The environmental, social, and economic benefits of sustainable travel to local high streets and town centres

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1 Executive summary

1.1 Background and aims

The Scottish Government aims to reduce car kilometres travelled by 20% by 2030. Scottish Government states that reducing car use will build stronger communities, including town centre revitalisation and developing 20-minute neighbourhoods.

This report provides an evidence base on the environmental, economic, and social impacts of sustainable travel for local high streets and town centres for those promoting, campaigning on, designing and delivering sustainable travel interventions. The research involved a literature review, stakeholder interviews, and case studies. As a companion to this report, a suite of engagement materials has been produced for use when engaging with communities, businesses, and local representatives on plans to implement sustainable travel measures.

1.2 Key findings

Evidence collected showed that there is a wide breadth of potential benefits of sustainable travel to communities, but that evaluation and measurement of impacts does not always capture this. Cross-sector working for delivery can help those implementing transport schemes better understand the measures that sectors use and how travel interventions impact them.

The organisations we spoke to had high ambitions to deliver sustainable travel interventions that help to develop strong, vibrant, inclusive, and accessible high streets. They see sustainable travel as being a key enabler to achieving better place-making. This research found that interventions can be most effectively designed and implemented when they consider the needs of the area and incorporate nature-based solutions (NbS). The identification of benefits can play an important role in engaging with communities on sustainable travel interventions. The use of evidence should be coupled with local knowledge of priorities and, as plans progress, indication of impacts at a local level. Sustainable travel interventions should meet or solve a community need or challenge, and engagement is a process that helps planners to do this. Having a good

knowledge of the community, the obstacles, and barriers they face, and the groups at risk of missing out allows planners to use the most appropriate evidence at the right time and in effective ways. The examples we have explored demonstrate that sustainable travel interventions that benefit local high streets do not need to be technologically complicated or large infrastructure projects.

Interventions which increase walking, wheeling, cycling, or use of public transport can reduce car use and free up space on streets. The degree by which an intervention realises the benefits varies depending on the local circumstance and the action taken. Figures we have found are either specific to the local context or the result of modelling impacts on a nationwide scale. The research found that introduction of sustainable travel can result in multiple positive benefits for high streets, such as:

Better environment:

- We found significant evidence of the decrease in air pollution in all geographies across large sample sizes.
- We found significant evidence of the decrease in carbon emissions in all geographies across large sample sizes.

Making room for people and nature:

- We found evidence of the benefits of increased natural solutions, which reduce the impact of noise pollution, improve air quality, and help with temperature control in urban areas across small sample sizes.
- We found evidence of the beneficial impact of making more room for people to walk, wheel and cycle, and better pedestrian facilities make it easier for those with limited mobility to navigate the high street in all geographies across small sample sizes.
- We found there was limited evidence of the increased biodiversity in urban areas, due to a lack of research in this area.

Valued places that people enjoy:

- We found significant evidence of the short-term impact of increased land values and rental prices for businesses, making an area more attractive for investment and desirable to live in more than one geography across large sample sizes.
- We found significant evidence of the increased positive public perception towards the area in more than one geography across medium sample sizes.

Healthier, happier and safer communities:

- We found significant evidence of improving physical health from active travel and better air quality across large sample sizes in all geographies.
- We found some evidence of improved mental health due to active travel, connection to nature, reduction in isolation and improved community cohesion in more than one geography in small sample sizes.
- We found some evidence recorded over long periods of time of better access to jobs and education opportunities in more than one geography in medium sample sizes.
- We found significant evidence of reduced accident numbers due to sustainable travel interventions across large sample in more than one geography.

Thriving businesses, better links to jobs, and more spending:

- We found significant evidence of higher footfall in businesses across large sample sizes in all geographies.

- We found significant evidence of increased time and money spent in local businesses across large sample sizes in more than one geography.

1.3 Recommendations

Based on our research we make recommendations for actions that could be taken to increase sustainable travel to high streets and town centres.

Maximise the benefits of sustainable travel through holistic projects that meet community needs.

- Planners should seek to implement interventions that cover a variety of sectors and address the community's needs rather than focusing on one aspect (e.g. travel) to encourage more local living behaviours.

- Sustainable travel interventions should maximise air quality and placemaking benefits by incorporating nature-based solutions wherever possible.

Guidance on how to measure benefits and evaluate interventions in order to identify and communicate these benefits effectively.

- The Scottish Government should ensure existing evaluation guidance is up to date and provides information on how to evaluate what success means to the local community and those impacted by interventions.

- Plans for sustainable travel interventions should include resources for evaluation of measures.

Identified benefits should play an important role in constructive engagement.

- Those planning sustainable travel interventions should consider different engagement stages and ensure that engagement activities fit their desired outcome and target the right audience.

- Planners should use the evidence of impacts from this report and engagement materials to help local people and business owners to understand the benefits to them and their communities.

Groups potentially negatively impacted by interventions need to be particularly catered for in engagement.

- Those planning to develop sustainable travel interventions should engage with vulnerable users early in the process to ensure that their needs are understood and accounted for.

Further research:

- Explore how planners can use innovative methods to demonstrate the emotive benefits of sustainable travel interventions. This would help planners to create local places that encourage 'local living' behaviours.

- Research archetypes of key performance indicators for good transport reflecting different geographies. This would aid local decision-makers in understanding the benefits to their population and the potential for these actions to contribute to net zero commitments.

- Investigate the most effective messages and post-intervention information to communicate the benefits of sustainable travel to local people and business owners.

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2 Introduction

2.1 Context

The Scottish Government aims to reduce car kilometres travelled by 20% by 2030. Scottish Government states that reducing car use will build stronger communities, including town centre revitalisation and developing 20-minute neighbourhoods (Transport Scotland, 2022a). The development of town centres and transport's role in supporting and connecting communities is recognised in several policies from the Scottish Government. Scotland 2045, the fourth national planning framework (NPF4), states that developments in town centres should reduce car dependency and increase walking, cycling, wheeling and public transport accessibility (Transport Scotland, 2023). The retail strategy for Scotland commits to working with retailers to encourage customers and staff to use accessible and inclusive active travel and public transport (Transport Scotland, 2023). This research provides evidence on the economic, environmental and social impacts of sustainable travel on local high streets and findings can be used to support organisations, local governments and businesses delivering interventions.

One route to achieve the desired reduction in kilometres travelled by car is to encourage and enable more local living. To achieve this, we require vibrant and attractive high streets that cater to the needs of the community they serve. However, high streets and town centres need help to survive if they are to support local jobs and deliver economic growth. Before the Covid-19 pandemic, businesses and local high streets struggled due to the shift to out-of-town shopping and the increased use of online retail. Decades of transport planning prioritising car access has resulted in high streets and town centres plagued by congestion that are less attractive places to live and visit. The lockdown restrictions during the coronavirus pandemic exacerbated these challenges. Footfall in many town centres and high streets have still not recovered to pre-pandemic levels. Post-lockdown recovery has been significantly slowed due to the current financial conditions, with many shoppers forgoing luxury items or more expensive options in the uncertain economic climate.

Sustainable travel solutions can include different modes of transport such as walking, wheeling, cycling, public transport, micromobility and shared transport. They could also include interventions that restrict or manage motor vehicle flow, including pedestrianisation, reduction in road space, removal or restriction of parking, and lower speed limits.

Scotland has led and continues to lead the UK in relation to targets for and delivery of zero-emission mobility, being the first devolved administration to set targets for reduction in car kilometres travelled.

2.2 Aim and research questions

This project aims to provide evidence of environmental, economic, and social benefits of sustainable travel interventions on local high streets and in town centres. This study provides collated evidence to help policymakers and planners quantify the social, economic, and environmental benefits of sustainable travel in Scotland. The research considers the following questions:

1. What are the economic benefits to local businesses of sustainable travel interventions, considering measures such as increased footfall, decreased congestion and pollution, more active travel, and better connections with public transport?

2. What are the environmental benefits of sustainable travel, and what evidence is available on their impact on climate change and pollutant emissions reduction, improved air quality, and less noise and congestion?

3. What are the social benefits of sustainable travel? What impacts can be observed on the health benefits of active travel, safety and accessibility, improved access to jobs and education, and enhanced inclusivity of potentially marginalised groups?

4. How can sustainable travel interventions be most effectively designed and implemented? What are the opportunities, challenges, and barriers in delivery?

5. How can a combination of mechanisms achieve policy objectives for reducing car use, encouraging the rejuvenation of high streets and decarbonisation?

The secondary aim is to present the evidence base on the benefits of sustainable travel to local high streets and town centres for a range of stakeholders to use to plan and implement sustainable travel changes, and to support engagement with local businesses and communities. The engagement material and guide can be found on the page for this project on the CXC website https://www.climatexchange.org.uk/research/projects/the-benefits-of-sustainable-travel-to-local-high-streets-and-town-centres/

The following section outlines the methods and evidence used to address these questions. We then go on to present evidence on interventions (research questions 1, 2 and 3) and case study research (addressing research questions 4) and a final section brings together synthesis of the finding to present lessons for action (addressing research questions 5 and feeding into the engagement materials produced as the output of the secondary aim).

3 Methodology

3.1 Research methods

This section summarises the methodology and further details are in the appendix. The research methods included a systematic literature search, interviews with key stakeholders and case studies.

Methodology
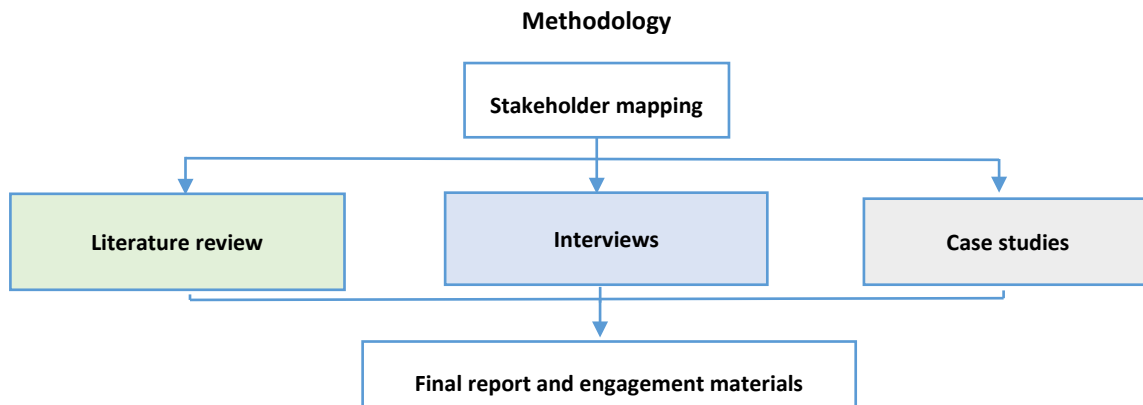
3.1.1 Literature review method

The study design applied a systematic search and screening approach, identifying economic, environmental, and social benefits of local living creating an evidence-base of the benefits of sustainable travel to local highstreets and town centres.

The literature search considered the kerbside as a cross-thematic topic with competing needs around parking, electric vehicle (EV) charging, active travel infrastructure, deliveries and space for local businesses. The systematic review identified the economic, environmental, and social benefits of local living, creating an evidence base for sustainable travel to local high streets and town centres.

An overview of studies included in the review is available in the [Appendix 7.1](#). We identified 44 academic studies and 36 reports, including policy papers and guidance documents produced by governmental agency, industry, and trade publications.

3.1.2 Interview method

Through a stakeholder mapping exercise, we identified organisations which could provide additional insights. These included central and local government departments and bodies, active travel special interest groups, local business groups, Regional Economic Partnerships, Business Improvement Districts, and community groups. We conducted semi-structured interviews to gain a better understanding of the actions that the Scottish Government and local authorities could take to encourage 'local living' behaviours, make business owners aware of the advantages to them and their communities, and inform decision-makers of the benefits to their population that could help them to reach their net zero commitments. The interviews were semi-structured, and all took place over Microsoft Teams. The team used semi-structured interviews to allow the researcher to guide the conversation but maintain the freedom for participants to reflect on their experiences and perceptions. Before the interview, we created an interview schedule. With the interviewee's permission, we recorded the interviews, which all took 45 minutes to one hour. Microsoft teams provide an automatic transcription that then requires checking against the recording to correct for errors. The transcripts were then analysed using a thematic analysis process by two researchers. This approach

identified benefits captured, challenges and best practices that should be highlighted and shared.

3.1.3 Development of engagement materials

The outputs of this work include engagement materials and accompanying guides illustrating some of the findings. We developed these resources by collating the stakeholder interviews' outputs and literature review findings. The resources aim at the following:

- To provide those thinking about implementing sustainable travel interventions with background information on the benefits.
- To include information resources for community members to explain why they are putting sustainable travel interventions.
- To help community members to visualize the potential benefits of sustainable travel interventions.
- To ensure that other areas have implemented similar things and see positive benefits.

