GO SEStran
South East of Scotland Transport Partnership

REGIONAL TRANSPORT STRATEGY

STAG Case for Change Report

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In partnership with: Stantec

SESTRAN REGIONAL TRANSPORT STRATEGY – CASE FOR CHANGE

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Appendix A - List of Documents from Literature Review
Appendix B - Stakeholder Consultation Approach and List

Introduction

SEStran Regional Transport Strategy

STAG Case for Change Report

1.0 INTRODUCTION

1.1 PURPOSE

This Case for Change report has been prepared to underpin the development of a new Regional Transport Strategy (RTS) for the South East of Scotland. South East of Scotland Regional Transport Partnership (SEStran) was set up under the Transport (Scotland) Act 2005 which also set the requirement to produce a statutory Regional Transport Strategy (RTS) to provide a strategic framework for transport management and investment for the Partnership area. This covers eight constituent local authorities as shown in Figure 1.1.

Figure 1.1 SEStran Location Plan

It is essential that the RTS addresses the transport problems and issues being experienced in the SEStran area. The purpose of this Case for Change is to set out these problems and issues along with associated Transport Planning Objectives and options which offer the potential to address them.

This Case for Change Report has been prepared in accordance with RTS development guidance (Transport Scotland, 2006), the Scottish Transport Appraisal Guidance (STAG) and all relevant legislative and policy requirements. It is supported by a suite of evidence drawn from published policy documents, data analysis as well as stakeholder and public consultation. The preparation of the new SEStran RTS including the development of this Case for Change Report is informed by Strategic Environmental Assessment (SEA) and Equalities Impact Assessment (EqIA) processes, each of which has already identified (at Scoping stage) relevant baseline conditions and key environmental and equalities issues which need to be addressed in the new RTS. This Case for Change Report is accompanied by proportionate SEA and Equalities Duties Assessment Reports which consider how relevant equalities and environmental issues have been taken account of to date and provides recommendations to inform future stages of RTS development. Therefore, whilst relevant evidence is incorporated within this Case for Change the majority of the supporting evidence base around environmental and equalities issues is contained within these reports and they should consequently be read alongside it.

It also draws upon the findings of the SEStran Main Issues Report published in June 2020. This was substantially prepared prior to the COVID-19 pandemic and therefore primarily reflects pre-pandemic problems and issues. As such, the Case for Change seeks to ensure the RTS is

developed upon an evidence base which reflects the latest understanding of problems and issues in the region and reflects travel behaviour changes arising from the pandemic.

1.2 POLICY CONTEXT

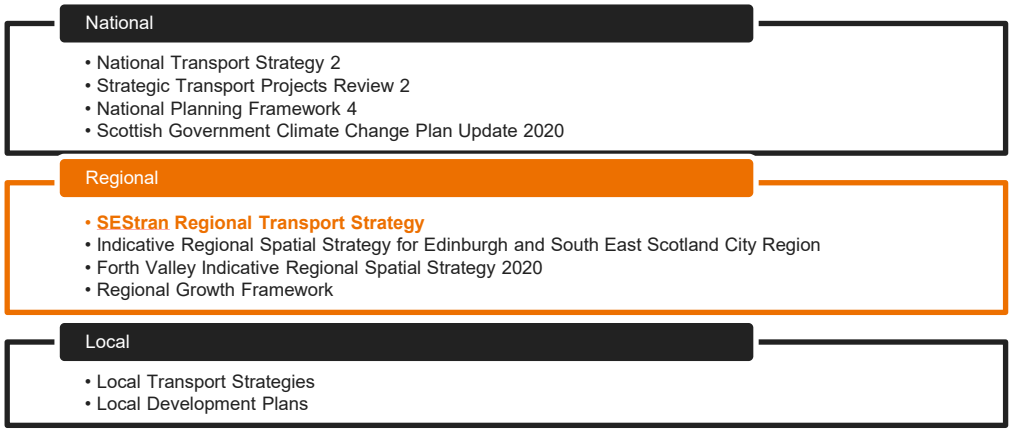


Figure 1.2 Policy Hierarchy

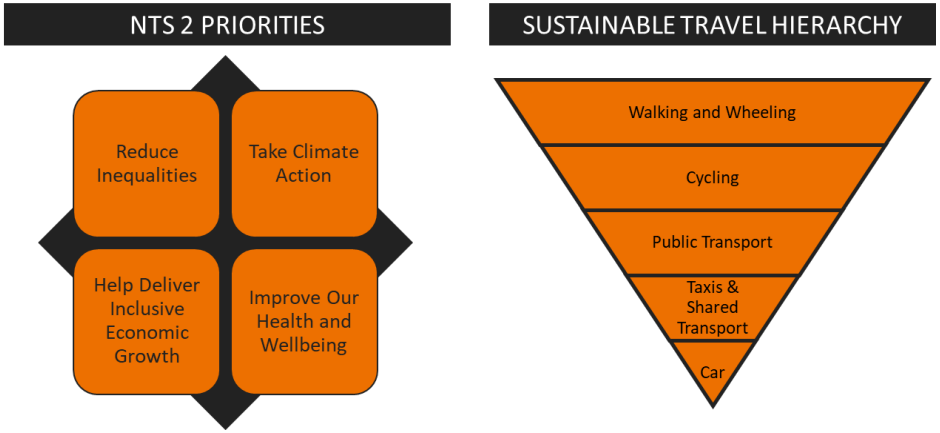


Figure 1.3 National Transport Strategy Policy Framework

The new Regional Transport Strategy sits within and is being developed in the context of a policy hierarchy which spans the national, regional and local levels. This is illustrated in Figure 1.2 along with some of the key policy documents.

In particular, the RTS is being developed within the policy framework provided by the National Transport Strategy 2 which was published in February 2020. It set out four strategic priorities as well as defining a Sustainable Travel Hierarchy as shown in Figure 1.3. These four priorities and hierarchy have been used to guide the development of this Case for Change.

Alongside this the Scottish Government has also set out ambitious targets to help achieve its overarching target of net zero emissions by 2045. In particular, the Climate Change Plan Update published in December 2020 outlined that by 2032:

- *our roads will contain no new petrol and diesel cars and vans; and*
- *car kilometres will have reduced by 20%.*

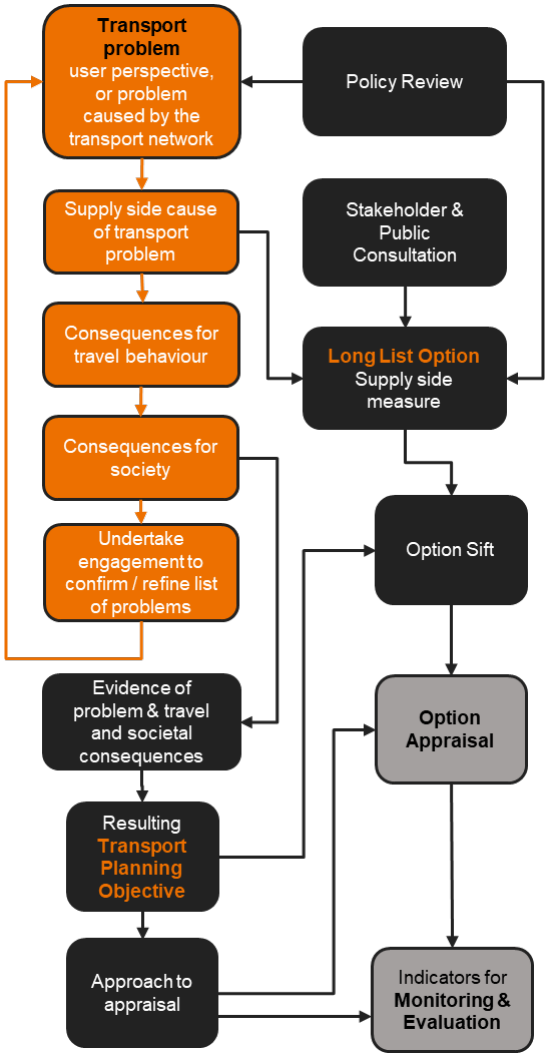
More broadly the RTS Case for Change has been informed by a review of over 90 local, regional and national policy documents spanning transport, land-use

planning, economic development, health, energy, digital connectivity and the environment. A full list of documents is included in Appendix A.

1.3 STRUCTURE & METHODOLOGY

This Case for Change has been developed from a transport users perspective using the methodology shown in Figure 1.4. This closely reflects the STAG methodology which primarily comprises of four parts:

- **Analysis of Problems and Opportunities:** Establishing the evidence base for problems / issues and opportunities drawing on targeted data analysis and engagement with the public and key stakeholders
- **Objective Setting:** Developing Transport Planning Objectives (TPOs) to encapsulate the aims of any interventions and to guide the development of solutions – where appropriate these could have targets associated with them
- **Option Generation, Sifting and Development:** Developing a 'long list' of multi-modal options to address the identified problems and opportunities, and undertake a process of option sifting and development leading to the identification of a short list of interventions recommended for progression towards Preliminary Options Appraisal
- **Option Appraisal:** Having developed the options beyond their specification at the Case for Change stage, each option will be appraised against the RTS objectives and the five STAG criteria. Consistent with the Preliminary Options Appraisal, this appraisal will be mostly qualitative. This task will also map out how the options which perform well may be grouped / mapped into a meaningful RTS structure. In this way the Draft RTS structure will be developed, in part, in parallel with this process.



The remainder of this document sets out the findings of the first three tasks set out above which will then be used to inform the fourth task. This has been done in line with the framework illustrated in Figure 1.4 and discussed in detail in Chapter 0. However, this is preceded by analysis of the socio-economic context of the SEStran region set out in Chapter 2.0, a review of the transport system in Chapter 3.0, the future context for the RTS in Chapter 0, a summary of the issues identified by the literature review in Chapter 5.0 and an overview of the consultation findings in Chapter 6.0.

The development of the RTS is also being informed by the processes of Strategic Environmental Assessment (SEA) and Equalities Impact Assessment (EqIA) which are running in parallel with it. This Case for Change is supplemented by supporting SEA and EqIA documentation which has been prepared alongside it and should also be referred to when reading the Case for Change. This is shown in Figure 1.5 which also outlines the timescales for the preparation of the new RTS.

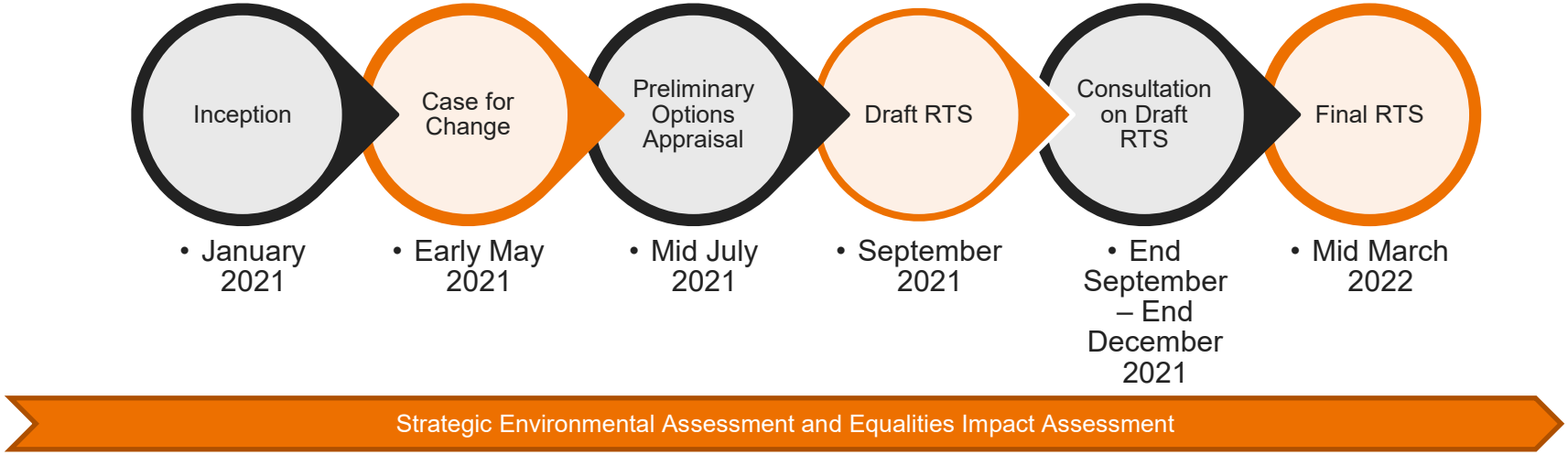


Figure 1.5 RTS Timescales

Figure 1.4 Methodology

Socio-Economic Context

SEStran Regional Transport Strategy

STAG Case for Change Report

2.0 SOCIO-ECONOMIC CONTEXT

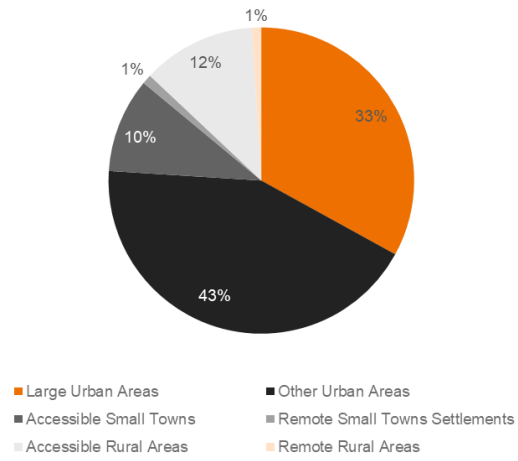


Figure 2.1 Population by Urban – Rural Classification

2.1 OVERVIEW

Transport is a critical enabler of socio-economic activity and opportunities; it affects access for individuals and communities to services, amenities, economic opportunities and social activities. The SEStran region covers 8,400km² which is just over 10% of Scotland's landmass. It is hugely diverse and includes areas which fall into every one of the Scottish Government's six-fold urban-rural classification. The classes, along with the proportion of the region's population that resides in each of them is shown Figure 2.1 whilst their distribution around the region is shown in Figure 2.2.

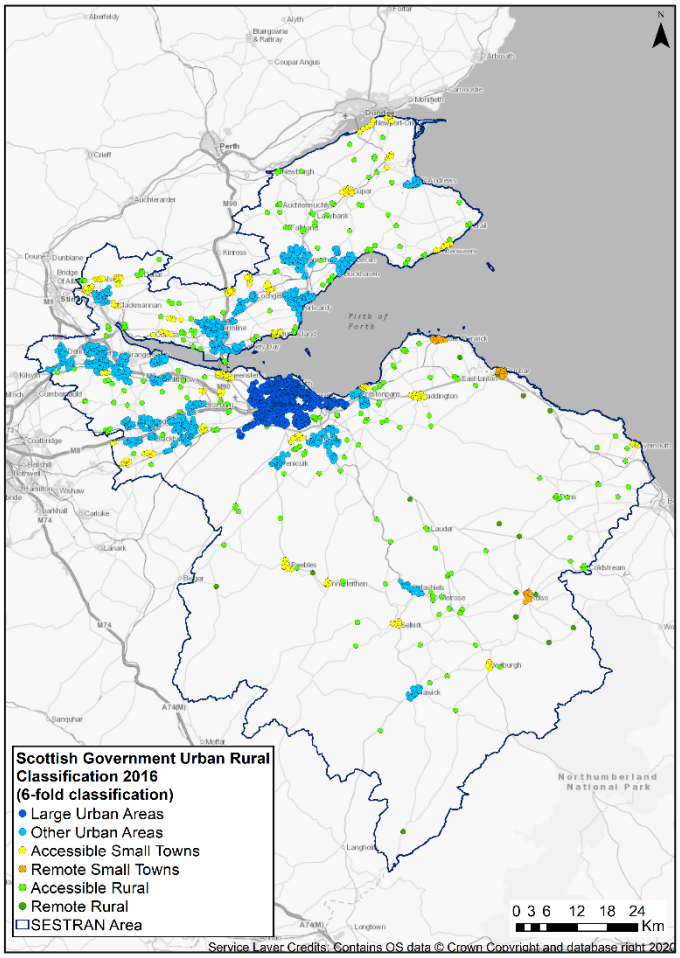


Figure 2.2 Distribution of Data Zones by Urban – Rural Classification

2.2 POPULATION / DEMOGRAPHICS

The total population of the SEStran area was estimated as 1,609,070 in 2019. The distribution of that population across the SEStran region is shown in Figure 2.4. This shows that the majority of the population is concentrated in the northern part of the SEStran area with a large, sparsely populated rural hinterland to the south in the Borders and parts of Midlothian and East Lothian. The greatest concentration of population is within the City of Edinburgh which accounts for approximately 33% of the total SEStran region population.[i]

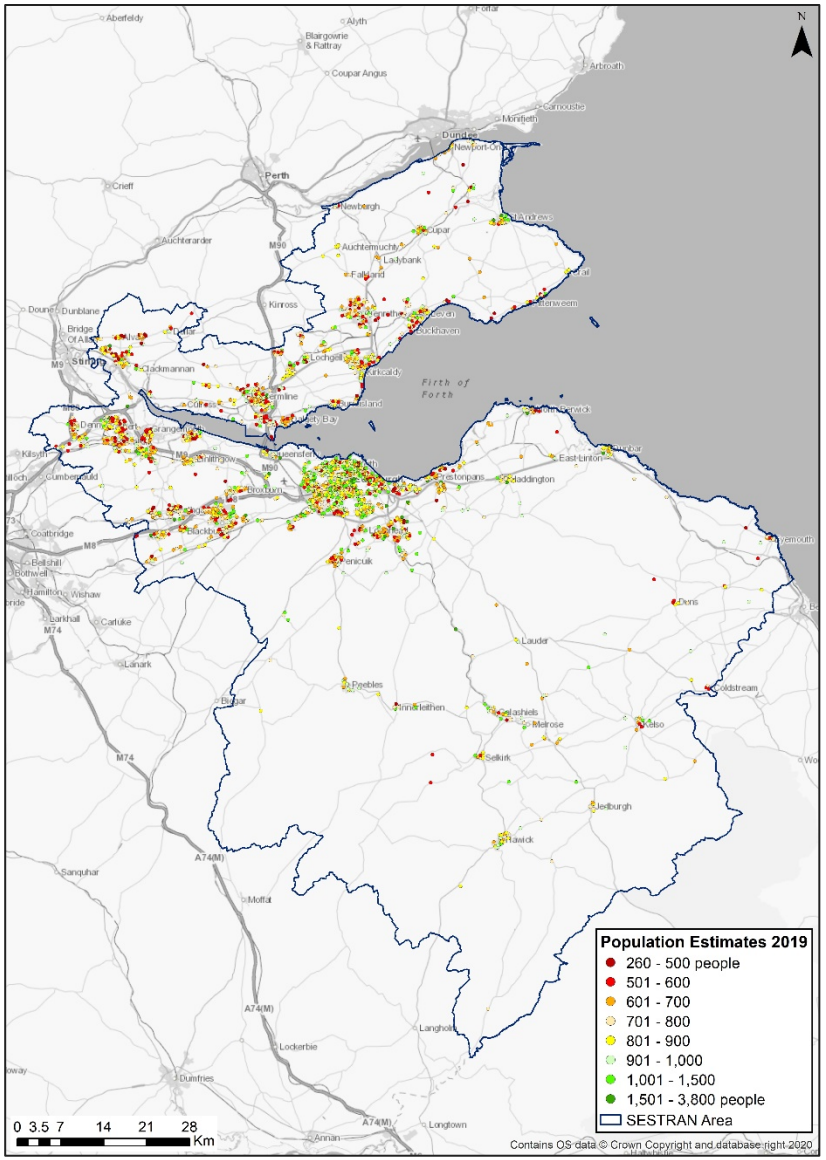


Figure 2.4 Population Distribution by Data Zone

There has also been significant population growth within the SEStran region with a 7.5% increase between 2009 and 2019. The largest growth has been in the City of Edinburgh (13.3%) with the lowest growth in Clackmannanshire (0.5%). In addition, the population has also been aging with the number of people aged 65 years or older in the region increasing by 23.6% over the same time period. West Lothian has seen the highest growth in the elderly population (34.3%). These trends are illustrated in Figure 2.3.

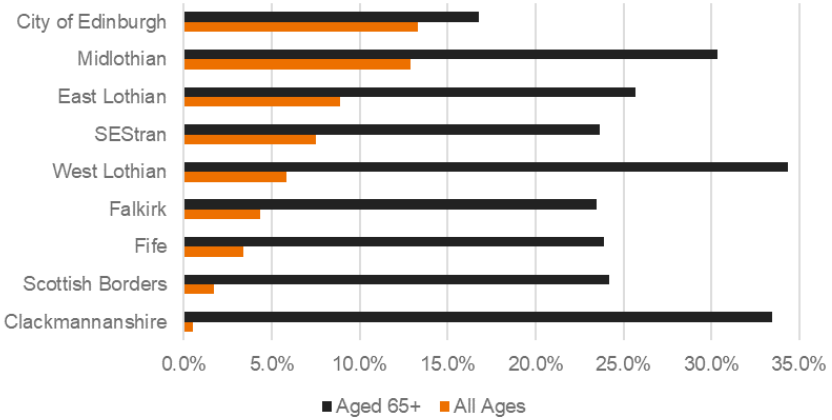


Figure 2.3 Population Growth in SEStran Region 2009 – 2019

The population of the SEStran region is projected to grow by 4.4% between 2018 and 2028 although this masks variations across the region as shown in Figure 2.5. In particular, the population of Clackmannanshire and Fife is forecast to decline whilst there is considerable growth expected in Midlothian. The trend towards an aging population is also expected to continue with a 21.6% increase in people aged 65 years or older over the period.[ii] However, it should be noted that these projections do not reflect the potential impact of Brexit on net-migration which has been the primary driver of growth in recent years.

In addition, the population is also becoming more dispersed as the average size of a household in the region has decreased by 4.7% from 2.30 in 2001 to 2.19 in 2019.[iii]

These trends will have a range of implications for travel including:

- Increased travel demand linked to a growing and more dispersed population
- Increasing demand for access to healthcare
- More people wanting to use concessionary travel putting increased pressure on public sector finances
- More dependence on public transport and community transport to access essential services

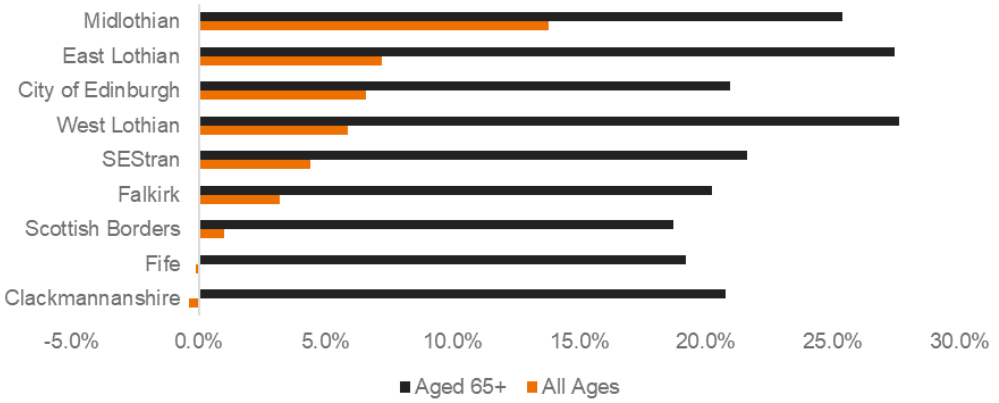


Figure 2.5 Forecast Population Change in SEStran Region 2018 - 2028

Vulnerable Groups

The use of and ability to benefit from the transport system (e.g. though access to services and economic opportunities) currently varies significantly between user groups, with particular challenges facing vulnerable groups. Some groups of people, such as people from ethnic minority groups, those with disabilities, young carers, young mothers, and care givers, are less mobile and more reliant on public transport. Recent literature has suggested vulnerable groups face particular transport challenges. The proportion of these groups in the SEStran region is shown in Figure 2.6.

Insofar as transport affects access to services, amenities, economic opportunities and social activities, the content and implementation of the emerging RTS is likely to result in different impacts on different demographic groups and persons with protected characteristics. It may also impact on other policies, organisations or work which could affect equality across the region. The public sector equality duty under Section 149 of the Equalities Act 2010 is therefore applicable and needs to be addressed within the EqIA process of the RTS.

In general, **women** engage in travel linked to domestic commitments and are more likely to travel with young people and the elderly (Duchene 2011; Sánchez de Madariaga 2013). This influences travel behaviour and women tend to travel shorter distances within a more restricted geographical area, make more multi-stop trips, and rely more on public transport.

Elderly people also tend to travel relatively less often and over shorter distances than other adults (Fatima, et al. 2020). Without needing to commute, elderly people are more likely to travel between the hours of 9:00 and 15:00, with most trips for shopping (mostly undertaken by elderly women) (Su and Bell 2012). According to Davis (2014), **young** people may have a more local focus than the population as a whole. This suggests that young people from deprived areas may look for jobs and training opportunities only in their local area and those easily accessible by public transport. Children and young people therefore need to be considered in the development of the RTS including the promotion and protection of children's rights.

An individual will generally use public transport less frequently if they experience a greater number of difficulties completing daily tasks due to a **disability** (Yarde, et al. 2020). However, travel behaviour among this group varies widely as the behaviour of people with specific types of disabilities is often markedly different to each other (Clery, et al. 2017). Recent research suggests that **black and ethnic minority** individuals make relatively few active leisure trips such as walking or cycling (Colley and Irvine 2018). Potential explanations can include socio-economic disadvantage, fear of discrimination, and language barriers.

These issues are explored and addressed in further detail through the Equalities Impact Assessment which is being undertaken in tandem with and to inform the RTS development process, including this Case for Change Report.

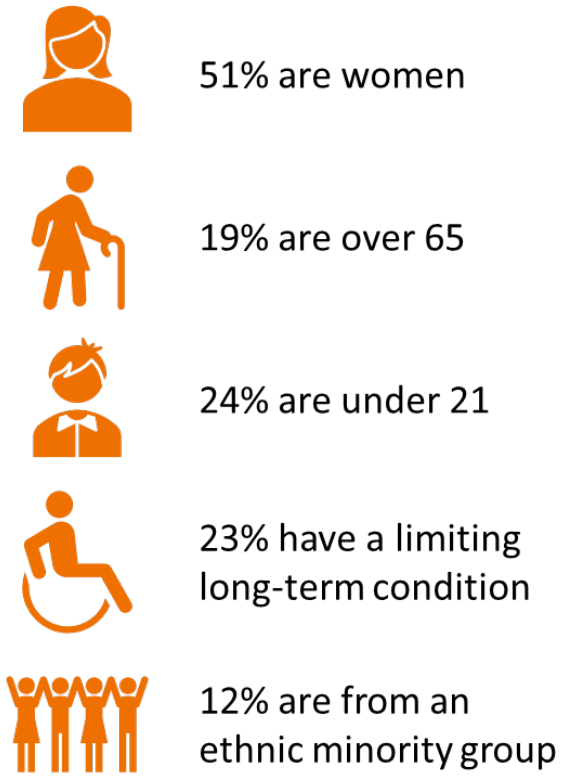


Figure 2.6 SEStran Region Vulnerable Groups 2019

2.3 EDUCATION

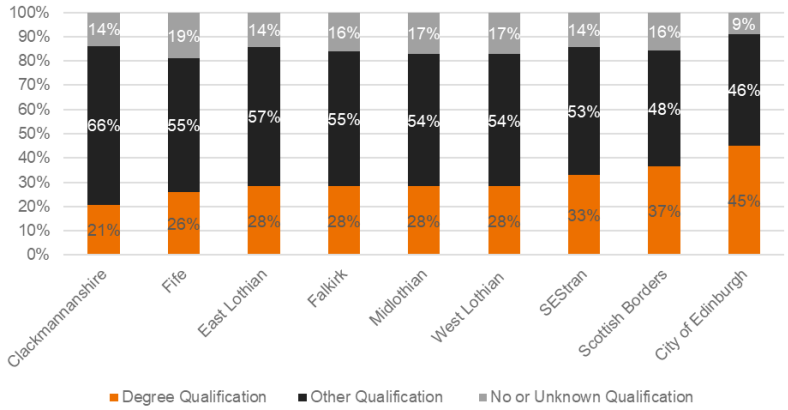


Figure 2.7 SEStran Region Highest Level of Qualification 2019

Levels of educational attainment vary across the region as illustrated in Figure 2.7. Edinburgh has the highest proportion of degree educated residents whilst this figure is lowest in Clackmannanshire. However, the local authority with the lowest levels of no or unknown qualifications is Fife.

Disparity of access to education can be a causal factor in levels of attainment. Research suggests that learners are often extremely constrained in terms of willingness or ability to travel. Most further education learners (around 70%) travel less than 10km from their home to reach the site of their provider, with 50% travelling less than 6km.[iv]

To understand this in more detail we have undertaken analysis of the relationship between connectivity to further and higher education and levels of education deprivation across the SEStran region using our Connectivity and Deprivation Audit Tool (CDAT). This classifies postcodes into three tiers based upon the combination of their deprivation, drawing upon the Scottish Index of Multiple Deprivation 2020, and public transport connectivity problems by a combination of TRACC connectivity analysis and weighting the attractiveness of each destination. The resultant tiers are therefore defined as:

- **Tier 1:** these have the least deprivation and public transport connectivity problems
- **Tier 2:** these show a potential correlation between deprivation and public transport connectivity and are classed as being at risk
- **Tier 3:** these show the greatest correlation between deprivation and public transport connectivity suggesting a relationship exists

The analysis examined connectivity to colleges and universities, weighted by their performance ratings, for residents of the SEStran region with Tier 2 and Tier 3 locations shown in Figure 2.8 and Figure 2.9 respectively.

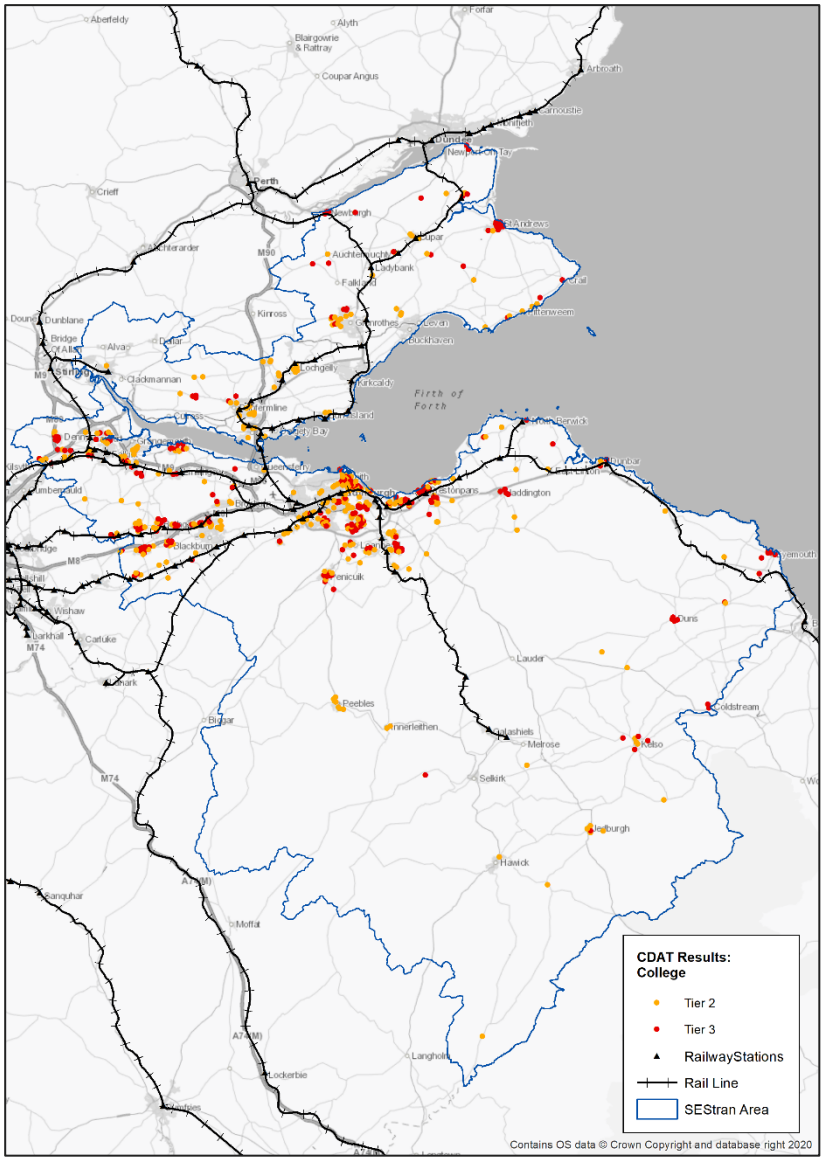


Figure 2.8 CDAT Connectivity to Colleges

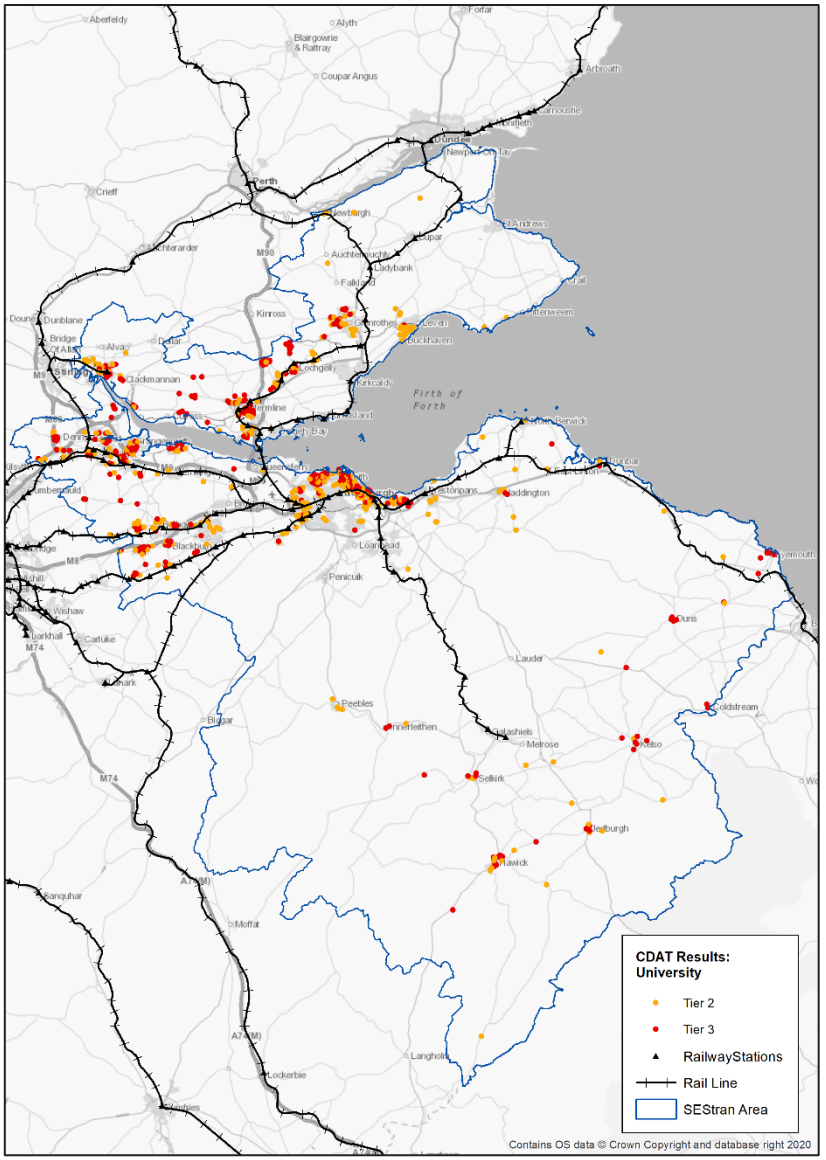


Figure 2.9 CDAT Connectivity to Universities

It can be seen that there are variations across the region but in both there are concentrations of Tier 3 postcodes in Edinburgh, West Lothian, Falkirk and Fife in particular. These areas have relatively poor connectivity to tertiary education and relatively low levels of educational attainment (both relative to all postcodes within the same Scottish Government urban / rural classification level).

The population which falls within each tier has also been calculated and broken down using the Scottish Government's urban – rural classification as shown in Table 2.1. This shows that the majority of the population is in Tier 1 for both colleges (72%) and universities (68%). Just over 15% of the population is in Tier 3 for universities whilst the equivalent figure for colleges is 12%.

The majority of the Tier 3 population is in Other Urban Areas accounting for 42% of the total for Tier 3 for universities and 46% of the Tier 3 total for colleges. Only around 13% of the university Tier 3 population is located in rural areas and this only increases slightly to 14% in the case of colleges. This highlights that whilst there are clearly connectivity to education problems within the rural parts of the region the majority of the problems are perhaps being experienced by people in urban areas.

Table 2.1 Education CDAT Population by Urban – Rural Classification and Tier

Area	Tier 1	Tier 2	Tier 3
University			
Large Urban Area	367,499	87,846	72,962
Other Urban Area	471,296	110,938	105,032
Small Town	126,772	28,953	37,855
Rural	136,345	31,117	32,455
College			
Large Urban Area	383,287	87,053	57,967
Other Urban Area	490,030	105,092	92,144
Small Town	139,316	31,776	22,488
Rural	139,002	33,339	27,576

These Tier 3 areas could form the basis of targeted actions to address these inequalities.

2.4 HOUSE PRICES

There are large variations in average house prices across the region as illustrated in Figure 2.10. The highest average house prices are in Edinburgh (£280,204) and East Lothian (£253,018). House prices have increased by 24% in the SEStran region between January 2016 and January 2021 with the largest increases in East Lothian (32%), Falkirk (28%) and Clackmannanshire (28%).

These large increases are being partially driven by the unaffordability of housing in Edinburgh for many with more people moving further out from the city to access more affordable housing. This is illustrated by the Council tax bandings with just 9% of dwellings in Edinburgh in the lowest band in 2020 compared to 29% in Falkirk, 27% in Scottish Borders, 25% in Clackmannanshire, 22% in Fife and 21% in West Lothian.[v] This has implications for transport in that people often still need to travel to work, shop and for leisure purposes spreading more journeys around the region as a result.

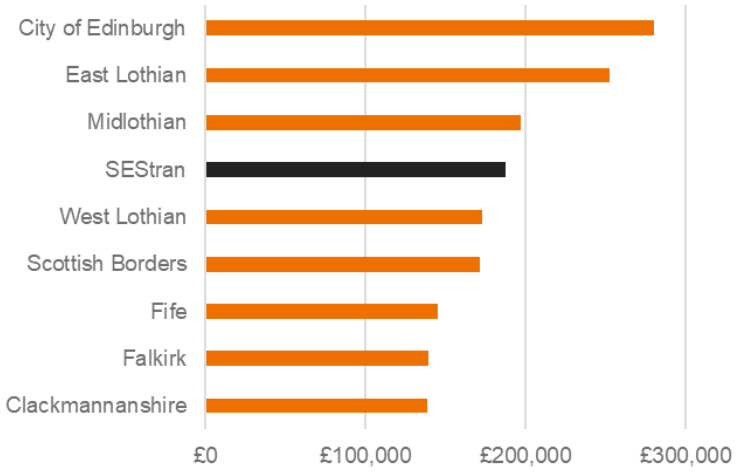


Figure 2.10 SEStran Region Average House Prices January 2021

2.5 ECONOMIC ACTIVITY

There are variations in levels of employment across the region as illustrated in Table 2.2 although only Clackmannanshire, Falkirk and Fife have an employment rate below the national average. All local authorities have experienced a growth in their employment rates since 2009 with the highest growth being in West Lothian.

Connectivity to employment opportunities also varies across the region and is influenced by the distribution of jobs as well as the ability to access transport services, particularly for those that are dependent upon public transport and active travel.

Table 2.2 Employment Rate in the SEStran Region 2019

LOCAL AUTHORITY	EMPLOYMENT RATE	CHANGE SINCE 2009
Clackmannanshire	74.4%	4.7%
East Lothian	78.9%	3.9%
Edinburgh	75.1%	3.0%
Falkirk	74.1%	1.2%
Fife	73.7%	2.5%
Midlothian	80.4%	4.8%
Scottish Borders	76.2%	1.3%
West Lothian	77.8%	5.1%
Scotland	*74.8%*	*2.8%*

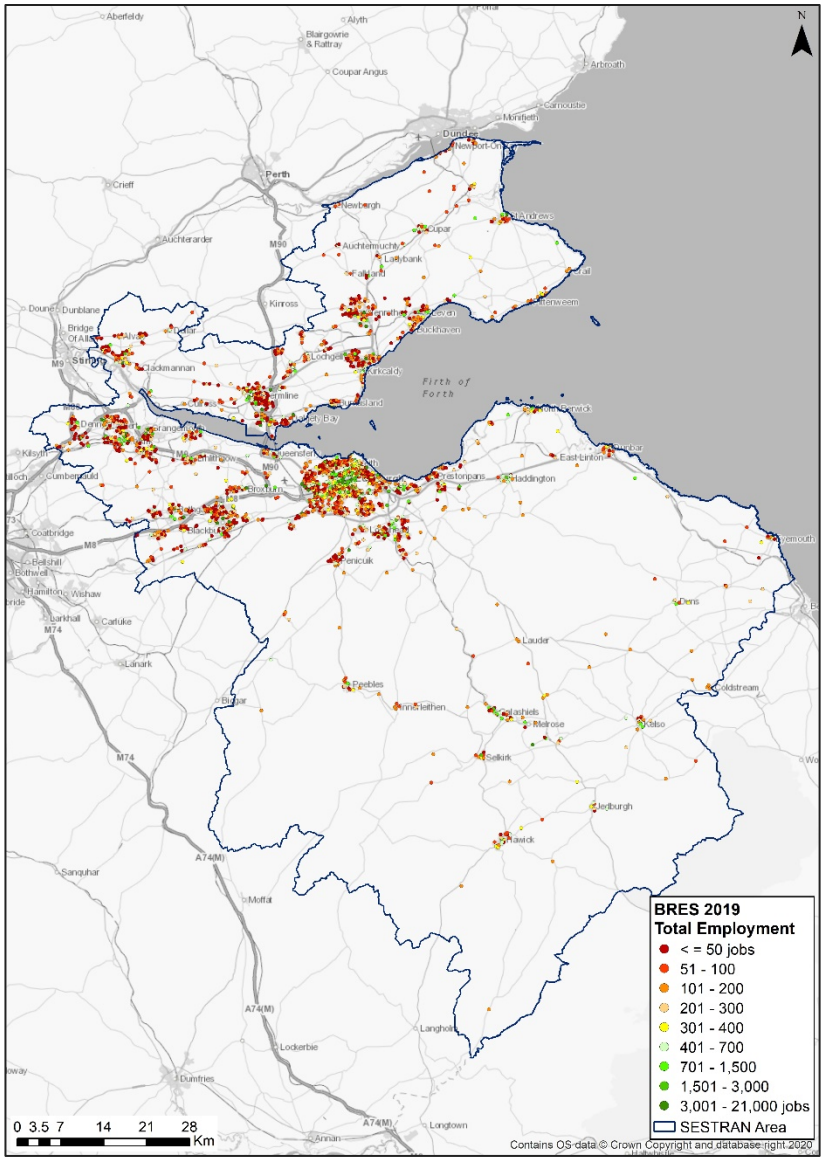


Figure 2.11 BRES Employment by Data Zone 2019

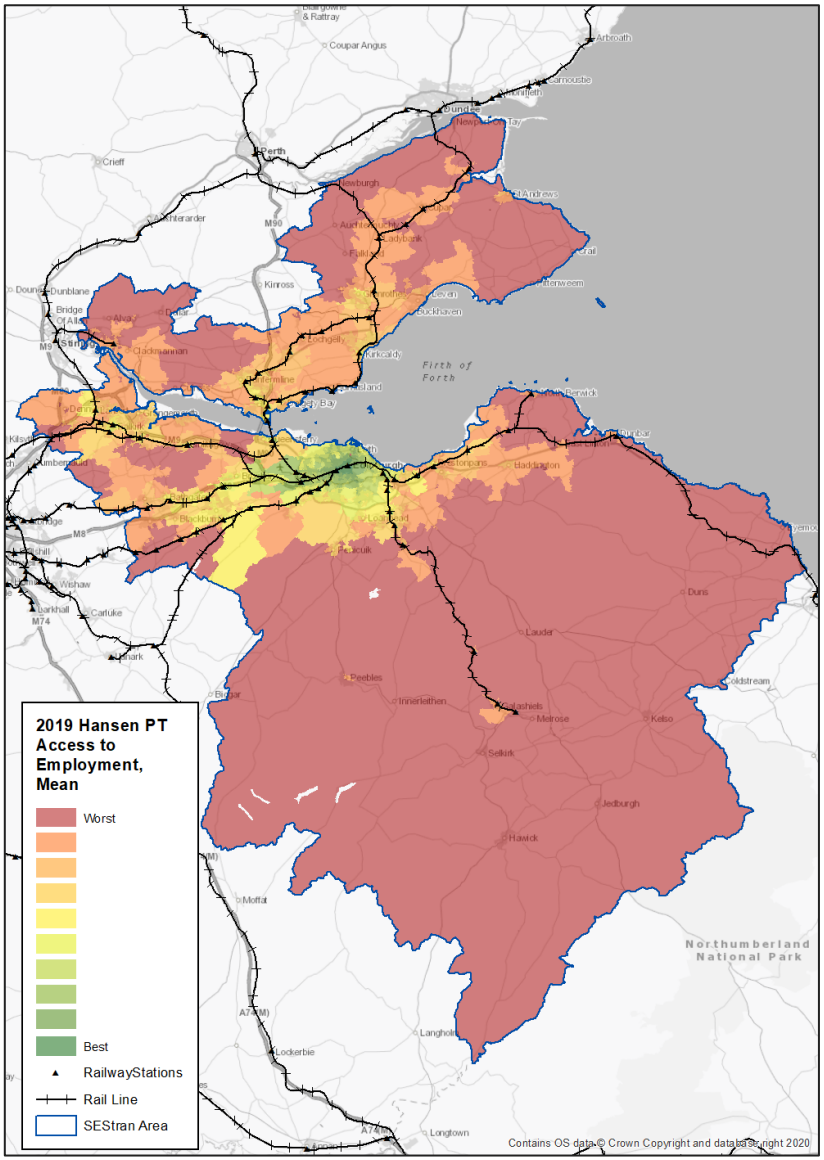


Figure 2.12 Hansen Measure Access to Employment

Figure 2.11 shows how jobs are distributed around the region and highlights the concentration in the northern part of the SEStran area around Edinburgh, West Lothian, Falkirk and Fife in particular. Figure 2.12 shows connectivity to all employment in the SEStran area by public transport for an average of the AM and PM peak periods. This shows that the best access is around Edinburgh where public transport services and employment are both concentrated. It is noticeable that areas with better access to employment are often located along the route of the rail network although this is not always the case. The rural parts of the region, particularly the Scottish Borders and parts of East Lothian, Fife and Clackmannanshire have some of the worst access to employment.

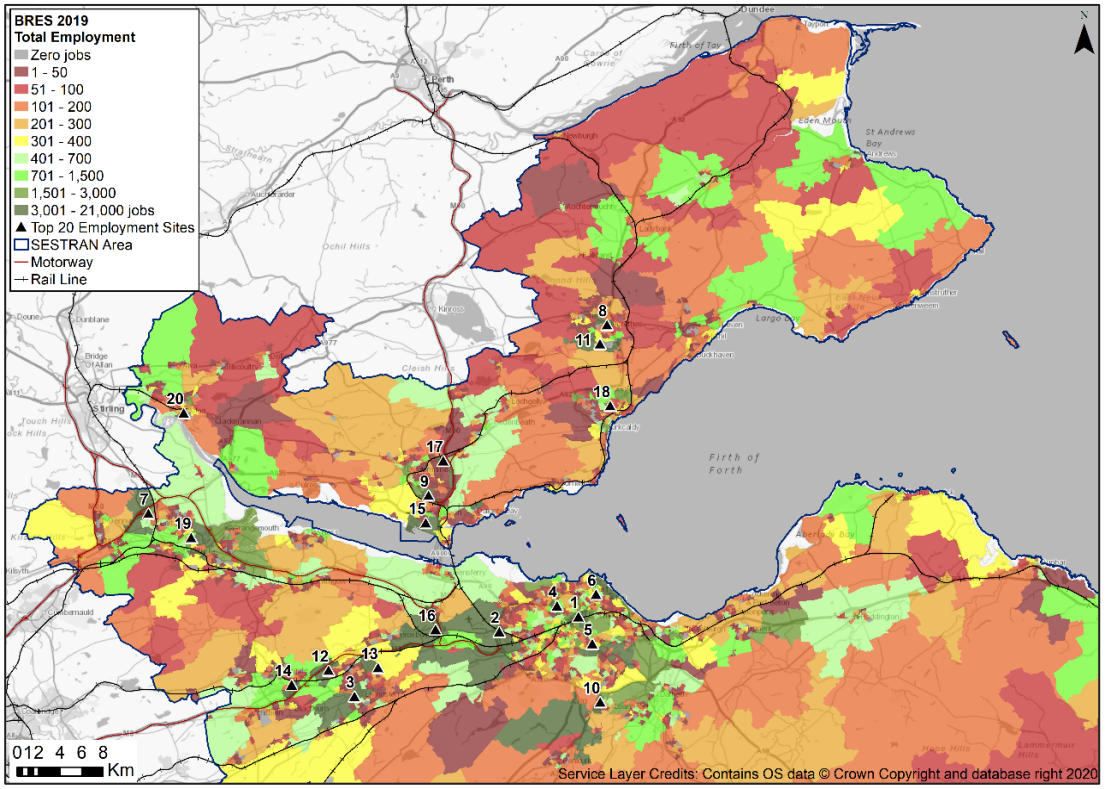


Figure 2.13 Largest Employment Sites in SEStran Region

Analysis has also been undertaken of the 20 largest employment sites in the region which are shown in Figure 2.13. These have been overlaid against the BRES total employment data by data zone to show the correlation. In addition, the sites were rationalised to remove clusters. For example, Edinburgh City Centre was combined into one site and an Edinburgh – Leith site was used to represent all employment in this area of the north east of the city.

The working age population catchment of each of these sites by public transport and car has then been calculated and is outlined in Table 2.3. This shows that the Edinburgh sites have the largest population catchments and that the number that can access each one by public transport within a given time period is substantially less than by car. In the case of Straiton, Newbridge Industrial Estate and Halbeath – Fife the population that can access the site by public transport in 15 minutes is only 1% of that which can do so by car.

Table 2.3 Working Age Population Catchment by Public Transport and Car of Largest Employment Sites

Top 20 Employment sites		No of working age population who lives within:				No of working age population who lives within:			
Site ID	Site Name	15 mins	30 mins	45 mins	60 mins	15 mins	30 mins	45 mins	60 mins
		By Public Transport				By Car			
1	Edinburgh City Centre	95,259	306,731	473,553	670,794	356,408	578,285	860,812	977,294
2	Edinburgh - South Gyle	9,153	100,107	323,471	585,508	191,756	753,375	940,305	990,110
3	Livingston Outlet	19,073	71,772	126,766	282,195	93,005	474,975	869,095	965,066
4	Edinburgh - West	34,975	186,261	333,168	450,462	315,053	618,166	887,367	974,855
5	Edinburgh - UoE	38,575	168,215	338,083	444,915	323,913	540,634	809,826	976,921
6	Edinburgh - Leith	73,242	189,635	321,473	441,601	276,311	503,338	801,195	978,292
7	Larbert	8,924	47,509	85,896	155,109	99,066	349,018	837,111	949,688
8	Auchmuty - Glenrothes	12,380	39,354	95,723	148,638	86,920	203,472	538,945	962,550
9	Pitreavie - Dunfermline	7,481	36,626	98,245	281,684	99,123	672,470	940,031	1,002,927
10	Straiton	2,795	50,835	155,039	340,220	296,161	649,767	880,720	998,791
11	Southfield - Glenrothes	5,187	23,398	56,004	105,872	89,875	203,146	574,930	963,878
12	Deans North - Livingston	9,070	46,263	101,289	229,708	103,548	503,324	878,684	964,635
13	Houstoun Industrial Estate	2,621	29,850	80,876	267,024	97,744	597,273	894,988	971,919
14	Whitehill Industrial Estate	14,299	45,926	96,111	218,518	117,180	651,954	900,879	974,316
15	Rosyth Business Centre	1,809	12,325	30,833	84,684	97,907	713,527	941,372	1,003,254
16	Newbridge Industrial Estate	3,303	42,930	173,165	429,789	234,463	816,483	955,731	991,121
17	Halbeath - Fife	1,495	37,444	92,460	169,497	114,535	581,523	939,495	1,000,381
18	Smeaton - Kirckaldy	16,525	42,490	89,248	154,919	85,471	209,975	682,288	968,828
19	Middlefield East - Falkirk	3,815	34,806	83,875	177,666	100,995	378,665	847,081	952,066
20	Alloa (town centre and south)	11,911	31,826	42,050	56,598	41,246	209,222	604,396	937,548

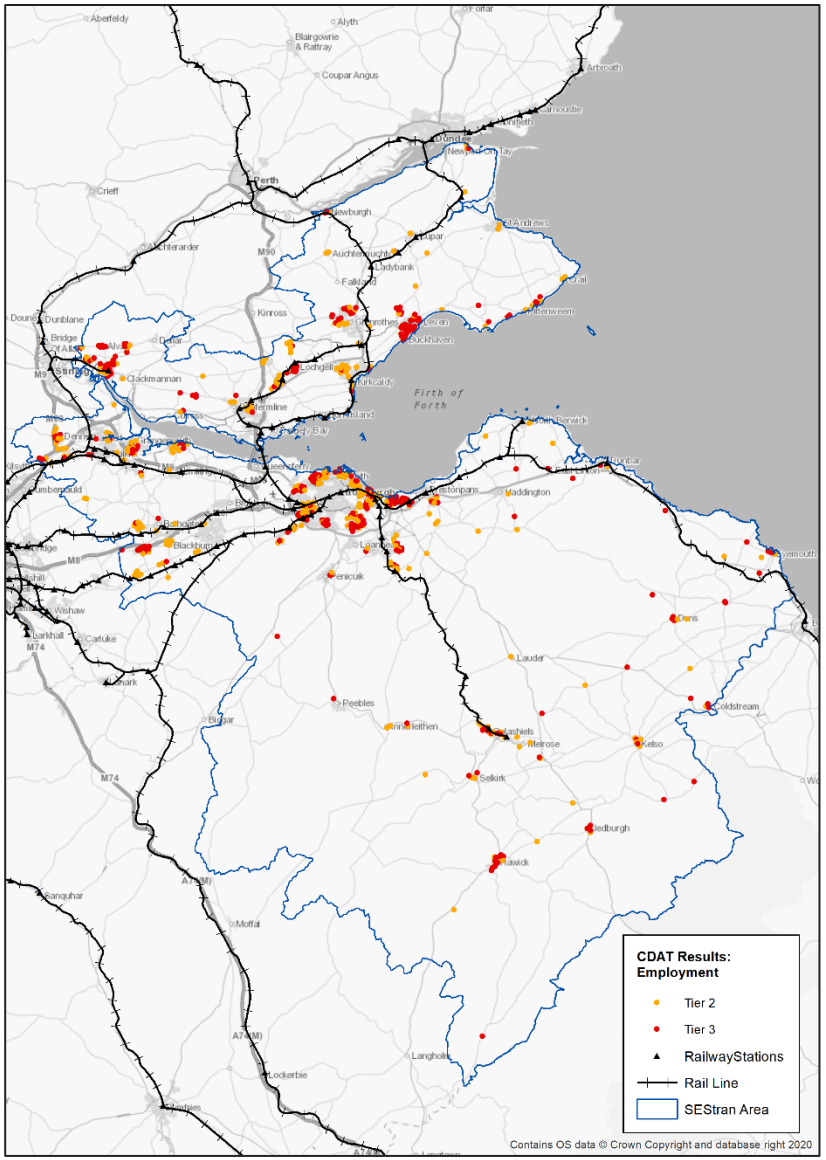


Figure 2.14 CDAT Connectivity to Employment

The CDAT connectivity analysis tool has also been used to assess the correlation between employment deprivation using the Scottish Index of Multiple Deprivation (SIMD) employment domain and public transport connectivity. This again categorises postcodes into three tiers with those in Tier 3 being the ones where there is a high degree of correlation between poor public transport connectivity to employment and employment deprivation (relative to other similar geographical areas). The findings are illustrated in Figure 2.14 which highlights a concentration of Tier 3 postcodes around the periphery of Edinburgh as well as in Clackmannanshire and Levenmouth in Fife.

The population within each tier has been calculated and set out in Table 2.4. This shows that 69% of the region's population live in Tier 1 postcodes with 15% in Tier 2 and 16% in Tier 3. Of the population in Tier 3, 39% of it is in large urban areas and 42% in small towns. Only 10% of the Tier 3 population lives in rural areas. This highlights that the majority of the people which suffer from the combination of employment deprivation and relatively poor public transport connectivity to employment are in urban areas, particularly around Edinburgh itself.

Table 2.4 Employment CDAT Population by Urban – Rural Classification and Tier

Area	Tier 1	Tier 2	Tier 3
Employment			
Large Urban Area	351,160	76,917	100,230
Other Urban Area	135,704	34,845	23,031
Small Town	478,546	99,685	109,035
Rural	138,800	35,219	25,898

These Tier 3 areas could form the basis of targeted actions to address these inequalities.

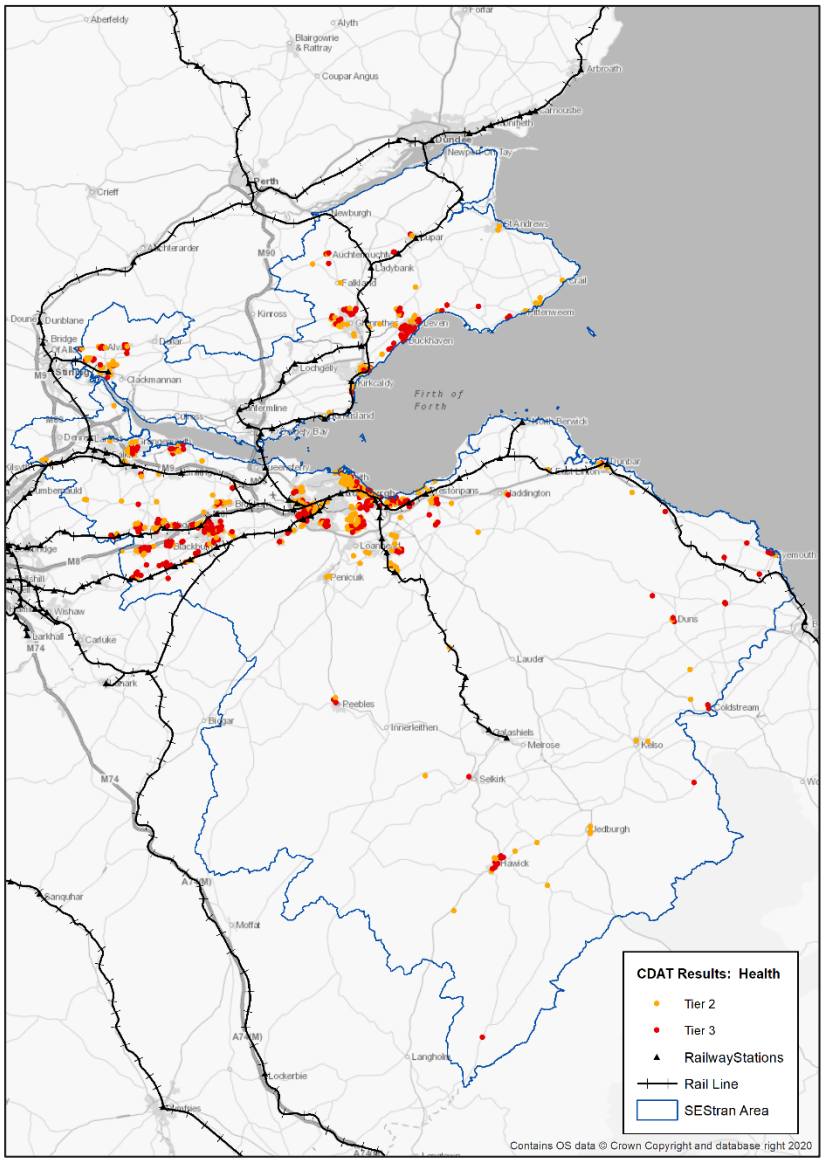


Figure 2.16 CDAT Connectivity to Healthcare

2.6 HEALTH & ACCESS TO HEALTHCARE

Levels of walking as a means of transport and as way to keep fit or for exercise are higher in the SEStran region than the national average as illustrated in Figure 2.15.[vi] This suggests higher levels of physical activity which is beneficial for health and this is also reflected in higher life expectancies compared to the national average. A male born in the SEStran region between 2016-18 is expected to live to 77.8 years old on average compared with a national average of 77.1 years old. Similarly, a female born at the same time would be expected to live to 81.4 years old in the SEStran region compared to a national average of 81.1 years old.[vii] Active travel is also beneficial in reducing limiting long-term conditions like obesity.

