The New Regional Transport Strategy for Strathclyde
Baseline Analysis Report

On behalf of **Strathclyde Partnership for Transport**

Document Control Sheet

Project Name: The New Regional Transport Strategy for Strathclyde

Project Ref: **43413**

Report Title: **Baseline Analysis Report**

Doc Ref: **Final Deliverable**

Date: **September 2019**

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For and on behalf of Stantec UK Limited				

Revision	Date	Description	Prepared	Reviewed	Approved
Final Deliverable	06/09/2019	Final Deliverable	AK	CP	CP

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1 Introduction

1.1 Background to the Study

1.1.1 Strathclyde Partnership for Transport (SPT) has a duty to prepare a new Regional Transport Strategy (RTS) for the Strathclyde region. The RTS will set out a new long-term vision for an approach to transport planning and transport policy across the region. The RTS will underpin a more sustainable and growing economy, enable a healthier and more inclusive society and reduce the impact of transport on the environment.

1.1.2 Peter Brett Associates (PBA) has been commissioned by SPT to assist with the development of the new RTS. This is a long-term appointment and involves several key stages. This document provides PBA's approach to management and support of the project.

1.1.3 The new RTS will be developed through an objective-led process in line with Scottish Transport Appraisal Guidance (STAG), drawing upon a wide range of evidence and experiences to achieve a shared approach to delivering our transport future.

1.1.4 The process to prepare the new RTS will take around 2.5 years, during which time PBA and SPT will be working with partners and stakeholders, including the public, gathering new evidence, setting new objectives and developing the best mix of options to achieve a more connected, accessible, greener transport system for present and future generations.

1.1.5 This baseline report sets out the key findings of the initial analysis, providing an understanding of travel movements, demands and the wider area. The purpose of the baseline exercise is to allow a solid evidence base which will be the foundation of the study as we move forward.

1.2 Approach to analysis

1.2.1 One of the key initial tasks in developing the new SPT Regional Transport Strategy (RTS) is the identification of current and future problems and issues. In order to do this, we carried out extensive data analysis for the SPT area.

1.2.2 In our proposal we stated that we would develop a series of transport corridors which would then enable succinct profiles to be created outlining the key data relating to that corridor along with the associated problems and issues.

1.2.3 Discussions within the project team identified that data analysis should be broken down into a three-tier hierarchy in order to better inform the identification of problems and issues. This approach includes:

- **Areas:** primarily centres of population between which there is demand to travel and that share common characteristics within them as defined by the sectors;

- **Movements:** the travel demand that exists between Areas; and

- **Network:** the routes and services upon which the Movements take place.

1.2.1 An example of how this works in practical terms is shown in Figure 1.1.

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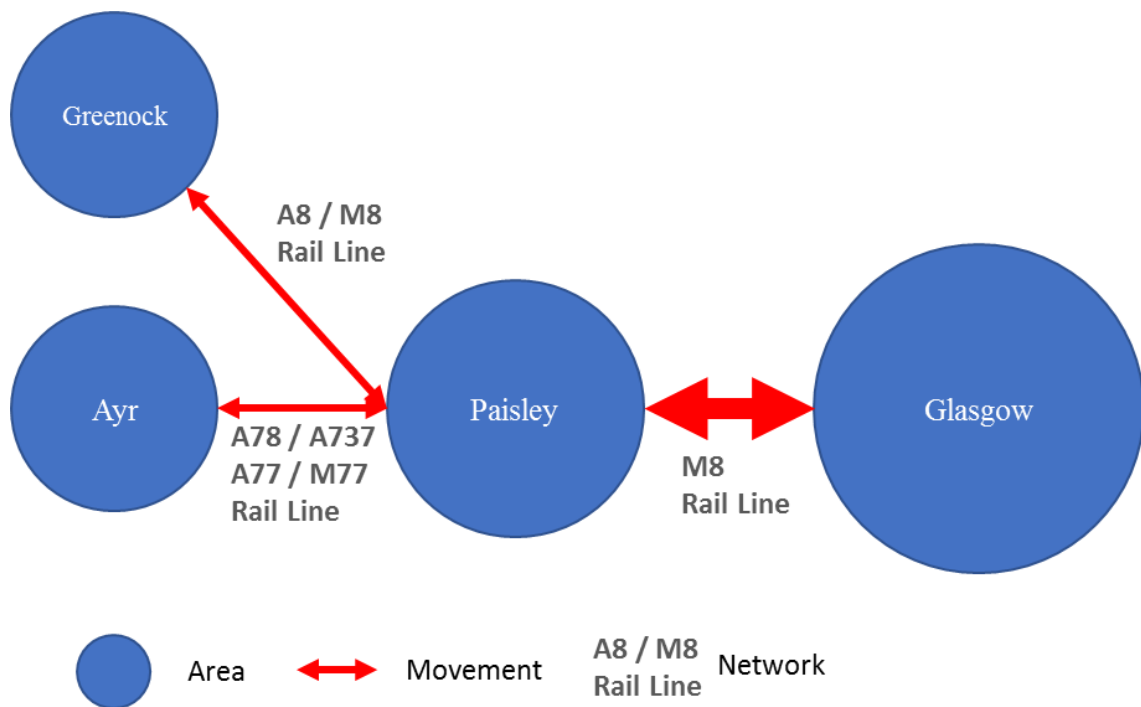
Figure 1.1 Indicative Schematic Diagram

1.2.1   Here we show four Areas with Movements that exist between them. The Movements between Greenock and Paisley along with Ayr and Paisley also form part of wider demand for travel to Glasgow. The combined Movement between Paisley and Glasgow includes the demand from Greenock and Ayr as well as that generated in Paisley itself. This consequently leads to parallel Movements. The results of the Movements are manifested on the transport network that link these Areas based upon mode choices and network performance.

1.3   Defining Areas

1.3.1   A sector system was defined that allows the analysis of the main travel movements within the SPT area using Census Travel To Work origin and destination data. The sectors were built up using Data Zones and Intermediate Zones to ensure consistency with data that is available at these geographies. They are broadly based around the NRS Settlement and Localities geography expanded to include the adjacent rural areas.

▪   In total, 40 sectors were identified within the SPT area as shown in Figure 1.2. The smallest sectors and most dense collection of them is within the Glasgow area and this is shown in more detail in Figure 1.3. The full list of sectors in the SPT area is shown in Figure 1.4.

1.3.2   Finally, there are 12 external sectors which represent the areas around the SPT area listed in Figure 1.5.

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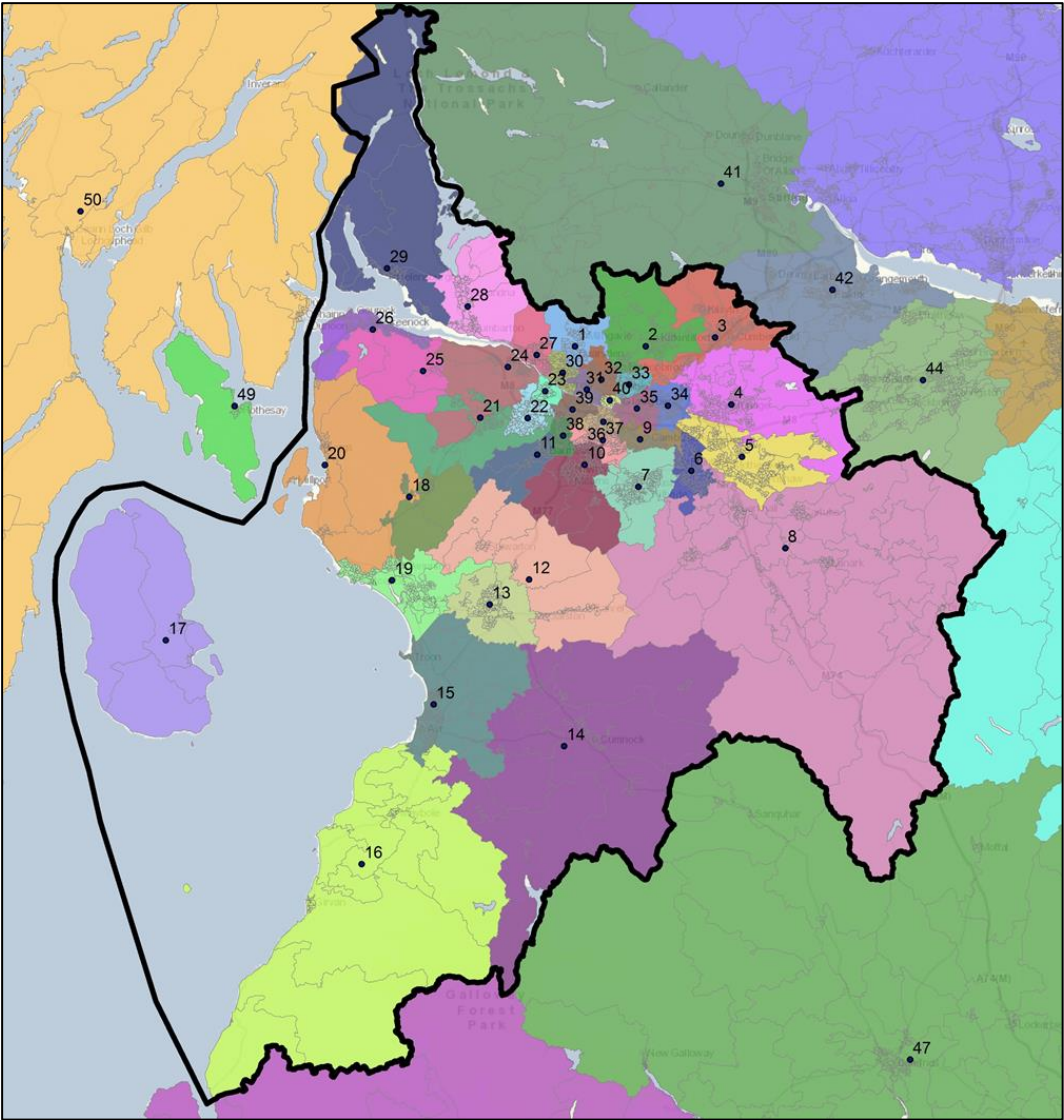
Figure 1.2 SPT Area Sectors