We tested an initial version of the engagement materials with a group of local authorities and representative bodies who deliver sustainable travel interventions to gain their input and feedback. Where we have been able to source qualitative information from local people and business owners that sustainable travel interventions have impacted, we have included it.

3.2 Quality assurance

We focused on studies that fall within selected inclusion criteria. These included:

- Studies from geographies that are comparable to Scotland's high street and town centres.

- Literature published between 2020 and 2023.

- Studies focused on walking, wheeling, cycling, e-scooter, and public transport (buses, trains, trams).

We included studies that are methodologically robust and those that are not, making sure to present them with caveats. The literature review followed a four-phase system of identification, screening, eligibility, and inclusion. We recognised that the parameters of our exclusion criteria (reviewed in the appendix) might cause us to miss some studies, so we drew from both peer-reviewed publications and grey research in order to counteract this. Where grey research is used, sources were reviewed for relevance to the research objectives and quality to minimise the use of low quality evidence.

3.3.1 Limitations

The ability to report the benefits of sustainable travel has been restricted by the scarcity of studies that account for more than a single impact. Most peer-review papers focus on a specific intervention, often without any follow-up evaluation or quantified wider impacts of the intervention. This has meant that the studies included here focus on one intervention at a time. The lack of post-evaluation in peer-reviewed and grey literature highlights the need for monitoring and evaluation plan that includes an assessment of the wider impacts on the intervention. This restriction reflects the absence of examination and evaluation we found during the stakeholder engagement with local authority activities due to monetary limitations (see 5.1).

Research has previously identified the challenge in attributing reductions in emissions to a specific intervention without pre- and post-evaluation(Sánchez et al., 2021). When looking at the environmental benefits it is important to note that travel emissions are influenced by transport mode choice, journey purposes, individual and household

characteristics (socio-economic status, car ownership, access to active transport, convenience), accessibility to public transport, jobs, services and the built environment. Understanding the net effects of changes in active travel on changes in mobility-related CO_2 emissions are complex and under-researched(Brand et al., 2021).

Measuring the net environmental benefits of sustainable travel and linking this to impact on a local high street can be challenging, particularly when trade-offs or unintended consequences can be associated with sustainable travel interventions. For example, diverting traffic from low traffic neighbourhoods (LTN) or pedestrianised areas can increase motor traffic on boundary roads without simultaneous interventions such as adding cycle tracks and enhancing safety improvements(Laverty et al., 2021; Sánchez et al., 2021).

Some sustainable travel interventions may have long-term environmental benefits that are not immediately apparent; therefore, measuring the long-term environmental benefits of sustainable travel interventions within a short time frame can be challenging, particularly in cases where the intervention has just been implemented. A key limitation when evaluating economic impacts is the complexity of quantifying the direct impacts of some modes like walkability, in contrast to cars (reduction in number of vehicles, measured traffic speeds)(Litman, 2003). Measuring walkability involves specific case-based evaluation involving data from document analysis, register data from existing data bases[1], maps, and spatial registrations[2], and combining these data sets with fieldwork and interviews to understand the impacts of Infrastructure and traffic, surroundings, and activities on walkability(Knapskog et al., 2019). Although there are several studies evaluating the impacts of pavements, bike lanes, dedicated bus lanes, and kerbside improvements on local businesses, few apply rigorous quantitative analysis, with many based on individual case studies utilising business interviews(Portland State University et al., 2020).

And finally, a key challenge of social benefits is that they are often expressed through qualitative data. Qualitative data cannot be accounted for in most cost benefit analysis that are often the main method of evaluation of transport projects. This means that many of the social benefits tend to be overlooked or not used in transport project evaluations.

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[1] This can include urban characteristics and density, physical access for pedestrians, accessibility by public transport, car and bicycle.

[2] This can include mapping each road or intervention site, identifying the positive and negative traits along the road/street when it comes to walkability. Examples include:

- Urban structure - functions (mix and type) and how they are placed in relation to each other, could the area be described as its own unit/node/ centre, destination?
- Greenery - street trees, front gardens and parks
- Transportation situation: type of roads, car traffic, public transport presence, number of bicycles (experienced not counted), amount of people walking, presence of exchange points between modes, noise and visible pollution
- Infrastructure for walking - presence of sidewalks, width of side walk, crowding separation from bicycles, crossings, roundabouts (and how easy is it to cross), distance between crossings, curbs and design – incline, lights, benches, floor evenness
- Street/road – width, separation of modes, design (curvature, crossings, roundabouts, signs), streets, urban space (formations)
- Barriers -infrastructure, parking lots and traffic
- Maintenance - lighting and safety

4 Environmental, economic and social benefits

Understanding and identifying sustainable travel's environmental, economic, and social impacts on local high streets is a complex task. High streets are diverse and fluid, comprising interdependent services, businesses, and infrastructure. Therefore, separating specific aspects for evaluation is difficult. Much of what is perceive as successful in a high street needs to be based on qualitative assessments that traditional transport project evaluations are not geared to assess, despite its importance to local residents and users of the high street. This study has explored how sustainable travel can impact local high streets and produced a starting point to help evaluators understand what aspects they should consider. The outputs also help planners to focus communications with communities on the range of impacts from sustainable travel measures. We have created a system map to demonstrate to connection between the different impacts of sustainable travel on local high street in section 5.1

This section presents our findings from the literature review and case study research, showing the evaluation of sustainable travel interventions. We provide these impacts under the headings of environmental, economic, and social benefits, and give some background to how these impacts can be measured and the challenges in evaluating outcomes. We have sought examples of how these impacts are related to local high streets and town centres and used literature to explore how these aspects link together. Each section contains a summary of the impacts with a qualification of the level of confidence in the evidence found. Quality and impact assessment information on the studies reviewed as part of this research is available in the appendix. To identify sources, we searched Web of Science, TRID and Google Scholar. Through the application of these databases and accompanying search criteria, we determined that impacts that showed up 15 or more times were considered significant, and searches with less than 5 studies were classified as having limited evidence requiring further refinement to find relevant research papers. Our assessment also included identifying whether we found variation in geographical distribution of the research i.e. studies covering all areas (urban, peri urban, rural), whether it was demonstrated in large sample sizes and where possible if impact was measured over a long period time. We identified sources that reviewed or assessed the need or opportunities for sustainable travel interventions in towns and communities. These interventions include:

- Reducing or restricting car use
- Making it easier to switch to active travel
- Increasing public transport
- Facilitating micromobility
- Low-traffic neighbourhoods (LTN)
- Best practice for deliveries to and by local businesses

4.1 Environmental impact

An increase in sustainable travel can offer a suite of environmental benefits. Sustainable travel interventions promote modal shift and reallocate urban land from car use space. Both of these changes result in environmental impacts such as reduced carbon dioxide (CO_2) emissions, particulate matter (PM) and nitrous oxides (NOx), increased biodiversity (see section 4.1.3), improved drainage, reduced noise and reduction in road surface temperature. Measuring environmental impacts most commonly identifies

reductions in air pollutants and greenhouse gases (GHGs) emitted by road vehicles. The key findings in this section are categorised into three areas:

- Improved air quality
- Reduced congestion
- Increased biodiversity

Assessment of environmental impacts

The most prevent method of assessing and evaluation environmental impact is to calculate carbon emissions saving. When calculating the carbon emissions for major transport interventions, local authorities should refer to STAG (Scottish transport appraisal guidance) which uses HM Treasury's Green Book guidance to instruct on how to undertake the appraisal of projects (Transport Scotland, 2022b). The STAG guidance has a requirement to set out post implementation evaluation, although there are currently no requirements for this evaluation to be published.

Some areas may have air quality sensors or monitoring programmes that provide actual air quality in a location and can record changes over time. Traffic counters can also be used to measure increases in vehicle numbers, which in turn can be used to demonstrate air quality impacts. This method provides real-world data on the impacts of changes in travel enabling stakeholders to assess the impact of their policies and make informed decisions(Verstaevel et al., 2020). Real world data collection using sensors is costly and therefore rare, however it is the most robust way of monitoring long terms changes in traffic patterns. NatureScot provide guidance on how to measure biodiversity and natural coverage in an area (NatureScot, 2022).

4.1.1 Improved air quality

Active travel and associated infrastructure, like protected bicycle lanes, contribute to reducing emissions(Reich, 2022). Increased cycling improves air quality by reducing motor vehicle use. A 2021 Sustrans UK study involving an attitudinal survey conducted from June to August 2021 identified that people cycling save 860 tonnes of NOx and 120 tonnes of particulates[3] annually (versus if they were driving)(Sustrans, 2022a). Sustainable travel can also reduce car use; one less car trip replaced by a bike or bus trip per day can have a significant impact on emissions (Brand et al., 2021). Studies have modelled that if 10% of the population changed their travel behaviour from cars to bikes and public transport, total emissions would decrease by about 10% (car to bike) and 3% (car to public transport) (Brand et al., 2021).

Reducing car use through cargo bikes can have a substantial impact on air pollution and carbon emissions. A London study modelling the benefits of freight cargo bike sampling Pedal Me cargo bikes between June 2020 and February 2021 across different seasons showed carbon emissions reduced by 90% compared with diesel vans, and 33% compared with electric vans(Active Travel Academy, 2021). Cargo bikes do not just have a substantial benefit on air quality but also have a number of other positive impacts. Cargo bikes help attract car users to cycling; without the presence of cargo-bike sharing operators, 31% of Swiss and 46% of German–Austrian cargo-bike users said they would have relied on cars(Becker, S. and Rudolf, C., 2018). Mitigating the high capital costs for e-cargo bikes can be overcome in cities with the implementation of e-cargo bike sharing schemes which have started to gain traction, particularly around Europe, with companies and grassroots initiatives such as Avo Cargo, Cargoroo, Baqme, Carvelo2go, and Freie Lastenrader (Carracedo and Mostofi, 2022). The impact of this option is recognised by Transport Scotland through the funding of the cargo bike Scotland project

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[3] PM_{10} and $PM_{2.5}$

encouraging more people to embrace this mode of travel helping to reduce car use (Sustrans, 2022b).

4.1.2   Reduced congestion

Giving priority to pedestrians and cyclists over motor vehicle traffic can redefine the use of kerbside space in favour of sustainable journeys, e.g. micro-mobility and walking over private vehicles for short trips to local centres. Studies have shown the benefits of reallocating kerb space to different modes/classifications, including pedestrians, cyclists, bus, and freight, attracting more people to the area, encourage them to stay and increasing satisfaction with the place(WSP, 2022). In 2019 freight and delivery vehicles account for 23% of road transport emissions in London, 33% of NOx, and 29% of all PM 2.5 (Quarshie et al., 2021). Studies have shown that switching from freight motor vehicle to cycle courier could reduce CO_2 emissions by 45%, NOx emissions by 33%, driving distance by 78% and kerbside parking time by 45% (McLeod et al., 2020).

4.1.3   Increased biodiversity

There are other aspects to consider when looking at environmental benefits, including the role of biodiversity and Nature-based solutions (NbS). Studies in Brussels showed that transport mode choices are highly influenced by urban characteristics(Van Acker et al., 2013). Promoting active travel allows for better use of space with cyclists requiring approximately 12% of the space needed to park a car (Lee and March, 2010). This space saving can be used for more NbS in town centres and high streets, enabling healthy and liveable spaces where pollutants generated by vehicle emissions are reduced as a result from increase in both active travel and its associated infrastructure and increase in increasing tree species able to absorb them (Gorrini, Andrea et al., 2022). Studies indicate a reduction of 13% for NO_2 and of 2% for $PM_{2.5}$ in the school playground after two years of plant establishment (Redondo Bermúdez et al., 2023).

Improving urban space utilisation which increase green spaces can be achieved by replacing used and unused on-street parking spaces in established highly urbanised areas with biodiverse green space. Studies have identified the potential for the use of green infrastructure in sustainable travel infrastructure, providing access and exposure to green space in cities (Hobbie and Grimm, 2020). Making these changes increases the canopy over the path or road and improves stormwater drainage and ecological connectivity (Croeser et al., 2022).

Green spaces like tree canopies over footpaths and bikeways provide habitats for urban wildlife, regulate air temperature, control pollution, and provide shading and CO_2 absorption (Schwaab et al., 2021). Green spaces can combat noise pollution, attenuating noise levels by up to 17 dB(A) (Islam et al., 2012). This leads to high streets that are pleasant to spend time in and better adapted to the impacts of climate change. A study across European cities have shown consumers' preference for green streets for cycling and favoured detours to avoid grey streets (Nawrath et al., 2019). Active living research found that visual aesthetic of environment influences how far and where people will walk(Active Living Research, 2015). The link between increased green space, biodiversity and physical and mental wellbeing is further explored in social impacts.