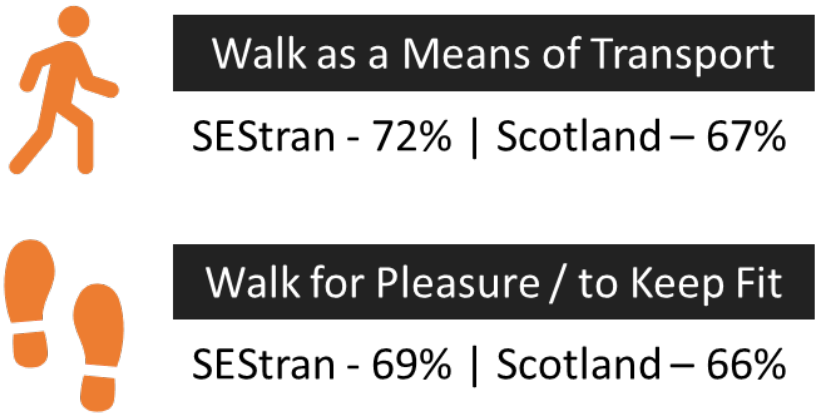


Figure 2.15 Walking 1+ Days in Past 7 Days 2019

Access to healthcare is also a critical requirement for residents of the region and will be becoming increasingly important as the proportion of the population that is elderly increases. We have undertaken analysis of the relationship between poor public transport connectivity to healthcare services (hospitals with outpatient facilities weight by the number of day

case patients) and high levels of health deprivation to identify locations where there may be a correlation using the CDAT tool. The findings are illustrated in Figure 2.16.

This shows that there are concentrations of Tier 3 postcodes, which are those showing the highest correlation between the SIMD health deprivation index and poor public transport connectivity to healthcare (relative to places of the same geography), around the periphery of Edinburgh, in West Lothian, Falkirk, Clackmannanshire and the Levenmouth area of Fife in particular.

In addition, the population within each tier has been calculated and is shown in Table 2.5. It can be seen that 69% of the population is in Tier 1 with 15% in Tier 2 and 16% in Tier 3. Of the population that is in Tier 3, 35% is in large urban areas and 45% is in other urban areas. Only 10% is in rural areas which suggests that the majority of people who suffer from a combination of poor public transport connectivity to healthcare and health deprivation live in urban areas.

Table 2.5 Healthcare CDAT Population by Urban – Rural Classification and Tier

Area	Tier 1	Tier 2	Tier 3
Employment			
Large Urban Area	344,572	92,483	91,252
Other Urban Area	472,662	99,610	114,994
Small Town	148,814	20,829	23,937
Rural	139,251	33,678	26,988

These Tier 3 areas could form the basis of targeted actions to address these inequalities.

Transport System & Demand

SEStran Regional Transport Strategy

STAG Case for Change Report

3.0 TRANSPORT SYSTEM & DEMAND

3.1 INTRODUCTION

This chapter summarises the performance of the current transport system in the SEStran region along with patterns of travel demand. The analysis set out in this chapter primarily draws upon data that reflects pre COVID-19 pandemic travel patterns. These will have been impacted by the pandemic, some of which will only be short-term whilst some is likely to be embedded as part of long-term travel behaviour change. These impacts are discussed further in Section 0.0.0.0. However, this chapter provides a baseline of evidence around the prevailing travel patterns in the SEStran region prior to the pandemic.

3.2 TRAVEL PATTERNS

Analysis of the 2011 Census travel to work data has been undertaken to provide an indication of cross boundary movements within the region although given the age of this data and subsequent impacts of the COVID-19 pandemic it should be interpreted with a suitable degree of caution. Figure 3.1 shows cross boundary trips by all modes and highlights that Edinburgh is the most significant attractor of cross-boundary trips within the region accounting for a third of total trips.

Origin \ Destination	Clackmannanshire	East Lothian	Falkirk	Fife	Midlothian	Scottish Borders	City of Edinburgh	West Lothian	Other	Total
Clackmannanshire	-	16	1,658	907	34	2	681	276	9,633	13,207
East Lothian	9	-	75	179	2,000	314	17,387	454	6,274	26,692
Falkirk	895	111	-	1,121	217	21	6,164	3,504	22,134	34,167
Fife	612	181	1,285	-	375	33	14,468	1,801	30,630	49,385
Midlothian	17	1,289	104	229	-	331	17,386	727	5,228	25,311
Scottish Borders	2	781	45	77	1,090	-	4,111	203	8,600	14,909
City of Edinburgh	95	4,220	970	2,897	5,186	537	-	5,497	27,694	47,096
West Lothian	104	286	2,056	948	681	59	18,877	-	13,773	36,784
Other	2,029	542	7,991	7,138	1,528	1,575	15,679	9,213	-	45,695
Total	3,763	7,426	14,184	13,496	11,111	2,872	94,753	21,675	123,966	293,246

KEY: Low High

Figure 3.1 Number of Cross Boundary Trips by All Modes

Figure 3.2 shows the breakdown of these cross-boundary trips by private transport (car driver, car passenger and motorcycle). This highlights that whilst Edinburgh is still the focal point for the majority of journeys there is a comprehensive spread across the region with West Lothian, Falkirk and Fife in particular attracting sizeable shares. 'Other' in this case refers to areas outside SEStran.

Origin \ Destination	Clackmannanshire	East Lothian	Falkirk	Fife	Midlothian	Scottish Borders	City of Edinburgh	West Lothian	Other	Total
Clackmannanshire	-	13	1,567	867	32	2	521	275	8,107	11,384
East Lothian	9	-	67	160	1,833	298	11,153	432	4,937	18,889
Falkirk	867	83	-	1,097	210	21	4,001	3,317	17,881	27,477
Fife	575	147	1,244	-	366	30	8,696	1,768	24,943	37,769
Midlothian	17	1,177	98	223	-	315	11,369	703	4,227	18,129
Scottish Borders	1	755	42	72	1,035	-	3,552	187	7,351	12,995
City of Edinburgh	93	2,922	884	2,509	4,012	480	-	4,926	15,686	31,512
West Lothian	102	248	1,918	932	661	56	13,487	-	11,476	28,880
Other	1,896	422	7,402	6,198	1,182	1,412	9,175	8,739	-	36,426
Total	3,560	5,767	13,222	12,058	9,331	2,614	61,954	20,347	94,608	223,461

KEY: Low High

Figure 3.2 Number of Cross Boundary Trips by Private Transport (Car Driver, Car Passenger, Motorcycle)

Figure 3.3 shows the cross-boundary trips being undertaken by public transport and active travel (bus, train, tram, walk, cycle, taxi and other). This highlights that again Edinburgh is the focal point and that the number of trips to other parts of the region by public transport is very low which reflects Edinburgh's position at the heart of the public transport network.

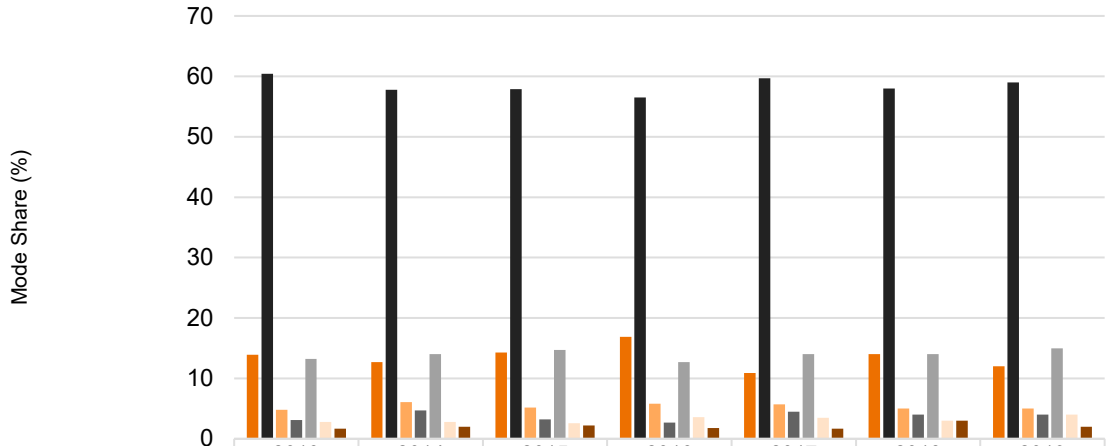
Origin \ Destination	Clackmannanshire	East Lothian	Falkirk	Fife	Midlothian	Scottish Borders	City of Edinburgh	West Lothian	Other	Total
Clackmannanshire	-	3	91	40	2	-	160	1	1,526	1,823
East Lothian	-	-	8	19	167	16	6,234	22	1,337	7,803
Falkirk	28	28	-	24	7	-	2,163	187	4,253	6,690
Fife	37	34	41	-	9	3	5,772	33	5,687	11,616
Midlothian	-	112	6	6	-	16	6,017	24	1,001	7,182
Scottish Borders	1	26	3	5	55	-	559	16	1,249	1,914
City of Edinburgh	2	1,298	86	388	1,174	57	-	571	12,008	15,584
West Lothian	2	38	138	16	20	3	5,390	-	2,297	7,904
Other	133	120	589	940	346	163	6,504	474	-	9,269
Total	203	1,659	962	1,438	1,780	258	32,799	1,328	29,358	69,785

KEY: Low High

Figure 3.3 Number of Cross Boundary Trips by Public Transport (Bus, Train, Tram, Walk, Cycle, Taxi, Other)

3.3 MODE SHARES

Travel to Work



	2013	2014	2015	2016	2017	2018	2019
Walking	13.9	12.7	14.3	16.9	10.9	14	12
Driver Car/Van	60.4	57.8	57.9	56.5	59.7	58	59
Passenger Car/Van	4.8	6.1	5.2	5.8	5.7	5	5
Bicycle	3.1	4.7	3.2	2.7	4.5	4	4
Bus	13.2	14.0	14.7	12.7	14.0	14	15
Rail	2.8	2.8	2.6	3.6	3.5	3	4
Other	1.7	2.0	2.2	1.8	1.7	3	2

Figure 3.4 Travel to Work Mode Share in SEStran Region 2013-2019

Scottish Household Survey data illustrated in Figure 3.4 shows that that Driver Car / Van is the most common travel-to-work mode for residents of SEStran, with 59% of the SEStran population travelling to work by this mode in 2019. The next most common mode is bus (accounting for 15% in 2019), followed by walking (accounting for 12% in 2019).

Between 2013 and 2019, the proportion of people traveling by car has fallen slightly, dropping from 60% in 2013 to 59% in 2019. There has been a slight increase in the bus, cycle, and rail mode share over the same period, with bus and cycle seeing the largest growth (an increase of 1.8 and 0.9 percentage points respectively) followed by rail (1.2 percentage points).

However, there are variations across the region as illustrated in Figure 3.5 which shows that the highest proportion of car / van drivers is in Falkirk (82%) whilst the lowest levels are in Edinburgh (39%). It is also noticeable that levels of walking to work (19%), cycling (9%) and bus use (28%) are highest in the city as well reflecting the local nature of the journeys being undertaken by many people.

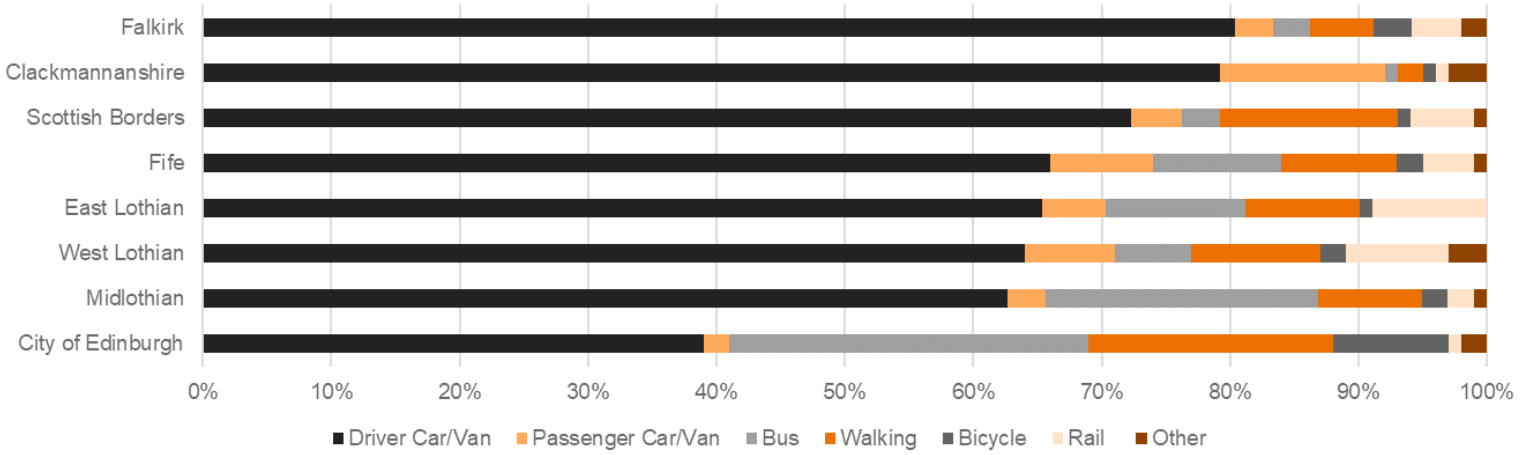


Figure 3.5 Travel to Work Mode Share by Local Authority 2019

Given these regional variations in travel to work mode shares it is not surprising that there is a similar variation in the number of car or van commuters who said they could use public transport for their journey as illustrated in Scottish Household Survey findings outlined in Figure 3.6. This shows that Midlothian and Edinburgh have the highest proportion of car and van commuters who think they could switch to public transport whilst Falkirk and Scottish Borders, two of the most car dependent local authorities from Figure 3.5, have the lowest proportion stating they could switch.

The Scottish Household Survey identified that between 2013 and 2019 the number of people working from home in the region increased by over a fifth as shown in Figure 3.7. However, this masks regional variations with growth in home working being 111% in

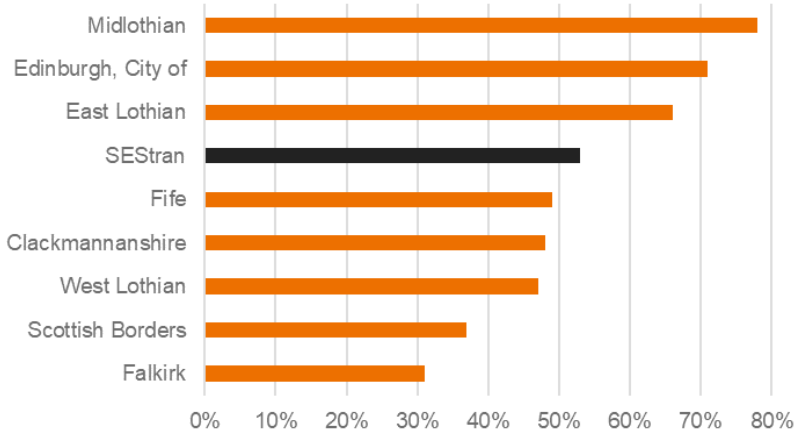


Figure 3.6 Car / Van Commuters That Could Use Public Transport 2018

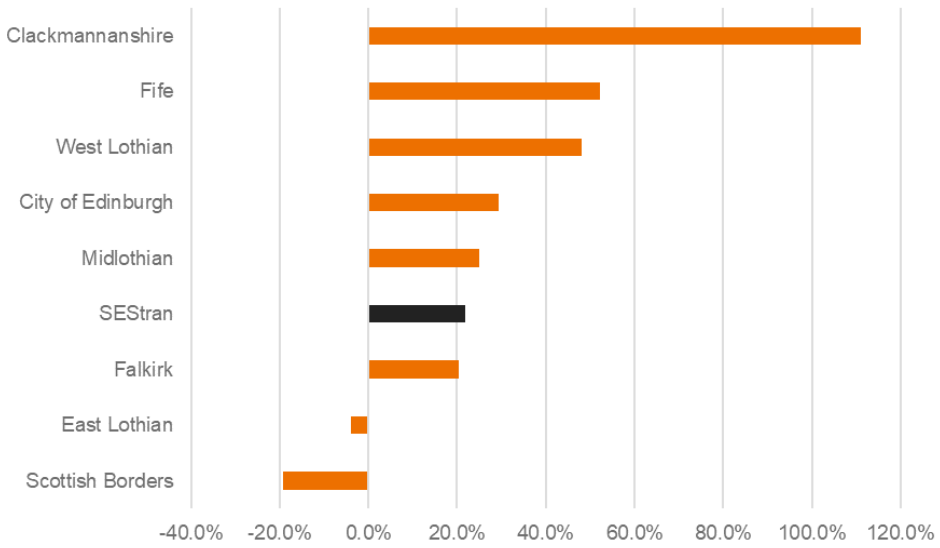


Figure 3.7 % Change in People Working from Home 2013 - 2019

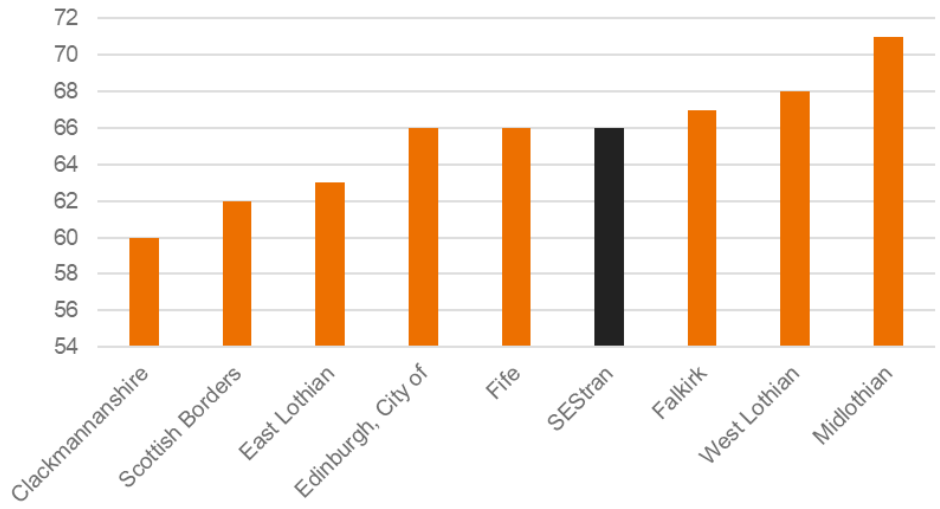


Figure 3.8 % of Households with No Bicycle Available 2019

Clackmannanshire whilst there was a decline in Scottish Borders (19%) and East Lothian (4%). More people working from home will lead to less commuting which will have implications for peak travel demand. This situation has also been affected by the impact of the COVID-19 pandemic and this is discussed further in Section 0.0.0.0.

3.4 ACTIVE TRAVEL

As shown in Figure 3.8, two thirds of households in the SEStran region have no access to a bicycle whilst the figure is as high as 71% in Midlothian. This highlights that a large proportion of the population is unable to use cycling as a mode of transport (unless via bike hire schemes).

In 2019, walking was the main mode of 23% of all journeys in the SEStran region whilst for it was just 2% for cycling. Rates of active travel also vary significantly across the region. Walking is the main mode of travel for 32% of journeys in Edinburgh but only 15% in Falkirk which is consistent with its high car mode share outlined above.

Sustrans 'hands up' survey shows that in 2020 64% of primary school children and 48% of secondary school children in the SEStran region travel to school by active modes. These are highest in Edinburgh where up to three quarters of pupils use active modes. This reflects the shorter journeys in the more densely urban areas which are more suited to active travel.

SEStran has also developed an integrated active travel network for the region as illustrated in Figure 3.9 and is now in the process of working with partners to facilitate its

delivery. This provides a framework for coordinated development of cross boundary active travel routes connecting cities, towns, neighbourhoods, settlements and public transport hubs. In addition, it will seek to overcome barriers presented by a public realm and urban environment not designed with active travel users in mind by facilitating placemaking and reducing car dominance.

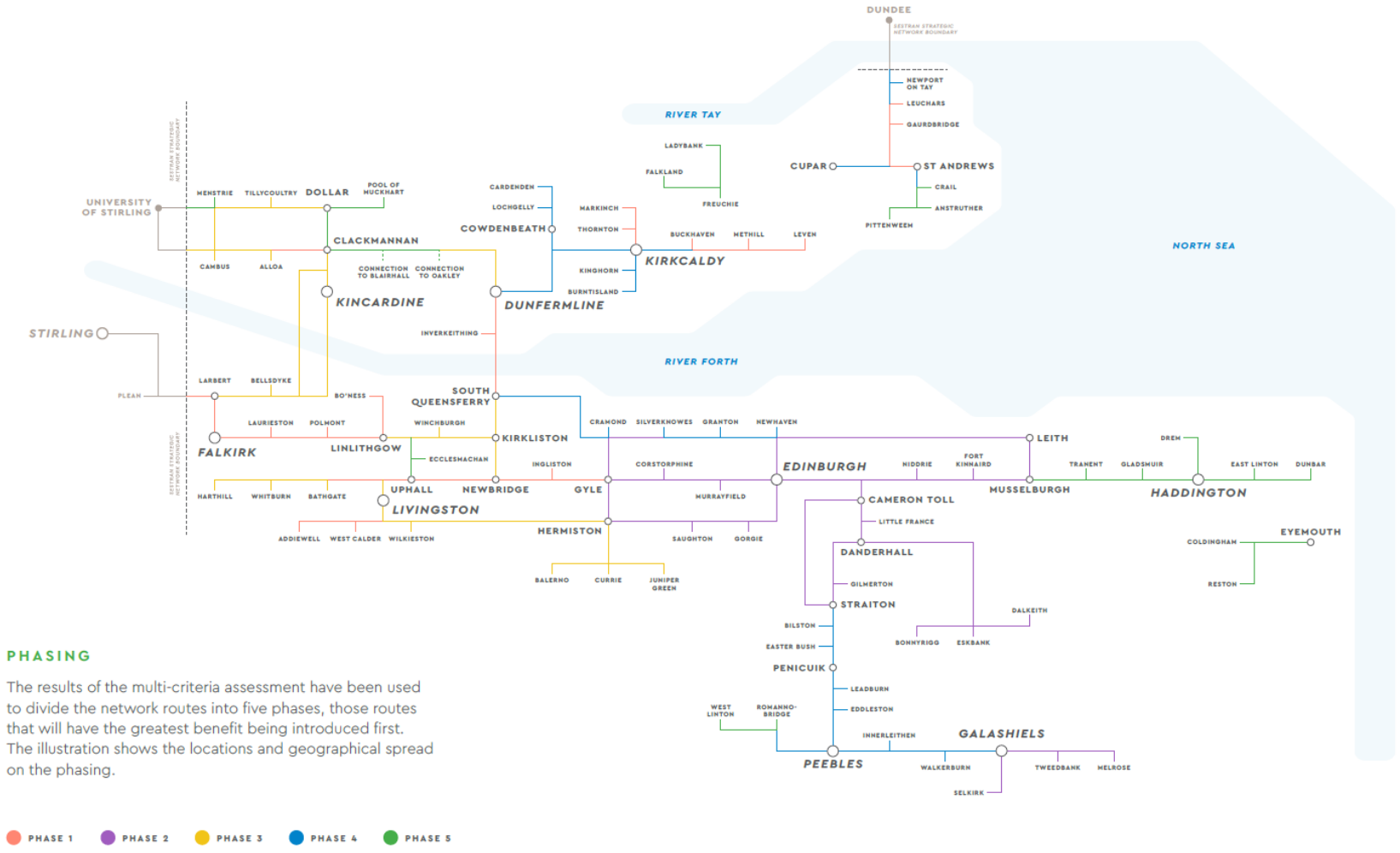


Figure 3.9 Proposed Active Travel Network

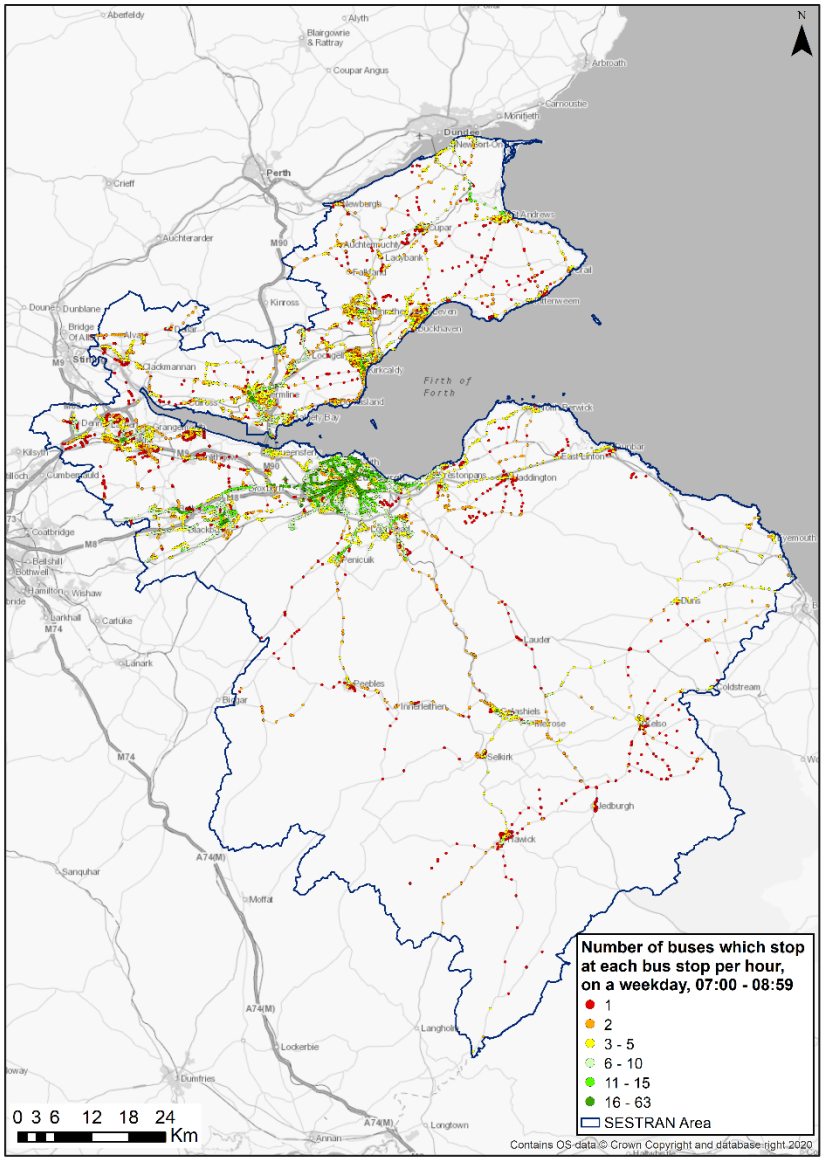


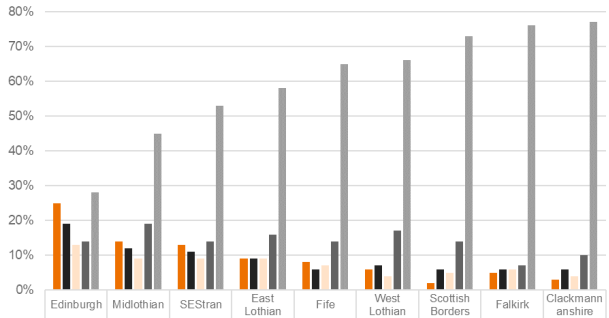
Figure 3.10 AM Bus Stop Service Frequency Per Hour

3.5 PUBLIC TRANSPORT

Bus

The bus network in the region is focused upon radial routes and urban areas as illustrated in Figure 3.10 which shows an indication of service frequencies at bus stops during the AM peak period. This highlights that the highest bus frequencies are in Edinburgh and to a lesser extent Livingston, Dunfermline, Falkirk and Kirkcaldy.

Use of local bus services varies widely across the region as shown in Figure 3.11. The greatest use of buses is in Edinburgh which is consistent with the high frequency of services shown in Figure 3.10. The lowest levels of bus usage are in Clackmannanshire which reflects its less dense bus network followed by Falkirk. This is more unexpected given Falkirk is one of the areas with a greater density of bus services in the SEStran region based upon Figure 3.10.



	Edinburgh	Midlothian	SEStran	East Lothian	Fife	West Lothian	Scottish Borders	Falkirk	Clackmannanshire
Every day, or almost every day	25%	14%	13%	9%	8%	6%	2%	5%	3%
2 or 3 times per week	19%	12%	11%	9%	6%	7%	6%	6%	6%
About once a week	13%	9%	9%	9%	7%	4%	5%	6%	4%
About once a fortnight, or about once a month	14%	19%	14%	16%	14%	17%	14%	7%	10%
Not used in past month	28%	45%	53%	58%	65%	66%	73%	76%	77%

Figure 3.11 Use of Local Bus Services in the Previous Month 2019

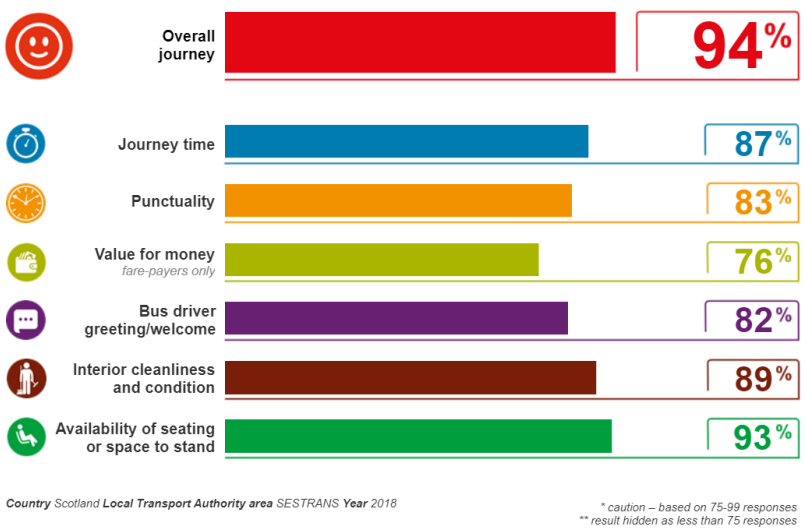


Figure 3.12 Passenger Satisfaction with Bus Services 2018

Overall, bus passengers are generally satisfied with the bus services in the SEStran region as shown in the 2018 survey by Transport Focus illustrated in Figure 3.12. The lowest levels of satisfaction are with the value for money provided by buses followed by the bus driver greeting and punctuality.

Train

There are 63 stations in the SEStran region with the busiest stations in 2019/20 shown in Table 3.1. This shows that Edinburgh Waverley is by far the busiest station accounting for 50% of the 47.9 million passengers that passed through stations in the region in 2019/20. Growth has been variable over the past decade with some stations experiencing a doubling of demand or greater (e.g. Livingston North, Edinburgh Park, Uphall) whilst others have experienced small declines in patronage (e.g. Linlithgow, Kirkcaldy, Falkirk High, Dunfermline). The data covers the period to 31st March 2020 so is minimally affected by the COVID-19 pandemic which set in from mid-March.

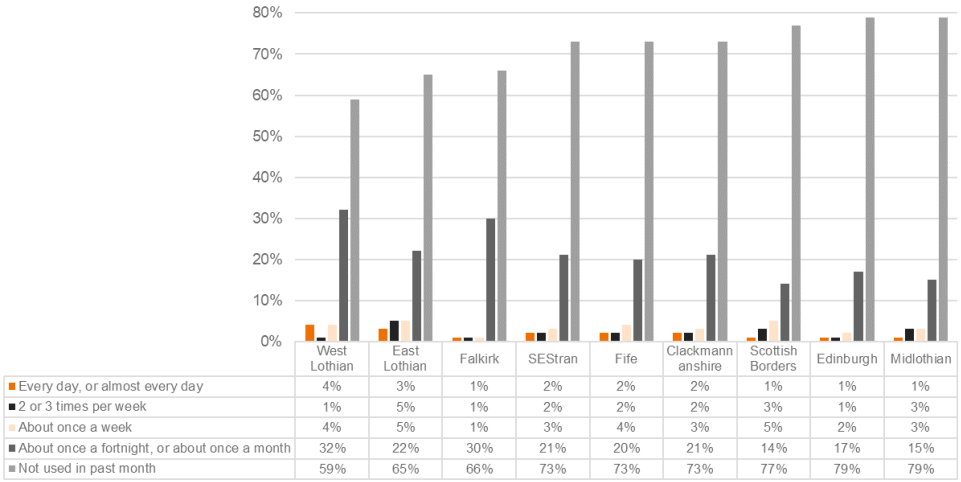
Table 3.1 Top 20 Stations in SEStran Region by 2019/20 Passenger Entries and Exits

STATION	LOCAL AUTHORITY	2009/10 PASSENGERS	2019/20 PASSENGERS	CHANGE SINCE 2009/10
Waverley	Edinburgh	19,312,458	23,872,996	24%
Haymarket	Edinburgh	1,832,396	3,068,112	67%
Bathgate	West Lothian	607,250	1,209,782	99%
Livingston North	West Lothian	552,702	1,179,130	113%
Inverkeithing	Fife	943,400	1,137,604	21%
Linlithgow	West Lothian	1,172,548	1,131,374	-4%
Kirkcaldy	Fife	1,074,524	1,008,276	-6%
Edinburgh Park	Edinburgh	451,790	914,576	102%
Falkirk High	Falkirk	993,144	895,962	-10%
Larbert	Falkirk	658,040	889,872	35%

Polmont	Falkirk	651,690	744,638	14%
Falkirk Grahamston	Falkirk	518,514	709,004	37%
Dalmeny	Edinburgh	384,262	606,138	58%
North Berwick	East Lothian	444,276	603,788	36%
Uphall	West Lothian	226,664	577,820	155%
Dunfermline (Town)	Fife	601,120	562,038	-7%
Leuchars	Fife	423,144	562,038	33%
Dunbar	East Lothian	318,976	473,884	49%
Musselburgh	East Lothian	389,240	460,918	18%
Tweedbank	Scottish Borders		420,238	N/A

Nearly three quarters of people in the SEStran region do not use train services on a regular basis as shown in Figure 3.16. The highest levels of train usage are in West Lothian, East Lothian and Falkirk which all host heavily used commuter lines. However, it is clear that for most people rail is not a frequently used mode of transport.

Overall satisfaction with train services in Scotland was high in Spring 2020 as illustrated in by Transport Focus's findings shown in Figure 3.13. However, levels of satisfaction with value for money and how well delays were dealt with was low with only around half of people being happy.



	West Lothian	East Lothian	Falkirk	SEStran	Fife	Clackmannanshire	Scottish Borders	Edinburgh	Midlothian
Every day, or almost every day	4%	3%	1%	2%	2%	2%	1%	1%	1%
2 or 3 times per week	1%	5%	1%	2%	2%	2%	3%	1%	3%
About once a week	4%	5%	1%	3%	4%	3%	5%	2%	3%
About once a fortnight, or about once a month	32%	22%	30%	21%	20%	21%	14%	17%	15%
Not used in past month	59%	65%	66%	73%	73%	73%	77%	79%	79%

Figure 3.14 Use of Train Services in the Previous Month 2019

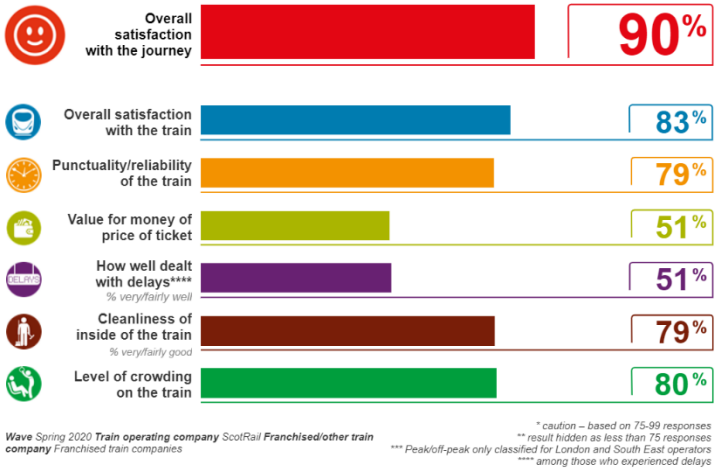


Figure 3.13 Passenger Satisfaction with Train Services 2020

Public Transport Interchange

Analysis of the number of interchanges required for a public transport journey between eight of the largest settlements across each of the SEStran local authority areas is shown in Figure 3.15. This provides an indication of how difficult it is to make a journey by public transport between these locations. A lower number means fewer public transport legs so fewer interchanges for a passenger. If there is only 1 public transport leg then no interchange is required. Locations coloured dark red cannot be accessed by public transport within 2 hours. Any longer than this is considered to be an unacceptable journey time and the journey is unlikely to be made by public transport. This highlights Hawick as facing particular barriers to public transport connectivity across the region and, to a lesser extent, Alloa and Musselburgh as well. Edinburgh has the best public transport connectivity which is to be expected as it is the focal point for the regional public transport network.

AM Public Transport Legs

	Alloa	Dalkeith	Dunfermline	Edinburgh	Falkirk	Hawick	Livingston	Musselburgh
Alloa		2	1	1	1		2	2
Dalkeith			2	1	2	1	1	1
Dunfermline	1	2		1	2		1	2
Edinburgh	1	1	1		1	2	2	1
Falkirk	2	2	2	1			2	2
Hawick		1		1				2
Livingston	3	1	2	1	2			3
Musselburgh	2	1	2	1	2	2	3	

Inter Peak Public Transport Legs

	Alloa	Dalkeith	Dunfermline	Edinburgh	Falkirk	Hawick	Livingston	Musselburgh
Alloa		1	1	1	1		1	1
Dalkeith			2	1	2	1	1	1
Dunfermline	1	2		1	1		1	2
Edinburgh	1	1	1		1	1	1	1
Falkirk	1	2	2	1			2	2
Hawick		1		1				
Livingston	2	1	1	1	2			3
Musselburgh		1	2	1	2		3	

PM Public Transport Legs

	Alloa	Dalkeith	Dunfermline	Edinburgh	Falkirk	Hawick	Livingston	Musselburgh
Alloa		2	1	1	1		2	2
Dalkeith			2	1	2	1	1	1
Dunfermline	1	2		1	1		1	2
Edinburgh	1	1	1		1	1	1	1
Falkirk	1	2	2	1			2	2
Hawick		1		1				2
Livingston	2	1	1	2	2			3
Musselburgh		1	2	1	2		1	

KEY Internal trip | Inaccessible by public transport within 2 hours

Figure 3.15 Typical Number of Interchanges between Major Settlements

Journey Times & Speeds

Analysis of public transport journey times between 20 of the largest settlements in the SEStran region was undertaken broken down by time period. The results are shown in Figure 3.17 overleaf. The locations shown in dark red with no journey time have no connectivity by public transport within 2 and half hours. It can be seen that Alloa, Denny, Galashiels, Glenrothes, Haddington, Hawick, Kelso, North Berwick, Peebles and St Andrews all suffer from a lack of connectivity and / or long journey times to the other settlements. Edinburgh has the shortest public transport journey times which is consistent with its position at the centre of the region and the public transport network. The difference in journey times between time periods is minimal and, in some instances, the peak period journey times are quicker than the inter peak.

These have then been compared with the equivalent road journey times to see how competitive public transport is with travelling by car. The ratio of these journey times is shown in Figure 3.18 (overleaf). This shows that for the vast majority of journeys, public transport journey times are much slower than the equivalent car journey and in some instances can be two, three, four or five times longer. In particular, journeys between Livingston and Linlithgow in the AM peak by public transport are five times longer than travelling by car. There are a small number of journeys where travelling by public transport is faster than car which are mainly to or from Edinburgh. This can be attributed to congestion and delays caused by traffic in the city whilst it is also has high quality public transport links. However, average public transport speeds for journeys to Edinburgh city centre are slowest within the city itself as illustrated in Figure 3.16, reflecting the frequency of bus stops. Average speeds are higher from more peripheral locations which can be attributed to a greater proportion of the journey being undertaken in uncongested conditions, fewer stops and the presence of rail services.

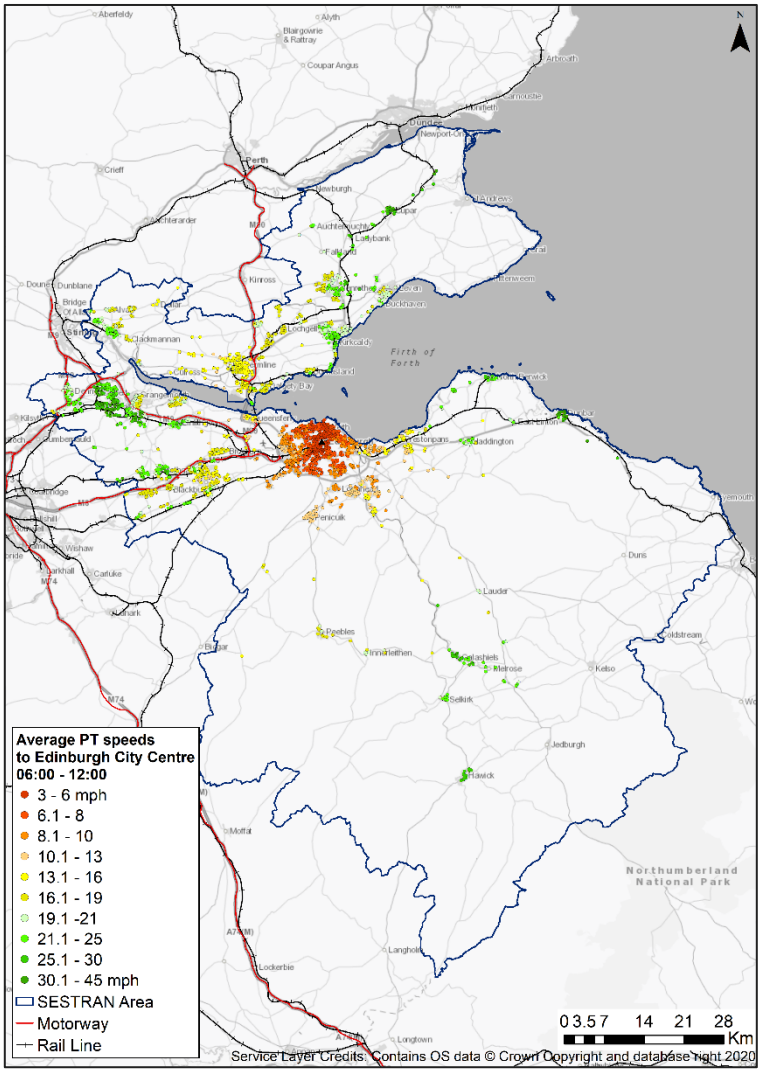


Figure 3.16 Average Public Transport Speeds to Edinburgh City Centre

AM Travel Time (Minutes)

	Alloa	Bathgate	Dalkeith	Denny	Dunfermline	Edinburgh	Falkirk	Galashiels	Glenrothes	Haddington	Hawick	Kelso	Kirkcaldy	Linlithgow	Livingston	Musselburgh	North Berwick	Peebles	Penicuik	St Andrews
Alloa	N/A	110	117	63	64	79	40		148	123			128	61	127	114	121		125	
Bathgate	115	N/A	89	91	82	44	49	115	129	99			90	30	29	84	92	117	92	138
Dalkeith		85	N/A	125	103	39	84	62	128	68	106	130	95	71	66	17	87	86	45	136
Denny	52	99	134	N/A	82	89	32		131				143	60	129	129			141	
Dunfermline	59	90	107	108	N/A	57	75	131	50	121			48	75	66	99	116		115	101
Edinburgh	91	43	42	79	52	N/A	40	66	78	48	126	121	56	28	52	33	43	77	47	91
Falkirk	56	53	89	28	63	43	N/A	108	117	95			88	18	82	83	92	123	97	123
Galashiels		118	61		133	64	112	N/A		110	43	57	132	93	128	76	119	45	69	
Glenrothes	140	125	144		50	85	125		N/A				37	119	119	141*	136			56
Haddington		96	73	132	108	46	95	97	133	N/A			114	81	109	33	42	119	99	
Hawick			108			136		41			N/A	115				140*		99	127	
Kelso			97			137		57			55	N/A				143		110		
Kirkcaldy	140	92	110	133	51	62	87	135	42	120			N/A	83	103	106	106		124	60
Linlithgow	74	29	76	53	75	30	17	96	103	83			69	N/A	55	70	71	110	84	108
Livingston	125	27	73	120	99	56	79	133	139	115			107	55	N/A	99	116		107	
Musselburgh	130	84	20	118	102	36	81	81	128	34	133		93	69	96	N/A	50	109	65	128
North Berwick		93	87	137	113	51	96	122	143	41			111	80	114	54	N/A	125	114	137
Peebles		120	84	146	132	69	113	46		132	107	132	135	99	128	103	124	N/A	28	
Penicuik		92	45	126	99	44	87	73	140	101	134		104	71	104	63	91	28	N/A	142
St Andrews					104	121			59				72							N/A

IP Travel Time (Minutes)

	Alloa	Bathgate	Dalkeith	Denny	Dunfermline	Edinburgh	Falkirk	Galashiels	Glenrothes	Haddington	Hawick	Kelso	Kirkcaldy	Linlithgow	Livingston	Musselburgh	North Berwick	Peebles	Penicuik	St Andrews
Alloa	N/A	111	129	63	64	82	51		116	131			131	71	127	127			139	
Bathgate	108	N/A	90	98	80	44	53	119	126	97			89	30	35	86	96	130	100	122
Dalkeith		90	N/A	125	100	44	84	61	137	63	103	94	105	72	69	18	94	78	45	140
Denny	56	106	134	N/A	86	87	33		135	136			137	60	127	129	143		144	
Dunfermline	59	86	105	71	N/A	56	78	120	50	113			51	75	60	96	125	141	113	92
Edinburgh	88	43	48	77	52	N/A	38	64	78	45	126	146	58	28	51	38	52	76	48	90
Falkirk	57	53	86	28	62	40	N/A	108	115	89			89	18	85	85	96	123	95	123
Galashiels		112	61		138	63	106	N/A		106	43	64	142	89	122	73	115	45	69	
Glenrothes	130	146	138	118	49	78	127		N/A	135			38	117	112	131	142		143	57
Haddington		94	70	125	98	43	86	106	145	N/A			116	87	103	33	41	124	99	
Hawick			108			130*		41			N/A							119		
Kelso			88			137		59			59	N/A								
Kirkcaldy	117	93	110	145	51	60	94	139	42	113			N/A	83	98	104	113	148	115	70
Linlithgow	78	29	78	68	79	31	17	96	108	92			75	N/A	55	70	86	109	84	113
Livingston	124	31	63	115	58	54	75	128	92	110			95	55	N/A	100	112	138	103	138
Musselburgh		83	20	123	97	38	82	82	131	34		149	101	69	101	N/A	53	97	64	137
North Berwick		103	98	134	115	52	95	121		49			120	81	126	56	N/A	134	121	
Peebles		111	89		137	72	120	47		129	102	144	133	108	127	109	138	N/A	28	
Penicuik		85	43	140	110	45	91	70	139	102	128		106	81	102	60	110	28	N/A	139
St Andrews					91	105	145		58				70	126						N/A

PM Travel Time (Minutes)

	Alloa	Bathgate	Dalkeith	Denny	Dunfermline	Edinburgh	Falkirk	Galashiels	Glenrothes	Haddington	Hawick	Kelso	Kirkcaldy	Linlithgow	Livingston	Musselburgh	North Berwick	Peebles	Penicuik	St Andrews
Alloa	N/A	111	134	64	61	86	48		121				133	71	130	127	141		142	
Bathgate	116	N/A	87	102	85	44	52	120	129	100			92	30	27	83	99	144	97	131
Dalkeith		90	N/A	132	92	44	88	62	138	73	103	87	102	74	73	19	93	90	47	140
Denny	56	106	134	N/A	95	88	29		140				134	60	127	124	145		147	
Dunfermline	59	89	101	106	N/A	57	66	121	55	114			56	72	73	87	113	146	114	100
Edinburgh	90	43	42	78	53	N/A	38	65	88	49	126		56	28	50	31	52	83	50	100
Falkirk	56	53	87	28	61	43	N/A	108	121	102			88	18	80	78	96	127	100	123
Galashiels		117	61		135	65	108	N/A		104	43	58	124	94	131	76	123	44	72	
Glenrothes	135	127	135		51	78	130		N/A				38	116	92	131				57
Haddington		91	67	125	102	44	91	106		N/A			118	88	106	30	48	141	110	
Hawick			108			130		41			N/A	125				136		114	125	
Kelso			143			139		56			59	N/A								
Kirkcaldy	147	95	110	141	56	61	93	125	36	120			N/A	83	98	102	120		126	78
Linlithgow	80	29	76	62	72	30	18	97	106	85			74	N/A	51	66	80	115	85	129
Livingston	129	27	78	119	58	53	76	132	117	110			94	51	N/A	84	113	148	105	
Musselburgh		89	22	123	98	39	85	82	133	31			99	73	100	N/A	53	120	68	
North Berwick		103	91		109	46	96	121		50			123	78	135	56	N/A		105	
Peebles		121	81		133	76	118	49	142	129	117	131	126	105	143	99	137	N/A	28	
Penicuik		92	44	141	104	46	88	73	121	102	134		93	77	106	62	109	29	N/A	
St Andrews	143				104	110			61				73	131						N/A

KEY: Low High Inaccessible

Figure 3.17 TRACC Public Transport Journey Times by Time Period (Minutes)

AM

	Alloa	Bathgate	Dalkeith	Denny	Dunfermline	Edinburgh	Falkirk	Galashiels	Glenrothes	Haddington	Hawick	Kelso	Kirkcaldy	Linlithgow	Livingston	Musselburgh	North Berwick	Peebles	Penicuik	St Andrews
Alloa	N/A	3.44	2.09	2.86	2.37	1.34	1.74		2.96	1.76			2.67	2.26	2.95	1.87	1.44		1.98	
Bathgate	3.38	N/A	2.12	3.14	2.22	0.94	1.96	1.37	2.53	1.77			1.80	1.76	1.53	1.79	1.30	1.77	1.88	1.66
Dalkeith		2.07	N/A	2.45	2.45	1.39	1.79	1.29	2.29	3.09	1.45	2.41	1.73	1.87	1.89	1.06	2.42	2.32	1.96	1.55
Denny	2.36	3.54	2.58	N/A	2.73	1.65	2.29		2.57				2.86	2.73	3.39	2.26			2.39	
Dunfermline	2.36	2.50	2.49	3.72	N/A	1.50	2.50	1.56	1.67	2.12			1.92	2.88	2.20	2.06	1.63		2.30	1.74
Edinburgh	1.72	1.02	1.62	1.65	1.63	N/A	0.91	0.99	1.70	1.37	1.40	1.66	1.24	0.78	1.58	1.43	0.88	1.45	1.34	1.17
Falkirk	2.43	2.30	1.89	2.15	1.97	0.88	N/A	1.21	2.49	1.56			1.91	1.00	2.41	1.57	1.21	1.73	1.80	1.56
Galashiels		1.46	1.39		1.62	1.00	1.29	N/A		2.12	1.30	2.11	1.39	1.19	1.71	1.55	1.63	1.50	1.47	
Glenrothes	2.75	2.31	2.53		2.00	1.63	2.50		N/A				2.85	2.90	2.70		1.58			1.60
Haddington		1.75	3.48	2.03	1.93	1.31	1.56	1.70	1.90	N/A			1.65	1.56	2.22	1.74	1.83	2.29	2.54	
Hawick			1.50			1.48		1.41			N/A	3.29						1.94	1.87	
Kelso			1.83			1.88		2.11			1.62	N/A				2.47		1.93		
Kirkcaldy	2.80	1.92	1.96	2.61	2.13	1.22	1.81	1.39	2.63	1.71			N/A	2.08	2.40	1.71	1.26		1.97	1.36
Linlithgow	2.74	1.71	2.00	2.41	3.00	0.73	0.94	1.20	2.71	1.60			1.82	N/A	5.00	1.59	1.06	1.77	1.87	1.52
Livingston	2.78	1.42	2.03	3.08	3.19	1.33	2.26	1.71	3.16	2.35			2.43	5.50	N/A	2.36	1.78		2.49	
Musselburgh	2.06	1.79	1.67	2.07	2.08	1.50	1.53	1.56	2.06	1.89	1.77		1.52	1.57	2.34	N/A	1.52	2.48	2.03	1.36
North Berwick		1.35	2.49	1.73	1.61	1.04	1.28	1.65	1.70	1.86			1.34	1.21	1.81	1.64	N/A	1.89	2.15	1.18
Peebles		2.07	2.40	2.15	2.20	1.33	1.77	1.53		2.44	2.10	2.36	1.88	1.80	2.46	2.29	1.82	N/A	1.40	
Penicuik		2.14	2.05	2.38	2.25	1.19	1.78	1.52	2.41	2.73	2.00		1.79	1.73	2.74	2.17	1.75	1.33	N/A	1.56
St Andrews					1.79	1.42			1.64				1.60							N/A

IP

	Alloa	Bathgate	Dalkeith	Denny	Dunfermline	Edinburgh	Falkirk	Galashiels	Glenrothes	Haddington	Hawick	Kelso	Kirkcaldy	Linlithgow	Livingston	Musselburgh	North Berwick	Peebles	Penicuik	St Andrews
Alloa	N/A	3.47	2.53	2.86	2.37	1.52	2.13		2.27	2.02			2.67	2.63	3.02	2.23			2.40	
Bathgate	3.18	N/A	2.50	3.38	2.35	1.10	2.04	1.51	2.68	1.94			1.85	1.76	1.84	2.05	1.45	2.17	2.33	1.51
Dalkeith		2.37	N/A	2.66	2.56	1.57	1.91	1.27	2.69	2.86	1.39	1.74	2.02	2.12	2.23	1.06	2.47	2.00	1.88	1.65
Denny	2.55	3.79	2.85	N/A	2.77	1.81	2.20		2.70	2.23			2.69	2.61	3.43	2.43	1.88		2.72	
Dunfermline	2.27	2.39	2.76	2.45	N/A	1.75	2.52	1.52	1.61	2.17			1.96	2.78	2.14	2.18	1.84	2.31	2.51	1.53
Edinburgh	1.63	0.96	1.71	1.57	1.58	N/A	0.83	0.93	1.70	1.22	1.35	1.97	1.23	0.74	1.46	1.58	0.98	1.36	1.26	1.13
Falkirk	2.38	2.21	2.00	1.87	1.88	0.91	N/A	1.29	2.50	1.56			1.89	0.95	2.58	1.73	1.32	1.86	1.90	1.54
Galashiels		1.42	1.33		1.75	0.97	1.26	N/A		1.96	1.26	2.29	1.53	1.19	1.69	1.40	1.51	1.45	1.41	
Glenrothes	2.45	2.75	2.65	2.19	1.88	1.66	2.54		N/A	2.05			2.92	2.79	2.67	2.26	1.73		2.42	1.58
Haddington		1.68	3.18	1.95	1.75	1.19	1.41	1.86	2.10	N/A			1.66	1.67	2.10	1.65	1.64	2.18	2.36	
Hawick			1.42					1.37			N/A							2.25		
Kelso			1.60			1.85		2.11			1.69	N/A								
Kirkcaldy	2.29	1.94	2.12	2.79	1.96	1.30	1.92	1.49	2.47	1.71			N/A	2.02	2.33	1.79	1.38	1.97	1.95	1.52
Linlithgow	2.69	1.61	2.23	2.96	3.04	0.84	0.85	1.26	2.77	1.88			1.88	N/A	4.58	1.71	1.34	1.88	2.05	1.55
Livingston	2.82	1.63	1.91	3.03	1.93	1.38	2.14	1.73	2.14	2.34			2.16	5.00	N/A	2.56	1.81	2.46	2.64	1.79
Musselburgh		1.73	1.54	2.16	1.98	1.52	1.52	1.58	2.11	1.79		2.61	1.63	1.57	2.46	N/A	1.51	1.98	1.83	1.44
North Berwick		1.45	2.45	1.70	1.62	1.04	1.25	1.61		2.13			1.43	1.21	2.00	1.60	N/A	1.89	2.12	
Peebles		1.88	2.41		2.32	1.36	1.88	1.47		2.35	1.92	2.48	1.82	1.96	2.44	2.32	1.97	N/A	1.33	
Penicuik		1.98	1.87	2.75	2.56	1.22	1.90	1.43	2.48	2.62	1.88		1.83	2.03	2.76	1.94	2.04	1.33	N/A	1.53
St Andrews					1.49	1.28	1.71		1.49				1.52	1.66						N/A

PM

	Alloa	Bathgate	Dalkeith	Denny	Dunfermline	Edinburgh	Falkirk	Galashiels	Glenrothes	Haddington	Hawick	Kelso	Kirkcaldy	Linlithgow	Livingston	Musselburgh	North Berwick	Peebles	Penicuik	St Andrews
Alloa	N/A	3.36	2.31	2.67	2.26	1.54	2.00		2.42				2.66	2.54	3.02	1.98	1.64		2.22	
Bathgate	3.31	N/A	2.07	3.40	2.24	1.00	2.00	1.43	2.53	1.82			1.80	1.76	1.50	1.73	1.41	2.25	2.02	1.56
Dalkeith		1.84	N/A	2.44	1.88	1.63	1.76	1.32	2.23	3.48	1.45	1.71	1.65	1.85	1.97	1.19	2.58	2.37	1.96	1.47
Denny	2.55	3.79	2.53	N/A	3.17	1.76	2.07		2.69				2.68	2.73	3.43	2.10	1.79		2.49	
Dunfermline	2.36	2.17	2.24	3.66	N/A	1.68	2.20	1.41	1.77	1.93			2.15	2.57	2.52	1.71	1.53	2.18	2.19	1.69
Edinburgh	1.53	0.81	1.40	1.44	1.36	N/A	0.78	0.93	1.69	1.26	1.35		1.08	0.68	1.28	1.15	0.96	1.48	1.28	1.18
Falkirk	2.24	2.12	1.74	1.87	1.79	0.91	N/A	1.19	2.47	1.62			1.80	0.95	2.35	1.39	1.23	1.76	1.79	1.48
Galashiels		1.34	1.42		1.55	1.02	1.24	N/A		2.04	1.30	2.15	1.24	1.21	1.72	1.52	1.71	1.47	1.53	
Glenrothes	2.65	2.19	2.29		1.96	1.63	2.55		N/A				2.92	2.70	2.14	2.02				1.63
Haddington		1.42	3.19	1.81	1.59	1.26	1.42	1.93		N/A			1.53	1.63	2.04	1.58	2.09	2.61	2.68	
Hawick			1.50			1.41		1.41			N/A	3.68				1.79		2.24	1.84	
Kelso			2.70			1.90		2.15			1.74	N/A								
Kirkcaldy	2.88	1.79	1.86	2.66	2.24	1.27	1.90	1.25	2.12	1.67			N/A	2.02	2.28	1.57	1.38		1.94	1.73
Linlithgow	2.67	1.71	1.85	2.58	2.57	0.79	0.90	1.18	2.59	1.57			1.80	N/A	4.64	1.40	1.16	1.83	1.81	1.74
Livingston	2.74	1.42	1.95	2.90	1.61	1.26	2.05	1.63	2.39	2.16			1.92	4.25	N/A	1.83	1.66	2.39	2.28	
Musselburgh		1.56	1.69	1.98	1.72	1.56	1.49	1.64	1.90	1.72			1.41	1.52	2.22	N/A	1.61	2.55	2.00	
North Berwick		1.32	2.53		1.40	0.94	1.23	1.68		2.27			1.35	1.13	2.05	1.70	N/A		1.91	
Peebles		1.83	2.31		2.02	1.46	1.79	1.63	1.80	2.48	2.29	2.38	1.59	1.84	2.65	2.25	2.04	N/A	1.40	
Penicuik		1.84	2.00	2.56	2.04	1.24	1.73	1.52	1.89	2.68	2.03		1.43	1.79	2.65	2.00	2.06	1.38	N/A	
St Andrews	1.96				1.70	1.33			1.61				1.62	1.72						N/A

KEY: Low High Inaccessible

Figure 3.18 Ratio of Public Transport Journey Times to Road Journey Times by Time Period

Safety & Security

The Scottish Household Survey collects data on the perceptions of users of public transport including safety and security on buses and train services. The findings from 2019 are shown in Figure 3.19 although it should be noted that this represents the whole of Scotland and not just the SEStran region. Nonetheless it provides an indication of perceptions of safety and security.

