emissions impact will need to be revisited as further Delivery Plans are developed** and the balance of measures to be implemented is identified.

Irrespective of the balance of schemes adopted in the Delivery Plans, it will be important to **continue to ensure that WLC impacts are considered throughout TWTP decision making and scheme development to optimise carbon outcomes**.

2. Introduction

2.1 Local Transport Plan

Telford & Wrekin Council is preparing a new Local Transport Plan (LTP), the Telford & Wrekin Transport Plan (TWTP), to be adopted in early 2027. The TWTP will provide a long-term strategic framework for transport, focusing on establishing a clear vision and set of ambitions for the 2027–2041 period, identifying the policies needed to deliver that vision, and setting out the priority schemes within the 2027–2030 Transport Delivery Plan.

Development of the TWTP has been informed by the recently published DfT LTP guidance[1] and the associated Local Transport Quantifiable Carbon Guidance (QCG),[2] which sets expectations for transport carbon assessment.

AtkinsRéalis has supported Telford & Wrekin Council in the technical, strategic and engagement activities required to prepare the TWTP. This builds on previous work undertaken for the council, including initial carbon baselining (2023) and place type analysis (2024).

2.2 Purpose of this report

This report provides a review of the TWTP's potential impact on carbon emissions and the influencing factors.

The remaining sections are structured as follows:

- **Section 3) Carbon context for Telford and Wrekin:** A summary of key points on baseline transport emissions in the Telford and Wrekin area (summarised from the TWTP Carbon Baseline Report).
- **Section 4) The impact of transport policies and measures on emissions:** An overview of the routes through which transport policies and measures can influence emissions across their lifecycle - to provide context for reviewing the potential impact of TWTP policies.
- **Section 5) The role of LTPs in transport decarbonisation:** A summary of the scope for local transport measures to contribute to decarbonisation in the context of action by other stakeholders.
- **Section 6) Factors influencing the impact of the TWTP on emissions:** An overview of the ways in which the range of policies identified in the Transport Vision & Strategy could influence emissions and the factors that would affect their scale of impact and the net impact of the TWTP on emissions. This section provides a high-level estimate of the emissions impacts of the measures included in the first TWTP Delivery Plan.
- **Section 7) Future action:** A summary of the ways in which the next steps in TWTP development will influence the emissions impacts and the need for further emissions assessment.

The note is supported by five appendices providing supporting detail and analysis as follows.

- **Appendix A.** Carbon emissions in scope for TWTP influence

[1] DfT (2026) Statutory Guidance: Local Transport Plans. Available at: Local transport plans - GOV.UK
[2] DfT (2025) Local Transport Quantifiable Carbon Guidance. Available at: Local Transport Quantifiable Carbon Guidance

- **Appendix B.** Logic-based review of carbon impact of TWTP policies
- **Appendix C.** Carbon Assessment Playbook Tests
- **Appendix D.** Current travel demand
- **Appendix E.** Estimate of emissions impact of first Delivery Plan

3. `Carbon context for Telford and Wrekin

3.1 Transport carbon emissions in Telford and Wrekin

The TWTP Carbon Baseline Report provides an overview of the transport carbon emissions context for Telford and Wrekin. This section highlights some of the key points. Further details on each are provided in the Baseline Report.

International, national and local action has been taken to respond to the Climate Emergency, aiming to limit the scale of the social, economic and environmental impacts of climate change caused by greenhouse gas (GHG) emissions. At the local level, Telford & Wrekin Council declared a climate emergency in July 2019 and committed both to carbon neutrality in the council's operations and activities by 2030 and to engage with stakeholders to support the aspiration for the borough to be carbon neutral by 2030.

Transport measures have an important role to play in reducing GHG emissions as the transport sector generates more emissions than any other sector nationally. It is also the most emitting sector in Telford and Wrekin, accounting for nearly 35% of the borough's GHG emissions in 2023.

There are a number of uncertainties in forecasts of transport emissions, including in relation to future travel demand, vehicle purchase trends and rates of decarbonisation of electricity supply. However, baseline projections indicate that, even with projected zero emission vehicle (ZEV) uptake, transport emissions in Telford and Wrekin and nationally are projected to exceed decarbonisation pathways to 2050, as illustrated in Figure 1.

The green lines in Figure 1 show decarbonisation pathways identified by the Climate Change Committee (CCC)[3] and in the Government's Net Zero Strategy (NZS)[4]. They reflect the rate of transport sector decarbonisation needed to meet the 2050 net zero target and the intermediate 5-year carbon budgets that have been determined to limit the cumulative emissions to 2050, the main driver of climate change.

The blue lines in the Figure 1 show baseline transport emissions projections from the Midlands Connect Emissions Baseline Dashboard for Telford and Wrekin, each reflecting different views of ZEV uptake. The dark dotted line (Localised ZEV Uptake scenario) is considered the most realistic reflection of current and proposed national action to support ZEV uptake. The lowest light dotted blue line reflects an illustrative, ambitious view of accelerated ZEV uptake, implying considerably more national action to support uptake than is currently proposed.

In all scenarios there is a significant emissions gap between projected emissions and the decarbonisation pathways meaning that there will be an 'overshoot' of carbon budgets. Decarbonisation progress has been slow in recent years, increasing the scale of the challenge and the risk of overshoot.

[3] CCC (2020) Sixth Carbon Budget Report. Available at: Sixth Carbon Budget - Climate Change Committee and CCC (2025) Seventh Carbon Budget Report. Available at: The Seventh Carbon Budget - Climate Change Committee

[4] HM Government (2021) Net Zero Strategy. Available at: Net Zero Strategy: Build Back Greener - GOV.UK

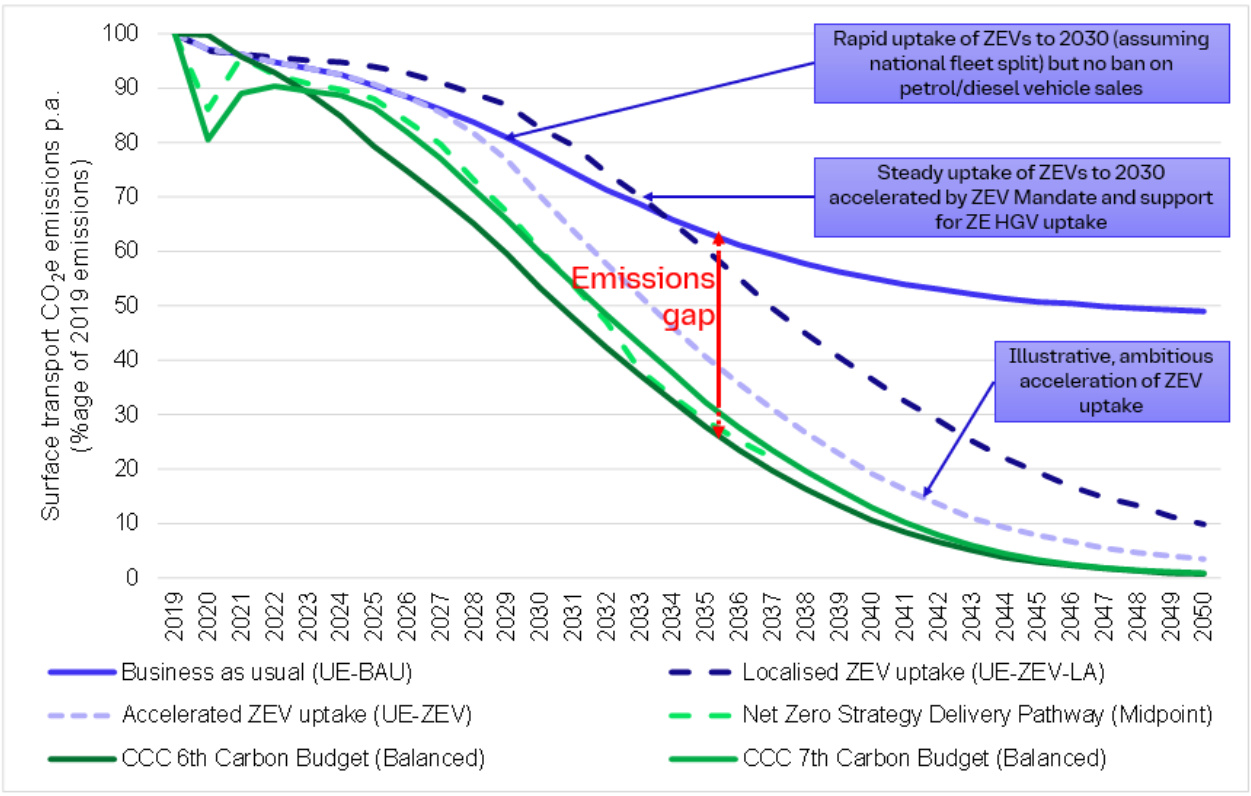


Figure 1: Telford and Wrekin surface transport baseline emissions and decarbonisation pathways[5]

Comparing the Localised ZEV Uptake scenario with the decarbonisation pathways indicates that by 2030, closing the emissions gap would require an emissions reduction of approximately 30% relative to the projected baseline. By 2035 the reduction would be approximately 50%, increasing to over 70% in the 2040s.

If the emissions gap is to be closed and the pathways met, significant action will be needed to reduce transport emissions in the next five and ten-year periods. The ambitious accelerated ZEV uptake scenario shows that ZEVs will play an important role but will not be enough alone; wider decarbonisation action to reduce emissions by reducing vehicle kilometres travelled will also be needed.

Data from the Midlands Connect Emissions Baseline Dashboard, Telford Strategic Transport Model, National Travel Survey and CREDS place based carbon calculator[6] provide some key insights into the source and geographical distribution of emissions in Telford and Wrekin that contribute to the emissions gap, as summarised in Figure 2.

[5] Further details on the pathways and baseline projections are provided in TWTP Carbon Baseline Report, 2026.
[6] CREDS carbon tool (Place-based carbon calculator). Source: Morgan, Malcolm, Anable, Jillian, & Lucas, Karen. (2021). A place-based carbon calculator for England. Presented at the 29th Annual GIS Research UK Conference (GISRUK), Cardiff, Wales, UK (Online): Zenodo. A place-based carbon calculator for England | Zenodo)

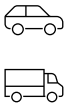
	Emissions by source		Emissions by movement type
	• Cars ~ 59% emissions within T&W • Light Goods Vehicles ~ 17% • Heavy Goods Vehicles ~ 19% • Public transport ~ 5%		• Through trips ~ 35% road emissions in T&W • Inbound/outbound trips ~ 40% • Internal trips ~ 30%
	• Local Road Network (LRN) ~ 45% emissions within T&W • Major Road Network (MRN) ~ 20% • Strategic Road Network (SRN) ~ 35%		• Trips to/from Telford 'Urban large' area (particularly central T&W) > 80% road emissions in T&W
	• Trips > 10 miles long: > 65% road emissions within T&W (all vehicle types) • Car trips < 5 miles: < 15% emissions (but >55% of trips) (reflecting national patterns) • Business travel ~ 50% (all vehicle types, including goods vehicles) • Leisure travel ~ 35% car emissions		• Car trips within T&W ~ 30% emissions from car trips to/from/within T&W • Car trips to/from Shropshire ~ 30% emissions from car trips to/from/within T&W • Car trips to/from wider West Midlands ~ 20% emissions from car trips to/from/within T&W
	• More rural and prosperous population groups can generate more than double the carbon emissions from car use than more urban, lower income groups		• Dispersed emissions from rural areas, less busy movements and on more minor roads sum to a significant proportion of the total

Figure 2: The sources and distribution of transport emissions in Telford and Wrekin

Closing the emissions gap will involve addressing emissions from each of these sources.

In the context of the need to meet cross-sector decarbonisation pathways, it will also be important to consider the wider lifecycle emissions impacts of transport decisions. This is because new transport infrastructure and fleet can generate significant capital and operational carbon impacting on other emissions sectors (primarily industry) (as described further in Section 4).

4. Impacts of transport policies and measures on emissions

4.1 Introduction

This section provides context for understanding the potential carbon impacts of the TWTP by summarising the routes through which transport policies and measures can influence carbon emissions. The overview includes a summary of Avoid, Shift and Improve categories of measures to reduce emissions.

4.2 Drivers of transport user emissions

To provide context for understanding the potential impacts of TWTP policies and measures on transport user emissions, it is useful to understand the key drivers of emissions and potential influences on them. This provides a basis for identifying the types of policies and measures that are likely to decrease user emissions and those that are likely to increase emissions.

At a high level, the influences on transport user emissions are simple. There are two key drivers: the number of vehicle kilometres (distance) travelled by vehicle type and the average emissions per vehicle kilometre by vehicle type (as shown in Figure 3).

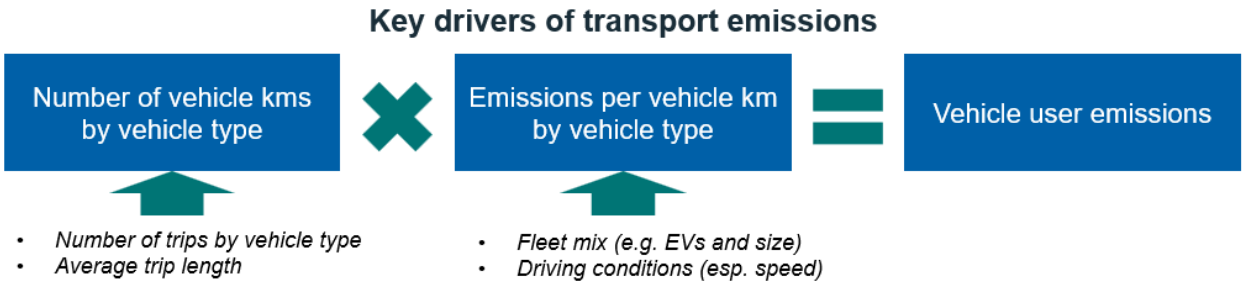


Figure 3: Key drivers of transport user emissions

The net impact of any measures on transport user emissions therefore depends on the balance between their impacts on vehicle kilometres and on emissions per vehicle kilometre.

Measures to reduce user emissions will need to:

- Reduce vehicle kilometres and/or
- Reduce carbon emissions per vehicle kilometre.

Conversely, transport measures that increase vehicle kilometres travelled will increase emissions unless the increase is balanced by a decrease in emissions per vehicle kilometre and vice versa.

4.3 Routes to reducing transport user emissions

Measures to reduce user emissions are often considered in terms of the Avoid, Shift, Improve framework shown in Figure 4.

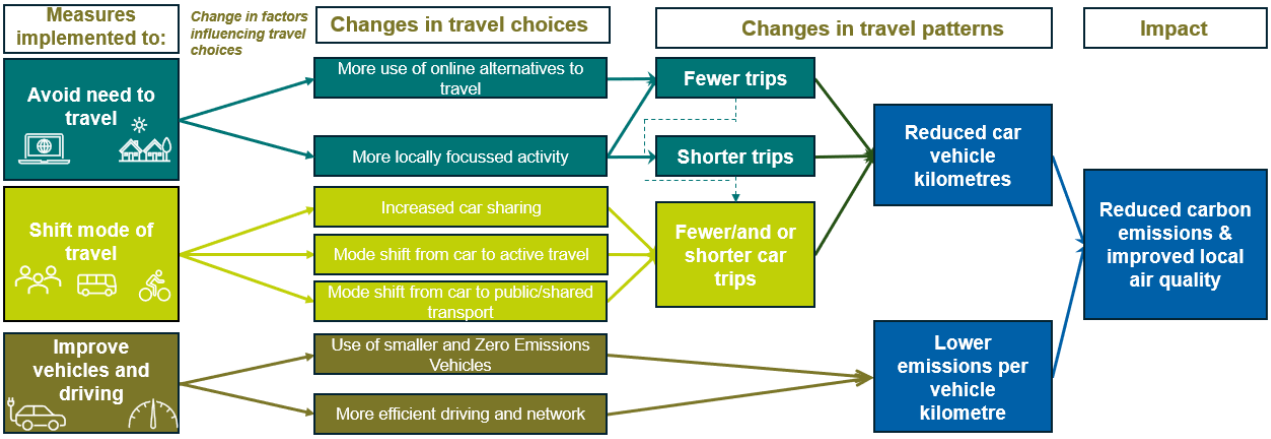


Figure 4: Measures to reduce user emissions structured in the Avoid, Shift, Improve framework

The first column shows the three key drivers for reducing user emissions: **avoiding** the need to travel in the first place, **shifting** to less polluting modes of travel, and **improving** vehicles and driving styles.

The second column highlights seven main travel choices under the categories for reducing emissions. The first five choices reduce emissions by reducing vehicle kilometres by **avoiding** the need to travel so much (through supporting shorter or fewer journeys) or **shifting** mode away from road vehicles use. The last two travel choices reduce emissions per vehicle kilometre by **improving** the emissions intensity of travel through improving fuel efficiency or changing the vehicle fleet used.