Some fields of psychology seek to understand the impact of restorative environments on our well-being, cognitive abilities, and resilience. Nature connectedness is the principle of how our connection with the natural world has significant psychological impacts on our everyday lives and well-being. Environments that have well-being benefits are referred to as restorative. For an environment to be restorative, it needs specific characteristics; they should evoke the feeling of escaping or being away, that your attention is held but not drained, and that you have the freedom to explore safely, and they are compatible with how you want to use the space. The natural world is often provided as an example of a restorative environment, with busy cities as an environment

which drains attention and energy. This links to improve mental health and wellbeing benefits (in section 4.3).

4.1.4 Summary

Quantifying the environmental benefits of sustainable travel needs to be a key consideration at the beginning of a planned intervention, identifying how the change in pedestrianisation, cycling infrastructure, or biodiversity will result in reduced CO_2 emissions, particulate matter (PM) and nitrous oxides (NOx). Our research has found that sustainable travel interventions have the following environmental impacts on local high streets:

Better environment:

- We found significant evidence of the decrease in air pollution in all geographies across large sample sizes. If 10% of the population switched from cars to bikes and public transport, emissions would decrease by about 10% (car to bike) and 3% (car to public transport)(Brand et al., 2021).

- We found significant evidence of the decrease in carbon emissions in all geographies across large sample sizes. In one case study, carbon emissions decreased by 66% over a 15 year period following pedestrianisation of a city centre(Council of Pontevedra, 2017).

Making room for people and nature:

- We found there was limited evidence for the increased biodiversity in urban areas, due to a lack of research in this area.

- We found evidence of the benefits of increased natural solutions, which reduce the impact of noise pollution, improve air quality, and help with temperature control in urban areas across small sample sizes. The potential for such solutions can be increased by encouraging modal shift; for example, cyclists require approximately 12% of the space needed to park a car (Lee and March, 2010).

- We found evidence of the beneficial impact of making more room for people to walk, wheel and cycle, and better pedestrian facilities make it easier for those with limited mobility to navigate the high street in all geographies across small sample sizes.

4.2 Economic Impacts

This section presents the economic impacts of sustainable travel in relation to the local economy. It identifies how improved access to sustainable travel benefits local businesses through increased footfall, decreased congestion and pollution, more active travel, and better connections with public transport. These benefits also include monetised time savings for the public and wider communities.

Assessment of economic impacts

Evaluations of the economic value of sustainable travel in town centres and high streets often focus on affordability metrics from a transport perspective (value for money or cost savings of modal shift). When calculating the economic impacts for transport interventions, local authorities should refer to the Wider Economic Impacts Appraisal and Section 9.3 of the STAG Appraisal which sets out a framework for the investigation and assessment of the wider economic impacts of projects (Department for Transport, 2018; Transport Scotland, 2018).This section focuses on how sustainable modes can shift consumer expenditures and behaviour, benefitting local businesses and communities.

The findings in this study are categorised into three areas:

- Increased footfall, sales, and access
- increased customer numbers and satisfaction
- increased land values and lower turnover

4.2.1 Increased footfall, sales, and access

A common misconception amongst businesses is that the prioritisation of sustainable travel options instead of cars will result in fewer customers and reduced sales(Lambe et al., 2017). Studies have shown that shop vacancy rates are five times higher on streets with high levels of traffic and that investments in sustainable travel can increase footfall, visitor spending, visit frequency and growth in the number of customers (Sustrans, 2019).

Pedestrian related improvement increase footfall. In Piccadilly, Stoke-on-Trent, pavement widening in 2016 led to a 30% increase in footfall. Similarly, in Maid Marian Way, Nottingham, carriageway remodelling, additional pedestrian crossings and new street furniture costing £2.5m in 2005 resulted in 29% increase in footfall. Improved pedestrian and cyclist safety on Newlands Avenue in Kingston-upon-Hull in 2005 increased pedestrian movements in the town centre by 18%, cycle movements by 17%, and crossing movements by people with reduced mobility by 15% (Momentum Transport Consultancy, 2022).

An example of the impact of sustainable travel is the 2015 conversion of Acorn Road in Newcastle from a two-way street to two-way access for cycling and one-way access for motor vehicles, plus the removal of 20 car parking spaces. At first local business owners were concerned about loss of trade because of the scheme but found that the change resulted in an improved atmosphere for business with better access for pedestrians and cyclists. Out of 500 people, 77% agreed that 'Acorn Road is a thriving retail area' after the introduction of the traffic calming features (Sustrans, 2019). Similarly, in Oxford a traffic restraint and pedestrianisation scheme led to a 17% reduction in car trips to the city centre without impacting visitor numbers (Parkhurst, 2003).

Multiple studies in North American cities have measured the economic impact of bike lanes on commercial streets. A study in Canada, using a case-control and pre-post design, surveyed merchants, and shoppers to understand the impacts of bike lanes on economic activities (Arancibia et al., 2019). This identified a correlation between the installation of bike lanes and increasing numbers of local customers (62%), monthly spending (from 44% to 53% of customers spending $100 or more per month) and increased visit frequency (Smith Lea et al., 2017). Separately, Transport for London found retail vacancies were 17% lower after improvements to high streets and towns centres to encourage walking and cycling (Sustrans, 2022c).

Economic benefits of walking and wheeling include decreased travel time through reduced congestion, reduce vehicle operating costs, decreased medical costs, reduce work absenteeism, improved local air quality, reduced noise and greenhouse gases and taxation(Pricewaterhouse Cooper, 2008). In the UK the estimated net annual economic benefit for individuals and society from all walking and wheeling trips is £5.4 billion. Of this total, £251 million is from people with a car choosing to walk or wheel for transport (Pricewaterhouse Cooper, 2008; Sustrans, 2022a).

4.2.2 Increased customer numbers and satisfaction

Walkability and cycle lanes have been shown to increase local communities' engagement with local high streets, increasing the likelihood of spending at local businesses. The economic benefit of active travel is linked to aesthetic appeal and sense of place. 95% of representatives of London's Business Improvement Districts

(BIDs) identifying a good walking environment as important to business performance, 85% in favour of cycling for business performance, and 97.5% identifying that areas that allow people to spend time in helps attract more customers (TFL, 2018). A study in Dublin identified time benefits for bike share users as a key outcome of sustainable travel, with Dublin bikes reducing journey times by 34%, with estimated monetised benefits of €6 million per year (Bullock et al., 2017).

Businesses that invest in cycling infrastructure see the benefit of attracting more active travel-related sales, creating a better economic environment overall, and being a part of place-making. For example at George Street Cycleway in Sydney, the impact of active travel on sales has encouraged the procurement of bicycle parking racks by some retailers and attracted other businesses to set up shop in the area (Crane et al., 2016). Another factor to consider is the influence of mixed spaces on encouraging spending. A qualitative study in Boston and Phoenix identified that mixed use places and urban design can increase the performance of individual businesses. It also noted that economic development strategies based around placemaking initiatives should be targeted to the specific businesses that will benefit most from specific urban design features (walkable, mixed use urban spaces)(Credit and Mack, 2019).

Encouraging more people to choose walking/cycling instead of driving within neighbourhoods is influenced by pedestrian amenities (lighting, toilets, recycling points/bins, benches, street trees and way finding). A study in Västra Götaland, Sweden, analysing a combination of micro data from the national survey and the GILDA database[4] compiled by Statistics Sweden containing geo-referenced individual and workplace data from various official Swedish registers found that increased access to neighbourhood amenities (including retail outlets, pubs, café's, health centres, banks, grocery retailers) contributes to more walking and cycling (Elldér et al., 2022). The research focused on three kinds of neighbourhoods: those with limited local availability (2 local services), small urban regions (with 23 amenities up to 1km from the residence) and large urban areas (an average of 167 amenities with 11-12 types up to 1km from the residence). Results of the study revealed that when 6-50 amenities were found in the local area, 30-40% of the neighbourhood's residents chose to walk or cycle, and 60-70% preferred to drive for everyday activities. When the local neighbourhood had more than 150 amenities, a majority of residents opted to walk or cycle instead of driving (Elldér et al., 2022). In this study, the overall number of available local amenities is a significant pointer of the residents travel patterns, as walking and cycling go on to rise with greater levels of local access (Elldér et al., 2022).

The importance of mixed use for health high street is demonstrated in a study from the Centre for Cities. This research stated that strong urban economies are those that offer a mix of high-quality office space supporting high skilled businesses alongside a proportion of retail space as well as leisure space such as cafes and restaurants that serve the needs of workers and residents. Data on 58 city centres in England and Wales shows that those with lower levels of retail space had a lower level of vacancy rate (Leeds has a proportion of 52% office space, 21% retail, with a vacancy rate of 14%; compared to Doncaster with a vacancy rate of 18%, retail space at 39% and 19% office space) (Centre for cities, 2019). Therefore supporting the evidence that sustainable travel interventions that take a multi service approach are more likely to be beneficial for local high streets. This is a bigger challenge for rural areas which are characterised by a lack of amenities within walking distance and poorer transport infrastructure making sustainable travel a key priority (Hutchinson et al., 2014).

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[4] This database offers the unique ability to identify the quantity, assortment, and special types of amenities available in various areas.

Whilst the economic benefit of added bike infrastructure is encouraging, studies note that some businesses, for example food services, benefit more than others. In a 2020 study across 14 case studies in the US, the addition of active travel infrastructure on streets showed that the food service industry benefitted the most even in cases where a motor vehicle travel lane or parking was removed to make room for a bike lane, food service industry metrics—employment, sales, and wages—increased and in 9 of 14 case studies .Retail sales and employment were positively impacted, indicating a positive effect on business vitality following the street improvements (AWS, 2020; Portland State University et al., 2020). The study identified a protected bike lane along Broadway in Seattle that was completed in 2014 showed a 30.78% increase in food service employment compared to 2.49% and 16.17% increases in control areas (Portland State University et al., 2020).

4.2.3   Increased land values and lower turnover

Investments in walking and wheeling infrastructure have been found to increase land values between 70–300% with retail commercial rates increasing in the range of 10–30% (Active Living Research, 2013; Litman, 2023; Living streets, 2018). A public regeneration project at Peace Gardens in Sheffield resulted in a 35% uplift in the number of visits for shopping and a net increase in spending of £4.2m and an increase in rental values to rise by £1.60-£2.40/sq. ft (Genecon, 2011).

Similarly, in Altrincham, Manchester, approximately £15m was spent in 2016 to improve the market area, food and drink premises and pavements, resulting in a 25% rise in footfall and a 22% decrease in retail vacancy across the town centre (Momentum Transport Consultancy, 2022). An evaluation survey with local businesses in Bromley North Village in 2014 showed that greening, seating, lighting, and outdooring enhancements raised turnover and land values. Restaurants within the scheme reported an average 30% increase in turnover, partly because of the expansion of outdoor seating delivered by the scheme and a total £492m in land value within the site catchment (Momentum Transport Consultancy, 2022).

Introducing parklets in place of car parking spaces, such as the Shoreditch temporary parklet in 2016, with seating and bike parking, resulted in a 20% boost in turnover for nearby retail outlets (Momentum Transport Consultancy, 2022). In Toronto Canada, installation of the Bloor bike cycle infrastructure reduced vacancy rates on Danforth, from 5.2% to 3.4% (Smith Lea et al., 2017).The increase in land and rental values is a gain for developers and landowners, as the properties are rented out quickly and the area's desirability keeps tenant turnover low (Momentum Transport Consultancy, 2022).

4.2.4   Summary

When implemented successfully sustainable travel interventions can make a place more appealing, which encourages people to spend longer and spend more in the area. Our research has found that sustainable travel interventions have the following economic impacts on local high streets:

Valued places that people enjoy:

- We found significant evidence of the short-term impact of increased land values and rental prices for businesses, making an area more attractive for investment and desirable to live in more than one geography across large sample sizes. The impact varied from an increase in land values between 70–300% with retail commercial rates increasing in the range of 10–30% (Litman, 2023; Living streets, 2018).

- We found significant evidence of the increased positive public perception towards the area in more than one geography across medium sample sizes.

Thriving businesses, better links to jobs, and more spending:

- We found significant evidence of higher footfall in businesses across large sample sizes in all geographies. Several UK studies found that footfall increase by approximately 30% after the introduction of sustainable travel measures(Momentum Transport Consultancy, 2022).

- We found significant evidence of increased time and money spent in local businesses across large sample sizes in more than one geography.

4.3 Social Impacts

This section looks at the potential role of sustainable travel in creating town centres as "places that serve their communities, visitors, businesses and key stakeholders" as well as spaces which "work better for those who live there, provide more opportunity for safe active travel and for local economic activity (ATCM et al., 2021; Gorman and Dillon-Robinson, 2021)

Assessment of social impacts

Measuring the social impacts of sustainable travel can look at both direct and indirect impacts on people and communities. These include impacts on safety and accessibility, improved access to jobs and education, and improved access to work, improved mental health, reduced health complications because of pollution, and on social mobility opportunities. Measures of wellbeing are used extensively at the local level frameworks in the UK, including SSN's ISM framework, the thriving places index, the SEED model and the Doughnut Economics Model and Valuation of Wellbeing Supplementary Guidance to the Green Book all of which include but are not limited to, personal wellbeing, place (local environment, safety, transport, proximity to services) and physical and mental health (Centre for Thriving Places, 2022; HM Treasury, 2022).