This shows that the vast majority of bus and train users feel safe on them during the day with 95% of train users and 93% of bus users providing a positive response. However, the situation changes in the evening with only 76% of train users and 68% of bus users stating that they feel safe and secure. This highlights that between a quarter and a third of public transport users do not feel safe and secure in the evening and that buses are perceived as being less safe than trains.

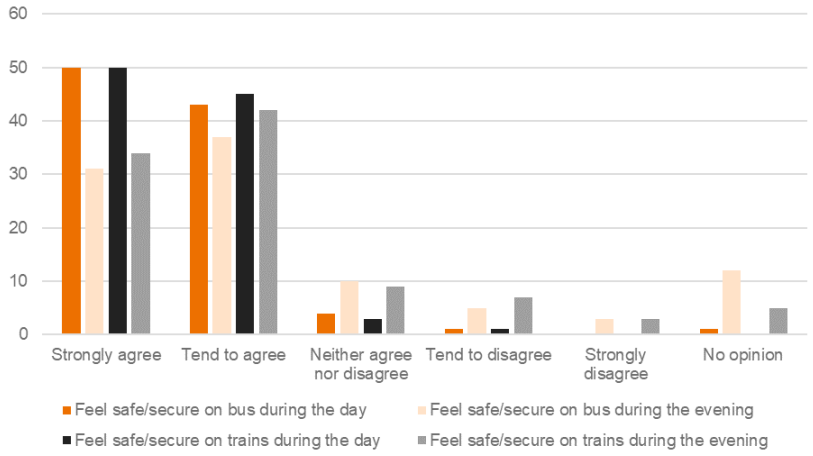


Figure 3.19 Views on Safety of Public Transport by Adults that Used it in Previous Month 2019

Awareness of Public Transport

The same survey also asks bus and train users about how easy it is to find out information about public transport routes and times. This found that 89% of train users and 84% of bus users thought accessing public transport information was easy as shown in Figure 3.20. However, this highlights that a small minority of public transport users still have difficulty in accessing public transport information and this percentage is likely to be much higher for people who do not use public transport and are therefore much less familiar with how and where to access information from.

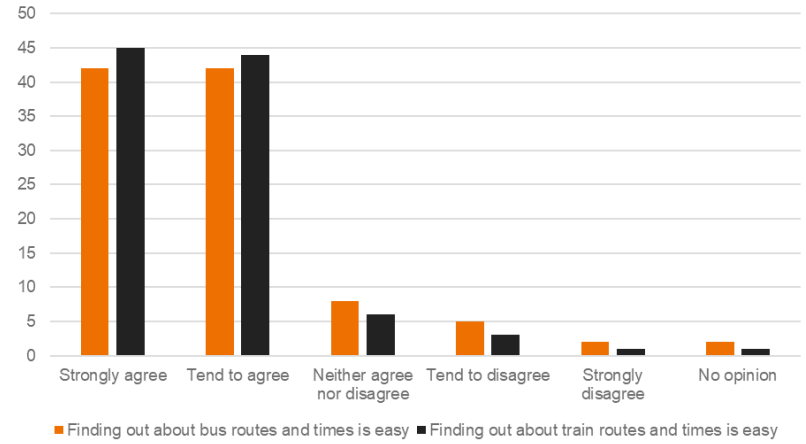


Figure 3.20 Views on Access to Public Transport Information by Adults that Used it in Previous Month 2019

3.6 ROAD TRANSPORT

Car Ownership & Road Traffic

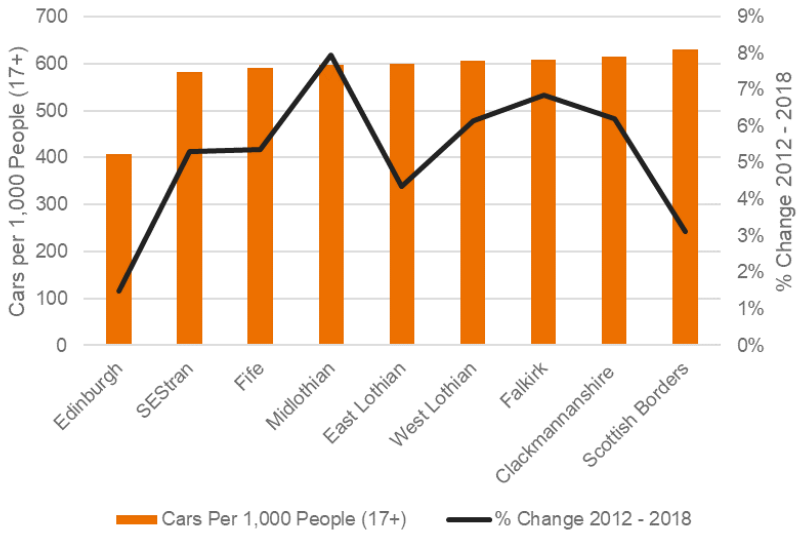


Figure 3.22 Cars Registered Per 1,000 People Aged 17 Years Or Older 2018

Journey Times

Analysis of road journey times between 20 of the main settlements in the SEStran region is shown in Figure 3.23. This replicates the analysis undertaken for public transport journey times discussed in Section 3.5. It shows that journey times vary across the region with the longest times being experienced traveling to and from the more peripheral settlements like Galashiels, Hawick, Kelso, North Berwick, Peebles and St Andrews.

The number of cars registered per capita old enough to drive is highest in the Scottish Borders as illustrated in Figure 3.21. The lowest levels of car registrations per head of population are in Edinburgh and it has also saw the slowest rate of growth in car ownership over the period between 2012 and 2018 at just 1.5%. Midlothian has experienced the highest rate of growth with car registrations increasing by 8% over the same timeframe. Despite having the highest levels of ownership the Scottish Borders has witnessed the second slowest rate of growth at just 3.1%.

Road traffic in the region has also increased in recent years rising 11% between 2010 and 2018 as illustrated in Figure 3.22. The largest increases have been in East Lothian (18%), West Lothian (13%) and Falkirk (13%). Almost a quarter of the total traffic in the region is in Edinburgh (24%) whilst a similar amount is in Fife (23%) which combined account for nearly half of all traffic in the region.

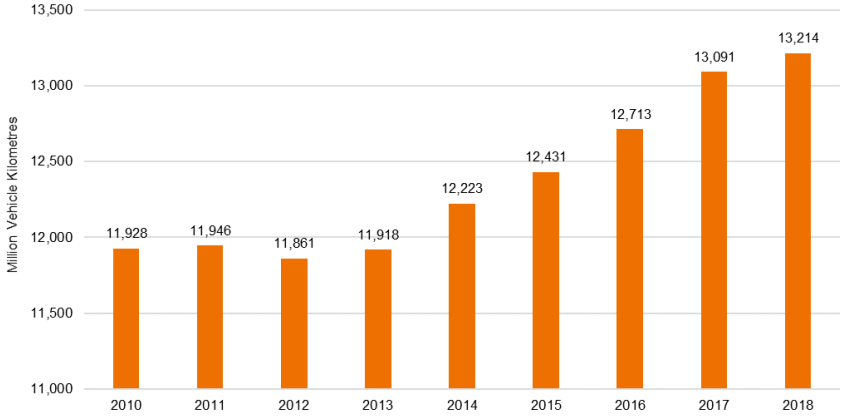


Figure 3.21 Traffic on Roads in SEStran Region 2010-18

AM Travel Time (Minutes)

	Alloa	Bathgate	Dalkeith	Denny	Dunfermline	Edinburgh	Falkirk	Galashiels	Glenrothes	Haddington	Hawick	Kelso	Kirkcaldy	Linlithgow	Livingston	Musselburgh	North Berwick	Peebles	Penicuk	St Andrews
Alloa	X	32	56	22	27	59	23	98	50	70	122	108	48	27	43	61	84	80	63	70
Bathgate	34	X	42	29	37	47	25	84	51	56	110	93	50	17	19	47	71	66	49	83
Dalkeith	56	41	X	51	42	28	47	48	56	22	73	54	55	38	35	16	36	37	23	88
Denny	22	28	52	X	30	54	14	93	51	65	120	101	50	22	38	57	80	75	59	79
Dunfermline	25	36	43	29	X	38	30	84	30	57	109	92	25	26	30	48	71	66	50	58
Edinburgh	53	42	26	48	32	X	44	67	46	35	90	73	45	36	33	23	49	53	35	78
Falkirk	23	23	47	13	32	49	X	89	47	61	91	97	46	18	34	53	76	71	54	79
Galashiels	96	81	44	91	82	64	87	X	96	52	33	27	95	78	75	49	73	30	47	128
Glenrothes	51	54	57	54	25	52	50	98	X	71	122	106	13	41	44	62	86	81	64	35
Haddington	70	55	21	65	56	35	61	57	70	X	75	59	69	52	49	19	23	52	39	102
Hawick	125	109	72	119	109	92	115	29	122	73	X	35	121	103	103	75	98	51	68	154
Kelso	106	90	53	100	92	73	96	27	105	56	34	X	104	85	84	58	79	57	68	137
Kirkcaldy	50	48	56	51	24	51	48	97	16	70	122	105	X	40	43	62	84	80	63	44
Linlithgow	27	17	38	22	25	41	18	80	38	52	105	88	38	X	11	44	67	62	45	71
Livingston	45	19	36	39	31	42	35	78	44	49	104	86	44	10	X	42	65	60	43	77
Musselburgh	63	47	12	57	49	24	53	52	62	18	75	58	61	44	41	X	33	44	32	94
North Berwick	84	69	35	79	70	49	75	74	84	22	97	80	83	66	63	33	X	66	53	116
Peebles	74	58	35	68	60	52	64	30	73	54	51	56	72	55	52	45	68	X	20	105
Penicuk	58	43	22	53	44	37	49	48	58	37	67	73	58	41	38	29	52	21	X	91
St Andrews	71	83	90	81	58	85	82	131	36	104	155	139	45	74	77	95	119	114	97	X

IP Travel Time (Minutes)

	Alloa	Bathgate	Dalkeith	Denny	Dunfermline	Edinburgh	Falkirk	Galashiels	Glenrothes	Haddington	Hawick	Kelso	Kirkcaldy	Linlithgow	Livingston	Musselburgh	North Berwick	Peebles	Penicuk	St Andrews
Alloa	X	32	51	22	27	54	24	93	51	65	118	102	49	27	42	57	81	74	58	71
Bathgate	34	X	36	29	34	40	26	79	47	50	105	86	48	17	19	42	66	60	43	81
Dalkeith	52	38	X	47	39	28	44	48	51	22	74	54	52	34	31	17	38	39	24	85
Denny	22	28	47	X	31	48	15	88	50	61	115	95	51	23	37	53	76	70	53	80
Dunfermline	26	36	38	29	X	32	31	79	31	52	105	86	26	27	28	44	68	61	45	60
Edinburgh	54	45	28	49	33	X	46	69	46	37	93	74	47	38	35	24	53	56	38	80
Falkirk	24	24	43	15	33	44	X	84	46	57	94	91	47	19	33	49	73	66	50	80
Galashiels	93	79	46	87	79	65	84	X	92	54	34	28	93	75	72	52	76	31	49	126
Glenrothes	53	53	52	54	26	47	50	93	X	66	118	100	13	42	42	58	82	75	59	36
Haddington	70	56	22	64	56	36	61	57	69	X	77	59	70	52	49	20	25	57	42	103
Hawick	123	109	76	117	110	95	114	30	123	76	X	36	123	104	102	79	102	53	70	157
Kelso	105	91	55	100	92	74	97	28	104	58	35	X	105	85	84	60	80	59	69	138
Kirkcaldy	51	48	52	52	26	46	49	93	17	66	119	100	X	41	42	58	82	75	59	46
Linlithgow	29	18	35	23	26	37	20	76	39	49	102	83	40	X	12	41	64	58	41	73
Livingston	44	19	33	38	30	39	35	74	43	47	101	81	44	11	X	39	62	56	39	77
Musselburgh	62	48	13	57	49	25	54	52	62	19	76	57	62	44	41	X	35	49	35	95
North Berwick	84	71	40	79	71	50	76	75	84	23	99	80	84	67	63	35	X	71	57	118
Peebles	73	59	37	67	59	53	64	32	72	55	53	58	73	55	52	47	70	X	21	106
Penicuk	57	43	23	51	43	37	48	49	56	39	68	73	58	40	37	31	54	21	X	91
St Andrews	75	85	87	84	61	82	85	129	39	101	153	136	46	76	78	94	117	111	94	X

PM Travel Time (Minutes)

	Alloa	Bathgate	Dalkeith	Denny	Dunfermline	Edinburgh	Falkirk	Galashiels	Glenrothes	Haddington	Hawick	Kelso	Kirkcaldy	Linlithgow	Livingston	Musselburgh	North Berwick	Peebles	Penicuk	St Andrews
Alloa	X	33	58	24	27	56	24	99	50	71	122	106	50	28	43	64	86	80	64	70
Bathgate	35	X	42	30	38	44	26	84	51	55	109	89	51	17	18	48	70	64	48	84
Dalkeith	59	49	X	54	49	27	50	47	62	21	71	51	62	40	37	16	36	38	24	95
Denny	22	28	53	X	30	50	14	94	52	66	120	99	50	22	37	59	81	75	59	78
Dunfermline	25	41	45	29	X	34	30	86	31	59	110	91	26	28	29	51	74	67	52	59
Edinburgh	59	53	30	54	39	X	49	70	52	39	93	75	52	41	39	27	54	56	39	85
Falkirk	25	25	50	15	34	47	X	91	49	63	93	96	49	19	34	56	78	72	56	83
Galashiels	97	87	43	92	87	64	87	X	100	51	33	27	100	78	76	50	72	30	47	134
Glenrothes	51	58	59	55	26	48	51	100	X	73	123	105	13	43	43	65	88	81	66	35
Haddington	74	64	21	69	64	35	64	55	77	X	73	56	77	54	52	19	23	54	41	110
Hawick	126	115	72	120	116	92	116	29	129	73	X	34	129	105	104	76	98	51	68	162
Kelso	109	98	53	103	98	73	99	26	111	56	34	X	112	87	87	59	75	56	66	145
Kirkcaldy	51	53	59	53	25	48	49	100	17	72	123	105	X	41	43	65	87	81	65	45
Linlithgow	30	17	41	24	28	38	20	82	41	54	105	87	41	X	11	47	69	63	47	74
Livingston	47	19	40	41	36	42	37	81	49	51	107	86	49	12	X	46	68	62	46	82
Musselburgh	67	57	13	62	57	25	57	50	70	18	73	55	70	48	45	X	33	47	34	103
North Berwick	88	78	36	82	78	49	78	72	91	22	96	76	91	69	66	33	X	68	55	124
Peebles	76	66	35	71	66	52	66	30	79	52	51	55	79	57	54	44	67	X	20	113
Penicuk	61	50	22	55	51	37	51	48	64	38	66	71	65	43	40	31	53	21	X	98
St Andrews	73	89	94	84	61	83	84	135	38	107	157	140	45	76	78	100	122	116	100	X

KEY: Low High

Figure 3.23 INRIX Road Journey Times by Time Period (Minutes)

Journey times are also subject to variability across the region as well. This is illustrated in Figure 3.24 which shows in turn the ratio of AM and PM peak journey time compared to the inter peak journey time. In the AM peak it can be seen that Dalkeith, Edinburgh, Galashiels, Haddington, Kelso, Musselburgh, North Berwick, Peebles and Penicuik all experience journey times in excess of the inter peak suggesting congestion and delays travelling to and from these areas. In the PM peak it is noticeable that Bathgate, Dalkeith, Dunfermline, Edinburgh, Livingston, Musselburgh and Penicuik all experience journey times which exceed the equivalent inter peak time which again suggests peak period congestion. This highlights the difference between peak and off-peak time journey times across the region.

AM

	Alloa	Bathgate	Dalkeith	Denny	Dunfermline	Edinburgh	Falkirk	Galashiels	Glenrothes	Haddington	Hawick	Kelso	Kirkcaldy	Linlithgow	Livingston	Musselburgh	North Berwick	Peebles	Penicuk	St Andrews
Alloa	X	1.00	1.10	1.00	1.00	1.09	0.96	1.05	0.98	1.08	1.03	1.06	0.98	1.00	1.02	1.07	1.04	1.08	1.09	0.99
Bathgate	1.00	X	1.17	1.00	1.09	1.18	0.96	1.06	1.09	1.12	1.05	1.08	1.04	1.00	1.00	1.12	1.08	1.10	1.14	1.02
Dalkeith	1.08	1.08	X	1.09	1.08	1.00	1.07	1.00	1.10	1.00	0.99	1.00	1.06	1.12	1.13	0.94	0.95	0.95	0.96	1.04
Denny	1.00	1.00	1.11	X	0.97	1.13	0.93	1.06	1.02	1.07	1.04	1.06	0.98	0.96	1.03	1.08	1.05	1.07	1.11	0.99
Dunfermline	0.96	1.00	1.13	1.00	X	1.19	0.97	1.06	0.97	1.10	1.04	1.07	0.96	0.96	1.07	1.09	1.04	1.08	1.11	0.97
Edinburgh	0.98	0.93	0.93	0.98	0.97	X	0.96	0.97	1.00	0.95	0.97	0.99	0.96	0.95	0.94	0.96	0.92	0.95	0.92	0.98
Falkirk	0.96	0.96	1.09	0.87	0.97	1.11	X	1.06	1.02	1.07	0.97	1.07	0.98	0.95	1.03	1.08	1.04	1.08	1.08	0.99
Galashiels	1.03	1.03	0.96	1.05	1.04	0.98	1.04	X	1.04	0.96	0.97	0.96	1.02	1.04	1.04	0.94	0.96	0.97	0.96	1.02
Glenrothes	0.96	1.02	1.10	1.00	0.96	1.11	1.00	1.05	X	1.08	1.03	1.06	1.00	0.98	1.05	1.07	1.05	1.08	1.08	0.97
Haddington	1.00	0.98	0.95	1.02	1.00	0.97	1.00	1.00	1.01	X	0.97	1.00	0.99	1.00	1.00	0.95	0.92	0.91	0.93	0.99
Hawick	1.02	1.00	0.95	1.02	0.99	0.97	1.01	0.97	0.99	0.96	X	0.97	0.98	0.99	1.01	0.95	0.96	0.96	0.97	0.98
Kelso	1.01	0.99	0.96	1.00	1.00	0.99	0.99	0.96	1.01	0.97	0.97	X	0.99	1.00	1.00	0.97	0.99	0.97	0.99	0.99
Kirkcaldy	0.98	1.00	1.08	0.98	0.92	1.11	0.98	1.04	0.94	1.06	1.03	1.05	X	0.98	1.02	1.07	1.02	1.07	1.07	0.96
Linlithgow	0.93	0.94	1.09	0.96	0.96	1.11	0.90	1.05	0.97	1.06	1.03	1.06	0.95	X	0.92	1.07	1.05	1.07	1.10	0.97
Livingston	1.02	1.00	1.09	1.03	1.03	1.08	1.00	1.05	1.02	1.04	1.03	1.06	1.00	0.91	X	1.08	1.05	1.07	1.10	1.00
Musselburgh	1.02	0.98	0.92	1.00	1.00	0.96	0.98	1.00	1.00	0.95	0.99	1.02	0.98	1.00	1.00	X	0.94	0.90	0.91	0.99
North Berwick	1.00	0.97	0.88	1.00	0.99	0.98	0.99	0.99	1.00	0.96	0.98	1.00	0.99	0.99	1.00	0.94	X	0.93	0.93	0.98
Peebles	1.01	0.98	0.95	1.01	1.02	0.98	1.00	0.94	1.01	0.98	0.96	0.97	0.99	1.00	1.00	0.96	0.97	X	0.95	0.99
Penicuk	1.02	1.00	0.96	1.04	1.02	1.00	1.02	0.98	1.04	0.95	0.99	1.00	1.00	1.03	1.03	0.94	0.96	1.00	X	1.00
St Andrews	0.95	0.98	1.03	0.96	0.95	1.04	0.96	1.02	0.92	1.03	1.01	1.02	0.98	0.97	0.99	1.01	1.02	1.03	1.03	X

PM

	Alloa	Bathgate	Dalkeith	Denny	Dunfermline	Edinburgh	Falkirk	Galashiels	Glenrothes	Haddington	Hawick	Kelso	Kirkcaldy	Linlithgow	Livingston	Musselburgh	North Berwick	Peebles	Penicuk	St Andrews
Alloa	X	1.03	1.14	1.09	1.00	1.04	1.00	1.06	0.98	1.09	1.03	1.04	1.02	1.04	1.02	1.12	1.06	1.08	1.10	0.99
Bathgate	1.03	X	1.17	1.03	1.12	1.10	1.00	1.06	1.09	1.10	1.04	1.03	1.06	1.00	0.95	1.14	1.06	1.07	1.12	1.04
Dalkeith	1.13	1.29	X	1.15	1.26	0.96	1.14	0.98	1.22	0.95	0.96	0.94	1.19	1.18	1.19	0.94	0.95	0.97	1.00	1.12
Denny	1.00	1.00	1.13	X	0.97	1.04	0.93	1.07	1.04	1.08	1.04	1.04	0.98	0.96	1.00	1.11	1.07	1.07	1.11	0.98
Dunfermline	0.96	1.14	1.18	1.00	X	1.06	0.97	1.09	1.00	1.13	1.05	1.06	1.00	1.04	1.04	1.16	1.09	1.10	1.16	0.98
Edinburgh	1.09	1.18	1.07	1.10	1.18	X	1.07	1.01	1.13	1.05	1.00	1.01	1.11	1.08	1.11	1.13	1.02	1.00	1.03	1.06
Falkirk	1.04	1.04	1.16	1.00	1.03	1.07	X	1.08	1.07	1.11	0.99	1.05	1.04	1.00	1.03	1.14	1.07	1.09	1.12	1.04
Galashiels	1.04	1.10	0.93	1.06	1.10	0.98	1.04	X	1.09	0.94	0.97	0.96	1.08	1.04	1.06	0.96	0.95	0.97	0.96	1.06
Glenrothes	0.96	1.09	1.13	1.02	1.00	1.02	1.02	1.08	X	1.11	1.04	1.05	1.00	1.02	1.02	1.12	1.07	1.08	1.12	0.97
Haddington	1.06	1.14	0.95	1.08	1.14	0.97	1.05	0.96	1.12	X	0.95	0.95	1.10	1.04	1.06	0.95	0.92	0.95	0.98	1.07
Hawick	1.02	1.06	0.95	1.03	1.05	0.97	1.02	0.97	1.05	0.96	X	0.94	1.05	1.01	1.02	0.96	0.96	0.96	0.97	1.03
Kelso	1.04	1.08	0.96	1.03	1.07	0.99	1.02	0.93	1.07	0.97	0.97	X	1.07	1.02	1.04	0.98	0.94	0.95	0.96	1.05
Kirkcaldy	1.00	1.10	1.13	1.02	0.96	1.04	1.00	1.08	1.00	1.09	1.03	1.05	X	1.00	1.02	1.12	1.06	1.08	1.10	0.98
Linlithgow	1.03	0.94	1.17	1.04	1.08	1.03	1.00	1.08	1.05	1.10	1.03	1.05	1.03	X	0.92	1.15	1.08	1.09	1.15	1.01
Livingston	1.07	1.00	1.21	1.08	1.20	1.08	1.06	1.09	1.14	1.09	1.06	1.06	1.11	1.09	X	1.18	1.10	1.11	1.18	1.06
Musselburgh	1.08	1.19	1.00	1.09	1.16	1.00	1.06	0.96	1.13	0.95	0.96	0.96	1.13	1.09	1.10	X	0.94	0.96	0.97	1.08
North Berwick	1.05	1.10	0.90	1.04	1.10	0.98	1.03	0.96	1.08	0.96	0.97	0.95	1.08	1.03	1.05	0.94	X	0.96	0.96	1.05
Peebles	1.04	1.12	0.95	1.06	1.12	0.98	1.03	0.94	1.10	0.95	0.96	0.95	1.08	1.04	1.04	0.94	0.96	X	0.95	1.07
Penicuk	1.07	1.16	0.96	1.08	1.19	1.00	1.06	0.98	1.14	0.97	0.97	0.97	1.12	1.08	1.08	1.00	0.98	1.00	X	1.08
St Andrews	0.97	1.05	1.08	1.00	1.00	1.01	0.99	1.05	0.97	1.06	1.03	1.03	0.98	1.00	1.00	1.06	1.04	1.05	1.06	X

KEY: Low High

Figure 3.24 Ratio of Peak INRIX Journey Time to Inter Peak Journey Time

Accidents

The number of reported road accidents to Police Scotland in the region has decreased by 43% between 2010 and 2019 as illustrated in Figure 3.25. This demonstrates a general trend towards improving road safety. Just under half of the accidents in the SEStran region occur in the City of Edinburgh (41%) with Fife being the next largest contributor (17%). This is consistent with the high proportion of traffic in these local authority areas outlined earlier in the section suggesting a correlation between volume of traffic and numbers of accidents.

In addition, according to Reported Road Casualties Scotland 2019 the number of pedestrian casualties in the SEStran area has reduced by 42% between the 2004 – 2008 average and 2015 – 2019 average. They are down from 807 to 468. Data for cyclists is not available.

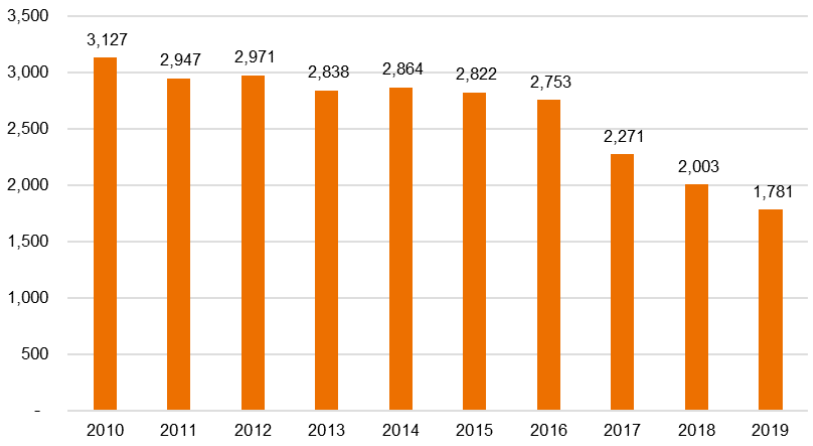


Figure 3.25 Reported Accidents in SEStran 2010 - 2019

Fleet Composition

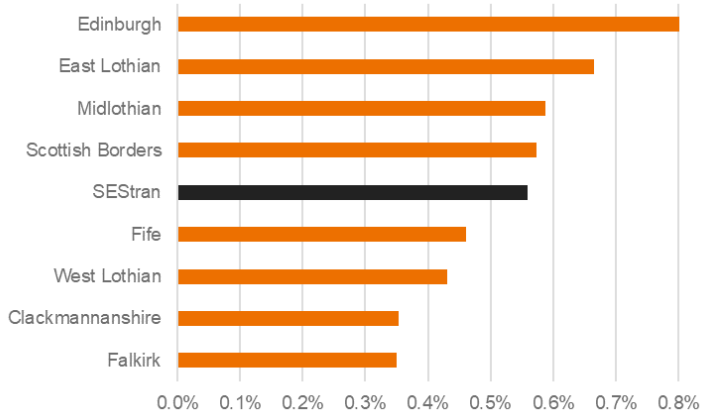


Figure 3.26 Proportion of Fleet which is ULEVs 2019

At the end of 2019 the car fleet in the SEStran region was overwhelmingly composed of conventionally powered vehicles with just under 0.6% being Ultra Low Emission Vehicles (ULEVs). The highest proportion of ULEVs is in Edinburgh (0.8%) as shown in Figure 3.26. Falkirk and Clackmannanshire have the lowest proportion of ULEVs in their fleets at ~0.35%. These low levels of ULEVs highlight the scale of the fleet turnover that is required to transition to a decarbonised fleet in line with the Scottish Government's aspirations.

This will also require putting in place the necessary charging infrastructure to support ULEVs. Figure 3.27 shows the number of electric vehicle charging points across the region in 2019. In total there were 306 which equates to 0.03 chargers per sq km. The density is highest in Edinburgh where there are 0.27 chargers per sq km. This highlights the need for investment in the network of

charging infrastructure to support the transition of the fleet to ULEVs across the region. This is set against rising petrol and diesel consumption by road vehicles which has increased by 1.9% in the region between 2010 and 2018 based upon data in Scottish Transport Statistics.

Analysis of electric vehicle costs compared to petrol vehicles undertaken by Direct Line Insurance in 2020 is shown in Table 3.2. This shows that the total lifetime cost of an electric vehicle is actually 3% less than that of an equivalent petrol vehicle. However, the up-front cost of purchasing an electric vehicle remains substantially higher (22%) than a petrol car which is likely to remain a barrier to the wider uptake of electric vehicles by some who cannot afford the additional initial outlay or that do not consider the whole lifetime cost of owning and operating the vehicle.

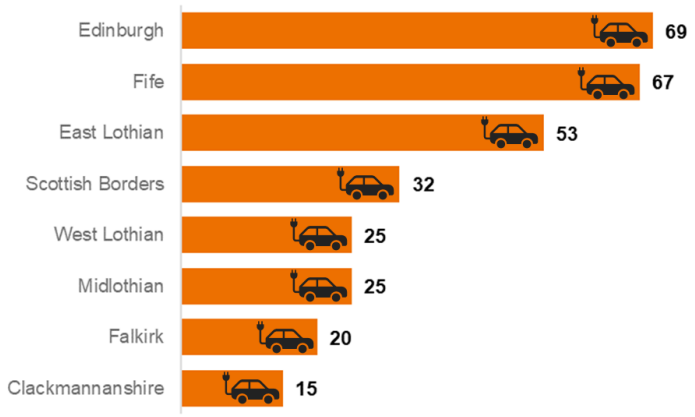


Figure 3.27 Number of Electric Vehicle Charging Points by Local Authority 2019

Table 3.2 Petrol v Electric Vehicle Costs

Expenditure Type	Electric Car	Petrol Car	Difference	Comparison
Up-front purchase cost	£27,921	£22,976	+£4,945	22% more expensive
Fuel	£343	£824	-£481	58% cheaper
Tax and Maintenance	£227	£443	-£216	49% cheaper
Insurance	£1,172	£938	+£234	25% more expensive
Total Annual Running Cost	£1,742	£2,205	-£463	21% cheaper
Total Lifetime Cost	£52,133	£53,625	-£1,492	3% cheaper
Annualised Cost	£3,751	£3,858	-£107	3% cheaper

Parking

The public survey identified that 45% of respondents were dissatisfied with parking charges in the region with the highest proportion being 54% in Midlothian followed by 50% in East Lothian. In addition, 38% of respondents said that they were dissatisfied with parking availability in the region. The highest proportion was again in Midlothian with 45% expressing dissatisfaction followed by 43% in East Lothian.

3.7 FREIGHT

Road Freight

Just under a quarter of all road freight in Scotland originated in the SEStran region between 2015 – 2019. The destination of this freight is shown in Table 3.3. Nearly two thirds of road freight that originates in the region is also destined for it highlighting most movements are internal to the region. The SPT area accounts for the next highest amount of road freight originated in the region. In addition, 12% of the road freight generated in the SEStran area is destined for a location outside of Scotland.

Table 3.3 Average Freight Lifted by UK HGVs in the SEStran Region 2015 – 2019

DESTINATION	THOUSAND TONNES	% OF TOTAL
ZetTrans	-	0%
HiTrans	472	2%
Nestrans	687	3%
Tactran	962	5%
SEStran	13,118	62%
SPT	2,934	14%
SWestrans	479	2%
Scotland	18,652	88%
Elsewhere in the UK	2,619	12%
Total	21,271	100%

There are currently 8 driver rest areas in the region which include:

- Esplanade (D) Lorry Park (A921, Kirkcaldy)
- Halbeath Lorry Park (A92, Cowdenbeath)
- Cedar Café (A1, Grantshouse)
- Hillview Lorry Park (A698, Coldstream)
- Newtown St Boswells Lorry Park, (A68, Newtown St Boswells)
- Edinburgh Coach and Lorry Park (A199, Portobello)
- Harthill Service (M8, Whitburn)
- Alloa Lorry Park, (A907, Alloa)

These help to reduce tiredness amongst HGV drivers which has safety implications for all road users.

Analysis undertaken by SEStran and used to inform the STPR 2 Case for Change for the region identified that delays come at a significant cost to the freight sector (as well as other road users) and road congestion costs the UK nearly £8billion per year. Having a large HGV stuck in congestion costs £1 per minute to the operator. It also highlighted that four of the UK's worst traffic bottlenecks occur on the Edinburgh City Bypass and that these could cost drivers in Scotland £5.1bn in wasted time over the next decade. It was identified that the impact of Edinburgh's 455 traffic hotspots was second only to London and was likely to cost drivers £2.8bn by 2025.

The COVID-19 pandemic has also driven an increase in home deliveries which has increased the number of LGVs on the road network although it is difficult to quantify this as data is not available for the region.

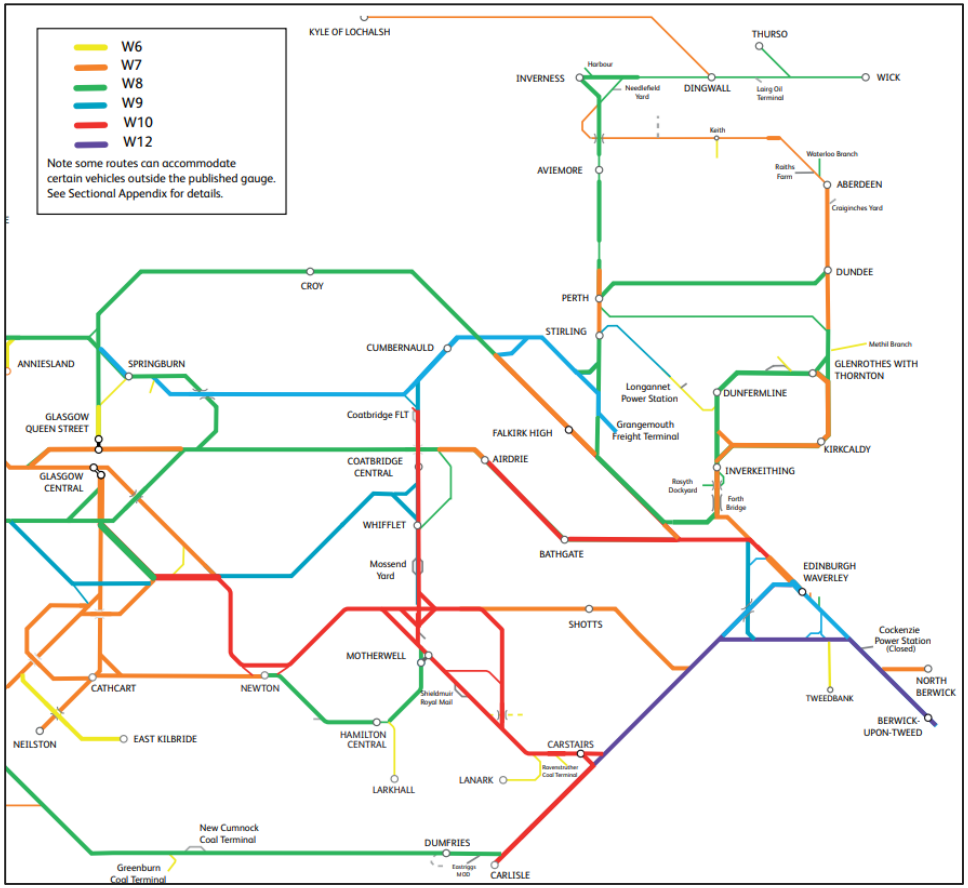


Figure 3.28 Rail Network Gauge Clearance in the SEStran Region

Rail Freight

Whilst the rail network in the region is primarily used for passenger services there are a number of rail freight movements that take place as well. These include:

- At Grangemouth the Port has a 400m rail siding for containers, which handles a weekly Tilbury train and a Monday to Friday service operated in conjunction with DRS
- Rail movements associated with the Tarmac Cement Plant near Dunbar
- Diverted West Coast Main Line freight trains using the East Coast Main Line (e.g. taking advantage of electrified routes between Mossend and Daventry)
- Movements between Teesport and Mossend associated with PD Ports

Figure 3.28 shows gauge clearance in the SEStran area and surrounding regions. As is common elsewhere on the network, clearance is mixed with the East Coast Main Line accommodating the largest freight movements on the network at W12. The port of Grangemouth has a W9 clearance which allows 2.9 m (9 ft 6 in) high *Hi-Cube* shipping containers to be carried on "Megafret" wagons that have lower deck height with reduced capacity.

The network around Leith and Edinburgh Waverley is also largely W9, whilst that in the vicinity of Rosyth and Fife ports is largely W7 / W8. Clearance of W7 enables the carriage of 2.44 m (8 ft 0 in) ISO containers and the W8 loading gauge accommodates the transport of 2.6 m (8 ft 6 in) ISO containers.

The main rail freight terminal in the SEStran area is that operated at Grangemouth. Other than the Tilbury-Grangemouth service, intermodal rail freight movements originating in the SEStran area (or destined for) will be transported by road to other terminals around Scotland.

Water Freight

The Forth has three ports capable of handling large ships and a range of cargoes at Grangemouth, Rosyth and Leith. They also all have rail connections, although at the Leith and Rosyth locations these have been out-of-use for some time. Smaller ports in the region include Burntisland, Kirkcaldy and Methil.

Grangemouth is Scotland's largest port, handling 9 million tonnes of cargo each year through specialist container, liquid and general cargo terminals. This cargo flow represents a significant proportion of Scotland's Gross Domestic Product (GDP), highlighting the port's essential role as an economic facilitator for Scotland.

Overall, in 2018 the Forth Ports handled 26,587,000 tonnes of freight between them accounting for 43% of the total freight through Scottish ports according to data from Scottish Transport Statistics. The breakdown of this freight is shown in Figure 3.29. This highlights that the majority of freight was foreign exports equating to three quarters of the total freight through the ports.

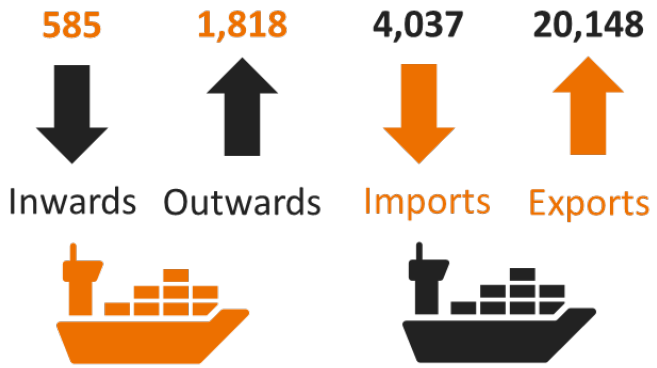


Figure 3.29 Foreign and Domestic Freight at Forth Ports 2018 (Thousand Tonnes)

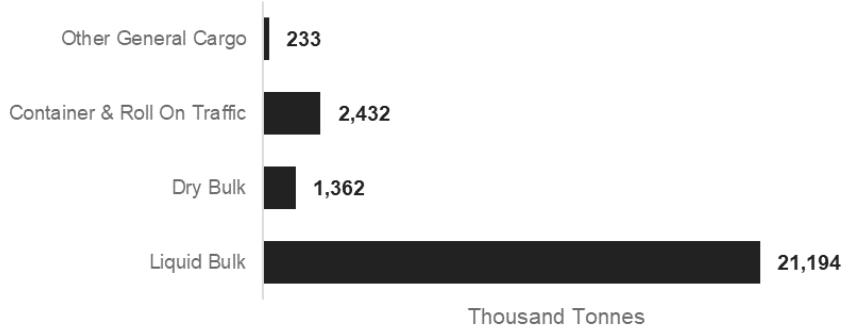


Figure 3.30 Breakdown of Forth Ports Freight by Commodity 2019

The breakdown of freight transported through Forth Ports in 2019 is shown in Figure 3.30. This shows that the majority of freight was liquid bulk accounting for 84% of the total. These figures include the ports of Rosyth, Braefoot Bay, Burntisland, Grangemouth, Hound Point, Kirkcaldy, Leith and Methil.

Air Freight

Edinburgh Airport carried the most cargo of all Scottish airports in 2019 accounting for 33% of the 58,914 tonnes lifted. There is a cargo terminal at the airport on Turnhouse Road where freight operators such as TNT have operations. Road freight accounts for the onward movement of freight to or from the airport making links to the strategic road network of crucial importance.

3.8 EMISSIONS & AIR QUALITY

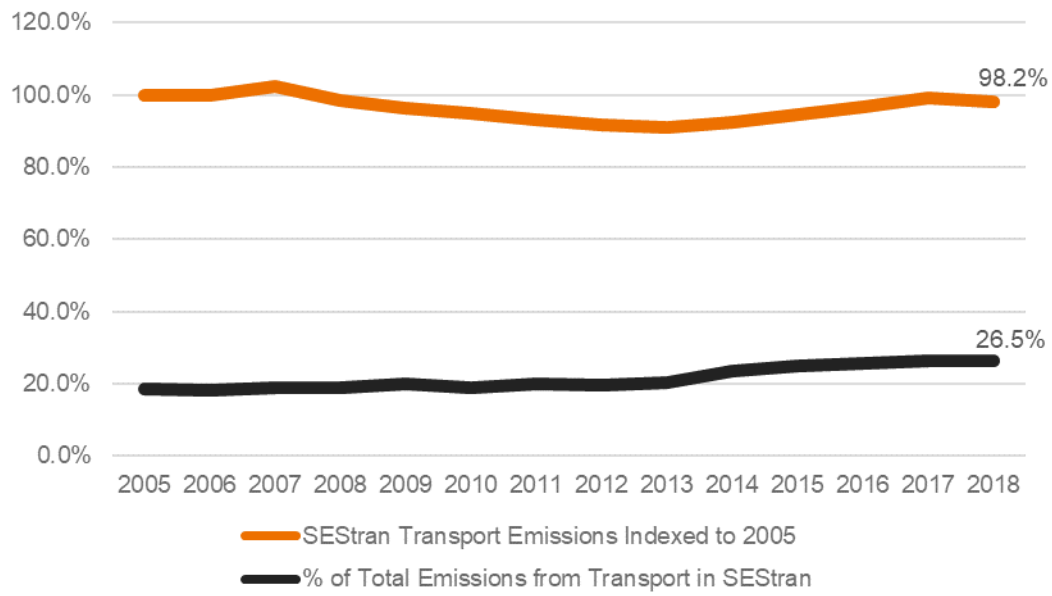


Figure 3.31 Transport Emissions in SEStran Region 2005 – 2018

Transport emissions[1] in the region fell between 2005 and 2013 but have since been steadily rising again and in 2018 were sitting at 98.2% of 2005 levels as illustrated in Figure 3.31. The percentage of total emissions from transport has also been increasing from 18.5% in 2005 to 26.5% in 2018. Road transport was responsible for 97.0% of total transport emissions in 2018. This highlights the need to reduce emissions from transport, particularly road transport, to meet the Scottish Government's statutory target of net zero emissions by 2045.

Air quality in much of the SEStran area is good, but there are 16 locations at which pollution levels exceed thresholds and Air Quality Management Areas (AQMAs) are currently in place. All but one of these AQMAs have been declared primarily because of pollution from road vehicles.

[1] Local Authority territorial CO_2 emissions estimates (kt CO_2), Department for Business, Energy & Industrial Strategy

3.9 COMMITTED SCHEMES

There are a number of key transport schemes and interventions within the SEStran region which are already committed for implementation and therefore need considered as part of the 'Do Minimum' case for the new RTS. A number of key schemes are summarised below.

Edinburgh Low Emission Zone

In September 2017, the Scottish Government committed to the introduction of Low Emission Zones (LEZs) into Scotland's four biggest cities. The City of Edinburgh Council is working to develop and implement its proposals. The LEZ will restrict the vehicles that can enter the area based upon their engine classification. Non-compliant vehicles will be issued with a penalty for entering the LEZ. This will have implications for travel into Edinburgh from across the region requiring people in non-compliant vehicles to switch to public transport or active travel.

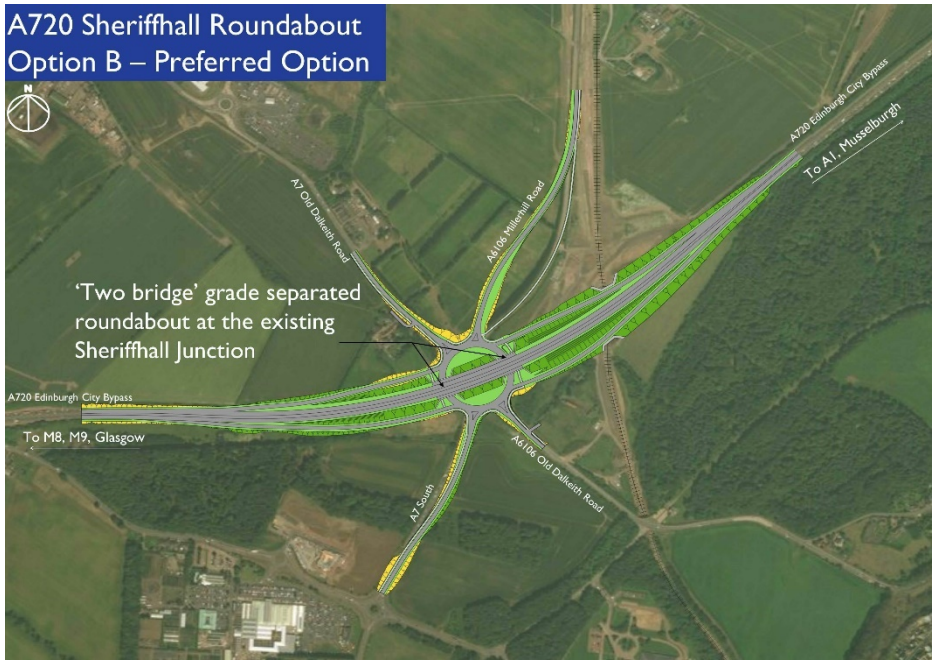


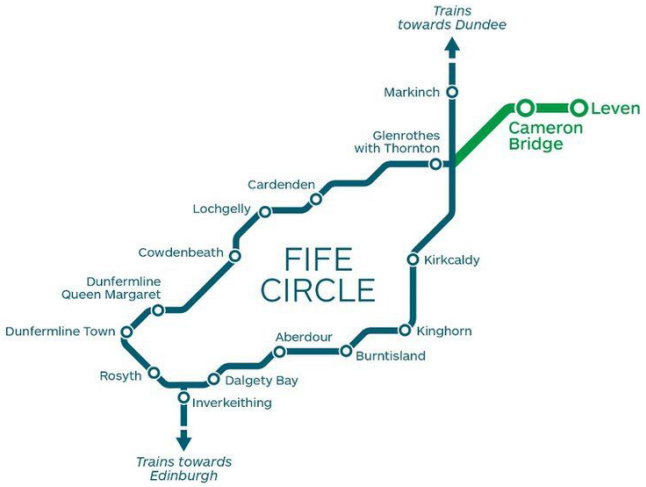
Figure 3.32 Sheriffhall Roundabout Preferred Option

Sheriffhall Roundabout

The Scottish Government is committed (subject to an ongoing review) to taking forward the design and construction of a new grade separated junction on the A720 Edinburgh City Bypass at Sheriffhall as illustrated in Figure 3.32.

The existing Sheriffhall roundabout is located in the south-east of Edinburgh and is the only at-grade junction on the A720 Edinburgh City Bypass which suffers from delays and congestion at peak periods. The need for grade-separation at Sheriffhall roundabout was consequently identified as part of the first Strategic Transport Projects Review (STPR) in 2008.

The preferred option for the scheme was identified in 2017 and has been subject to detailed development and assessment since this date. Extensive consultation with active travel stakeholders was undertaken to ensure that the scheme incorporated adequate provision for walking and cycling.



Levenmouth Rail Line

Transport Scotland confirmed in August 2019 that the reopening of the link to Levenmouth and the rail network is to be taken forward to the next stage of development. The project has gone forward to detailed design which will see the proposed rail link provide a journey time to Edinburgh of 70 – 75 minutes with stops in Leven and Cameron Bridge.

Edinburgh Trams Extension

In March 2019, Edinburgh City Council approved the Newhaven tram extension. This was just two years before its powers to build the extension, granted under the 2006 Edinburgh Tram Act, were due to expire. Trams to Newhaven will add 4.69 kilometres / 2.91 miles of track in both directions, connecting Leith and Newhaven to the current end of the Edinburgh tram line at York Place with eight new stops as shown in the route map in Figure 3.33. Construction commenced in November 2019 with trams scheduled to start operating to and from Newhaven in Spring 2023.

Rail Stations

New stations have been committed for construction on the East Coast Main Line at Reston in the Scottish Borders and East Linton in East Lothian. In addition, there is also a commitment to construct a new station at Winchburgh in West Lothian.

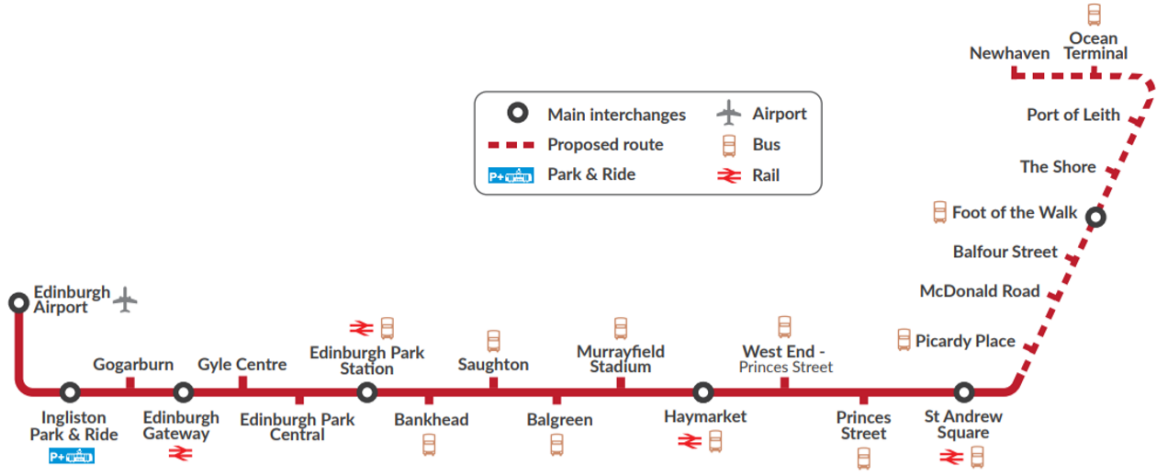


Figure 3.33 Edinburgh Tram Newhaven Extension

The Future Context

SEStran Regional Transport Strategy

STAG Case for Change Report

4.0 THE FUTURE CONTEXT

4.1 INTRODUCTION

The RTS is being developed at a time when a range of factors are likely to influence the future demand for travel in the south east of Scotland. In particular, three factors have been identified which need to be taken into consideration in the development of the new RTS including:

- **Land-Use Development:** there is significant housing development planned for the region which will have implications for where people want to travel to and from as well as how they want to get there.
- **Transport Innovation:** new technologies are offering the potential to disrupt the traditional transport system by providing new ways of accessing and operating transport networks and services.
- **Travel Behaviour Change:** the COVID-19 pandemic has accelerated a number of long-term trends in travel behaviour that will have repercussions for how and when people want to travel.

These are each explored in detail in the remainder of this chapter.

4.2 LAND-USE DEVELOPMENT

Transport demand is closely related to land-use as people travel to reach services like employment, healthcare, retail, education and leisure facilities. Historically, land-use and transport planning have often not been undertaken in a wholly coordinated manner leading to developments which can be difficult to use or access for those without access to a private car. It is critical to achieving environmental targets (e.g. climate change, air quality) that land-use development and transport are integrated to plan for a future mobility system and low-carbon society.

The land-use planning context in the region is influenced by national, regional and local policy. The Scottish Government is currently in the process of preparing the National Planning Framework 4 (NPF4) which will set out a plan for Scotland in 2050. It is anticipated that this will focus on four key outcomes which include:

- Net-Zero Emissions
- A Wellbeing Economy
- Resilient Communities
- Better, Greener Places

In February 2021, the 'Minimum All-Tenure Housing Land Requirement' method paper was published for NPF4. This included housing land allocations for each of the SEStran local authorities for the next 10 years as shown in Table 4.1. In addition, the percentage increase on the existing housing stock that these housing allocations represent has been calculated to provide an indication of the scale of development. This shows that housing could increase by up to 20% in Midlothian whilst the smallest increase would be in Clackmannanshire at just 1.8%. Overall, housing in the region could increase by 8.4% on this basis.

Table 4.1 10 Year Housing Land Requirements

AREA	HOUSING LAND REQUIREMENT	TOTAL DWELLINGS (2018)	% OF TOTAL DWELLINGS
Clackmannanshire	450	24,451	1.8%
Fife	5,250	176,500	3.0%
Scottish Borders	1,750	58,296	3.0%
Falkirk	5,250	74,594	7.0%
SEStran	63,200	749,642	8.4%
Edinburgh	27,550	248,314	11.1%
West Lothian	8,850	79,483	11.1%
East Lothian	6,050	47,731	12.7%
Midlothian	8,050	40,275	20.0%

A new duty has been introduced requiring planning authorities, acting individually or in groupings, to produce a Regional Spatial Strategy as soon as is practicable. In the short term, the Scottish Government has invited planning authorities to form regional groupings and develop indicative Regional Spatial Strategies (iRSS) to feed into the consultation on NPF4.

Through the development of the RTS and iRSSs it is imperative that there is closer integration between land-use and transport planning in the region. It is important to understand where growth opportunities will be created and how these can be delivered in a manner that ensures sustainability and inclusivity through equitable access. In addition, there is a need to join up the delivery plans and priorities for transportation to support ongoing development.

An Interim Regional Spatial Strategy has been prepared for the Edinburgh and South East Scotland City Region which covers Edinburgh, Fife, West Lothian, Midlothian, East Lothian, Scottish Borders and an overview of the spatial strategy is shown in Figure 4.1. This sets out a commitment to meeting significant levels of housing growth in the region and providing for sustainable economic development. A key element of this housing delivery focuses around seven strategic sites which include:

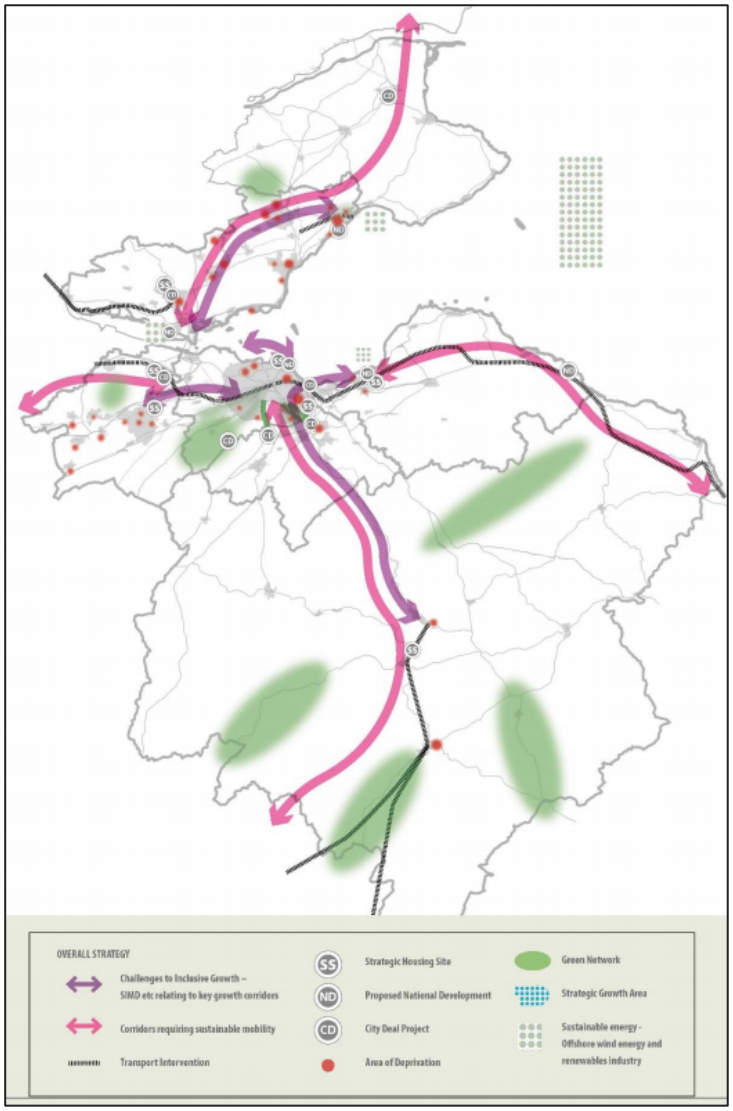


Figure 4.1 Edinburgh and South East Scotland City Region iRSS Overall Strategy

- Blindwells, East Lothian (proposed National Development)
- Shawfair, Midlothian
- Granton, Edinburgh
- Winchburgh, West Lothian
- West Edinburgh
- Dunfermline, Fife
- Longannet, Fife

The iRSS highlights the importance of connectivity to the region noting that it is both about transport infrastructure and strong connections between communities and settlements to ensure there are no barriers to participation. There are concerns that cross-boundary deficiencies in connectivity and affordable public transport options are leading to disconnection from work opportunities, including in more rural areas.

In terms of transport the iRSS strategy focus is twofold. Firstly, to improve the linkages along existing major transport corridors to enhance connectivity beyond the region and, secondly, enhance the inter-region links. For new developments connecting infrastructure needs to be identified and delivered before sites are completed to give the best opportunity for sustainable habits to develop.

The iRSS also outlines that local authorities will aim to ensure that there is a sufficient supply of housing land to meet the housing land requirements to be set out in NPF4 and indicated in Table 4.1. Development policy will promote brownfield sites and minimum levels of density appropriate to urban and edge of urban sites, to promote better public transport and active travel provision and more sustainable neighbourhoods where the density supports a level of local services, public transport and employment opportunities.

Falkirk and Clackmannanshire Councils are working with Stirling Council on the preparation of an RSS for the Forth Valley area. An iRSS has been submitted to the Scottish Government to inform the development of NPF4.

4.3 TRANSPORT INNOVATION

There are four main areas of transport innovation that are of relevance to the RTS which include:

- **Alternative Fuels:** transitioning away from fossil fuels towards electric and hydrogen powered vehicles has implications for decarbonisation, supply systems, tax revenue and travel behaviour
- **Shared Mobility:** new 'on demand' models of transport where traditional models of ownership are replaced
- **Mobility as a Service (MaaS):** based on buying packages of travel and shared mobility solutions to integrated travel with potential implications for travel behaviours
- **Automation:** both in terms of public transport (conventional and on-demand) and personal transport

Alternative Fuels

Most transport modes contain an internal combustion engine (ICE) which is fuelled by petrol or diesel. These fuels source from petroleum, or crude oil, which is a fossil fuel, and emits high levels of CO_2 and other greenhouse gases when it is burned to create energy. In Scotland, the transport sector is responsible over 30% of CO_2 emissions, the majority of which derives from road transportation, which is highly dependent on fossil fuels.

In 2015, there were 2.9 million road vehicles licenced nationally of which 84% were cars. Within the SEStran region, there was a steady increase in the traffic on all roads between 2012 and 2018.

This high contribution to emissions has detrimental impacts on the environment, ecosystems, and the quality of air notably for those living in densely populated urban areas and near main roads. As the Scottish Government is aiming to phase out the sale of new petrol and diesel cars by 2032 and due to the diminishing supply of available fossil fuels, it is paramount to critically consider alternative fuels and environmentally friendly technologies, not only for cars, but across the transport sector.