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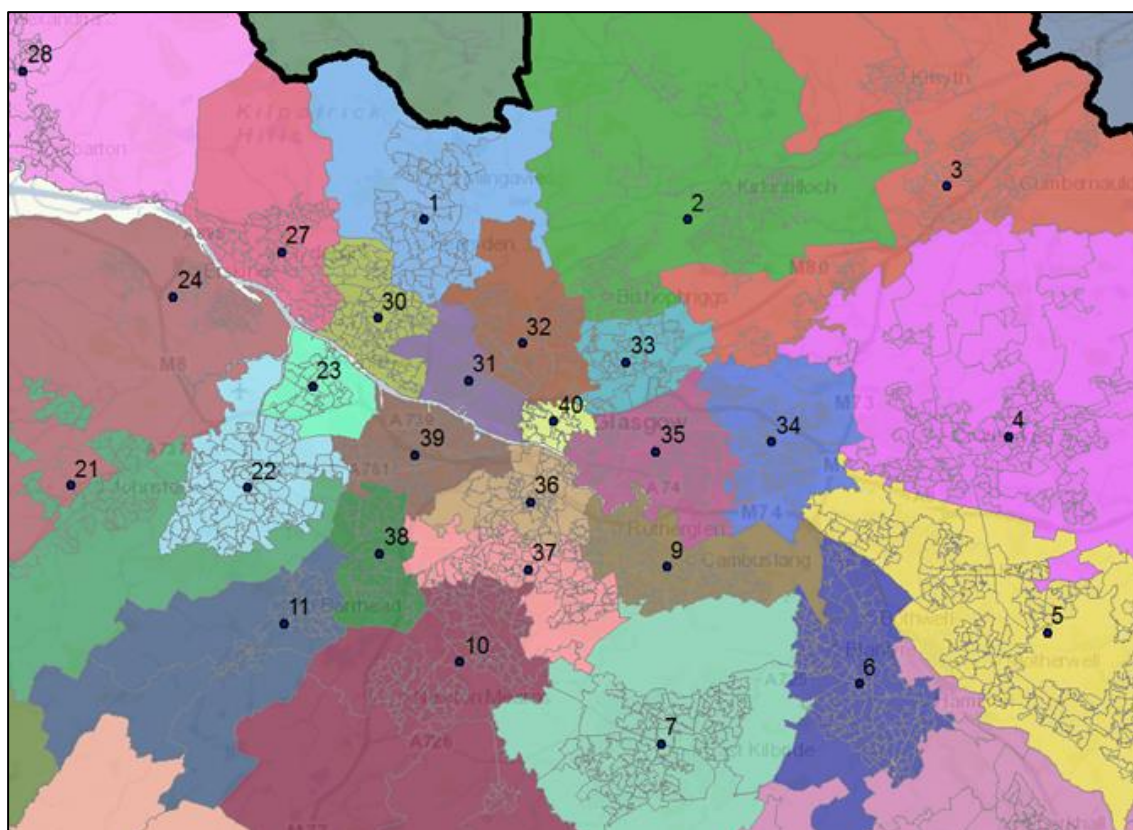
Figure 1.3 Glasgow Area Sectors

1. Bearsden and Milngavie
2. Lenzie, Kirkintilloch and Rural East Dunbartonshire
3. Cumbernauld and Moodiesburn
4. Airdrie and Coatbridge
5. Motherwell and Wishaw
6. Hamilton
7. East Kilbride
8. Carluke, Lanark and Rural South Lanarkshire
9. Rutherglen and Cambuslang
10. Giffnock and Newton Mearns
11. Barrhead and Neilston
12. Stewarton and Rural North East Ayrshire
13. Kilmarnock
14. East Ayrshire South
15. Ayr, Prestwick and Troon
16. Girvan, Maybole and Rural South Ayrshire
17. Arran
18. Garnock Valley
19. Irvine, Kilwinning and Three Towns
20. Largs and West Kilbride
21. Johnstone, Linwood and West Renfrewshire
22. Paisley
23. Renfrew
24. Bishopton and Erskine
25. Kilmacolm and Rural Inverclyde
26. Gourock, Greenock and Port Glasgow
27. Clydebank and Dalmuir
28. Dumbarton and Leven Valley

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29. Helensburgh
30. Scotstoun / Yoker
31. Kelvindale / Partick
32. Sighthill / Maryhill
33. Springburn / Robroyston
34. Baillieston / Easterhouse
35. Dennistoun / Tollcross
36. Gorbals / Shawlands
37. Langside / Castlemilk
38. Darnley / Nitshill
39. Ibrox / Cardonald
40. Glasgow City Centre

Figure 1.4 List of All SPT Area Sectors

41. Stirling
42. Falkirk
43. East Central Scotland
44. West Lothian
45. Edinburgh
46. Rural South East Scotland
47. Dumfries & Galloway East
48. Dumfries & Galloway West
49. Bute
50. Rest of Argyll and Bute
51. Highlands and Islands
52. Aberdeen, Aberdeenshire and Moray

Figure 1.5 List of External Sectors

1.3.3   These sectors have been used for the analysis of the Area, Movement and Network data as set out in the following chapters. However, firstly we set out a summary of the entire SPT area in Chapter 2.

Greater Glasgow

1.3.4   Throughout this report we refer to Greater Glasgow when discussing the wider Glasgow urban area. The boundary of Greater Glasgow is shown in Figure 1.6**Error! Reference source not found.**. This boundary has been defined by National Records of Scotland (NRS) using their Settlements and Localities geography and is widely recognised as that of Greater Glasgow.

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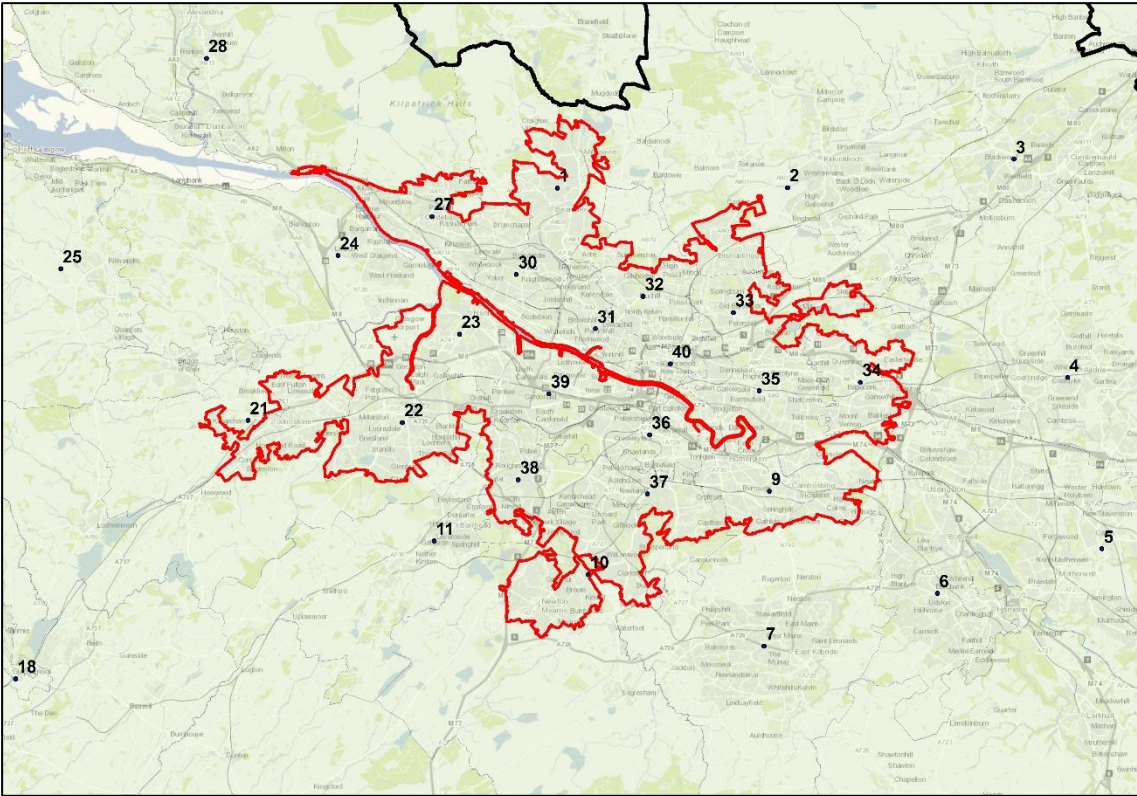
Figure 1.6 Greater Glasgow Boundary

1.4   Data Sources

1.4.1   Where relevant Census data has been used with the most recent results being available for the 2011 Census. Whilst this is now several years old and may be somewhat dated in some instances it provides the most comprehensive and reliable data source for population and travel behaviour. If more recent data is available this has been used wherever possible.

1.4.2   Where appropriate modelled data has been used drawing upon Transport Model for Scotland (TMfS) 2014. This model was deemed the most appropriate for the baseline analysis following a review of the available models.

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2 SPT Area Overview

2.1 Introduction

2.1.1 The SPT area covers 7000 sq. km and is home to over two million people which is more than two fifths of the Scottish population.[1] The SPT area is diverse and includes the most densely populated city in Scotland as well as remote rural settlements. It has areas with the lowest car ownership rates in Scotland as well as areas with 2 or more cars for every household.[2] It includes both the most deprived and least deprived areas in Scotland.[3]

2.1.2 In this chapter we provide an overview of the SPT area using high-level analysis of population, economic, travel and environment data. Where appropriate we have sought to focus upon providing time series comparisons, identifying changes that have occurred as well as developing an understanding of why these trends are apparent.