When looking to measure the social impacts of sustainable travel, studies often compare pre- and post-intervention changes as indicators of reduced congestion, improved safety, health benefits, and risk reduction of premature death from increased walking or bicycle commuting and reduced absenteeism due to improved health (Department for Transport, 2012). Additional benefits to consider that are more complex to measure include reduced deprivation, social mobility opportunities, mental health benefits, pride of place, nature-based connection, individuals' capability and autonomy and community development and cohesion (Lisa Muller et al., 2021). We have not found any studies that link sustainable travel interventions with these benefits. We expect it would be difficult to prove causality since many influencers are acting upon them. What Works Centre for Wellbeing have created a searchable database of measures that can be used to assess changes in wellbeing in a project evaluation (What Works Centre for Wellbeing, n.d.). These measures can include Happiness (ONS), Neighbourhood belonging, Social trust, Feeling safe, Satisfaction with local area and Neighbourliness.

We have grouped the findings in this part of the study into three categories of :

- Improved health and wellbeing

- Increased safety

- Increased accessibility and liveability

4.3.1 Improved health and wellbeing

The social benefits of sustainable travel are largely around health gains (from being more physically active and reduction in air pollution), followed by the congestion and noise savings from reduced car traffic (Gössling and Choi, 2015). A dominant benefit of

active travel is increased physical outcome. In the UK a walking and cycling index found that cycling prevents 4,199 serious long-term health conditions each year (Sustrans, 2022a). This saves the NHS in sampled cities £27.5 million per year, equivalent to the cost of 920,000 GP appointments (Sustrans, 2022a). The Healthy Streets for London report published by TfL stated that if all Londoners walked or cycled for 20 minutes a day, £1.7bn would be saved in NHS treatment (TfL, 2018). It is possible for local areas to model the benefit on health and local NHS service using the STAG and green book guidance see (section 4.1 for more information).

Noise and air pollution have a strong negative impact on mental health in car dominated streets (Hematian and Ranjbar, 2022). Growing evidence suggests that improvements promoting walkability and the pedestrianisation of streets lead to health benefits. In London's 'Mini-Holland' programme in Waltham Forest, residents living near to walking and cycling interventions walked an extra 32 minutes a week compared to the average outer Londoner; adding an estimated 7 months in life expectancy (Aldred et al., 2019; Dajnak and Walton, 2018).

4.3.2 Increased safety

Public spaces (high streets and neighbourhoods) play a key role in the social and economic life of communities. In London 45% of visitors to high streets visit for social and community reasons. Reducing the dominance of cars expands residents and communities' experience of space in the town centre or neighbourhood. In Thunder Bay, Canada, a qualitative study showed that cycling has physical and mental health benefits, providing efficiency and convenience, creating a commuter cycling culture, community, and identity (Galway et al., 2021).

Sustainable travel can prioritise the needs of people allowing for social engagement, neighbourly relations, and "liveliness", creating an environment for people to spend their leisure time, and partaking in recreational activities. A survey of approximately 2,000 households in Portsmouth and Manchester, New Hampshire in the United States, showed higher levels of place-making/social capital within neighbourhoods with access to physical infrastructure improvements like pavements, and safety considerations such as lighting and slower traffic speeds, and mixed-use development (Rogers et al., 2014).

Increasing safety is a key aim in sustainable travel interventions such as cycle lanes, traffic control, and traffic calming measures, bus boarding platforms, and pop-up parklets. Parklets are "a temporary pavement extension which would sit in existing parking bays", the first parklet in London appearing in Hackney in 2015[5].

A study on the impact of 20-mph legislation, signage, enforcement, and education and awareness-raising in Edinburgh (citywide) and Belfast (city centre) from 2000 to 2018 showed improvement in liveability as a result of reduced speed limits. Researchers identified improvements in safety, attractiveness, social cohesion, health, sustainability, education, transport, amenities and living standards in Belfast and Edinburgh after the introduction of 20-mph speed limits (Jepson et al., 2022). Both cities observed a decrease in traffic flow and lower speeds due to the 20-mph speed limits, resulting in fewer collisions. In Edinburgh, collisions reduced by 40%, with a 39% reduction in casualties and a 23% reduction in the number of road traffic fatalities after one year. In Belfast city centre up to 3 years following the 20-mph speed limit, road traffic fatality rates decreased by 44% (Jepson et al., 2022).

A 2017 study on Bloor Street, a key corridor in Toronto's 10 Year Cycling Network Plan (2016) showed an increase in cycling after the addition of a bike lane. Daily cyclist numbers rose by 49%, and 66% of car drivers felt safe driving beside cyclists post bike lane installation, compared to 14% before (Smith Lea et al., 2017). Similarly, in Ontario,

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[5] For more information on how to set up a parklet visit Hackney parklet design guidance

Canada, bicycle lanes with physical barriers between them and motor vehicles (cycle tracks) drew in 2.57 times more cyclists after their construction, and caused a 'halo' of safety, reducing cyclist-motor vehicle collision rates by 35% per km-month[6] on streets around the cycle tracks within a range of 151 m – 550 m from the tracks (Ling et al., 2020).These studies show that increasing safety through segregated cycle infrastructure like bicycle lanes and cycle tracks can enhance the safety for cyclists and motorists and encourage more cycling as a form of transport.

An example of the parklet approach is the Lambeth Kerbside strategy, implemented to address the fact that 94% of the kerbside is used to offer and manage parking spots for motor vehicles (Lambeth Council, 2023). This plan promises to give 25% of kerbside space to parklet programmes that provide green spaces for people to meet and socialise, reduce traffic speeds (in conjunction with other traffic and speed measures), and revitalise the area (Cross River Partnership, 2020; Lambeth Council, 2023). The Lambeth approach will increase the use of kerbside space to incorporate sustainable transport solutions such as shared e-scooters, bike parking, EV charging stations, cycle hangers, and help for companies using electric delivery vehicles and cargo bikes.

Another approach to safer sustainable travel is the application of traffic management and calming systems like low traffic neighbourhoods (LTN) to reduce motor traffic inside the intervention area. LTNs use modal filter measures such as planters or lockable bollards to remove motor traffic form residential streets. A study on LTNs introduced between September 2015 and June 2016 in London found that vehicle trips fell 56%, walking and cycling injury numbers fell two- to three-fold, car driver or passenger injuries decreased, and the duration of walking increased by 29% and cycling by 51% (Laverty et al., 2021). A more recent review and meta-analysis of traffic data presented in monitoring reports from 46 LTN schemes in 11 London boroughs introduced between May 2020 and May 2021 found that the typical internal road went from carrying 1,226 motor vehicles per day before LTN implementation to carrying 666 motor vehicles per day following LTN implementation, improving safety for those walking and cycling (Active Travel Academy, 2023). LTN can encourage safer, and less traffic dominated streets and neighbourhoods enabling perceived safety, building the confidence and resilience to use the street for play, cycling and social cohesion (Mott MacDonald, 2002; Play England, 2016).

4.3.3   Increased accessibility and liveability

Having sustainable travel infrastructure (such as good pedestrian routes, and links to public transport stops) in place makes it easier for people to access services and employment opportunities that are within walking distance or can be reached via public transport (Douglas and Beautyman, 2021). Sustrans' Walking and Cycling Index in 2021 found that only 56% of people on low incomes felt they could get to places easily without having to drive, despite 38% of people on low incomes not owning or having access to a car (Sustrans, 2022a).

Accessibility of transport is evaluated through access to modes of transport, cost of transport, distance to public transport and length of journeys to work, school, and necessary services. For the last decade, disabled people made 38% fewer journeys than non-disabled people in the UK and 1 in 5 disabled people felt unable to travel due to the lack of appropriate transport options (Motability, 2022). Sustainable travel can reduce this transport gap, improving connectivity and access to jobs, essential services, retail, and education especially for low-income populations and people with lower levels of transport choice (Douglas and Beautyman, 2021; Hutchinson et al., 2014).

There is a wealth of psychological data on how we are impacted by our environment. In the environmental impact section, sustainable travel enables the change of use of urban

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[6] Accident data reported monthly on kilometres of bike lane

space away from car dominance (Lee and March, 2010). This increase in space can be used to make areas more liveable and improve physical and mental health outcomes for residents and visitors. A study of 10,000 individuals in the UK found that, on average, individuals have lower mental distress and higher well-being when living in an area with more green space (White et al., 2013). Research in the Netherlands found that people in cities with green space 1 – 3 km away from where they lived reported fewer physical and mental health problems than those further away (de Vries et al., 2003). These effects have been showed to persist across variations in age, gender, race and socio-economic status (de Vries et al., 2003).

4.3.4 Summary

Sustainable travel interventions have a social impact by encourage more healthy behaviour, creating better communities and safer streets. Our research has found that sustainable travel interventions have the following social impacts on local high streets:

Healthier, happier and safer communities:

- We found significant evidence of improving physical health from active travel and better air quality across large sample sizes in all geographies. Modelling suggests that walking and cycling save the NHS £27.5 million per year through preventing long term health conditions (Sustrans, 2022a).

- We found some evidence of improved mental health due to active travel, connection to nature, reduction in isolation and improved community cohesion in more than one geography in small sample sizes.

- We found some evidence recorded over long periods of time of better access to jobs and education opportunities in more than one geography in medium sample sizes.

- We found significant evidence of reduce accident numbers due to sustainable travel interventions across large sample in more than one geography.

4.4 Case Studies

In this section we present a selection case studies that explore how sustainable travel interventions be most effectively designed and implemented. The case studies provide examples of some of the opportunities, challenges, and barriers in delivery. These case study demonstrate real world examples of different approaches to delivery sustainable travel interventions in different communities.

The case studies are:

- Pedestrianisation and walkability in Pontevedra, Spain.

- Covid response and legacy in Cotham Hill, Bristol.

- Small town community delivery in Huntly.

- Sustainable and active travel on the Isle of Arran.

- Future of transport, how drone pilots may support island and rural communities.

- Electrek explorer, a countrywide app that supports sustainable tourist travel and local businesses.

The case studies below demonstrate examples of sustainable travel interventions in various locations and circumstances - such as urban, semi-urban or rural areas and large-scale programmes or smaller street-based actions. We sought to include examples that demonstrate good evaluation of impacts or had a link to the themes that arose from the literature review and stakeholder interviews and are not available in academic

research presented in the literature review. More detail on each case study is available in the engagement materials produced as a companion to this report.

4.4.1 Pedestrianisation and walkability in Pontevedra in Spain

Pontevedra in Northwest Spain has a population of 83,000 with a high population density and is famous for its historic centre. The city struggled with congestion and infrastructure not built for heavy car use. To tackle the challenges, Pontevedra implemented an ambitious plan to pedestrianise the city centre streets and allow only car access for residents and services. The process began in 1999 with the old town and was combined with upgrades to the sewage, restoration of historical sites and other public realm infrastructure. The size of the pedestrianised area increased in the following years, and in 2010 the city set a maximum speed limit of 30 km/h, with 10km/h for vehicles in the centre. Traffic entering Pontevedra reduced by 92% in the centre, 77% in the inner city and 53% in across the whole city. Maps demonstrate the city's walkability by depicting the link to public transit routes and the distances and average walking times between key locations.

Much evaluation has been done on the impact of the predestination project. Since 1999 there have been no fatal traffic casualties in the pedestrianised area, and only three across the city since 2007. Carbon emissions decreased by 66% between 1999 and 2014. There was a 7% increase in offered jobs between 1997 and 2015. Most significantly, residents and visitors are positive about the city, and the local economy has thrived in the transformed areas.

Further links or information

[Fewer cars more city](#)

[Pontevedra - pedestrian](#)

[Pontevedra local government](#)

4.4.2 Covid response and legacy in Cotham Hill, Bristol

Cotham Hill is situated in Cotham, a suburb of Bristol, about one mile from the city centre. In April 2021, the council introduced temporary road closure measures in response to Covid-19 restrictions. This aimed to support local businesses to operate by providing outside space and enabling social distancing. Before implementing the changes, the local authority surveyed the residents, asking them about their street environment, what they liked, what they would improve and what their priorities were. The closure was initially demarked by a temporary red and white barrier. In response to complaints about the look of these barriers, planters were put in place to improve the appearance in July 2021. An on-the-street survey accompanied this change to capture what residents and users of the street thought. 80% felt the road was safer, and 75% felt the shared space was easy to use.