The following sections provide more detail on Avoid, Shift and Improve measures.

Avoid measures

Avoid measures include the transport measures of freight consolidation and travel planning to plan more efficient combinations of journeys. However, most Avoid measures rely largely on actions from outside the transport sector to improve access to activities and services (e.g. healthcare) through means other than improving transport.

The triple access model of accessibility shown in Figure 5 highlights that improving accessibility does not need to rely only on transport measures to improve physical mobility. Accessibility can also be increased by improving digital connectivity or spatial proximity.

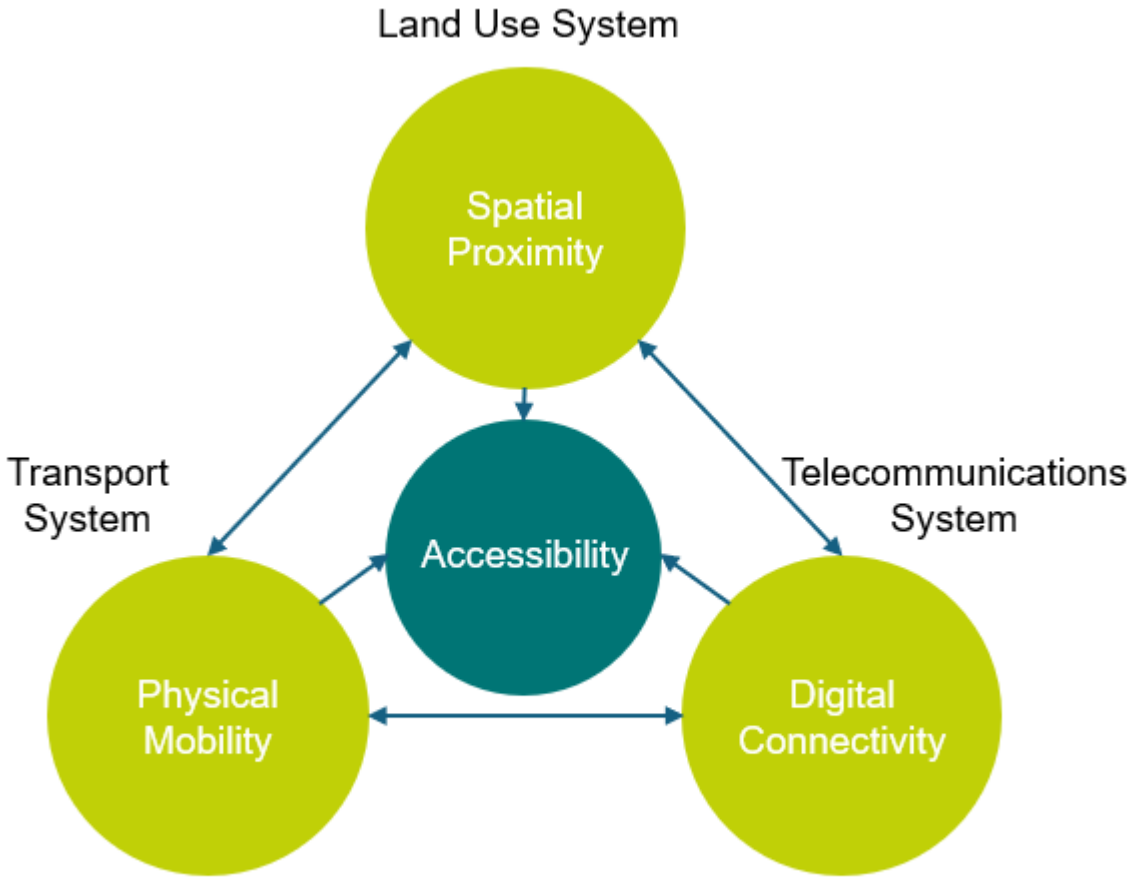


Figure 5: Triple Access Model of Accessibility[7]

Improved digital connectivity involves ensuring widespread provision of high-quality internet connectivity to homes and organisations and increasing the number of services and activities that can be accessed online, e.g. health appointments.

From a transport perspective, caution is needed as there is the potential for some rebound effects that increase travel and offset some of the gains of Avoid measures, particularly additional deliveries being made.

Improved spatial proximity involves land use planning to increase density and bring people and services/activities closer together so that people can access equivalent services and activities more locally, reducing average trip length.

These principles need to be applied in designing and identifying locations for new development. However, new development only accounts for a relatively small proportion of trips made and therefore it is important that the principles are also retrofitted into existing development, for instance repurposing existing buildings to improve services.

[7] Source: Lyons, G., & Davidson, C. (2016). Guidance for transport planning and policymaking in the face of an uncertain future. Transportation Research Part A: Policy and Practice, 88, 104–116. https://doi.org/10.1016/j.tra.2016.03.012 [researchgate.net], [studylib.net]

Shift measures

Approaches to achieving mode shift from car use

Shift measures encourage a shift in travel from more to less carbon intensive modes. To effectively reduce carbon, the mode shift needs to be achieved on medium and long-distance trips as short trips account for only a limited proportion of emissions, despite representing a large proportion of trips. For instance, in 2025, trips under 5 miles long accounted for over 55% of car trips nationally but less than 15% of car emissions.[8]

Achieving mode shift depends on influencing travel choices and behaviour of people and organisations. To achieve the change, it will be critical to provide attractive public transport and active travel alternatives to road travel. However, it is not enough alone, due to the range of influences on travel behaviour.

The COM-B model of behaviour change (shown in Figure 6) helps to understand the influences on travel behaviour and mode choices. It identifies that, for people to make a change in behaviour, they need all three of:

- Capability – i.e. capacity to use the transport system, including having relevant knowledge and skills, e.g. understanding fares systems and how to pay.
- Opportunity – external factors making it possible to use the transport system, e.g. a bus service running from the relevant origin to destination at the relevant time for the trip required.
- Motivation – people's decision-making process - including emotional responses and analytical decision making, e.g. dislike of certain modes and perceptions of relative cost and convenience of different options.

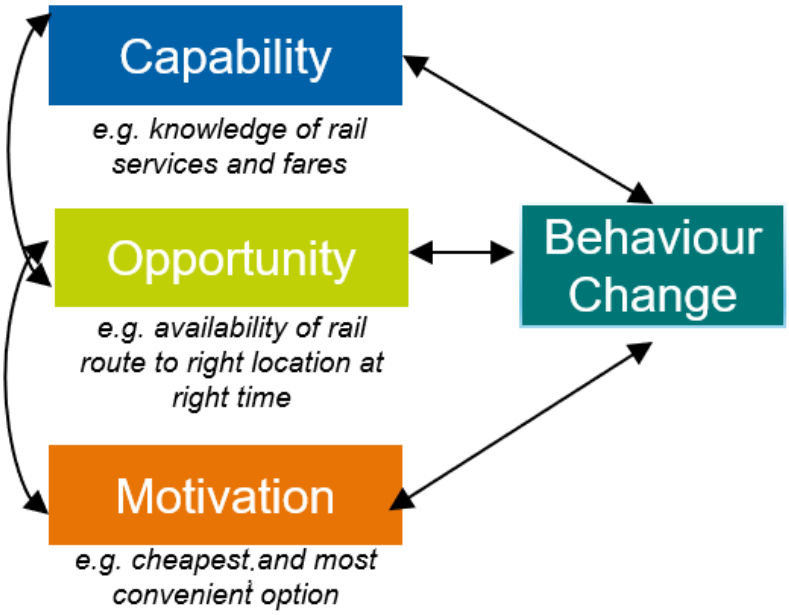


Figure 6: COM-B Model of Behaviour Change[9]

[8] DfT (2025) National Travel Survey 2025. Available at: National Travel Survey - GOV.UK

[9] Source: Michie, S., Van Stralen, M. M., & West, R. (2011). The behaviour change wheel: A new method for characterising and designing behaviour change interventions. Implementation Science, 6(1).

Transport measures often focus on providing Capability and Opportunity to travel by public transport and active travel.

Motivation can be the hardest element to deliver, particularly where car ownership levels are high. Fuel costs (the main cost likely to be considered on a per trip basis) are only about 25% of the typical annual cost of owning a car (see Figure 7) and parking costs only apply to a small proportion of trips. Other costs of car use are upfront (purchase/ depreciation), annual (e.g. insurance and tax) or sporadic (e.g. maintenance). This means that, once someone has invested in owning a car, the extra costs of driving per trip are perceived as relatively low, particularly where parking charges are low or absent.

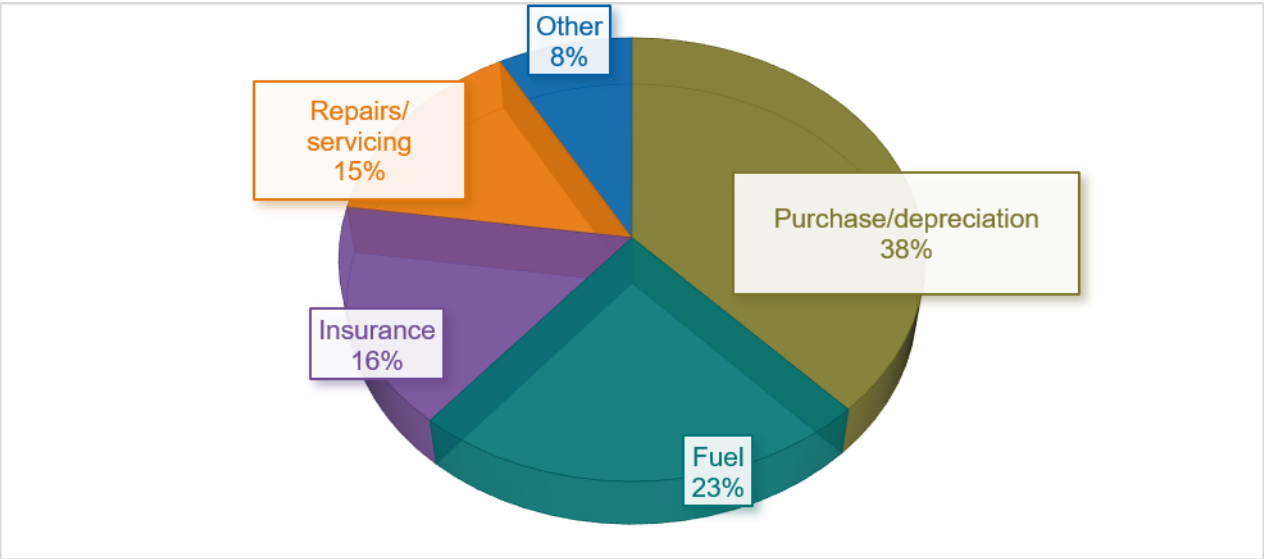


Figure 7: Average car costs per year[10]

Car trips also rate highly for convenience, particularly as cars and road vehicles are typically prioritised in the allocation of road space and provision of convenient parking space. This improves convenience by reducing time and costs associated with finding and paying for parking and walking to a destination.

Day to day travel decisions are often made on the basis of either habit or the cost and convenience of different options. This means that once people own a car, in current conditions, it becomes the default choice to drive for nearly all trips, even if other options are available, and it is difficult to provide motivation for mode shift.

In order to achieve a significant mode shift away from car, to reduce emissions, a range of measures are likely to be needed to level up the balance between modes by:

- Improving the provision of sustainable alternatives; and
- Balancing up the cost and convenience of travelling by road with other modes.

More explanation on the range of changes required is provided in the next section.

Barriers to reducing car use through mode shift

The web diagram in Figure 8 shows the self-reinforcing cycle of transport, planning and social factors that lead to high car usage and limit mode shift because car is viewed as the most convenient and/or cheapest option for most journeys by car owners.

[10] Source: Nimblefins (2025) Average Cost to Run a Car UK 2025

The top blue box shows that a key influence in the cycle is the fact that public transport and active travel are only viable and attractive for a percentage of journeys. The percentage varies and is typically higher for trips within urban areas. However, the diversity of many people's travel patterns means at least some of the trips they want or need to make for personal or work reasons are not feasible by other modes.

This feeds into the right-hand box of high car ownership. Ownership levels partly reflect social factors with cars being seen as assets that people want to own and most people being able to afford them. However, levels are also influenced by the previous box, which means that, even when it is financially challenging, people feel that they need to own a car because there are some journeys that they need to make that are not possible by other modes. Once people own a car, the additional costs per trip are relatively low (as shown in Figure 7).

The left-hand side of the web shows how this situation is reinforced by prioritisation of space for cars and parking and location of jobs, shops, services and housing in dispersed, low-density locations. These factors make car use more convenient for many journeys and less convenient for public transport and active travel. This in turn reduces the viability of providing public transport, contributing to the top box identifying the limits to public transport provision.

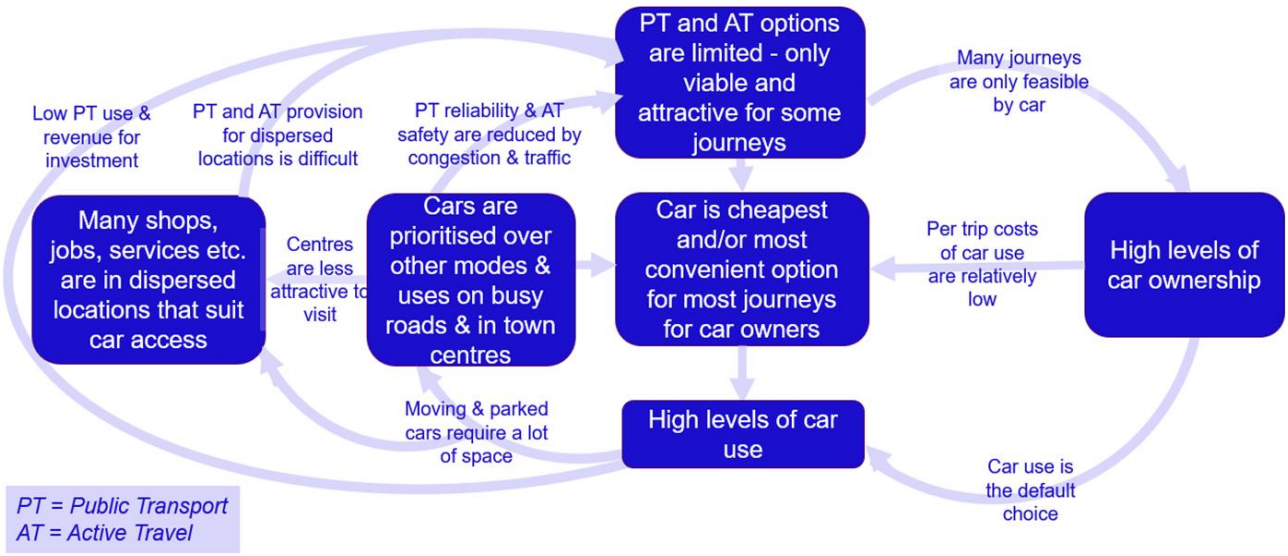


Figure 8: Drivers of car use in Telford and Wrekin

The number of interacting factors shown in Figure 8 indicates that intervening with measures that influence only one part of the web will not be enough to encourage mode shift and reduce high levels of car use.

The version of the web diagram in Figure 9 shows five types of measure (with red outlines) that are needed to change the balance and influence travel choices to encourage mode shift and reduce car use. At the top of the diagram are changes relating to significant improvements in public transport, active travel and travel information to provide good quality, reliable, affordable, attractive services, giving people the opportunity and capability to use other modes for more of their journeys.

The right box highlights a change in approach to car usage, moving to pay per use rather than ownership. This change gives people the opportunity to use a car for those journeys for which there is no alternative without owning a car. It also puts the costs of car use on a per trip basis, similar to public transport. Decisions between modes for each trip can then

be made on a comparable basis, making it more likely that there is motivation to use an alternative to a car on cost and convenience grounds.

The boxes on the left highlight the changes in space prioritisation, planning and parking provision needed to help further balance the convenience and cost of travelling by car and by other modes to help to encourage mode shift.