This section considers alternative fuels such as electricity, hydrogen, and biofuels (bioethanol and biodiesel) as well technological developments which facilitate the use of these fuels, such as batteries, fuel cells, and infrastructure.

Types of Alternative Fuels

Electric Vehicles

Electric Vehicles (EVs) are often viewed as the future of road transport as there are various models currently on the market and on the road. Notably, in urban areas, electric drive has become popular for modes such as trams, metro, and rail alongside internal transport i.e. in warehouses and airports.

There are several types of EVs split broadly into All-Electric Vehicles (AEV) and Hybrid Electric Vehicles (HEV) which operate using different supplies of energy. These are set out in Figure 4.2 and Table 4.2. Battery Electric Vehicle (BEV) and Plug in Hybrid Electric Vehicle (PHEV) are highlighted as they are the main types of EV on the market.

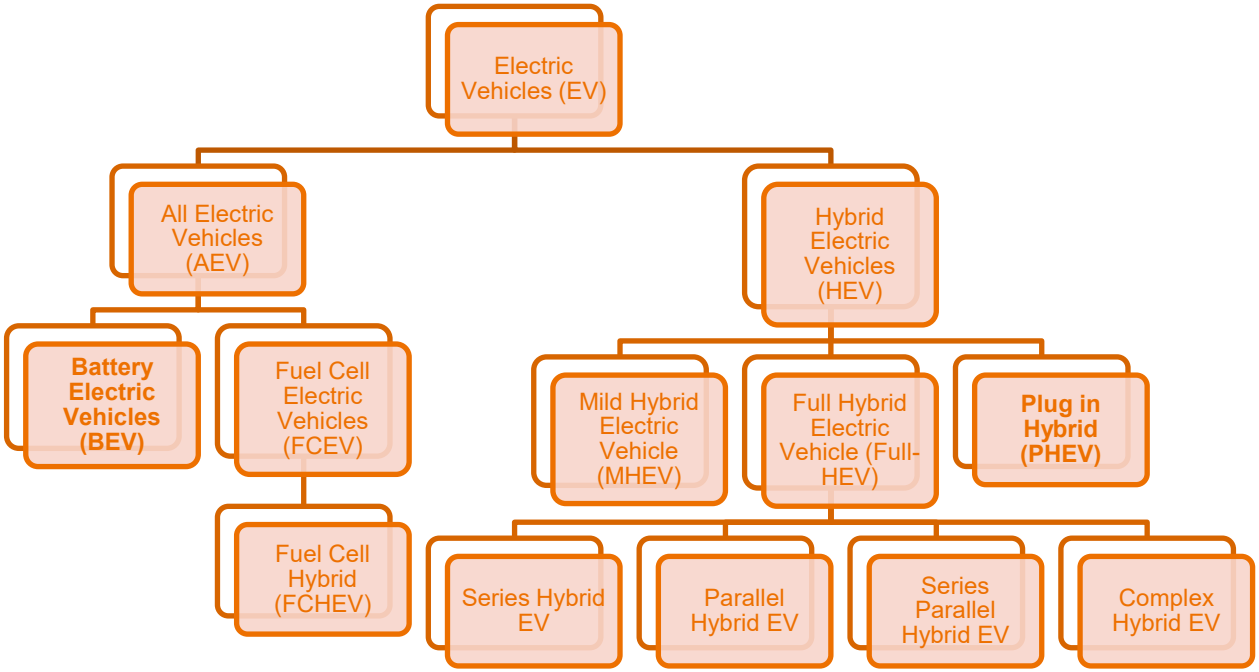


Figure 4.2 Types of Electric Vehicles

Table 4.2 Specifications of Different Electric Vehicle Types

AEV	• Only run-on electricity drawn from the electric grid which is stored in the battery and powers one or more electric motors • Part charges through regenerative braking (whereas ICE vehicles lose energy when braking) • Require electricity charge points
BEV	• As above. • Charging system can be on or off board the vehicle
FCEV	• Fuel Cells use hydrogen and other fuel sources to cleanly and efficiently produce electricity (the products are only electricity, water and heat) • Fuel Cells work like batteries but do not require recharging, they simply keep producing electricity if fuel (hydrogen) is supplied • Require hydrogen refuelling stations
FCHEV	• Consists of a Fuel Cell, battery and / or ultracapacitor (stores electricidal energy) • Drawbacks of individual power sources are compensated by other sources in the vehicle
HEV	• ICE engine using petroleum-based fuel in combination with electric motor or separately • Battery is charged by the engine and is not plugged in
MHEV	• Petroleum provides main source of power to operate ICE • An electric motor supports the engine and is typically used for coasting, braking and assist pulling away • Battery charged by the engine and is not plugged in • Cannot drive on electric power alone
Full - HEV	• ICE engine using petroleum-based fuel in combination with electric motor or separately • Consists of 4 main types, Series, Parallel, Series Parallel and Complex full-HEV
PHEV	• Use batteries to power an electric motor • Larger battery than HEV allowing it to travel further using just electric power • Plug into the electric grid to charge • Use petroleum based or alternative fuel to power ICE

Electric bikes (e-Bikes) have also now emerged as genuine alternative mode to private car for some journeys. The assistance provided by the battery lets you cover longer distances making trips that were only viable for hardcore cyclists more accessible to a wide range of people. In addition, e-cargo bikes are also becoming a potential option for last-mile freight logistics and deliveries.

Case Study: Electric Buses

Scottish Ultra-Low Emissions Bus Scheme (SULEBS): The Scottish Government are investing in the SULEBS to replace 215 diesel buses with new battery-electric buses. 172 of these buses are to be built in Falkirk, within the SEStran region, enhancing skills and green manufacturing jobs in the area. This also reduces the environmental impact of the lifecycle of the buses as they are being produced locally to where they will be used, limiting transportation emissions.

Poland: Various electric bus models have been developed in Poland, for example, the Ursus City Smile bus has a range of circa 240km and is a fast-charging electric vehicle. Another model is the Ursus Ekovolt which has photovoltaic cells on the roof of the vehicle which helps to power the on-board batteries.

EVs: the future of transport?

There are numerous benefits to electric vehicle implementation for widespread use within the transport sector:

- **Environmental benefits:** lower levels of noise and air pollution in addition to fuel sources being greener than fossil fuels. They are more efficient vehicles, i.e. electric motors have a higher tank-to-wheel efficiency than ICE vehicles meaning they have higher energy efficiency between obtaining energy to when it is exerted via movement. They can also regain kinetic energy through regenerative breaking which does not occur in traditional road vehicles.
- **Social benefits:** less noise and air pollution benefits people's health as well as plants and animal habitats in which humans can enjoy.
- **Financial benefits:** lower car registration tax, annual circulation tax, maintenance costs, energy tax and energy price by switching to an EV from an ICE.
- **Future benefits:** The technology is becoming more popular meaning the cost of car batteries are declining which could allow more people to adopt these vehicles. Technological advancements are positive thus it is anticipated that future EVs will have lower climate implications than the ones on the market today.

However, there are still many factors hindering the uptake of EVs. Despite the cost benefits above, the price of an EV remains uncompetitively high compared to a traditional car which obstructs some people from entering the market. The technology is developing; however, range anxiety is still prevalent due to battery capabilities and a developing charging infrastructure which can further dissuade potential buyers. Specifically, within rural areas, EVs are not viewed as a practical alternative for road transportation.

Though EVs can be beneficial in some cases for passenger cars and light goods vehicles, they are not suitable across all modes within the sector. Larger vehicles such as aeroplanes or ships would require incredibly large batteries and multiple stops disrupting a journey to recharging. This shows the impracticality of electrification for large carriers unless there are highly disruptive changes in battery technology.

An electric passenger plane would require batteries which weigh between 14 to 31 times its maximum take-off weight. The charge time (if using an 80 Tesla supercharger) would take over one day to fully recharge the battery equivalent of an Airbus 320 fuel tank.

Hydrogen

Hydrogen can be used instead of fossil fuels within an ICE and only produce energy and water, not CO_2 emissions. Currently, hydrogen is produced from fossil fuels, but under standard pressure and temperature it can be obtained from renewable resources. However, the cost of producing hydrogen via renewables is high in comparison to fossil fuels making it less competitive.

Figure 4.3 Toyota Mirai Fuel Cell Compartment

Hydrogen can be used to power fuel cells and produce electricity. Fuel Cells do not produce emissions and can be an alternative to batteries in cars which have their limitations. These are compact which makes them ideal for portable application within road vehicles and they are already commercially available in some hydrogen powered vehicles, such as the Toyota Mirai as shown in Figure 4.3. Though, due to a lack of hydrogen refuelling infrastructure, they are not viewed as competitive compared to ICE vehicles or EVs.

Conversely, there is scope for hydrogen to be used within shipping and aviation as it can fuel longer distances and / or facilitate higher load capacities. Hydrogen Fuel Cells are already used in demonstration projects for trucks, buses, trains, and commercial forklifts.

Case Study: Aberdeen Hydrogen Double-Decker Buses

Aberdeen City Council is leading a project to implement the world's first hydrogen double-decker buses across the city. The only bi-product of this zero-emission fleet is water during its day-to-day running which is in line with the cities 'Net Zero Vision' and national climate targets. The buses are fuel efficient, have a good range and take less than 10 minutes to refuel.

Biofuels

Biofuels are produced from renewable organic materials and have recently been used as alternative fuels for cars. There are two main types: bioethanol and biodiesel which produce significantly fewer pollutants than fossil fuels.

Biofuels are rarely used as the sole fuel to power a car; however, they are frequently blended with other fuels like petrol and diesel to make them more environmentally friendly. For example, standard unleaded fuel across the UK contains up to 5% bioethanol. There is scope to include a higher percentage as countries like Brazil and Sweden have up to an 85% bioethanol blend. They can be used within traditional ICE in addition to heavy duty vehicles, aviation, and shipping.

Bioethanol	*Biodiesel*
Made from corn and sugarcane which forms an alcohol. Classed as carbon neutral fuel as emissions produced in production process are removed from the atmosphere by the crops photosynthesising.	Made up of animal fats and vegetable oils. Recycles unusable waste products like cooking oil which is the most popular choice for the cars that are solely fuelled by biodiesel.

Electro-Fuels

These fuels are electricity-based gas or liquids which can be used within an ICE and can be produced via renewable electricity production. However, they are not considered to be a cost-effective alternative to fuel the transport sector due to the inefficient and expensive production process and would require much higher levels of electricity generation than are currently available. Despite this, there is scope to develop the technology for the purposes of the aviation sector if strict sustainability criteria are enforced during production.

Other Developing Alternative Fuels		
Steam	*Kinetic*	*Heat*
Steam cars were replaced by vehicles with an ICE, however the potential for steam to be used to help lower emissions has been recognised. They use external combustion engines where the fuel is combusted away from the engine and could use anything to create the steam, even renewables. Steam cars do not reach particularly high speeds and are less efficient than IC engines.	As mentioned above, many EVs include brake energy regeneration systems which converts energy into electricity which is usually lost braking. This technology can be harnessed to help reduce future fuel use in cars.	Heat is the main biproduct of petrol and diesel combustion. Thermoelectric technology can help reduce this wastage by converting the heat into electricity which is already being undertaken by some car manufacturers.
Air	*Nitrogen*	*Liquified Petroleum Gas*
Utilising compressed air to replace petrol within a combustion engine can produce power and zero emissions.	Liquid nitrogen can be pressurised and then heated to produce gas which can be used in engines. This is less efficient than fossil fuels.	This can be used for various purposes, including fuelling vehicles with low carbon outputs. There is scope to expand the use of LPG as there are 1,400 LPG refuelling stations across the UK.

EV Batteries: Lifecycles and Recycling Potential

There is scope to create a circular lifecycle of EV batteries via a closed-loop system for recycling as shown in Figure 4.4.

Battery Replacement: Manufacturers allow a 5-to-8-year warranty for their batteries however they are thought to last between 10 to 20 years before they need replacing.

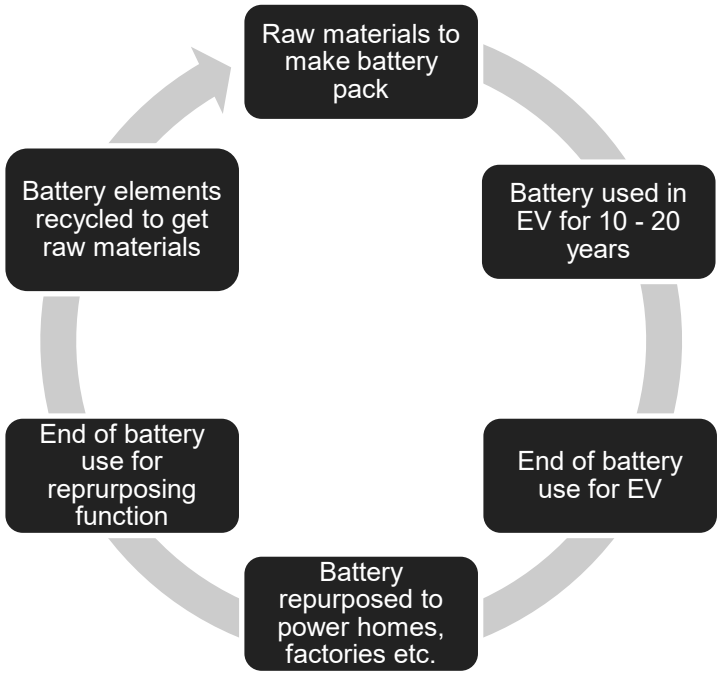


Figure 4.4 Potential Circular Lifecycle of EV Batteries

Preserving life of a battery: Manufacturers provide additional capacity within the battery to compensate for its degradation over time, allowing the range of the vehicle to be consistent. Once the battery capacity falls below 80%, drivers may notice a fall in the range and performance.

Repurposing: Once batteries are no longer useful for EVs, they can be repurposed and help power and store energy for homes, buildings, factories, and the electricity network. For example, Nissan aims to utilise old batteries as a back-up power resource for the Amsterdam Arena, an entertainment venue.

Recycling: The materials of the battery are separated out. Currently, about 50% of the materials within a battery pack can be recycled however manufacturers are investigating how to improve this. For example, VW announced a pilot plant for battery recycling which aims to recycle up to 97% of battery components where elements will be shredded, dried, then sieved to recover raw materials. These can then be used to make new batteries.

Supply Systems and Infrastructure

To facilitate an uptake of alternative fuels, there needs to be infrastructure in place to support the transition away from ICE vehicles. Without this infrastructure, alternative fuels will remain a reality only for a small section of the population and areas.

Appropriate infrastructure should offer:

- **Coverage:** offering enough infrastructure to enable convenient travel
- **Capacity:** to meet growing demand
- **Positive cash flow:** for station owners and network-wide supply
- **Cost competitiveness:** with fossil fuel alternatives

To implement the infrastructure which meets these aims, coordinated deployment actions, geographically and over time, are needed which has implications for the RTS.

Hydrogen Refuelling Infrastructure

The highest investment in hydrogen and Fuel Cell Vehicles are currently concentrated in a small number of countries including the USA, Japan, China, Korea and a few EU countries. Currently, worldwide there are just 376 hydrogen refuelling stations.

Hydrogen issues:

- Affordability compared to EV and ICE vehicles
- Competition with EV and high rate of penetration into the market
- Deployment of infrastructure takes time and money.

Electric Charge Point Infrastructure

ChargePlace Scotland is the national Electric Vehicle Charging Network which incentivises people and businesses to invest in charging points around the country. It aims to offer low cost, fast and accessible charge points as well as an interactive map to help EV owners plan their journeys and find the nearest available charge point.

Charge points range from rapid, fast and slow chargers which are mainly located close to main routes and often at motorway services. Domestic charge points are often slow chargers whereas main motorway services would be faster.

More charge points will need to be implemented for wide uptake of EV.

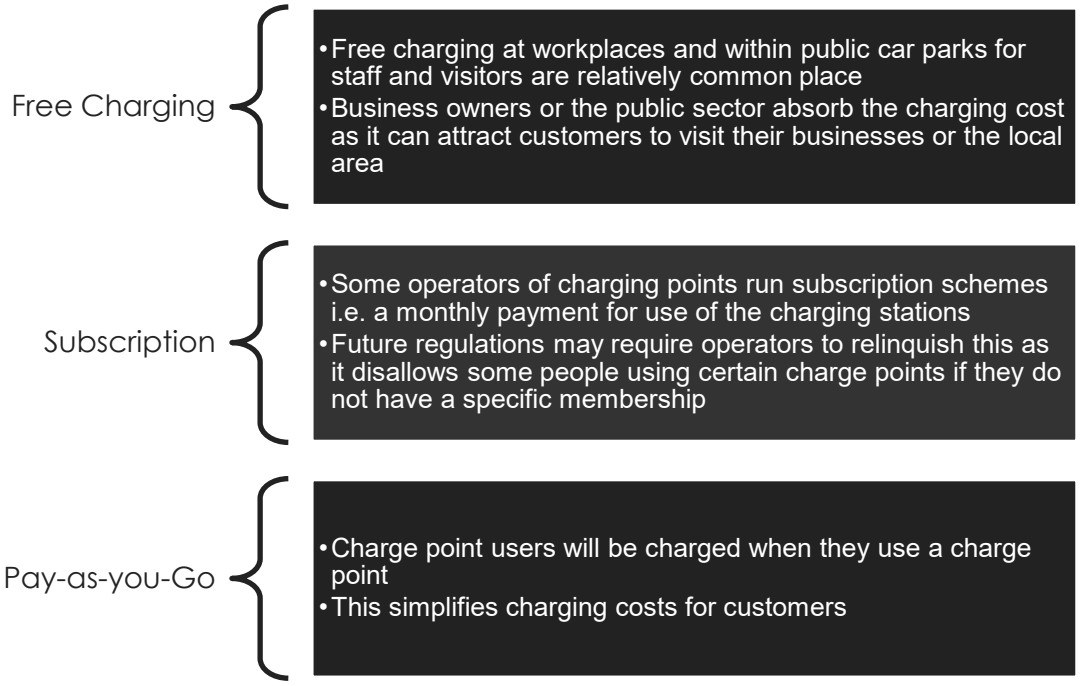


Figure 4.5 Potential Electric Charge Point Business Models

There are different business models that can be applied to the charging infrastructure as shown in Figure 4.5.

Potential Issues:

- Reliability of system could be compromised if the network is required to increase capacity
- Transmission congestion can mean the grid may fail to deliver the necessary electricity on demand at times of peak usage
- Difficulty in providing charging points at convenient locations which is key to alleviating range anxiety for long distance trips
- Provision of appropriate charging infrastructure in dense urban areas could be challenging

Tax Revenue and Implementation

As alternative fuels offer environmental benefits, there are some incentives to help persuade their uptake by consumers. For example, switching from and ICE vehicle to a BEV can have financial benefits such as:

- Lower vehicle registration tax
- Lower annual circulation tax
- Lower maintenance costs
- Lower energy tax
- Lower cost of energy

To a consumer, this is an attractive prospect as they can save money in the long term whilst feeling like they are reducing their carbon footprint and contributing to mitigation of climate change. However, the greater the uptake of these alternative fuels means there are fewer people purchasing and being taxed on traditional fuels like petrol and diesel. Thus, there would be a significant loss of tax revenue which helps maintain the quality and upkeep of the road network.

There are alternative schemes that could subsidise the loss of fuel tax revenue, one of which is road-user charging as set in Figure 4.6.

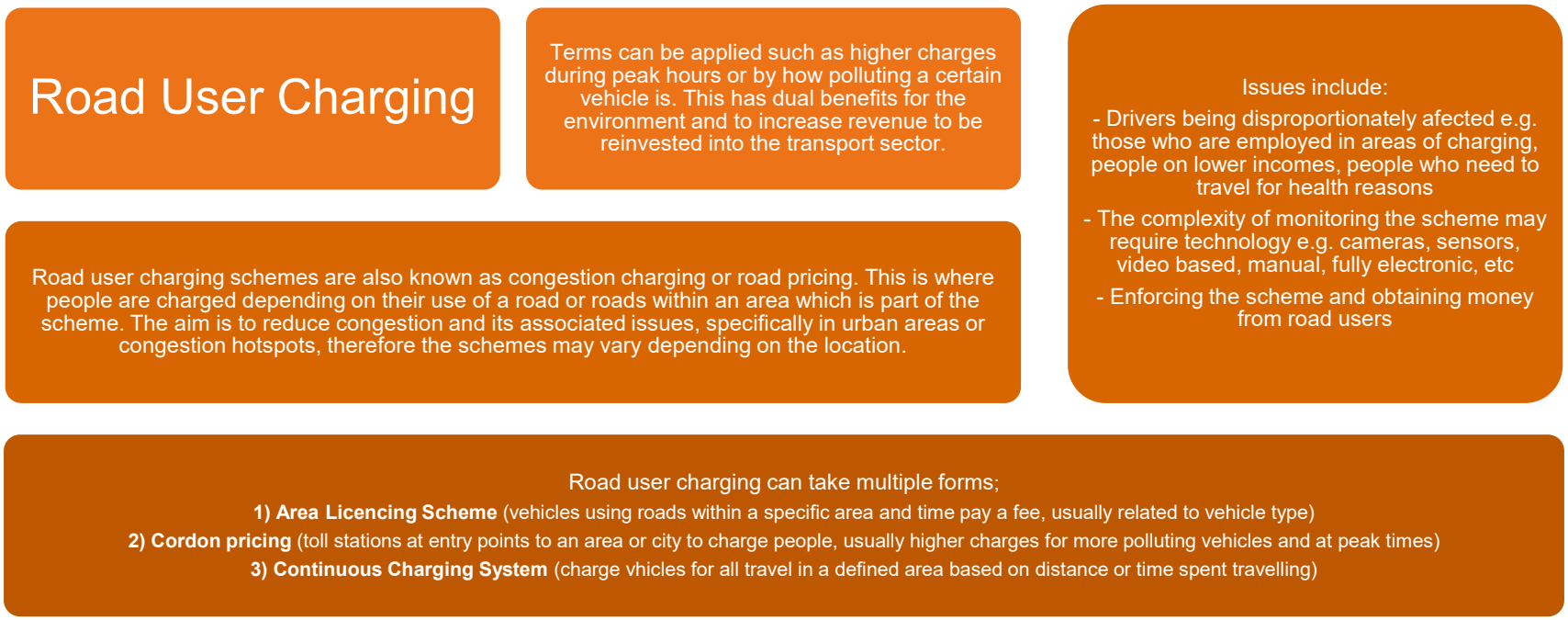


Figure 4.6 Overview of Road User Charging

Implications for Decarbonisation

Due to the abundance of alternatives discussed above, the future decarbonisation of the transport sector looks promising. However, potential issues can arise if we only consider how 'green' these fuels are during the day-to-day running of a vehicle, and not the entire lifespan of a vehicle or production process of a fuel. If this is not acknowledged, then there is potential to miscalculate the progress to meet national climate targets or determine the actual impact of alternative fuels on the environment. By critically engaging with the introduction of alternative fuels, potential issues that that may materialise upon their adoption may be avoided.

Some issues which need to be critically engaged with are as follows:

- The raw materials for EV batteries require mining for minerals and metals, namely lithium, manganese, copper, and nickel which can result in high levels of resource extraction and depletion in comparison to what is required for ICE vehicles.

- The manufacturing process of EVs can emit more CO2 than ICE vehicle production. The global warming potential of BEVs is almost twice the impact of that of ICE vehicles due to battery-related and electronic component manufacturing.
- Some batteries in EVs have become a safety concern in terms of battery fires or become faulty, for example, if they are damaged during a traffic collision
- The 'end of life' of an EV battery can also have negative environmental impacts
- Some alternative fuels require the production of electricity which can be via renewable or non-renewable sources.

Travel Behaviour and Decarbonisation

There are several factors which are hindering the widespread adoption of alternatively fuelled vehicles, such as:

- Lack of cost competitivenes and availability in comparison with ICE vehicles
- Range anxiety
- Requirement for infrastrucure development to cater for alternative fuel use
- Safety and legal liability of features within EVs
- Charging issues and battery service life and cost of replacement

Transpiring technological advancements are attempting to combat these issues. However, by making alternative fuels readily availbale to replace fossil fuels, there will be no requirement for people to alter their travel behaviour, or attitude towards how they travel. For example, consumers may replace their current vehicle with an alternatively fuelled car without actually adjusting their lifestyle or travel habits. The user may rationalise travelling more frequently or for lengthier journeys as the vehicle is considered to be 'green'. In turn, if all road users adopted this attitude, then alternative fuels could actualy induce more road traffic and counteract any environmental benefits that it had offered in the first place.

To add, people who have adopted an EV for environmental reasons are likely to be more conscious of their travel behaviours and reflect on their personal impact on the environment. However, some consumers may adopt EVs for the long-term financial benefits such as lower energy taxation. This consumer group are less likely to be thoughtful of how they use their EV.

Therefore, it is paramount that alongside the adoption of alternative fuels, there is an effort to adjust our travel behaviours to walking and cycling for short journeys and use public transport where possible.

Summary

Overall, the shift to alternative fuels presents a number of uncertainties which will need to be taken into consideration through the development of the new RTS. Whilst EVs appear to be emerging as the dominant technology they will not necessarily be appropriate for all modes of transport and decarbonisation may require alternative fuels such as hydrogen in some instances. There are also issues around provision of the necessary infrastructure to support alternative fuels. In particular, who takes the lead and who bears the cost of this as well as ensuring adequate network coverage. A shift to alternative fuels will also have implications for tax revenues which may require consideration of how we pay to use the road network. Finally, there is a risk that the transition to alternative fuel sources is seen as a panacea to transport emissions and that people choose to use their car more often on this basis which would lead to other negative impacts such as congestion, delays and unreliable journey times. As such, a range of policy measures which include encouraging modal shift to public transport and active travel will still need to be pursued to achieve both decarbonisation aspirations and an efficient and sustainable transport system.

Shared Mobility

Shared Mobility is based upon providing people with short-term access to shared vehicles like cars, bikes, scooters, etc. on an on-demand basis. This removes the need for vehicle ownership and provides people with a wider range of sustainable transport options than they would have available under the traditional ownership-based approach. It is facilitated through a range of services and mechanisms like those in Figure 4.7.

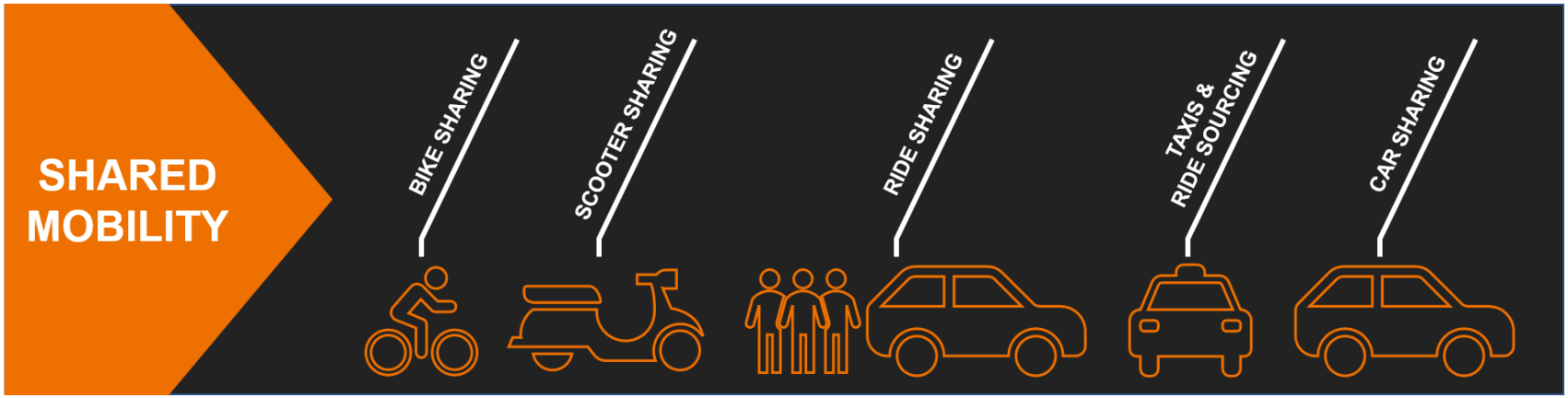


Figure 4.7 Shared Mobility Services

Bike Sharing

People are able to access pools of communal bikes as required from a network of bike sharing stations like that shown below. These are typically unattended and located around towns and urban areas although there is also potential to place them in rural locations for leisure purposes.

The majority of bike sharing operators cover the costs of maintenance, storage and parking of bicycles and users can pay on an annual, monthly, daily or per-journey basis. In general, trips of less than 30 minutes are included within the membership fees. In addition to traditional bikes, schemes can also include e-bikes and cargo bikes as well.

There are three main types of bike share network which include:

- **Station-Based One-Way Access**: Bicycle can be returned to any station. The most common form of Bike Sharing.
- **Station-Based Round-Trip Access**: Bicycles must be returned to the same station where they were picked up.
- **Free-Floating One-Way Bike Share**: Offers users the ability to check-out a bicycle and return it to any location within a predefined area.

Case Study: Go e-Bike, SEStran Region

The Go e-Bike project was developed by SEStran. The project has involved setting up a series of hubs across the region. The hubs are developed with a mix of local community organisations, charities and academic institutions. Each hub is unique and tailored to its community to support long term sustainability.

E-Bikes and support infrastructure are provided based on an assessment of the requirements of the proposed hub in partnership with local stakeholders. There are currently 5 hubs across the region in Buckhaven, Tweeddale, Edinburgh, St Andrews and Livingston with 68 e-bikes available across these sites. To date over 1,000 journeys have been made using the scheme.

Scooter Sharing

It is currently illegal to ride an electric scooter on a footway or road in the UK although they are subject to trials within four Future Transport Zones in England. It is anticipated that these will establish the foundations for regulations that will enable use of electric scooters and open up opportunities to introduce scooter sharing schemes across the country.

This would enable provision of short-term access to electric, two-wheeled scooters similar to those available in cities across Europe. These are usually dockless and can either be station based or distributed throughout a specified urban area. They are normally only used for one-way trips. Typically, users can track, reserve and unlock scooters via their smartphone with payment on an annual, monthly, daily or per-trip basis.

Nonetheless, there remains legislative and safety issues surrounding electric scooters at this time and these will need to be taken into consideration before any decisions are taken to introduce scooter sharing schemes in the region.

Ride Sharing

One of the most well-known forms of shared mobility is ride sharing where people with similar travel requirements share one vehicle rather than make separate trips. Carpooling is the most common form of ride sharing which can take three forms:

- **Informal:** organised independently of any carpooling system through friends, family or colleagues. In addition, some informal carpooling schemes are community-based initiatives.
- **Organisational:** coordinated by an employer, university or other large organisation for their members.
- **Formal Non-Organisational:** formally coordinated through an online platform or app that seeks to match people who have no other connection other than similar travel requirements.

Carpoolers will typically contribute to the running costs of the driver's vehicle and may share driving responsibilities. However, the COVID-19 pandemic is likely to reduce the willingness for people to ride share with strangers whilst the virus remains a threat.

Case Study: SEStran Tripshare

Liftshare is an online platform which facilitates ridesharing between strangers via an online app. SEStran Tripshare utilises this platform to provide ridesharing within the region with 13 individual communities making up the scheme.

Users looking to ride share register online and add their journey to the Liftshare matching database. They can then filter their search to find the most suitable ride share option for them and use the messaging system to arrange their potential Liftshare before confirming their request.

Payment between driver and passenger(s) is up to each member, with Liftshare recommending the cost per mile as a suggested contribution.

Taxis, Ride Sourcing and Community Transport

Taxis are the most well-established form of shared mobility and are now being incorporated into online ride sourcing platforms which enable journeys to be booked online or through an app. The most well-known example of a ride sourcing provider is Uber which, like other similar operators, coordinates a fleet of private vehicles that offer users services that are uninterrupted, personalised, highly flexible and provide a door-to-door service which covers individual requests from place of origin to destination.

In ride sourcing systems like these, a service charge covers fuel costs and vehicle depreciation, the driver's fee, remuneration for the company that linked the service provider and final consumer and any taxes associated with the regulation of the service. They often use a dynamic pricing mechanism in which fares increase when demand is high and then efficiently adjust to the fluctuating demand throughout the day.

Community Transport services also provide vital links for people who are elderly, require special assistance or, for mobility or other reasons, cannot access public or other private transport. These are often provided by volunteers with minimal charge and, in some instances, are free. These are often lifeline services for people who have no other access to public or private transport providing key links to healthcare, shops and social events.

Car Sharing

This differs from ride sharing in that people share access to a vehicle, like bike sharing, rather than sharing a journey with someone. This means people can enjoy the freedom and benefits of the car without the responsibilities and costs of owning one.

Customers typically access vehicles by joining a car sharing organisation that provides a fleet of vehicles in the local area. Vehicles can then be booked online or via a smartphone app. The operator provides fuel, parking and maintenance with users paying a fee each time they use the vehicle.

Like bike share schemes, there are three main types of car share network which include:

- **Station-Based Round-Trip Car Sharing**: Customers pick up a vehicle at a designated station and return it to the same place with fees normally being paid on an hourly basis.
- **Station-Based One-Way Car Sharing**: Like the above except vehicles do not need returned to the same station but can instead be dropped off at designated parking places across a city or region. These are harder to manage as operators must guarantee a level of vehicle availability and imbalance in demand between stations could lead to an oversized fleet and underused vehicles.
- **Free-Floating One-Way Car Share**: Enables vehicles to be picked up and dropped off anywhere within a designated operating area. There are no specific stations and while users can drive outside the operating zone they still have to drop off cars inside the operating area.

Case Study: Co-wheels, Midlothian and East Lothian

Co-wheels are the UK's biggest car sharing company providing car sharing facilities in East Lothian at Musselburgh and Dunbar and Midlothian at Dalkeith. Cars are available 24 hours a day, seven days a week and can be booked by the hour, day or as long as you want.

Vehicles were also previously available in Haddington and North Berwick but were removed in June 2019 due to low usage.

Increasing usage of car sharing will be dependent upon provision of a comprehensive network of vehicles across the SEStran region.

Alongside traditional car sharing schemes like these, an emerging alternative is personal vehicle sharing where car owners rent their vehicle to other drivers on a short-term basis. Generally, a company will broker transactions between car-owners and renters by providing the resources necessary to make the exchange possible (e.g. online platforms, customer support, insurance, etc.).

There are two main types of personal vehicle sharing which are:

- **Peer to Peer Car Sharing:** privately owned vehicles that are temporarily made available for shared use by an individual or members of a peer-to-peer car sharing company. The operator facilitates the rental and retains a portion of the fee to cover operating costs.
- **Fractional Ownership:** Involves the ownership of a vehicle amongst a small number of people, with each of these individuals taking up a portion of the expense for access to the shared service.

Delivering Shared Mobility

Shared Mobility trends are already emerging and there is an opportunity to influence their development to ensure they deliver mobility lifestyles that are more inclusive and have less environmental impact than traditional travel systems. This will be essential to ensure Shared Mobility develops in a manner consistent with policy aspirations to reduce carbon emissions and deliver inclusive economic growth through sustainable access to essential services.

To facilitate this, it is essential that Shared Mobility is developed in line with the principles set out in Figure 4.8 and that solutions are used in an integrated manner through the creation of Mobility Hubs.

It will also need to be responsive to changing travel demand patterns and personal requirements resulting from the COVID-19 pandemic. This may necessitate further measures to ensure that shared vehicles and services are thoroughly cleaned between uses.

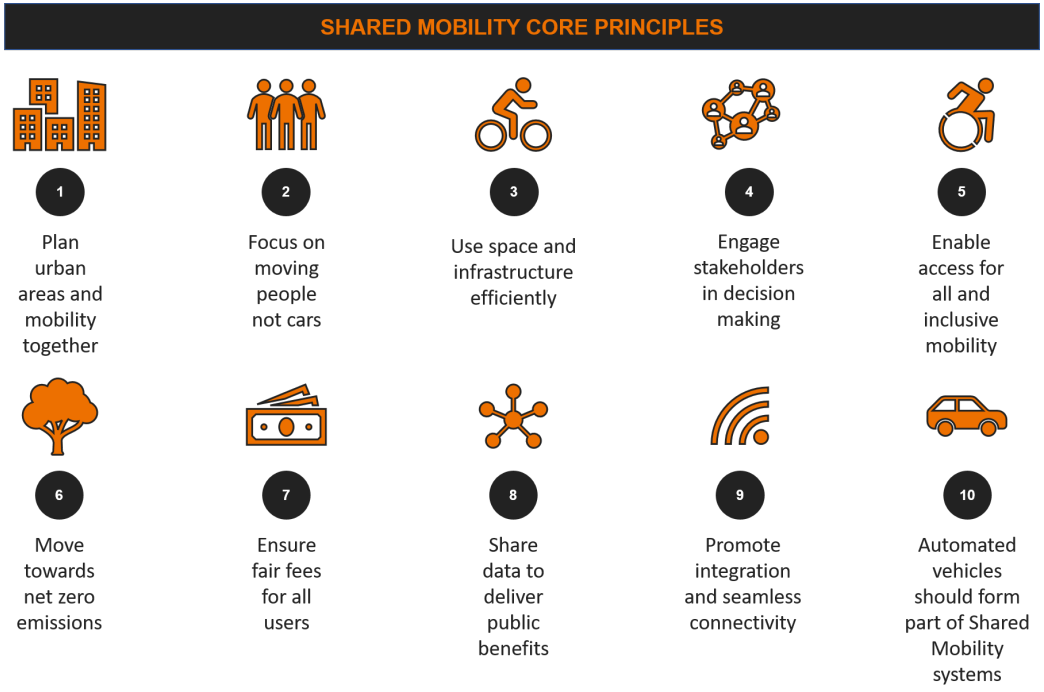


Figure 4.8 Shared Mobility Core Principles

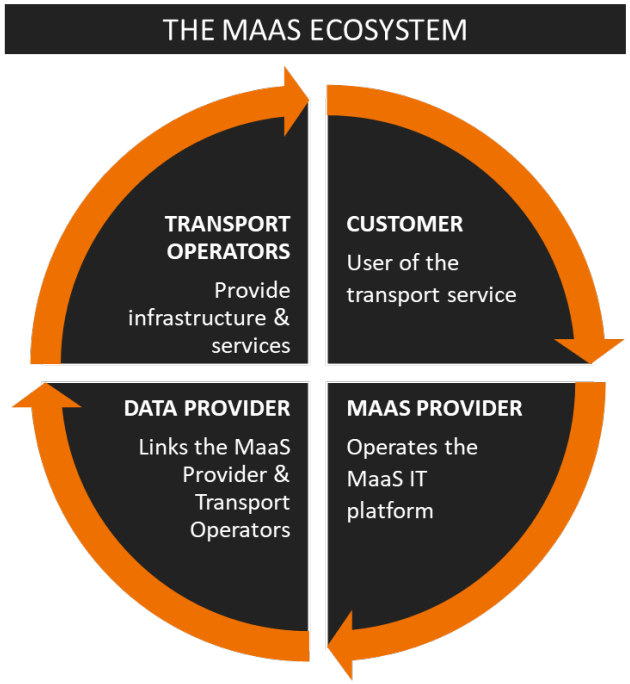
Mobility as a Service (MaaS)

MaaS envisages users buying transport services (including public transport, car usage, access to active travel, taxi, demand responsive transport, etc.) as packages based on their needs instead of buying the means of transport itself or in a series of distinct packages. It is being driven by digital innovation which presents the opportunity to combine transport provision through a single platform. It is still an emerging concept which has yet to be widely implemented.

Core Characteristics

Whilst MaaS is still in its embryonic stage the fundamental components have been largely agreed which are:

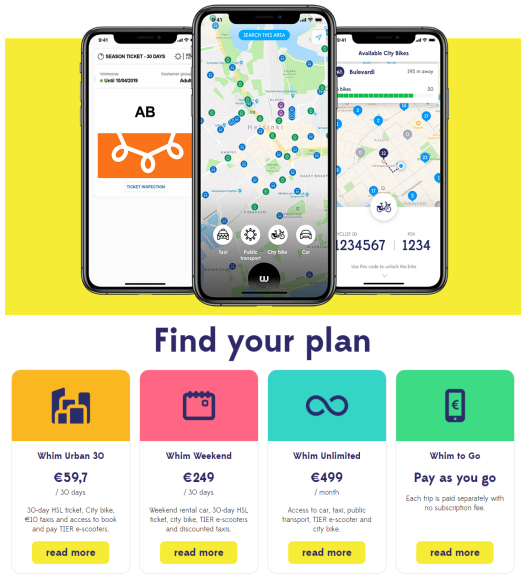
- **MULTI-MODAL:** integration between multiple modes of transport including public transport, active travel and shared mobility solutions
- **PAYMENT SOLUTIONS:** users are able to pay for their travel across a range of modes directly through the MaaS platform with integrated multi-modal ticketing solutions in built
- **ONE PLATFORM:** for everything including travel information, booking, ticketing and payments
- **INTEGRATION:** bringing together customers, transport providers, public sector, payment processors, telecommunication companies and the platform owners
- **DIGITAL:** an online platform supported by telecommunications technology
- **USER FOCUSED:** centred around demand from customers and personalised to their needs



There are two types of payment model anticipated for MaaS which are:

- **Subscription Based:** Customer would purchase a 'bundle' of services proportionate to their budget and mobility needs e.g. 'fortnightly' subscription which provides unlimited trips on public transport, 11 hours of car sharing, 10% discount on ride-hailing services and unlimited bike rental

- **Pay as You Go:** Customer would be provided with the range of available transport services and choose their mode(s) for that journey then pay a single, one-time transaction price for the whole journey. This could include a pricing cap which would be applied at a variety of timescales (i.e. daily, weekly or monthly) to encourage increased usage of MaaS services (e.g. Transport for London has a daily pricing cap on their Oyster Card).



Case Study: Whim, Helsinki

In Helsinki, MaaS Global is the first commercial start-up to develop a MaaS subscription service. This was created in October 2016 through the launch of its Whim app. It offers several levels of service, ranging from a pay-as-you-go option to an unlimited use package which includes public transport, taxis, bike and car-sharing.

Whim was enabled by Finnish Ministry of Transportation legislation, which itself was informed by the deregulation of their telecoms market, making it mandatory for public transportation to allow access to their Application Programming Interfaces (APIs) and ticketing systems on vendor platforms. Phase one of the legislation came into effect in January 2018, with phase two implemented in January 2019.

Whim now has 13,000 active users per month in Helsinki and has expanded its service to several other European cities, including Antwerp and Birmingham. Within Helsinki, Whim currently has less than 1.5% of the total mobility market but aims to shift the market from ownership to usership, with its unlimited package costing less than car ownership.

Delivering MaaS

The implementation of MaaS presents an opportunity to create a seamlessly integrated sustainable travel system that meets the needs of users as effectively and efficiently as possible. However, given the uncertainty at this time around the ways that MaaS will develop there is a need for Government and bodies like MaaS Scotland to guide and shape MaaS provision to ensure its successful delivery by supporting a broad, collaborative and multi-modal approach which provides a framework for:

- achieving beneficial social, economic and environmental outcomes
- developing a healthy ecosystem that encourages operators and users to engage with it as well as facilitating an open data environment
- co-ordination and scaling of infrastructure and services to meet growth in demand
- equality of access and meeting the needs of all passengers

- performance, monitoring, evaluation and ongoing improvement
- future proofing to accommodate innovations like autonomous vehicles

Current uncertainties and barriers around the delivery of MaaS include:

- data sharing and the extent to which an open data environment can be achieved
- whether a top down or bottom-up approach should be taken to delivering MaaS
- the most appropriate Governance models (e.g. public / private partnership, etc.)
- whether white label MaaS platforms should be the preferred approach

Any MaaS scheme in the SEStran region would need to capable of meeting the differing needs of both urban and rural areas which must be considered when planning the ecosystem. In urban areas, MaaS will predominantly provide a more comprehensive sustainable mobility package that provides an attractive alternative to the private car leading to a reduced need for ownership and usage.

In rural areas, MaaS needs to ensure that people are provided with effective and affordable links to essential services particularly for those that do not own a car. Rural residents with lower levels of independence are likely to be the users who have the greatest potential to benefit from MaaS as shown in Figure 4.9. [viii]

Within this group, planned journeys, where the person knows in advance where they want to go, are likely to be those with the greatest opportunity to be delivered by new transport methods through MaaS. Here, users typically have more notice to consider their journey method ahead of time. They also have a greater degree of flexibility over their journey compared to commuting or spontaneous trips.

In rural areas, MaaS Providers and Transport Operators should be seeking to increase convenience, decrease cost or ideally do both in order to help create

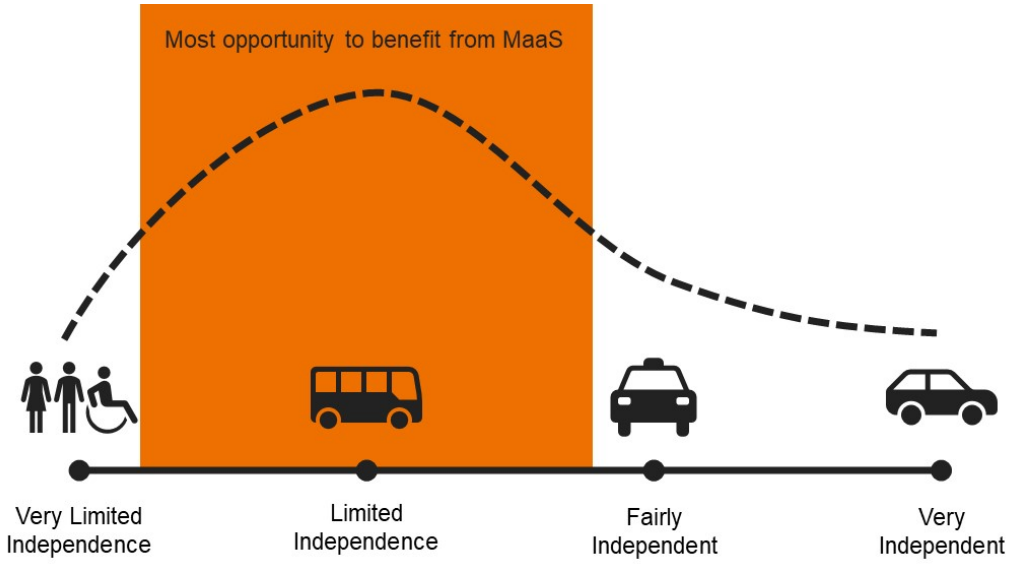


Figure 4.9 Rural Independence and Opportunity for MaaS Adoption

a desirable proposition for passengers. The greatest opportunity lies in the field of Demand Responsive Transit (DRT) as illustrated in Figure 4.10.[viii]

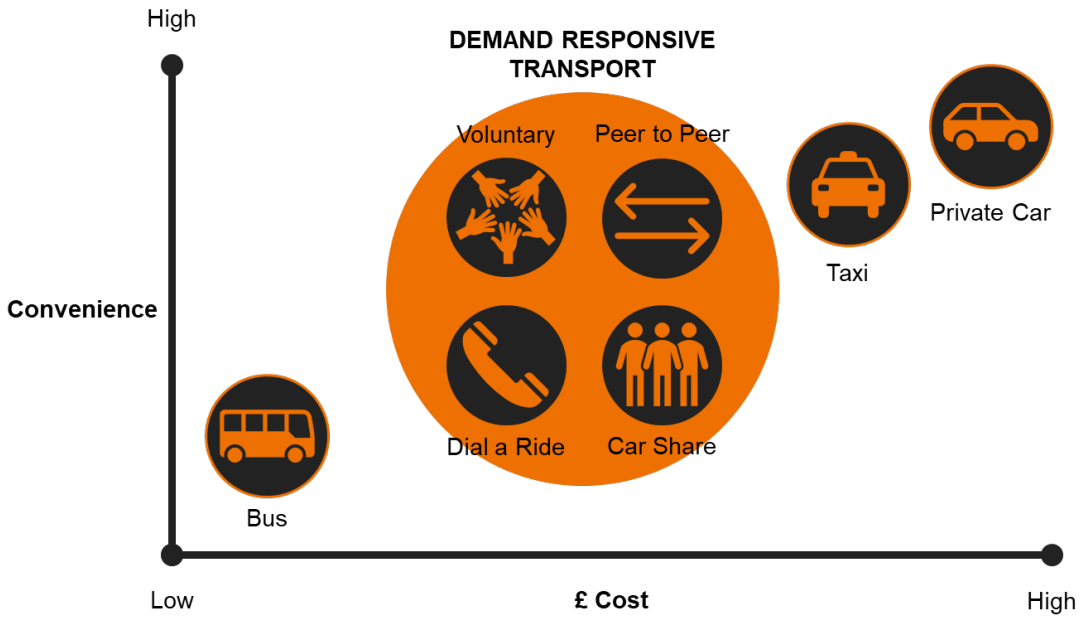


Figure 4.10 Convenience v Cost of Rural Transport Modes

Whilst DRT is not a new concept and is already widely operating across rural areas in the region, there are opportunities to deliver DRT services to a wider user base at a lower cost to users. The opportunity for transport suppliers is to make more use of existing spare capacity on their services. This capacity comes in the form of spare seats, empty running and vehicle downtime. Innovation can help to tackle these inefficiencies by increasing visibility of services, making booking services easier and smarter routing. The benefit to customers would be optimised services providing better accessibility and meeting their needs more effectively.

The geographical scale at which a MaaS scheme operates also needs to be considered as artificial boundaries could be created which limits its effectiveness. On this basis, a regional scheme may be most effective.

Automation

The automation of the transportation system refers to a myriad of technologies which range from automated car features to modifications across a transport network which integrates information and communication for different modes. Automation ultimately aims to complement the existing transport network by applying technological advancements to enhance the efficiency and safety for network users, reduce congestion, which has scope to reduce emissions, specifically in urban areas.

Though it is a vast topic, automation can generally be split up into automated features and automated capabilities. Automated features are already present in cars available on the market today, such as automatically regulating a safe distance to the vehicle ahead, lane assist technologies, blind spot detection or cameras and sensors when cars are reversing. The capability of an automated vehicle refers to several systems or automated features which collectively work together to conduct an overall task with little or no human intervention. This is an attractive concept as it has the potential to revolutionise the way people can be transported, i.e., driving time could be spend productively engaging in other activities. There is also scope for freight transport to shift with automation enhancements via truck platooning or drones being utilised for last-mile deliveries. The various levels of automation are at different stages of development and deployment into the transport system.

Different Levels of Automation

There are six levels of automation which range from a vehicle with no automation (a human is in complete control of the vehicle or device) to a fully automated vehicle (where the automated technological system performs the entire movement of the vehicle). This is detailed in terms of driving road vehicles in Figure 4.11.

DRIVER PERFORMS PART OF THE DRIVING TASKS		
NO AUTOMATION	*DRIVER ASSISTANCE*	*PARTIAL AUTOMATION*
The driver performs all tasks even if aided by enhanced warning or intervention systems	Some automation, such as steering or acceleration / deceleration features, are in place. These features use information about the surrounding environment to act and warn the driver. There is an expectation the driver will be engaged and perform the remaining tasks.	One or more automated features are in place such as steering and acceleration / deceleration, again using features from the surrounding environment. There is an expectation the driver will be engaged and perform the remaining tasks.
SYSTEM PERFORMS THE ENTIRE DRIVING TASK		
CONDITIONAL AUTOMATION	*HIGH AUTOMATION*	*FULL AUTOMATION*
The automated vehicle system will undertake all the dynamic driving tasks with the expectation that the driver will be engaged and intervene where required.	The automated vehicle system will undertake all the dynamic driving tasks with no expectation that the driver will need to respond or intervene.	The automated vehicle system will fully undertake all the dynamic driving tasks with no expectation that the driver will need to respond or intervene.

Figure 4.11 Six Levels of Vehicle Automation

The technology which is currently available on the market mainly belongs to the category shown as *Driver performs part of the driving tasks*. These include partially automated vehicles which include Tesla developing an autopilot feature where the system takes control of most driving actions, but the driver is expected to remain alert and intervene where necessary. In addition, intelligent speed assistance is starting to be introduced which aids the driver in maintaining the appropriate speed for the road environment by providing dedicated and appropriate feedback. Further examples of existing semi-automated cars are provided in Figure 4.12.

The other category *System performs the entire driving task* involves technology which is being developed. Higher levels of automation have been developed though many are undergoing testing and pilot studies, thus they have not been successfully implemented into mainstream transportation to date.

However, technological advancements in this sector are market driven by organisations such as Tesla, Google and other major stakeholders within the technology sector who are who are competing to develop fully automated or 'driverless' vehicles. Similarly, driverless trucks have been operating within areas like ports and airports, however they are not fully operational on the road network. As such, it is plausible that vehicles which fall into the *System performs the entire driving task* category will move from pilot projects to operational within the lifetime of the RTS.

AVAILABLE SEMI-AUTOMATIC CARS	
Tesla Autopilot	Enhanced autopilot which can autosteer, lane keep assist, break, and accelerate as long as the driver has their hands on the wheel.
Volvo Pilot Assist	Steering, lane keep assist and maintain a safe distance from the car in front as long as the driver has their hands on the wheel. If their hands come of the wheel, then an alarm will sound.
BMW Intelligent Driving	Steering, lane keep assist as long as the driver has their hands on the wheel. The 'stop and go' feature which warns the driver of a vehicle ahead which is sharply breaking. The vehicle can depress breaks if no action is taken by the driver.
Nissan Pro-pilot	Adjust speed to suit surrounding traffic conditions, lane keep assist, auto parking and stops the car if necessary.
Audi A8	This model is the first production car to reach conditional automation (vehicle is able to cover nearly all aspects of driving). This includes monitoring surroundings, braking, and controlling steering in certain conditions. The driver is not required to monitor the situation and can remove their hands from the wheel for long periods of time but must be able to intervene if needed or if the vehicle reaches a speed over 37mph.

Figure 4.12 Examples of Currently Available Semi-Automated Cars

Intelligent Transport Systems (ITS)

ITS manage the transport network via the utilisation of 'big data' and artificial intelligence (AI) to implement the most effective solutions to improve network efficiency and safety. ITS involves integrating various technologies including sensors, computers, electronics, communication devices, and other automated technologies within transport infrastructure and individual vehicles. The aim is to improve efficiency, safety, sustainability, increasing travel time reliability and reducing the cost of the transport network on the economy and environment by distributing the information across all modes to benefit all network users. Users of the transport network would be able to access real time travel information and be presented with smart alternatives at identified areas of high congestion or disruption to inform their travel choices.

To counteract or limit the intensification of congestion or disruption, the ITS can manipulate the transport network by;

- Predicting traffic conditions via data from the surrounding environment and infrastructure;
- Providing information to network users to best inform travel choice;
- Car communication via signal controllers in the road infrastructure relaying information to individual vehicles to modify speed / act accordingly;
- Smart intersections which collect data and relay information;

- Redirecting road traffic; and
- Altering signal timings.

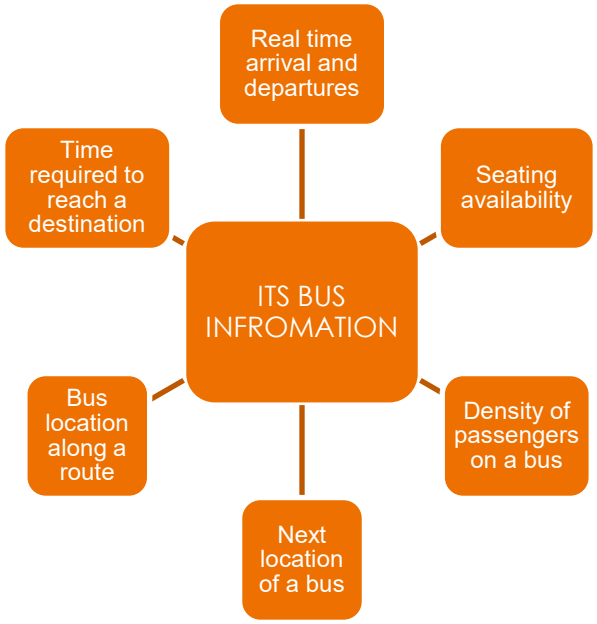


Figure 4.13 ITS Bus Information Provision

ITS are being actively introduced into traffic control systems, vehicle designs and interactive systems for informing transport network users. There is also some cross over with ITS and 'smart cities', a concept which strives for urban areas to function in a sustainable and intelligent way through the cohesive integration of infrastructure and services by using technology. The aim is to generate a better quality of life for inhabitants of these urban areas. The main issue within the UK is the lack of investment, state of readiness and the awareness of the smart road transport concept. Though, 'smart motorways' have been developing in the UK since 2006 and some cities have implemented ITS features within their transport network. An example of how ITS is applied to bus information provision is shown in Figure 4.13.

Platooning

Platooning involves a lead vehicle, which is generally driven by a human driver who can navigate the road traffic and route, followed by other vehicles which are potentially driverless. The subsequent vehicles do so via automated communication technologies such as longitudinal and lateral control which involves integrating cooperative adaptive cruise control and lane keeping assist systems. Coupling and de-coupling technologies can also be implemented to allow other road users to cross and come between different vehicles within a platoon.

Platooning can help to reduce energy consumption as vehicles are usually driving within a tightly packed "platoon", reducing the aerodynamic drag. To add, technologies such as vehicle detection, anti-collision and lateral control technologies can benefit road safety for the driver of the platoon and other road users. Freight capacity can be enhanced as multiple vehicles containing cargo could be led by one driver which saves time and cost.

This technology has not been implemented as a viable commercial product; however, there are some active pilots which show potential. The European Truck Platooning Challenge (2016) involved European truck manufactures which trialled platoons of trucks with automation technologies on public roads across Europe. In 2016, the first cross-border truck platooning trial was successful in reaching its destination in the

Port of Rotterdam. This form of automation could also therefore begin to emerge as a viable means of transportation during the lifetime of the new RTS.

Other Areas of Automation

Automation does not always apply to solely road vehicles as there have been some technological developments for how automation can benefit the operation of rail, air and sea transport operations for both pedestrian travel and freight movements as well. These are summarised in Table 4.3 below.

Table 4.3 Automation of Rail, Sea and Air

Rail	Sea	Air
Automated train operations (ATO) offer predictable running times, higher capacity, energy optimisation, automated and computerised failure detection and response, enhanced safety as well as the potential for driverless train operation. ATO is expected to considerably alter the interaction between infrastructure and the day to day running of rail operations. Some automated and driverless rail systems are already in operation such as the Docklands Light Railway (DLR) in London.	There is scope for sea vessels to operate without the need to have a large crew as they could be automated or operate via remote controls. This has many safety benefits as less workers would be exposed to harsh sea conditions as people could operate vessels movements from land. Whilst this is unlikely to be adopted immediately, there may be a phasing of implementation resulting in a mix of traditionally crewed vessels and autonomous vessels sailing at the same time.	Unmanned aircraft systems, i.e., drones, are discussed below, however, ultra-short haul commercial flights are also being explored as potential future developments for aviation. Automation can also be used to enhance safety checks of aircrafts prior to take off which aids workers and pilots in managing the flight by replaying certain manual tasks, and air traffic control to monitor the status of all flights. Airports have also implemented automated baggage handling and screening systems which helps to improve safety and remove human error.

Implementation of Automation

The implementation of automation into mainstream transportation is dependent on the market and industry stakeholders. Economic benefits, demographic trends and safety factors are catalysts for automation and companies such as Tesla, Uber and Google are competing to eventually develop cars which completely remove the need for a driver. Some of the technologies described above have been implemented or are undergoing pilot studies. For example, drones and automated features are already operating within the mainstream transport network but it

is uncertain about when more advanced automation will be formally integrated. However, it is anticipated that within the next two decades there will be a gradual but significant deployment and uptake of this technology which means this needs to be taken into account in the development of the new RTS.

There are clear benefits to the implementation of automation within the transport sector, however this needs to be managed carefully through policy. Automation does not automatically result in reductions in energy consumption and emissions, but it indirectly supports changes in vehicle operations, vehicle design, choice of energy, policy intervention, or transportation system design that may or may not be more sustainable. To add, automated vehicles could increase network efficiency, making driving more attractive to people who may have otherwise opted for an alternative mode. Thus, there is scope for vehicle kilometers travelled to increase alongside the implementation of automation.

There would also be a reduction in jobs, specifically for truck drivers and people manually operating trucks, trains, ships as they will be replaced by machine led automated devices. This will disproportionally impact jobs which are low-skilled and low-paid, whereas there will be an increase in demand for jobs which are more highly-paid such as engineers and researchers.