In autumn 2021, a further consultation took place based on making the changes permanent. Residents were offered three choices: keeping the current changes, making more areas car-free, or returning car access with a single lane and reducing speed limits. 63% of respondents selected to keep the existing measures, 27% wanted to extend the pedestrianised area, and only 5% wanted to return to some car access. 37% wanted better bike parking, and 59% wanted street art included in the preferred option.

Cotham Hill pedestrianization is now permanent, and Bristol has submitted a funding bid for £5.2 million to make walking and cycling easier in eight areas. The engagement process undertaken for Cotham Hill demonstrates good practice in understanding the community's needs and priorities, and consulting on specific plans.

Further links or information

Using Vivacity to track trials of walking to generate evidence.

Lucy Saunders Healthy street approach

Cotham Hill Permanent Scheme Consultation

4.4.3   Small town community delivery: Huntly

Huntly and District Development Trust run the Huntly Green Travel Hub (HGTH), which includes three low-emission cars, e-bikes, and a community minibus. They are also running a community consultation on 'Mini Holland Huntly' to explore how they can make it easier for the community to get around by walking and cycling. The organisation has a broader green initiative, including a farm, eco-bothy, and sustainable regeneration of the town.

They are also developing the Huntly travel hub, a premises in the town centre, which is expected to open in September 2023. The hub will allow them to operate the e-bike hire and be a location where people can find out about walking and cycle routes in the area and receive support when looking to join the car club.

The car club was launched in 2015 and is operated by Co-wheels car club. The car club has 70 members, with ten core users from whom the car club has replaced their vehicles, meaning ten cars were removed from the road. There are around 20 members who use a car once a month, and the remaining members use the car on a one-off basis. In the first 2.5 years of introduction, the club vehicles have driven a total of 23,500 miles, which equates to around 783 miles per month travelled by car club users[7].

Further links or information

Huntly Green Travel Hub

4.4.4   Sustainable and active travel on the Isle of Arran

The Isle of Arran is the largest island in the Firth of Clyde off the west coast of Scotland. With a population of around 5,000, it has several villages, the largest being Lamlash, with a population of approximately 1,000.

Ecosavvy is a grassroots organisation that has been operating since 2014 and started through the operations of a local charity shop with a focus on waste reduction and reuse. Over time they have expanded their activity into energy sustainability, food production and low-carbon transport. They operate a weekly travel hub using space in a local leisure centre where they run e-bike loans, Dr Bike check-ups, e-bike service and repair and support for those wishing to cycle more around the island. They have also set up the Arran recharge network, working with local businesses that can offer e-bike charging to those using their company. The network gives tourists and residents who use e-bikes confidence that they can travel around the island and recharge their batteries if needed. Their Arran Green Travel Map provides the location of charging points for bikes and cars and bike repair stations on the island as well as information on cycle tracks and routes, including distances, estimated journey times and difficulty.

In 2020 – 2021 the organisation reported that 22 businesses have signed up to the e-charge network, there have been 17,557 e-bike miles cycled, residents have brought 14 e-bikes, and they have 264 active members on the Arran lift share forum. Committed volunteers drive the group's progress; however, they face significant challenges in finding funding and managing the administration burden. They have found they make the biggest impact through projects that take a holistic view of climate actions (address transport alongside energy, waste, and food production) and link into several services.

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[7] CoMoUk survey found that 17 private cars are replaced by one car club vehicle in Scotland
62a8acfd0a9730425b051e95_CoMoUK Scotland Car Club Report 2021 Key Findings.pdf (webflow.com)

Further links or information

[Arran Eco Savvy](#)

4.4.5 Future of transport: how drone pilots may support island and rural communities

The Sustainable Aviation Test Environment (SATE), started in 2020, is partly funded by UK Research and Innovation (UKRI), which created the UK's first operationally based low-carbon aviation test Centre at HIAL's Kirkwall Airport in the Orkney Islands. £8.9 million has been secured to run the centre until 2025. One successful project has been establishing an unmanned aerial vehicle (UAV) hub and spoke delivery network working in partnership with Windracers Downs and Royal Mail.

Many communities in the Highlands and Islands need better access to services, and it is challenging to provide a level of service equal to that in better-connected, less rural locations. UAVs can improve connectivity in these locations and reduce carbon emissions, reduce bottlenecks on access routes and support local economies. Part of the project is to develop and understand use cases for UAVs in rural and island communities.

The SATE project aims to test the technology and explore the potential benefits to the highlands and islands and find solutions to the challenges in the regulatory environment.

Further links or information

[Regional and Rural Air Mobility](#)

4.4.6 Electrek explorer: a countrywide app that supports sustainable tourist travel and local businesses.

Electrek Explorer grew out of the Covid-19 pandemic as a response to the influx of tourists in rural Scotland, causing congestion and issues on the road that were not designed for the numbers. The web-based platform aims to help tourists find more sustainable solutions when travelling to an area. It provides information on using e-bikes in the area you are travelling to, along with EV charging and local businesses offering to charge and linking with nature-based tourist adventure.

The data and information collected through the app can also be used to support local authorities and tourist organisations in designing more sustainable routes. The developers surveyed local communities and businesses to understand their priorities and interests in attracting green tourism.

Further links or information

[Electrek Explorer](#)

5 Effective design and implementation of interventions

5.1 Overview of how sustainable travel impact high streets

The primary outcomes of introducing sustainable travel interventions are the increased modal shift out of cars and reallocating of public space from cars to other uses. These changes result in several environmental and social benefits, leading to safer and more pleasant urban environments. An improved urban environment has economic and social benefits, creating stronger local economies and happier, healthier communities.

In Figure 1, we have mapped a bounded system of how sustainable travel interventions can impact high streets. This map focuses on sustainable travel; there are multiple feedback loops which add complexity that we have not mapped and would require more detailed systems analysis to depict. Other interventions not included here and leading to more pleasant and vibrant high streets include better-built environment planning and improved social mobility. Few research studies measure and evaluate more than one of the impacts or stages within the system. Our research did not find much evaluation of the timescale in which different impacts/benefits can be expected to be realised. Examples and case studies show that change is often incremental and over a long period of time. Realising the environmental benefits of sustainable travel relies on sustained behaviour change.

Sustainable travel's most apparent local benefits are the reduction of pollutant emissions and the associated improvement in air quality. Whilst we have found examples of how sustainable travel can have more comprehensive environmental and ecological benefits (e.g. climate change, biodiversity, cooling, and noise), there are limited studies on how to maximise these benefits. Ultimately, the impact on a local high street comes from the shift in the use of road space, away from cars and towards a mix of other uses. Any interventions that do not do this will have a limited impact across all environmental, social, and economic measures.

We found challenges in seeking robust and sustained evaluation examples. Many interviewees reported that whilst they would like to have more opportunities to measure and evaluate the impact of their actions, they needed more resources. This observation was true of organisations at all levels, from local and regional authorities to community-delivered projects.

Stakeholders reported that it is often common practice (particularly for larger projects) to undergo an appraisal of a future intervention. Depending on the project's complexity, this may be using STAG (Scottish transport appraisal guidance), a feasibility study, or business case development (see section 4.1). However, there are often limited resources dedicated to post-intervention monitoring or evaluation to understand the impact of the implemented/complete intervention. Stakeholders identified the need for methodologies for long-term individual outcomes. Others reported that implementing evaluation methods is difficult:

> "It's very hard if you are a town to measure increases. People have the money they have, if a space is nice then perhaps, they will come and shop in that area but not necessarily spend more than what they have got."

Often, measuring the impacts of transport interventions focuses purely on the direct impact, i.e. modal shift that has occurred. This data can then be used to model the carbon dioxide savings and air quality improvements and estimate the effect on health or access to jobs and education. Identifying the wider benefits of sustainable travel can be challenging. The economic and environmental benefits often filter into the surrounding

communities, enabling increased social mobility opportunities. The gap in evaluating interventions was a recurring theme across different stakeholders. Where evaluation had been applied, it was often described as:

> "narrowly focused on environmental impact not a holistic impact".

Stakeholders identified that it is not always clear or easy to incorporate indicators identifying increases in a community's quality of life and enjoyment through mobility choices. Some examples that work well include the centre for wellbeing and economic growth who have tools that are useful for developing frameworks and theories of change. Those interviewed reported that finding a measure and evaluating these changes were as crucial as those observed more routinely, such as estimated changes in emissions, equity, changes in the number of accidents, and changes in modal-split numbers.

Social outcomes can be evaluated by looking at well-being measures, including mental and physical health. Demonstrating causality is difficult as various inputs can influence outcomes, for example, social deprivation, an area's physical infrastructure, and systemic inequality. Perhaps because of this, few research studies measure and evaluate more than one of the impacts or stages within the depicted system. Some explicit or well-understood social impacts of sustainable travel include the health benefits of sustainable travel, safety, and the reduction of fatal road traffic accidents.

Some of the most profound benefits may be difficult or impossible to quantify. All stakeholders we interviewed spoke of the joy and pleasure someone might take from being in a car-free environment, with more room to include aesthetically pleasing NbS. Relying solely on metrics such as modal shift, carbon emissions and financial impact in appraisals and evaluation of initiatives risk excluding these less tangible benefits. These findings suggest that those implementing sustainable travel interventions need more support and guidance on how to measure a variety of impacts that truly represent the benefits perceived and realised by the community. Interventions should have an evaluation plan with indicators that link to the local priorities in order to measure the realisation on the benefits.
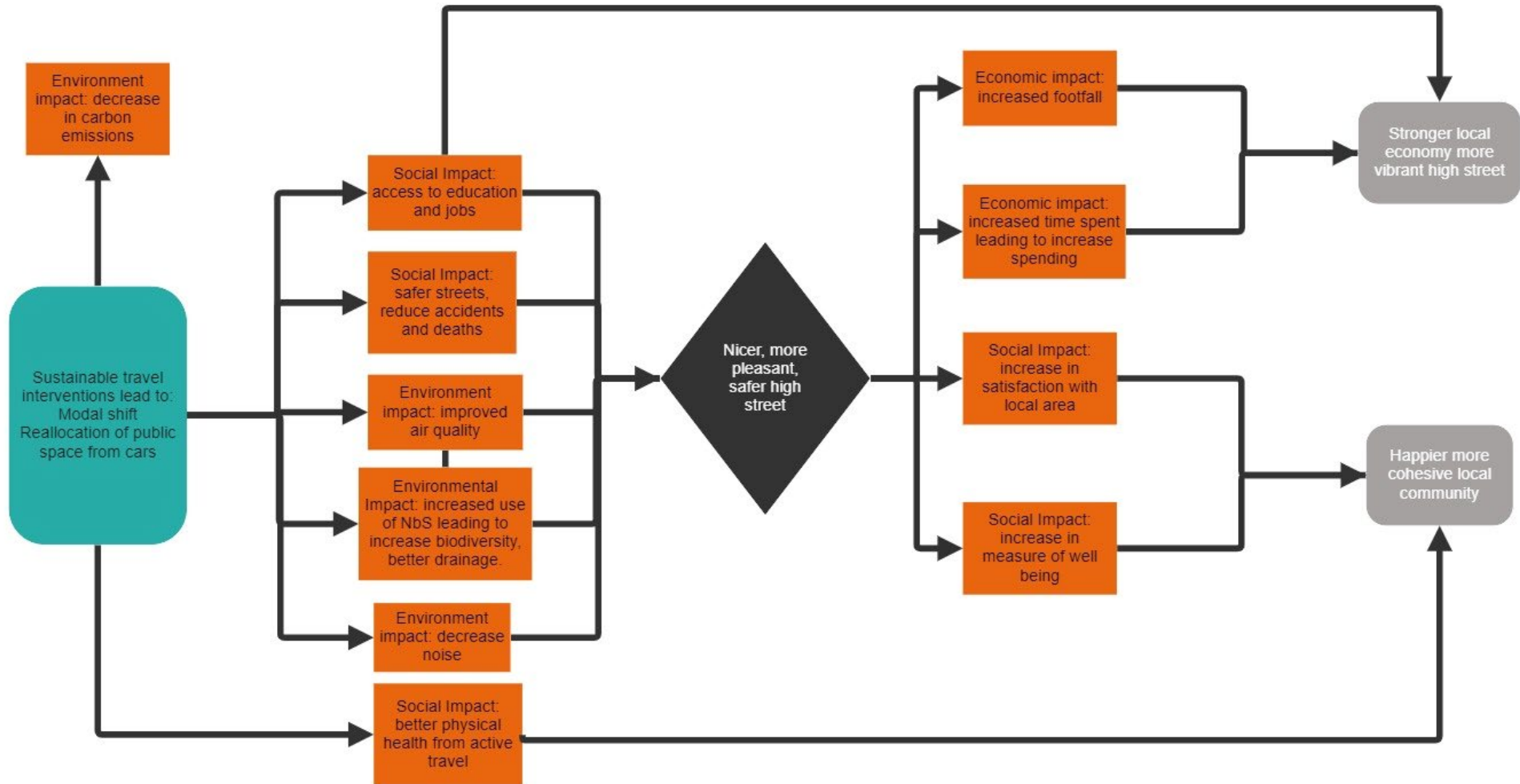
Figure 1: System map of sustainable travel impact

5.2 How sustainable travel design and implementation is supported by identified benefits in engagement.

Considering the research question of how sustainable travel interventions can be most effectively designed and implemented, evidence from the case studies we collated demonstrates that local authorities and communities may want to consider two things; at what point of engagement they use this information on impacts, and how they can include locally specific impacts alongside the evidence if impacts. We have collated evidence of benefits in this research and presented them in easy to access formats in the engagement materials. (Link). The demonstrated impacts of past travel interventions can feed into the design, development, and delivery of sustainable travel interventions in several ways:

- Evidence of impacts can aid in increasing understanding of how interventions impact the community. Using evidence and examples on the impacts of sustainable travel coupled with an understanding of local priority areas and barriers that will highlight the information relevant to the community. This engagement can be part of a process to seek a deeper knowledge of the community.