2.1.3 In addition, data has been included here where presentation at an SPT level is more appropriate than at an Area level. Furthermore, the analysis seeks to minimise duplication with the Area Profiles, which are discussed in Chapter 3, as these include substantial data that allows comparison of the local, regional and national context.

2.2 Population

2.2.1 The change in the age composition of the population of the SPT area is shown in Figure 2.5. The proportion of children (under 15 years old) has declined from 19% to 17%. Scotland has experienced a similar decline from 19% to 17% between 2001 and 2011. Alongside this, the population aged 60 and over has increased from 21% to 23% which also mirrors the change that has been observed at a national level. The proportion of the population aged 16-60 has remained at 60%. Nonetheless, there is evidence of an aging population in the SPT area which is consistent with wider demographic trends occurring at a national level.
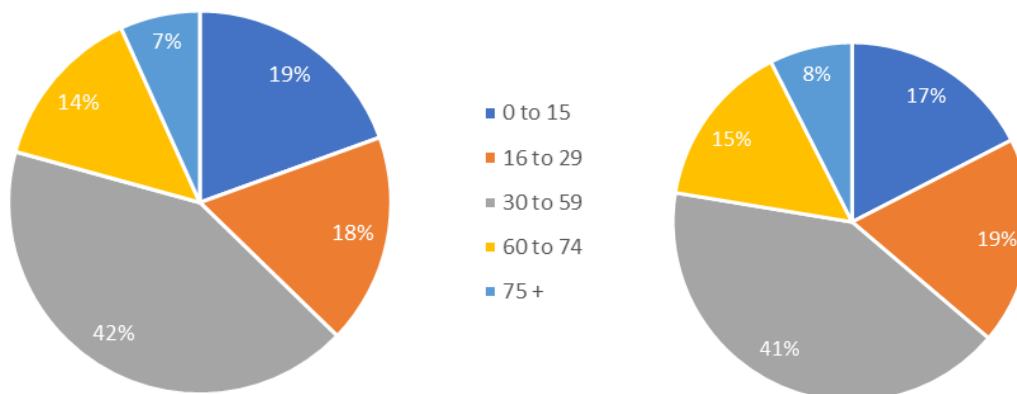
Figure 2.1 Breakdown of Population By Age 2001 v 2011

2.2.2 The population of the SPT area is primarily concentrated in densely populated urban areas. Greater Glasgow is the largest locality, containing 28% of the total population of the SPT area. This is followed by Paisley (3%); East Kilbride (3%); and Hamilton (2%) (see Table 2.1). Over two-thirds (67%) of the population of the SPT area live in urban settlements of 15,000 people

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[1] National Records for Scotland, 2018.

[2] Census, 2011.

[3] Ferguslie Park, Paisley; and Lower Whitecraigs and South Giffnock, East Renfrewshire respectively. Scottish Index of Multiple Deprivation, 2016.

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or above.[4] Figure 2.8 Travel to Work By Mode 2001 v 2011shows that the vast majority of the SPT area outside of these localities is sparsely populated.

Table 2.1: Ten largest localities in the SPT area

Locality	Population	Proportion of SPT Population
Glasgow	612,040	28%
Paisley	77,220	3%
East Kilbride	75,120	3%
Hamilton	54,080	2%
Ayr	46,780	2%
Kilmarnock	46,770	2%
Coatbridge	43,960	2%
Greenock	42,680	2%
Airdrie	37,410	2%
Irvine	34,090	2%

Source: National Records for Scotland, Mid-2016 Population Estimates for Settlements and Localities in Scotland, 2018.

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[4] National Records for Scotland, Mid-2016 Population Estimates for Settlements and Localities in Scotland, 2018.

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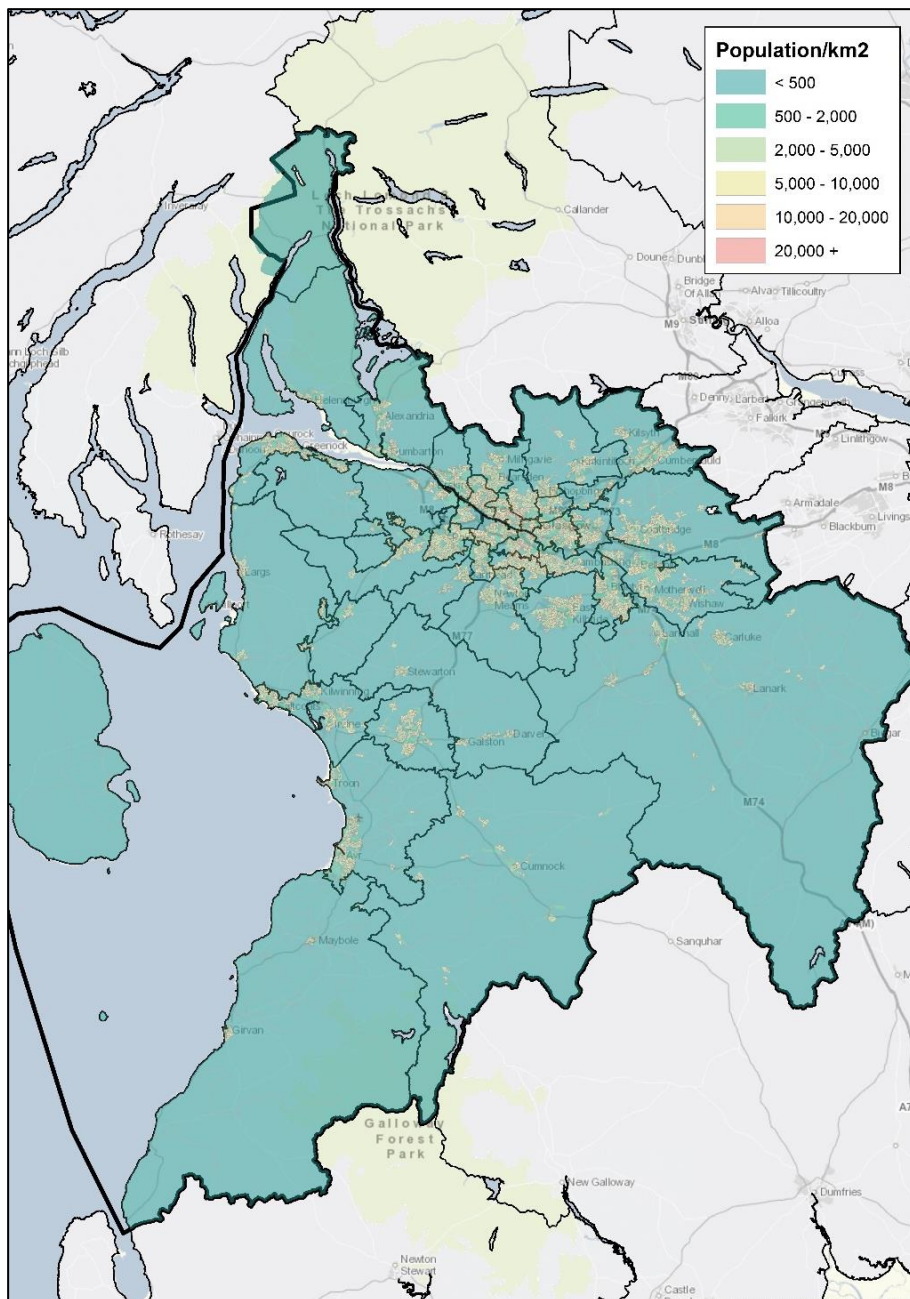
Figure 2.2 Population Density in SPT Area (People / km2) 2011

2.3   Socio-Economic

Economic Activity

2.3.1   The change in the economic activity of people living in the SPT area is shown in Figure 2.3. It is apparent that the proportion of people economically active has increased between 2001 and 2011 with more people in employment and fewer people inactive due to being long-term sick or disabled, for looking after the home or family as well as for any other reason. The proportion of retired people increased which correlates with the population trends. In addition, there were more people which were economically active but unemployed.

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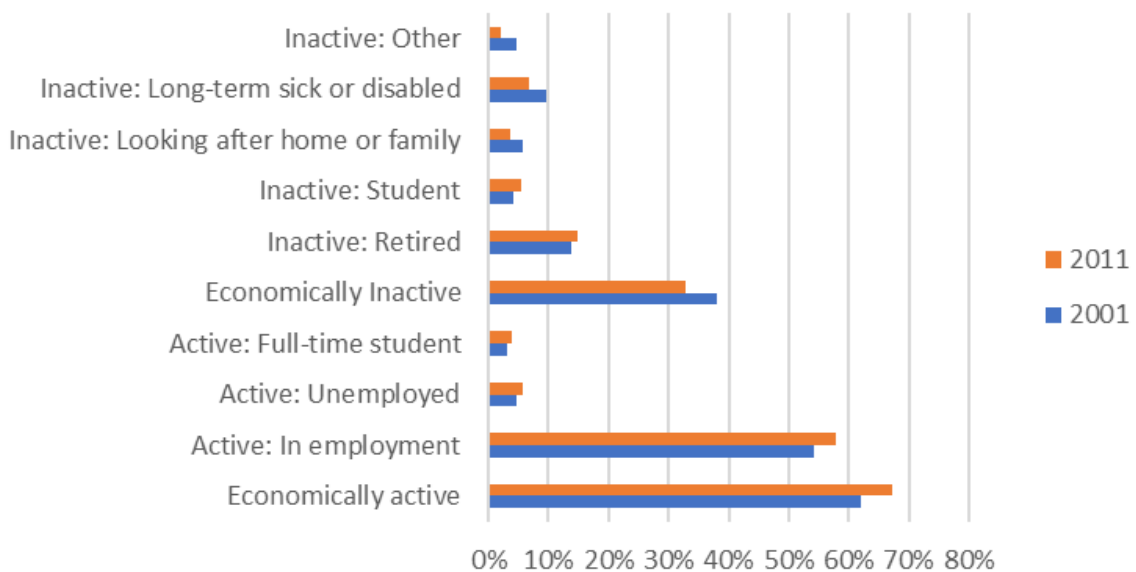
Figure 2.3 Economic Activity in SPT Area

2.3.2 Data from the Annual Population Survey (2018) indicates that 71.1% of those aged 16-64 population is in employment across the SPT area.[5] This is 3.2% below the figure for Scotland as a whole. The rate of those over 16 who are self-employed (7.7%) is also less than the national rate (8.2%). This suggests a higher level of unemployment in the SPT area, which is reinforced by a higher benefit claimant count rate (3.2%) than the national average (2.6%).[6]

Multiple Deprivation

2.3.3 The Scottish Index of Multiple Deprivation (SIMD) 2016 data in Table 2.2 shows that, whilst there are geographical variations within the region, a third of Strathclyde is classified as within the most deprived areas in Scotland. To deliver sustainable and inclusive economic growth within Strathclyde there is consequently a need to tackle all aspects which contribute to multiple deprivation including income, employment, health, education, housing, accessibility and crime.