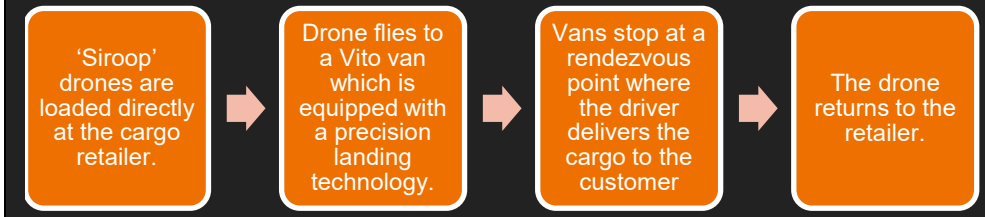
There are also concerns about how automated vehicles will replicate human actions, specifically in situations such as traffic collisions. As automation is market led, it is paramount that there is policy intervention to ensure that automation is implemented into the transport network at a gradual and sustainable rate and in a manner that seeks to deliver overarching policy objectives.

Drones and Robots

Unmanned aircraft systems, i.e. drones, are regularly used for numerous purposes, however there is scope for them to be utilised in the future to become integral to different aspects of the transport network. Drones can act as an airborne inspection agent to observe vehicles prior to trips taking place to ensure there are no safety issues before it embarks. This can assist workers at airports, ports and stations to carry out manual checks even if they are in a different location. There has been some development of drone technology to aid delivery services, such as Amazon, with last-mile freight for parcels which are under a certain weight. There is scope to develop automated battery swapping systems within drones which would enable them to operate for longer or deliver a parcel to a destination further away i.e. to more remote or rural locations.

Case Study: Matternet and Mercedes Benz Electric Van and Drone On-Demand Deliveries

The aim was to create on-demand parcel delivery solutions by developing electric delivery trucks as automated cargo spaces from which drones autonomously travel to and from with parcels.



This optimizes the drivers time but also allows more space in the electric van and optimizes energy usage. This is in the pilot stages in Zurich using e-commerce which can weigh up to 2kg being delivered autonomously to customers.

Automated people movers or ground vehicles are integrated in small scale transport networks in confined areas to shuttle people on mass between locations to reduce travel time, increase network efficiency, decrease delay, and help to reduce emissions. These may operate within airports, for example at Heathrow Airport where 'Westfield Pods' have been adapted to transport people from the airport car park to Terminal 5 in only 6 minutes, whereas a bus would take 27 minutes. These pods have also been adapted to be used for cargo and mobilise baggage containers and unit loading device containers from the same self-powered platform.

Westfield are also developing pod platooning technology which will require high-speed inter-pod data connectivity and use of advanced sensor technologies; however, this technology is still developing, but there is scope to utilise this for transport and freight.

Automated chatbots or robots can assist users of the transport system by offering real time information or directions to transport services such as bus stops, stations, or cycle routes etc. These can also be adapted to assist non-English speakers or tourists to determine the best option for their transport needs. These do not have to be static as some robots have been used to autonomously deliver parcels. An example of this is the Amazon Scout, robots which autonomously navigate residential neighbourhood routes for last mile parcel delivery services. They operate at a walking speed and can navigate around pedestrians, pets and other things that cross their paths. These robots are currently undergoing a pilot within Washington in the US. An example is shown adjacent.

4.4 TRAVEL BEHAVIOUR CHANGE

In addition to technology-based supply side changes, there are long-term trends surrounding the amount and way that people travel, which if continued will affect future travel patterns. It is important to understand these as this will inform the development of the RTS. Firstly, there is a long-term trend of people making fewer trips, as reflected in the DfT's long-running National Travel Survey as shown in Figure 4.14.

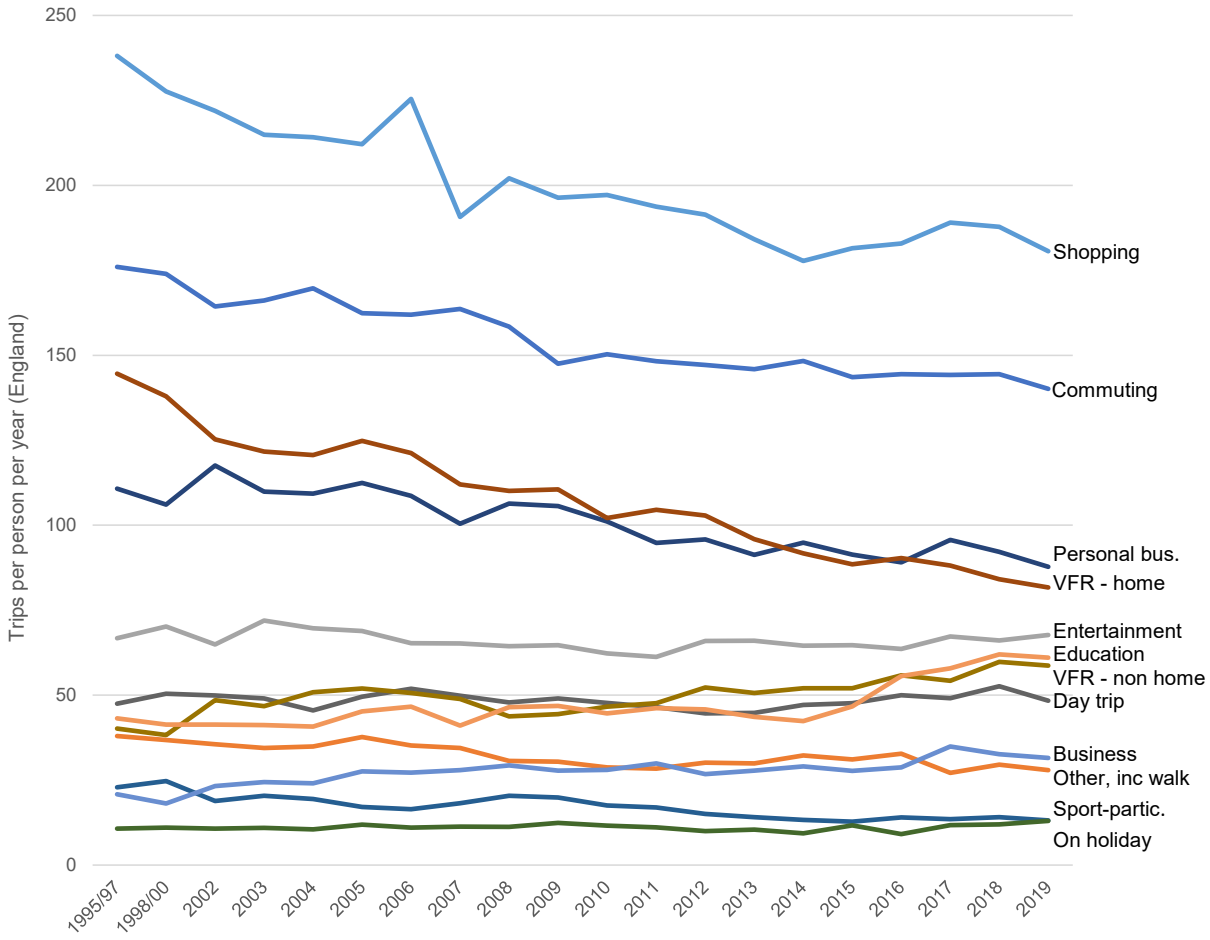


Figure 4.14 DfT Trips Per Person Per Year

On average people are making 13% fewer trips per annum compared to the mid-1990s. All of the main travel purposes have seen a decline, with only education and some of the less frequent leisure trip categories seeing an increase. The average distance travelled has declined at a lower rate (7%) meaning that the average trip length has increased over this period. Reflecting this, average trip duration has also increased from 20 to 23 minutes. At the UK level, this reduction in travel per person has been offset by growth in population of 15% over this period. Population growth has therefore been the main driver of growth in travel, offsetting the reductions in travel at the individual level. Population projections are therefore a key element of thinking in the RTS development process and are discussed further in Section 2.2.

COVID-19

The COVID-19 pandemic and its potential aftermath has introduced a high degree of uncertainty into all aspects of transport planning. Whilst the short-term picture (during the pandemic and the various levels of restriction) is well understood, there is significant uncertainty regarding the structural (permanent) changes in peoples' behaviour once the pandemic is behind us.

There are a wide range of surveys (with businesses and the public) and other data which provide an indication of what the post-pandemic world might look like. However, SEStran has been running a Travel Attitudes Survey throughout the pandemic with Wave 2 being reported in March 2021, and this provides a useful summary of what is now something of an emerging consensus. The key findings are shown in Figure 4.15.

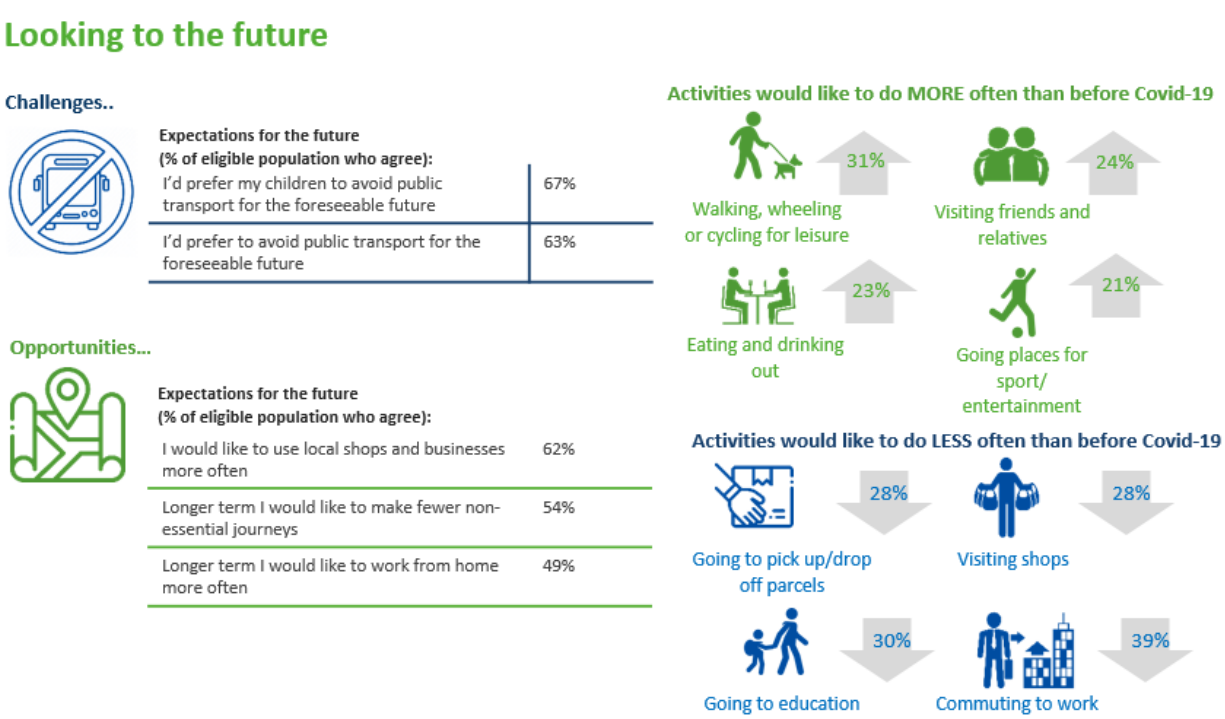


Figure 4.15 Anticipated Travel Behaviour Changes Post COVID-19 Pandemic

In general terms, these stated intentions represent an acceleration of many of the trends which were already underway. The unknown here is the extent to which these stated intentions become reality as and when the pandemic is behind us, and all restrictions are lifted. It is likely that there will be a degree of oscillation in peoples' behaviour before a new equilibrium is reached. The level of behavioural change that this new equilibrium represents relative to 2019 is however impossible to estimate at this stage.

The main components which will determine this change will be:

First and foremost is **reduced commuting**. This will be focussed on 'location independent' jobs, i.e., the jobs which can most easily be done without being at the workplace. As an example, the analysis presented in Figure 4.16 shows the number of jobs in the Information & Communication, Professional, Scientific & Technical and Financial and Insurance Services industries in the City of Edinburgh, by datazone.

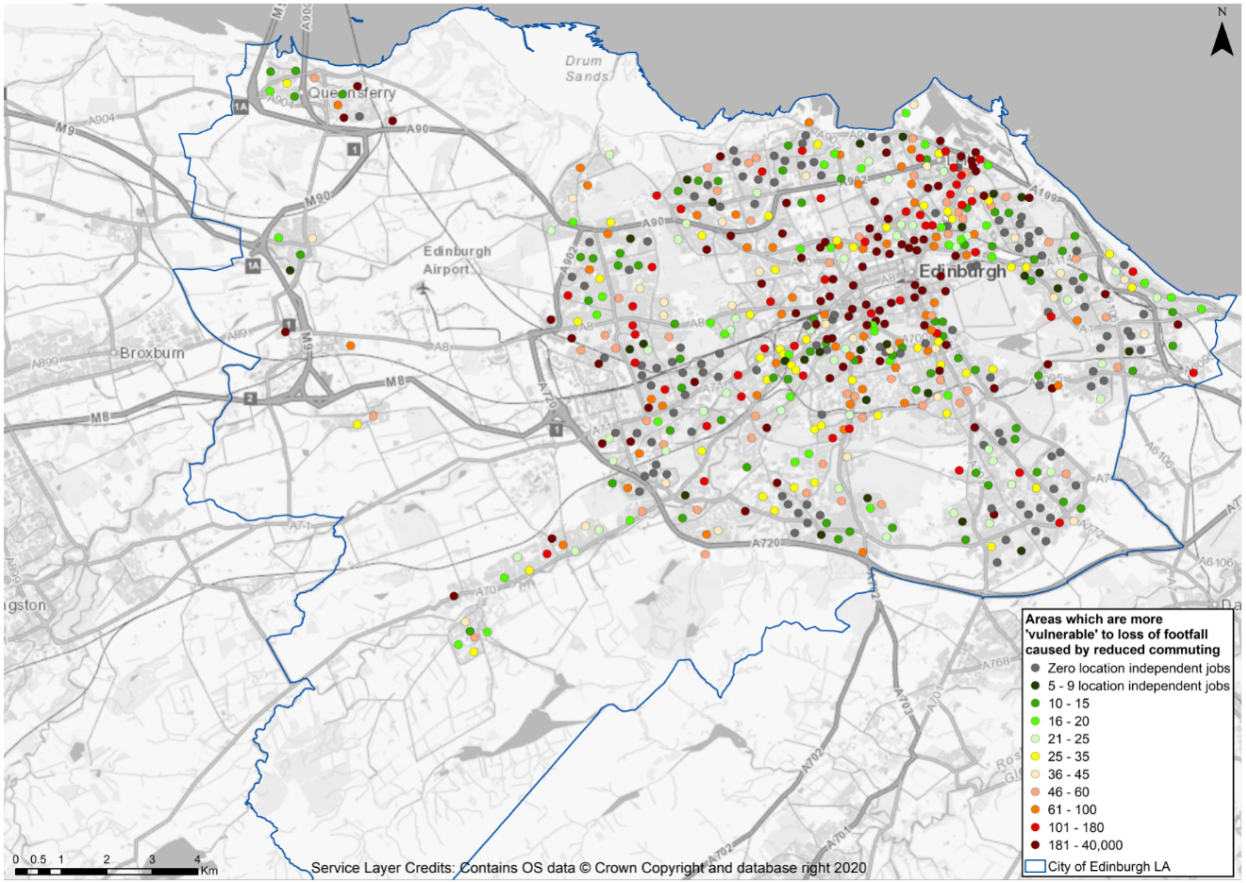


Figure 4.16 Location Independent Jobs in Edinburgh

It can be seen that the darkest dots are concentrated in the city centre and along public transport corridors. Fewer people travelling to these jobs would therefore disproportionately affect the demand for public transport and the fact that many of these jobs will be based on the conventional working day means that peak hour demand for public transport could be significantly reduced. This could have implications for high-capacity public transport provision both now and with respect to future investments.

These areas with high numbers of location independent jobs are therefore at risk of much **reduced footfall** with all the implications for businesses which rely on this footfall for their trade. If this happens at scale, there may be a need to re-purpose office buildings and more generally the areas affected by a loss of their main purpose for being. A substantial policy response may be required to revitalise these areas.

The impact of reduced commuter footfall would be amplified by the more general shift away from high-street shopping to **online shopping**. Town and city centres may have to innovate and develop a new style of retail, hospitality, cultural and leisure offer if they are to retain their role as focal points.

Allied to this, there will be a redistribution of footfall to neighbourhoods where people are now working from home more often. Assuming people do leave their homes, there will be opportunities in retail and hospitality in these areas, as well as providers of other services. This would of course be beneficial in terms of aspirations for more 'local' living, working and shopping as represented by the 20-minute neighbourhood concept.

As noted above, **business travel** has been declining for some time. With the widespread adoption of platforms such as Zoom and MS Teams, the move to remote meetings has been rapidly accelerated by the pandemic. Whist there will undoubtedly be some return of business travel, all the evidence suggests it will be at a lower level than before.

The SEStran survey has indicated however that **leisure travel** will increase, again reflecting medium term trends. In part this may reflect less time spent commuting and shopping freeing up time for more leisure-based activities.

The surveys also suggest a residual **reluctance to use public transport** due to lasting concerns about the virus and perhaps a greater awareness of the risk of infectious diseases more generally. This allied to reduced commuting trips could have major implications for the finances of public transport delivery. Commercial services may now require subsidy and subsidised services may now require more subsidy. In response to reduced fares revenue, frequencies may be reduced and / or services may be withdrawn, diminishing public transport connectivity and potentially adding to car use. Public transport operators may therefore have to review the nature of the services they provide (or are specified to provide) in response to a new, more leisure-focussed and cautious public. Current models of season tickets may also need to be revised to account for the more flexible travel patterns likely to be adopted by many who previously commuted five days per week.

In the longer term, as the **link between the workplace and the home** is reduced or broken completely for some types of jobs, some may reconsider where they wish to live. This is likely to lead to a more dispersed population which may bring pressures to the communities affected by in-migration and a mix of environmental and travel impacts.

More generally, structural changes resulting from the pandemic may bring significant **changes to the economy** and the types of activity undertaken at different locations, with retail perhaps being the sector most 'at risk' from permanent changes in behaviour.

This section has highlighted some of the uncertainties surrounding the post-pandemic world. As noted above, the key issue here is the scale of these impacts and the implications could range from transformative to marginal. This uncertainty will be captured in the development of forecast scenarios within which the RTS measures will be considered.

Literature Review

SEStran Regional Transport Strategy

STAG Case for Change Report

5.0 LITERATURE REVIEW

5.1 OVERVIEW

The evidence base for the Case for Change has been informed by a comprehensive literature review of over 90 local, regional and national policy documents. These covered a range of relevant topic areas including transport, land-use planning, economic development, health, energy, digital connectivity and the environment. A full list of documents in included in Appendix A.

The purpose of the literature review was to inform the identification of problems, issues, constraints and opportunities as well as assisting in the process of option generation. A summary of the problems identified from the literature review is provided in Table 5.1.

Separate literature reviews were undertaken to inform the development of the Strategic Environment Assessment and Equalities Impact Assessment scoping processes. These are presented in these stand alone notes which have been used to inform the development of the Case for Change. Therefore, this evidence base should also be referred to when considering equalities and environmental issues discussed in the Case for Change.

Table 5.1 Summary of Literature Review Problems

Category	Sub-Category	No.	Problem	Source
Environment	Noise	1	Noise pollution from traffic impacts health, wellbeing and discourages active travel	Edinburgh City Mobility Plan 2021
	Emissions	2	Transport, especially road transport, is a key contributor to CO2 emissions and global warming	Strategic Transport Projects Review 2: Case for Change Edinburgh and South East Scotland Region 2020
				The Future of Energy in Scotland: Scottish Energy Strategy 2017
				Edinburgh City Mobility Plan 2021
				Scottish Government Climate Change Plan Update 2020
	Biodiversity	3	Transport features disrupting biodiversity / natural corridors / green areas	Edinburgh City Mobility Plan 2021
				East Lothian Main Issues Report 2014

Category	Sub-Category	No.	Problem	Source
				Granton Waterfront Development Framework 2020
	Air Quality	4	Local areas of poor air quality created by high traffic flows	Cleaner Air for Scotland National Modelling Framework 2018
				East Lothian Main Issues Report 2014
				Edinburgh City Mobility Plan 2021
				Strategic Transport Projects Review 2: Case for Change Edinburgh and South East Scotland Region 2020
Public Transport	Rail	5	Overcrowding on rail services particularly around Edinburgh. Passengers may not be able to get on the first train	Regional Transport Strategy Main Issues Report 2020 Fife Local Transport Strategy 2006 – 2026
		6	Platform Crowding	East Lothian Local Transport Strategy 2018 - 2024
		7	Some settlements have no direct connection to the rail network	SEStran Regional Park and Ride Strategic Study 2020
		8	Poor links between rail and wider public transport network leading to excessive interchange	Strategic Transport Projects Review 2: Case for Change Edinburgh and South East Scotland Region 2020
		9	Difficult interchanging between modes at Waverley Station	Edinburgh City Mobility Plan 2021
		10	Rail journey times uncompetitive with car	Regional Transport Strategy 2015 - 2025 Refresh 2015
		11	Rail station access is not always suitable for all users	National Transport Strategy 2 2020
	Bus	12	Lack of bus services outside main transport corridors	Regional Transport Strategy Main Issues Report 2020
		13	Difficulty making orbital movements around Edinburgh and neighbouring areas by public transport	Strategic Transport Projects Review 2: Case for Change Edinburgh and South East Scotland Region 2020
				Regional Transport Strategy Main Issues Report 2020

Category	Sub-Category	No.	Problem	Source
		14	High bus demand in City Centre to BioQuater / Royal Infirmary corridor in Edinburgh	Edinburgh Strategic Sustainable Transport Study 2019
		15	The provision of a good bus service which still has poor uptake (e.g., St John's Hospital)	Extract Main Issues Report Technical Note 2020
		16	High demand for buses in Edinburgh city centre	Edinburgh Strategic Sustainable Transport Study 2019
		17	Inconsistent bus stop infrastructure like many bus stops / stations do not have step-free access.	Extract Main Issues Report Technical Note 2020
				City Region Deal Edinburgh & South East Scotland Deal Document 2018
		18	Lack of buggy and wheelchair space on buses	Edinburgh City Mobility Plan 2021
		19	Bus services contributing to congestion at peak times leading to slow and unreliable journey times	Strategic Transport Projects Review 2: Case for Change Edinburgh and South East Scotland Region
		20	Urban bus speeds have been falling in recent years	Regional Transport Strategy Main Issues Report 2020
		21	Delayed services undermine the competitiveness and attractiveness of public transport	Regional Transport Strategy Main Issues Report 2020
		22	Incorrect use of bus lanes causing buses to be delayed	Regional Transport Strategy 2015 - 2025 Refresh 2015
	General	23	Vulnerable people are concerned about their safety on public transport	Edinburgh City Mobility Plan 2021
		24	Difficulties accessing services and opportunities at off peak periods	Regional Transport Strategy 2015 - 2025 Refresh 2015
		25	Difficulty travelling between West Edinburgh and North Edinburgh by public transport	Edinburgh Strategic Sustainable Transport Study 2019

Category	Sub-Category	No.	Problem	Source
Shared Transport and Multi-Modal	Park and Ride	26	Limited uptake of P&R services in some locations e.g., bus P&R facilities operating at 50-100% capacity	SEStran Regional Park and Ride Strategic Study 2020
		27	Rail based P&R sites operating at or above capacity leading to overspill parking	SEStran Regional Park and Ride Strategic Study 2020
		28	Difficulty interchanging between modes at some P&R sites	SEStran Regional Park and Ride Strategic Study 2020
		29	Difficulty accessing popular P&R sites after AM peak period	East Lothian Local Transport Strategy 2018 - 2024
		30	Lack of integration between bus P&R and modes other than active travel	SEStran Regional Park and Ride Strategic Study 2020
	Airport	31	Lack of surface access to Edinburgh Airport to people other than those accessing by car / taxi	Regional Transport Strategy Main Issues Report 2020
		32	Projections of air travel in 2030 show there is a lack of bus services in West Edinburgh to cater for growth	West Edinburgh Transport Appraisal Refresh 2016
		33	Lack of cross border access to Newcastle and Carlisle Airports	Local Access and Transport Strategy Scottish Borders Council 2015
		34	Growth in visitors to Edinburgh in the future leading to increased demand on transport network	Edinburgh City Mobility Plan 2021
	Multi-Modal	35	Edinburgh centre lacks cross city transport links and there is limited integration between modes	SEStran Regional Park and Ride Strategic Study 2020
		36	Lack of cohesion between drivers, pedestrians, and cyclists: drivers don't want cyclists on roads, pedestrians don't want cyclists on footways	Clackmannanshire Local Transport Strategy 2015 - 2019 Survey Findings
		37	Poor links to North Berwick	East Lothian Main Issues Report 2014

Category	Sub-Category	No.	Problem	Source
		38	Good links east and west in Edinburgh, but north to south have poor links	West Edinburgh Transport Appraisal Refresh 2016
	DRT	39	Difficulties booking DRT services	SEStran Strategic Demand Responsive Transport Study 2021
		40	Difficulty interchanging between DRT and other public transport services	SEStran Strategic Demand Responsive Transport Study 2020
Fares and Ticketing	Fares	41	Lack of affordable public transport. Particularly notable for those that do not have access to a car and vulnerable groups like the young, elderly, ethnic minorities, mobility impaired, etc.	Regional Transport Strategy Main Issues Report 2020
				Edinburgh City Mobility Plan 2021
				Free Bus Travel for Under 19s Consultation Analysis Final Report 2020
		42	Inconsistent acceptance of National Concessionary Travel Scheme on DRT services.	SEStran Strategic Demand Responsive Transport Study 2020
		43	Increasing demand for concessionary travel	Regional Transport Strategy Main Issues Report 2020
	Ticketing	44	Lack of affordable, convenient, and streamlined ticketing system	Regional Transport Strategy 2015 - 2025 Refresh 2015
		45	Difficulties in buying tickets for vulnerable groups	National Transport Strategy 2 2020
	Information	46	Difficulties accessing travel information	Regional Transport Strategy 2015 - 2025 Refresh 2015
				Falkirk Local Transport Strategy 2014
Connectivity	Connectivity to Services	47	Difficulty accessing services and employment	Regional Spatial Strategy for Edinburgh and South East Scotland City Region 2020
		48	Lack of accessible bus stops	Edinburgh Strategic Sustainable Transport Study 2019
		49	High demand for transport in New Town to Granton (via Newhaven) corridor within Edinburgh	Edinburgh Strategic Sustainable Transport Study 2019

Category	Sub-Category	No.	Problem	Source
		50	Severance between communities	Edinburgh Strategic Sustainable Transport Study 2019
		51	Difficulties accessing services and opportunities from rural areas and isolated communities	SEStran Regional Park and Ride Strategic Study 2020
				Regional Transport Strategy Main Issues Report 2020
				SEStran Strategic Demand Responsive Transport Study 2020
				Scottish Borders Local Development Plan 2016
		52	Lack of connectivity in Scottish Borders	SESplan Main Issues Report 2015
		53	Duns in Scottish borders loses economic activity in the area to Berwick and Edinburgh due to the ease of access	Scottish Borders Local Development Plan 2016
		54	Poor cross-border connections between Scotland and England	East Lothian Local Development Plan 2018
		55	Poor surface access to key gateways	Regional Transport Strategy 2015 - 2025 Refresh 2015
		56	Delays at key access points to the city for people and goods	Edinburgh City Mobility Plan 2021
		57	Increasing commuting distances and longer journeys to work	Strategic Transport Projects Review 2: Case for Change Edinburgh and South East Scotland Region 2020
				East Lothian Local Transport Strategy 2018 – 2024
				Regional Transport Strategy Main Issues Report 2020
		58	People want to live in neighbourhoods where services and amenities are nearby	Sustrans: Reducing car use: Views and behaviours of people who live and drive in towns and cities in Scotland 2019
	Vulnerable Groups	59	Aging population causing a shift in transport demand. More people require access to healthcare, more carers travelling, more emergency services	Regional Transport Strategy Main Issues Report 2020
				Edinburgh City Mobility Plan 2021

Category	Sub-Category	No.	Problem	Source
		60	Lack of access to employment, training, services and leisure for people without a car	Mobility Hubs Strategic Study for the SEStran Region 2021
		61	Women feel less safe on public transport, more likely to use a car or taxi	Edinburgh City Mobility Plan 2021
				National Transport Strategy 2 2020
		62	Transport poverty making accessing employment and services prohibitively expensive or difficult	Sustrans: Transport poverty in Scotland 2016
				Edinburgh Strategic Sustainable Transport Study 2019
		63	Difficulties accessing transport services for those who are mobility impaired	Regional Transport Strategy 2015 - 2025 Refresh 2015
				National Transport Strategy 2 2020
		64	Difficulty of travelling on public transport for families, people with children	Edinburgh City Mobility Plan 2021
		65	Lack of access to transport contributing to inequality of opportunity for young people	Free Bus Travel for Under 19s Consultation Analysis Final Report 2020
		66	COVID-19 exacerbating existing inequalities in access to public transport	National Transport Strategy 2 2020
Active Travel	Network	67	Gaps in Active Travel Network discourage people from utilising it	Midlothian Active Travel Strategy
				Strategic Transport Projects Review 2: Case for Change Edinburgh and South East Scotland Region 2020
				West Edinburgh Transport Appraisal Refresh 2016
				Strategic Cross Boundary Cycle Development 2017
				Edinburgh City Mobility Plan 2021
				East Lothian Local Transport Strategy 2018 - 2024
		68		Granton Waterfront Development Framework 2020

Category	Sub-Category	No.	Problem	Source
			Strategic transport routes not always appropriately catering for active travel, just car / motorised transport	Strategic Transport Projects Review 2: Case for Change Edinburgh and South East Scotland Region 2020
				Strategic Cross Boundary Cycle Development 2017
		69	Lack of interchange from active travel to public transport outside main travel hubs	Strategic Transport Projects Review 2: Case for Change Edinburgh and South East Scotland Region 2020
	Lifestyle	70	Journeys not attractive to be undertaken by active travel	SEStran Strategic Network 2020
				Strategic Transport Projects Review 2: Case for Change Edinburgh and South East Scotland Region 2020
				Cycling Action Plan for Scotland 2017 - 2020
				West Edinburgh Transport Appraisal Refresh 2016
				Road Safety Plan for Edinburgh to 2020
				West Lothian Active Travel Plan 2016
				Sustrans: Safety in numbers: Scottish cycling collision hotspots 2017
				Edinburgh Active Travel Action Plan 2016
				Let's get Scotland Walking: The National Walking Strategy 2014
				Clackmannanshire Local Transport Strategy 2015 - 2019 Survey Findings
		71	Growth in walking and cycling to work has mostly occurred in Edinburgh, limited growth in other areas	SESplan Main Issues Report 2015
		72	Health disbenefits of lack of active travel and sedentary travel choices	Regional Transport Strategy Main Issues Report 2020
Freight	Road	73	Congestion delays road freight and deliveries	Draft Forth Freight Study: Case for Change in SEStran Area 2020

Category	Sub-Category	No.	Problem	Source
				National Transport Strategy 2 2020
		74	Empty freight vehicles creates unnecessary traffic	Draft Forth Freight Study: Case for Change in SEStran Area 2020
		75	Disruption to freight and logistics networks due to network resilience	Draft Forth Freight Study: Case for Change in SEStran Area 2020
		76	Increase in freight demand largely driven by more home deliveries	Regional Transport Strategy Main Issues Report 2020
	Rail and Sea	77	Declining demand for rail freight causing disused rail terminals. Limits scope for growth in the area and modal shift for freight. Lack of rail and sea freight leading to high dependence on road freight	Draft Forth Freight Study: Case for Change in SEStran Area 2020
				Regional Transport Strategy 2015 - 2025 Refresh 2015
Road	Network	78	Competing demands for road space create congestion with roads reaching capacity at peak times leading to long and unreliable journey times	Edinburgh City Mobility Plan 2020
				Edinburgh Strategic Sustainable Transport Study 2019
				East Lothian Local Development Plan 2018
				East Lothian Main Issues Report 2014
				West Lothian Main Issues Report 2014
		79	Roads are susceptible to impacts of flooding and landslides causing delays to drivers	West Lothian Main Issues Report 2014
		80	High vehicle speeds are risk to safety of all road users but especially cyclists and pedestrians	The Good Practice Guide to 20mph speed restrictions 2016
				Road Safety Plan for Edinburgh to 2020
		81	Lack of road maintenance creates potholes which are dangerous for all road users but particularly cyclists and motorcyclists	Falkirk Local Transport Strategy
				Draft Forth Freight Study: Case for Change in SEStran Area 2020
				Extract Main Issues Report Technical Note 2020

Category	Sub-Category	No.	Problem	Source
		82	Some roads and footways not being gritted appropriately during winter	Clackmannanshire Local Transport Strategy 2015 - 2019 Survey Findings
	Car Usage / Ownership	83	Car is more convenient mode than public transport and active travel even for short local journeys	Regional Transport Strategy Main Issues Report 2020
				Sustrans: Reducing car use: Views and behaviours of people who live and drive in towns and cities in Scotland 2019
				National Transport Strategy 2 2020
				Extract MIR Technical Note 2020
Parking	Demand	84	High demand for town and city parking	Regional Transport Strategy 2015 - 2025 Refresh 2015
				East Lothian Local Transport Strategy 2018 - 2024
				West Edinburgh Transport Appraisal Refresh 2016
				Edinburgh City Mobility Plan 2020
				National Transport Strategy 2 2020
				Climate Change Plan Update 2020
	Overspill Parking	85	High levels of on street overspill parking creates safety problems	Edinburgh Local Development Plan 2016
				Granton Waterfront Development Framework 2020
				West Edinburgh Transport Appraisal Refresh 2016
		86	Parking on footway causes issues for pedestrians, particularly those who are disabled, have mobility issues, have small children, pushchairs or luggage.	Edinburgh City Mobility Plan 2021
				Edinburgh Active Travel Action Plan 2016
				East Lothian Local Transport Strategy 2018 - 2024

Category	Sub-Category	No.	Problem	Source
	Freight	87	Insufficient lorry parking facilities meaning drivers can't rest	Draft Forth Freight Study: Case for Change in SEStran Area 2020
	Cycle	88	Cycle parking not conveniently located next to associated building / service	Edinburgh Local Development Plan 2016
Future Mobility	Technological Innovation	89	Increase in demand for digitally connected vehicles and Intelligent Transport Systems	SESplan Main Issues Report 2015
				Regional Spatial Strategy for Edinburgh and South East Scotland City Region 2020
		90	Uncertainty of the future due to emerging technological changes	Regional Transport Strategy Main Issues Report 2020
		91	Barriers to uptake of electric vehicles	National Transport Strategy 2 2020
				Extract MIR Technical Note 2020
				Rail Services Decarbonisation Action Plan Pathway to 2035, 2020
	Travel Behaviour Change	92	Reduced demand for public transport in wake of the COVID-19 pandemic leading to less services and more car dependency	Climate Change Plan Update 2020
				SEStran Strategic Demand Responsive Transport Study 2020
		93	Less demand for commuting particularly at peak times	National Planning Framework 4 Position Statement 2020
				Extract Main Issues Report Technical Note 2020
		94	Shift in the use of town centres and less retail trips	Regional Transport Strategy Main Issues Report 2020
Land Use Integration	New Developments	95	Significant proposals for new developments which are often built without convenient access to public transport leading to car dependency	Regional Transport Strategy Main Issues Report 2020
				Extract Main Issues Report Technical Note 2020
				East Lothian Local Development Plan 2018

These findings were subsequently used to inform the problems defined in Chapter 0 which are then cross-referenced back to the relevant evidence from the literature review as appropriate.

Consultation

SEStran Regional Transport Strategy

STAG Case for Change Report

6.0 CONSULTATION

6.1 INTRODUCTION

The development of the Case for Change has been informed by an extensive consultation process. The detailed findings from this are set out in a stand alone Consultation Report and summarised in this chapter. The consultation included the following elements:

- **Stakeholder Engagement**: Over 130 stakeholders were invited to participate in consultation either through workshops, individual meetings or by responding to briefing notes. In total 9 workshops and 21 meetings took place and 62 written responses were received. A full list of the organisations which participated in the stakeholder engagement along with the approach that was undertaken is included in Appendix B.
- **Public Consultation**: A public survey was undertaken online over a six week period between Monday 8th March 2021 and Monday 19th April 2021. This explored pre-pandemic travel patterns, anticipated post-pandemic travel behaviour along with the reasons for these travel choices. In total 998 responses were received.

The problems and issues identified from the stakeholder and public consultation reflect those identified through the preceding chapters and have also informed the development of the Problems Framework set out in Chapter 7.0.

6.2 STAKEHOLDER CONSULTATION

The following section provides a high-level summary of the consultee responses in a collective capacity. These have been disaggregated into the following overarching headings:

- Role of the RTS
- COVID19 Implications
- Modes and Operational Issues
- Cross Boundary Issues
- Technology

Role and Purpose of the RTS

It was felt that there is currently a real opportunity to prepare a forward thinking, ambitious RTS which can work alongside national and local transport and planning policies to help shape the delivery of transport across Scotland. It was noted there is currently an alignment on policies

which should be leveraged and used to drive forward ambitions within Scotland. Stakeholders noted the recent National Transport Strategy 2 (NTS2) and forthcoming Strategic Transport Projects Review (STPR2) provide overarching guidance at a national level, alongside the Scottish Governments Climate Change Plan and emerging National Planning Framework 4 (NPF4). It was felt that these strategic policies should be used to guide development of the RTS, which itself should seek to align and deliver at a regional level.

These views were closely tied to responses to the climate emergency and routes to net zero, both of which have significant transport implications. Stakeholders tended to believe that the RTS should act as the link between the National and Local policies, helping to facilitate national policies at a regional level whilst working with local authorities where appropriate to shape local delivery, and crucially being the conduit to improved cross border transport schemes between local authorities.

Essentially, stakeholders felt that the RTS should be ambitious in formation, both in terms of setting targets and outcomes.

Behavioural change was raised by a number of stakeholders and again linked to the climate emergency and current transport situation. These stakeholders felt that SEStran, through the RTS, has a significant role to play in influencing behavioural change with regards transport choices across the region.

The final point which was made was that transport does not and should not operate in a bubble. The next RTS has to work hand in hand with the planning industry to ensure developments and how they are served are properly considered early in the process. These links should not be confined to the National Planning Framework and it is important to recognise the role that Community Planning plays in society along with the benefits to residents across the region that it offers.

COVID-19 Implications

The majority of consultees highlighted that there is a large amount of uncertainty regarding how the transport network will operate once COVID-19 restrictions have been lifted.

One of the major concerns stakeholders raised was the feasibility of commercial public transport services once restrictions have been lifted and their recovery. The messaging from both the UK and Scottish Government through the pandemic has been to avoid using public transport unless journeys are necessary. As a result, patronage has significantly declined. Lothian Buses – the dominant bus operator in Edinburgh – reported 9% of pre pandemic patronage during the first lockdown with demand peaking at 45% before Christmas. Reversing this messaging and encouraging people back onto public transport is the Confederation of Passenger Transport's key concern at present. Stakeholders, particularly those within public transport, warned that undertaking a promotional campaign encouraging travel without a change in Government messaging is unlikely to make any real positive changes.

To date, the Scottish Government have been subsidising bus services throughout the pandemic. This has allowed services to continue to operate and provide transport to key workers. Several consultees noted that when the focus turns to transitioning from this support, unless managed properly, it is likely that the number of services on the network will reduce significantly. As such, it was felt important the transition is planned with all relevant parties in a way to least impact customers. First Buses noted that they have a plan to return to 90% of pre-pandemic capacity but advised that even at that level, some services will have to be cut.

Bus operators across the SEStran area believe that it is likely bus patronage in the area will fall relatively more than in other regions of Scotland. The reasons for this were three-fold. Firstly, the baseline bus patronage is significantly higher than other areas in Scotland, and therefore the percentage decrease will be higher. Secondly, a large proportion of workplaces in Edinburgh have now widely adopted home working. It is likely that home working will continue, in one way or another, which reduces travel demand and patronage. Finally, some of the bus operators noted that there appears to be greater compliance with government guidelines in the SEStran area than in other areas of Scotland.

With organisations across the country adapting to home working, many stakeholders noted travel demand is unlikely to return to pre-pandemic levels. While many offices in city and town centres sitting empty, it is likely that there will be an impact on the surrounding areas. For example, various stakeholders highlighted that local shops could have a reduction in footfall as a result.

Whilst the majority of the above has focused on the effects of the pandemic on bus operators, ScotRail has also suffered a huge drop in passenger numbers. Again, Scottish Government messaging has been clear that people should only travel for essential purposes. As restrictions are relaxed, ScotRail will be in a similar position to bus operators, reliant upon the public being happy to travel on public transport.

Modes & Operational Issues

This section explores mode-specific and operational issues raised by stakeholders.

Road & Vehicular

Several stakeholders recognised the strategic importance of the Queensferry Crossing. Although the Confederation of Passenger Transport noted that the opening of the Queensferry Crossing has reduced journey times crossing the Forth itself, all this time is lost when vehicles arrive at Queensferry Road. Being the main link from the bridges into Edinburgh, it is heavily congested. Lothian Buses also highlighted this to be a key transport problem impacting their services.

Another major pinch point on the road network is Sheriffhall Roundabout. Midlothian Council noted that this severely impacts public transport travelling north from Midlothian into Edinburgh. It was suggested that, around 70% of people making this journey are doing so by car.

It was noted that the councils within the SEStran region are at varying stages in terms of rolling out electric charging infrastructure and supporting the transition to decarbonisation. The majority of the councils noted that there is very little regional or national guidance on charging and infrastructure. Some councils felt that they do not have the resources to develop and implement an electric infrastructure strategy. For example, Clackmannanshire Council highlighted that they are unsure if they are placing chargers in the best places for the community. On the other hand, East Lothian Council noted that they have pushed forward and implemented a wide range of charging infrastructure across the local authority area and have begun charging a fee for use. Overall, it was suggested that better guidance and support for councils in terms of a strategy for the roll-out of charging and other infrastructure would be useful.

Several of the local authorities raised concerns regarding equality issues around electric vehicles. Although the vehicles are relatively inexpensive to run compared with conventional vehicles, the upfront cost is significant and therefore not an option for many people. Additionally, not everyone has a house with a private driveway or area suitable for an electric charging point. It was recognised that while it is not necessary to charge vehicles at home locations, it is highly desirable and was thought to be a barrier to owning an electric vehicle.

Concerns were also raised regarding the capacity of the grid network and whether it will be able to cope with the mass transition to electric vehicles. Clackmannanshire and the Scottish Borders councils specifically noted that Scottish Power Energy Networks had raised concerns about the local grid and at present it was not suitable for the number of charging points which would be required. Lothian Buses also noted that charging their fleet every night would require a huge amount of electricity, which again will draw power from the grid.

A number of stakeholders raised the question of introducing some form of Road User Charging (RUC) within the area and across the country in general. Some believed that RUC will be inevitable as the vehicle fleet becomes electric, which will have ramifications for the UK Treasury with the loss of fuel duty. Others noted that RUC could be used as part of a carrot and stick approach to force modal shift to greener modes and assist with net zero aspirations. Whilst most stakeholders felt that RUC was inevitable at some point, they did warn that any introduction needs to be carefully considered and phased, so as not to stifle the COVID-19 recovery.

The Freight Transport Association, Road Haulage Association and the bus operators raised serious concerns regarding the implications of Edinburgh's Low Emission Zone. Although the boundaries have not been confirmed yet, the Freight Transport Association noted that it would make deliveries in and out of Edinburgh significantly more complicated and difficult to carry out. Several stakeholders felt that of the four cities implementing low emission zones – Aberdeen, Edinburgh, Glasgow and Perth – Edinburgh had carried out the least consultation with the industry.

Concerns were raised about pressures on Local Authority budgets, and each Councils ability to maintain their road infrastructure to a high standard.

Rail

Several of the councils noted that there are capacity issues on the railway which encourages private car use. The specific lines highlighted were:

- East Coast Main Line (ECML)
- Borders Railway
- Fife Circle

Capacity issues on these lines lead to a lack of available seating and in some instances, passengers unable to board the train. ScotRail and Network Rail noted that they are aware of the capacity issues on the network and they were carrying out work to resolve these issues. However, these capacity related projects have been put on hold due to the pandemic and the uncertainty surrounding future travel demand.

Network Rail have carried out some analysis looking at key drivers of demand in Glasgow and hope to carry this over to Edinburgh. This analysis will be important when considering COVID-19 recovery. As previously mentioned, the Government message to avoid public transport, unless for necessary journeys, has resulted in significant patronage decline.

In terms of future investment, the Levenmouth Reconnected project is committed. This includes the reinstatement of Levenmouth Rail link with two stations at Cameron Bridge and at Leven. Fife Council, along with other stakeholders, noted that this project will significantly improve access to key services.

It was noted that there are other rail projects in the region that are being considered or promoted by various bodies and groups including Blindwells in East Lothian, St Andrews in Fife and the Borders Extension. At present, these are being taken forward independently with funding from Transport Scotland's Local Rail Development Fund. Each of these projects are working through the system but no decisions have yet been made and, as yet, neither ScotRail nor Network Rail have direct involvement.

Parking capacity issues at train stations were cited by many stakeholders as a major problem. It should be acknowledged that, similar to capacity issues on services, this was a pre-pandemic problem, and it is unknown whether travel demand will return once restrictions are lifted. As is the case across the country, when rail station car parks become full, then problems manifest in residential areas as people try to park close to the station.

Accessing stations was also highlighted by stakeholders as a major problem across the region. This included Fife Council noting that several stations in the area are not Disability Discrimination Act compliant. Drem Station was also highlighted during consultations as being particularly

difficult to access. Stakeholders noted that there can be land ownership issues with areas surrounding stations which limits what can be done. However, it was highlighted that this needs to be considered in the future.

Bus

Local authorities and bus operators alike noted the decline in bus use that has been seen across Scotland in the last decade. Although Edinburgh itself has not been affected to the same extent, it is still a concern for the surrounding areas and the future of the industry. First Bus noted that there are many reasons for the decline in patronage, noting that an 11-year freeze on fuel duty, investment in roads and rail have all combined to make travel by these modes cheaper. By contrast, there has been limited investment and support for the bus industry and it is therefore unsurprising that patronage drops. As a result, fares have increased and bus travel becomes relatively more expensive.

However, in Edinburgh, Lothian Buses have seen success in recent years which opposes the trend across the country. They noted that there is no suburban rail network in Edinburgh to compete with and they have invested heavily into their fleet to ensure they have the highest quality of vehicles on the network.

It terms of decarbonisation, it was noted that that the bus operators in the region are going to struggle to meet the net-zero target. It was felt that it is currently not feasible to have electric buses on the network. Stakeholders advised that these vehicles do not have the range required for the services in the region. Lothian Buses noted that they have recently invested to ensure their fleet was Euro 6 standard but noted that they may struggle to meet more stringent requirements. Operators also raised concerns whether, even if the infrastructure was in place, would the grid be able to cope with the large number of buses requiring charging.

First Bus believed that there should be more direction and guidance for bus operators in terms of transitioning to electric vehicles. First have been involved in pilot schemes for hydrogen buses in Aberdeen and note that these vehicles have the range which electric vehicles can not match however the capital cost is prohibitive.

Congestion was cited as the main problem impacting the bus industry in the area, especially on the main arterial routes into Edinburgh. The reliability and frequency suffer as a result on congestion. The Confederation of Passenger Transport (CPT) noted that during lockdown their members experienced journey times of 15%-25% faster. It is important to try lock in some of these time savings going forward, offering fast bus services that offer better competition to the private car.

The Bus Partnership Fund is seen as a big opportunity for the industry. CPT had concerns that some of the smaller local authorities may not have the resources to put forward bids for this fund. The majority of local authorities in the region noted that they are working with operators and various other groups to put forward a bid. The majority of the bids seek to address some of the congestion issues with bus priority and road reallocation.

Bus Operators noted that Spaces for People temporary cycle infrastructure was introduced without adequate consultation with the industry. Operators understand the need for new infrastructure however road space reallocation without discussion has serious effects on their business.

Within rural areas, the bus industry faces significant struggles with declining patronage, low population density and expectations that they should still be able to serve people's needs. Stakeholders noted that more must be done to support and embrace Community Transport, particularly within rural areas.

Tram

In general, there was very little commentary provided by stakeholders on Tram services, potentially due to the discussions being framed along the lines of problem identification. Those who did mention the Tram noted its greener credentials, and in terms of improvements, looked for line extensions to create more of a network than currently available. Indeed, a number of local authorities felt that the Tram should run further out with Edinburgh city boundary and become a core part of the regional network rather than an Edinburgh centric service.

Others felt that as and when the Tram network is extended, there is an opportunity to re-cast buses to act as feeder services for the Tram. Properly aligned, this would cut the numbers of vehicles entering Edinburgh City Centre.

Walking & Cycling

Walking, cycling and active travel was viewed positively across most stakeholders with a recognition of the benefits in terms of congestion, air quality and, crucially, health which can be accrued from investment and promotion of these modes of travel. Local Authorities noted that funding for these types of modes has significantly increased in recent years through Sustrans and Cycling Scotland. The majority of infrastructure funding is available through Sustrans and local authorities now have better developed relationships with Sustrans as well as understanding the process better. This has led to more ambitious projects being realised and a greater spend on active travel infrastructure being achieved. Local authorities do however still note issues in requirements to match fund and believe that criteria to achieve funding awards can be very challenging which can lead to schemes being abandoned or in some cases not being attempted.

Whilst local authorities are grateful that there are funding pots which they can access to deliver schemes, they note that these are all to be used for capital investment. Once new infrastructure is introduced, there is the requirement for the local authority to maintain the asset. Whilst most recognised that this is a reasonable situation, they all noted shrinking budgets which severely affected their ability to undertake developments as they struggle to pay for future upkeep.

Whilst the majority of issues raised with walking and cycling centred around perceived safety and lack of segregated routes, specific commentary was provided on issues of severance caused by the Edinburgh bypass and lack of safe crossing points.

A number of bus operators and the freight industry commented on the introduction of 'pop up' cycling infrastructure which was introduced during the pandemic. Whilst most seemed to have no issues with provisions for active travel, a number noted a lack of consultation with their industry in the development of these routes. Both bus and freight stakeholders noted that whilst reallocation of road space may be a worthy goal, it does affect their respective industry and they found that many of these temporary schemes were introduced without notice.

Freight

The Freight Transport Association (FTA) noted that the biggest issue for them right now is the UK's exit from the EU. They reported that Brexit is fundamentally making exporting out of Britain much more difficult now than it used to be. One consequence is that some companies are looking at their business models and making decisions whether to remain in Britain or move to Europe.

Several stakeholders highlighted that modal shift must be supported where appropriate, but it is important to acknowledge that rail freight is only relevant for certain goods. The FTA said that they have been trying for years to get whisky transported via rail, but this has never happened. It is important that this is fully understood and rail is not seen to be the one answer.

Decarbonisation is really important for all modes of transport including trucks. Stakeholders noted that electric is realistic for vans, provided that the infrastructure is in place to support the industry. Scotland have pinned themselves to hydrogen being the future for HGVs but they are very expensive. It is important to note that there is not one single solution that will solve all problems. Additionally, it was highlighted that the truck fleet in Scotland has never been cleaner with about 70% of the vehicles being at Euro 6 standard.

Throughout the pandemic, home deliveries have dramatically increased. This has resulted in large numbers of additional jobs in the industry being created although the delivery mode has shifted from large haulage vehicles to small vans and often cars. Flexibility has been a positive for the industry and has been aided by technology through real time tracking app's and scheduling systems. There are however concerns on the sustainability of this offshoot, as and when more people go back to work at offices / premises, etc. It should be noted that the localised delivery has no doubt been assisted by lack of traffic on roads through lockdown periods.

Cross Boundary Movements

Several stakeholders noted that providing cross boundary active travel routes is important to facilitate both commute and leisure journeys. However, it was highlighted that there can be problems joining up active travel links at the boundaries of local authority areas. It can be difficult for neighbouring councils to coordinate funding and desire for specific paths at the same time. Often this results in significant gaps in the network. It was suggested that there is role Sustrans to coordinate with authorities and ease this process.

Fife Council specifically noted that there are plans to improve transport provision at the Tay Bridge, facilitating movements from the SEStran area into Dundee. It is anticipated that there will be a park and ride facility south of the river, linking with the existing bus services. Additionally, improvements will be made to the active travel provision across the bridge.

During discussions with the neighbouring authorities, it was highlighted by South Lanarkshire Council that there is demand to travel east into the SEStran area. It was noted that generally, east to west travel movements are alright, despite the M8 being heavily congested.

Technology Implications

Across a range of stakeholders, it was noted that there is an aspiration for an integrated public transport ticketing model across the region. Stakeholders felt that integrated ticketing would make journeys easier and encourage people onto public transport. However, Lothian Buses did note that they have removed their previously very successful RidaCard because customers want to simply use contactless payment with their bankcard and not have to carry an additional travel card. This is something that will have to be considered if integrated ticketing is explored.

Many stakeholders felt that in the future Mobility as a Service (MaaS) will be important across the region. It was suggested that if the government is serious about meeting their climate targets, alternative options to the private car would have to be offered. MaaS would meet customers direct requests, likely via an app, across a range of transport options and therefore ensure people are able to travel to where they need to get to.

It was highlighted by a few stakeholders that car sharing and car clubs have the potential to aid a reduction in car ownership, especially in densely populated areas. These clubs would rely on technology to facilitate the booking, picking up and dropping off of the vehicle.

Several stakeholders highlighted that improving digital connectivity could reduce the need to travel for many people. It was noted that during the pandemic it has been shown that people are able to work at home, reducing travel demand. Improving digital connectivity further will give people the option of staying at home.

6.3 PUBLIC SURVEY

The public survey was open from Monday 8th March 2021 and Monday 19th April 2021. Initially there were 1055 responses however a data cleaning process was undertaken to remove any respondents who answered less than four questions and to account for potential duplications from the same person. After this process, there were 998 responses remaining.

The following section summarises some of the key findings. For the purposes of the Case for Change Report, this section has been reported across the SEStran area however individual local authority reporting has been provided within the full Consultation Report.

Demographics

73% (n=727) of respondents indicated which gender they identify as. 53% were female, 45% were male and 3% either preferred not to say or specified other.

50% (n=500) of the respondents indicated their age, this is shown in Figure 6.1. The majority of respondents, 70% fall evenly between the 45-54 and 55-64 age categories.

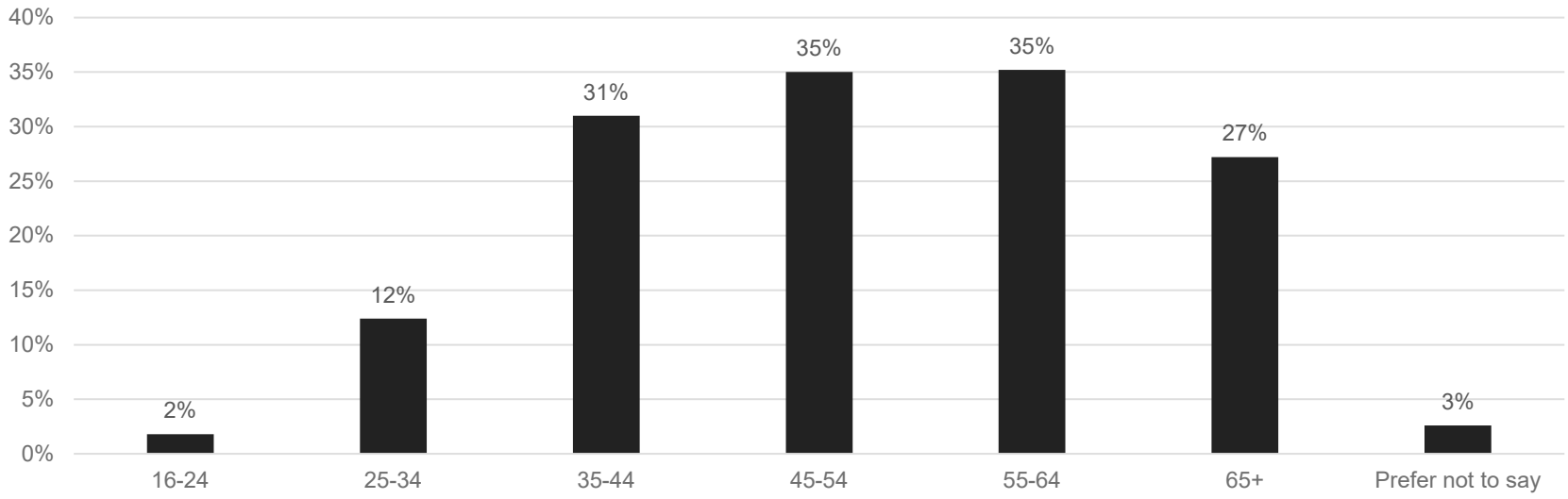


Figure 6.1 Respondents Age

Local Authority Breakdown

All 998 respondents were asked in which SEStran local authority they lived. 42% (n=415) of respondents were from Midlothian. Only 2% of respondents were from Clackmannanshire and West Lothian respectively, while only 3% were from both Falkirk and East Lothian. This is shown in Figure 6.2.

Due to the imbalance of respondents across the local authorities and the need to understand problems with regional issues, the full analysis has also been undertaken by local authority.

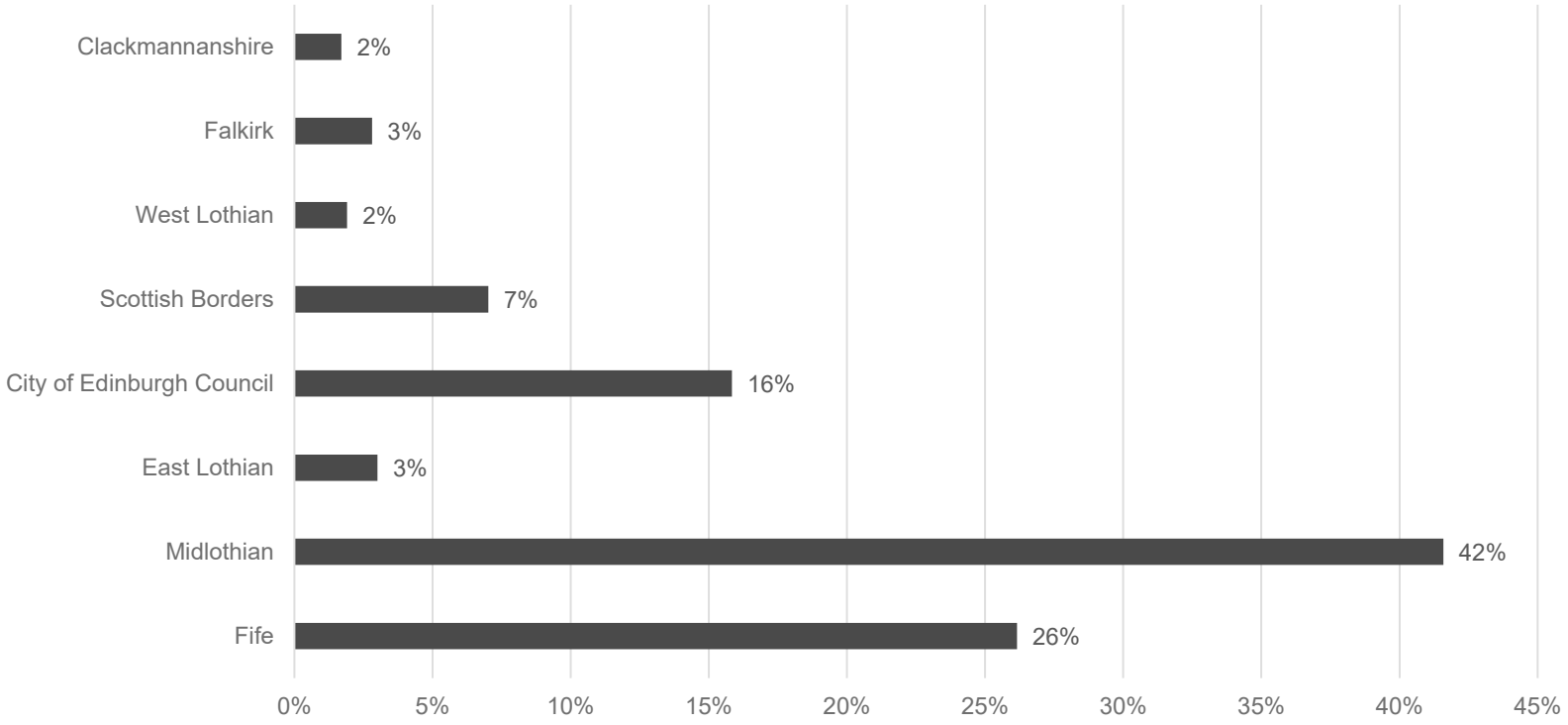


Figure 6.2 Local Authority Breakdown

Car / Van and Bicycle Ownership or Access

Respondents were asked whether they own or have regular access to both a car / van and a bicycle. Among the respondents, those who live in East Lothian had the highest car ownership at 97%. This was closely followed by 96% of those living in the Scottish Borders. West Lothian had the lowest car ownership at 68%.