- Data and evidence collated in this research, and presented in the engagement materials, can support to help explain the parameters and constraints of potential interventions to a community. Using previous research to help set expectations and can be useful when seeking input or consulting on ideas.

- Communications activities can use the evidence in this research to demonstrate successful change. Case studies such as those presented in section 4.4 and examples of other places that have implemented interventions can help to alleviate fears of change based on potential negative impacts.

- When the opportunity to take specific plans or options to the community for their input, evidence of the expected impact will be helpful to manage expectations and be clear about reasons for decisions.

The evidence we have found in this research is beneficial for engagement, but stakeholders we spoke to also stressed of the importance of having data and information on the local context. When developing a communication, those planning it should tailor the materials to the local context, intervention, and community. Alongside this information evidence on the impacts of sustainable travel can explain why a decision for this location has been made.

Our research found examples of interventions removed or discounted due to dissatisfaction from the local community. The basis for this decision was often not data on benefits or impacts. More research would help understand what type of message and behaviour change techniques would help persuade those dissatisfied with a change of the benefits of the local area. This research has identified the critical benefits of sustainable travel and how they may impact different audiences, particularly those that are hard to reach. However, we have not assessed what messages or methods of communication are most effective. The research and interviews indicate that it is important to consider what success means to the community; as discussed in previous sections, there is often an overreliance on environmental impact measurement, and input from stakeholders suggests that this is not an important motivating factor for many.

5.3 How to consider and address potential negative impact.

Through our research and stakeholder interviews, we identified two groups that require particular consideration when designing sustainable travel interventions for local high streets.

The first are those for whom interventions may impact their ability to travel to and use the high street. Restricting car access could make it harder for people with limited mobility to get close enough to the premises they wish to visit. Shared spaces also raise concerns from those with sensory impairment as it makes navigating the environment more complex. There is a need to design high streets and town centres as inclusive spaces that give people the access to mobility options they need and ensure equity of treatment and access. One local authority interviewee noted that when planning for sustainable travel through pedestrianisation:

> "We need to think about what would happen if you took blue badge [access] and busses away from central spaces."

We came across examples where accessibility concerns had led to a project being abandoned or blocked, even though sustainable travel interventions could improve the urban environment for vulnerable users and protected groups. The decision was attributed to sub-optimal engagement with vulnerable users rather than a lack of solutions. There are a number of adaptations to the streetscape that support accessibility and can be part of sustainable travel interventions. These include, kerb cuts and ramps, places to rest, and tactile paving which texture and which provides information about changes in the environment.

Feedback from the stakeholders suggested that the perception of sustainable travel impact on disabled communities and the reality of what can be delivered was one of the biggest challenges they face. Delivery of interventions that are inclusive and consider equality of access requires engagement with disabled communities to build inclusivity and accessibility. Presenting positive benefits alongside co-design processes should be used for sustainable travel interventions to ensure no significant barriers and enable access by various pedestrian groups, including but not limited to the elderly, those with a disability and children.

The second group are businesses on high streets that fear they will suffer an economic loss due to proposed changes. Sustainable travel can positively impact high streets through increased customer satisfaction and foot traffic, sales, and land values as evidenced in this research. However, businesses realise these benefits in different ways. Evidence suggests hospitality businesses benefit more from pedestrianised streets than retail. In particular, niche retail businesses that rely on customers travelling long distances for their services may be put at risk (Portland State University et al., 2020). In the planning stage of sustainable travel interventions, a good understanding of the economic activity in the area will ensure the effect on local business has been considered. There is a risk that important factors will be overlooked (such as the type of customers, their current travel patterns, and delivery requirements), which may result in negative impacts. It is vital to have a good understanding of the businesses in the area, who their customers and workforce are, and what is important to the success of their business. Having good data and information on the businesses on the local high street means you can consider the following in your planning:

- Deliver intervention to the high street where they will have the most significant benefit first (i.e. those with predominantly hospitality businesses).

- Design interventions that support businesses and consider their needs.
- Plan for extra support to those that may be at risk.
- Plan for the disruption caused when any civil works are taking place as part of the intervention.

The research we reviewed suggested that businesses see more significant benefits when they take ownership and are involved in sustainable travel interventions. Engagement processes that take the time to understand the community and businesses' needs and foster buy-in are vital for successful schemes.

5.4 Geographic considerations

Rural communities face many unique challenges to accessing sustainable travel. These include infrastructure such as narrow roads, a lack of cycling lanes and walking paths, infrequent public transport services, low population density and road user fluctuations due to tourism. Setting up and maintaining services is difficult as potential user numbers are insufficient to support a viable business case.

> "When looking at rural schemes, you need a big city to take the overheads…having e-scooters in two or three rural towns will not work."

Access to services is important for sustainable travel in rural and island communities. There is a need to engage with the ecosystem of the high street, with stakeholders noting that you cannot look at one aspect (benefits to businesses or e-bikes) in isolation. Whilst it is a challenge, we should be clear some solutions and interventions can work for rural high streets. Planning should look at local circumstances, build on local needs and take a cross-sector approach.

This integrated approach to sustainable travel, with a holistic view connecting investments in sustainable travel with wider services and needs in the community, reveals potential solutions. Developing a mobility hub is one method of convening services and amenities alongside sustainable travel. CoMoUK defines a mobility hub as:

> "a recognisable place with an offer of different and connected transport modes supplemented with enhanced facilities and information features to both attract and benefit the traveller" (CoMo UK, 2023).

Many Scottish rural communities are exploring how they can create mixed-used centres that offer various services, including transport. The Angus Rural Mobility Hub is one example(Pattie, 2020) .Angus Council and Dalhousie Estates are developing a clean growth business park in Brechin, Angus. The hub will offer sustainable travel solutions such as EV charging, bus interchange, on-demand public transport, micromobility (e-bikes and cargo bikes), community hub and office space. Ecosavy on the Island of Arran is an excellent example of making the most significant impact with projects that take a holistic view of climate actions (address transport alongside energy, waste, and food production) and link into several services. However, they have increasing difficulty securing funding supporting this cross-sector work.

One element that requires further investigation is what type of messaging works best in rural communities. Whilst this study has identified benefits of sustainable travel and the accompanying engagement materials advise on how this can be used in communication, we have not examined evidence on the types of messaging that are most effect for different demographics. In the evidence we have reviewed there is no assessment of effective behaviour change techniques or which messages work best. Our research has found that benefits seem to be better realised when the emphasis of an intervention is

on connectivity and access to service rather than building environment improvements, however more research is needed to fully understand what is most effective.

5.5 Different audience interests

Our research and stakeholder interviews have revealed various reasons for measuring and reporting the impacts of sustainable travel. It is important to consider which measures are relevant for different uses. Much of the current collection and analysis of data on sustainable travel is performed to compile funding proposals or to report on the outcome of funding decisions. These measures document anticipated benefits and are particularly useful for project appraisal processes such as STAG (see section 4.1). These tend to focus on modal shift and associated outcomes. One of the most measured impacts of sustainable travel – carbon emissions – does not have a direct and perceivable impact on local high streets and town centres (in the short term, at least).

Whilst this impact measurement is important for the transport sector, they often have little relevance or importance to stakeholders involved in the local high street. These groups are more likely to be interested in how the perception of the area may change, demonstrating an increase in perceived vibrancy. The focus on the overall perception of a location may be linked to the concept of place-making. Place-making refers to aspects that make the local high street and town centre liveable and welcoming for residents and tourists. Successful place-making increases the time spent in local centres and increases economic activity and community cohesion.

Our research has found that for a healthy local economy to thrive on a high street, a variety of aspects, workplaces, residential spaces, and schools are needed. These are the aspect that communities and businesses are interested in when discussing their local high streets. Providing information and impacts that demonstrate how sustainable travel can create "enjoyable spaces" will interest communities. Interviewees reported that this is a challenging aspect to measure and often overlooked. A stakeholder specialising in transport and industrial design noted:

> "You shouldn't underestimate the importance and power of making people feel happy. Especially when you are talking about streetscapes, people want to be in places that make them feel happy. If you want to be somewhere, you are more likely to work there, shop there and raise a family there."

Sustainable travel interventions can seem counterintuitive. For example, many consumers struggle to be convinced that LTNs will not increase traffic elsewhere, despite evidence that they decrease driving time and increase active travel use, reducing traffic overall; this can be a complex message to relay to communities.

There is always a balance to be achieved between what is possible to deliver and what residents may wish to happen. Communities are not homogeneous, and people will have different opinions on what they want to see in their area. In this instance, it is unlikely that any data is likely to change opinions. Some places have chosen to navigate this complexity by simply going forward with measures despite dissent from the community or without a lengthy consultation process. One of the most famous examples is Ghent in Belgium, which pedestrianised the inner city and seven neighbourhoods overnight and forged ahead with the plans despite threats to officials. This approach requires strong political support and robust data that provides an in-depth understanding of the communities that will be impacted.

5.6 The mindset of the engagement process

Treating people's concerns with respect and listening is essential, and this must occur at the right points throughout the planning process. It fosters resentment if it is left too late and plans are decided with no opportunity for adaptation to their concerns. It is not always possible to make everyone happy about changes to their local environment. Still, it is vitally important that planners identify those who may lose out and consider how to accommodate their needs. This includes:

- Planning is based on sound data and a good understanding of local circumstances.

- Engagement is genuine when they offer opportunities for input and are clear in the input parameters.

- Regularly communicate with groups impacted, listen to concerns, and communicate how they have been considered.

- Considered what success looks like for everyone, not just meeting transport or decarbonisation targets.

Projects should engage closely with the communities and businesses impacted by sustainable travel interventions. This will not only build better initiatives but also help planners to have a greater understanding of the impact they are having.

6 Conclusion

Interventions which increase walking, wheeling, cycling, or use of public transport can reduce car use and free up space on streets. The literature reviewed as part of the research demonstrates sustainable travel has environmental, economic, and social benefits to local high streets and towns. Evidence collected showed that there is a wide breadth of potential benefits of sustainable travel to communities, but that evaluation and measurement of impacts does not always capture this.

The criteria used for determining significance of the research is described in section 4. The degree by which an intervention realises the benefits varies depending on the local circumstance and the action taken. Figures we have found are either specific to the local context or the result of modelling impacts on a nationwide scale. The introduction of sustainable travel can result in multiple positive benefits for high streets:

Better environment:

- We found significant evidence of decrease in air pollution in all geographies across large sample sizes. Modelling suggests that if 10% of the population switched from cars to bikes and public transport, emissions would decrease by about 10% (car to bike) and 3% (car to public transport)(Brand et al., 2021).

- We found significant evidence of a decrease in carbon emissions in all geographies across large sample sizes. In one case study, carbon emissions decreased by 66% over a 15 year period following pedestrianisation of a city centre (Council of Pontevedra, 2017).

Making room for people and nature:

- We found there was limited evidence of increased biodiversity in urban areas, due to a lack of research in this area.

- We found evidence of the benefits of increased natural solutions, which reduce the impact of noise pollution, improve air quality, and help with temperature control in urban areas across small sample sizes. The potential for such solutions can be increased by encouraging modal shift; for example, cyclists require approximately 12% of the space needed to park a car(Lee and March, 2010).

- We found evidence of the beneficial impact of making more room for people to walk, wheel and cycle, and better pedestrian facilities make it easier for those with limited mobility to navigate the high street in all geographies across small sample sizes.

Valued places that people enjoy:

- We found significant evidence of the short-term impact of increased land values and rental prices for businesses, making an area more attractive for investment and desirable to live in more than one geography across large sample sizes. The impact varied from an increase in land values between 70–300% with retail commercial rates increasing in the range of 10–30% (Active Living Research, 2013; Litman, 2023, 2003; Living streets, 2018).