Table 2.2 Percentage of Area in SIMD Quintile

Local Authority	20% Most Deprived Quintile	20% Least Deprived Quintile
East Ayrshire	33%	11%
East Dunbartonshire	5%	53%
East Renfrewshire	7%	60%
Glasgow	48%	9%
Inverclyde	44%	13%
North Ayrshire	38%	10%
North Lanarkshire	32%	9%

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[5] Annual Population Survey, 2018.

[6] Benefit claimant counts are often used as a proxy for unemployment rates. They have a tendency to underestimate the true rate due to non-claimants.

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Local Authority	20% Most Deprived Quintile	20% Least Deprived Quintile
Renfrewshire	27%	19%
South Ayrshire	18%	21%
South Lanarkshire	21%	14%
West Dunbartonshire	40%	4%
Helensburgh and Lomond[7]	0%	32%
SPT Region	**33%**	**16%**

Source: Scottish Index of Multiple Deprivation, 2016.

Income and Employment

2.3.4   The rate of child poverty within Strathclyde is higher than for Scotland as whole, with overall income poverty also higher.[8] To deliver sustainable and inclusive economic growth within Strathclyde there is a need to reduce both child and total poverty levels and to enhance economic prosperity for all. In addition, national trends, which are likely to apply within Strathclyde, illustrate income poverty disproportionally impacts groups who face existing structural disadvantages including disabled people, women and specific ethnic groups.[9]

2.3.5   The employment rate and level of economic activity rate is lower in Strathclyde than for Scotland as whole with the proportion of working age population in employment being 71.1%, which is 3.2% below the national average.[10] In addition, wage levels in 2018 were also lower than the national average in four of the constituent local authorities of Strathclyde although this has improved from six in 2008. East Renfrewshire has the highest wage level in Strathclyde as shown in Figure 2.4.

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[7] These are the two Argyll and Bute council wards within the SPT region. Owing to their localised nature they are not directly comparable with the eleven other full local authorities within the SPT region, as Helensburgh and Lomond contain 25 data zones whereas the other local authorities contain an average of 258 data zones each.

[8] Scottish Government, *Poverty in Scotland,* 2018. Available at: https://news.gov.scot/news/poverty-in-scotland-2

[9] SPT RTS EqIA Scoping Report, 2019

[10] Annual Population Survey, 2018.

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Median Income	2008	Above or Below Scotland	2018	Above or Below Scotland
Argyll and Bute	17,617	Below	21,048	Below
East Ayrshire	20,258	Above	23,833	Above
East Dunbartonshire	22,039	Above	26,449	Above
East Renfrewshire	23,906	Above	28,977	Above
Glasgow City	19,927	Below	22,325	Below
Inverclyde	17,969	Below	20,237	Below
North Ayrshire	19,535	Below	25,396	Above
North Lanarkshire	19,884	Below	24,506	Above
Renfrewshire	20,726	Above	24,999	Above
South Ayrshire	22,899	Above	25,224	Above
South Lanarkshire	21,626	Above	24,592	Above
West Dunbartonshire	19,755	Below	22,815	Below
Scotland	20,198		23,800	
Source: ASHE 2018				

Figure 2.4 Median Incomes by Local Authority Area 2008 v 2018

Education

2.3.6   Strathclyde exhibits lower levels of academic achievement than Scotland as a whole, as demonstrated in Figure 2.5. There are also significant socio-economic and geographic disparities in educational attainment and opportunities. The SIMD 2016 showed that areas suffering from education deprivation are concentrated in urban areas. Poor educational attainment is strongly correlated with other forms of deprivation with 44% of the resident working age population in the most deprived data zones within Strathclyde having no qualifications whilst this drops to 7% in the least deprived areas. It is therefore crucial that access to educational opportunities is addressed within the RTS.
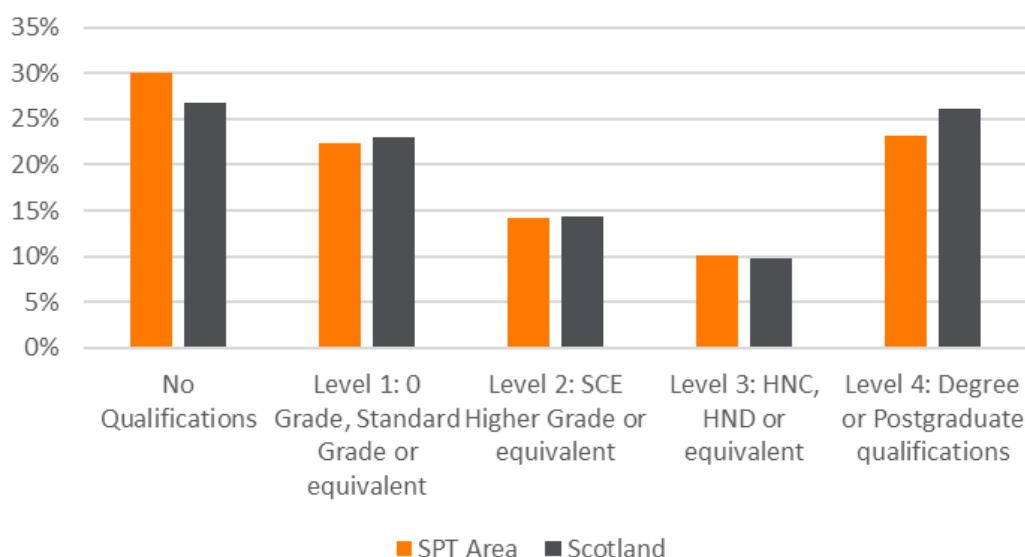
Figure 2.5 Level of Qualification 2011[11]

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[11] Census 2011

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Health

2.3.7   The health of residents in Strathclyde is relatively poor compared with the Scottish population. Areas with poor SIMD health deprivation are typically clustered in urban areas and are heavily concentrated in, but not limited to, Glasgow. Several settlements register areas amongst the most deprived across multiple local authorities. However, areas among the top scoring for health deprivation are also concentrated in urban areas, particularly the suburbs of Glasgow and East Dunbartonshire. There are also pockets of very good health in Glasgow itself, concentrated in the West End of the city. These results indicate significant inequalities within a relatively small geographical area.

2.3.8   Whilst the geographic health disparities are evident there is less evidence of gender and ethnicity impacts despite the strong linkages between socio-economic background and the health of an individual.

Safety and Security

2.3.9   Crime rates have risen across Scotland for the first time in ten years and there has been a sharp rise in sexual crimes over the past decade. Strathclyde has a higher crime rate than Scotland as a whole. Recorded crimes in the area totalled 504 per 10,000 residents, 12% higher than the Scottish rate of 451 per 10,000 residents.[12] Furthermore, over half (51.7%) of the most crime deprived areas in Scotland are within Strathclyde.[13] This highlights how crime is disproportionately concentrated within Strathclyde with urban areas being the focal point for crime related deprivation.

2.3.10   In addition, whilst there is limited data available for Strathclyde, national trends indicate that demographic groups and deprived communities facing existing structural disadvantages, including disabled people, women and ethnic minorities, are more likely to experience crime. It is reasonable to assume these disadvantages are experienced within Strathclyde to a similar degree.

2.4   Travel

Origins and Destinations of Travel to Work

2.4.1   Analysis of residents of Strathclyde has been undertaken with the distribution of the origins of Travel To Work journeys across the SPT area is shown in Figure 2.6 whilst journey destinations are shown in Figure 2.7.

2.4.2   It is noticeable that journey origins are more widely dispersed than destinations with Glasgow City Centre and the West End of Glasgow being a clear focal point as the main destination for Travel To Work journeys. This is unsurprising given the concentration of jobs within Glasgow City Centre.

2.4.3   Beyond this, Paisley Town Centre along with Pacific Quay and Alexandra Parade in Glasgow can be seen as key destinations. The Pacific Quay demand is likely to be generated by the BBC and STV presence whilst Alexandra Parade can be attributed to City Park.

2.4.4   While employment is centred around Glasgow, there are other employment centres across the SPT area focussed around Ayrshire, Lanarkshire and Inverclyde. This is discussed in detail in Chapter 4.

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[12] Recorded Crime in Scotland, 2017-18.