West Lothian had the highest bike ownership at 95%. The lowest bike ownership was among respondents living in Fife at 55%, closely followed by Midlothian at 56% as illustrated in Figure 6.3.

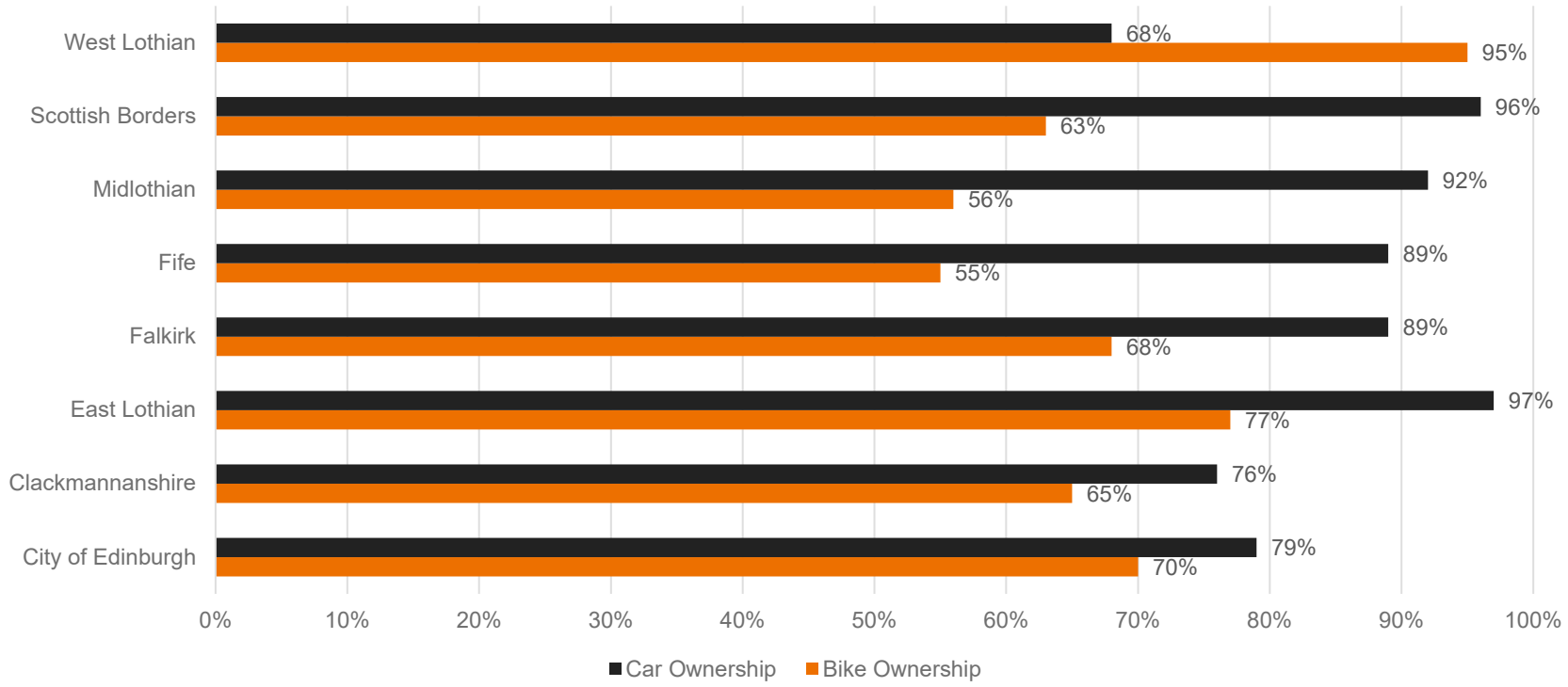


Figure 6.3 Car and Bike Ownership

Bus Travel Prior to Pandemic

Respondents were asked, prior to the pandemic, did they travel by bus in a typical month. **62% (n=545) respondents indicated that they had.**

Overall, respondents were more satisfied than dissatisfied with the bus services across the SEStran region. Respondents were most satisfied with physical access to the vehicle, followed by physical access to the stop. Meanwhile, respondents were least satisfied with the time of their last service with 9% (n=45) respondents choosing very dissatisfied. This is likely an issue in the more rural areas of the SEStran region. The full results are shown in Figure 6.4.

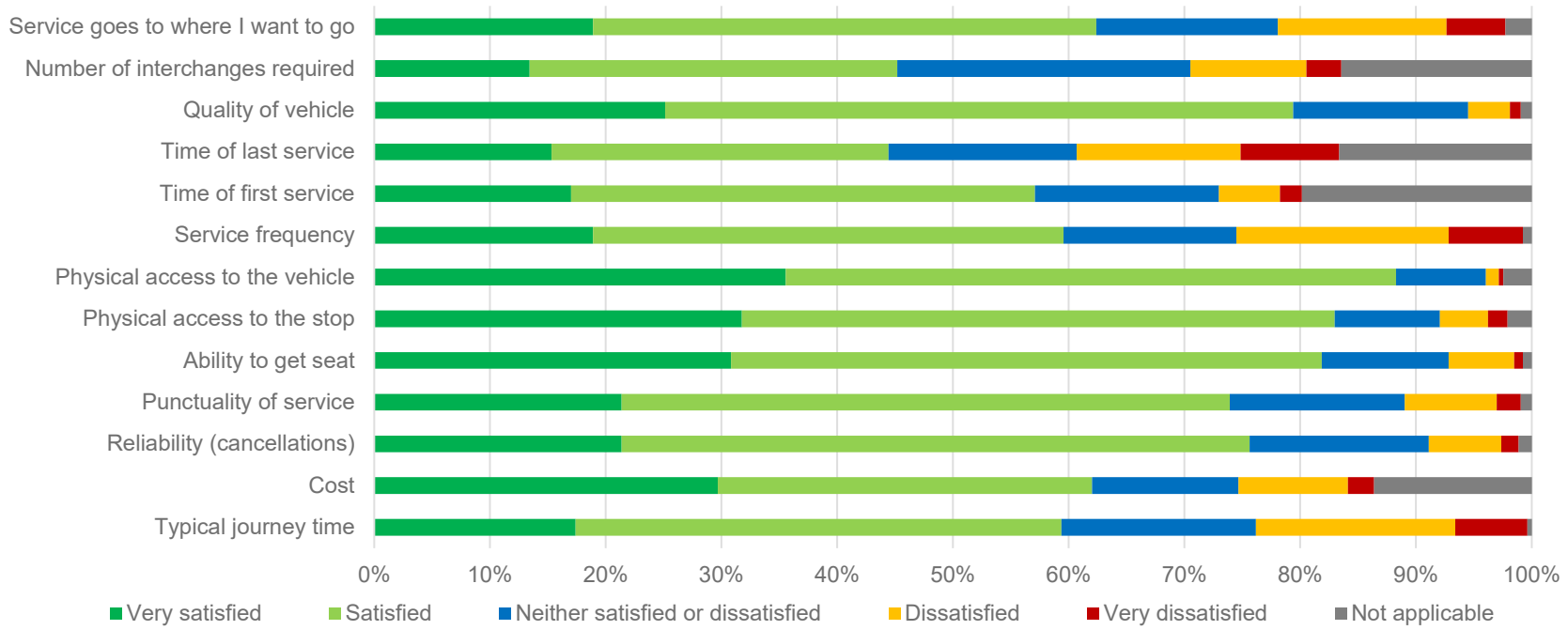


Figure 6.4 Satisfaction with Bus Services

Respondents were asked to indicate which factors were the most important for them in choosing not to travel by bus. As shown in Figure 6.5, l**ack of useable connections, journey times and service frequency were the most important factors** for the respondents choosing not to travel by bus.

Respondents indicated that the least important factors were physical access to both the vehicle and the stop.

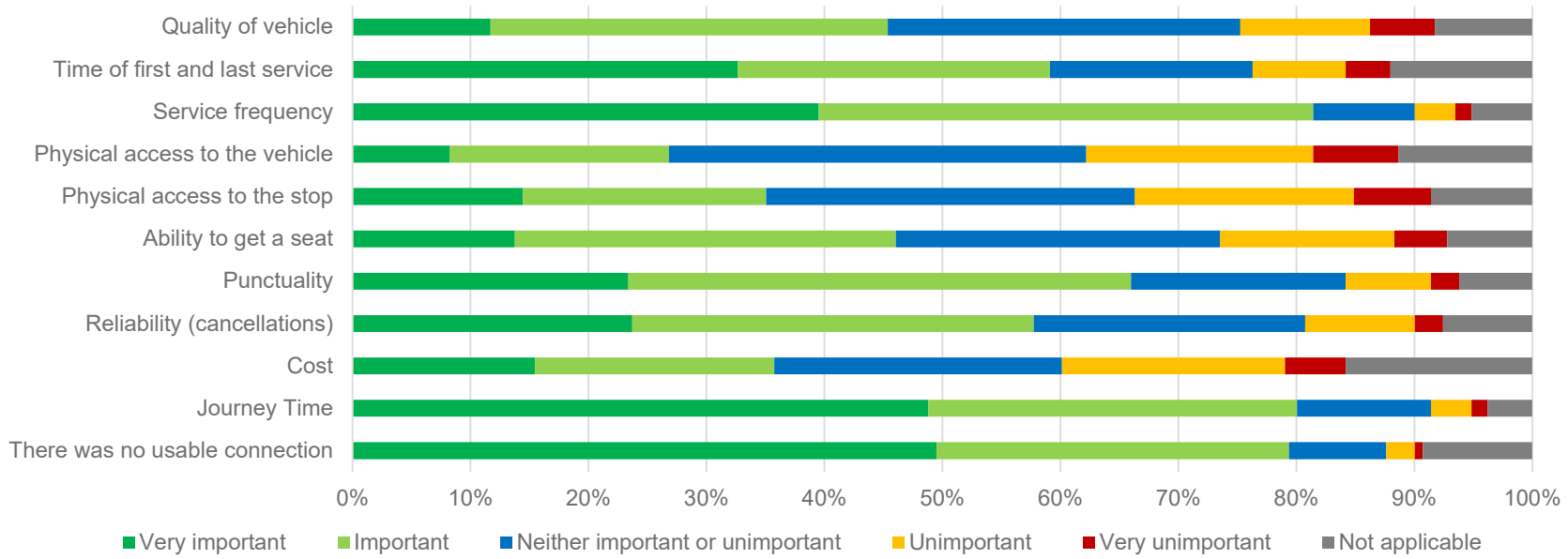


Figure 6.5 Factors Influencing Decision on Whether to Travel by Bus

Rail Travel Prior to Pandemic

Respondents were asked, prior to the pandemic, did they travel by train in a typical month. **44% (n=378)** respondents indicated that they had.

Respondents were most satisfied with typical journey times with 80% (n=296) of respondents choosing either satisfied or very satisfied. They were also satisfied with physical access to the station and vehicle.

On the other hand, respondents were least satisfied with the cost of train fares with 44% (n=114) of respondents stating that they were either dissatisfied or very dissatisfied. The full findings are shown in Figure 6.6.

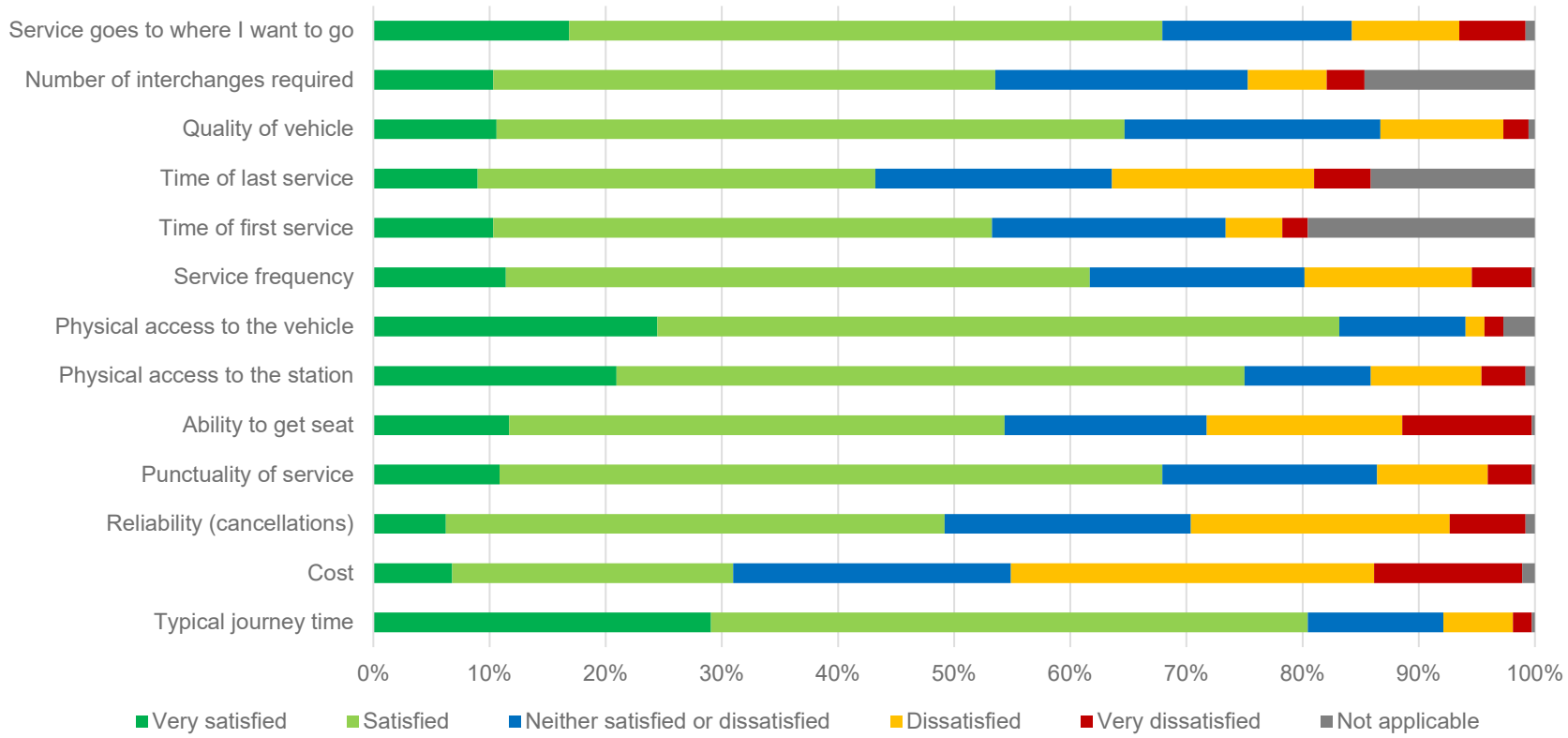


Figure 6.6 Satisfaction with Rail Services

Respondents were asked to indicate which of the following factors were the most important for them in choosing not to travel by train. 334 respondents answered this question with the results shown in Figure 6.7.

Lack of useable connections, service frequency and cost were the most important reasons for the respondents not travelling by train. 82% (n=274) respondents noted that there being no useable connection was either important or very important. Physical access to the vehicle was indicated to be the least important factor.

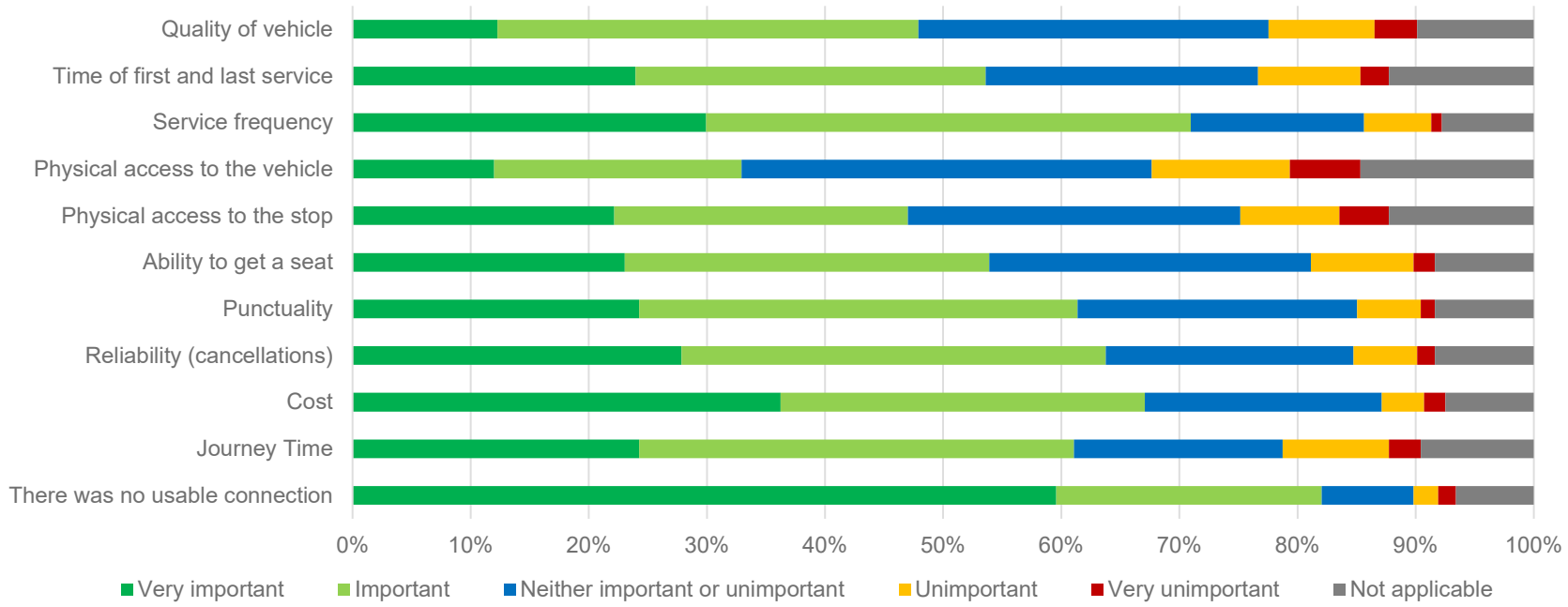


Figure 6.7 Factors Influencing Decision on Whether to Travel by Rail

Walking

Respondents were asked to indicate, when walking, how satisfied they were with their journey. 805 respondents answered this question with the results outlined in Figure 6.8.

As shown, respondents were most satisfied with the directness of their journey. Closely followed by their feeling of safety. Respondents were least satisfied with the quality of walking paths with 28% (n=230) respondents choosing either dissatisfied or very dissatisfied.

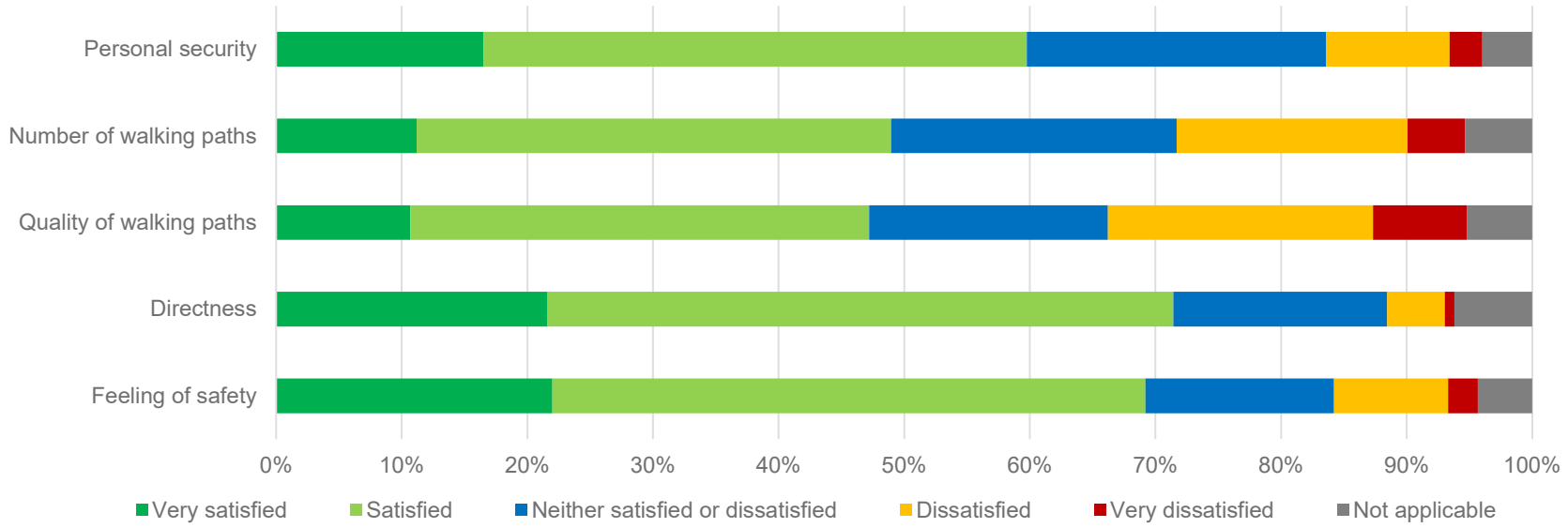


Figure 6.8 Satisfaction with Walking

Cycling

Respondents were then asked to indicate how satisfied they were with their journey while cycling. 805 respondents answered this question and the results are set out in Figure 6.9.

As shown, the majority of respondents chose not applicable which would suggest that they do not cycle. Respondents were most satisfied with personal security and directness of journeys. 28% (n=222) and 28% (n=223) noted that they were very satisfied or satisfied with directness and personal security respectively. Respondents were least satisfied with the degree of segregation from traffic with 38% (n=304) respondents choosing either dissatisfied or very dissatisfied.

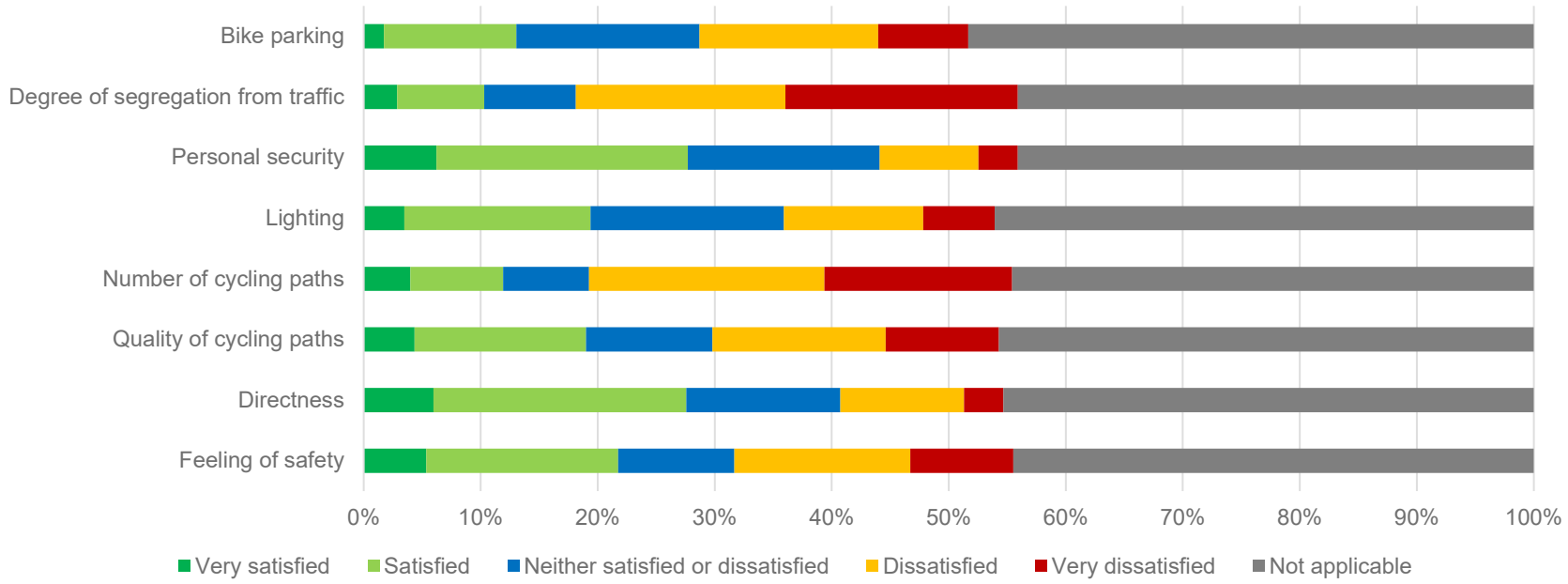


Figure 6.9 Satisfaction with Cycling

Respondents were asked whether there were journeys that they made by car or public transport where they would have rather walked or cycled. **36%(n=262) of respondents noted that there were journeys they would have liked to have either walked or cycled.**

They were also asked which factors affect whether they choose to walk or cycle with the results outlined in Figure 6.10. **Segregation from traffic was by far the most important factor with 91% (n=227) of respondents choosing either very important or important.** Respondents noted that the least important factor was personal security.

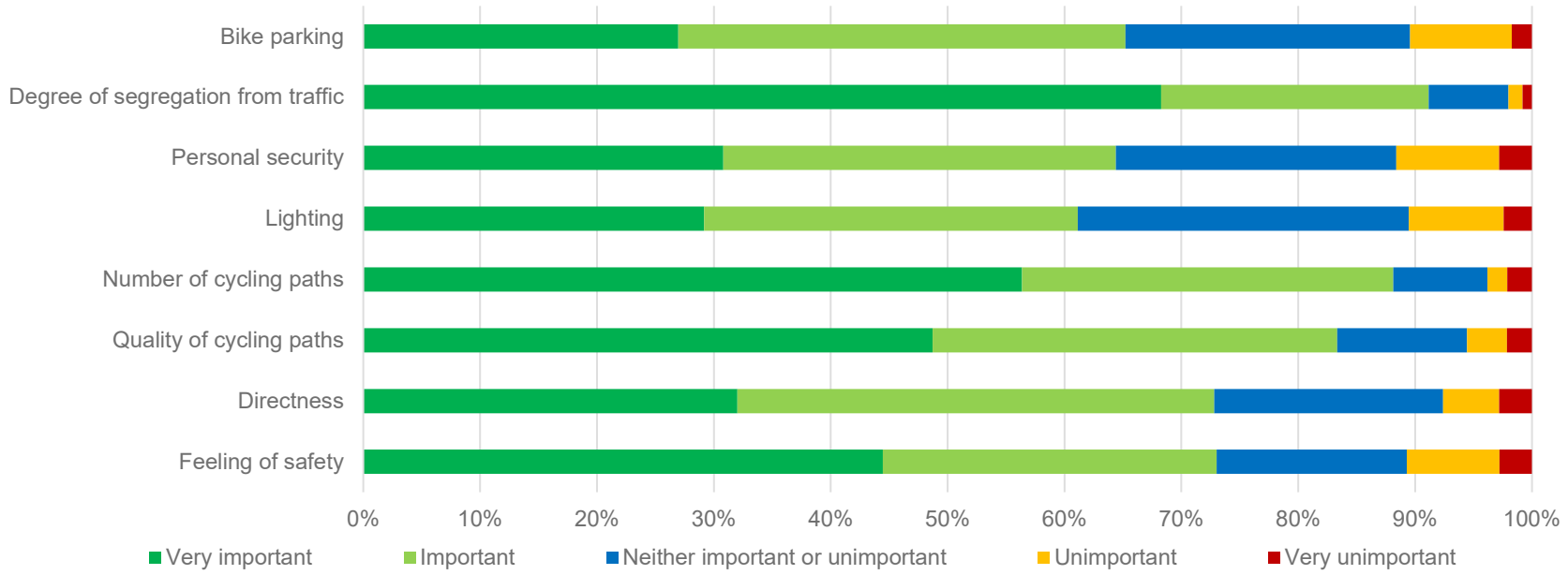


Figure 6.10 Factors Affecting Whether People Would Walk or Cycle

Car Use

Respondents were asked when travelling by car how satisfied they were with various elements of their journey. 780 respondents answered this question and the results are shown in Figure 6.11.

Overall, respondents were not satisfied with their journeys by car. They were least satisfied with the road surface quality with 76% (n=594) noting that they were either dissatisfied or very dissatisfied with road surfaces.

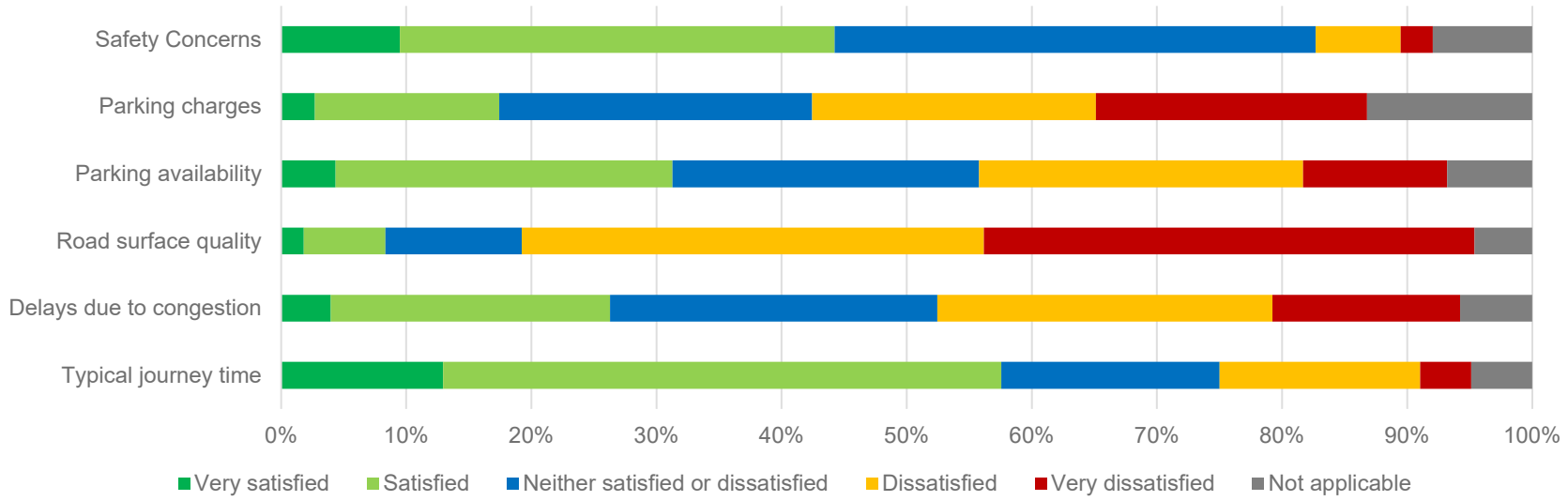


Figure 6.11 Satisfaction with Car Journeys

Post Pandemic Travel

Respondents were asked, assuming a return to normality, what they thought should be the priority for transport in future. A list of possible options was given, and respondents were asked to rank their top 5 priorities 1st – 5th. A weighted average was calculated for each of the options; options ranked 1st got 5 points down to that placed 5th getting 1 point.

The top three priorities were as follows:

1st (weighted average = 3.89)	To take climate action
2nd (Weight average = 3.64)	To improve our health and wellbeing
3rd (weighted average 3.28)	To help deliver inclusive economic growth

Travel Patterns

Respondents were asked whether, once COVID-19 restrictions are lifted, they think their travel patterns will be the same as before or will they change. 740 respondents answered this question with the results shown in Figure 6.12.

47% (n=345) of respondents indicated that their travel patterns will change. 44% (n=322) noted that their travel patterns will remain the same.

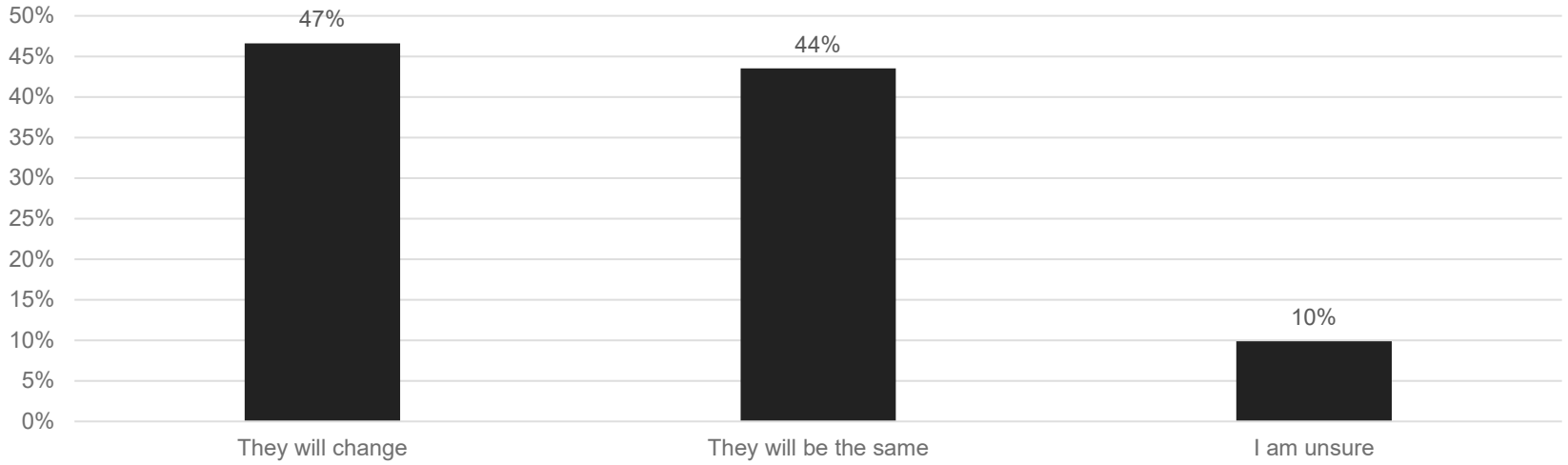


Figure 6.12 Anticipated Changes in Travel Patterns in the Future

Home Working

Respondents were asked whether, once COVID-19 restrictions are lifted, if they expect to work from home more often compared to before the pandemic. 416 respondents answered this question with the results shown in Figure 6.13.

Only 4% (n=16) of respondents noted that they will work fully from home. In total, 51% (n=213) respondents noted that they will work between 1 and 4 days a week from home in the future. 25% (n=103) respondents noted that they will not be working from home any more often.

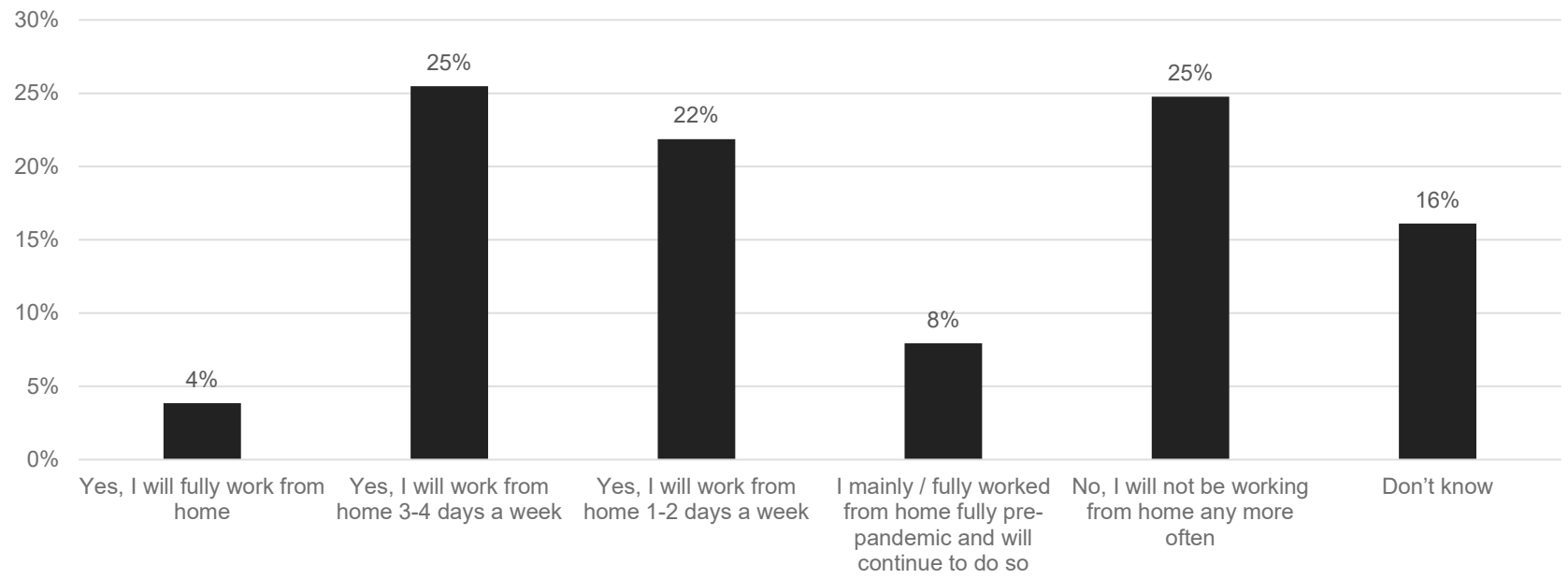


Figure 6.13 Anticipated Frequency of Working from Home in the Future

Shopping

Respondents were asked whether, once COVID-19 restrictions are lifted, if they are more or less likely to shop online or use home deliveries. 416 respondents answered this question. **The majority of respondents indicated that their shopping habits will be similar to before the pandemic.** 32% (n=134) and 22% (n=90) of respondents noted that they are more likely to shop online for products they would normally buy in store and for supermarket shopping respectively.

Public Transport

Respondents were asked whether, once COVID-19 restrictions are lifted, if they expect to use public transport more or less often. 399 respondents answered this question.

The majority of respondents, 49% (n=194), indicated that they would travel on public transport about the same. In total, 29% (n=116) respondents noted that they expect to travel on public transport either much less or less.

Active Travel

Respondents were asked whether, once COVID-19 restrictions are lifted, if they expect that they will cycle more or less often than before the pandemic. 388 respodnents answered this question with the results shown in Figure 6.14.

32% (n=126) of respondents noted that they don't own a bicycle. Meanwhile, 30% (n=116) outlined that they would cycle about the same. In total, 32% (n=124) respondents indicated that they expect to cycle either much more or more often.

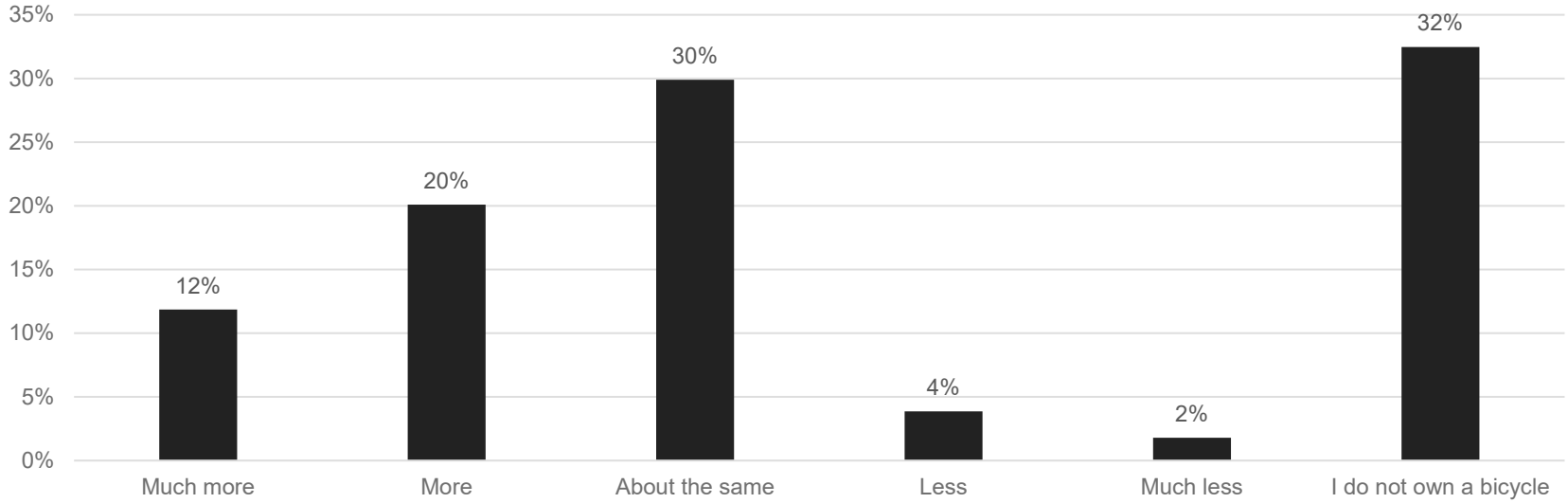


Figure 6.14 Anticipated Frequency of Cycling in the Future

Car Use

Similarly, respondents were asked whether once COVID-19 restrictions are lifted if they expect that they will use their car / van more or less often. 415 respondents answered this question.

46% (n=191) of respondents noted that they expect to use their car/van about the same. In total, 33% (n=137) respondents indicated that they expect to drive either less or much less in the future.

Respondents were then asked whether they expect to reduce the number of vehicles in their household. 737 respondents answered this question.

By far the majority of respondents, 81% (n=599) indicated that they do not plan to reduce the number of cars in their household.

Finally, respondents were asked whether they anticipate purchasing a fully electric or plug-in hybrid vehicle. 736 respondents answered this question with the results shown in Figure 6.15.

The majority of respondents, **30% (n=223), noted that they are currently not considering purchasing an electric or hybrid vehicle.** However, 36% (n=263) of respondents noted that they would consider purchasing an electric / hybrid vehicle between the next 2 and 5 years.

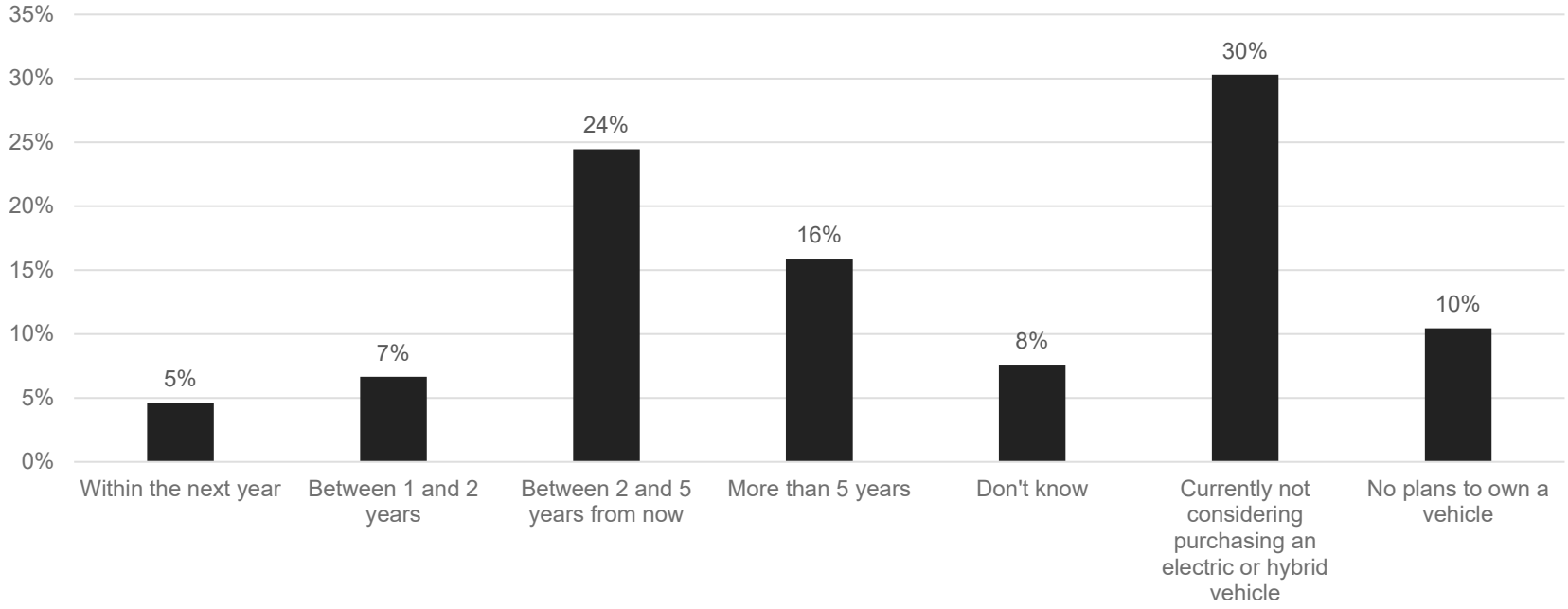


Figure 6.15 Likelihood of Purchasing an Electric of Hybrid Vehicle

Problems, Issues, Constraints & Opportunities

SEStran Regional Transport Strategy

STAG Case for Change Report

7.0 PROBLEMS, ISSUES, CONSTRAINTS & OPPORTUNITIES

7.1 TRANSPORT PROBLEMS FRAMEWORK

Every STAG-based project starts from a set of transport problems and, to a lesser extent, transport opportunities. These are the foundations of any study and STAG notes that as well as the problem themselves (i.e., as experienced by the user) the '*analysis should, instead, explore the root causes and consequences of problems*'.

To be meaningful to the public, the transport problems which the RTS is aiming to address must reflect problems experienced in everyday life by individuals, organisations and businesses in the SEStran area. In addition, these problems should be evidenced where possible and defined by a series of metrics or key performance indicators (KPIs) using the evidence base set out in this Case for Change, the Equalities Impact Assessment Scoping and Strategic Environmental Assessment Scoping. These KPIs should then in turn form the basis of the subsequent Monitoring & Evaluation Framework thus providing a coherent end-to-end process for the RTS and its implementation.

From a **user perspective**, these transport problems will impact on individuals and groups including those with protected characteristics but are likely to be related to a relatively small number of parameters which define any travel such as:

- cost of travel (especially relative to disposable income)
- lack of public transport connectivity
- personal security / safety
- physical accessibility of services
- punctuality of travel (public transport punctuality / congestion making road-based journey times unreliable)
- quality and comfort of journey
- reliability of travel (cancellation of public transport services)
- requirement for excessive interchange
- travel time (relative to other modes)

As shown in the **Problems Framework** below, these transport problems as experienced by the user:

- can usually be traced back to a **root cause**, associated with the transport supply-side which in turn informs the identification of Transport Planning Objectives and options
- can have a **travel choice consequence**, e.g., use of less sustainable modes, journeys not being made
- have a wider **societal consequence**, e.g., economic (e.g., wasted time), environmental (e.g., emissions), health & wellbeing (e.g., reduced levels of walking), social (e.g., exclusion from employment opportunities)

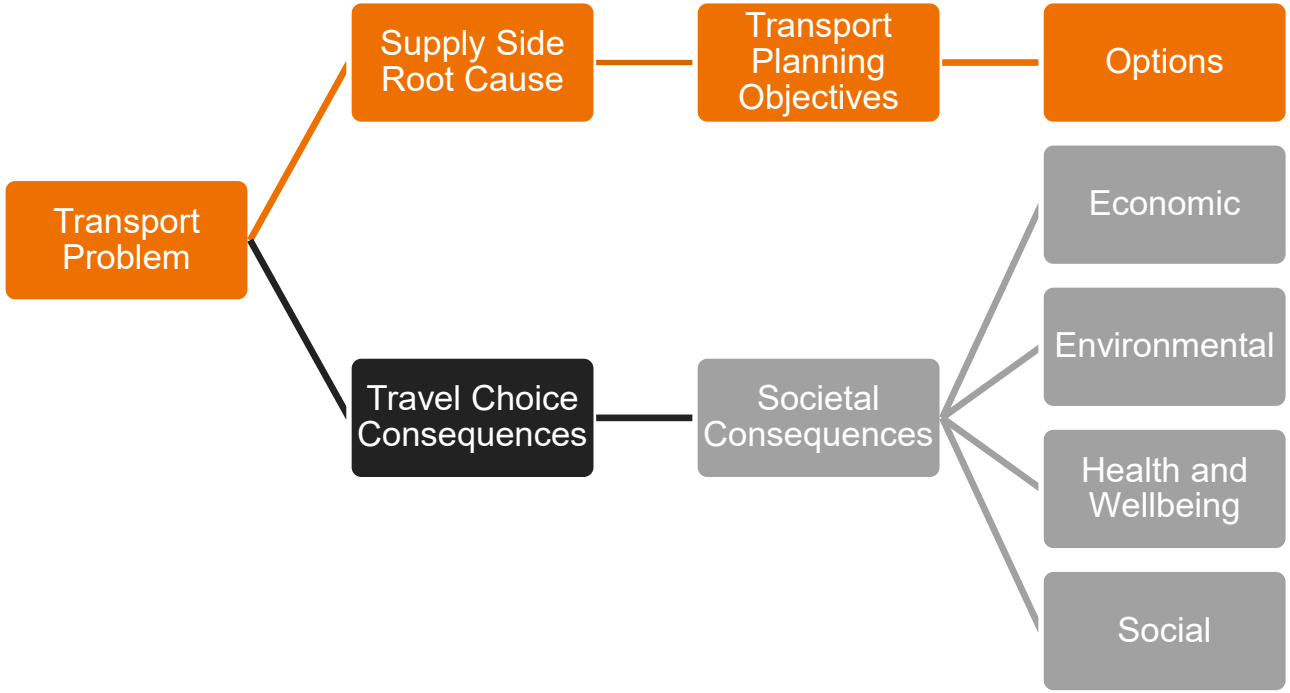


Figure 7.1 Transport Problems Framework

We have used this Framework to organise and present the transport problems which have been identified from a range of sources including:

- **Main Issues Report**: SEStran published a RTS Main Issues Report in June 2020. This was substantially prepared prior to the COVID-19 pandemic and therefore primarily reflects pre-pandemic problems and issues although consideration was given to anticipated impacts.
- **Policy Review**: Over 90 local, regional and national policy documents were reviewed spanning transport, land-use planning, economic development, health, energy, digital connectivity and the environment. A full list of documents in included in Appendix A.
- **Stakeholder Engagement**: Over 130 stakeholders were invited to participate in consultation either through workshops, individual meetings or by responding to briefing notes. In total 9 workshops and 21 meetings took place and 62 written responses were received. A full list of the organisations which participated in the stakeholder engagement is included in Appendix B.

- **Public Consultation**: A public survey was undertaken online over a six week period between Monday 8th March 2021 and Monday 19th April 2021. This explored pre-pandemic travel patterns, anticipated post-pandemic travel behaviour along with the reasons for these travel choices. In total 998 responses were received.
- In accordance with statutory requirements, **Strategic Environmental Assessment (SEA)** and **Equalities Impact Assessment (EqIA)** processes are being undertaken to respectively assess likely significant environmental impacts and apply relevant equalities duties throughout the RTS development process.
  - Key environmental and equalities issues for the emerging RTS have been identified through an SEA Scoping Report and Equalities Duties Assessment Framing Note. Engagement with the SEA Consultation Authorities (NatureScot, SEPA and Historic Environment Scotland) and with the SEStran Equalities & Access to Healthcare Forum also informed the preparation of this Case for Change Report.
  - The Case for Change Report is accompanied by a proportionate SEA Environmental Report and an Equalities Duties Assessment Report which examine how key environmental and equalities issues are being addressed and provide recommendations to inform future stages of RTS development. Analysis has also been undertaken to identify the extent to which there is evidence to support the identified problems recognising that all robust STAG appraisals must be founded upon evidence-based problems.

7.2 APPLYING THE FRAMEWORK

This framework has therefore been used as the basis for setting out the transport problems in this Case for Change. For each problem identified, its root causes have been defined along with the travel choice implications and the societal consequences of these travel choices. The evidence that underpins the problem has then been set out followed by an indication of the linked Transport Planning Objective(s) (TPOs) to resolve it, and options generated to deliver the TPO(s).

The next section sets out each problem in turn following this framework. These have been broken down into the following categories which broadly align with the National Transport Strategy's sustainable travel hierarchy:

- **All Modes**
- **Active Travel**
- **Public Transport**
- **Mixed Mode**
- **Freight**
- **Car**

7.3 PROBLEMS

This section outlines the problems that have been identified by mode as well as providing an overview of the evidence that underpins them which has been set out in preceding chapters.

All Modes

These problems overarch all modes of transport and are experienced by users regardless of how they choose to travel. On this basis they need to be considered in relation to all modes of transport.

1. Those living in new developments or travelling to new developments can have long journeys and / or implied car use to undertake day to day activities: there has been a lack of integration between land-use and transport planning which has led to car dependency for accessing many new developments. Significant land-use development is planned for the region and this requires careful integration with transport to ensure that sustainable transport provision is planned and delivered from the outset. This is underpinned by the evidence from the Edinburgh and South East Scotland City Region iRSS as well as the housing land requirements for NPF4.

2. Use of the transport system brings the risk of accidents and personal injury: whilst the number of road accidents has been declining over recent years there is still a risk of injury on the road network as shown in Figure 3.25. Other modes of transport which do not utilise the road network (e.g. air, rail, sea) present a significantly lower risk of injury or accident but nonetheless this must still be taken into account.

Active Travel

Walking and cycling are the most appropriate mode of transport for short journeys. However, analysis has shown that whilst walking was the main mode used for 23% of all journeys in the SEStran region it was only 2% for cycling. This can be linked to the fact that two thirds of households in the SEStran region have no access to a bicycle.

Consultation with active travel groups highlighted that the main barriers to walking and cycling are safety, accessing bikes and a lack of dedicated infrastructure whilst the maintenance and monitoring costs are also a key concern for the infrastructure providers. The lack of cross boundary cycling routes was also raised as a concern along with physical barriers like the Edinburgh City Bypass and River Forth. The public highlighted the quality of walking paths and degree of segregation from traffic when cycling as the factors they were least satisfied with.

3. Many do not find cycling a realistic option: low levels of cycling are indicative of the fact that it is unattractive to many potential users. A lack of access to bikes and poor integration across networks are key barriers to greater cycling.

4. Walking or wheeling is not an attractive option for some short journeys: whilst levels of walking are higher than cycling it still remains unattractive to many with over a quarter of people in the region not using walking as a mode of transport on a regular basis. This is likely to be the particularly the case for people who face mobility impairments or disabilities which make walking or wheeling challenging.

Public Transport

Analysis of bus journey times shown in Figure 3.18 highlights that they can be up to five times longer than the equivalent car journey time at peak periods whilst road journey times show there is a high degree of variability between peak and off-peak periods as illustrated in Figure 3.24. This affects the attractiveness of bus services. Lothian Buses highlighted that their problems include congestion, road space allocation and service reliability whilst congestion was also acknowledged as a key factor affecting buses by City of Edinburgh Council, Falkirk Council and Fife Council.

Our analysis set out in Figure 3.15 also found that some public transport journeys between the main settlements across the region require two or three interchanges whilst others cannot be undertaken at all within a two-hour time period. Interchange and long journey times are known to be seen as significant barriers to public transport use which will undoubtedly cause people to choose alternative modes for these journeys. Furthermore, the CDAT analysis identified locations which suffer from a combination of deprivation and poor public transport connectivity to healthcare, employment and education. The majority of the most 'at-risk' population was situated in urban areas.

The findings from passenger satisfaction surveys outlined in Figure 3.13 highlighted that around 20% of people have difficulty with the levels of crowding and availability of seating on train services. These findings reflect pre-COVID circumstances and may therefore change as a result of the pandemic so peak hour crowding on public transport services is a problem that will require ongoing monitoring. However, Network Rail and ScotRail highlighted that there are capacity issues on the Fife Circle and Borders line but that capacity related projects have taken a step back due to post-pandemic uncertainty. There is also a pinch point at Edinburgh Waverley and Haymarket stations resulting from Portobello junction and Abbey Hill junction. Problems with capacity on the East Coast Main Line through East Lothian were also raised by stakeholders.

The same survey also highlighted value for money of rail services as a concern for nearly half of respondents. This along with the findings from a similar survey of bus users outlined in Figure 3.12 which suggests that a quarter of people are dissatisfied with the value for money provided by bus services highlights a potential affordability issue with public transport. Fife Council highlighted that the cost of rail travel is often felt to be disproportionately high in the area. Affordability of transport is a key factor affecting those on low incomes with those in lower income households more likely to travel by bus while people in higher income households are more likely to drive or take the train.

Access to the public transport network can also be challenge for some. Analysis of Scottish Household Survey data identified that 23% of the population of the region have a limiting long-term physical or mental health condition whilst 19% are over the age of 65 with significant growth in elderly population anticipated in the future. These groups along with others like those with disabilities, the mobility impaired and parents with

pushchairs can experience physical barriers to accessing public transport networks and services which was highlighted as a particular concern by stakeholders at the active travel workshop citing the need for step free access at stations. Fife Council outlined that some stations in their area are not Disability Discrimination Act compliant.

Up to a third of bus passengers and a quarter of train passengers do not feel safe when travelling by public transport in the evening as illustrated in Figure 3.19. These problems are particularly acute for the most vulnerable groups including the young, elderly, disabled, women and ethnic minorities. In addition, a small minority of users also have difficulty accessing public transport information as outlined in Figure 3.20. This is also likely to be higher for non-public transport users who are less familiar with where and how to access public transport information.

5. Peak period bus-based journey times can be much longer than off-peak: peak period congestion causes delays which make journey times longer.

6. Peak period bus-based journey times can be much more variable than off-peak: as well as being longer journey times are more variable and less reliable at peak periods which can make buses unattractive particularly when people need to travel to and from work.

7. Some direct public transport journey speeds are slow so journey times are long and not competitive with car: this makes public transport unattractive compared to car for many trips.

8. Some travel by public transport requires interchange(s) – adding to journey times, access issues, inconvenience and cost: similarly this also makes public transport unattractive when people cannot make a direct journey between their origin and destination creating a perceived barrier.

9. People can't get a seat on some public transport services: overcrowding on public transport may only be perceived as an inconvenience for many but for some could lead them to choose to travel by car instead. This is particularly the case for vulnerable groups who may have mobility impairments or additional requirements such as parents with pushchairs.

10. Travel by bus or rail is unaffordable for some particularly the unemployed or those on low incomes: these are also likely to be those most dependent on the use of public transport.

11. Some journeys cannot be made by public transport: lack of direct connections means some journeys are not possible by public transport within a reasonable timescale. This can affect access to essential services like employment, healthcare and education.

12. Physical access to, and use of the public transport network is a problem or not possible for some users like the elderly, those with disabilities, parents with pushchairs and mobility impaired: who may be amongst those who are most dependent on public transport to access essential services can also be those who face the greatest physical barriers to using it.

13. Vulnerable groups (e.g. young, elderly, disabled, women, ethnic minorities, etc.) not feeling safe on public transport: these groups are often those who feel the most unsafe when using public transport which can discourage them from using it particularly in the evenings.

14. People do not have full awareness of their public transport options: people that do not know how to find out about public transport information will not know what services they could potentially make use of. This is likely to be a particular problem for those with learning difficulties or that have a sight or hearing impairment which may make accessing public transport information more challenging.

Mixed Mode

Stakeholders highlighted that there are barriers to combining the use of public transport and bikes. The active travel workshop attendees outlined that it was important to integrate bike with bus and train in terms of parking and space on vehicles whilst Fife Council outlined that there are issues with taking bikes on buses and trains.

Rail patronage has grown considerably at the vast majority of stations across the region as illustrated in Table 3.1. This has had a corresponding impact on the demand for Park and Ride. Clackmannanshire Council, Falkirk Council, Fife Council and West Lothian Council all highlighted that many rail station car parks are at capacity.

15. Combining cycling and public transport use is not possible: few buses and trains have facilities to carry bikes whilst those that do have low capacity which creates a degree of uncertainty for users.

16. Preferred Park and Ride station cannot be used due to lack of parking during commuter (i) peak and (ii) inter peak: some station car parks are full at the beginning of the AM peak and remain so throughout the day meaning there is no capacity available for people travelling later on. This leads to people choosing to use other modes instead or to drive further to reach less popular Park and Ride sites.