- We found significant evidence of the increased positive public perception towards the area in more than one geography across medium sample sizes.

Healthier, happier and safer communities:

- We found significant evidence of improving physical health from active travel and better air quality across large sample sizes in all geographies. Modelling

suggests that walking and cycling save the NHS £27.5 million per year through preventing long term health conditions (Sustrans, 2022a).

- We found some evidence of improved mental health due to active travel, connection to nature, reduction in isolation and improved community cohesion in more than one geography in small sample sizes.

- We found some evidence recorded over long periods of time of better access to jobs and education opportunities in more than one geography in medium sample sizes.

- We found significant evidence of reduce accident numbers due to sustainable travel interventions across large sample in more than one geography.

Thriving businesses, better links to jobs, and more spending:

- We found significant evidence of higher footfall in businesses across large sample sizes in all geographies. Several UK studies found that footfall increase by approximately 30% after the introduction of sustainable travel measures (Momentum Transport Consultancy, 2022).

- We found significant evidence of increased time and money spent in local businesses across large sample sizes in more than one geography.

There are some areas where the evidence we found for benefits or impacts we found was limited, did not cover large sample sizes or across different geographies. These included the impact on biodiversity, mental health and wellbeing, access to jobs and education and the benefits of creating more room for people with limited mobility to access local high streets. This evidence gap reflects a lack of research in those areas rather than a lack of benefit, as did not find evidence to suggest a negative or no impacts.

Sustainable travel's most apparent local benefits are the reduction of pollutant emissions and the associated improvement in air quality. Our literature review found that best practice appears when interventions consider the cross-sector needs of the area and incorporate NbS. Combining sustainable travel and NbS methods improve local air quality significantly, as this prioritises liveable places for pedestrians and cyclists over vehicle traffic. Whilst we have found examples of how sustainable travel can have more comprehensive environmental and ecological benefits (e.g. climate change, biodiversity, cooling and noise), there is a need for more studies on how to maximise these benefits. Evaluation of interventions should include data on economic impacts from businesses and social impacts and not just measures of modal shift and reduction in transport emissions. Cross-sector working for delivery can help those implementing transport schemes better understand the measures that sectors use and how travel interventions impact them.

The organisations we spoke to had strong ambitions to deliver sustainable travel interventions that help to develop strong, vibrant, inclusive, and accessible high streets. They see sustainable travel as being a key enabler to achieving better place-making. Identifying benefits can play an important role in engagement with the community and sustainable travel interventions. Having evidence and quantitative data on the potential benefits of sustainable travel for local high streets is helpful. Those engaging on sustainable travel interventions should combine evidence with local knowledge of priorities and, as plans progress, an indication of impacts at a local level. Sustainable travel interventions should meet or solve a community need or challenge, and engagement is a process that helps planners to do this. Having a good knowledge of the community, the obstacles and barriers they face, and the groups at risk of missing out

allows planners to use the most appropriate evidence at the right time and in effective ways.

Our interviews with stakeholders found that it is important to recognise the value of qualitative information. Case studies and information on the less tangible benefits help tell the story to communities. We have used these findings and existing best practices for engaging with communities to develop a pack of engagement materials. The design of the materials uses recognisable images of Scottish cities and towns to evoke links to local communities. It also uses the idea of presenting positive change through sustainable travel and our guide to explore ways to engage with the different target audiences and how to use evidence in engagement activities. The engagement materials can be found on the page for this project on the CXC website: https://www.climatexchange.org.uk/research/projects/the-benefits-of-sustainable-travel-to-local-high-streets-and-town-centres/.

This study has not looked into research on messaging, behaviour change or effective community engagement; much of the input on this subject has been from practitioners who work with communities and sustainable travel interventions. The examples we have explored demonstrate that all not sustainable travel interventions that benefit local high streets must be technologically complicated or large infrastructure projects. The places we have spoken to highlight how understanding the community's needs and evaluating what works can deliver outstanding results.

Based on our research we have made recommendations for actions that could be taken to increase sustainable travel to high streets and town centres. These apply to various stakeholders, from national and regional authorities to those in communities engaging with the public. (Note – where we have used planners, we refer to any group, authority or organisation that is planning to develop and deliver sustainable travel interventions).

Maximise benefits of sustainable travel through holistic projects that meet community needs.

- Planners should seek to implement interventions that cover a variety of sectors and address the community's needs rather than focusing on one aspect (e.g. travel) to encourage more local living behaviours. Evidence gathered in this research found that where projects addressed the cross-sector needs of a community, the interventions were more successful.

- Sustainable travel interventions should maximise air quality and place making benefits by incorporating nature based solutions wherever possible. Evidence gathered in the research found that interventions that included nature based solutions realised greater benefits.

Guidance on how to measure benefits and evaluate interventions in order to identify and communicate these benefits effectively.

- The Scottish Government evaluation should ensure existing guidance is up to date[8] and provides information on how to evaluate what success means to the local community and those impacted by interventions. Support is needed for planners to ensure that evaluation accounts for those impacts which will significantly affect communities (economic and social impacts).

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[8] Plans for sustainable travel interventions should include resources for evaluation of measures. Certain grant-funded interventions could benefit from a proportion of their cost being allocated towards evaluation costs.

https://www.gov.scot/publications/evaluation-policy-makers-straightforward-guide/

- Plans for sustainable travel interventions should include resources for evaluation of measures. This is so decision-makers have a greater understanding of the potential for these actions to contribute to net zero commitments.

Identified benefits should play an important role in constructive engagement.

- Those planning sustainable travel interventions should consider different engagement stages and ensure that engagement activities fit their desired outcome and target the right audience. Evidence gathered in the research demonstrates the importance of timely engagement and identifies important target groups of businesses and vulnerable members of the community.

- Planners should use the evidence of impacts from this report and engagement materials to help local people and business owners to understand the benefits to them and their communities. Evidence from this research found that demonstrating benefits to local communities and business owners was helpful, and the engagement materials provide advice on the best ways to do this.

Groups potentially negatively impacted need to be particularly catered for in engagement.

- Those planning to develop sustainable travel interventions should engage with vulnerable users early in the process to ensure that their needs are understood and accounted for. Evidence gathered in the research found that vulnerable groups at risk of missing out are key stakeholders. The research also found that sustainable travel could benefit these groups when they have input into the planning.

Recommendations for further research and investigation that the Scottish government should explore:

- How planners can use innovative methods to demonstrate the emotive benefits of sustainable travel interventions, this would help more planners to communicate how they are aiming to create local places that encourage 'local living' behaviours and the benefits of this.

- Archetypes of how the key performance indicators for good transport vary in different geographies would aid local decision-makers in understanding the benefits to their population and the opportunity for these actions to contribute to wider net zero commitments.

- What are the most effective messages and post-intervention information to promote the realised benefits of sustainable travel and help local people and business owners understand the benefits to them and their communities?

7 Appendix

7.1 Literature review method

We systematically reviewed and synthesised peer-reviewed and grey literature and English-language publications to identify relevant research about two key measures:

- Reducing car use by switching to active travel, public transport, and Micromobility, and best practice for deliveries to and by local businesses.
- Kerbside as a cross-thematic topic with competing needs around parking, EV charging, active travel infrastructure, deliveries, and space for local businesses.

Identifying the business and local economic benefits that can come from more local living was the primary aim. The secondary aim was to create an evidence-base of the benefits of sustainable travel to local highstreets and town centres. The potential benefits that we have explored will include economic, social, and environmental benefits.

We applied a rapid evidence assessment methodology to fast-track the systematic review process, enabling us to synthesise evidence in a shorter period of time. To identify sources, we searched Web of Science, TRID and Google Scholar using a combination of search terms *(see inclusion and exclusion criteria)*. In total, we found 44 academic studies and 36 research reports including policy papers produced by governmental agency, industry, and trade publications (grey research). We also reviewed the reference lists from the selected academic and non-peer reviewed grey literature sources to identify additional studies that fell within the search criteria.

Our systematic approach involved following the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) guidelines that recommend using a flow diagram to describe the screening and study selection process (see 6.1.3). This process was applied to both academic literature and grey research materials, reviewing all for relevance to the research objectives. All academic studies and research included in this study followed full-text screening.

7.1.1   Search strategy

We adopted the following set of criteria for the review of academic and grey literature. The literature review procedure followed a four-phase system, identification, screening, eligibility, and inclusion. The identification process utilised an initial set of keywords developed in consultation with the project steering group.

We used the full list of keywords to identify related academic literature. Transport terms and Local Town Centres will be used to search for subject matter, with the social, economic, and environmental benefits works used to narrow down the specific area of research. We will allow for some flexibility in the key terms – allowing for an iterative process to add or remove key terms from the guide – to ensure that we do not exclude potentially relevant material. In order to generate relevant literature, we linked key search terms, presented in the following table. We will use combinations of the agreed keywords as search terms.

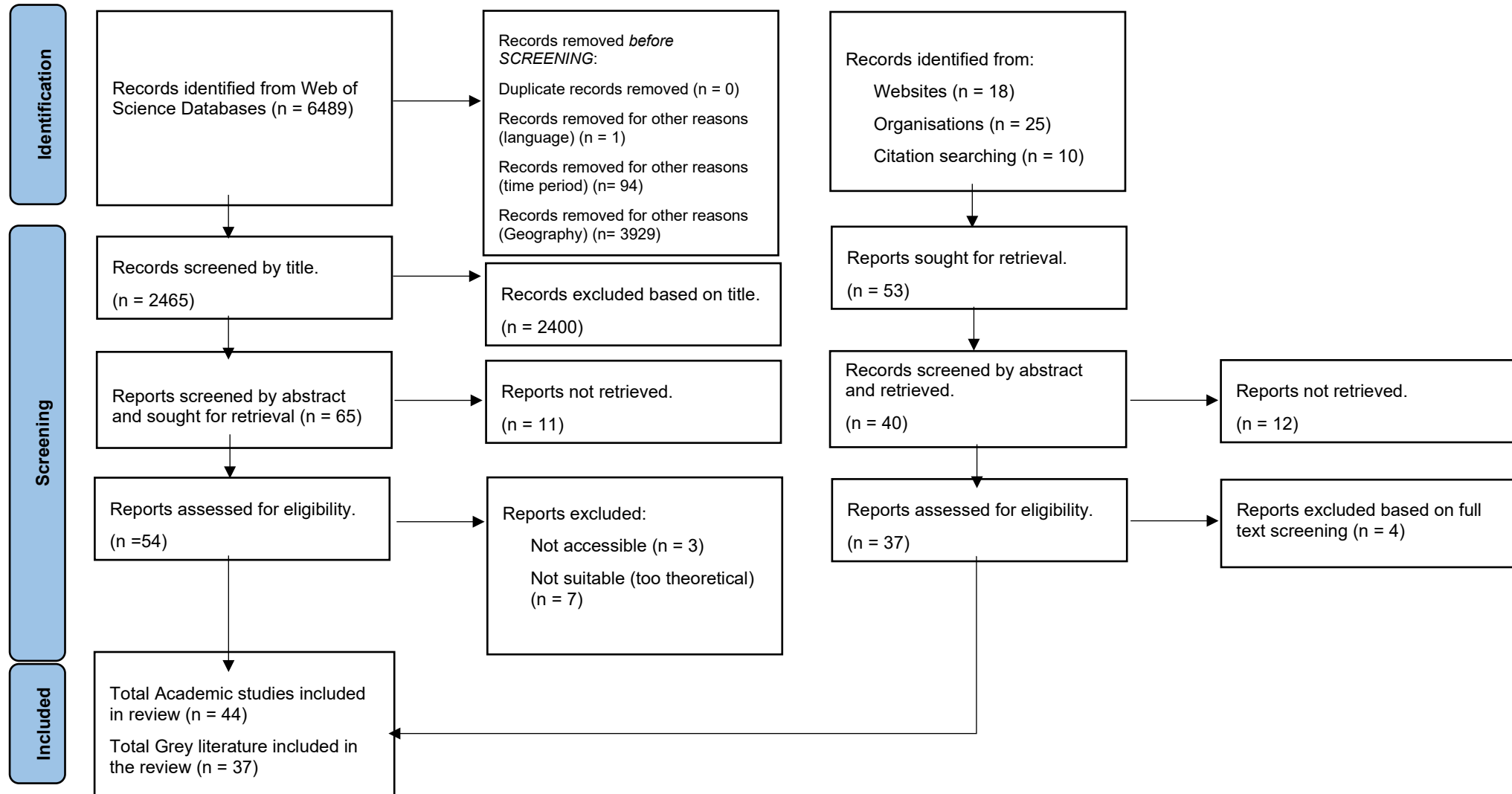| Transport	Local Town Centre	Social benefits keywords	Economic benefits keywords	Environmental benefits keywords	Potential Exclusion terms
Low traffic Neighbourhood Active travel Walking/walk Cycling/cycle Wheeling Scootering Bus, Rail, Train, Tram Modal shift Sustainable transport Mobility Pedestrians, Mobility hubs Last-mile delivery Car park Road space reallocation Vulnerable road users	Local living Place making Neighbourhood Space utilisation Kerbside Highstreets Walkability Planning Town centres	Local Households Behaviour (change, antisocial, criminal) Accessibility Inclusive Marginalisation Social Community Wellbeing family	Businesses Consumer trends (where/location) Economic Integrated Connected value (forming partnerships between businesses and walking and wheeling) Circular economy	Intervention Behaviour change pollutant emissions Air quality Congestion Environmental Health Carbon emissions zero emissions ultra-low emission Recycling Waste	Technology

7.1.2   Inclusion and exclusion criteria

The process of screening, eligibility and inclusion was influenced by the following set of criteria. The academic and grey literature searches were examined by title, with the criteria below used to decide which ones were suitable. Those identified as potentially

relevant were screened by title and abstract where possible. Those accepted based on this screening were assessed for eligibility through a full text review.