[13] Scottish Index of Multiple Deprivation 2016

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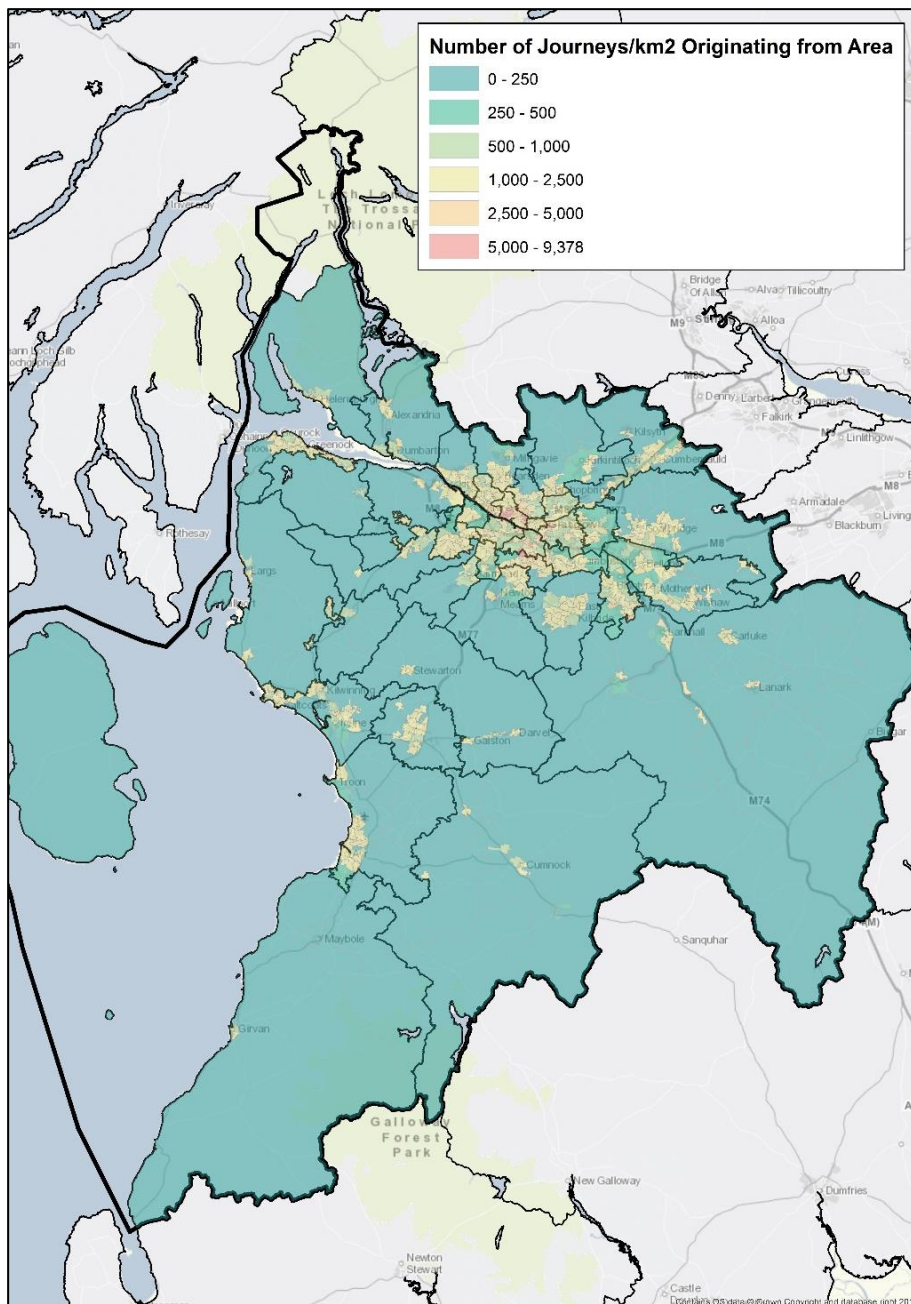
Figure 2.6 Density of Travel to Work Journeys Originating in Area (Journeys / km2) 2011

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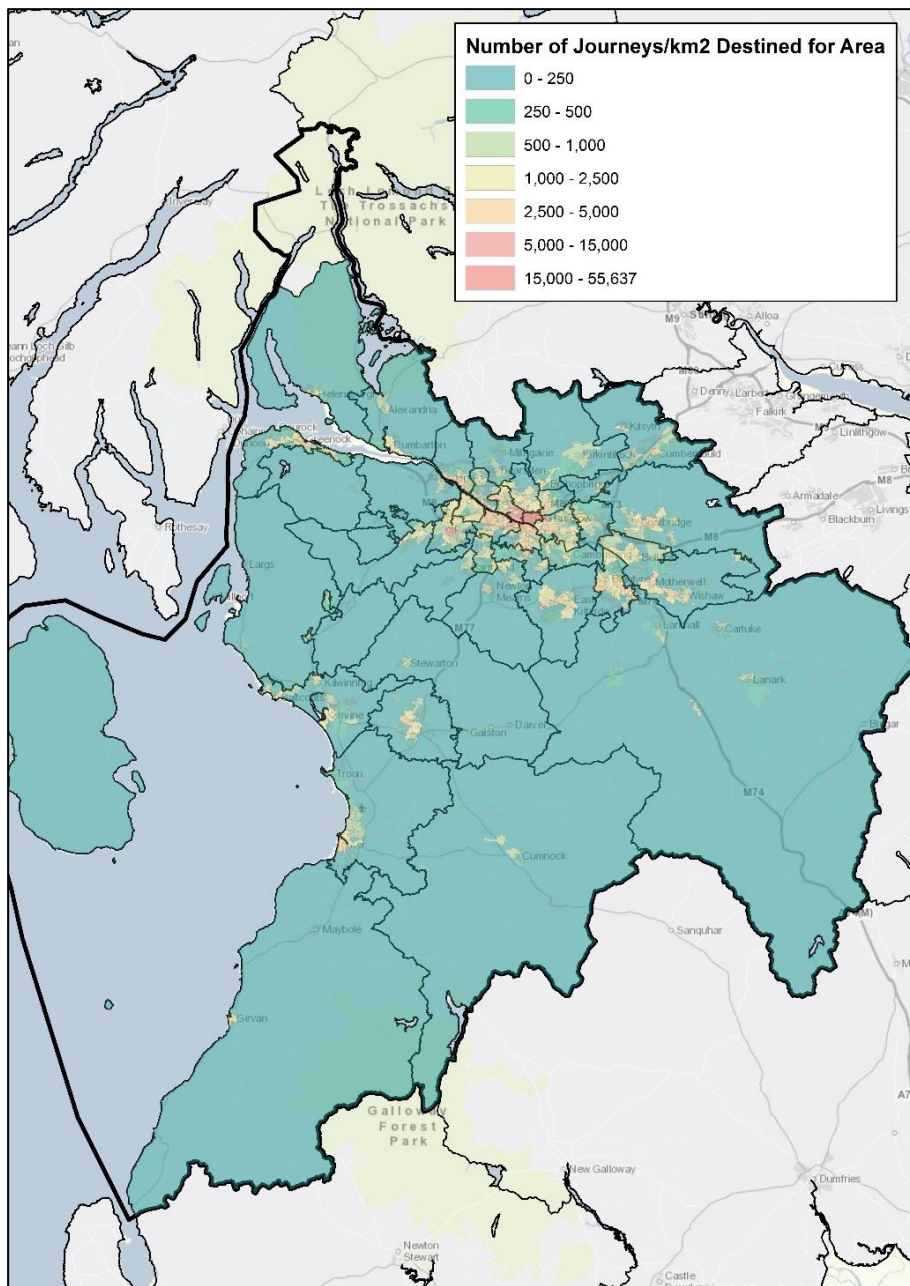
Figure 2.7 Density of Travel to Work Journeys Destined for Area (Journeys / km2) 2011

Mode of Travel to Work

2.4.5   Analysis of Census Travel to Work data shown in Figure 2.8 illustrates the changes in travel behaviour that have taken place in the SPT area. A small increase in car or van drivers from 55% to 56% and a decline in people walking and cycling from 9% to 6% are notable trends.

2.4.6   People working from home has increased from 5% to 10% which is consistent with a wider trend towards remote working and will likely rise in the future as more workplaces embrace flexible working and digital communications are enhanced. Bus usage has declined which reflects the ongoing trend of a decline in bus patronage.

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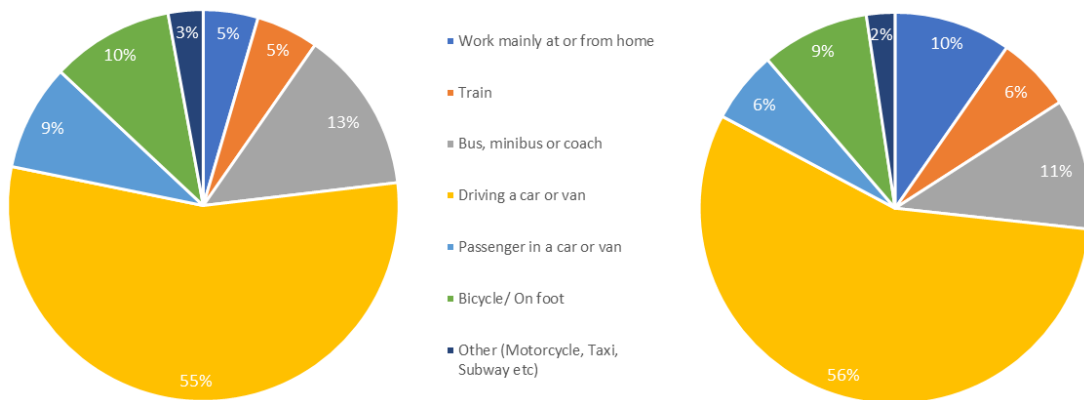
Figure 2.8 Travel to Work By Mode 2001 v 2011