Freight

Road-based freight suffers from some similar problems to public transport in that it suffers from delays and long journey times caused by congestion on the network, and without the priority given to public transport. The analysis set out in Figure 3.24 highlights that off-peak journey times can often be much quicker than peak journey times and that they are subject to more variability.

It was also suggested by road freight operators and industry representatives that there is insufficient formal lorry parking in the region, affecting drivers' ability to properly rest and potentially resulting in inappropriate parking. Tired drivers are more likely to have accidents and with freight vehicles being larger and heavier this has more chance of resulting in severe injuries or fatalities. There are currently eight driver rest areas in the region.

The commercial vehicle fleet is also heavily dependent on fossil fuels with only a small proportion being ULEVs as outlined in Figure 3.26. Whilst the switch the alternative fuels is underway for private vehicles this is more difficult to achieve for commercial vehicles as electric vehicle technology has not advanced sufficiently yet to provide a viable alternative to fossil fuels.

The constraints on the rail network outlined in Section 3.7 limit the scope to transfer more freight to rail although there are some notable rail freight facilities in the region. In particular, Forths Ports outlined that they are trying to develop Grangemouth as a rail freight hub.

Whilst Forth Ports account for 43% of the total freight through Scottish ports with a high proportion of exports in 2018 (76% of total freight through these ports) the cessation of the DFDS freight ferry service from Rosyth to Zeebrugge in 2018 is likely to have negatively impacted upon these numbers. This has left the region and Scotland as a whole with no direct ferry service to the EU restricting trade links.

17. In places, peak period commercial vehicle-based journey times can routinely be much longer than off-peak: congestion causes delays to freight vehicles which increases costs and reduces productivity.

18. Peak period commercial vehicle-based journey times can be much more variable than off-peak: unreliable journey times affect the ability to deliver a 'just in time' service affecting supply chains across the economy.

19. Cost and practicality of rail freight prevents widespread use: the fixed nature of the rail network makes it impractical for some freight movements.

20. Commercial vehicle drivers have limited options for secure parking and rest: whilst rest facilities are available these are insufficient and not always located in the most convenient locations.

21. Commercial vehicles are currently reliant on fossil fuels in the absence of viable / cost effective alternatives: ULEV technology has yet to provide a viable alternative for commercial vehicles affecting the ability to decarbonise the sector.

22. Direct sea-based international connectivity is poor: there is no ferry service between Scotland and the EU since the cessation of the DFDS freight ferry between Rosyth and Zeebrugge in 2018.

Car

Car journey times suffer from the same delays on the road network as buses particularly at peak periods. Figure 3.24 shows the variability between peak and off-peak journey times and that peak journey times can be much longer than their off-peak equivalent. Falkirk Council highlighted that most of their transport problems were related to peak-time congestion that this is especially an issue on the Camelon corridor. Edinburgh Council highlighted the problem of congestion on the A90 which also impacts on buses whilst Fife Council outlined a related problem of congestion on the Forth crossings.

Travel around the region by road can also be slow as shown in Figure 3.23 where some journeys can take over two and a half hours. This illustrates the scale of the region and the fact that, in some areas, the network is still of a low standard. In addition, Fife Council and Scottish Borders Council both highlighted that tight maintenance budgets impact upon the ability to provide a high-quality road network.

Analysis of the public survey results showed that parking costs are a source of dissatisfaction for 45% of respondents across the region with this rising to over half in some parts such as Midlothian. The public survey also highlighted that 38% of respondents were dissatisfied with parking availability in the region. Fife Council outlined that parking is generally operating at capacity in areas at peak times highlighting that there can be a lack of available parking as a result. Edinburgh Council suggested that this can led to lots of parking outside the controlled zones. This can be inconvenient for those trying to park whilst also having a negative impact on areas that area affected by overspill parking. Falkirk Council also highlighted that much of the parking provided in town and city centres is privately owned meaning they have no direct control over it.

Fleet transition from fossil fuels to ULEVs also faces barriers. The low proportion of ULEVs owned in the region (0.6% in 2019) highlighted in Figure 3.26 highlights that these are yet to be mainstreamed. Figure 3.27 demonstrated the low number of electric vehicle charging points in the region which underlines why they are currently not seen as being a practical option for many. Fife Council and Scottish Borders Council both identified another barrier in that SP Energy Networks note significant issues with the capacity of the electricity grid which could lead to issues for provision of adequate charging infrastructure. Edinburgh Council also highlighted a problem for urban residents who live in flats not being able to charge their cars. Finally, whilst the total lifetime costs of an electric vehicle are less than an equivalent petrol vehicle as shown in Table 3.2, the higher initial outlay for the vehicle will remain a barrier for some who cannot afford it or that do not consider the whole lifetime cost of owning and operating the vehicle.

23. In places, peak period car-based journey times can routinely be much longer than off-peak: peak period congestion causes delays which make journey times longer.

24. Peak period car-based journey times can be much more variable than off-peak: as well as being longer journey times are more variable and less reliable at peak periods which may contribute to people being late for work or appointments.

25. High cost of town / city centre parking: dissatisfaction with parking charges may lead people to choose not to travel or to switch their destination to an out-of-town location which they know offers free parking rather than travelling in to town or city centres.

26. Lack of availability of parking is inconvenient: this creates a mismatch between supply and demand leading to frustration with people potentially favouring locations where they are confident of being able to get parked.

27. Road-based travel on the regional road network, including some external links (including ports and airports) can be slow even when traffic volumes are relatively low: some journey times are unattractive due to poor quality roads making travel around the region difficult.

28. Electric car operation and ownership not practical for all: constraints around provision of charging infrastructure exist which could inhibit the uptake of electric vehicles.

29. Cost of electric cars is higher than equivalent ICE cars and too expensive for many at present: whilst total lifetime costs are less than petrol cars the initial outlay for an electric car is significantly higher which could present a barrier to their uptake unless this differential is eliminated.

7.4 PROBLEMS SUMMARY

Drawing on the Transport Problems Framework set out at the beginning of the chapter the identified problems have been summarised in Table 7.1.

Table 7.1 Transport Problems Framework Summary

No	Transport Problem (from a User's Perspective)	Supply Side Cause of Transport Problem	Travel Consequence	Societal Consequence	Evidence for This	Any Post-Covid Implication
ALL MODES						
1	Those living in new developments or travelling to new developments can have long journeys and / or implied car use to undertake day to day activities	- Land use patterns - Location of new developments - All aspects of transport supply side	- Longer trips are made - Mode car trips are made	- Avoidable car km with associated impacts (energy usage, emissions, congestion, collisions, noise etc) - Negative health outcomes through lack of physical activity - Employment and other opportunities not taken up	- Literature review problems 1, 2, 4, 47, 51, 58, 72, 78, 95 - Edinburgh and South East Scotland City Region iRSS - NPF4 Housing Land Requirements	People may need to travel less due to increased home working, shopping etc so problem be reduced in scale
2	Use of the transport system brings the risk of accidents and personal injury	- Traffic speed and driver behaviour e.g., people breaking speed limits - Speed limits too high - Weather events - Human error - Technical failure	- Reduced levels of active travel - Trips not made at all	- Human cost of physical injury - Economic cost of physical injury - Negative health outcomes through lack of physical activity	- Literature review problems 23, 68, 72, 79, 80, 81, 82, 85 - Road Accident data	People may need to travel less due to increased home working, shopping etc so accidents may reduce
ACTIVE TRAVEL						
3	Many do not find cycling a realistic option	- Lack of appropriate facilities mean that many do not feel safe cycling (safety and personal security) - Lack of secure parking options - Gaps in cycling provision - Bicycle ownership is not practical for some - High vehicle speeds and intimidation - Freight deliveries	- People do not cycle - People drive instead - People use public transport instead	- Negative health outcomes through lack of physical activity - Avoidable car km with associated impacts (energy usage, emissions, congestion, collisions, noise etc)	- Literature review problems 1, 2, 4, 67, 68, 69, 70, 72, 78 - Main Mode of Travel data - Access to Bicycle data - SUSTRANS Hands Up Survey	People have expressed a wish to walk / cycle more so an opportunity

No	Transport Problem (from a User's Perspective)	Supply Side Cause of Transport Problem	Travel Consequence	Societal Consequence	Evidence for This	Any Post-Covid Implication
4	Walking or wheeling is not an attractive option for some short journeys	- Lack of appropriate facilities mean that many do not feel safe walking or wheeling (safety and personal security) - Traffic intimidation - Physical barriers particularly for those with disabilities and mobility impairments	- People do not walk or wheel - People drive instead - People use public transport instead	- Negative health outcomes through lack of physical activity - Avoidable car km with associated impacts (energy usage, emissions, congestion, collisions, noise etc)	- Literature review problems 1, 2, 4, 67, 68, 69, 70, 72, 78 - Main Mode of Travel data - SUSTRANS Hands Up Survey - Walking as a Means of Transport data	People have expressed a wish to walk / wheel / cycle more so an opportunity
PUBLIC TRANSPORT						
5	Peak period bus-based **journey times** can be much longer than off-peak	- Buses are slowed down by routine congestion caused by general road traffic (including other buses)	- Discourages bus use - Longer peak hour journeys - People travel by car instead - Peak spreading - earlier and later journeys are made - People do not make the journey	- Wasted time (commuting and leisure) - Constrains labour markets - Avoidable car km with associated impacts (energy usage, emissions, congestion, collisions, noise etc)	- Literature review problems 1, 2, 4, 19, 20, 21, 22, 47, 51, 78 - INRIX Road Journey Time data - TRACC Public Transport Journey Time data	Problem could be diminished with reduced peak hour commuting
6	Peak period bus-based **journey times** can be much more variable than off-peak	- Buses are slowed down by congestion caused by variable congestion and congestion caused by incidents - Mis-use of bus lanes	- Discourages bus use - To be sure of making a given appointment, people have to catch an earlier bus, wasting more time - Peak spreading - earlier and later journeys are made - People do not make the journey - People travel by car instead – greater journey flexibility	- As above, plus: - People are late for appointments - Cost of missed appointments – e.g., work and health	- Literature review problems 1, 2, 4, 19, 20, 21, 22, 47, 51, 78 - INRIX Road Journey Time data - TRACC Public Transport Journey Time data	Problem could be diminished with reduced peak hour commuting
7	Some direct public transport **journey speeds** are slow so journey times are long and not competitive with car	- Indirect service routing - In-vehicle speeds (including bus versus rail) - Frequency of stops increases journey times	- People drive instead - People car-share / lift-share - People do not make the trips - People who would prefer to use public transport cannot do so	- Wasted time (commuting and leisure) - Avoidable car km with associated impacts (energy usage, emissions, congestion, collisions, noise etc) - 'Forced' car ownership impacting disproportionately on some household budgets - Employment and other opportunities not taken up	- Literature review problems 1, 2, 4, 10, 12, 13, 19, 20, 21, 22, 41, 47, 51, 62, 78 - INRIX Road Journey Time data - TRACC Public Transport Journey Time data	None

No	Transport Problem (from a User's Perspective)	Supply Side Cause of Transport Problem	Travel Consequence	Societal Consequence	Evidence for This	Any Post-Covid Implication
8	Some travel by public transport requires **interchange**(s) – adding to journey times, access issues, inconvenience and cost	- Most 'regional' public transport is focussed on Edinburgh city centre and the relevant access corridor, including services which call at P&R sites - Integration between modes is inconvenient - Integrated ticketing options are limited meaning individual fares often have to be paid - Suburban and out of town employment / leisure / retail locations more difficult to competitively serve by public transport - Other regional travel generators such as Edinburgh Airport require interchange for many - Land use development patterns	- People drive instead - People car-share / lift-share - People do not make the trips - People who would prefer to use public transport cannot do so	- Avoidable car km with associated impacts (energy usage, emissions, congestion, collisions, noise etc) - 'Forced' car ownership impacting disproportionately on some household budgets - Employment and other opportunities not taken up	- Literature review problems 1, 2, 4, 5, 8, 9, 12, 16, 28, 30, 40, 41, 44, 47, 51, 55, 62, 69, 78, 95 - TRACC Interchange Analysis	Public transport services may be diminished post Covid potentially adding to the problem
9	People can't **get a seat** on some public transport services	- Mismatch of supply and demand, generally peak hour and more of a factor in rail - Situation exacerbated in summer due to tourists (mainly Edinburgh) - Land use development patterns	- Journey is uncomfortable for some and not possible for others - People drive instead - People car-share / lift-share - People do not make the trips - People travel by bus instead - Peak spreading - earlier and later journeys - People who would prefer to use public transport cannot do so	- Avoidable car km with associated impacts (energy usage, emissions, congestion, collisions, noise etc) - Limits employment / training and other opportunities and constrains labour markets	- Literature review problems 1, 2, 4, 5, 6, 14, 16, 47, 51, 78, 95 - Transport Focus Passenger Satisfaction Surveys	Reduced peak hour commuting and public transport use in general may reduce the scale of the problem public transport services may be diminished post COVID-19 potentially adding to the problem
10	Travel by bus or rail is **unaffordable** for some particularly the unemployed or those on low incomes	- Fares levels do not reflect ability to pay - Lack of integrated fares and daily capping across operators - DRT acceptance of concessionary fares	- People have to rely on others' good will for lifts - People do not travel - People do travel but at disproportionate cost to them / their household - People who would prefer to use public transport cannot do so	- Contributes to poverty - Limits employment / training and other opportunities and constrains labour markets - Avoidable car km with associated impacts (energy usage, emissions, congestion, collisions, noise etc)	- Literature review problems 1, 2, 4, 41, 44, 45, 47, 51, 62, 78 - Transport Focus Passenger Satisfaction Surveys - Equalities Impact Assessment Scoping evidence base	Public transport revenues may be affected post Covid affecting the ability to reduce fares

No	Transport Problem (from a User's Perspective)	Supply Side Cause of Transport Problem	Travel Consequence	Societal Consequence	Evidence for This	Any Post-Covid Implication
11	Some journeys **cannot be made** by public transport	- There is no public transport service which allows the journey to be made at the time required - There is no public transport service at all - DRT provision is patchy and inconsistent - DRT services not available to all - Land use development patterns	- People drive instead - People car-share / lift-share - People use taxi - People do not make the trips - People drive / get a lift to a location where the journey can be made using public transport - People who would prefer to use public transport cannot do so - People have to rely on good will / lifts	- 'Forced' car ownership impacting disproportionately on some household budgets - Limits employment / training and other opportunities and constrains labour markets - Avoidable car km with associated impacts (energy usage, emissions, congestion, collisions, noise etc) - Social isolation - People do not take up opportunities with social and economic consequences -	- Literature review problems 1, 2, 4, 7, 8, 12, 13, 39, 40, 41, 47, 51, 62, 78, 95 - TRACC Interchange Analysis - Connectivity to Education, Healthcare and Employment Analysis	Public transport services may be diminished post Covid potentially adding to the problem
12	**Physical access** to, and use of the public transport network is a problem or not possible for some users like the elderly, those with disabilities, parents with pushchairs and mobility impaired	- Vehicles - Stops / stations - Access to stops / stations	- People have to use cars instead, either their own or relying on lifts - People do not travel - People do use public transport but at significant inconvenience to them - People who would prefer to use public transport cannot do so	- Groups in society suffer significant inequality - Social isolation - 'Forced' car ownership - Limits employment / training and other opportunities and constrains labour markets - Avoidable car km with associated impacts (energy usage, emissions, congestion, collisions, noise etc)	- Literature review problems 1, 2, 4, 11, 17, 47, 51, 59, 60, 61, 62, 63, 64, 65, 78, 83 - Demographic data - Equalities Impact Assessment Scoping evidence base	Public transport revenues may be affected post Covid affecting the ability to invest in the network and vehicles
13	Vulnerable groups (e.g. young, elderly, disabled, women, ethnic minorities, etc.) not feeling **safe** on public transport	- Environment feels unsafe - Lack of security (human, technological) - Intimidation by other passengers	- Taxi use - Car use - Lift / share - People do not travel - People who would prefer to use public transport cannot do so	- Groups in society suffer significant inequality - Social isolation - 'Forced' car ownership - Limits employment / training and other opportunities and constrains labour markets - Avoidable car km with associated impacts (energy usage, emissions, congestion, collisions, noise etc)	- Literature review problems 1, 2, 4, 23, 47, 51, 59, 60, 61, 62, 63, 64, 65, 78, 83 - Scottish Household Survey Views of Safety on Public Transport data - Equalities Impact Assessment Scoping evidence base	Public transport revenues may be affected post Covid affecting the ability to invest security
14	People do not have **full awareness** of their public transport options	- Information is not provided in a way which all can access - Public transport travel options are not publicised in a way which reaches key groups	- People do not use public transport - People use car instead - People do not make trips	- Avoidable car km with associated impacts (energy usage, emissions, congestion, collisions, noise etc) - People do not take up opportunities with social and economic consequences	- Literature review problems 1, 2, 4, 46, 47, 51, 59, 60, 61, 62, 63, 64, 65, 66, 78 - Scottish Household Survey Views on Public Transport Information	Public transport services may be diminished post Covid potentially adding to the problem

No	Transport Problem (from a User's Perspective)	Supply Side Cause of Transport Problem	Travel Consequence	Societal Consequence	Evidence for This	Any Post-Covid Implication
MIXED MODE						
15	Combining **cycling and public transport** use is not possible	- Few buses and trains have facilities to carry bikes – those that do have low capacity which creates a degree of uncertainty for users	- Low levels of this form of mixed mode travel - Likely to lead to higher car use	- Avoidable car km with associated impacts (energy usage, emissions, congestion, collisions, noise etc)	- Literature review problem 1, 2, 4, 18, 69, 78 - Stakeholder Feedback	Public transport revenues may be affected post Covid affecting the ability to invest in new vehicles
16	Preferred **P&R** station cannot be used due to lack of parking during commuter (i) peak and (ii) inter peak	- Mismatch of supply and demand at station car parks - Differential train frequencies - Fare boundary effects - Spaces used by those who could use active travel instead - Car park is filled with all-day commuters	- People drive for their whole journey - People drive to an alternative station (could be closer or further) - People get a lift to the station (double journey) - People walk / cycle to the station instead - People change their destination – e.g., not going shopping in city centre	- Avoidable car km with associated impacts (energy usage, emissions, congestion, collisions, noise etc) - Could have a distributional impact if people e.g., drive to out/edge of town retail rather than take a train to the city centre	- Literature review problems 1, 2, 4, 26, 27, 29, 78 - ORR Station Usage data - Stakeholder Feedback	Reduced peak hour commuting and public transport use in general may reduce the scale of the problem
FREIGHT						
17	In places, peak period **commercial vehicle-based journey times** can routinely be much longer than off-peak	- Mismatch of supply and demand, particularly at key regional bottlenecks including City Bypass, Newbridge, Forth Crossings - Increased LGV traffic - Land use development patterns	- Longer peak hour journeys - Peak spreading - earlier and later journeys are made - People do not make the journey	- Loss of productive time (business) - Increased energy usage - Increased emissions and pollution - Adds to the cost of distributing goods	- Literature review problems 2, 4, 73, 75, 76, 78, 95 - INRIX Road Journey Time data	Problem could be diminished with reduced peak hour commuting
18	Peak period **commercial vehicle-based journey times** can be much more variable than off-peak	- Small variations in traffic volumes create volatile journey times when the network is operating near capacity - This is exacerbated by incidents – lack of alternative routes in places – these are thought to be increasing in frequency in part due to increased severe weather events - Increased LGV traffic	- Peak spreading - earlier and later journeys are made - Late arrival of goods - People re-route onto less appropriate routes	- As above, plus: - Supply chain scheduling and cost impacts of unscheduled delays - Noise / emissions / safety etc impacts of traffic re-routing	- Literature review problems 1, 2, 4, 73, 75, 76, 78, 79 - INRIX Road Journey Time data	Problem could be diminished with reduced peak hour commuting
19	Cost and practicality of **rail freight** prevents widespread use	- Market forces - Rail freight intermodal facilities and connections to key nodes - Lack of capacity (paths) on the rail network for a significant increase in freight services - Pricing and regulatory regimes	- Virtually all freight is moved by road	- Negative impacts of CV traffic	- Literature review problem 1, 2, 4, 77 - Stakeholder Feedback - Rail Network Gauge Clearance	None
20	Commercial vehicle drivers have limited options for **secure parking** and rest	- There are few bespoke facilities in the region for drivers requiring to rest and overnight	- CVs park in less appropriate locations	- Thefts from vehicles add to costs - Nuisance parking leads to conflict	- Literature review problem 87 - Number of Lorry Rest Stops	None

No	Transport Problem (from a User's Perspective)	Supply Side Cause of Transport Problem	Travel Consequence	Societal Consequence	Evidence for This	Any Post-Covid Implication
21	Commercial vehicles are currently reliant on **fossil fuels** in the absence of viable / cost effective alternatives	- Alternative fuel solutions not suitably developed for widespread use	- ICE powered vehicles continue to be used	- Ongoing carbon emissions and impact on local air quality and associated health impacts	- Literature review problems 2, 4, 90, 91 - Fleet Composition data	None
22	Direct **sea-based international connectivity** is poor	- No ferry service to the EU	- CVs travel south to Channel and other ports - Freight travels by air rather than sea	- Emissions related to use of road and air freight	- Literature review problems 2, 77 - Sea Freight data	None
CAR						
23	In places, peak **period car-based journey times** can routinely be much longer than off-peak	- Mismatch of supply and demand, particularly at key regional bottlenecks including City Bypass, Newbridge, Forth Crossings - Increased LGV traffic - Land use development patterns	- Longer peak hour journeys - Peak spreading - earlier and later journeys are made - People do not make the journey	- Wasted time (commuting and leisure) - Loss of productive time (business) - Increased energy usage - Increased emissions and pollution - Constrains labour market efficiency	- Literature review problems 2, 4, 47, 51, 76, 78, 95 - INRIX Road Journey Time data	Problem could be diminished with reduced peak hour commuting
24	Peak period **car-based journey times** can be much more variable than off-peak	- Small variations in traffic volumes create volatile journey times when the network is operating near capacity - This is exacerbated by incidents – lack of alternative routes in places – these are thought to be increasing in frequency in part due to increased severe weather events - Increased LGV traffic	- To be sure of making a given appointment, people have to allow more time, wasting more time - Peak spreading - earlier and later journeys are made - People do not make the journey - People re-route onto less appropriate routes	- As above, plus: - People are late for appointments - Cost of missed appointments – e.g., work and health - Noise / emissions / safety etc impacts of traffic re-routing	- Literature review problems 1, 2, 4, 47, 51, 76, 78, 79 - INRIX Road Journey Time data	Problem could be diminished with reduced peak hour commuting
25	High cost of town / city centre **parking**	- Scale of parking charges and enforcement regime	- People use public transport or active travel instead - People's destination choice is affected favouring locations with plentiful free parking	- Positive impacts through lower car km - Price mechanisms disproportionately affect those who can least afford to pay - May impact on town / city centre vitality and recovery from Covid19	- Literature review problems 62, 66, 94 - Public Survey responses	Balance between supply and demand likely to change Could be part of a town centre economic recovery package in places
26	Lack of availability of **parking** is inconvenient	- Mismatch of supply of and demand for parking - Insufficient provision for those most in need, blue badge etc.	- Vehicles spend excessive time circulating looking for parking spaces - People use public transport or active travel instead - People's destination choice is affected favouring locations with plentiful free parking	- Some avoidable car km with associated impacts (energy usage, emissions, congestion, collisions, noise etc) - Positive impacts of reduced car trips to these areas - Distributional impact on economic activity in urban areas - May impact on town / city centre vitality and recovery from Covid19	- Literature review problems 1, 2, 4, 47, 66, 78, 84, 85, 94 - Stakeholder Feedback - Public Survey responses	Balance between supply and demand likely to change Could be part of a town centre economic recovery package in places

No	Transport Problem (from a User's Perspective)	Supply Side Cause of Transport Problem	Travel Consequence	Societal Consequence	Evidence for This	Any Post-Covid Implication
27	**Road-based travel** on the regional road network, including some external links (including ports and airports) can be **slow** even when traffic volumes are relatively low	- Road standard - Horizontal and vertical alignment - Lack of overtaking opportunities	- Journeys take longer - Can lead to accidents	- Wasted time - Loss of productive in-work time - Casualties	- Literature review problem 78 - INRIX Road Journey Time data	None, other than where travel volumes reduce
28	**Electric car** operation and ownership **not practical** for all	- Facilities for EV charging are patchy	- Continuing use of ICE powered cars - Some may ultimately be precluded from owning a vehicle	- Higher carbon emissions - Some groups may be disproportionately affected by regulatory change around ICE cars (e.g., those who live in flats)	- Literature review problem 2, 4, 90, 91 - Fleet Composition data - EV Charging Point data	None
29	**Cost of electric cars** is higher than equivalent ICE cars and too expensive for many at present	- Market forces – supply and demand - Government regulation and incentives	- Continuing use of ICE powered cars	- Higher carbon emissions - Lower income groups may be disproportionately affected by regulatory change around ICE cars - Impact should reduce over time as prices equalise	- Literature review problems 2, 4, 62, 90, 91 - Fleet Composition data - Lifetime Cost of Electric v Petrol Vehicles data	None

Overarching a number of the transport problems is the major negative societal consequence generated by unsustainable travel patterns and high levels of dependence on carbon emitting fossil fuels which drive transport's contribution to the global Climate Emergency. On this basis, responding to the Climate Emergency and enhancing environmental quality are also fundamental matters to be addressed through the new RTS.

7.5 ISSUES

In Chapter 4.0 two potential issues were identified which present uncertainties that will have implications for the development of the new RTS. These affect the future context within which the RTS will sit and therefore their impacts need to be considered through the strategy development process.

Travel Behaviour Change

The COVID-19 pandemic has accelerated a number of long-term travel behaviour change trends including increased working from home, more online shopping, reduced trip making, decline in bus use and increased car use. In addition, it has also stimulated new travel behaviours including a decline in the previously growing train patronage and increases in walking and cycling as illustrated in Figure 7.2. It is unknown the extent to which these changes will become embedded long-term but, at the very least, it is likely to take time for travel patterns to stabilise and return to close to pre-pandemic levels. Peak period commuting could be particularly affected if there is a permanent shift to increased home and

flexible working potentially leading to less strain on public transport services and less congestion on the road network at these times. It is also unclear how public transport demand will recover in the wake of the pandemic.

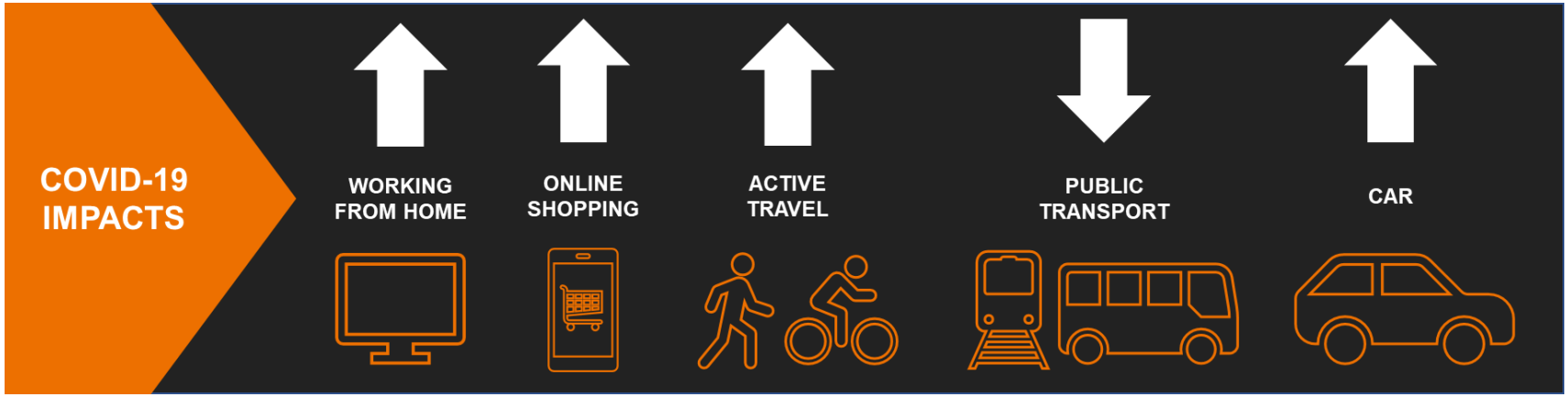


Figure 7.2 Overview of COVID-19 Impacts

Transport Innovation

Technology and transport innovation offer the potential to change the landscape within which the transport system operates within the lifetime of the RTS. There will be a fleet transition towards ULEVs and alternative fuel sources which will present challenges to delivery and widespread uptake. Alongside this automation could reduce or eliminate the need for driver operated vehicles changing the nature of how we travel. Finally, shared mobility and MaaS seek to break traditional ownership models and shift transport to an integrated 'on demand' service across all modes.

These innovations are to varying extents market led and it is therefore difficult for the public sector to control them which presents an uncertainty for the RTS. However, it can provide a policy context that seeks to ensure innovations evolve in a manner that is consistent with policy aspirations.

7.6 CONSTRAINTS

Governance

One main constraint has been identified through the process of developing the Case for Change which has emerged through the stakeholder engagement process and by undertaking a review of what has been achieved since the initial SEStran RTS was published in 2008. This

document set out an ambitious plan for a range of cross-boundary schemes and interventions which required an integrated approach across a range of industry partners for their successful delivery.

However, upon review of the previous RTS and the refreshed version published in 2015 it was identified that limited progress had been made towards delivering many of the cross-boundary schemes that had been set out within them. This was largely attributed to difficulties with the existing delivery mechanisms and in coordinating cross-boundary and multi-partner schemes. In addition, given SEStran's position as a 'Level 1' Regional Transport Partnership and the limited statutory powers this conveys along with a lack of dedicated funding to support delivery of the RTS, it was highlighted that the current regional governance arrangements present a constraint to the delivery of cross-boundary schemes and interventions emerging from the RTS.

This systemic barrier is likely to continue to affect the ability for SEStran to deliver cross-boundary and multi-partner schemes that emerge from the new RTS unless the governance arrangements are changed.

7.7 OPPORTUNITIES

Policy Linkages

The RTS is being developed at a time which coincides with the development of Regional Spatial Strategies (RSSs). This presents an opportunity to ensure that the strategic land-use and transport plans for the region are closely integrated and complementary to one another. As outlined in Section 4.2 there is significant housing development planned for the region which will have implications for where people want to travel to and from. The RTS can provide a blueprint for ensuring that these developments are served by sustainable transport links from the outset to prevent unsustainable travel patterns from becoming entrenched.

In addition, there is also an opportunity for the RTS to feed into Transport Scotland's Strategic Transport Projects Review Phase 2 which is due to report in Autumn 2021. This will provide Scottish Ministers with a programme of potential transport investment opportunities for the period 2022 – 2042 so it is important that the long-term needs of the region are reflected within this.

Finally, a Regional Economic Strategy is also under development for the south east of Scotland and there is an opportunity to ensure close integration with it as well.

Transport Planning Objectives

SEStran Regional Transport Strategy

STAG Case for Change Report

8.0 TRANSPORT PLANNING OBJECTIVES

8.1 DEFINING TRANSPORT PLANNING OBJECTIVES

The Transport Planning Objectives (TPOs) have been derived by identifying a TPO linked to each of the problems defined in the Problems Framework initially set out in Chapter 0. The TPOs along with the associated problems are set out in Table 8.1.

Table 8.1 Problems Framework including TPOs

Transport Problem (from a User's Perspective)		Supply Side Cause of Transport Problem	Travel Consequence	Societal Consequence	Evidence for This	Transport Planning Objective
ALL MODES						
1	Those living in new developments or travelling to new developments can have long journeys and / or implied car use to undertake day to day activities	- Land use patterns - Location of new developments - All aspects of transport supply side	- Longer trips are made - Mode car trips are made	- Avoidable car km with associated impacts (energy usage, emissions, congestion, collisions, noise etc) - Negative health outcomes through lack of physical activity - Employment and other opportunities not taken up	- Literature review problems 1, 2, 4, 47, 51, 58, 72, 78, 95 - Edinburgh and South East Scotland City Region iRSS - NPF4 Housing Land Requirements	- Ensure sustainable connectivity and travel behaviour is embedded in all new development
2	Use of the transport system brings the risk of accidents and personal injury	- Traffic speed and driver behaviour e.g., people breaking speed limits - Speed limits too high - Weather events - Human error - Technical failure	- Reduced levels of active travel - Trips not made at all	- Human cost of physical injury - Economic cost of physical injury - Negative health outcomes through lack of physical activity	- Literature review problems 23, 68, 72, 79, 80, 81, 82, 85 - Road Accident data	- Reduce injuries and fatalities for all users of the transport networks
ACTIVE TRAVEL						
3	Many do not find cycling a realistic option	- Lack of appropriate facilities mean that many do not feel safe cycling (safety and personal security) - Lack of secure parking options - Gaps in cycling provision - Bicycle ownership is not practical for some - High vehicle speeds and intimidation - Freight deliveries	- People do not cycle - People drive instead - People use public transport instead	- Negative health outcomes through lack of physical activity - Avoidable car km with associated impacts (energy usage, emissions, congestion, collisions, noise etc)	- Literature review problems 1, 2, 4, 67, 68, 69, 70, 72, 78 - Main Mode of Travel data - Access to Bicycle data - SUSTRANS Hands Up Survey	- Create an environment which allows more people to cycle

Transport Problem (from a User's Perspective)		Supply Side Cause of Transport Problem	Travel Consequence	Societal Consequence	Evidence for This	Transport Planning Objective
4	Walking or wheeling is not an attractive option for some short journeys	- Lack of appropriate facilities mean that many do not feel safe walking or wheeling (safety and personal security) - Traffic intimidation - Physical barriers particularly for those with disabilities and mobility impairments	- People do not walk or wheel - People drive instead - People use public transport instead	- Negative health outcomes through lack of physical activity - Avoidable car km with associated impacts (energy usage, emissions, congestion, collisions, noise etc)	- Literature review problems 1, 2, 4, 67, 68, 69, 70, 72, 78 - Main Mode of Travel data - SUSTRANS Hands Up Survey - Walking as a Means of Transport data	- Create an environment which allows more people to walk or wheel
PUBLIC TRANSPORT						
5	Peak period bus-based **journey times** can be much longer than off-peak	- Buses are slowed down by routine congestion caused by general road traffic (including other buses)	- Discourages bus use - Longer peak hour journeys - People travel by car instead - Peak spreading - earlier and later journeys are made - People do not make the journey	- Wasted time (commuting and leisure) - Constrains labour markets - Avoidable car km with associated impacts (energy usage, emissions, congestion, collisions, noise etc)	- Literature review problems 1, 2, 4, 19, 20, 21, 22, 47, 51, 78 - INRIX Road Journey Time data - TRACC Public Transport Journey Time data -	- Reduce peak-period delays for bus-based travel
6	Peak period bus-based **journey times** can be much more variable than off-peak	- Buses are slowed down by congestion caused by variable congestion and congestion caused by incidents - Mis-use of bus lanes	- Discourages bus use - To be sure of making a given appointment, people have to catch an earlier bus, wasting more time - Peak spreading - earlier and later journeys are made - People do not make the journey - People travel by car instead – greater journey flexibility	- As above, plus: - People are late for appointments - Cost of missed appointments – e.g., work and health	- Literature review problems 1, 2, 4, 19, 20, 21, 22, 47, 51, 78 - INRIX Road Journey Time data - TRACC Public Transport Journey Time data -	- Improve the punctuality of peak-period bus-based travel
7	Some direct public transport **journey speeds** are slow so journey times are long and not competitive with car	- Indirect service routing - In-vehicle speeds (including bus versus rail) - Frequency of stops increases journey times	- People drive instead - People car-share / lift-share - People do not make the trips - People who would prefer to use public transport cannot do so	- Wasted time (commuting and leisure) - Avoidable car km with associated impacts (energy usage, emissions, congestion, collisions, noise etc) - 'Forced' car ownership impacting disproportionately on some household budgets - Employment and other opportunities not taken up	- Literature review problems 1, 2, 4, 10, 12, 13, 19, 20, 21, 22, 41, 47, 51, 62, 78 - INRIX Road Journey Time data - TRACC Public Transport Journey Time data -	- Improve the competitiveness of public transport with car journey times

Transport Problem (from a User's Perspective)		Supply Side Cause of Transport Problem	Travel Consequence	Societal Consequence	Evidence for This	Transport Planning Objective
8	Some travel by public transport requires **interchange**(s) – adding to journey times, access issues, inconvenience, and cost	- Most 'regional' public transport is focused on Edinburgh city centre and the relevant access corridor, including services which call at P&R sites - Integration between modes is inconvenient - Integrated ticketing options are limited meaning individual fares often have to be paid - Suburban and out of town employment / leisure / retail locations more difficult to competitively serve by public transport - Other regional travel generators such as Edinburgh Airport require interchange for many - Land use development patterns	- People drive instead - People car-share / lift-share - People do not make the trips - People who would prefer to use public transport cannot do so	- Avoidable car km with associated impacts (energy usage, emissions, congestion, collisions, noise etc.) - 'Forced' car ownership impacting disproportionately on some household budgets - Employment and other opportunities not taken up	- Literature review problems 1, 2, 4, 5, 8, 9, 12, 16, 28, 30, 40, 41, 44, 47, 51, 55, 62, 69, 78, 95 - TRACC Interchange Analysis	- Reduce the time and inconvenience of having to interchange
9	People can't **get a seat** on some public transport services	- Mismatch of supply and demand, generally peak hour and more of a factor in rail - Situation exacerbated in summer due to tourists (mainly Edinburgh) - Land use development patterns	- Journey is uncomfortable for some and not possible for others - People drive instead - People car-share / lift-share - People do not make the trips - People travel by bus instead - Peak spreading - earlier and later journeys - People who would prefer to use public transport cannot do so	- Avoidable car km with associated impacts (energy usage, emissions, congestion, collisions, noise etc.) - Limits employment / training and other opportunities and constrains labour markets	- Literature review problems 1, 2, 4, 5, 6, 14, 16, 47, 51, 78, 95 - Transport Focus Passenger Satisfaction Surveys	- Provide appropriate seated capacity on public transport services
10	Travel by bus or rail is **unaffordable** for some particularly the unemployed or those on low incomes	- Fares levels do not reflect ability to pay - Lack of integrated fares and daily capping across operators - DRT acceptance of concessionary fares	- People have to rely on others' good will for lifts - People do not travel - People do travel but at disproportionate cost to them / their household - People who would prefer to use public transport cannot do so	- Contributes to poverty - Limits employment / training and other opportunities and constrains labour markets - Avoidable car km with associated impacts (energy usage, emissions, congestion, collisions, noise etc.)	- Literature review problems 1, 2, 4, 41, 44, 45, 47, 51, 62, 78 - Transport Focus Passenger Satisfaction Surveys - Equalities Impact Assessment Scoping evidence base	- Reduce the cost of travel by public transport

	Transport Problem (from a User's Perspective)	Supply Side Cause of Transport Problem	Travel Consequence	Societal Consequence	Evidence for This	Transport Planning Objective
11	Some journeys **cannot be made** by public transport	- There is no public transport service which allows the journey to be made at the time required - There is no public transport service at all - DRT provision is patchy and inconsistent - DRT services not available to all - Land use development patterns	- People drive instead - People car-share / lift-share - People use taxi - People do not make the trips - People drive / get a lift to a location where the journey can be made using public transport - People who would prefer to use public transport cannot do so - People have to rely on good will / lifts	- 'Forced' car ownership impacting disproportionately on some household budgets - Limits employment / training and other opportunities and constrains labour markets - Avoidable car km with associated impacts (energy usage, emissions, congestion, collisions, noise etc.) - Social isolation - People do not take up opportunities with social and economic consequences -	- Literature review problems 1, 2, 4, 7, 8, 12, 13, 39, 40, 41, 47, 51, 62, 78, 95 - TRACC Interchange Analysis - Connectivity to Education, Healthcare and Employment Analysis	- Widen access to public transport by geography and time of day
12	**Physical access** to, and use of the public transport network is a problem or not possible for some users like the elderly, those with disabilities, parents with pushchairs and mobility impaired	- Vehicles - Stops / stations - Access to stops / stations	- People have to use cars instead, either their own or relying on lifts - People do not travel - People do use public transport but at significant inconvenience to them - People who would prefer to use public transport cannot do so	- Groups in society suffer significant inequality - Social isolation - 'Forced' car ownership - Limits employment / training and other opportunities and constrains labour markets - Avoidable car km with associated impacts (energy usage, emissions, congestion, collisions, noise etc)	- Literature review problems 1, 2, 4, 11, 17, 47, 51, 59, 60, 61, 62, 63, 64, 65, 78, 83 - Demographic data - Equalities Impact Assessment Scoping evidence base	- Widen access to public transport by user group
13	Vulnerable groups (e.g. young, elderly, disabled, women, ethnic minorities, etc.) not feeling **safe** on public transport	- Environment feels unsafe - Lack of security (human, technological) - Intimidation by other passengers	- Taxi use - Car use - Lift / share - People do not travel - People who would prefer to use public transport cannot do so	- Groups in society suffer significant inequality - Social isolation - 'Forced' car ownership - Limits employment / training and other opportunities and constrains labour markets - Avoidable car km with associated impacts (energy usage, emissions, congestion, collisions, noise etc)	- Literature review problems 1, 2, 4, 23, 47, 51, 59, 60, 61, 62, 63, 64, 65, 78, 83 - Scottish Household Survey Views of Safety on Public Transport data - Equalities Impact Assessment Scoping evidence base	- Improve actual and perceived personal security on the public transport networks
14	People do not have **full awareness** of their public transport options	- Information is not provided in a way which all can access - Public transport travel options are not publicised in a way which reaches key groups	- People do not use public transport - People use car instead - People do not make trips	- Avoidable car km with associated impacts (energy usage, emissions, congestion, collisions, noise etc) - People do not take up opportunities with social and economic consequences	- Literature review problems 1, 2, 4, 46, 47, 51, 59, 60, 61, 62, 63, 64, 65, 66, 78 - Scottish Household Survey Views on Public Transport Information	- Provide effective information about public transport services for all

Transport Problem (from a User's Perspective)		Supply Side Cause of Transport Problem	Travel Consequence	Societal Consequence	Evidence for This	Transport Planning Objective
MIXED MODE						
15	Combining **cycling and public transport** use is not possible	- Few buses and trains have facilities to carry bikes – those that do have low capacity which creates a degree of uncertainty for users	- Low levels of this form of mixed mode travel - Likely to lead to higher car use	- Avoidable car km with associated impacts (energy usage, emissions, congestion, collisions, noise etc)	- Literature review problem 1, 2, 4, 18, 69, 78 - Stakeholder Feedback	- Improve bike / public transport mixed mode travel options
16	Preferred **P&R** station cannot be used due to lack of parking during commuter (i) peak and (ii) inter peak	- Mismatch of supply and demand at station car parks - Differential train frequencies - Fare boundary effects - Spaces used by those who could use active travel instead - Car park is filled with all-day commuters	- People drive for their whole journey - People drive to an alternative station (could be closer or further) - People get a lift to the station (double journey) - People walk / cycle to the station instead - People change their destination – e.g., not going shopping in city centre	- Avoidable car km with associated impacts (energy usage, emissions, congestion, collisions, noise etc) - Could have a distributional impact if people e.g., drive to out/edge of town retail rather than take a train to the city centre	- Literature review problems 1, 2, 4, 26, 27, 29, 78 - ORR Station Usage data - Stakeholder Feedback	- Maximise the reduction in car-km travelled associated with car / rail travel
FREIGHT						
17	In places, peak period **commercial vehicle-based journey times** can routinely be much longer than off-peak	- Mismatch of supply and demand, particularly at key regional bottlenecks including City Bypass, Newbridge, Forth Crossings - Increased LGV traffic - Land use development patterns	- Longer peak hour journeys - Peak spreading - earlier and later journeys are made - People do not make the journey	- Loss of productive time (business) - Increased energy usage - Increased emissions and pollution - Adds to the cost of distributing goods	- Literature review problems 2, 4, 73, 75, 76, 78, 95 - INRIX Road Journey Time data -	- Reduce peak period delays for freight vehicles
18	Peak period **commercial vehicle-based journey times** can be much more variable than off-peak	- Small variations in traffic volumes create volatile journey times when the network is operating near capacity - This is exacerbated by incidents – lack of alternative routes in places – these are thought to be increasing in frequency in part due to increased severe weather events - Increased LGV traffic	- Peak spreading - earlier and later journeys are made - Late arrival of goods - People re-route onto less appropriate routes	- As above, plus: - Supply chain scheduling and cost impacts of unscheduled delays - Noise / emissions / safety etc impacts of traffic re-routing	- Literature review problems 1, 2, 4, 73, 75, 76, 78, 79 - INRIX Road Journey Time data -	- Improve peak period journey time reliability for freight vehicles
19	Cost and practicality of **rail freight** prevents widespread use	- Market forces - Rail freight intermodal facilities and connections to key nodes - Lack of capacity (paths) on the rail network for a significant increase in freight services - Pricing and regulatory regimes	- Virtually all freight is moved by road	- Negative impacts of CV traffic	- Literature review problem 1, 2, 4, 77 - Stakeholder Feedback - Rail Network Gauge Clearance	- Improve the competitiveness of the rail-freight 'offer'

	Transport Problem (from a User's Perspective)	Supply Side Cause of Transport Problem	Travel Consequence	Societal Consequence	Evidence for This	Transport Planning Objective
20	Commercial vehicle drivers have limited options for **secure parking** and rest	- There are few bespoke facilities in the region for drivers requiring to rest and overnight	- CVs park in less appropriate locations	- Thefts from vehicles add to costs - Nuisance parking leads to conflict	- Literature review problem 87 - Number of Lorry Rest Stops	- Improve security and safety for drivers of freight vehicles
21	Commercial vehicles are currently reliant on **fossil fuels** in the absence of viable / cost effective alternatives	- Alternative fuel solutions not suitably developed for widespread use	- ICE powered vehicles continue to be used	- Ongoing carbon emissions and impact on local air quality and associated health impacts	- Literature review problems 2, 4, 90, 91 - Fleet Composition data	- Decarbonise the freight sector
22	Direct **sea-based international connectivity** is poor	- No ferry service to the EU	- CVs travel south to Channel and other ports - Freight travels by air rather than sea	- Emissions related to use of road and air freight	- Literature review problems 2, 77 - Sea Freight data	- Improve 'external' freight links
CAR						
23	In places, peak **period car-based journey times** can routinely be much longer than off-peak	- Mismatch of supply and demand, particularly at key regional bottlenecks including City Bypass, Newbridge, Forth Crossings - Increased LGV traffic - Land use development patterns	- Longer peak hour journeys - Peak spreading - earlier and later journeys are made - People do not make the journey	- Wasted time (commuting and leisure) - Loss of productive time (business) - Increased energy usage - Increased emissions and pollution - Constrains labour market efficiency	- Literature review problems 2, 4, 47, 51, 76, 78, 95 - INRIX Road Journey Time data	- Reduce peak period delays for car-based travel
24	Peak period **car-based journey times** can be much more variable than off-peak	- Small variations in traffic volumes create volatile journey times when the network is operating near capacity - This is exacerbated by incidents – lack of alternative routes in places – these are thought to be increasing in frequency in part due to increased severe weather events - Increased LGV traffic	- To be sure of making a given appointment, people have to allow more time, wasting more time - Peak spreading - earlier and later journeys are made - People do not make the journey - People re-route onto less appropriate routes	- As above, plus: - People are late for appointments - Cost of missed appointments – e.g., work and health - Noise / emissions / safety etc impacts of traffic re-routing	- Literature review problems 1, 2, 4, 47, 51, 76, 78, 79 - INRIX Road Journey Time data	- Improve peak period journey time reliability for car-based travel
25	High cost of town / city centre **parking**	- Scale of parking charges and enforcement regime	- People use public transport or active travel instead - People's destination choice is affected favouring locations with plentiful free parking	- Positive impacts through lower car km - Price mechanisms disproportionately affect those who can least afford to pay - May impact on town / city centre vitality and recovery from Covid19	- Literature review problems 62, 66, 94 - Public Survey responses	- Ensure the level and scope of parking charges reflect the strategy objectives

	Transport Problem (from a User's Perspective)	Supply Side Cause of Transport Problem	Travel Consequence	Societal Consequence	Evidence for This	Transport Planning Objective
26	Lack of availability of **parking** is inconvenient	- Mismatch of supply of and demand for parking - Insufficient provision for those most in need, blue badge etc.	- Vehicles spend excessive time circulating looking for parking spaces - People use public transport or active travel instead - People's destination choice is affected favouring locations with plentiful free parking	- Some avoidable car km with associated impacts (energy usage, emissions, congestion, collisions, noise etc) - Positive impacts of reduced car trips to these areas - Distributional impact on economic activity in urban areas - May impact on town / city centre vitality and recovery from Covid19	- Literature review problems 1, 2, 4, 47, 66, 78, 84, 85, 94 - Stakeholder Feedback - Public Survey responses	- Ensure the availability of parking reflects the strategy objectives
27	**Road-based travel** on the regional road network, including some external links (including ports and airports) can be **slow** even when traffic volumes are relatively low	- Road standard - Horizontal and vertical alignment - Lack of overtaking opportunities	- Journeys take longer - Can lead to accidents	- Wasted time - Loss of productive in-work time - Casualties	- Literature review problem 78 - INRIX Road Journey Time data	- Improve journey times on regional / external road network
28	**Electric car** operation and ownership **not practical** for all	- Facilities for EV charging are patchy	- Continuing use of ICE powered cars - Some may ultimately be precluded from owning a vehicle	- Higher carbon emissions - Some groups may be disproportionately affected by regulatory change around ICE cars (e.g., those who live in flats)	- Literature review problem 2, 4, 90, 91 - Fleet Composition data - EV Charging Point data	- Widen access to electric vehicle ownership / use
29	**Cost of electric cars** is higher than equivalent ICE cars and too expensive for many at present	- Market forces – supply and demand - Government regulation and incentives	- Continuing use of ICE powered cars	- Higher carbon emissions - Lower income groups may be disproportionately affected by regulatory change around ICE cars - Impact should reduce over time as prices equalise	- Literature review problems 2, 4, 62, 90, 91 - Fleet Composition data - Lifetime Cost of Electric v Petrol Vehicles data	- Widen access to electric vehicle ownership / use

8.2 LINKS TO NATIONAL TRANSPORT STRATEGY 2

Analysis of the TPOs has been undertaken to show how they contribute to deliver the National Transport Strategy 2's four priorities and their associated outcomes. The findings are outlined in Table 8.2 and show that the majority of the TPOs make a positive contribution to at least of the NTS 2 priorities.

Table 8.2 Links between TPOs and NTS 2 Priorities

TPO	Reduced Inequalities			Takes Climate Action			Helps Deliver Inclusive Economic Growth			Improves Our Health and Wellbeing		
	Fair access to services	Easy to use for all	Affordable for all	Delivery net-zero target	Adapt to climate change	Promote greener, cleaner choices	Get goods / people where need to go	Reliable, efficient, and high quality	Use beneficial innovation	Safe and secure for all	Enable healthy travel choices	Communities great places to live
ALL MODES												
Ensure sustainable connectivity and travel behaviour is embedded in all new development	✓	✓				✓	✓	✓			✓	✓
Reduce injuries and fatalities for all users of the transport networks										✓		
ACTIVE TRAVEL												
Create an environment which allows more people to cycle	✓	✓				✓				✓	✓	✓
Create an environment which allows more people to walk and wheel	✓	✓				✓				✓	✓	✓
PUBLIC TRANSPORT												
Reduce peak-period delays for bus-based travel	✓					✓		✓				
Improve the punctuality of peak-period bus-based travel	✓					✓		✓				
Improve the competitiveness of public transport with car journey times	✓					✓		✓				
Reduce the time and inconvenience of having to interchange	✓	✓				✓		✓				
Provide appropriate seated capacity on public transport services	✓					✓		✓				
Reduce the cost of travel by public transport	✓		✓			✓						

TPO	Reduced Inequalities			Takes Climate Action			Helps Deliver Inclusive Economic Growth			Improves Our Health and Wellbeing		
	Fair access to services	Easy to use for all	Affordable for all	Delivery net-zero target	Adapt to climate change	Promote greener, cleaner choices	Get goods / people where need to go	Reliable, efficient, and high quality	Use beneficial innovation	Safe and secure for all	Enable healthy travel choices	Communities great places to live
Widen access to public transport by geography and time of day	✓					✓	✓					
Widen access to public transport by user group	✓	✓				✓						
Improve actual and perceived personal security on the public transport networks						✓				✓		
Provide effective information about public transport services for all		✓				✓			✓		✓	
MIXED MODE												
Improve bike / public transport mixed mode travel options	✓					✓	✓	✓			✓	
Maximise the reduction in car-km travelled associated with car / rail travel						✓	✓	✓				
FREIGHT												
Reduce peak period delays for freight vehicles							✓	✓				
Improve peak period journey time reliability for freight vehicles							✓	✓				
Improve the competitiveness of the rail-freight 'offer'				✓		✓	✓					
Improve security and safety for drivers of freight vehicles									✓	✓		
Decarbonise the freight sector				✓		✓			✓			✓
Improve 'external' freight links							✓	✓				
CAR												
Reduce peak period delays for car-based travel							✓	✓				

TPO	Reduced Inequalities			Takes Climate Action			Helps Deliver Inclusive Economic Growth			Improves Our Health and Wellbeing		
	Fair access to services	Easy to use for all	Affordable for all	Delivery net-zero target	Adapt to climate change	Promote greener, cleaner choices	Get goods / people where need to go	Reliable, efficient, and high quality	Use beneficial innovation	Safe and secure for all	Enable healthy travel choices	Communities great places to live
Improve peak period journey time reliability for car-based travel							✓	✓				
Ensure the level and scope of parking charges reflect the strategy objectives												
Ensure the availability of parking reflects the strategy objectives												
Improve journey times on regional / external road network							✓	✓				
Widen access to electric vehicle ownership / use				✓		✓			✓			✓

Option Generation

SEStran Regional Transport Strategy

STAG Case for Change Report

9.0 OPTION GENERATION

9.1 INITIAL OPTION GENERATION

The initial option generation process has drawn upon the problems outlined in the Problems Framework set out in Chapter 0 and built upon through the development of the Transport Planning Objectives in Chapter 8.0. This process has now been extended to incorporate option generation too as set out in Table 9.1 which shows a clear linkage between the problems, TPOs and options. Option generation has been informed by a combination of the literature review, stakeholder consultation and internal workshops.

Table 9.1 Problems Framework including TPOs and Options

Transport Problem (from a User's Perspective)		Supply Side Cause of Transport Problem	Travel Consequence	Societal Consequence	Evidence for This	Transport Planning Objective	Options
ALL MODES							
1	Those living in new developments or travelling to new developments can have long journeys and / or implied car use to undertake day to day activities	- Land use patterns - Location of new developments - All aspects of transport supply side	- Longer trips are made - Mode car trips are made	- Avoidable car km with associated impacts (energy usage, emissions, congestion, collisions, noise etc) - Negative health outcomes through lack of physical activity - Employment and other opportunities not taken up	- Literature review problems 1, 2, 4, 47, 51, 58, 72, 78, 95 - Edinburgh and South East Scotland City Region iRSS - NPF4 Housing Land Requirements	- Ensure sustainable connectivity and travel behaviour is embedded in all new development	- Land use planning measures around new development and urban form e.g., 20-minute neighbourhoods, Transit Oriented Development, public transport services and infrastructure
2	Use of the transport system brings the risk of accidents and personal injury	- Traffic speed and driver behaviour e.g., people breaking speed limits - Speed limits too high - Weather events - Human error - Technical failure	- Reduced levels of active travel - Trips not made at all	- Human cost of physical injury - Economic cost of physical injury - Negative health outcomes through lack of physical activity	- Literature review problems 23, 68, 72, 79, 80, 81, 82, 85 - Road Accident data	- Reduce injuries and fatalities for all users of the transport networks	- Road safety schemes - Reduced speed limits - Traffic engineering-based speed limiting solutions - Active travel schemes - Technical measures in relation to rail and air safety

Transport Problem (from a User's Perspective)		Supply Side Cause of Transport Problem	Travel Consequence	Societal Consequence	Evidence for This	Transport Planning Objective	Options
ACTIVE TRAVEL							
3	Many do not find cycling a realistic option	- Lack of appropriate facilities mean that many do not feel safe cycling (safety and personal security) - Lack of secure parking options - Gaps in cycling provision - Bicycle ownership is not practical for some - High vehicle speeds and intimidation - Freight deliveries	- People do not cycle - People drive instead - People use public transport instead	- Negative health outcomes through lack of physical activity - Avoidable car km with associated impacts (energy usage, emissions, congestion, collisions, noise etc)	- Literature review problems 1, 2, 4, 67, 68, 69, 70, 72, 78 - Main Mode of Travel data - Access to Bicycle data - SUSTRANS Hands Up Survey	- Create an environment which allows more people to cycle	- Cycling route / infrastructure improvements - Bike hire and access schemes - Reduced speed limits - Promotional campaigns - Measures to reduce car use – Congestion Charging, Road User Charging / parking policies (inc charging by energy / emissions) / WPL / LEZ, digital connectivity measures, land use planning measures
4	Walking or wheeling is not an attractive option for some short journeys	- Lack of appropriate facilities mean that many do not feel safe walking or wheeling (safety and personal security) - Traffic intimidation - Physical barriers particularly for those with disabilities and mobility impairments	- People do not walk or wheel - People drive instead - People use public transport instead	- Negative health outcomes through lack of physical activity - Avoidable car km with associated impacts (energy usage, emissions, congestion, collisions, noise etc)	- Literature review problems 1, 2, 4, 67, 68, 69, 70, 72, 78 - Main Mode of Travel data - SUSTRANS Hands Up Survey - Walking as a Means of Transport data	- Create an environment which allows more people to walk or wheel	- Walking route / infrastructure improvements - Traffic calming / pedestrianisation / walk to school initiatives - 20 mph zones - Promotional campaigns - Measures to reduce car use – Congestion Charging, Road User Charging / parking policies (inc charging by energy / emissions) / WPL / LEZ, digital connectivity measures, land use planning measures
PUBLIC TRANSPORT							
5	Peak period bus-based **journey times** can be much longer than off-peak	- Buses are slowed down by routine congestion caused by general road traffic (including other buses)	- Discourages bus use - Longer peak hour journeys - People travel by car instead - Peak spreading - earlier and later journeys are made - People do not make the journey	- Wasted time (commuting and leisure) - Constrains labour markets - Avoidable car km with associated impacts (energy usage, emissions, congestion, collisions, noise etc)	- Literature review problems 1, 2, 4, 19, 20, 21, 22, 47, 51, 78 - INRIX Road Journey Time data - TRACC Public Transport Journey Time data -	- Reduce peak-period delays for bus-based travel	- Bus priority measures - New public transport modes, including new railway lines, stations, and tram extensions - Measures to reduce car use – Congestion Charging, Road User Charging / parking policies (inc charging by energy / emissions) / WPL / LEZ, digital connectivity measures, land use planning measures

Transport Problem (from a User's Perspective)		Supply Side Cause of Transport Problem	Travel Consequence	Societal Consequence	Evidence for This	Transport Planning Objective	Options
6	Peak period bus-based **journey times** can be much more variable than off-peak	- Buses are slowed down by congestion caused by variable congestion and congestion caused by incidents - Mis-use of bus lanes	- Discourages bus use - To be sure of making a given appointment, people have to catch an earlier bus, wasting more time - Peak spreading - earlier and later journeys are made - People do not make the journey - People travel by car instead – greater journey flexibility	- As above, plus: - People are late for appointments - Cost of missed appointments – e.g., work and health	- Literature review problems 1, 2, 4, 19, 20, 21, 22, 47, 51, 78 - INRIX Road Journey Time data - TRACC Public Transport Journey Time data -	- Improve the punctuality of peak-period bus-based travel	- Bus priority measures - Enforcement of bus lane use - Enforcement of parking regulations - New public transport modes, including new railway lines, stations, and tram extensions - Measures to reduce car use – Congestion Charging, Road User Charging / parking policies (inc charging by energy / emissions) / WPL / LEZ, digital connectivity measures, land use planning measures
7	Some direct public transport **journey speeds** are slow so journey times are long and not competitive with car	- Indirect service routing - In-vehicle speeds (including bus versus rail) - Frequency of stops increases journey times	- People drive instead - People car-share / lift-share - People do not make the trips - People who would prefer to use public transport cannot do so	- Wasted time (commuting and leisure) - Avoidable car km with associated impacts (energy usage, emissions, congestion, collisions, noise etc) - 'Forced' car ownership impacting disproportionately on some household budgets - Employment and other opportunities not taken up	- Literature review problems 1, 2, 4, 10, 12, 13, 19, 20, 21, 22, 41, 47, 51, 62, 78 - INRIX Road Journey Time data - TRACC Public Transport Journey Time data -	- Improve the competitiveness of public transport with car journey times	- Provide more direct bus routes, at least part-day - Reduce number of bus stops - New public transport modes, including new railway lines, stations, and tram extensions - High Speed Rail - Shared mobility – including to tackle forced car ownership - Electrification of rail lines can help increase rail journey speeds.