Geographic area	Countries with similar population size, culture, topography, and economic output for example: New Zealand, Canada, Sweden, possibly Denmark	We will use geography as a final filter to pick out relevant studies, considering geographies that are comparable to Scotland's high street and town centres. This includes High-income countries comparable with Scottish context. However our initial search will be global in order to capture any interesting or exemplar case studies that may fall outside of this definition.	search
Language	English language	Research team skills	search
Sustainable travel modes	Walking, wheeling, cycling, e-scooter, public transport (buses, trains, trams)	Broad scope reflecting funder evidence needs. Note: sustainable travel modes will change depending on the neighbourhood type	screening
Population of interest	Segments – young, old and families	This study aims to quantify the benefits of people of all ages. Groups of interest may include consumers/shoppers, small/independent business owners	screening
Travel scale	Neighbourhood & Town centre level	Identifying the business and local economic benefits that can come from more local living is the primary aim.	screening
Study type	Studies evaluating intervention impacts. Peer review academic papers	Assessment of business and local economic environmental and social benefits that can come from more local living. Including whether local economies have improved; quality of life and well-being, resident incomes, business profitability, employment, visitors/footfall and perceptions of place, carbon savings, air quality improvement, health benefits, other social outcome indicators a defined by the study. Assessing and evidencing the benefits of sustainable travel to local highstreets and town centres	screening
Time period	Past 20 years	Exploring economic, social, and environmental benefits will require widening the time period. Recent publications will help when identifying environmental and economic benefits, however, setting a limit of 10 years may exclude social benefits. We will undertake and additional exclusion process to studies that were compiled during or after the Coronavirus pandemic and lockdowns in 2020/2021. Selecting those that demonstrate sustained change as a result of changes to travel and local businesses due to lockdown restrictions.	search
Document types	Original research articles and grey literature documents	Reviews excluded to avoid double counting and allow assessment of key benefits of different interventions.	search

7.1.3 PRISMA Flow diagram

Identification

Records identified from Web of Science Databases (n = 6489)

Records removed *before SCREENING*:

Duplicate records removed (n = 0)

Records removed for other reasons (language) (n = 1)

Records removed for other reasons (time period) (n= 94)

Records removed for other reasons (Geography) (n= 3929)

Records identified from:

    Websites (n = 18)

    Organisations (n = 25)

    Citation searching (n = 10)

Screening

Records screened by title.

(n = 2465)

Records excluded based on title.

(n = 2400)

Reports sought for retrieval.

(n = 53)

Reports screened by abstract and sought for retrieval (n = 65)

Reports not retrieved.

(n = 11)

Records screened by abstract and retrieved.

(n = 40)

Reports not retrieved.

(n = 12)

Reports assessed for eligibility.

(n =54)

Reports excluded:

    Not accessible (n = 3)

    Not suitable (too theoretical) (n = 7)

Reports assessed for eligibility.

(n = 37)

Reports excluded based on full text screening (n = 4)

Included

Total Academic studies included in review (n = 44)

Total Grey literature included in the review (n = 37)

7.1.4 Limitations

The PRISMA model effectively minimises the risk of study selection bias, allowing the reviewer to broadly consider the social, economic, and environmental benefits of sustainable travel in Scotland.

In practice, the position of a rapid review approach, including limiting the literature search date, is subjective. To ensure the accuracy of our results, we avoided setting a narrow search date limit to reduce bias and increase the accuracy of the analysis. A second review screened for consistency of approach.

This study focused exclusively on articles written in English with a specific geographic area (see Inclusion/exclusion criteria). Our inclusion and exclusion criteria prioritises peer reviewed, academic literature and grey reports avoiding the use of websites and articles to minimise the use of any low quality evidence.

Some academic studies did not have research terms identified in our search strategy in their abstract or title and required us to consider alternative terms. To address this, we developed a wide breath of search criteria in consultation with CXC and reviewed the selection criteria regularly to highlight any potential missing phrases or subject areas. Some academic and grey literature sources were inaccessible due to paywalls, which may result in missing key evidence. To counter this, we avoided using a small number of sources.

7.1.5 Quality and impact table

 The findings presented in this systematic analysis include studies that are both methodological robust and those that are not. i.e., most studies did not use a case–control and pre–post design, making some findings are speculative. The research conducted a qualitative assessment of data quality and found three main types of data which are summarised in the table. Green stands for strong quality, and red indicates not enough quality. Priority is given to green and orange. In doing so, we have limited our sources to 37 grey research reports and 44 peer-reviewed academic papers. We have included one article reference (City of Stoke-on-Trent Council (2017), City News) due to a lack of additional data. A total of 81 data sources have been used to identify the environmental, social, and economic benefits of sustainable travel to local highstreets and town centres.

Quality and impact	
Robust	Academic and grey literature, this also includes sources that used a case–control and pre–post design
Speculative/Theoretical	Did not use case control or pre–post design
Low	Websites and articles

7.2 Interview guidelines

We conducted 12 stakeholder semi-structured interviews with relevant organisations. The aim of the semi structured interviews was to get input and a deeper understanding of the potential priority actions that might be taken by the Scottish Government and / or Local Authorities to make possible:

1. local places to be designed in a way that encourages more 'local living' behaviours;
2. local people and business owners to understand the benefits to them and their communities;
3. local decision makers to understand the benefits to their population as well as opportunity for these actions to contribute to wider net zero commitments.
4. Additionally identify potential case studies for inclusion in the engagement materials.

The types of organisations we engaged with include businesses, representative bodies, local governments, charities, and community organisations. We obtained informed consent before any interviews or data collection. Participants were given an information sheet clearly stating what they are expected to do and the opportunity to ask questions about the research before deciding whether to participate. The consent form stated that they can withdraw from the study and will reference their rights as articulated by the Cenex Privacy Policy. There was no obligation to participate, and all interviews were voluntary.

Interview guide:

1. **Please can you confirm your role and organisation?**
   o *What kind of organisation? Are there paid staff? What is the governance?*
2. **Please can you give some background to your organisation's interest in the subject area and sustainable travel interventions you have been involved with.**
   o *What is your focus (sustainable travel – what type, local high streets, delivery, research).*
3. **What evaluation or monitoring have you done are you doing on your initiatives? How have environmental, economic, and social impacts been measured if at all?**
4. **Do you know of any examples of how any of the following have been used and can you tell me more about it?**
   o *reducing car use through e.g. restricting parking or pedestrianising local high streets;*
   o *encouraging more 'thoughtful' business practices, including e.g. refill services and local deliveries; and*
   o *providing local collection points and / or zero emissions last mile delivery from local hubs.*
5. **How do you think sustainable travel interventions might impact safety and accessibility of local streets and public places?**
6. **What do you think the impact is of reducing congestion and transport emissions on the perception of the local area, how important is this?**
   How does this impact local policy and high street development? If there is a link, how well is this link understood – by policy makers? By businesses? By public?
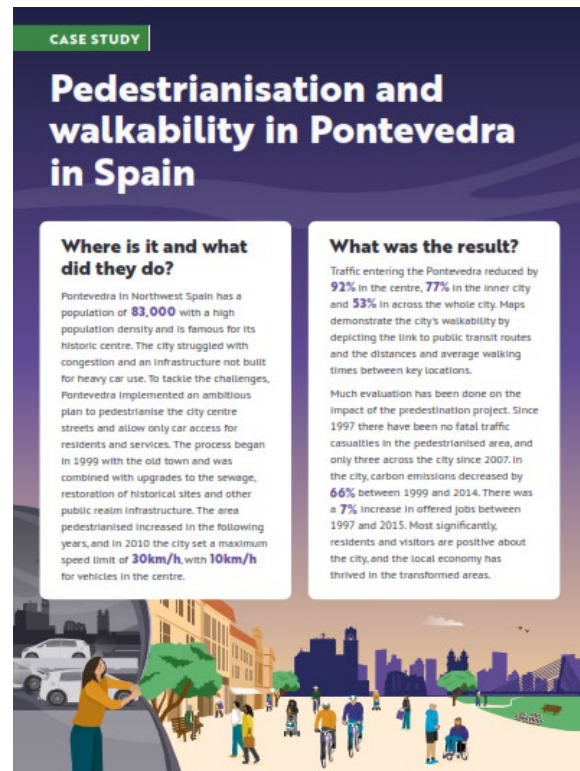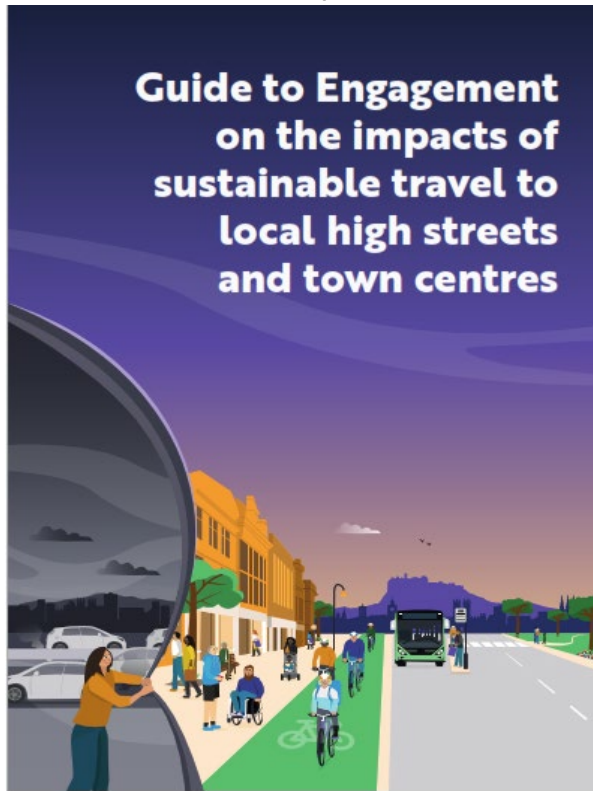
7. **How Can the 'living locally' agenda be beneficial across the full range of demographics; (for example disabled people, those on lower incomes and those living in rural and island communities).**
What are the barriers to this? What are enablers?

8. **What tools or resources do you think are needed to help plan, develop, and deploy sustainable travel interventions on local high streets?**
Do you have any examples of resources that have aided you in past projects?

   How best can these be presented? What type of information works well: costs/monetised evidence, other quantitative evidence, personal/location based stories, tools/actions, and tips, photos/pictures and visual.

9. **Out of Economic, environmental, and social impacts – which have the most traction when communicating about sustainable travel interventions?**

7.3 Engagement materials

The full engagement materials pack can be found here
https://www.climatexchange.org.uk/research/projects/the-benefits-of-sustainable-travel-to-local-high-streets-and-town-centres/

Below are some examples:

7.4 Glossary

Term	Definition
Euro emissions standards	Regulations on engine and vehicle pollutant emission limits set by the European Commission and adopted into UK legislation.
Greenhouse gas (GHG) emissions	Gases that absorb and emit radiation and contribute to rising global temperatures. Includes carbon dioxide (CO_2) and methane (CH_4).
Last mile	The movement of goods, most likely from a transportation hub to the final delivery destination.
Walkability	Walkability is defined as the extent the surroundings are nice to walk in, as well as pleasant and interesting, and inviting walking
Nitrogen oxides (NOx)	Air pollutants that include nitric oxide (NO) and nitrogen dioxide (NO_2). Formed from combustion of fossil fuels. Road transport is a significant source of NOx.
Particulate matter (PM)	Air pollutants that comprise tiny particles suspended in air. Road transport is a significant source of PM. These include emissions from combustion of fossil fuels and also wear from tyres and brakes.
Carbon Dioxide (CO_2)	Carbon dioxide (CO2) is a greenhouse gas which contributes to climate change.
Well to wheel (WTW) emissions	Total emissions resulting in the production and transmission of the fuel from source to vehicle (known as well to tank emissions), *and* the TTW emissions.

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