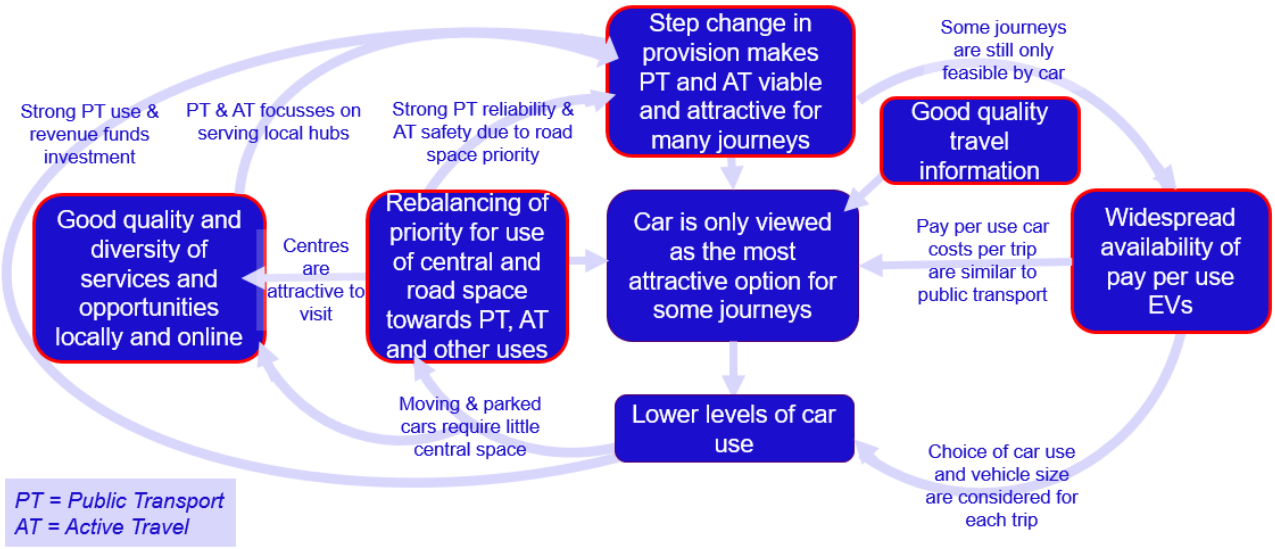


Figure 9: System level interventions needed to reduce car use

Improve measures

Improve measures to reduce emissions per vehicle kilometre fall in two categories:

- Measures to improve operating efficiency of existing vehicles.
- Changes of fleet to lower emissions and zero emissions vehicles (ZEV) which in turn rely on supporting measures to raise awareness and provide incentives to change, and provide a supporting system of fuelling/ charging infrastructure.

Emphasis is often placed on ZEV uptake being the main route to transport decarbonisation. However, for multiple reasons, ZEVs and Improve measures cannot close the emissions gap alone. The challenges include the fact that:

- There is a limit to the uptake rate that is possible through purchase of new vehicles. New cars bought each year only equate to approximately 6% of the total car fleet. So even if all new cars bought between 2027 and 2030 were EVs they would only account for about 20% to 25% of the fleet in 2030. There are also practical limits on the number of vehicles that it will be possible to build and supply over that time frame.
- Emissions reductions depend on availability of sufficient decarbonised electricity.
- The construction of ZEVs generates embodied emissions.
- ZEVs also bring other challenges including equity issues due to the relatively high purchase cost and continued traffic congestion and elements of local air pollution.

Improve measures are therefore not sufficient alone. In order to reduce emissions rapidly, action would also be needed across the Avoid and Shift dimensions to reduce vehicle kilometres.

4.4 Importance of a whole life cycle perspective

Statistics and targets relating to emissions from the transport sector, such as the pathways shown in Figure 1, relate to transport user emissions, i.e. the emissions generated by the use of vehicles of all types. However, in identifying measures to reduce emissions, it is important to recognise that transport decisions also have wider impacts on emissions through building infrastructure, equipment and vehicles ('capital carbon'), maintaining them ('operational carbon') and dealing with them at the end of their lives (capital carbon).

Figure 10 is a simple representation of the transport lifecycle. Emissions generated by stages outside the dotted box will contribute to sectors other than the transport sector (e.g. industry). However, they will all contribute to national emissions totals and will be directly affected by transport decisions. It is therefore important that transport decision making for TWTP and in other contexts takes a whole lifecycle perspective when considering emissions.

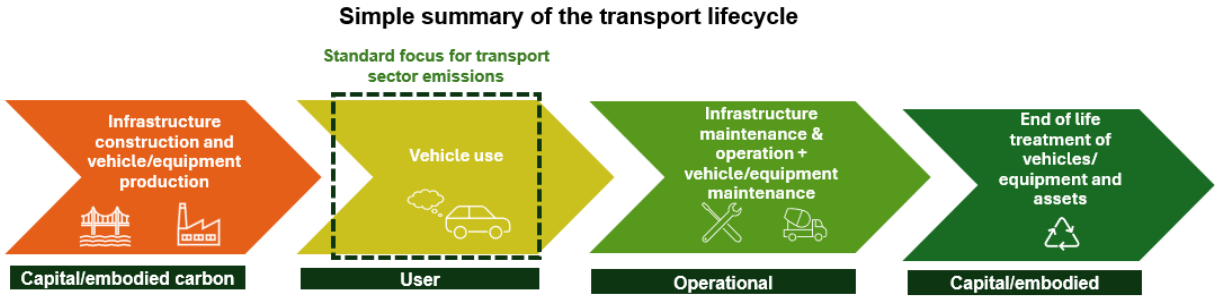


Figure 10: Simple summary of the transport lifecycle

Drivers of whole lifecycle (WLC) emissions

At a high level, the influences on emissions from all lifecycle stages can be summarised in terms of the amount and type of materials and energy used and the emissions intensity of the materials and energy used (as shown in Figure 11).

Measures to reduce all non-user WLC emissions (capital and operational) associated with transport infrastructure, fleet and equipment therefore need to:

- Reduce the amount of materials and energy used and/or
- Change the type of materials/energy used to be less emissions intensive.

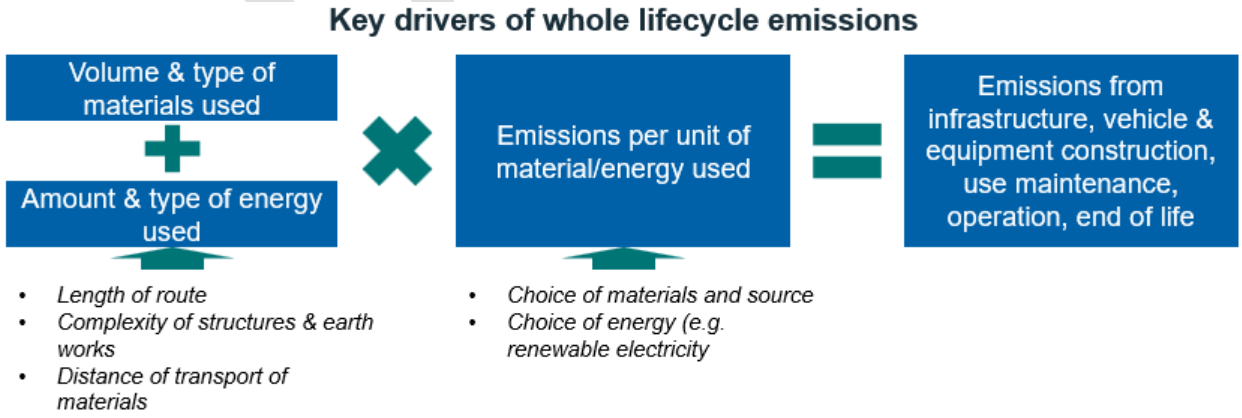


Figure 11: Key drivers of whole lifecycle emissions

Routes to emissions reduction

Potential measures to reduce wider lifecycle emissions are considered in terms of the Avoid, Switch, Improve hierarchy (from the PAS2080 standard[11]). This hierarchy focuses on reducing emissions associated with infrastructure and assets (in contrast to the similarly named Avoid, Shift, Improve framework introduced at the beginning of the section, which focuses on reducing transport user emissions).

The hierarchy is shown in Figure 12 and has the following components:

- Avoid: involves challenging the need for a new asset – for instance whether a smaller design could work or an alternative approach not needing a new asset, e.g. a bus lane using the existing road rather than a new lane.
- Switch: relates to adopting alternative solutions to reduce whole life emissions (e.g. alternative scope, design approach, materials, technologies for operational carbon reduction etc.).
- Improve: involves solutions that improve the use of resources and design life of an asset/network, e.g. re-use materials in situ or review materials choice.

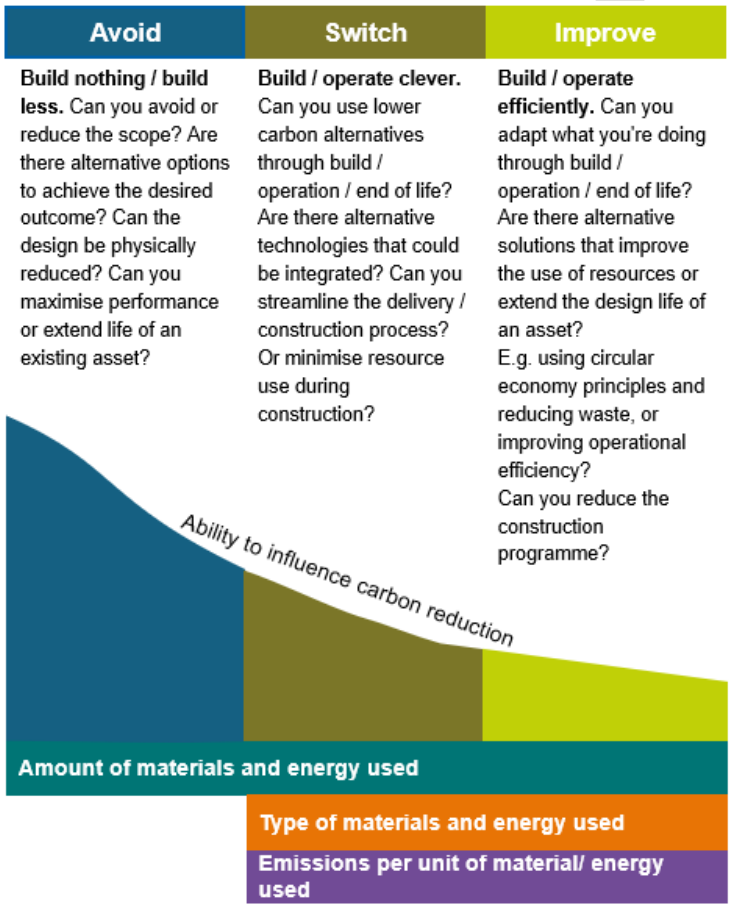


Figure 12: Avoid, Switch, Improve framework

[11] British Standards Institution (BSI) (2023) PAS 2080:2023 Carbon management in buildings and infrastructure.

5. The role of LTPs in transport decarbonisation

5.1 Introduction

This section provides an overview of the potential for Local Transport Plans (LTPs) such as the TWTP to contribute to decarbonisation and the emissions categories over which they have most influence.

5.2 The role of local transport decarbonisation

The need for rapid decarbonisation of the transport system is widely recognised to be a significant challenge.

The scale and pace of change needed means that action will be needed from a wide range of stakeholders. For instance, to deliver rapid uptake of EVs, national government action plays an important role in providing the framework for roll-out and uptake. Other key stakeholders and roles include the automotive industry producing sufficient suitable vehicles, individuals and organisations deciding to buy and use the EVs, local authorities and private providers supporting uptake and providing charging points and electricity providers providing sufficient, low carbon electricity.

Many sources expect rapid uptake of EVs and other ZEVs to achieve the majority of the required reduction in emissions, as illustrated in Figure 13 (drawn from the recent Climate Change Committee, CCC, report on the Seventh Carbon Budget[12]) and the government's recent Carbon Budget and Growth Delivery Plan (CBGDP)[13] which also focuses on ZEV uptake as the primary route to surface transport decarbonisation.

However, as outlined in Section 4, ZEV uptake cannot close the emissions gap alone. An important role is also identified for transport behaviour change, particularly through mode shift to public transport and active travel. The CCC report indicates that mode shift is expected to account for nearly 20% of the reduction in emissions in 2030 (relative to the baseline assuming current EV levels and future traffic levels). The CBGDP and identifies a role for emissions reduction through increased car occupancy and mode switch to active travel.

[12] Climate Change Committee (2025) Seventh Carbon Budget. Available at: The Seventh Carbon Budget - Climate Change Committee

[13] HM Government (2025) Carbon Budget and Growth Delivery Plan. Available at: Carbon budget and growth delivery plan - GOV.UK

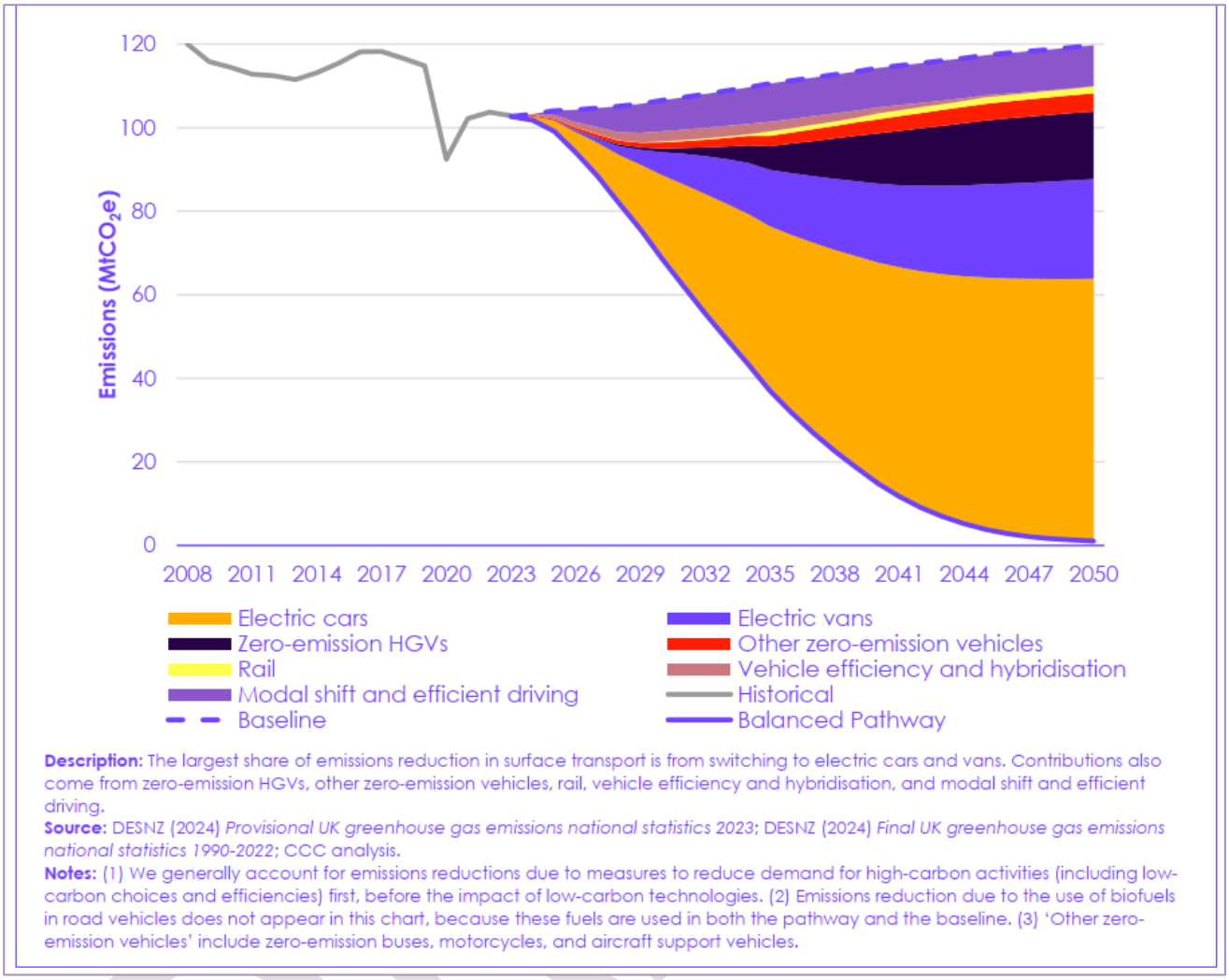


Figure 13: Sources of abatement in the CCC Balanced Pathway for surface transport[14]

The mode shift required is likely to be largely achieved through local transport measures, particularly as the CCC indicates that public transport mode shift will largely be to bus (as rail improvements are likely to take too long to deliver).

The DfT's Transport Decarbonisation Plan in 2021[15] also identified an important role for local transport measures and the implementation of place-based measures to reduce emissions.

The local transport measures delivered through LTPs therefore have a role to play in contributing to meeting decarbonisation commitments. However, there are limits to LTPs' scope of influence, as the largest emissions reductions are reliant on action by the national government, private sector and individuals.

[14] Source: Climate Change Committee (2025) Seventh Carbon Budget. Available at: The Seventh Carbon Budget - Climate Change Committee

[15] Department for Transport (2021) Transport Decarbonisation Plan. Available at: Transport decarbonisation plan - GOV.UK

5.3 Emissions in scope for LTP decarbonisation action

An LTP's impact also depends on the level of influence local action has on different types of trips. The extent to which the LTP can influence trip types depends on the extent to which the trip choices made for each type are affected by the accessibility options available within the local transport authority area and the extent to which it is possible to identify local measures to change travel choices for each type.

LTP measures will generally have greatest scope to influence emissions from car and van trips for private purposes, particularly trips:

- That start or end in the authority or are wholly within the authority and are
- Between or within urban areas - the density of trip patterns in urban corridors mean that there is often more scope to provide attractive, viable alternatives to car use and often makes car use less convenient (due to congestion and demand for parking).