Transport Problem (from a User's Perspective)		Supply Side Cause of Transport Problem	Travel Consequence	Societal Consequence	Evidence for This	Transport Planning Objective	Options
8	Some travel by public transport requires **interchange**(s) – adding to journey times, access issues, inconvenience, and cost	- Most 'regional' public transport is focused on Edinburgh city centre and the relevant access corridor, including services which call at P&R sites - Integration between modes is inconvenient - Integrated ticketing options are limited meaning individual fares often have to be paid - Suburban and out of town employment / leisure / retail locations more difficult to competitively serve by public transport - Other regional travel generators such as Edinburgh Airport require interchange for many - Land use development patterns	- People drive instead - People car-share / lift-share - People do not make the trips - People who would prefer to use public transport cannot do so	- Avoidable car km with associated impacts (energy usage, emissions, congestion, collisions, noise etc.) - 'Forced' car ownership impacting disproportionately on some household budgets - Employment and other opportunities not taken up	- Literature review problems 1, 2, 4, 5, 8, 9, 12, 16, 28, 30, 40, 41, 44, 47, 51, 55, 62, 69, 78, 95 - TRACC Interchange Analysis -	- Reduce the time and inconvenience of having to interchange	- Eliminate the need for interchange by providing more direct service to key regional travel generators - Reduce the impact of interchange - cost: integrated ticketing to avoid double fare - time: integrated timetabling to reduce wait times including intermodal - comfort / access / hassle: improving shelter / facilities at key interchange points and integrated ticketing - MaaS - Shared mobility – including to tackle forced car ownership - New public transport modes, including new railway lines, stations and tram extensions - New or improved intermodal facilities e.g., Mobility hubs
9	People can't **get a seat** on some public transport services	- Mismatch of supply and demand, generally peak hour and more of a factor in rail - Situation exacerbated in summer due to tourists (mainly Edinburgh) - Land use development patterns	- Journey is uncomfortable for some and not possible for others - People drive instead - People car-share / lift-share - People do not make the trips - People travel by bus instead - Peak spreading - earlier and later journeys - People who would prefer to use public transport cannot do so	- Avoidable car km with associated impacts (energy usage, emissions, congestion, collisions, noise etc.) - Limits employment / training and other opportunities and constrains labour markets	- Literature review problems 1, 2, 4, 5, 6, 14, 16, 47, 51, 78, 95 - Transport Focus Passenger Satisfaction Surveys	- Provide appropriate seated capacity on public transport services	- Bigger buses / trains - Higher frequency services - New public transport modes, including new railway lines, stations, and tram extensions

Transport Problem (from a User's Perspective)		Supply Side Cause of Transport Problem	Travel Consequence	Societal Consequence	Evidence for This	Transport Planning Objective	Options
10	Travel by bus or rail is **unaffordable** for some particularly the unemployed or those on low incomes	- Fares levels do not reflect ability to pay - Lack of integrated fares and daily capping across operators - DRT acceptance of concessionary fares	- People have to rely on others' good will for lifts - People do not travel - People do travel but at disproportionate cost to them / their household - People who would prefer to use public transport cannot do so	- Contributes to poverty - Limits employment / training and other opportunities and constrains labour markets - Avoidable car km with associated impacts (energy usage, emissions, congestion, collisions, noise etc.)	- Literature review problems 1, 2, 4, 41, 44, 45, 47, 51, 62, 78 - Transport Focus Passenger Satisfaction Surveys	- Reduce the cost of travel by public transport - Equalities Impact Assessment Scoping evidence base	- Uniform low / fares - Discounted / free fares targeted at specific groups in need - Daily fare capping across operators - Integrated ticketing to reduce 2-fares trips - Taxicard for discounted taxi fares
11	Some journeys **cannot be made** by public transport	- There is no public transport service which allows the journey to be made at the time required - There is no public transport service at all - DRT provision is patchy and inconsistent - DRT services not available to all - Land use development patterns	- People drive instead - People car-share / lift-share - People use taxi - People do not make the trips - People drive / get a lift to a location where the journey can be made using public transport - People who would prefer to use public transport cannot do so - People have to rely on good will / lifts	- 'Forced' car ownership impacting disproportionately on some household budgets - Limits employment / training and other opportunities and constrains labour markets - Avoidable car km with associated impacts (energy usage, emissions, congestion, collisions, noise etc.) - Social isolation - People do not take up opportunities with social and economic consequences -	- Literature review problems 1, 2, 4, 7, 8, 12, 13, 39, 40, 41, 47, 51, 62, 78, 95 - TRACC Interchange Analysis - Connectivity to Education, Healthcare and Employment Analysis	- Widen access to public transport by geography and time of day	- Earlier and later services - Higher frequency services - Shared mobility – including to tackle forced car ownership - DRT / Community Transport - Semi-scheduled bus services - Taxicard for discounted taxi fares - New public transport modes, including new railway lines, stations, and tram extensions
12	**Physical access** to, and use of the public transport network is a problem or not possible for some users like the elderly, those with disabilities, parents with pushchairs and mobility impaired	- Vehicles - Stops / stations - Access to stops / stations	- People have to use cars instead, either their own or relying on lifts - People do not travel - People do use public transport but at significant inconvenience to them - People who would prefer to use public transport cannot do so	- Groups in society suffer significant inequality - Social isolation - 'Forced' car ownership - Limits employment / training and other opportunities and constrains labour markets - Avoidable car km with associated impacts (energy usage, emissions, congestion, collisions, noise etc)	- Literature review problems 1, 2, 4, 11, 17, 47, 51, 59, 60, 61, 62, 63, 64, 65, 78, 83 - Demographic data - Equalities Impact Assessment Scoping evidence base	- Widen access to public transport by user group	- Step free access to vehicles - Getting to / from bus / train / tram e.g., step free access at stations, stops, etc. - Journey planning e.g., Traveline, etc - Escorting / chaperoning for vulnerable users - Shared mobility – including to tackle forced car ownership - New public transport modes, including new railway lines, stations and tram extensions

Transport Problem (from a User's Perspective)		Supply Side Cause of Transport Problem	Travel Consequence	Societal Consequence	Evidence for This	Transport Planning Objective	Options
13	Vulnerable groups (e.g. young, elderly, disabled, women, ethnic minorities, etc.) not feeling **safe** on public transport	- Environment feels unsafe - Lack of security (human, technological) - Intimidation by other passengers	- Taxi use - Car use - Lift / share - People do not travel - People who would prefer to use public transport cannot do so	- Groups in society suffer significant inequality - Social isolation - 'Forced' car ownership - Limits employment / training and other opportunities and constrains labour markets - Avoidable car km with associated impacts (energy usage, emissions, congestion, collisions, noise etc)	- Literature review problems 1, 2, 4, 23, 47, 51, 59, 60, 61, 62, 63, 64, 65, 78, 83 - Scottish Household Survey Views of Safety on Public Transport data - Equalities Impact Assessment Scoping evidence base	- Improve actual and perceived personal security on the public transport networks	- Improved security / lighting etc. - in vehicle - at stop / station / interchange - Shared mobility – including to tackle forced car ownership
14	People do not have **full awareness** of their public transport options	- Information is not provided in a way which all can access - Public transport travel options are not publicised in a way which reaches key groups	- People do not use public transport - People use car instead - People do not make trips	- Avoidable car km with associated impacts (energy usage, emissions, congestion, collisions, noise etc) - People do not take up opportunities with social and economic consequences	- Literature review problems 1, 2, 4, 46, 47, 51, 59, 60, 61, 62, 63, 64, 65, 66, 78 - Scottish Household Survey Views on Public Transport Information	- Provide effective information about public transport services for all	- Improved information provision targeted at specific groups - Journey planning e.g., Traveline, etc - Promotion of information sources - MaaS
MIXED MODE							
15	Combining **cycling and public transport** use is not possible	- Few buses and trains have facilities to carry bikes – those that do have low capacity which creates a degree of uncertainty for users	- Low levels of this form of mixed mode travel - Likely to lead to higher car use	- Avoidable car km with associated impacts (energy usage, emissions, congestion, collisions, noise etc)	- Literature review problem 1, 2, 4, 18, 69, 78 - Stakeholder Feedback	- Improve bike / public transport mixed mode travel options	- Provision of bike-buses
16	Preferred **P&R** station cannot be used due to lack of parking during commuter (i) peak and (ii) inter peak	- Mismatch of supply and demand at station car parks - Differential train frequencies - Fare boundary effects - Spaces used by those who could use active travel instead - Car park is filled with all-day commuters	- People drive for their whole journey - People drive to an alternative station (could be closer or further) - People get a lift to the station (double journey) - People walk / cycle to the station instead - People change their destination – e.g., not going shopping in city centre	- Avoidable car km with associated impacts (energy usage, emissions, congestion, collisions, noise etc) - Could have a distributional impact if people e.g., drive to out/edge of town retail rather than take a train to the city centre	- Literature review problems 1, 2, 4, 26, 27, 29, 78 - ORR Station Usage data - Stakeholder Feedback	- Maximise the reduction in car-km travelled associated with car / rail travel	- Parking charges to discourage short car trips - Improved active travel links to discourage short car trips - Fares and frequency changes to balance demand - Provision of additional parking capacity on site or at new location

Transport Problem (from a User's Perspective)		Supply Side Cause of Transport Problem	Travel Consequence	Societal Consequence	Evidence for This	Transport Planning Objective	Options
FREIGHT							
17	In places, peak period **commercial vehicle-based journey times** can routinely be much longer than off-peak	- Mismatch of supply and demand, particularly at key regional bottlenecks including City Bypass, Newbridge, Forth Crossings - Increased LGV traffic - Land use development patterns	- Longer peak hour journeys - Peak spreading - earlier and later journeys are made - People do not make the journey	- Loss of productive time (business) - Increased energy usage - Increased emissions and pollution - Adds to the cost of distributing goods	- Literature review problems 2, 4, 73, 75, 76, 78, 95 - INRIX Road Journey Time data -	- Reduce peak period delays for freight vehicles	- Measures to reduce car use – Congestion Charging, Road User Charging / parking policies (inc charging by energy / emissions) / WPL / LEZ, digital connectivity measures, land use planning measures - Measures to encourage mode shift from road to rail freight - Combined bus / commercial vehicle lanes - Provide additional road capacity - Freight consolidation centres
18	Peak period **commercial vehicle-based journey times** can be much more variable than off-peak	- Small variations in traffic volumes create volatile journey times when the network is operating near capacity - This is exacerbated by incidents – lack of alternative routes in places – these are thought to be increasing in frequency in part due to increased severe weather events - Increased LGV traffic	- Peak spreading - earlier and later journeys are made - Late arrival of goods - People re-route onto less appropriate routes	- As above, plus: - Supply chain scheduling and cost impacts of unscheduled delays - Noise / emissions / safety etc impacts of traffic re-routing	- Literature review problems 1, 2, 4, 73, 75, 76, 78, 79 - INRIX Road Journey Time data -	- Improve peak period journey time reliability for freight vehicles	- Measures to reduce car use – Congestion Charging, Road User Charging / parking policies (inc charging by energy / emissions) / WPL / LEZ, digital connectivity measures, land use planning measures - Measures to encourage mode shift from road to rail freight - Combined bus / commercial vehicle lanes - Provide additional road capacity - Freight consolidation centres
19	Cost and practicality of **rail freight** prevents widespread use	- Market forces - Rail freight intermodal facilities and connections to key nodes - Lack of capacity (paths) on the rail network for a significant increase in freight services - Pricing and regulatory regimes	- Virtually all freight is moved by road	- Negative impacts of CV traffic	- Literature review problem 1, 2, 4, 77 - Stakeholder Feedback - Rail Network Gauge Clearance	- Improve the competitiveness of the rail-freight 'offer'	- Public subsidy for rail freight - Innovative approaches to rail train forming - New or improved intermodal facilities - Additional freight paths on the network - Enabling infrastructure works e.g., gauge - Additional freight services to serve new origin-destination pairs

Transport Problem (from a User's Perspective)		Supply Side Cause of Transport Problem	Travel Consequence	Societal Consequence	Evidence for This	Transport Planning Objective	Options
20	Commercial vehicle drivers have limited options for **secure parking** and rest	- There are few bespoke facilities in the region for drivers requiring to rest and overnight	- CVs park in less appropriate locations	- Thefts from vehicles add to costs - Nuisance parking leads to conflict	- Literature review problem 87 - Number of Lorry Rest Stops	- Improve security and safety for drivers of freight vehicles	- Provide new secure freight rest facilities at key locations on the network
21	Commercial vehicles are currently reliant on **fossil fuels** in the absence of viable / cost effective alternatives	- Alternative fuel solutions not suitably developed for widespread use	- ICE powered vehicles continue to be used	- Ongoing carbon emissions and impact on local air quality and associated health impacts	- Literature review problems 2, 4, 90, 91 - Fleet Composition data	- Decarbonise the freight sector	- Public investment or partnership in e.g., synthetic fuels and hydrogen - Working with the tech sector to fund pilots, etc.
22	Direct **sea-based international connectivity** is poor	- No ferry service to the EU	- CVs travel south to Channel and other ports - Freight travels by air rather than sea	- Emissions related to use of road and air freight	- Literature review problems 2, 77 - Sea Freight data	- Improve 'external' freight links	- Public subsidy for new ferry services e.g., from Rosyth
CAR							
23	In places, peak **period car-based journey times** can routinely be much longer than off-peak	- Mismatch of supply and demand, particularly at key regional bottlenecks including City Bypass, Newbridge, Forth Crossings - Increased LGV traffic - Land use development patterns	- Longer peak hour journeys - Peak spreading - earlier and later journeys are made - People do not make the journey	- Wasted time (commuting and leisure) - Loss of productive time (business) - Increased energy usage - Increased emissions and pollution - Constrains labour market efficiency	- Literature review problems 2, 4, 47, 51, 76, 78, 95 - INRIX Road Journey Time data -	- Reduce peak period delays for car-based travel	- Additional road capacity at congestion hotspots - Traffic management measures to improve network efficiency - Measures to reduce car use – Congestion Charging, Road User Charging / parking policies (inc charging by energy / emissions) / WPL / LEZ, digital connectivity measures, land use planning measures - Rationalise bus services in key corridors
24	Peak period **car-based journey times** can be much more variable than off-peak	- Small variations in traffic volumes create volatile journey times when the network is operating near capacity - This is exacerbated by incidents – lack of alternative routes in places – these are thought to be increasing in frequency in part due to increased severe weather events - Increased LGV traffic	- To be sure of making a given appointment, people have to allow more time, wasting more time - Peak spreading - earlier and later journeys are made - People do not make the journey - People re-route onto less appropriate routes	- As above, plus: - People are late for appointments - Cost of missed appointments – e.g., work and health - Noise / emissions / safety etc impacts of traffic re-routing	- Literature review problems 1, 2, 4, 47, 51, 76, 78, 79 - INRIX Road Journey Time data -	- Improve peak period journey time reliability for car-based travel	- Additional road capacity at congestion hotspots - Traffic management measures to improve network efficiency and planning for resilience (alternative routes) - Measures to reduce car use – Congestion Charging, Road User Charging / parking policies (inc charging by energy / emissions) / WPL / LEZ, digital connectivity measures, land use planning measures - Rationalise bus services in key corridors

Transport Problem (from a User's Perspective)		Supply Side Cause of Transport Problem	Travel Consequence	Societal Consequence	Evidence for This	Transport Planning Objective	Options
25	High cost of town / city centre **parking**	- Scale of parking charges and enforcement regime	- People use public transport or active travel instead - People's destination choice is affected favouring locations with plentiful free parking	- Positive impacts through lower car km - Price mechanisms disproportionately affect those who can least afford to pay - May impact on town / city centre vitality and recovery from Covid19	- Literature review problems 62, 66, 94 - Public Survey responses	- Ensure the level and scope of parking charges reflect the strategy objectives	- Reduce parking charges - Provide better alternatives to car-based access
26	Lack of availability of **parking** is inconvenient	- Mismatch of supply of and demand for parking - Insufficient provision for those most in need, blue badge etc.	- Vehicles spend excessive time circulating looking for parking spaces - People use public transport or active travel instead - People's destination choice is affected favouring locations with plentiful free parking	- Some avoidable car km with associated impacts (energy usage, emissions, congestion, collisions, noise etc) - Positive impacts of reduced car trips to these areas - Distributional impact on economic activity in urban areas - May impact on town / city centre vitality and recovery from Covid19	- Literature review problems 1, 2, 4, 47, 66, 78, 84, 85, 94 - Stakeholder Feedback - Public Survey responses	- Ensure the availability of parking reflects the strategy objectives	- Increase parking capacity - Reduce parking regulation - Increase parking charges to price away some users - Provide better alternatives to car-based access
27	**Road-based travel** on the regional road network, including some external links (including ports and airports) can be **slow** even when traffic volumes are relatively low	- Road standard - Horizontal and vertical alignment - Lack of overtaking opportunities	- Journeys take longer - Can lead to accidents	- Wasted time - Loss of productive in-work time - Casualties	- Literature review problem 78 - INRIX Road Journey Time data	- Improve journey times on regional / external road network	- Route action plans targeting safety concerns and areas where the lack of overtaking opportunities is a problem - Upgrading the standard of strategic internal and external road links - Provide better alternatives to car-based access – rail / high speed rail
28	**Electric car** operation and ownership **not practical** for all	- Facilities for EV charging are patchy	- Continuing use of ICE powered cars - Some may ultimately be precluded from owning a vehicle	- Higher carbon emissions - Some groups may be disproportionately affected by regulatory change around ICE cars (e.g., those who live in flats)	- Literature review problem 2, 4, 90, 91 - Fleet Composition data - EV Charging Point data	- Widen access to electric vehicle ownership / use	- Provision of charging infrastructure (many options) - market led or public responsibility - Electrical grid capacity measures
29	**Cost of electric cars** is higher than equivalent ICE cars and too expensive for many at present	- Market forces – supply and demand - Government regulation and incentives	- Continuing use of ICE powered cars	- Higher carbon emissions - Lower income groups may be disproportionately affected by regulatory change around ICE cars - Impact should reduce over time as prices equalise	- Literature review problems 2, 4, 62, 90, 91 - Fleet Composition data - Lifetime Cost of Electric v Petrol Vehicles data	- Widen access to electric vehicle ownership / use	- Local grants and incentives – winding down from central government - Do nothing and wait for market to respond - Shared mobility access to EVs through car clubs

9.2 OPTION DEVELOPMENT

The initial long list of options outlined in the previous section was then consolidated and categorised. These consolidated options were subsequently assessed against the Sustainable Travel Hierarchy and Investment Hierarchy defined in National Transport Strategy 2 and illustrated in Figure 9.1. In addition, the options were also classified into three types:

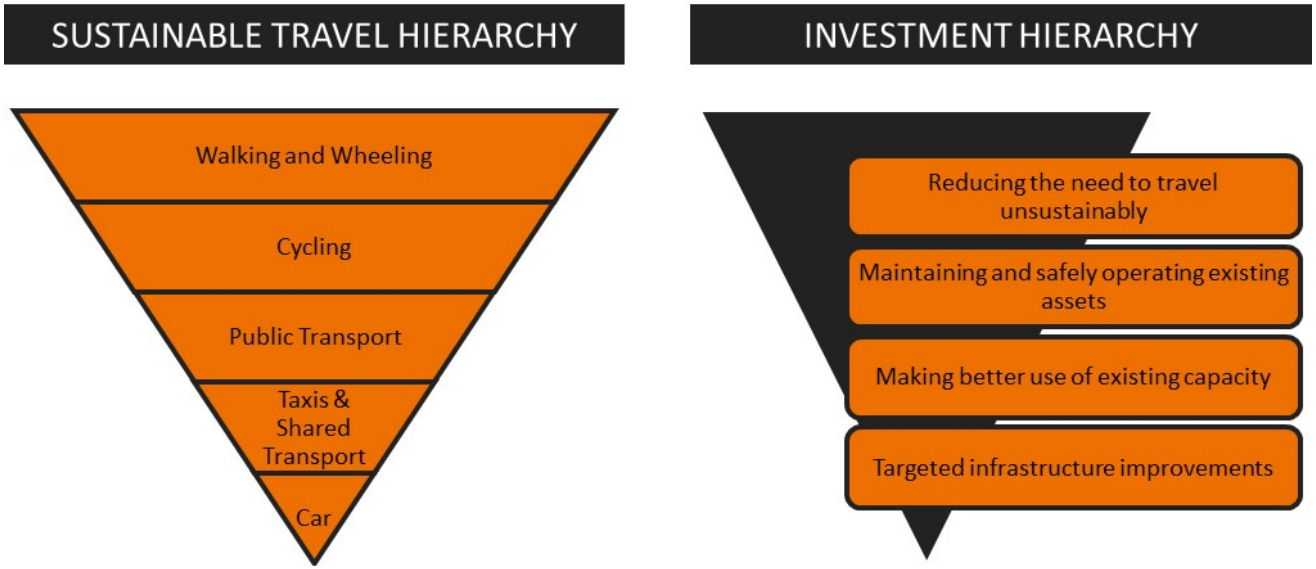


Figure 9.1 National Transport Strategy Hierarchies

- **policy measures**: guiding legal and regulatory matters, and perhaps steering the types of capital and revenue measures which may be appropriate to specific policies.
- **capital measures**: for the construction of new infrastructure 'on the ground', either physical or technical. These tend to be one off investments.
- **revenue measures**: spending to support services or initiatives, e.g. bus services, promotional campaigns etc. which is often ongoing on an annual basis.

The results of this process are outlined in Table 9.2. The options will subsequently undergo further development at the outset of the Preliminary Options Appraisal to provide more detail around each of them.

Table 9.2 Option Type and Assessment Against NTS 2 Hierarchies

No	Option Description	Type of Option	Sustainable Travel Hierarchy	Investment Hierarchy
Active Travel				
6	Cycling route / infrastructure improvements	Capital	2. Cycling	4. Targeted infrastructure improvements
7	Bike hire and access schemes	Revenue	2. Cycling	1. Reducing the need to travel unsustainably
8	Promotional campaigns	Revenue	1. Walking and wheeling	1. Reducing the need to travel unsustainably
9	Walking route / infrastructure improvements	Capital	1. Walking and wheeling	4. Targeted infrastructure improvements
10	Traffic calming / pedestrianisation / walk to school initiatives	Policy	1. Walking and wheeling	2. Maintaining and safely operating existing assets
11	20 mph zones	Policy	1. Walking and wheeling	3. Making better use of existing capacity
Public Transport				
12	Bus priority measures	Capital	3. Public Transport	3. Making better use of existing capacity
13	New public transport links and modes, including new railway lines, stations and tram extensions	Capital	3. Public Transport	4. Targeted infrastructure improvements
15	Enforcement of bus lane use	Capital	3. Public Transport	3. Making better use of existing capacity
17	Provide more direct bus routes, at least part-day	Revenue	3. Public Transport	3. Making better use of existing capacity
18	Reduce number of bus stops	Policy	3. Public Transport	3. Making better use of existing capacity
19	High Speed Rail	Policy	3. Public Transport	4. Targeted infrastructure improvements
21	Electrification of rail lines to help increase rail journey speeds.	Policy	3. Public Transport	3. Making better use of existing capacity
23	Reduce the impact of interchange (i) cost: integrated ticketing to avoid double fare (ii) time: integrated timetabling to reduce wait times including intermodal (iii) comfort / access / hassle: improving shelter / facilities at key interchange points and integrated ticketing	Capital	3. Public Transport	4. Targeted infrastructure improvements
25	Bigger buses / trains	Capital	3. Public Transport	1. Reducing the need to travel unsustainably
26	Uniform low / fares	Revenue	3. Public Transport	1. Reducing the need to travel unsustainably
27	Discounted / free fares targeted at specific groups in need	Revenue	3. Public Transport	1. Reducing the need to travel unsustainably
28	Daily fare capping across operators	Revenue	3. Public Transport	1. Reducing the need to travel unsustainably
29	Integrated ticketing to reduce 2-fares trips	Revenue	3. Public Transport	1. Reducing the need to travel unsustainably
31	Earlier and later services	Revenue	3. Public Transport	1. Reducing the need to travel unsustainably
32	Higher frequency services	Revenue	3. Public Transport	1. Reducing the need to travel unsustainably

No	Option Description	Type of Option	Sustainable Travel Hierarchy	Investment Hierarchy
33	DRT / Community Transport	Revenue	3. Public Transport	1. Reducing the need to travel unsustainably
34	Semi scheduled bus services	Revenue	3. Public Transport	1. Reducing the need to travel unsustainably
35	Step free access to vehicles	Capital	3. Public Transport	2. Maintaining and safely operating existing assets
36	Improved access to / from bus / train / tram e.g. step free access at stations, stops, etc.	Capital	3. Public Transport	2. Maintaining and safely operating existing assets
37	Journey planning e.g. Traveline, etc	Revenue	3. Public Transport	1. Reducing the need to travel unsustainably
38	Escorting / chaperoning for vulnerable users	Revenue	3. Public Transport	1. Reducing the need to travel unsustainably
39	Improved security / lighting etc. (i) in vehicle (ii) at stop / station / interchange	Capital	3. Public Transport	2. Maintaining and safely operating existing assets
40	Improved information provision targeted at specific groups	Revenue	3. Public Transport	1. Reducing the need to travel unsustainably
41	Provision of bike-buses	Policy	3. Public Transport	3. Making better use of existing capacity
43	Fares and frequency changes to balance demand	Revenue	3. Public Transport	3. Making better use of existing capacity
50	Innovative approaches to rail train forming	Policy	3. Public Transport	3. Making better use of existing capacity
61	Rationalise bus services in key corridors	Policy	3. Public Transport	3. Making better use of existing capacity
Multi-Modal				
1	Land use planning measures around new development and urban form e.g. 20 minute neighbourhoods, Transit Oriented Development, public transport services and infrastructure	Policy	1. Walking and wheeling	1. Reducing the need to travel unsustainably
5	Technical measures in relation to rail and air safety	Policy	3. Public Transport	2. Maintaining and safely operating existing assets
20	Shared mobility – including to tackle forced car ownership	Revenue	4. Taxis & shared transport	1. Reducing the need to travel unsustainably
22	Eliminate the need for interchange by providing more direct services to key regional travel generators	Capital	3. Public Transport	3. Making better use of existing capacity
24	MaaS	Revenue	3. Public Transport	1. Reducing the need to travel unsustainably
30	Taxicard for discounted taxi fares	Revenue	4. Taxis & shared transport	1. Reducing the need to travel unsustainably
51	New or improved intermodal facilities (e.g. Mobility Hubs)	Capital	3. Public Transport	4. Targeted infrastructure improvements
Freight				
45	Measures to encourage mode shift from road to rail freight	Capital	3. Public Transport	1. Reducing the need to travel unsustainably
46	Combined bus / commercial vehicle lanes	Policy	3. Public Transport	3. Making better use of existing capacity
48	Freight consolidation centres	Capital	5. Private Car	3. Making better use of existing capacity

No	Option Description	Type of Option	Sustainable Travel Hierarchy	Investment Hierarchy
49	Public subsidy for rail freight	Revenue	3. Public Transport	1. Reducing the need to travel unsustainably
52	Additional freight paths on the rail network	Capital	3. Public Transport	4. Targeted infrastructure improvements
53	Enabling rail infrastructure works e.g. gauge	Capital	3. Public Transport	4. Targeted infrastructure improvements
54	Additional rail freight services to serve new origin destination pairs	Capital	3. Public Transport	1. Reducing the need to travel unsustainably
55	Provide new secure freight rest facilities at key locations on the road network	Capital	5. Private Car	4. Targeted infrastructure improvements
57	Working with the tech sector to fund new fuel pilots, etc.	Capital	5. Private Car	1. Reducing the need to travel unsustainably
58	Public subsidy for new ferry services e.g. from Rosyth	Revenue	3. Public Transport	1. Reducing for need e trafel unsustainably
Car - Fleet Transition				
56	Public investment or partnership in alternative fuels e.g. synthetic fuels and hydrogen	Capital	5. Private Car	1. Reducing the need to travel unsustainably
68	Provision of charging infrastructure (many options) e.g. market led or public responsibility	Policy	5. Private Car	4. Targeted infrastructure improvements
69	Electrical grid capacity measures	Policy	5. Private Car	3. Making better use of existing capacity
70	Local grants and incentives for purchasing EVs – winding down from central government	Revenue	5. Private Car	3. Making better use of existing capacity
71	Do nothing and wait for market to make EVs more affordable	Policy	5. Private Car	3. Making better use of existing capacity
Car – Parking & Demand Management				
14	Measures to reduce car use – Congestion Charging, Road User Charging / parking policies (inc charging by energy / emissions) / WPL / LEZ, digital connectivity measures, land use planning measures	Policy	5. Private Car	1. Reducing the need to travel unsustainably
16	Enforcement of parking regulations	Policy	5. Private Car	3. Making better use of existing capacity
42	Parking charges to discourage short car trips	Policy	5. Private Car	3. Making better use of existing capacity
44	Provision of additional parking capacity on site or at new location including Park & Ride	Policy	5. Private Car	4. Targeted infrastructure improvements
62	Reduce parking charges	Revenue	5. Private Car	3. Making better use of existing capacity
63	Increase parking capacity	Revenue	5. Private Car	3. Making better use of existing capacity
64	Reduce parking regulation	Policy	5. Private Car	3. Making better use of existing capacity
65	Increase parking charges to price away some users	Policy	5. Private Car	3. Making better use of existing capacity

No	Option Description	Type of Option	Sustainable Travel Hierarchy	Investment Hierarchy
Car – Road Network				
2	Road safety schemes	Capital	5. Private Car	2. Maintaining and safely operating existing assets
3	Reduced speed limits	Policy	5. Private Car	2. Maintaining and safely operating existing assets
4	Traffic engineering based speeding limiting solutions	Capital	5. Private Car	2. Maintaining and safely operating existing assets
47	Provide additional road capacity	Capital	5. Private Car	4. Targeted infrastructure improvements
59	Additional road capacity at congestion hotspots	Capital	5. Private Car	4. Targeted infrastructure improvements
60	Traffic management measures to improve network efficiency and planning for resilience (i.e. alternative routes)	Capital	5. Private Car	3. Making better use of existing capacity
66	Route action plans targeting safety concerns and areas where the lack of overtaking opportunities is a problem	Policy	5. Private Car	3. Making better use of existing capacity
67	Upgrading the standard of strategic internal and external road links	Capital	5. Private Car	3. Making better use of existing capacity

Next Steps

SEStran Regional Transport Strategy

STAG Case for Change Report

10.0 NEXT STEPS

10.1 OPTION APPRAISAL

Given the nature of the appraisal which is suitably high level given the focus is upon developing a new RTS rather than on individual interventions, it has been agreed that a Detailed Options Appraisal stage will not be undertaken. However, this means that the Preliminary Options Appraisal will therefore have to be rather more rigorous than normal as this stage normally acts as a gateway to the Detailed Options Appraisal. The purpose of this stage is to '*develop a list of interventions that can be justifiably referenced as strategic interventions within the draft RTS'.* It has subsequently been agreed to approach this as a 'Preliminary+' stage. The Preliminary Options appraisal would not typically involve conventional modelling of options. Indeed, options will not require strategic transport modelling since the RTS will be a step removed from developing the details of projects, such as would be required to be coded into a model. The options will nonetheless require further development to define them in more detail and provide geographic specificity, where appropriate, prior to being submitted to Preliminary Options Appraisal.

In the context of the RTS options will not be limited to infrastructure measures and the process will also involve developing interventions that are predominantly policy based. In addition, there will be some options that span a number of the transport problems as well as their associated societal consequences and consequently be overarching in nature. Through this option development process the core aspects of the RTS will begin to emerge.

Having developed the options beyond their specification at the Case for Change stage, each option will be appraised against the RTS objectives and the STAG criteria. Consistent with the Preliminary Options Appraisal, this appraisal will be mostly qualitative. For transparency, each component of the STAG appraisal scoring will be accompanied by an explanatory narrative drawing on case study examples and evidence from elsewhere where appropriate. This appraisal will be set in the context of a small number of future transport scenarios, where these scenarios will capture range of uncertainties referred to throughout this Case for Change.

As well as an appraisal against the TPOs and the STAG criteria, this task will also map out how the options which perform well may be grouped / mapped into a meaningful RTS structure. In this way the Draft RTS structure will be developed in part, in parallel with this process which will also be informed by the Strategy Objectives outlined in the following section.

10.2 STRATEGY OBJECTIVES

The next stage of the development of the RTS also requires consideration of the structure of the strategy itself and how the problems, issues, constraints and opportunities set out in this Case for Change will be taken forward into the new RTS. As an initial step a set of four Strategy Objectives closely linked to our TPOs identified in Chapter 8.0 have been developed. These seek to aggregate some of the themes from the TPOs and provide a more concise structure within which the RTS can begin to be developed. In particular, 28 TPOs would clearly be excessive for the strategy itself but instead these would act as the foundation for more high-level strategic objectives.

The proposed strategy objectives are outlined below along with why each is relevant, how it could be achieved and the metrics that could be used for monitoring and evaluation. The latter would enable the objectives to eventually be made SMART (Specific, Measurable, Attainable, Relevant, Timed) in line with the requirements of STAG.

Strategy Objective 1: Transitioning to a sustainable, post-carbon transport system

Problems Addressed

- Those living in new developments or travelling to new developments can have long journeys and / or implied car use to undertake day to day activities
- Commercial vehicles are currently reliant on fossil fuels in the absence of viable / cost effective alternatives
- High cost of town / city centre parking
- Lack of availability of parking is inconvenient
- Electric car operation and ownership not practical for all
- Cost of electric cars is higher than equivalent ICE cars and too expensive for many at present

Why is this Objective Relevant?

- Respond to the Climate Emergency
- Reduce emissions and energy use
- Improve air quality
- Enhance environmental quality

How Could it be Achieved?

- Reduce (avoidable) car km in line with the Scottish Government target to reduce car km by 20%
- Shape strategic land-use development
- Facilitate the use of electric vehicles for unavoidable car trips

- Encourage behaviour change in travel habits to reduce the need to travel and the use of sustainable modes
- Decarbonisation of public transport and commercial vehicle fleet
- Facilitating E-mobility (e.g. scooters and bikes)
- Regional integration and delivery (systems and joined-up projects)
- Embracing opportunities provided by technological advancement and societal change

Metrics for Monitoring and Evaluation

- Emissions levels, air quality monitoring (car km)

Strategy Objective 2: Facilitating greater physical activity

Problems Addressed

- Those living in new developments or travelling to new developments can have long journeys and / or implied car use to undertake day to day activities
- Many do not find cycling a realistic option
- Walking or wheeling is not an attractive option for some short journeys
- Physical access to, and use of the public transport network is a problem or not possible for some users like the elderly, those with disabilities, parents with pushchairs and mobility impaired
- Combining cycling and public transport use is not possible

Why is this Objective Relevant?

- To improve health and wellbeing
- To reduce emissions

How Could it be Achieved?

- By enhancing 'place' and creating an environment suitable for walking, cycling and wheeling
- Regional integration and delivery (systems and joined-up projects)
- Embracing opportunities provided by technological advancement and societal change

Metrics for Monitoring and Evaluation

- Scottish Household Survey Travel Diary measures of walking and cycling

Strategy Objective 3: Widening public transport connectivity and access across the region

Problems Addressed

- Some travel by public transport requires interchange(s) – adding to journey times, access issues, inconvenience, and cost
- People can't get a seat on some public transport services
- Travel by bus or rail is unaffordable for some particularly the unemployed or those on low incomes
- Some journeys cannot be made by public transport
- Physical access to, and use of the public transport network is a problem or not possible for some users like the elderly, those with disabilities, parents with pushchairs and mobility impaired
- Vulnerable groups (e.g. young, elderly, disabled, women, ethnic minorities, etc.) not feeling safe on public transport
- People do not have full awareness of their public transport options
- Combining cycling and public transport use is not possible
- Preferred P&R station cannot be used due to lack of parking during commuter (i) peak and (ii) inter peak

Why is this Objective Relevant?

- To reduce inequality of opportunity and encourage more inclusive growth
- To reduce car dependency and forced car ownership and encourage modal shift

How Could it be Achieved?

- By increasing public transport network coverage and removing barriers to access
- By identifying and addressing geographical / time of day / user groups / cost / personal security issues with public transport
- By addressing inequalities in access to healthcare, employment, training and educational opportunities, etc. (drawing on the findings of connectivity and deprivation analysis)
- Regional integration and delivery (systems and joined-up projects)
- Embracing opportunities provided by technological advancement and societal change

Metrics for Monitoring and Evaluation

- Public transport usage from Scottish Household Survey Travel Diary
- CDAT connectivity and deprivation analysis
- EqIA measures

Strategy Objective 4: Supporting safe, sustainable and efficient movement of people and freight across the region

Problems Addressed

- Use of the transport system brings the risk of accidents and personal injury
- Peak period bus-based journey times can be much longer than off-peak
- Peak period bus-based journey times can be much more variable than off-peak
- Some direct public transport journey speeds are slow so journey times are long and not competitive with car
- Some travel by public transport requires interchange(s) – adding to journey times, access issues, inconvenience, and cost
- Vulnerable groups (e.g. young, elderly, disabled, women, ethnic minorities, etc.) not feeling safe on public transport
- In places, peak period commercial vehicle-based journey times can routinely be much longer than off-peak
- Peak period commercial vehicle-based journey times can be much more variable than off-peak
- Cost and practicality of rail freight prevents widespread use
- Commercial vehicle drivers have limited options for secure parking and rest
- Commercial vehicles are currently reliant on fossil fuels in the absence of viable / cost effective alternatives
- Direct sea-based international connectivity is poor
- In places, peak period car-based journey times can routinely be much longer than off-peak
- Peak period car-based journey times can be much more variable than off-peak
- Road-based travel on the regional road network, including some external links (including ports and airports) can be slow even when traffic volumes are relatively low

Why is this Objective Relevant?

- Deliver economic growth and increased productivity through the efficient movement of people and goods
- Reduce personal injuries

How Could it be Achieved?

- Reducing / maintaining travel times
- Improving travel time reliability (i.e. minimise congestion and delays they cause)
- Expanding labour markets – connecting the right people to the right jobs
- Improving external connections
- Supporting sustainable logistics
- This objective would support some ‘essential’ road schemes requiring policy around when a road scheme may be appropriate
- Regional integration and delivery (systems and joined-up projects)
- Embracing opportunities provided by technological advancement and societal change

Metrics for Monitoring and Evaluation

- INRIX journey time and congestion data
- Scottish Household Survey Travel Diary measure of people encountering delays
- Labour market catchment analysis
- Commercial vehicle kms
- Rail-freight tonnes lifted

Finally, the linkages between the Strategy Objectives and TPOs are set out in Table 10.1.

Table 10.1 Links between Strategy Objectives and TPOs

TPO	Transitioning to a sustainable, post-carbon transport system	Facilitating greater physical activity	Widening public transport connectivity and access across the region	Supporting safe, sustainable and efficient movement of people and freight across the region
ALL MODES				
Ensure sustainable connectivity and travel behaviour is embedded in all new development	✓			
Reduce injuries and fatalities for all users of the transport networks				✓
ACTIVE TRAVEL				
Create an environment which allows more people to cycle	✓	✓		
Create an environment which allows more people to walk or wheel	✓	✓		
PUBLIC TRANSPORT				
Reduce peak-period delays for bus-based travel	✓		✓	✓
Improve the punctuality of peak-period bus-based travel	✓		✓	✓
Improve the competitiveness of public transport with car journey times	✓		✓	✓

TPO	Transitioning to a sustainable, post-carbon transport system	Facilitating greater physical activity	Widening public transport connectivity and access across the region	Supporting safe, sustainable and efficient movement of people and freight across the region
Reduce the time and inconvenience of having to interchange	✓		✓	✓
Provide appropriate seated capacity on public transport services	✓		✓	
Reduce the cost of travel by public transport	✓			
Widen access to public transport by geography and time of day			✓	
Widen access to public transport by user group			✓	
Improve actual and perceived personal security on the public transport networks				✓
Provide effective information about public transport services for all			✓	
MIXED MODE				
Improve bike / public transport mixed mode travel options		✓		
Maximise the reduction in car-km travelled associated with car / rail travel	✓			
FREIGHT				
Reduce peak period delays for freight vehicles				✓
Improve peak period journey time reliability for freight vehicles				✓
Improve the competitiveness of the rail-freight 'offer'	✓			✓
Improve security and safety for drivers of freight vehicles				✓
Decarbonise the freight sector	✓			

TPO	Transitioning to a sustainable, post-carbon transport system	Facilitating greater physical activity	Widening public transport connectivity and access across the region	Supporting safe, sustainable and efficient movement of people and freight across the region
Improve 'external' freight links				✓
CAR				
Reduce peak period delays for car-based travel				✓
Improve peak period journey time reliability for car-based travel				✓
Ensure the level and scope of parking charges reflect the strategy objectives				
Ensure the availability of parking reflects the strategy objectives	✓	✓	✓	✓
Improve journey times on regional / external road network	✓	✓	✓	✓
Widen access to electric vehicle ownership / use	✓			

It can be seen that there is close integration between the identified TPOs and the Strategy Objectives. On this basis, these Strategy Objectives will be taken forward and act as the foundation upon which the development of the new RTS will commence.

Notes

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11.0 NOTES

[i] Mid-2019 Population Estimates Scotland | National Records of Scotland (nrscotland.gov.uk)
[ii] Population Projections for Scottish Areas (2018-based) | National Records of Scotland (nrscotland.gov.uk)
[iii] statistics.gov.scot : Average Household Size
[iv] Understanding the Further Education Market in England
[v] Council tax datasets - gov.scot (www.gov.scot)
[vi] Transport and Travel in Scotland 2019: Results from the Scottish Household Survey
[vii] Life expectancy at birth and at age 65 years by local areas, UK - Office for National Statistics (ons.gov.uk)
[viii] Adapted from Transport Catapult: Ready for Innovation – The Opportunity for Innovation in Rural Transport

Appendix A

SEStran Regional Transport Strategy

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APPENDIX A - LIST OF DOCUMENTS FROM LITERATURE REVIEW

PLANNING DOCUMENTS		
National	National Transport Strategy 2 Delivery Plan 2020-2022	2020
	National Planning Framework 4 Position Statement	2020
	A National Mission with Local Impact: Draft Infrastructure Investment Plan for Scotland 2021-2022 to 2025-2026: Consultation	2020
Regional	SESplan Main Issues Report	2015
	Regional Spatial Strategy for Edinburgh and South East Scotland City Region	2020
	Forth Valley Indicative Regional Spatial Strategy	2020
Local	Edinburgh Local Development Plan	2016
	Scottish Borders Local Development Plan	2016
	Scottish Borders Local Development Plan 2 Main Issues Report	2018
	East Lothian Local Development Plan	2018
	East Lothian Main Issues Report	2014
	Fife Local Development Plan (FIFEplan)	2017
	Fife Plan Main Issues Report	2013
	Clackmannanshire Local Development Plan	2015
	Clackmannanshire Local Outcomes Improvement Plan 2017 - 2027	2017
	West Lothian Local Development Plan	2018
	West Lothian Main Issues Report	2014
	Falkirk Local Development Plan 2	2020
	Falkirk Main Issues Report	2017
	Midlothian Local Development Plan	2017
	Midlothian Main Issues Report	2013
	Midlothian Strategy for Growth 2020-2025	2020

	Granton Waterfront Development Framework 2	2020
TRANSPORT PLANNING		
National	A Guide to National Concessionary Travel (Transport Scotland Website)	Accessed 2021
	Strategic Transport Projects Review 2: Update and Phase 1 Recommendations	2021
	Sustrans: Reducing car use: Views and behaviours of people who live and drive-in towns and cities in Scotland	2019
	Transport Accessibility Summit Online Survey Result Summary (Transport Scotland Website)	2015, Accessed 2021
Regional	SEStran Regional Transport Strategy Main Issues Report	2020
	SEStran Regional Transport Strategy Extract Main Issues Report Technical Note	2020
	Regional Transport Strategy 2015 - 2025 Refresh	2015
	SEStran Strategic Network	2020
	Strategic Transport Projects Review 2: Case for Change Edinburgh and South East Scotland Region	2020
	Surface Water Flood Forecasting on Trunk Roads	2020
Local	West Edinburgh Transport Appraisal Refresh	2016
	Edinburgh Strategic Sustainable Transport Study	2019
	Edinburgh city mobility plan draft	2020
	Rural Economy and Connectivity Committee Transport Scotland Bill, City of Edinburgh submission	2020
	East Lothian Local Transport Strategy 2018 - 2024	2018
	Local Access and Transport Strategy Scottish Borders Council	2016
	Fife Local Transport Strategy 2006 - 2026	2006
	Clackmannanshire Local Transport Strategy 2015 - 2019 Survey Findings	2015
	Falkirk Local Transport Strategy	2014

FREIGHT		
Regional	Forth Freight Study: Case for Change	2020
FUTURE MOBILITY		
National	Smart Mobility (Scottish Cities Alliance Website)	Accessed 2021
Regional	Mobility Hubs Strategic Study for the SEStran Region	2020
	Mobility Hubs Strategic Study for the SEStran Region Appendices	2020
	SEStran Strategic Demand Responsive Transport Study	2020
DE-CARBONISATION OF THE TRANSPORT SECTOR		
National	Hydrogen (Scottish Cities Alliance Website)	Accessed 2021
	The Future of Energy in Scotland: Scottish Energy Strategy	2017
MULTI-MODAL		
Regional	SEStran Regional Park and Ride Strategic Study	2020
ACTIVE TRAVEL		
National	Strategic Cross Boundary Cycle Development	2017
	Sustrans: Active Nation: The health benefits of cycling and walking in Scotland	2018
	Safety in numbers: Scottish cycling collision hotspots (Sustrans Website)	2017, Accessed 2021
	Sustrans: Transport poverty in Scotland	2016
	Active Travel Infrastructure (Transport Scotland Website)	2020, Accessed 2021
	Cycling Action Plan for Scotland 2017 - 2020	2017
	Let's get Scotland Walking - The National Walking Strategy	2014
	A long-term vision for Active Travel in Scotland	2014

Local	Edinburgh Active Travel Action Plan 2016	2016
	East Lothian Active Transport Improvement Plan	2018
	West Lothian Active Travel Plan	2016
	Midlothian Active Travel Strategy	2019
ECONOMY		
Regional	City Region Deal Edinburgh & South East Scotland Deal Annual Report	2019
Local	Edinburgh's Economic Strategy	2018
	East Lothian Economic Development Strategy Refresh	2018
RAIL		
National	Network Rail Scotland Route Study	2016
	Rail Services Decarbonisation Action Plan Pathway to 2035	2020
BUS		
National	Free Bus Travel for Under 19s Consultation Analysis	2020
Regional	Borders Buses NHS and care home worker's discount (Borders Buses Website)	2020, Accessed 2021
CANALS		
National	Making the most of Scotland's Canals	2013
HEALTH AND SAFETY		
National	Coronavirus (COVID-19) Guidance on Temporary Traffic Regulation Orders and Notices	2020
	Scotland's Public Health Priorities	2018
	Preventing Overweight and Obesity in Scotland: A Route Map Towards Healthy Weight	2010
	The Good Practice Guide to 20mph speed restrictions	2016
	Cleaner Air for Scotland - The Road to a Healthier Future	2015

	A Connected Scotland	2018
Local	Road Safety Plan for Edinburgh to 2020	2010
DIGITAL INNOVATION		
National	5G: strategy for Scotland	2019
	Smart and Integrated Ticketing and Payments Delivery Strategy	2018
	Realising Scotland's Full Potential in a Digital World: A Digital Strategy for Scotland	2017

The supporting Equalities Impact Assessment and Strategic Environmental Assessment processes contain additional bibliographic references.

Appendix B

SEStran Regional Transport Strategy

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APPENDIX B – STAKEHOLDER CONSULTATION APPROACH AND LIST

1.1 Introduction

Consultation ensures that the knowledge, ideas and experiences of people that live and work in a town, city or region are the basis for the development of policy and strategy that will meet future needs. As such, consultation and engagement needs to be inclusive and assist in the resolution of tensions between different interest groups by including all views at an early stage. Our approach to establishing the baseline was cognisant of this and sought to capture as wide an input of views as possible through identifying relevant key stakeholders and partners as well as the appropriate forum for engagement.

This appendix describes:

- Stakeholders and consultees
- Consultation approach
- Consultation format
- Response summary

1.2 Stakeholders and Consultees

Stantec and SEStran worked together to devise a list of consultees and industry groupings as part of the SEStran RTS preparation process. Figure 1 below outlines the agreed stakeholders and consultees who were included as part of the Case for Change consultation process. Each group or stakeholder was therefore approached to take part within the programme.

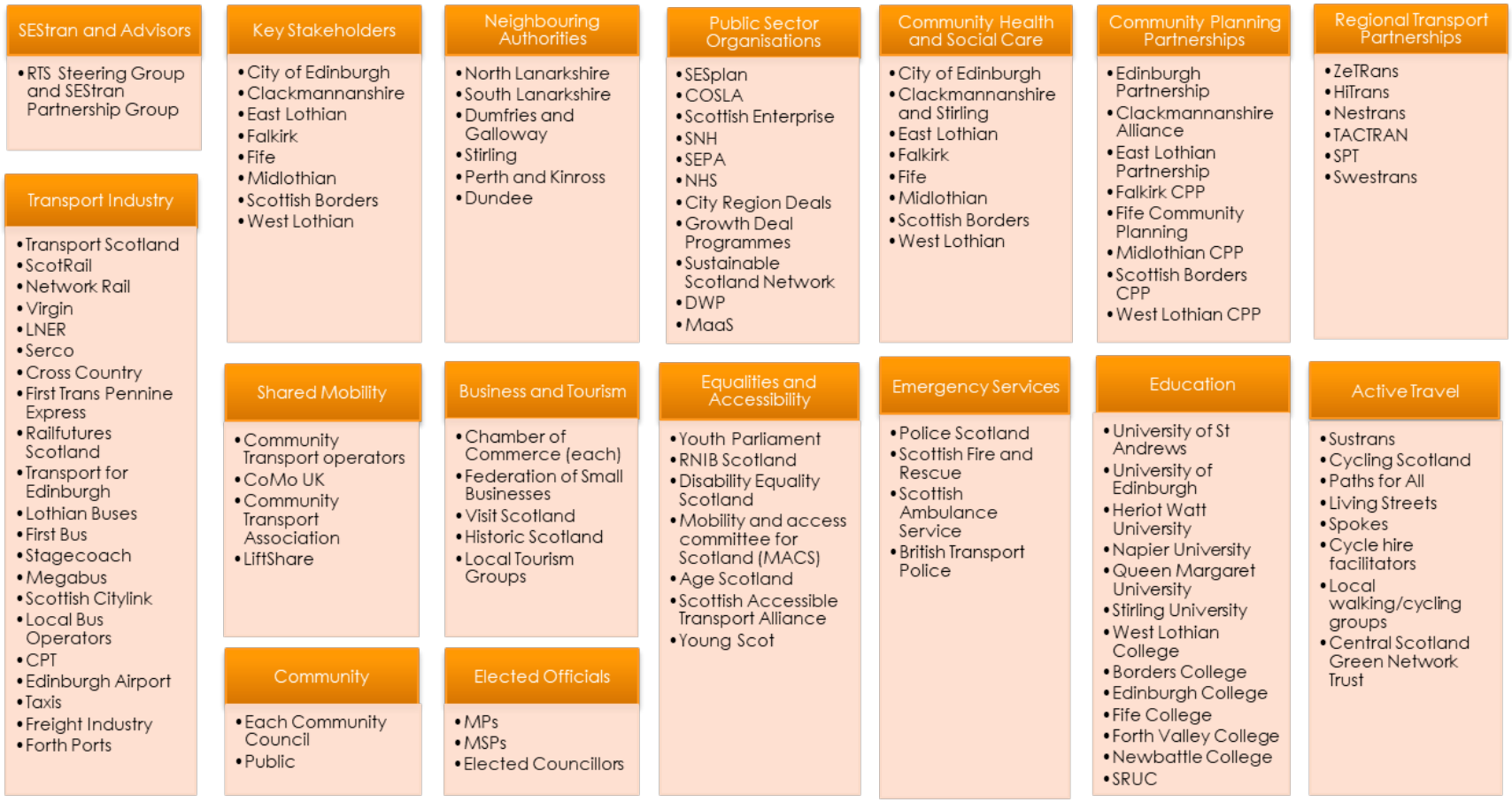

Figure 1: Stakeholders and Consultees

1.3 Consultation and Engagement Approach

The approach to consultation included the following key activities:

- **Multi-Service Meetings / Workshops**: primarily aimed at the 8 member councils within the SEStran area, but also suitable for wider representatives of groups with similar interests e.g. Active Travel
- **Individual Meetings**: with nominated individuals or representatives

- **Briefing & Opportunity to Comment**: provision of an infographic and specific response options, tailored for:
    - stakeholder organisations
    - elected officials
    - community councils
- **A Public Survey**: suitable for completion by all residents of the wider SEStran Region over 16 years of age

Due to the ongoing COVID-19 pandemic, all workshops and meetings were carried out remotely using Microsoft Teams.

SEStran supported the consultation and engagement tasks by providing initial contacts to local authority partners and other key stakeholders, advising on the project and to expect contact from Stantec.

In advance of any consultations being undertaken, a bespoke project email address and account was created: Sestran_RTS@Stantec.com and managed by Stantec's Consultation and Engagement Manager.

1.4 Consultation Format

This section describes in detail the discrete consultation and engagement methods outlined above and the stakeholders and consultees engaged throughout the process.

Multi-Service Meeting Workshops

Multi-service meeting workshops were undertaken with the 8 constituent councils:

- City of Edinburgh
- Clackannanshire
- East Lothian
- Falkirk
- Fife
- Midlothian

- Scottish Borders
- West Lothian

The format of the multi-service meetings included a presentation around the following:

- Welcome and introduction
- Workshop format overview
- Background to the study
    - Summary of the RTS
    - Initial baselining
    - Engagement programme
    - Outline issues and data analysis
- Workshop session–facilitated discussion
- Feedback and close

Once multi-service meeting workshops were arranged, initial baseline data gathering and analysis from the council area, was used to inform the preparation of a bespoke presentation for each local authority. This included a high-level overview of known strategic and local transport and connectivity issues within the area and was used to facilitate wider discussion at the meeting.

The multi-service meeting workshops were facilitated, as a minimum, by two attendees from Stantec, a register of council attendees, relevant local area mapping, a pre-approved discussion guide to facilitate and steer the workshop-session and a workshop discussion log. The Stantec team recorded notes to log the local authority discussion content and engagement outcomes. Notes were consolidated after the meetings.

The multi-service meeting workshops were undertaken in March 2021.

Individual Meetings

Individual meetings were convened initially along much the same lines as the multi-service workshops, with initial contact being made with SEStran's nominated contact for the organisation via specific email correspondence. Thereafter, once mutually convenient meeting dates were established, these were attended by a member of the Stantec Engagement Team.

Individual meetings also followed a similar format to the multi-service meetings with exception of a presentation being provided. A specific and pre-approved Individual Meeting Agenda / Discussion Guide was prepared in advance of the meeting and included:

- Introductions
- Overview of project, programme and timelines
- Problems and Issues
- Other Issues / Commentary
- Next Steps

Each individual meeting was managed and facilitated by the Project Manager and / or the Consultation and Engagement Manager, with additional project / meeting support provided by Stantec in almost all individual meetings, but particularly in the instance of more than two or three organisation representatives being present.

Individual meetings were undertaken between March and April 2021.

Briefing & Opportunity to Comment

The Briefing & Opportunity to Comment, referred to as the 'briefing' herein, was devised around a three-fold approach to:

- impart information about the developing RTS, the project approach and context for consultation
- share high-level initial analysis of transport and related trends including, population, car-ownership, mode-share and economic activity
- understand and document specific information and responses from key stakeholders not engaged through other means

The briefing, as approved by SEStran, was tailored specifically for three key stakeholder categories:

- Key stakeholder organisations

- Community Councils
- Elected officials including:
    - Local Councillors
    - MPs and MSPs

Whilst all stakeholders received a pre-approved cover email and tailored version of the briefing, the initial approach and contact with the groups varied by recipient category:

- **Stakeholders**: received a cover email and attached briefing
- **Elected officials (including SEStran members, local councillors, MSPs and MPs)**: received a cover email and attached briefing
- **Community councils (nominated contact):** received an advance email explaining the project and subsequent email with the briefing attached, to be forwarded on to the relevant community council contact
- **MSYPs:** were contacted via their general information contact email address with a cover email and the attached briefing, requesting that this was sent on to all MSYPs

The briefing was issued to all recipient categories between 25th March and 27th March 2021. Responses were requested for return by 15th April 2019.

Each briefing note was linked to an online survey for ease of response.

Public Survey

A public survey available for completion by residents over 16 years of age within the SEStran area was prepared in conjunction with SEStran. The survey was developed as an online survey to maximise participation and outreach during the COVID-19 pandemic.

The survey was open from 11 March until 19th April 2021. Initially there were 1055 responses however a data cleaning process was undertaken to remove any spurious responses and those which had been duplicated or submitted in error. After data cleaning, there were **998** responses.

A weblink to the public survey was published on the SEStran website. SEStran promoted the survey through social media channels. Stakeholders also played a part in raising awareness by pushing links to the survey on their own communications platforms.

Further Group Meetings

A presentation was provided by Stantec at the SEStran Equalities and Accessibility Forum on 31st March, and also at the Integrated Mobility Forum on 27th April. Stantec attended and presented at each forum and took part in the question and answer session after the presentation.

Stantec also presented at the Edinburgh and South East of Scotland City Region Deal Directors Meeting on 4th March.

1.5 Response Summary

This section provides an overview of the stakeholder and consultees who engaged throughout the consultation stage of the study. It should be noted that the list below contains those who responded to requests for engagement. There were additional stakeholders who were invited but declined to participate.

- **Multi-Service Workshop Meetings**
  - All 8 constituent local authorities
  - **'Active Travel' groups including:** SUSTRANS, Paths for All, Spokes, Cycling Scotland, and Living Streets
- **Individual Meetings**
  - **Neighbouring local authorities:** North Lanarkshire Council, South Lanarkshire Council, Dumfries and Galloway Council, Stirling Council, Dundee Council
  - **Regional Transport Partnerships:** ZetTrans, HiTrans, Nestrans, TACTRAN, SPT, Swestrans
  - **Transport Industry Strategic:** Transport Scotland, Transport for Edinburgh
  - **Bus operators:** Lothian Buses, First Bus, Confederation of Passenger Transport
  - **Rail Network & Operators:** ScotRail, Network Rail
  - **Ports:** Forth Ports
  - **Freight:** Road Haulage Association
  - **Airports:** Edinburgh Airport

- **Planning & Regeneration:** SESplan, Scottish Enterprise

- **Briefing & Opportunity to Comment**
  - **Rail / Tram Operators:** Cross Country, Edinburgh Tram
  - **Bus Operators:** Salmond's
  - **Other transport organisations:** Technology Scotland / MaaS Scotland, LiftShare
  - **Emergency Services:** British Transport Police
  - **Elected Members:** 15 Councillors covering Edinburgh, Fife, Midlothian and Scottish Borders. 2 MPs covering Falkirk and Scottish Borders
  - **Community Councils:** 39 in total – Edinburgh (3), Clackmannanshire (2), East Lothian (1), Falkirk (4), Fife (3), Midlothian (9), Scottish Borders (15)
  - **Equalities Groups:** Nature Scotland, Historic Environment Scotland, Disability Scotland, RNIB, Young Scottish Parliament
  - **Education:** University of Edinburgh

GO SEStran

South East of Scotland Transport Partnership

Stantec