Car Dependency

2.4.7 Strathclyde exhibits a growing degree of car dependency as illustrated by the change in car ownership between 2001 and 2016 shown in Figure 2.9. This shows that the number of households owning no cars has decreased from 40% to 34% whilst the percentage of households owning 2 or more cars has increased from 20% to 26% with no evidence this trend is slowing down. Households with 2 or more cars are less likely to need to use public transport and are consequently much more car dependent.
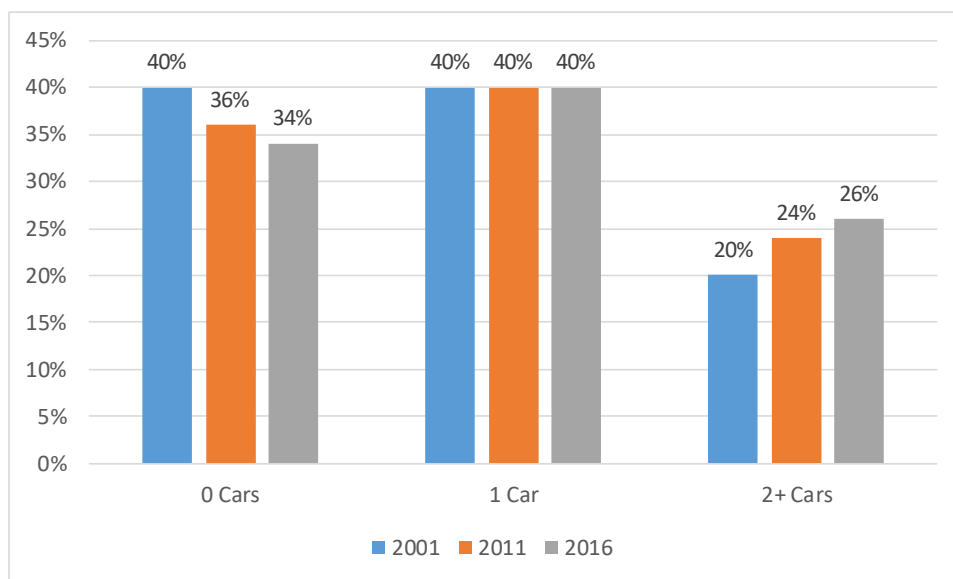
Figure 2.9 Car Ownership in Strathclyde, Census 2001 & 2011, Scottish Household Survey 2016

2.4.8 Figure 2.10 shows the percentage of households that own no cars in 2011. The largest concentration of households with no cars is in Greater Glasgow with other urban areas also being more likely to have no car ownership.

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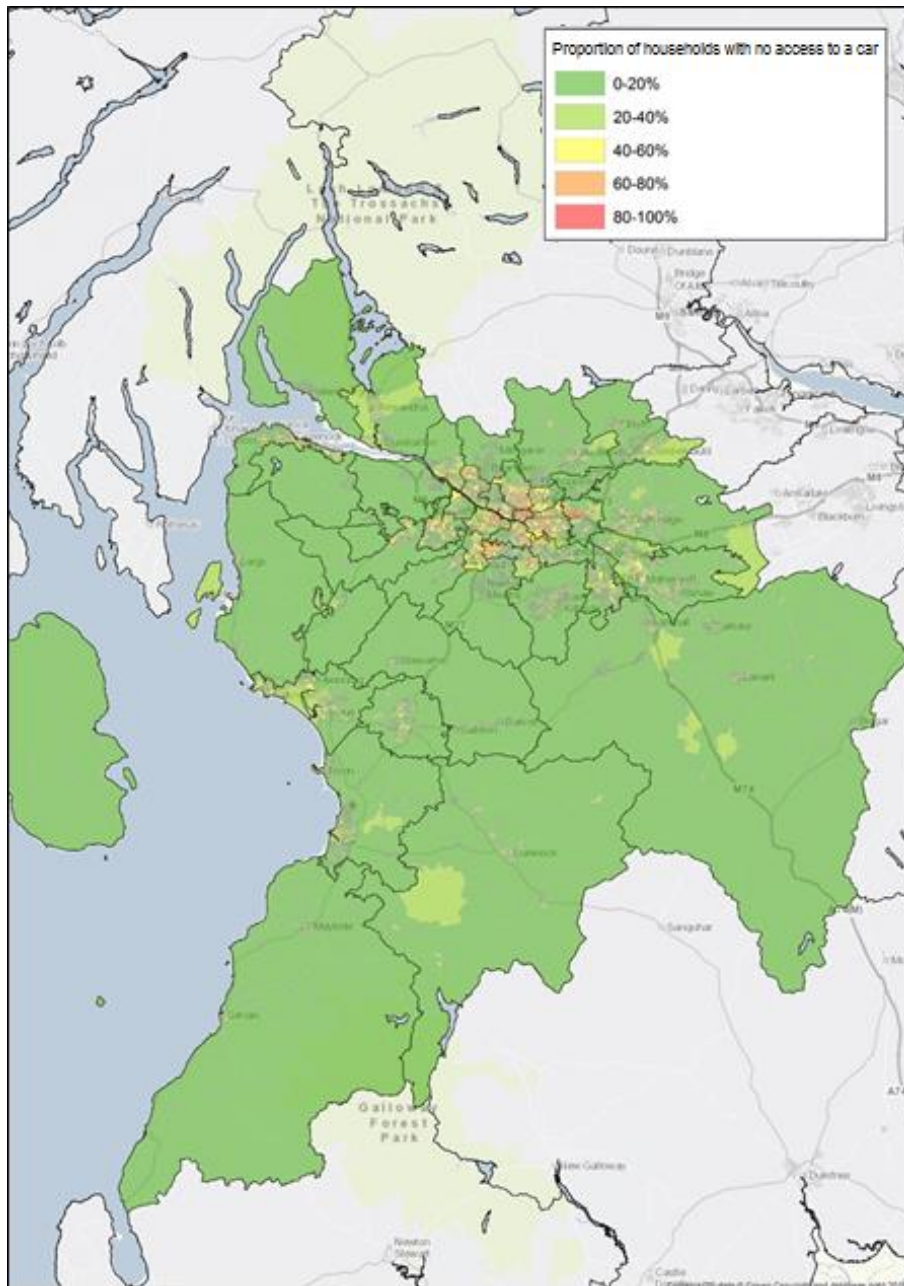
Figure 2.10 Percentage of Households Owning No Cars 2011

2.4.9   In Figure 2.11 the percentage of total Travel to Work journeys made by car in 2011 is shown. This highlights that the highest proportions of car journeys are from rural areas particularly in Ayrshire and Lanarkshire which may reflect the public transport network of these local authorities. The lowest proportions of car journeys are in Greater Glasgow whilst pockets are also evident in other urban areas like Ayr, Blantyre, Coatbridge, Cumbernauld, Dumbarton, Helensburgh, Greenock and Irvine.

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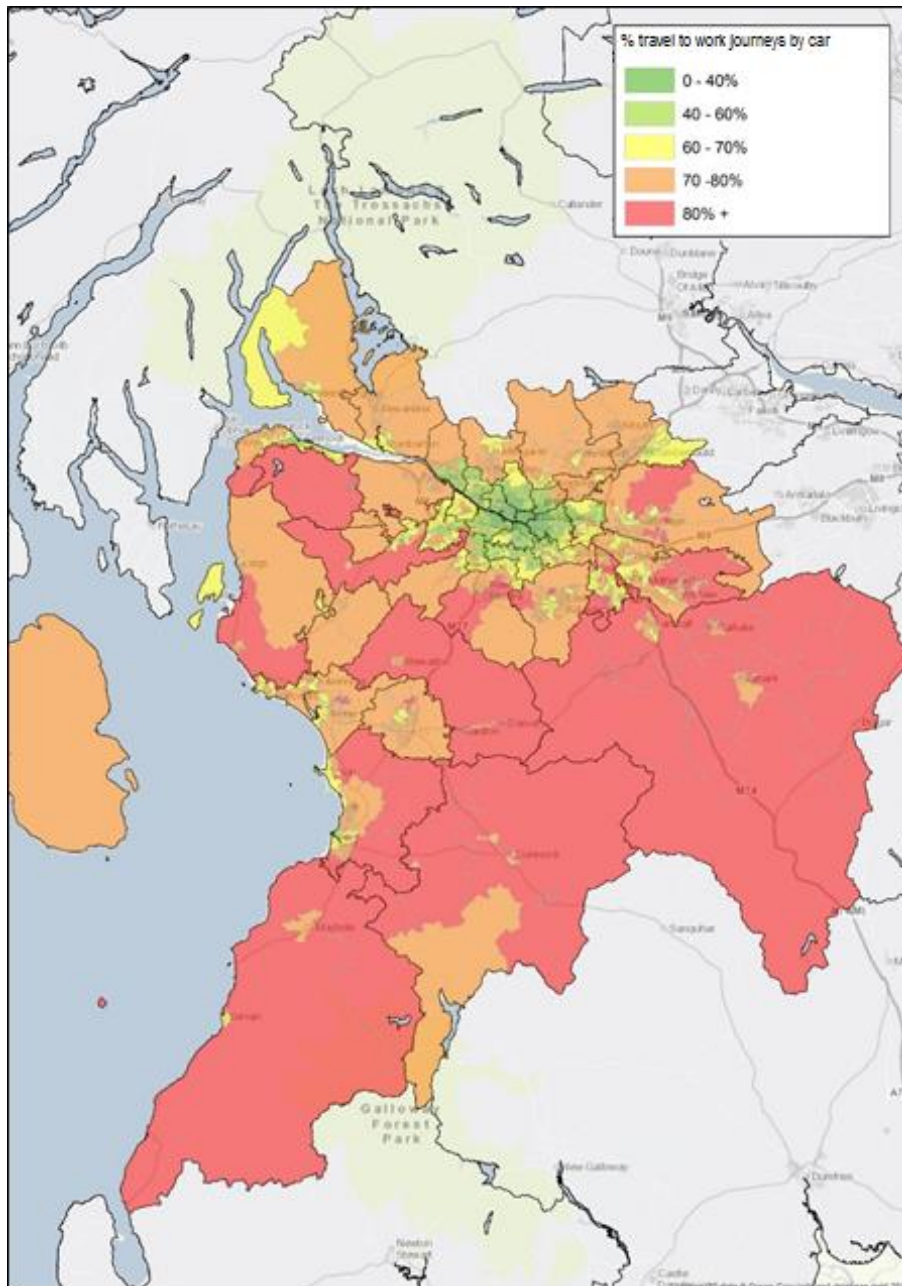
Figure 2.11 Percentage of Travel to Work Journeys by Car 2011

Public Transport

2.4.10 The proportion of people travelling to work by bus is shown in Figure 2.12. This shows the highest concentrations of bus use in Greater Glasgow, particularly the south and east, as well as the larger urban areas such as Ayr, Cumbernauld, East Kilbride, Greenock, Gourock, Irvine, Kilmarnock, Motherwell and Wishaw. Bus usage tends to be more prevalent where car ownership is low, rail links are limited, and the population is poorer.[14]

2.4.11 In Figure 2.13 the proportion of Travel to Work journeys by rail is shown. This highlights the density of the rail network in Greater Glasgow as well as that in Dunbartonshire, Inverclyde,

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[14] Approximately 75% of all bus journeys are made by households below the median income (£25,958); 72% of bus trips are made by those who do not hold a driving license. See: Scottish Transport Statistics, 2018, p.66.