In contrast, LTP measures are unlikely to significantly influence:

- Through car and van trips - as choices about mode, vehicle type and routing for the trips are mainly driven by factors outside the authority's boundary.
- Freight trips - as they are largely cross-boundary and mainly influenced by commercial decisions made in the private sector and by national action. LTP measures are likely to be limited to influencing local delivery legs.

Based on these considerations, analysis from the Carbon Assessment Playbook baseline dashboard indicates that the TWTP would have scope to influence approximately 70% of total transport emissions in the area that are generated by trips with at least one end in Telford and Wrekin, in particular the component generated by cars and LGVs (see Appendix A). The greatest scope for influence would be on the proportion of emissions that occur within and between urban areas.

The TWTP also has an important role to play in ensuring a whole lifecycle perspective is taken in developing measures to minimise the capital and operational carbon of new infrastructure, fleet and equipment.

6. Factors influencing the impact of the TWTP on emissions

6.1 Introduction

This section provides an overview of the influences affecting the potential emission impacts of the TWTP.

The DfT's Quantifiable Carbon Guidance (QCG)[16], provides guidance on using carbon analysis to support the development of transport strategies and schemes.

The main emphasis of the guidance is on the importance of transport strategy and scheme development being informed by a good evidence base and understanding of:

- Baseline transport carbon emissions in an area; and
- The carbon impacts of proposed measures and schemes.

The LTP Guidance highlights that local authorities must use the QCG to assess and understand the impacts of proposed LTP measures and report on whole lifecycle transport carbon impacts as an indicator in the LTP outcome framework.

The TWTP Carbon Baseline Report provided a summary of the baseline carbon evidence base for the Telford and Wrekin area. This report responds to the requirement to review the potential carbon impacts of the TWTP measures.

It is not possible to undertake a detailed carbon assessment of the impact of the full TWTP at this stage as the measures have not yet been identified in detail beyond the first Delivery Plan period to 2030. A high level assessment of the impact of the first Delivery Plan has been undertaken and is the outlined at the end of the section. However, information is not available to support a quantitative assessment for the remainder of TWTP time period. Instead, this section sets out the key issues that will influence the net carbon impacts of the TWTP over the full time period.

It provides an overview of:

- The ways in which different types of measure could influence emissions, building on the routes through which emissions could be influenced (as outlined in Section 4).
- The range of factors that are likely to influence the impact of different types of measure and therefore the net impact of the TWTP on carbon emissions.

Emissions are considered from a whole lifecycle perspective.

The following sections provide:

- A summary of a logic-based review of the routes through which the range of policies mentioned in the TWTP Transport Vision & Strategy could influence carbon emissions.
- An overview of the key influences on the emissions impacts of different types of policy and measure and their implications for the overall impact of the TWTP. This overview draws on a number of high-level benchmarks and metrics that are presented in more detail in the Appendices and Carbon Baseline Report, including:

[16] DfT (2025) Local Transport Quantifiable Carbon Guidance. Available at: Local Transport Quantifiable Carbon Guidance

- Evidence on the balance of current travel volumes and implications for the impact of mode shift.
- The results of a series of high-level indicative tests run with the Sub National Transport Bodies' Carbon Assessment Playbook (CAP).
- Evidence on the relative scale of embodied emissions for example infrastructure types using data from the DfT's Local Transport Infrastructure Carbon Benchmarking Tool (LTICBT).
- Estimate of the carbon impact of the first Delivery Plan.

6.2 Potential routes for LTP measures to influence emissions

Review of policies

The TWTP Transport Vision & Strategy includes 54 policies to support delivery of the four identified guiding principles.

The potential for each policy to either increase or decrease carbon emissions has been reviewed using a high-level, logic-based approach. This involved reviewing each policy against each of the routes to emissions reduction or increase described in Section 4, i.e.:

- User emissions
  - Avoid routes – policy causes changes in trip numbers and/or length
  - Shift routes – policy causes mode shift from or to road travel
  - Improve – policy causes uptake in ZEV and/or changes in driving conditions (particularly congestion levels)
- Infrastructure/embodied emissions
  - Requirement for new or amended infrastructure

The assessment identified whether each policy would be likely to have a positive, negative or neutral impact on emissions through each route. The key influences on the potential overall scale of impact were also recorded. Examples of the review are provided below, and more detail is provided in Appendix A. Carbon emissions in scope for TWTP influence

Table 1 summarises the review of potential routes through which the first four policies supporting the transforming travel choices guiding principle could influence user and embodied emissions. The shading in the tables distinguishes between clear routes to increasing or decreasing emissions (darker colours) and less certain potential routes (lighter colours). The shades do not indicate relative scale of impact between different measures. There is not sufficient information available on the policies and their implementation at this stage to support a robust estimate of relative scale of impact. Therefore, the focus of the assessment has instead been on understanding direction of impact to understand issues and trade-offs in the impacts of the policies.

Reviews were undertaken for the other 50 policies and they are summarised in more detailed tables in Appendix B. Logic-based review of carbon impact of TWTP policies

		User										Infrastructure/ Embodied
		Avoid Road trip numbers & length			Shift From road to other modes		Improve ZEV uptake			Improved traffic		
Policy		Travel by individuals	Bus/coach/ rail	Freight	Car veh km	Freight veh km	Car	GV	Bus	Car & GV	Bus	
TT1	Deliver a priority network for walking and wheeling.											
TT2	Deliver a priority network for cycling.											
TT3	Support secure and convenient cycle parking and facilities.											
TT4	Maintain and enhance our leisure routes including Public Rights of Way.											

Table 1: Review of potential emissions impact of subset of policies

The reviews provided a systematic way of highlighting the range of potential impacts of the 54 TWTP policies and some of the complexities of estimating the overall carbon impact of the TWTP, outlined further in the next section.

6.3 TWTP policies' impacts on emissions

Overview

The review of emissions impacts of the policies highlighted why the net emissions impact of the TWTP over the full plan time period is uncertain at this stage.

The measures required to support the policies identified will unavoidably generate capital and operating emissions through the introduction of new infrastructure, fleet and equipment. This is discussed further at the end of this section.

However, the overall impact on user emissions is uncertain and will depend on the scale, balance, timescale and intensity of implementation of the range of proposed policies across the borough.

Whilst many of the policies outlined in the Transport Vision & Strategy have the potential to reduce user emissions, others have the potential to increase emissions, as outlined in the following sections.

Range of impact of TWTP policies on user emissions

Policies that could increase user emissions

A number of the TWTP policies to support the overarching unlocking potential guiding principle would be likely to increase user emissions, particularly by increasing vehicle kilometres travelled.

In particular, in the absence of mitigation measures, emissions are likely to be increased by possible measures to develop strong cross-border connections for freight and other vehicle types.

Additionally, some measures that involve changing the allocation of road space could increase user emissions by increasing congestion. For instance, a policy supported by measures to increase bus priority could decrease emissions through encouraging mode

shift whilst increasing emissions through increasing congestion through road space reallocation.

Policies that could reduce user emissions

The policies outlined in the TWTP that could reduce user emissions would be supported by measures from across each of the Avoid, Shift and Improve dimensions, such as:

- **Avoid** measures to reduce the need to travel so far and/or so often include supporting digital connectivity and delivering place making and regeneration.
- **Shift** measures include a range of possible measures to improve public transport and active travel provision.
- **Improve** measures include possible support for EV charging and zero emissions buses.

Policies with limited impact on user emissions

Other policies mentioned in the TWTP as playing an important role in supporting other goals will have relatively limited direct impact on user emissions. For instance, safety schemes targeted at reducing collision rates would be likely to have only a minor indirect impact on emissions through potentially supporting mode shift to active travel as a result of improved perception of safety.

Influences on emissions impacts of different measure types

The following sections provide more explanation on the potential influences on the user emissions impact of:

- Measures that could increase emissions.
- Measures that could reduce emissions - looking separately at Avoid, Shift and Improve measures.

The range of potential influences outlined highlight the variety of the influences on the net impact of the TWTP and the extent to how impacts could vary with different approaches to implementation of different policies in future Delivery Plans.

Influences on measures that could increase emissions

The measures that could increase user emissions would do so largely by increasing road vehicle kilometres travelled as a result of:

- Improved road conditions and routing options.
- Additional trips generated by growth sites.
- Increased emphasis on longer-distance connections (for instance inter-regional) rather than local connections.

The emissions impact would be increased if the measures also lead to significant additional freight trips and increases in freight trip length as HGV emissions are many times higher than car emissions per kilometre. The emissions differential will increase into the future as uptake of ZEVs in the freight sector is projected to be slower than uptake in the light vehicle fleet.

Other measures may increase emissions through increasing congestion, particularly as a result of road space reallocation, for instance to improve bus, cycle or pedestrian priority.

The emissions impacts of all these measures could potentially be reduced if other measures are implemented in parallel to ensure that there are attractive options to make equivalent journeys by sustainable modes.

In the case of measures introducing new road capacity, the balance between the convenience of car use and other modes could be levelled to some degree by allocating some of the additional road space to provide priority to other modes (such as bus lanes) or by setting lower speed limits to make active travel more attractive.

However, as outlined further in the next section, measures to improve sustainable modes are unlikely to achieve significant mode shift from car in conditions where car ownership is high and car parking and use is convenient.

Influences on measures that could reduce emissions

Overview of emissions reductions measures

Many of the policies in the TWTP have the potential to support reductions in transport user emissions, alongside supporting other goals. However, it is widely recognised that achieving significant reductions in carbon emissions through local transport measures is challenging.

Large-scale emissions reductions are most likely to be achieved where measures are selected and planned in the context of a clear vision focussing on the need to significantly reduce the level and emissions intensity of car and freight travel.

Plans to achieve the vision would provide a framework for integrated and intensive application of measures to achieve a step change in travel choices, through a wide range of Avoid, Shift and Improve measures. The range and pace of action required would need involvement from diverse stakeholders and the measures would need to be targeted to reflect varying place types.

However, measures have previously been implemented in a more individual, less integrated and more incremental way across the country, rather than in the context of a vision. The available evidence indicates that emissions impacts of measures implemented in this way are usually limited.

A useful source of evidence on impacts of measures is the Carbon Assessment Playbook developed by the Sub National Transport Bodies[17]. The Playbook drew on an extensive literature review (supplemented by modelling using National Travel Survey data) to develop an evidence base on the scale of impact of typical examples of different types of decarbonisation measure, considered in the six broad categories of:

- Active travel
- Public transport
- Parking and traffic management
- Integrated planning policy
- Behavioural change
- Fleet upgrade

Evidence from the Playbook indicates the potential scale of emissions reduction that the types of policies and measures in the Transport Vision & Strategy might achieve if implemented through the conventional, incremental approaches used previously.

[17] Available at: Carbon Assessment Playbook

A range of simple, indicative Playbook tests have been run for Telford and Wrekin. The tests were not intended to represent the TWTP Vision & Strategy. Instead, they illustrate the broad scale of possible impact from the types of decarbonisation measures that are being considered as part of the TWTP, drawing on the evidence of the impacts of typical schemes of each type in the Playbook.

The tests represent highly generalised scenarios, assuming that identified measure types in each of the six categories listed above (such as public transport) are applied across between 10% and 30% of Telford and Wrekin (covering all area types proportionally) at an average level of intensity, typical of the examples reviewed for the CAP. The levels of application are simple, illustrative assumptions to reflect different levels of ambition, with the upper end reflecting an ambitious level of roll-out across Telford and Wrekin. Further detail on the tests is given in Appendix C. Carbon Assessment Playbook Tests

The results indicate that, even assuming a relatively high level of implementation, the combination of measures across all six categories would reduce transport user emissions in Telford and Wrekin by only a few percent by 2035, only a small proportion of the 50% reduction in emissions needed to close the emissions gap in that year (shown in Figure 1).

The categories of measure with the estimated greatest potential impact in the tests were acceleration of EV uptake and behaviour change programmes (such as travel planning for individuals and businesses), followed by extensive public transport improvements.

The category with the smallest estimated impact was active travel improvements, reflecting the short average trip length affected and the challenge of achieving mode shift from car to other modes.

The difficulty of achieving mode shift from car in situations of high car ownership is one of the main factors behind the limited emissions impact of incremental implementation of decarbonisation measures, as outlined further in the next section.

Influences on the emissions impact of Shift measures

One practical dimension of the challenge of achieving significant mode shift from car is the relative scale of travel by different modes. The estimated number of kilometres travelled by car (drivers and passengers) within Telford and Wrekin is over 100 times the estimated number of bus passenger kilometres in the borough, and over 500 times the estimated number of cycle kilometres (see Appendix D. Current travel demandfor more detail on the estimates).

This existing balance of demand for travel between modes means that even a small reduction in car traffic through mode shift would result in a significant percentage increase in public transport patronage or cycling levels.

Figure 14 illustrates this by showing the percentage increase in existing travel by each mode that would be caused if 1% of current kilometres travelled by car drivers switched to bus and cycle (i.e. 1% to each mode).

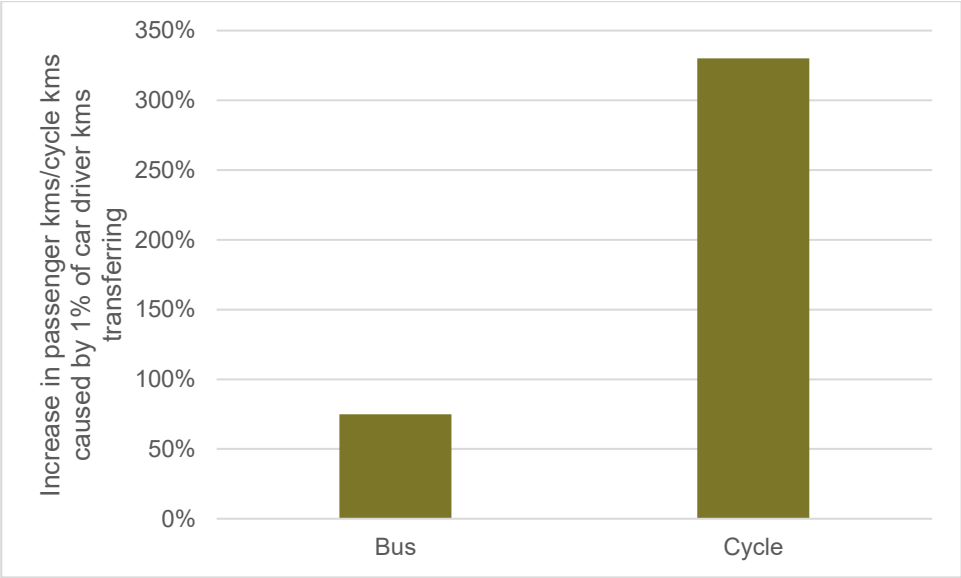


Figure 14: Percentage increase in travel by bus and cycle caused by a switch of 1% of car driver kilometres

The graph highlights that, even though a 1% reduction in car kilometres would only make a minor contribution to closing the emissions gap in Telford and Wrekin, it would have a significant impact on travel on other modes.

The Bus Service Improvement Plan (BSIP)[18] indicates a target increase in patronage of 36% by 2030 (relative to 2018/19). This is a relatively ambitious patronage target but, even if the full increase was achieved directly through mode switch from car driver trips, it would result in a reduction in car vehicle kilometres of less than 0.5%.

In practice, the percentage reduction in vehicle kilometres would be lower as some of the BSIP patronage increase would result from people also switching from walking, cycling, travelling as a car passenger or not travelling.

Achieving material reductions in car vehicle kilometres through mode switch to active travel would be more challenging because existing demand is lower and trips are shorter.

The current travel demands by mode outlined above reflect high levels of car ownership which in turn represents the main challenge to achieving mode shift. As outlined in Section 4.2, most costs of car ownership are up-front or occasional. This means that the additional per trip costs of car use are relatively low, particularly where parking is convenient and low cost and road space allocation favours private vehicles. This means that, for car owners, a car is likely to be perceived as the most convenient and low-cost option for most trips.

Many of the TWTP policies would improve the quality and range of public transport and active travel options. They will bring a number of benefits for Telford and Wrekin, including increased accessibility. However, in most areas, they are unlikely to deliver significant mode shift from car if delivered in an incremental way, as outlined above.

Whilst the measures will provide improved capability and opportunity to shift modes, for many drivers the changes would not be sufficient to provide the motivation to change (as identified in the COM-B model in Figure 6). Potential responses would vary between area types. Motivation for mode shift is more likely on urban corridors where density of trip

[18] Telford & Wrekin Council (2025) Bus Service Improvement Plan. Available at: Telford & Wrekin Council | The National Bus Strategy

patterns makes attractive public transport options more viable and limited space makes car trips slower (due to congestion) and parking more difficult.

The difference between area types highlights the importance of the wider context in achieving mode shift. Figure 9 showed that integrated action across five broad types of measure would be needed in most area types to change the balance of perceived cost and convenience between modes and encourage mode shift.

In addition to improvements to public and active travel options and information, planning changes would be needed. Changes would involve relocating services and activities to be more readily accessed by public transport and active travel and reallocating space in prime central areas away from parking and private vehicle use to other purposes and modes.

Changes in approach to car use would also be needed. In particular, a change to pay per use would make a valuable contribution. This approach would allow people to use cars for those trips that are not possible by other modes without needing to own a car. The full costs of car travel per trip would also be considered, comparable with other modes (in contrast to car owners perceiving low per trip costs).

Without these wider changes in the context for travel choices, in most areas, delivering improvements in public transport and active travel incrementally is unlikely to achieve significant mode shift from car.

Influences on the impact of Avoid measures

The patterns described above relating to car ownership and convenience of car use are also relevant for the impact of Avoid measures. They limit the ability to reduce vehicle kilometres by reducing trip length. The extra cost and time of longer journeys to reach a service or shop may not be perceived to be significant when the journey is made by car, reducing the appeal of more local options.

The emissions impact of possible Avoid TWTP measures would also be influenced by the pace at which planning changes allow the improvement of local services and activities and the fact that new development accounts for a relatively small proportion of trips. Even if new developments include exemplar travel patterns and mode share, the net impact on trips across Telford and Wrekin will be low.

The scale of impact of Avoid measures also depends on action by other stakeholders. TWTP policies would play a role in reducing travel through increases in online and local activity, however significant change will also require measures to be delivered by other parties. For example, collaboration with internet providers would be needed to improve high-speed broadband coverage, and with businesses and other organisations to increase levels of online activity.

Influences on the impact of Improve measures

Similarly, the impact of Improve policies and supporting measures included in the TWTP will depend on action by other stakeholders including individuals, organisations and other sectors.

For instance, roll-out of charging points is a necessary component of encouraging EV uptake but charging point availability is only one of many factors affecting the choice to buy or use an EV. Other possible TWTP measures could help to raise EV awareness and provide opportunities for uptake (such as through car clubs and supporting corporate fleet uptake). However, several other influences beyond the scope of LTP (such as travel patterns, perceptions of vehicle types and affordability and vehicle production and

availability) will also affect the decisions by individuals or businesses over whether to use EVs.

It is also important to note that the rate of EV uptake assumed as a reference case (in the Playbook and by the DfT) is relatively rapid to 2030. Proposed TWTP measures such as charging points may be needed to support the reference case rate of change rather than achieving a further acceleration and reduction in emissions.

Influences on the potential impact of the TWTP on WLC emissions

Looking beyond user emissions to whole lifecycle carbon (WLC) emissions, local action will be important in limiting the capital and operating emissions of transport interventions. In line with the fit for the future guiding principle, this will involve ensuring that careful carbon management is undertaken to make best use of existing infrastructure and limit the capital and operational carbon of any new infrastructure, equipment or fleet.

This approach is important because any TWTP measures involving new and extended infrastructure, vehicle fleets and equipment will inevitably generate wider lifecycle emissions: capital emissions through the production of materials and energy used in construction and production, and operational emissions through ongoing maintenance and operation.

The level of capital and operational emissions generated will depend on a range of factors including:

- The routes and designs chosen, including the extent of use of existing infrastructure and assets (rather than building new).
- The approach to design and choice of materials for construction/ production. Locally sourced materials and low carbon and nature-based design reduce emissions.
- The choice of construction machinery and energy sources.

The whole lifecycle impact of measures on emissions will reflect the combined effect of user, capital and operating emissions impacts.

For proposals that are intended to reduce road travel or emissions per kilometre, the net lifecycle emissions impact will depend on the balance between capital emissions of construction and production, operational emissions and the ongoing user savings. The balance can be considered in terms of a ‘payback period’ - the time taken for the user savings achieved year on year to offset or ‘pay back’ the upfront capital carbon and operational carbon.

For proposals that increase road travel, there will be a whole lifecycle increase in carbon emissions generated through both the user and non-user stages.

The TWTP Carbon Baseline report sets out some illustrative payback periods for different scheme types based on benchmark estimates of infrastructure emissions from the DfT’s Local Transport Infrastructure Carbon Benchmarking Tool (LTICBT)[19]. The LTICBT provides high-level estimates of capital and operational carbon for a range of types of local transport measures. Comparing the benchmarks against potential user emissions savings highlighted a series of useful messages to inform the review of the potential emissions impact of the TWTP.

[19] Available at: Local transport infrastructure carbon benchmarking tool - GOV.UK

- Capital carbon will be a significant component of the net emissions impact of the TWTP.
- Significant and sustained mode shift from car will be needed to 'pay back' the capital carbon of bus and cycle lanes.
    - As the car fleet becomes electrified it will become increasingly challenging for the upfront capital carbon in infrastructure to be 'paid back' through user savings achieved through mode shift unless there are substantial reductions in the carbon intensity of construction.
- A 'low infrastructure' approach can bring more rapid pay-back times.
    - For instance, the LTICBT estimates indicate that, if cycle priority for 1 km can be achieved through light segregation, a mode shift of 100 trips from car per day (both directions combined, assuming average cycle trip length) could pay back the capital and operational carbon of segregation within about a year. In contrast, the same level of mode shift would take 14 years to pay back the capital emissions in a fully-kerbed cycle track or over 60 years for a stepped cycle track.
- User emissions are the most significant component of the lifecycle emissions of a road where construction is relatively simple. In the examples given in the LTICBT, the capital and operational emissions of each kilometre of road are equivalent to about 5 years of car use emissions on that section of road or less (and the number of years would be lower for busier roads or if emissions associated with freight vehicles were also accounted for).
- However, when there is a need for complex structures such as bridges, capital carbon increases significantly as a proportion of the total lifecycle emissions. The capital carbon per kilometre for the two example 15m wide bridges provided in the LTICBT are equivalent to more than 60 years of car traffic emissions on each kilometre (assuming uncongested traffic conditions).

When detailed TWTP measures are proposed for implementation, it will be important to understand the carbon impacts from a whole lifecycle perspective. This will help to ensure that measures proposed to reduce user savings are not undermined by significant capital and operational carbon implications and to identify opportunities for carbon management to optimise carbon outcomes, in line with the fit for the future guiding principle.

Estimated impact of the measures in the first Delivery Plan

A high level estimate of the WLC impact of the measures proposed in Delivery Plan for the period 2027 to 2030 has been undertaken, focussing on the interventions that would deliver a change to the transport system during the 2027 to 2030 window. The elements of the plan that relate to undertaking research and analysis to support development of interventions to be implemented after 2030 were not included in the analysis.

The estimate provides an understanding of the scale of impact of the measures, drawing on available information and scheme details at this stage. It is not a detailed bottom-up assessment of carbon impacts, as information is limited in most cases. The emissions impacts of each scheme will need to be revisited in more detail as they progress.

A range of approaches and tools were used to estimate the impacts and make best use of available data, as set out in Appendix E. Estimate of emissions impact of first Delivery Plan

The estimates indicate that the mode shift impacts of the proposed measures in the Delivery Plan have the potential to reduce user emissions by up to 20 to 30 tonnes CO_2e per year by 2030. This equates to approximately 0.01% of annual user emissions.

The impacts of road schemes are predicted to be more significant but more uncertain, with the estimated impact in 2030 ranging from an increase of approximately 1500 tonnes CO_2e per year to a decrease of 500 tonnes CO_2e per year. The actual impact will depend on the balance of impact on vehicle kilometres and increases and decreases in congestion levels at different points on the network.

The combined estimated impact on user emissions ranges between an increase and decrease of less than 0.5% of annual user emissions.

The infrastructure emissions associated with the Delivery Plan measures are estimated to be of the order of 2000 to 3000 tonnes CO_2e, equivalent to 0.5% to 1% of annual user emissions in 2030.

Over the three year period the combined impacts of the different lifecycle stages equate to an increase, equivalent to up to 1% of annual user emissions.

This initial assessment highlights the points made in previous sections reflecting the challenge of achieving a balance of measures that results in a significant net decrease in emissions and the significance of infrastructure emissions and associated importance of carbon management to optimise carbon outcomes as the TWTP measures are implemented.

7. Future action

This review of the potential emissions impact of the TWTP has highlighted the challenge of achieving significant carbon emissions savings through local transport measures. The first Delivery Plan is predicted to deliver a very limited reduction in emissions through mode shift measures, which is likely to be offset by increases in emissions due to road capacity improvements. The infrastructure emissions associated with proposed infrastructure and equipment will offset any user savings. The overall impacts combine to an increase that equates to up to 1% of annual user emissions each year.

Delivering a significant reduction in user emissions through later Delivery Plans to help to close the emissions gap would require implementation of a wide range of integrated measures, with a focus on those policies that support road travel reduction. Achieving emissions reductions will also need aligned, meaningful action through wider economic and planning policies in Telford and Wrekin, along with action from central government to accelerate decarbonisation of transport.

The scale of action needed to meet decarbonisation commitments is most likely to be achieved if a clear and shared priority to reduce road transport emissions is established across local and national government. This would support stakeholders in delivering a coordinated set of measures that support more sustainable travel choices, including Avoid and Shift measures to support reductions in mileage travelled by car. The scale and pace of decarbonisation of the car, goods vehicle and public transport fleets needed (the Improve measures) will also require significant action by industry and central government.

Framing the actions within a widely supported vision would help maximise their effectiveness while ensuring that improvements to road travel do not inadvertently offset emissions savings. Without this shared direction, the potential for positive emissions outcomes may be significantly diminished.

TWTP's estimated emissions impact will need to be revisited as later Delivery Plans are developed and the balance of measures to be implemented is identified.

Irrespective of the balance of schemes adopted in the Delivery Plans, it will be critical to continue to ensure that WLC impacts are considered throughout TWTP decision making and scheme development to optimise emissions impacts of individual interventions, in line with the TWTP's fit for the future guiding principle.

Appendix A. Carbon emissions in scope for TWTP influence

Influence by vehicle type

As for all LTPs, there will be greatest scope for TWTP measures to influence emissions from car and van trips for private purposes. Freight trips are largely cross boundary and mainly influenced by commercial decisions made in the private sector and by national action. LTP measures are likely to be limited to influencing the local delivery leg of freight journeys. Measures can improve local pollutant emissions and traffic conditions but have limited impacts on carbon emissions because they only influence a small proportion of HGV mileage.

The TWTP Carbon Baseline Report indicates that cars currently account for 59% of road transport emissions in Telford and Wrekin, HGVs for 19% and LGVs for 17%. These proportions will change in the future as projected uptake of ZEVs in the HGV fleet is slower than in the car and LGV fleet. By 2050, HGVs are projected to account for 28% of emissions (cars for 49%, LGVs for 19%) in the Business-as-Usual scenario identified in the Midlands Connect Emissions Baseline Dashboard. This balance will vary with different assumptions on ZEV uptake.

Influence by trip origin and destination

The potential for LTP measures to influence car and van trips will also vary according to the origin and destination of the trip.

LTP measures are likely to have the greatest influence over journeys which are wholly within Telford and Wrekin meaning that measures can influence travel choices at both the trip origin and destination.

Analysis presented in the TWTP Carbon Baseline Report, using data from the Midlands Connect Dashboard, indicates that trips wholly within Telford and Wrekin area are currently estimated to account for nearly 30% of emissions.

TWTP measures will also have the potential to influence many of the journeys which start or end within Telford and Wrekin (travelling outbound or inbound). These trips can potentially be affected by measures which influence factors such as parking provision or access to cross-boundary public transport routes.

The Midlands Connect Dashboard indicates that inbound and outbound trips account for nearly 40% of transport emissions within Telford and Wrekin, mainly travelling to and from Shropshire and the wider West Midlands.

Nearly 35% of emissions are generated by trips passing through Telford and Wrekin. TWTP measures are generally unlikely to significantly affect through trips as choices about mode, vehicle type and routing for the trips are mainly driven by factors outside Telford and Wrekin's boundaries.

There will also be variation in the potential for the TWTP to influence emissions for different trip types. It is widely recognised that there is more scope to influence trips within and between urban areas than in less densely populated areas. The density of trip

patterns and lengths of trips within urban areas means that it there is more scope to provide attractive, viable alternatives to car use.

Analysis in the Carbon Baseline Report highlights that central Telford is a particularly significant generator and attractor of trips and carbon and these movements would be a key area for focussing decarbonisation measures.

In contrast, the more dispersed emissions from rural areas and less busy movements, whilst summing to significant totals, are more challenging to address and influence measures cannot be focussed solely on select movements and hotspots.

Appendix B. Logic-based review of carbon impact of TWTP policies

Overview

The Transport Vision & Strategy includes 54 policies in support of the four guiding principles and their underlying goals.

The potential for each policy to either increase or decrease carbon emissions was reviewed using a high level, logic-based approach. This involved reviewing each policy against each of the routes to emissions reduction or increase described in Section 4, i.e.:

- User emissions
  - Avoid routes – policy causes changes in trip numbers and/or length
  - Shift routes – policy causes mode shift from or to road travel
  - Improve – policy causes uptake in ZEV and/or changes in driving conditions (particularly congestion levels)
- Infrastructure/embodied emissions
  - Requirement for new or amended infrastructure

The assessment identified whether each policy would be likely to have a positive, negative or neutral impact on emissions through each route. The key influences on the potential overall scale of impact were also recorded. .

The following tables summarise the results of the review process. Each column represents one of the routes to emissions reduction or increase described in Section 4. The rows represent the 54 policies outlined in the TWTP. The entries in the table indicate the potential routes through which each category of measure could influence user and infrastructure/embodied emissions and the key influences on their scale of impact.

The shading in the tables distinguishes between clear routes to increasing or decreasing emissions (darker colours) and less certain potential routes (lighter colours). The shades do not indicate relative scale of impact between different measures. There is not sufficient information available on the policies and their implementation at this stage to support a robust estimate of relative scale of impact. Therefore, the focus of the assessment has instead been on understanding direction of impact to understand issues and trade-offs in the impacts of the policies.

Guiding principle and policy					User emissions											Infrastructure/ Embodied
					Key influences	Avoid			Shift		Improve					
						Road trip numbers & length			Shift from road to other modes		ZEV uptake			Improved traffic conditions		
Guiding Principle	Goal		Policy			Travel by individuals	Bus/coach/rail	Freight	Car veh km	Freight veh km	Car	GV	Bus	Car & GV	Bus	
1: Transforming Travel Choices	a	Walking, wheeling and cycling are safer, more accessible and attractive travel options	TT1	Deliver a priority network for walking and wheeling.	Scale of coverage of improvements - population, number and length of trips affected, relative attractiveness of travel by car and the amount and type of new infrastructure and equipment	N/A	N/A	N/A	Mode shift	N/A	N/A	N/A	N/A	*Reduced car trip numbers due to mode shift may alleviate congestion (limited impact due to trip length) and prioritisation measures may reallocate road space, increasing congestion*	*Reduced car trip numbers due to mode shift may alleviate congestion (limited impact due to trip length) and prioritisation measures may reallocate road space, increasing congestion*	New infrastructure for priority and equipment for crossings, lighting, facilities etc
1: Transforming Travel Choices	a	Walking, wheeling and cycling are safer, more accessible and attractive travel options	TT2	Deliver a priority network for cycling.	Scale of coverage of improvements - population, number and length of trips affected, relative attractiveness of travel by car and the amount and type of new infrastructure and equipment	N/A	N/A	N/A	Mode shift	N/A	N/A	N/A	N/A	*Reduced car trip numbers due to mode shift may alleviate congestion (limited impact due to trip length) and prioritisation measures may reallocate road space, increasing congestion*	*Reduced car trip numbers due to mode shift may alleviate congestion (limited impact due to trip length) and prioritisation measures may reallocate road space, increasing congestion*	New infrastructure for priority and equipment for crossings, lighting, facilities etc
1: Transforming Travel Choices	a	Walking, wheeling and cycling are safer, more accessible and attractive travel options	TT3	Support secure and convenient cycle parking and facilities.	Scale of coverage of improvements - population, number and length of trips affected (e.g. extent to which improvements support PT travel as well), relative attractiveness of travel by car and the amount and type of new infrastructure and equipment	N/A	N/A	N/A	Mode shift	N/A	N/A	N/A	N/A	Reduced trip numbers may alleviate congestion (limited imact due to trip length	Reduced trip numbers may alleviate congestion (limited imact due to trip length	New equipment, facilities etc