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Lanarkshire and parts of Ayrshire. Sparsely populated parts of the SPT area where access to the rail network is more limited demonstrate lower levels of train usage.
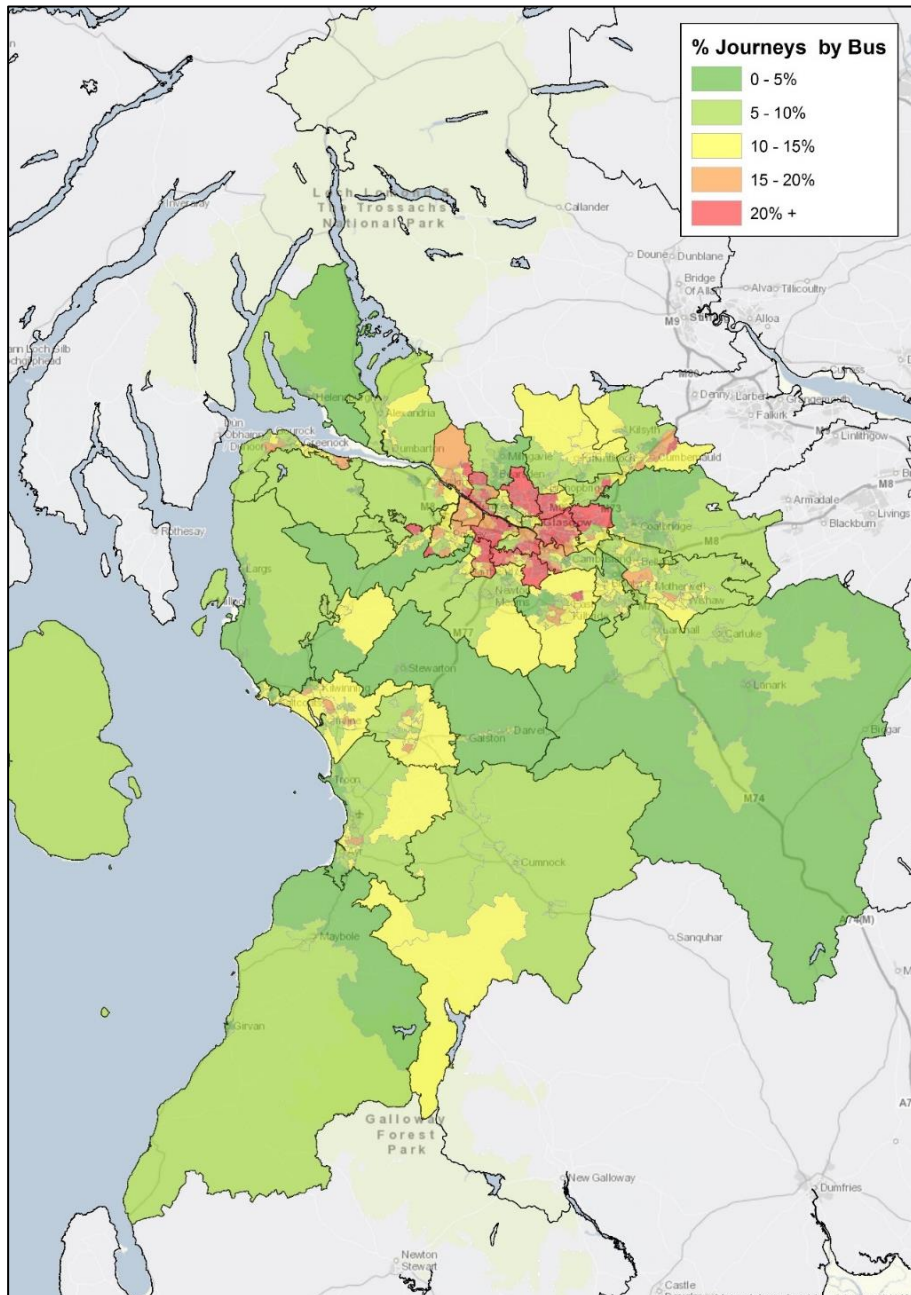
Figure 2.12 Percentage of Travel to Work Journeys by Bus 2011

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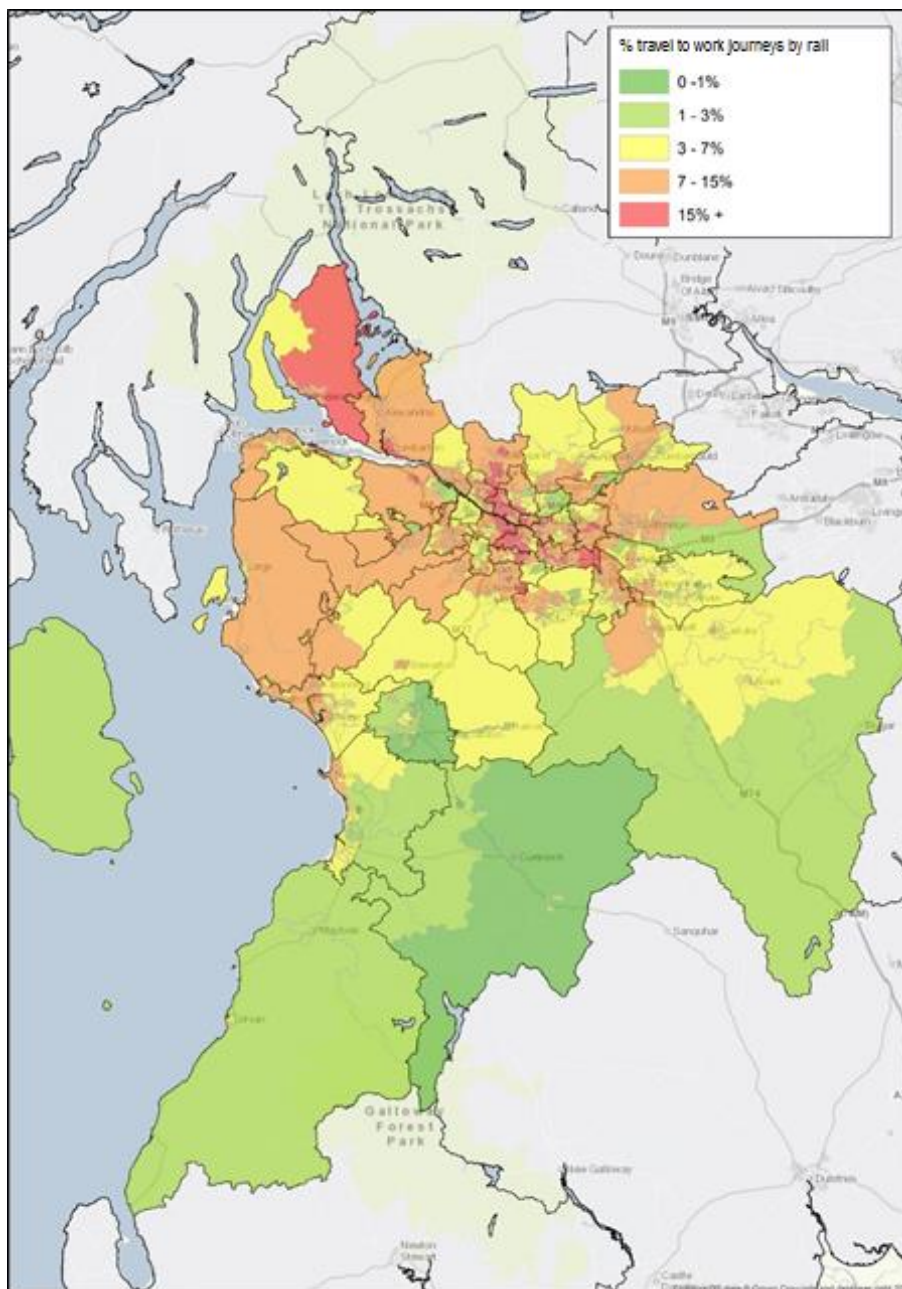
Figure 2.13 Percentage of Travel to Work Journeys by Rail 2011

Active Travel – Walking & Cycling

2.4.12 For shorter journeys walking and cycling can be an attractive alternative where suitable infrastructure is provided. In 2017, the average cycling journey in Scotland was 4.5 km in length and the average walking journey was 2.0 km in length.[15]

2.4.13 In the 2011 Census, 25% of journeys to work or study in Strathclyde were less than 2km suggesting these could be undertaken by walking whilst 43% were less than 5km where cycling would be feasible. The actual breakdown of these journeys by mode is shown in Figure 2.14 where it can be seen that just over half (55%) of less than 2km journeys were undertaken by walking with cycling only accounting for 1% of journeys. For journeys less than 5km the walking

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[15] https://www.transport.gov.scot/publication/scottish-transport-statistics-no-37-2018-edition/sct01193326941-14/