Guiding principle and policy					User emissions											Infrastructure/ Embodied
					Key influences	Avoid			Shift		Improve					
						Road trip numbers & length			Shift from road to other modes		ZEV uptake			Improved traffic conditions		
Guiding Principle	Goal		Policy			Travel by individuals	Bus/coach/rail	Freight	Car veh km	Freight veh km	Car	GV	Bus	Car & GV	Bus	
1: Transforming Travel Choices	a	Walking, wheeling and cycling are safer, more accessible and attractive travel options	TT4	Maintain and enhance our leisure routes including Public Rights of Way.	Scale and coverage of improvements, whether they will encourage additional trips to leisure destinations and whether they will be by car, cycle, on foot or PT. Amount of	Potential additional car trips to leisure locations (to then walk/cycle)	N/A	N/A	Potential mode shift (on journeys to and from leisure locations)	N/A	N/A	N/A	N/A	N/A	N/A	New infrastructure for priority and equipment for crossings, lighting, facilities etc
1: Transforming Travel Choices	b	Public transport is frequent, reliable and more affordable	TT5	Work with operators to develop a comprehensive bus network.	Scale of coverage of improvements - population, number and length of trips affected, relative attractiveness of travel by car and the amount and type of new infrastructure, vehicles and equipment	N/A	Potential additional services	N/A	Mode shift	N/A	N/A		Possible new ZEB	*Reduced trip numbers may alleviate congestion but prioritisation measures may reallocate road space, increasing congestion*	Reduced trip numbers and prioritisation measures may alleviate congestion	New infrastructure for priority and equipment for crossings, facilities etc. Potential new buses
1: Transforming Travel Choices	b	Public transport is frequent, reliable and more affordable	TT6	Work with operators to improve bus reliability and speed up journeys.	Scale of coverage of improvements - population, number and length of trips affected, relative attractiveness of travel by car and the amount and type of new infrastructure and equipment	N/A	N/A	N/A	Mode shift	N/A	N/A	N/A	N/A	*Reduced trip numbers may alleviate congestion but prioritisation measures may reallocate road space, increasing congestion*	Reduced trip numbers and prioritisation measures may alleviate congestion	New infrastructure for priority and equipment for crossings, facilities etc.
1: Transforming Travel Choices	b	Public transport is frequent, reliable and more affordable	TT7	Work with operators to increase bus frequencies.	Scale of coverage of improvements - population, number and length of trips affected, relative attractiveness of travel by car and the number of new buses	N/A	Additional services/frequency	N/A	Mode shift	N/A	N/A	N/A	Possible new ZEB	*Reduced trip numbers may alleviate congestion*	*Reduced trip numbers may alleviate congestion*	Likely new vehicle fleet

Guiding principle and policy					User emissions										Infrastructure/ Embodied
					Key influences	Avoid			Shift		Improve				
						Road trip numbers & length			Shift from road to other modes		ZEV uptake			Improved traffic conditions	
Guiding Principle	Goal		Policy			Travel by individuals	Bus/coach/rail	Freight	Car veh km	Freight veh km	Car	GV	Bus	Car & GV	Bus
1: Transforming Travel Choices	b	Public transport is frequent, reliable and more affordable	TT8	Support simple and affordable public transport ticketing.	Scale of coverage of improvements - population, number and length of trips affected, relative attractiveness of travel by car	N/A	N/A	N/A	Mode shift	N/A	N/A	N/A	N/A	*Reduced trip numbers may alleviate congestion*	*Reduced trip numbers may alleviate congestion*	N/A
1: Transforming Travel Choices	b	Public transport is frequent, reliable and more affordable	TT9	Improve links to bus stops and rail stations.	Scale of coverage of improvements - population, number and length of trips affected, relative attractiveness of travel by car and the amount and type of new infrastructure and	N/A	N/A	N/A	Mode shift	N/A	N/A			*Reduced trip numbers may alleviate congestion*	*Reduced trip numbers may alleviate congestion*	New infrastructure and equipment for crossings, facilities potential mobility hubs etc.
1: Transforming Travel Choices	b	Public transport is frequent, reliable and more affordable	TT10	Explore opportunities for very light rail.	Scale of coverage and quality/attractiveness of light rail provision - population, number and length of trips affected, relative attractiveness of travel by car	N/A	New services	N/A	Mode shift	N/A	N/A			*Reduced car trip numbers due to mode shift may alleviate congestion and prioritisation measures may reallocate road space, increasing congestion*	*Reduced car trip numbers due to mode shift may alleviate congestion and prioritisation measures may reallocate road space, increasing congestion*	New infrastructure, vehicles and equipment
1: Transforming Travel Choices	b	Public transport is frequent, reliable and more affordable	TT11	Develop a rail strategy.	Scale of coverage and quality/attractiveness of rail improvements - population, number and length of trips affected, relative attractiveness of travel by car	N/A	Potential additional services	N/A	Mode shift	N/A	N/A			*Reduced trip numbers may alleviate congestion*	*Reduced trip numbers may alleviate congestion*	New infrastructure, equipment and potential new rolling stock
1: Transforming Travel Choices	b	Public transport is frequent, reliable and more affordable	TT12	Support tourism-focused public transport.	Level of awareness of P&R and tourist services, attractiveness relative to car access, amount of new equipment, facilities, number of new vehicles	N/A	P&R and possible other tourist bus services	N/A	Mode shift	N/A	N/A		Possible new ZEB	*Reduced trip numbers particularly at busy tourist destinations likely to alleviate congestion*	*Reduced trip numbers particularly at busy tourist destinations likely to alleviate congestion*	Potential equipment/facilities (e.g. bus shelters, signs), potential new buses/minibuses

Guiding principle and policy					User emissions										Infrastructure/ Embodied
					Key influences	Avoid			Shift		Improve				
						Road trip numbers & length			Shift from road to other modes		ZEV uptake			Improved traffic conditions	
Guiding Principle	Goal		Policy			Travel by individuals	Bus/coach/rail	Freight	Car veh km	Freight veh km	Car	GV	Bus	Car & GV	Bus
1: Transforming Travel Choices	c	People are supported to make informed and sustainable travel choices	TT13	Continue to deliver behaviour change and travel awareness programmes.	Scale of coverage of programmes - population, number and length of car driving trips affected and quality of alternatives	Trip chaining and/or shorter trips due to travel planning	N/A	N/A	Mode shift	N/A	N/A	N/A	N/A	*Reduced trip numbers may alleviate congestion*	*Reduced trip numbers may alleviate congestion*	N/A
1: Transforming Travel Choices	c	People are supported to make informed and sustainable travel choices	TT14	Provide travel information in user friendly formats.	Scale of coverage and roll out of information - population, number and length of car driving trips affected and quality of alternatives information covers. Number of new signs/shelters	N/A	N/A	N/A	Mode shift	N/A	N/A				*Reduced trip numbers may alleviate congestion*	Potential additional bus shelter and signs provision
1: Transforming Travel Choices	c	People are supported to make informed and sustainable travel choices	TT15	Work with our partners to plan for major events.	Scale of events, number of car trips affected, quality of alternatives provided relative to car	N/A	Additional services	Potential improved coordination of deliveries	Mode shift	N/A	N/A	N/A	N/A	*Reduced trip numbers particularly at busy tourist destinations likely to alleviate congestion*	*Reduced trip numbers particularly at busy tourist destinations likely to alleviate congestion*	Potential additional buses/mini buses and signs

Guiding principle and policy					User emissions											Infrastructure/ Embodied
				Key influences	Avoid			Shift		Improve						
					Road trip numbers & length			Shift from road to other modes		ZEV uptake			Improved traffic conditions			
Guiding Principle	Goal		Policy		Travel by individuals	Bus/coach/rail	Freight	Car veh km	Freight veh km	Car	GV	Bus	Car & GV	Bus		
2: Improving accessibility	a	Thriving and healthy local communities	IA1	Support sustainable access to employment, education and healthcare.	Scale of coverage of improvements - population, number and length of trips affected, relative attractiveness of travel by car and the amount and type of new infrastructure and equipment	Shorter trips as a result of right services in right places approach	Additional services	N/A	Mode shift	N/A	N/A		Possible new ZEB	*Reduced trip numbers may alleviate congestion*	*Reduced trip numbers may alleviate congestion*	Potential additional buses/mini buses and signs
2: Improving accessibility	a	Thriving and healthy local communities	IA2	Broaden travel choices in suburban and rural areas.	Scale of coverage of improvements - population, number and length of trips affected, relative attractiveness of travel by car and number of new vehicles and equipment	N/A	Potential additional services/ expansion of DRT coverage	N/A	Mode shift	N/A	N/A		Possible new ZEB	*Reduced trip numbers may alleviate congestion*	*Reduced trip numbers may alleviate congestion*	Infrastructure e.g. EV chargers and mobility hubs, equipment and signage and potential additional buses/mini buses
2: Improving accessibility	a	Thriving and healthy local communities	IA3	Deliver placemaking and regeneration.	Scale of coverage of improvements - population, number and length of trips affected, attractiveness of centres relative to others, relative attractiveness of car and other modes for reaching the centre	Possible additional short car trips attracted to more attractive places and/or possible shortening of longer trips to use more local centre instead		N/A	Mode shift	N/A	N/A			*Reduced car trip numbers due to mode shift may alleviate congestion and prioritisation measures may reallocate road space, increasing congestion*	*Reduced car trip numbers due to mode shift may alleviate congestion and prioritisation measures may reallocate road space, increasing congestion*	Public realm improvements e.g. infrastcructure and signs
2: Improving accessibility	a	Thriving and healthy local communities	IA4	Link communities together.	Scale of coverage of improvements - population, number and length of trips affected, relative attractiveness of travel by car and number of new vehicles and amount of new infrastructure, facilities and	N/A	N/A	N/A	Mode shift	N/A	N/A	N/A	N/A	*Reduced car trip numbers due to mode shift may alleviate congestion and prioritisation measures may reallocate road space, increasing congestion*	*Reduced car trip numbers due to mode shift may alleviate congestion and prioritisation measures may reallocate road space, increasing congestion*	Infrastructure improvements, crossings, signs, equipment etc

Guiding principle and policy					User emissions											Infrastructure/ Embodied
				Key influences	Avoid			Shift		Improve						
					Road trip numbers & length			Shift from road to other modes		ZEV uptake			Improved traffic conditions			
Guiding Principle	Goal		Policy		Travel by individuals	Bus/coach/rail	Freight	Car veh km	Freight veh km	Car	GV	Bus	Car & GV	Bus		
2: Improving accessibility	a	Thriving and healthy local communities	IA5	Continue to partner with communities.	No direct effect findings from engagement will feed into measures represented on other rows	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
2: Improving accessibility	a	Thriving and healthy local communities	IA6	Support improved digital connectivity.	Scale of coverage of improvements - population, range of services and opportunities available online	Switch to online alternatives to travel (e.g. shopping, work, appointments)		Increased deliveries due to increased online shopping	N/A	N/A	N/A	N/A	N/A	N/A	N/A	Potential additional internet infrastructure
2: Improving accessibility	b	Everyone feels safe to travel	IA7	Develop a new road safety strategy and adopt a safe systems approach.	Scale of coverage of strategy, number and length of trips affected. Amount of infrastructure changes and equipment involved	N/A	N/A	N/A	*Possible mode shift to walking/cycling due to increased sense of safety*	N/A	N/A	N/A	N/A	*Changes in road capacity and speed limits and mode shift due to safety schemes may influence congestion in either direction*	*Changes in road capacity and speed limits and mode shift due to safety schemes may influence congestion in either direction*	Infrastructure changes and changes in signage/equipment
2: Improving accessibility	b	Everyone feels safe to travel	IA8	Empower everyone to travel safely on our roads, progressing towards vision zero. We will support safer road use by empowering all users to travel responsibly through a range of education and	Scale of coverage of training	N/A	N/A	N/A	*Possible mode shift to walking/cycling due to increased sense of safety*	N/A	N/A	N/A	N/A	*Reduced trip numbers may alleviate congestion*	*Reduced trip numbers may alleviate congestion*	N/A

Guiding principle and policy					User emissions												Infrastructure/ Embodied
					Key influences	Avoid			Shift		Improve						
						Road trip numbers & length			Shift from road to other modes		ZEV uptake			Improved traffic conditions			
Guiding Principle	Goal		Policy			Travel by individuals	Bus/coach/rail	Freight	Car veh km	Freight veh km	Car	GV	Bus	Car & GV	Bus		
2: Improving accessibility	b	Everyone feels safe to travel	IA9	Design for safety.	Amount and type of additional infrastructure and equipment. Extent to which changes influence perception and encourage mode shift	N/A	N/A	N/A	*Possible mode shift to walking/cycling due to increased sense of safety*	N/A	N/A	N/A	N/A	*Changes in road capacity and speed limits and mode shift due to safety schemes may influence congestion in either direction*	*Changes in road capacity and speed limits and mode shift due to safety schemes may influence congestion in either direction*		Infrastructure changes and changes in signage
2: Improving accessibility	b	Everyone feels safe to travel	IA10	Improve the experience of personal security, particular for more vulnerable	Amount and type of additional infrastructure and equipment. Extent to which changes influence perception and encourage mode shift	N/A	N/A	N/A	Mode shift due to improved sense of security	N/A	N/A			*Reduced trip numbers may alleviate congestion*	*Reduced trip numbers may alleviate congestion*		Likely new equipment e.g. lighting, CCTV
2: Improving accessibility	c	An inclusive and accessible transport network	IA11	Improve bus, stop, station and vehicle accessibility.	Amount and type of additional infrastructure and equipment. Extent to which changes influence perception and encourage mode shift	N/A	N/A	N/A	Mode shift due to improved accessibility (potentially away from lift or taxi)	N/A	N/A			*Reduced trip numbers may alleviate congestion*	*Reduced trip numbers may alleviate congestion*		Infrastructure amendments and likely new equipment e.g. lighting, CCTV
2: Improving accessibility	c	An inclusive and accessible transport network	IA12	Continue to support Dial-a-Ride.	Extent of additional mileage, type of vehicle used and amount of car and taxi trips saved	N/A	Additional dial a ride mileage	N/A	Mode shift due to improved accessibility (potentially away from lift or taxi)	N/A	N/A			*Reduced trip numbers may alleviate congestion*	*Reduced trip numbers may alleviate congestion*		Potential additional mini buses/vehicles

Guiding principle and policy					User emissions												Infrastructure/ Embodied
					Key influences	Avoid			Shift		Improve						
						Road trip numbers & length			Shift from road to other modes		ZEV uptake			Improved traffic conditions			
Guiding Principle	Goal		Policy			Travel by individuals	Bus/coach/rail	Freight	Car veh km	Freight veh km	Car	GV	Bus	Car & GV	Bus		
2: Improving accessibility	c	An inclusive and accessible transport network	IA13	Improve railway station facilities and accessibility.	Amount and type of additional infrastructure and equipment. Extent to which changes influence perception and encourage mode shift	N/A	N/A	N/A	Mode shift due to accessibility	N/A	N/A			*Reduced trip numbers may alleviate congestion*	*Reduced trip numbers may alleviate congestion*		Infrastructure amendments and likely new equipment e.g. lighting, CCTV
2: Improving accessibility	c	An inclusive and accessible transport network	IA14	Provide accessible information and ticketing for all.	Scale of coverage of improvements - population, number and length of trips affected, relative attractiveness of travel by car	N/A	N/A	N/A	Mode shift	N/A	N/A	N/A	N/A	*Reduced trip numbers may alleviate congestion*	*Reduced trip numbers may alleviate congestion*		New information displays at bus stos etc
2: Improving accessibility	c	An inclusive and accessible transport network	IA15	Ensure taxis and private hire vehicles offer an accessible and safe service.		Possible additional trips as taxi provides an option for more trips	N/A	N/A	Possible mode shift to taxi if improvements make more convenient than car	N/A	N/A	N/A	N/A	N/A	N/A		Possible amendments to taxis

Guiding principle and policy					User emissions											Infrastructure/ Embodied
				Key influences	Avoid			Shift		Improve						
					Road trip numbers & length			Shift from road to other modes		ZEV uptake			Improved traffic conditions			
Guiding Principle	Goal		Policy		Travel by individuals	Bus/coach/rail	Freight	Car veh km	Freight veh km	Car	GV	Bus	Car & GV	Bus		
3: Unlocking potential	a	Strong cross-border connections	UP1	Work with neighbouring areas to improve our cross-border connections.	Scale and type of change delivered, number, length and mode of trips and balance of action between modes. Amount of infrastructure and equpment change.	Increase in number and length of trips likely to be caused by improved road connections for longer distance trips between Telford and neighbouring authorities		Increase in number and length of trips likely to be caused by improved road connections for longer distance trips between Telford and neighbouring authorities	Mode shift for some longer journeys due to improved alternatives	N/A	N/A	N/A	N/A	N/A	N/A	N/A
3: Unlocking potential	a	Strong cross-border connections	UP2	Work with National Highways, Network Rail (and Great British Railways in the future) and train operators to improve our longer distance motorway and rail connections.	Scale and type of change delivered, number, length and mode of trips and balance of action between modes. Amount of infrastructure and equpment change.	Increase in number and length of trips likely to be caused by improved road connections for longer distance trips between Telford and neighbouring authorities		Increase in number and length of trips likely to be caused by improved road connections for longer distance trips between Telford and neighbouring authorities	Mode shift for some longer journeys due to improved alternatives	N/A	N/A	N/A	N/A	Potential alleviation of congestion/delay as a result of improved network management. Potentially offset to an extent by more high speed travel	Potential alleviation of congestion/delay as a result of improved network management. Potentially offset to an extent by more high speed travel	Infrastructure changes, charging/fuelling infrastructure, equipment, signage
3: Unlocking potential	a	Strong cross-border connections	UP3	Support long distance freight movements.	Nature of support, number and length of trips affected. Amount of infrastructure and equpment change.	N/A		Additional trips and mileage encourageed by further support	N/A	Possible shift from water/rail as road becomes more attractive. If support aso covers water and rail, possible mode shift to rail and water as they become more attracvie	N/A	Likely support for ZEV fuelling/charging	N/A	Potential alleviation of congestion/delay as a result of improved network management. Potentially offset to an extent by more high speed travel	Potential alleviation of congestion/delay as a result of improved network management. Potentially offset to an extent by more high speed travel	Infrastructure changes, charging/fuelling infrastructure, equipment, signage

Guiding principle and policy					User emissions											Infrastructure/ Embodied
				Key influences	Avoid			Shift		Improve						
					Road trip numbers & length			Shift from road to other modes		ZEV uptake			Improved traffic conditions			
Guiding Principle	Goal		Policy		Travel by individuals	Bus/coach/rail	Freight	Car veh km	Freight veh km	Car	GV	Bus	Car & GV	Bus		
3: Unlocking potential	b	Sustainable, mixed use developments	UP4	Support the current Local Plan.	Nature of improvements and their impact on trip numbers and lengths per person and on the level of attraction of different modes	May encourage more or less and shorter or longer trips depending on the travel options supported and the extent to which local centres for activity are provided and served by transport		May encourage more or less and shorter or longer delivery trips, depending on the approach taken to supporting deliveries	May encourage mode shift to or from car as a result of changes in the balance of attractivness of travelling by car/other modes	N/A	Likely to encourage ZEV uptake through charging provision and potential further measures to support EV uptake (e.g, car clubs)	N/A	N/A	May increase or decrease congestion depending on the impact on road trip numbers and on road space allocation	May increase or decrease congestion depending on the impact on road trip numbers and on road space allocation	Infrastructure, buildings (e.g. mobility hubs), new equipment/signage
3: Unlocking potential	b	Sustainable, mixed use developments	UP5	Transform the town centre through Station Quarter.	Scale and nature of change, number and length of trips affected, relative attractiveness of different modes. Amount of new infrastructure	May encourage shorter trips to Telford Town Centre rather than further afield and/or additional trips to the town centre	N/A	N/A	Mode shift, particularly to rail for trips to the town centre	N/A	N/A	N/A	N/A	May increase or decrease congestion depending on the impact on road trip numbers and on road space allocation in the central area	May increase or decrease congestion depending on the impact on road trip numbers and on road space allocation in the central area	Infrastructure, buildings, new equipment/signage
3: Unlocking potential	b	Sustainable, mixed use developments	UP6	Shape future Local Plan development.	Nature of vision and associated measures and their impact on trip numbers and lengths per person and on the level of attraction of different modes	May encourage more or less and shorter or longer trips depending on the travel options supported and the extent to which local centres for activity are provided and served by transport		May encourage more or less and shorter or longer delivery trips, depending on the approach taken to supporting deliveries	May encourage mode shift to or from car as a result of changes in the balance of attractivness of travelling by car/other modes	N/A	Likely to encourage ZEV uptake through charging provision and potential further measures to support EV uptake (e.g, car clubs)	N/A	N/A	May increase or decrease congestion depending on the impact on road trip numbers and on road space allocation	May increase or decrease congestion depending on the impact on road trip numbers and on road space allocation	Infrastructure, buildings (e.g. mobility hubs), new equipment/signage

Guiding principle and policy					User emissions												Infrastructure/ Embodied
					Key influences	Avoid			Shift		Improve						
						Road trip numbers & length			Shift from road to other modes		ZEV uptake			Improved traffic conditions			
Guiding Principle	Goal		Policy			Travel by individuals	Bus/coach/rail	Freight	Car veh km	Freight veh km	Car	GV	Bus	Car & GV	Bus		
3: Unlocking potential	b	Sustainable, mixed use developments	UP7	Integrate a range of transport options into new development.	Nature and quality of options provided and their impact on trip numbers and lengths per person and on the level of attraction of different modes	N/A	Additional services	N/A	Mode shift	N/A	Support for EV uptake through charging provision and parking spaces	N/A	N/A	*Reduced car trips may reduce congestion*	*Reduced car trips may reduce congestion*		Infrastructure, buildings (e.g. mobility hubs), charging points, new equipment/signage
3: Unlocking potential	c	A greater share of journeys are made by greener modes	UP8	Incentivise sustainable travel.	Extent of support, number of people and number and length of trips affected and relative attractiveness of cars	N/A	N/A	N/A	Mode shift	N/A	Support for EV uptake	N/A	N/A	*Reduced car trips may reduce congestion*	*Reduced car trips may reduce congestion*		Amendments to infrastructure for priority, new equipment, charging infrastructure, facilities etc
3: Unlocking potential	c	A greater share of journeys are made by greener modes	UP9	Implement smarter parking strategies that meet evolving needs.	Scale of change, nature of change and number of trips affected. Amount of new infrastructure/equipment	Reduction in/combination of trips if parking becomes less convenient/more expensive. Increase in trips if parking becomes more convenient	N/A	N/A	Mode shift away from car if parking becomes less convenient/more expensive. Increase in car trips if parking becomes more convenient	N/A	Possible support for EV uptake through parking charges/allocation	N/A	N/A	Changes in parking provision may decrease congestion by reducing the amount of circulating to look for parking spaces and the number of car trips to the centre or may increase congestion if parking encourages additional trips to busy areas	Changes in parking provision may decrease congestion by reducing the amount of circulating to look for parking spaces and the number of car trips to the centre or may increase congestion if parking encourages additional trips to busy areas		Additional signage/equipment provision and potential modifications to car parks and
3: Unlocking potential	c	A greater share of journeys are made by greener modes	UP10	Roll out more EV charging facilities.	Number and types of charger and number of drivers/vehicle operators who can access them	N/A	N/A	N/A	N/A	N/A	Supports decision to convert to EV	Supports decision to convert to EV	N/A	N/A	N/A		Charging infrastructure and possible additional vehicles
3: Unlocking potential	c	A greater share of journeys are made by greener modes	UP11	Support businesses and organisations to transition to electric fleets.	Number of EVs and mileage covered	N/A	N/A	N/A	N/A	N/A	Uptake of ZEV in corporate fleets	Uptake of ZEV	N/A	N/A	N/A		Additional vehicles and charging infrastructure

Guiding principle and policy					User emissions												Infrastructure/ Embodied
					Key influences	Avoid			Shift		Improve						
						Road trip numbers & length			Shift from road to other modes		ZEV uptake			Improved traffic conditions			
Guiding Principle	Goal		Policy			Travel by individuals	Bus/coach/rail	Freight	Car veh km	Freight veh km	Car	GV	Bus	Car & GV	Bus		
3: Unlocking potential	c	A greater share of journeys are made by greener modes	UP12	Support the transition to electric buses.	Number of EVs and mileage covered	N/A	N/A	N/A	Possible minor mode shift impact due to improved quality of new vehicles	N/A	N/A	N/A	Uptake of ZEB	N/A	N/A		Additional vehicles and charging infrastructure
3: Unlocking potential	c	A greater share of journeys are made by greener modes	UP13	Support sustainable local and last-mile freight movements.	Scale of influence, number and length of trips affected, extent to which micro consolidation centres are attractive to operators	Possible increase in trips to pick up deliveries, depending on consolidation approach	N/A	Reduction in larger goods vehicle trips within urban areas likely to reduce congestion	N/A	Use of carbo bike for last legs	N/A	Uptake of ZEV for last leg	N/A	Reduction in larger goods vehicle trips within urban areas likely to reduce congestion	Reduction in larger goods vehicle trips within urban areas likely to reduce congestion		Additional buildings/equipment for consolidation centres. Potential new vehicles for last leg

Guiding principle and policy					User emissions											Infrastructure/ Embodied
					Key influences	Avoid			Shift		Improve					
						Road trip numbers & length			Shift from road to other modes		ZEV uptake			Improved traffic conditions		
Guiding Principle	Goal		Policy			Travel by individuals	Bus/coach/rail	Freight	Car veh km	Freight veh km	Car	GV	Bus	Car & GV	Bus	
4: Fit for the future	a	Reliable and well-maintained networks	FF1	Maintain and manage our transport assets.	Number and type of assets saved and amount of asset renewal saved	Potential avoidance of diversions	Potential avoidance of diversions	Potential avoidance of diversions	N/A	N/A	N/A	N/A	N/A	Potential avoidance of disruption	Potential avoidance of disruption	Reduction in the need for new assets
4: Fit for the future	a	Reliable and well-maintained networks	FF2	Keep our transport network running smoothly.	Extent and effectiveness of management, balance of impact on different modes. Amount and type of infrastructure change and equipment required	Possible impacts through additional induced trips due to better conditions and/or rerouting to longer faster routes or shorter more direct routes as a result of improved traffic conditions	N/A	Possible impacts through rerouting to longer faster routes or shorter more direct routes as a result of improved traffic conditions	Possible mode shift to and from raod as a result of increased reliability of road journeys and bus journeys	N/A	N/A	N/A	N/A	Likely reduction in congestion (potentially partly offset by increased high speed travel)	Likely reduction in congestion (potentially partly offset by increased high speed travel)	Likely additional traffic management equipment and potential infrastucture changes
4: Fit for the future	b	Adaptable and resilient networks	FF3	Build in resilience to climate change and extreme weather.	Scale and nature of changes in design caused and success in terms of avoiding transport disruptiondue to weather conditions	Potential avoidance of diversions	Potential avoidance of diversions	Potential avoidance of diversions	N/A	N/A	N/A	N/A	N/A	Potential avoidance of disruption	Potential avoidance of disruption	*Amendments may result in more or less quantity and/or carbon intensity of infrastructure and equipment such as data assets*
4: Fit for the future	b	Adaptable and resilient networks	FF4	Embrace new transport data and technologies.	Scale and nature of changes to transport provision and management caused. Amount of new technological assets introduced.	N/A		N/A	Potential mode shift due to improved quality and reliability of alternatives	N/A	N/A	N/A	N/A	Improved network management and reduced delay	Improved network management and reduced delay	*Amendments may result in more or less quantity and/or carbon intensity of infrastructure and equipment such as data assets*

Guiding principle and policy					User emissions											Infrastructure/ Embodied
					Key influences	Avoid			Shift		Improve					
						Road trip numbers & length			Shift from road to other modes		ZEV uptake			Improved traffic conditions		
Guiding Principle	Goal		Policy			Travel by individuals	Bus/coach/rail	Freight	Car veh km	Freight veh km	Car	GV	Bus	Car & GV	Bus	
4: Fit for the future	c	Sustainably and inclusively designed networks	FF5	Seek opportunities to bring enhancement through transport	Scale and nature of changes in design caused. Amount of infrastructure required	N/A		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	*Amendments may result in more or less quantity and/or carbon intensity of infrastructure and equipment such as signs*
4: Fit for the future	c	Sustainably and inclusively designed networks	FF6	Protect areas that are recognised for their importance to conservation and biodiversity.	Scale and nature of changes in design required and implications for amount of infrastructure/equipment	N/A		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	*Amendments may result in more or less quantity and/or carbon intensity of infrastructure and equipment such as signs*
4: Fit for the future	c	Sustainably and inclusively designed networks	FF7	Protect Telford & Wrekin's landscape, townscape and historic environments.	Scale and nature of changes in design required and implications for amount of infrastructure/equipment	N/A		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	*Amendments may result in more or less quantity and/or carbon intensity of infrastructure and equipment such as signs*
4: Fit for the future	c	Sustainably and inclusively designed networks	FF8	Protect air and water environments from transport pollution.	Extent to which other measures to reduce travel, improve traffic management and achieve mode shift are successful. Level of infrastructure, assets, equipment required	Potential reduction in travel due to fewer/shorter trips	N/a	Potential reduction in travel due to fewer/shorter trips	Potential mode shift due to improved quality and reliability of alternatives	Potential mode shift due to improved quality and reliability of alternatives	Potential acceleration of EV uptake	Potential acceleration of EV uptake	Potential acceleration of EV uptake	Potential improved traffic flow	Potential improved traffic flow	Additional infrastructure (e.g. priority measures), vehicles and equipment/technology

Guiding principle and policy					User emissions											Infrastructure/ Embodied
					Key influences	Avoid			Shift		Improve					
						Road trip numbers & length			Shift from road to other modes		ZEV uptake			Improved traffic conditions		
Guiding Principle	Goal		Policy			Travel by individuals	Bus/coach/rail	Freight	Car veh km	Freight veh km	Car	GV	Bus	Car & GV	Bus	
4: Fit for the future	c	Sustainably and inclusively designed networks	FF9	Reduce whole-life carbon.	Scale/extent of carbon management	N/A		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	Reduced carbon across construction, maintenance and operation lifecycle stages of schemes
4: Fit for the future	c	Sustainably and inclusively designed networks	FF10	Protect natural resources and promote circular economy principles.	Scale of impact of policy on resource use	N/A		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	More efficient use of resources and inputs
4: Fit for the future	c	Sustainably and inclusively designed networks	FF11	Proactively consider health and equalities impacts.	No direct impact, considerations will feed into policies and measures listed on other rows	N/A		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A

Table 2: Review of potential emissions impacts of policies

Appendix C. Carbon Assessment Playbook Tests

Illustrative emissions impacts by type of measure – CAP

Overview

The Carbon Assessment Playbook (CAP)[20] produced by the Sub National Transport Bodies provides an indication of the relative scale of impact of different transport decarbonisation measures. The full set of 29 measures included in the Playbook is listed at the end of this Appendix.

The CAP draws on a summary of available evidence on the typical scale of impact that could be expected from each measure type, based on an international evidence review and modelling based on data from the National Travel Survey. The impacts focus largely on vehicle kilometre reductions achieved and are estimated for trips that are considered to be 'in scope' to be influenced by each intervention type (e.g. for a new bus service, car trips made for journeys served by the bus route are considered to be 'in scope').

The estimated impacts reflect the available evidence on variation of impacts of measures by broad area type (particularly between urban and rural areas). However, they do not reflect location-specific impacts such as different approaches to parking management or characteristics of the existing public transport system.

The estimated impacts should therefore be considered as illustrative of typical levels of impact only as the impacts of individual measures depend strongly on the transport context in which they are implemented. For instance, a bus lane would achieve more mode shift and emissions reduction if implemented on a busy corridor serving several bus routes than on a low traffic corridor with few routes.

Impacts of measures also depend on firstly the intensity of implementation and secondly the area over which they are implemented, determining the volume of trips in scope to be influenced. The combination of measures implemented together also influences impacts. For instance, bus measures are likely to achieve more mode shift if implemented alongside changes to parking availability and cost.

Illustrative tests

Although generalised, the CAP outputs provide a useful sense of the relative scale of impact of different types of measure. A series of high-level simple tests have therefore been undertaken using the CAP to provide additional metrics to help understand the influences on the potential scale of impact of the TWTP on emissions.

Seven high-level tests were run using the CAP. Six tests illustrated the impact of each of the different categories of measure included in the CAP. The seventh test assumes that all the measures in the previous six tests are applied in combination.

[20] Available at: Carbon Assessment Playbook

For simplicity, the tests made two simplifying assumptions. Firstly, an ambitious assumption was made that all measure types in each category would be fully applied by 2030 (recognising that in practice this implementation timescale would be very challenging for some of the measure types).

Secondly, a range of scale of application of measures was assumed to reflect differing levels of ambition. Simple illustrative assumptions were made that measures were applied across between 10% and 30% of Telford and Wrekin (covering all area types proportionately), applied to relevant trip types only (e.g. business travel plans applied to commuting from Telford & Wrekin and trips from Telford & Wrekin businesses).

This means, for example, that the upper-end active travel test assumes that on average 30% of trips across all area types would benefit from improved pedestrian and cycling infrastructure and e-bike hire schemes. In practice, it would be more difficult to achieve the 30% level of implementation for some measures (e.g. new public transport services) than others (e.g. fare changes). Additionally, implementation of measures would in practice tend to be focused on area types where the greatest impact could be achieved.

It was assumed that all measures would be applied at the average level of intensity identified in the CAP, representing the typical level of implementation in the examples and literature reviewed to develop the CAP. This assumption was consistent in both scenarios tested; they varied only in terms of the area of application i.e. the proportion of the borough assumed to be affected by the measures (10% or 30%).

The scenarios included nearly all of the measures in the CAP. The main exceptions were charging measures (road user charging, cordon-based charges, and a workplace parking levy); it has already been identified that these are unlikely to form part of the TWTP.

Some of the EV uptake support measures were also excluded. The CAP user guide indicates that the different measures to represent approaches to accelerate EV uptake each take the same approach of assuming that EV uptake is accelerated by a year. The guide advises against combining different measures as they are unlikely to produce an amplified effect in practice. On the basis of this guidance, only the EV charging infrastructure measure was included (campaigns for switch to LEV fleets and supporting EV uptake in corporate fleets were not included in the scenarios).

The tests were not intended to represent the specific impacts of the TWTP Vision & Strategy. Instead, they illustrate the potential scale of impact of the types of measure that are being considered for the TWTP. The upper end of the range represents an ambitious upper bookend of the likely scale of impact that TWTP decarbonisation measures might achieve. As the CAP focusses on decarbonisation measures, the tests do not account for measures that would increase emissions.

This estimated emissions impacts of the scenarios in 2035 are presented in Table 3. 2035 was selected as this is within the LTP time window but allows time for implementation whilst avoiding the greater uncertainty over issues such as behaviour change and EV uptake over longer time frames.

Category of measures	Reduction in CO_2e in 2035 (range) 10% T&W	Reduction in CO_2e in 2035 (range) 30% T&W	Measures included
Active travel	<0.1%	<0.2%	Walking and cycling infrastructure and e-mobility hire schemes.
Public transport	1%	2%	Bus priority measures, improved bus/LRT frequency, mobility hubs, reduced fares, DRT, extended public transport network, new rail station/line and integrated ticketing, information and MaaS.
Parking & traffic management	<0.5%	1%	On- and off-street parking measures and liveable neighbourhoods.
Fleet	1%	2%	EV charging infrastructure and low emissions public transport fleet.
Integrated planning policy	<0.5%	1%	Local service provision and high-density developments.
Behavioural change	1%	2%	Area-wide travel planning, EV car clubs, incentive-based apps, business & school travel plans & support for car sharing.
Combined	2%	6%	All of the above combined. Note: total impact is less than the sum of the component parts.

Table 3: Results of illustrative CAP tests

Impacts of different types of measure on user emissions

The results shown in the Table 3 illustrate that even the indicative ambitious level of implementation (across 30% of Telford and Wrekin) would have a relatively limited impact on emissions. The overall scenario assuming that all measures are applied is estimated to reduce emissions by approximately 6% by 2035.

The category of measure indicated to have the greatest potential to reduce emissions is further EV uptake including electric public transport fleet (Improve measures). The CAP represents EV support measures through the assumption that they accelerate EV uptake in the fleet by a year. In practice it would take widespread action to achieve this change across 30% of trips in Telford & Wrekin because the reference scenario used in the CAP already assumes relatively rapid EV uptake. Support and measures such as EV charging point roll-out are likely to be required to achieve the reference case levels of uptake before achieving any acceleration.

Within the Avoid and Shift measures considered in the CAP, the greatest indicated potential for emissions reduction is through extensive behavioural change and public transport improvements. The tests are ambitious and implementation in practice would face considerable funding and delivery challenges as it would take significant activity and expenditure to achieve the level of change in public transport provision and behavioural change programme implied by the tests across 30% of the local population.

Even if the change were achieved, the CAP indicates that the mode shift and travel change achieved by each category of measure would only equate to around 2% reduction

in emissions per year by 2035. This reinforces the challenge of significantly reducing emissions through mode shift to reduce car vehicle traffic. The results indicate that the category of parking and traffic management measures fall in the middle of the impact range, using the average values in the CAP. Impacts in individual locations would depend on factors including the extent of change in parking costs and provision and the options available for travel by other modes.

Integrated planning measures are also estimated to have a low impact, reflecting the fact that new development accounts for a small proportion of trips and local service provision have more significant impacts in urban areas than rural areas.

The active travel category of measures is projected to have a considerably lower impact than any of the other categories tested. This reflects the fact that the measures often achieve relatively little mode shift from car and the mode shift that does occur is from short trips. Impacts are increased where the active travel provides good connections to local centres (avoiding longer trips) and public transport, providing the first leg of longer trips.

CAP measures

Table 4 below lists the full set of measures included in the CAP by category.

Measure	A-S-I	Category
BC5 Business Travel Plans	Avoid	Behavioural change
BC6 Support for car sharing	Avoid	Behavioural change
IP1 20-Minute neighbourhoods	Avoid	Integrated planning policy
IP2 High density developments	Avoid	Integrated planning policy
AT1 Improved pedestrian infrastructure	Shift	Active travel
AT2 Improved cycling infrastructure	Shift	Active travel
AT3 (e-)Mobility hire schemes	Shift	Active travel
BC1 Area-wide travel planning/mobility management	Shift	Behavioural change
BC7 School Travel Plans	Shift	Behavioural change
BC2 EV car clubs	Shift	Behavioural change
BC3 Incentive based apps	Shift	Behavioural change
PC1 Road user charging/tolls	Shift	Parking, charging & traffic management
PC6 Cordon based charges and restrictions	Shift	Parking, charging & traffic management
PC2 Off-street parking measures	Shift	Parking, charging & traffic management
PC3 On-street parking measures	Shift	Parking, charging & traffic management
PC4 Workplace parking levy	Shift	Parking, charging & traffic management
PC5 Low Traffic Neighbourhoods (LTNs)	Shift	Parking, charging & traffic management
PT1 Bus priority measures	Shift	Public transport
PT2 Improved bus/LRT frequency	Shift	Public transport

Measure	A-S-I	Category
PT3 Mobility hubs	Shift	Public transport
PT4 Reduced public transport fares	Shift	Public transport
PT5 Demand responsive transport (DRT)	Shift	Public transport
PT6 Extended public transport network	Shift	Public transport
PT7 New rail stations/line opening	Shift	Public transport
TE1 Integrated ticketing, information & Mobility as a Service	Shift	Technology
BC4 Campaigns for switch to LEV fleets	Improve	Behavioural change
LE1 Low emission public transport fleets	Improve	Low emission vehicles
LE2 EV Charging infrastructure	Improve	Low emissions vehicles
LE3 Support EV uptake in corporate fleets	Improve	Low emissions vehicles

Table 4: CAP measures

Appendix D. Current travel demand

The estimates of relative passenger kilometres by mode used in Section 6 were derived from National Travel Survey data and DfT vehicle kilometre statistics as described further below.

Bus:

- Data
  - DfT Bus Statistics: Table Bus01e - Passenger journeys on local bus services by local authority: England, Source: Bus statistics data tables - GOV.UK.
  - National Travel Survey, 2024, Table: NTS9910: Average trip length by main mode and region of residence (miles): England: Region and Rural-Urban Classification - GOV.UK.
- Approach
  - Telford and Wrekin passenger journeys from table Bus01e (cross-checked against BSIP) multiplied by average trip length for local bus trips for West Midlands, assuming that passenger kilometres outside Telford and Wrekin on outbound trips would be balanced by passenger kilometres inside Telford and Wrekin on inbound trips.

Cycling:

- Data
  - DfT Walking and Cycling Statistics: Table CW0302: Proportion of adults who cycle, by any purpose, frequency, and local authority, England, November 2015 to November 2023 Source: Walking and cycling statistics (CW) - GOV.UK.
  - National Travel Survey, 2024, Table: NTS9910: Average trip length by main mode and region of residence (miles): England: Region and Rural-Urban Classification - GOV.UK.
  - Census 2021 population data. Source: Telford & Wrekin Council | Census population.
- Approach
  - Cycle journeys per person in West Midlands from Table CW0302 were cross-checked against the Telford and Wrekin values available (samples were only sufficiently large to give estimates for cycling once a week or once a month for any purpose). The values were consistent so West Midlands values for cycle journeys per person for travel purposes were used.
  - Journeys per person multiplied by adult population.
  - Total journeys were multiplied by average trip length for cycle trips for West Midlands, assuming that cycle kilometres outside Telford and Wrekin on outbound trips would be balanced by cycle kilometres inside Telford and Wrekin on inbound trips.

Car:

- DfT Transport Statistics Table TRA8905: Motor traffic (vehicle kilometres) for selected vehicle types by Local Authority in Great Britain, Source: Road traffic estimates (TRA) - GOV.UK.

Appendix E. Estimate of emissions impact of first Delivery Plan

Introduction

This section sets out the approach to estimating the whole life carbon impact of the measures proposed in Delivery Plan for the period 2027 to 2030, focussing on the interventions that would deliver a change to the transport system during the 2027 to 2030 window. The elements of the plan that relate to undertaking research and analysis to support development of interventions to be implemented after 2030 were not included in the analysis.

The estimate provides an understanding of the scale of impact of the measures, drawing on available information, and scheme details at this stage. It is not a detailed bottom-up assessment of carbon impacts, as information is limited in most cases. The emissions impacts of each scheme will need to be revisited in more detail as it progresses.

The following section identifies the range of approaches used to estimate the user and infrastructure emissions impact of each measure. The subsequent section then summarises the overall scale of impact identified.

Assessment approaches

User emissions

A range of approaches were used to estimate user emissions impacts assuming an opening year of 2030 with varying levels of detail.

The **DfT's Vehicle Carbon Assessment Tool (VECAT)** used link-based data on traffic volumes, speeds and distance to calculate user emissions using the TAG Data Book speed-based fuel consumption functions by vehicle type and fuel carbon intensity factors ($kgCO_2e$ per litre of fuel or kWh of electricity). This tool was used to assess the impact of the junction capacity measures that had been captured in a model run developed to support a recent corridor study for the A518.

The **DfT's Active Mode Appraisal Toolkit (AMAT)** uses the TAG Data Book fuel consumption functions and carbon intensity factors to estimate carbon impacts based on estimates of mode shift from car-driving trips caused by active travel schemes, combined with assumed trip lengths and speeds. The tool had already been used to assess the impacts of two of the proposed active travel measures (Ironbridge and Old Park).

A similar **TAG emissions factor based approach** was applied in a separate spreadsheet developed for the TWTP for a number of other measures. Estimates of the impacts of the measures on vehicle kilometres and speed were combined with the TAG fuel consumption functions and fuel carbon intensity factor to estimate impacts.

The **Sub National Transport Bodies Carbon Assessment Playbook** was used to inform the estimate of the A518 active travel corridor improvements. As outlined in Section 6, the Carbon Assessment Playbook was developed to provide an indication of the scale of impact of different types of decarbonisation measures in different area types, based on

evidence derived from a literature review and modelling undertaken using National Travel Survey data.

For junction improvements not included in the available model run, an **estimate based on cost and traffic demands affected** was made. This drew on the emissions impacts, costs and number of trips passing through the modelled junction improvements and involved the following steps:

- The numbers of trips passing through the junctions affected by improvements were extracted from the traffic model (whether or not the improvements had been included in the model scenario described above).
- For both the modelled and unmodelled junction improvements, scheme costs were divided by the number of trips affected.
- For the modelled junction improvements, the average emissions impact estimated using the VECAT process described above was divided by scheme cost and trips affected to provide a ratio of emissions impact per £ of investment per trip across all junctions.
- This emissions to spend per trip ratio was assumed to also apply to the junctions for which the improvements had not been modelled.
- Combining the ratio with the scheme cost and estimated trips using the junction provided an estimate of scale of emissions impact.

This is an approximate approach as the emissions impacts of junction improvements depend heavily on the details of measures implemented. However, it provides a reasonable estimate of scale.

Finally, for the remaining interventions for which very limited data were available, a **simple estimate based on scheme cost** was made. For the remaining active travel and minor schemes, it was assumed that, on average, each £ of investment would have the same emissions impact as other similar schemes for which more detailed assessments had been made using the approaches described above. This is the most approximate of the approaches as the relationship between user emissions and cost is not direct or simple. However, these estimates accounted for only a minor proportion of the total estimate.

Infrastructure emissions

A number of approaches were adopted to estimate the infrastructure emissions of the schemes included in the Delivery Plan.

Where scheme drawings and high level estimates of quantities were available, the **AtkinsRéalis Carbon Ready Reckoner** (CRR) was used. The CRR tool estimates the carbon impacts of highway schemes using benchmarked data and material quantity assumptions based on the Manual of Contract Documents for Highway Works (MCHW).

Drawing on expert knowledge of typical material requirements for different scheme types, it calculates embodied carbon emissions from materials and applies additional allowances for transport, construction, and maintenance activities across the asset lifecycle. The tool presents results by MCHW series and lifecycle stage, using tables and charts to identify carbon hotspots (as illustrated in Figure 15).

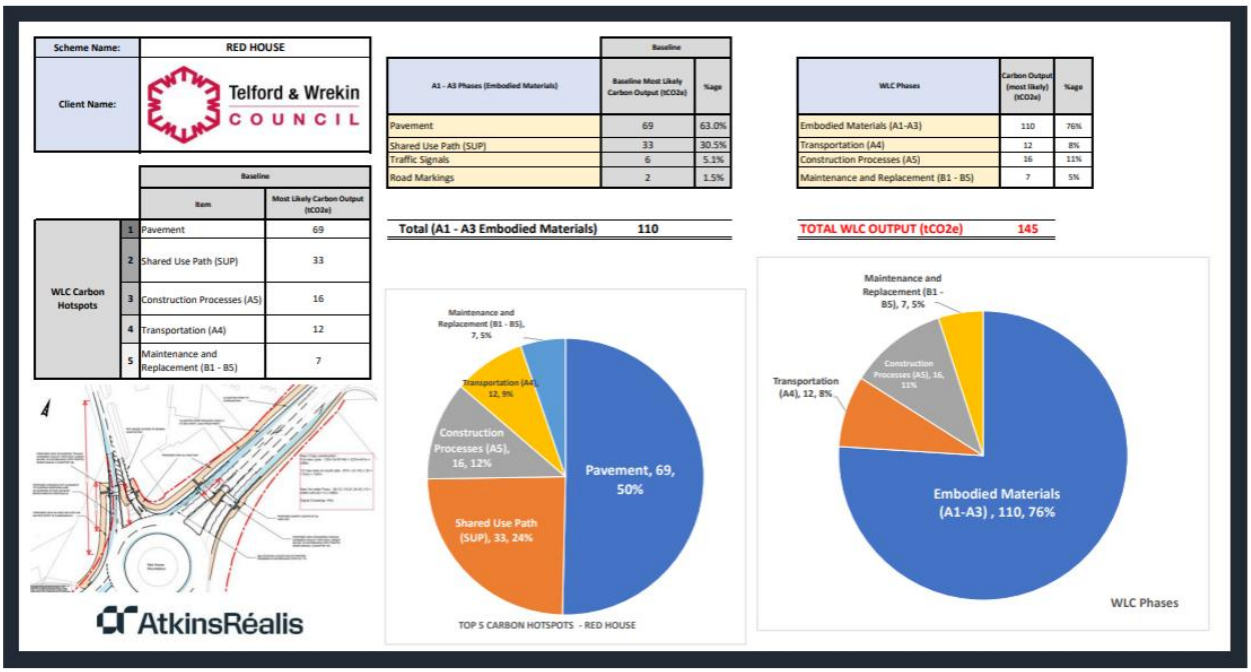


Figure 15: Example output from Carbon Ready Reckoner

For schemes for which more limited data were available, with information focusing on scheme scale and type, the DfT's **Local Transport Infrastructure Carbon Benchmarking Tool (LTICBT)** was used. The tool provides estimated benchmark levels of construction and operational emissions for a range of local transport scheme types, based on typical scheme types (and supporting data such as Bills of Quantities).

For some schemes that fell outside of the remit of the LTICBT (such as bus shelters and EV chargers), data was obtained from **Environment Product Declarations and bespoke analysis** on the basis of quantities of materials in the item.

For the remaining schemes for which very limited data was available, a **cost-based estimate** was made, assuming the same emissions impact per pound spent as for similar schemes for which a more detailed assessment had been possible using the approaches described above.

Estimated impacts

The estimates indicate that the mode shift impacts of the proposed measures in the Delivery Plan have the potential to reduce emissions by up to 20 to 30 tonnes per year by 2030. This equates to approximately 0.01% of annual user emissions.

The impacts of road schemes are predicted to be more significant but more uncertain, ranging from an increase of approximately 1500 tonnes per year in 2030 to a decrease of 500 tonnes (depending on factors including the area of impact considered). The overall impact will depend on the balance of impact on vehicle kilometres and increases and decreases in congestion levels at different points on the network.

The combined estimated impact on user emissions ranges between an increase and decrease of less than 0.5% of annual user emissions.

The infrastructure emissions associated with the Delivery Plan measures are estimated to be of the order of 2000 to 3000 tonnes, equivalent to 0.5% to 1% of annual user emissions.

This initial assessment highlights the points within the report about the challenge of achieving a balance of measures that results in a significant net decrease in emissions and the significance of infrastructure emissions and importance of carbon management as the TWTP measures are implemented.