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share falls to 36% whilst cycling remains at 1%. For both distances car was the highest used mode after walking which again highlights the high level of car dependency which exists across Strathclyde.
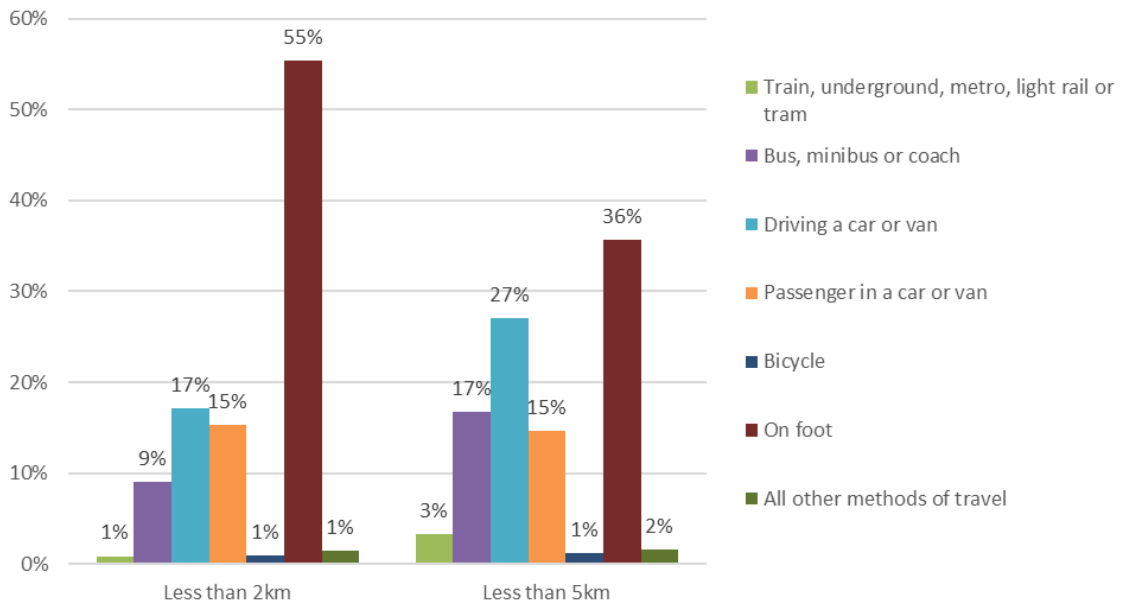
Figure 2.14 Distance Travelled To Work Or Study By Mode 2011

Distance Travelled to Work

2.4.14   In Figure 2.15 the distance travelled to work in 2001 and 2011 is shown. It is apparent that there has been a large increase in people working from home whilst those travelling less than 2km has decreased markedly. This is consistent with the observed decrease in people walking and cycling to work as these modes are most suited to short journeys.
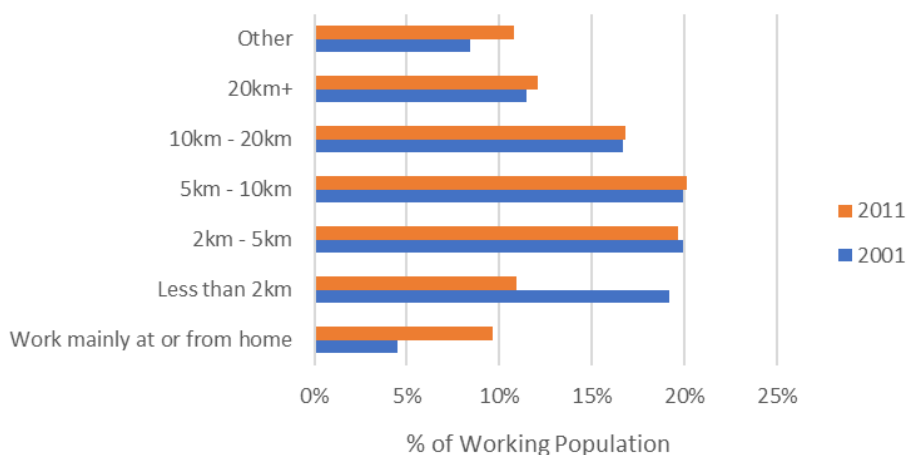
Figure 2.15 Distance Travelled to Work

2.4.15   When the distance travelled to work is considered alongside car ownership, as shown in figure 2.16, it is apparent that households traveling the furthest to work are less likely to have no cars available whereas those travelling between 2km to 5km had the highest proportion of no car ownership suggesting car ownership is linked to length of journey.

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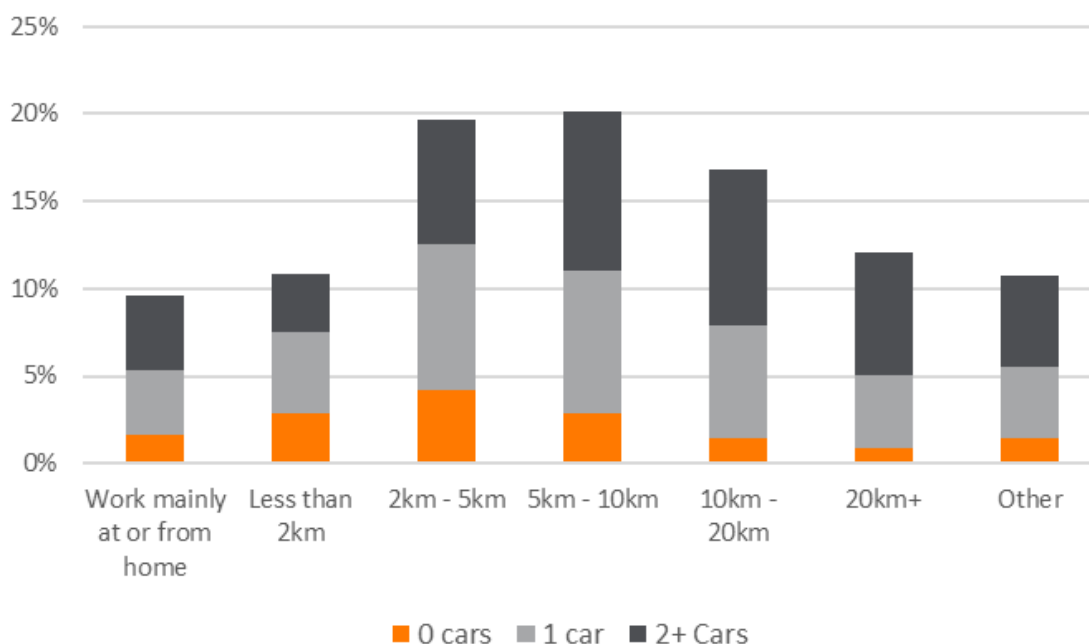
Figure 2.16 Distance Travelled To Work By Car Ownership 2011

Accessibility and Connectivity

2.4.16 Urban areas in Strathclyde have better transport connectivity than rural areas which impacts upon access to amenities, public services, employment and economic opportunities that are concentrated in these locations. This creates clear geographic disparities in access to services with remoter areas such as Helensburgh and Lomond, East and South Ayrshire, and South Lanarkshire having poorer connectivity. Access to employment and services is explored in detail in Section 4 and 5.

2.4.17 Affordability of transport is also a crucial socio-economic issue affecting Strathclyde. The UK Retail Prices Index (RPI) rose by 32% between 2007 and 2017 but most of the transport elements of the RPI increased more rapidly than this, and therefore rose in real terms. In cash terms, the costs of the maintenance of motor vehicles increased by 38%, petrol and oil by 24% and there was a 163% rise in the cost of vehicle tax and insurance. However, the cost of purchasing a vehicle fell by 11% in cash terms over the last ten years. As a result, the motoring expenditure index rose by 30% which is less than the 32% increase in the RPI. However, over the same period public transport fares and other travel costs rose by 58% in cash terms. Rail fares increased by 51% whilst bus and coach fares rose by 69% which are increases of 19% and 37% above inflation. This means that the real cost of public transport grew whilst the cost of motoring fell in real terms between 2007 and 2017.[16]

2.4.18 Increases in transport costs disproportionally impact on socio-economically disadvantaged groups. This is particularly the case for people with no car accessibility making them dependent on public transport. So, the rising cost of public transport presents a significant economic barrier to accessing transport which contributes to wider inequalities in terms of access to employment and overall quality of life. In particular, people in low paid employment or in receipt of welfare benefits will find the costs of transport alongside other essentials like housing and shopping challenging.

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[16] Scottish Transport Statistics No. 37, 2019

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2.5 Environment

2.5.1 This analysis was focussed upon a review of Air Quality as data is readily available for the majority of the SPT area which allows a comparison with Air Quality targets to be undertaken. For the purposes of measuring this we have focussed upon Nitrogen Dioxide (NO_2) and Particulates (PM10) as comparable indicators across the SPT area.

Nitrogen Dioxide (NO_2)

2.5.2 Mean annual Nitrogen Dioxide (NO_2) emissions across the SPT area in 2018 are shown in **Error! Reference source not found.**. Glasgow City Centre emits the most NO_2 of any of the 1 km areas shown below.

2.5.3 For NO_2 the annual mean threshold target defined in the National Air Quality Strategy is 40 µg m^{-3}. The lack of any sites emitting at or beyond this level suggests there are no major isolated NO_2 problems across the SPT area.

2.5.4 There are 15 active Air Quality Management Areas (AQMAs) within the SPT area with 3 in Glasgow, 3 in Renfrewshire, 3 in South Lanarkshire, 4 in North Lanarkshire and 2 in East Dunbartonshire as shown in Figure 2.18.[17] These localised pockets of poor air quality are often transport related at locations where high traffic flows, congestion and stationary vehicles lead to a concentration of emissions.

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[17] http://www.scottishairquality.scot/laqm/aqma?id=386

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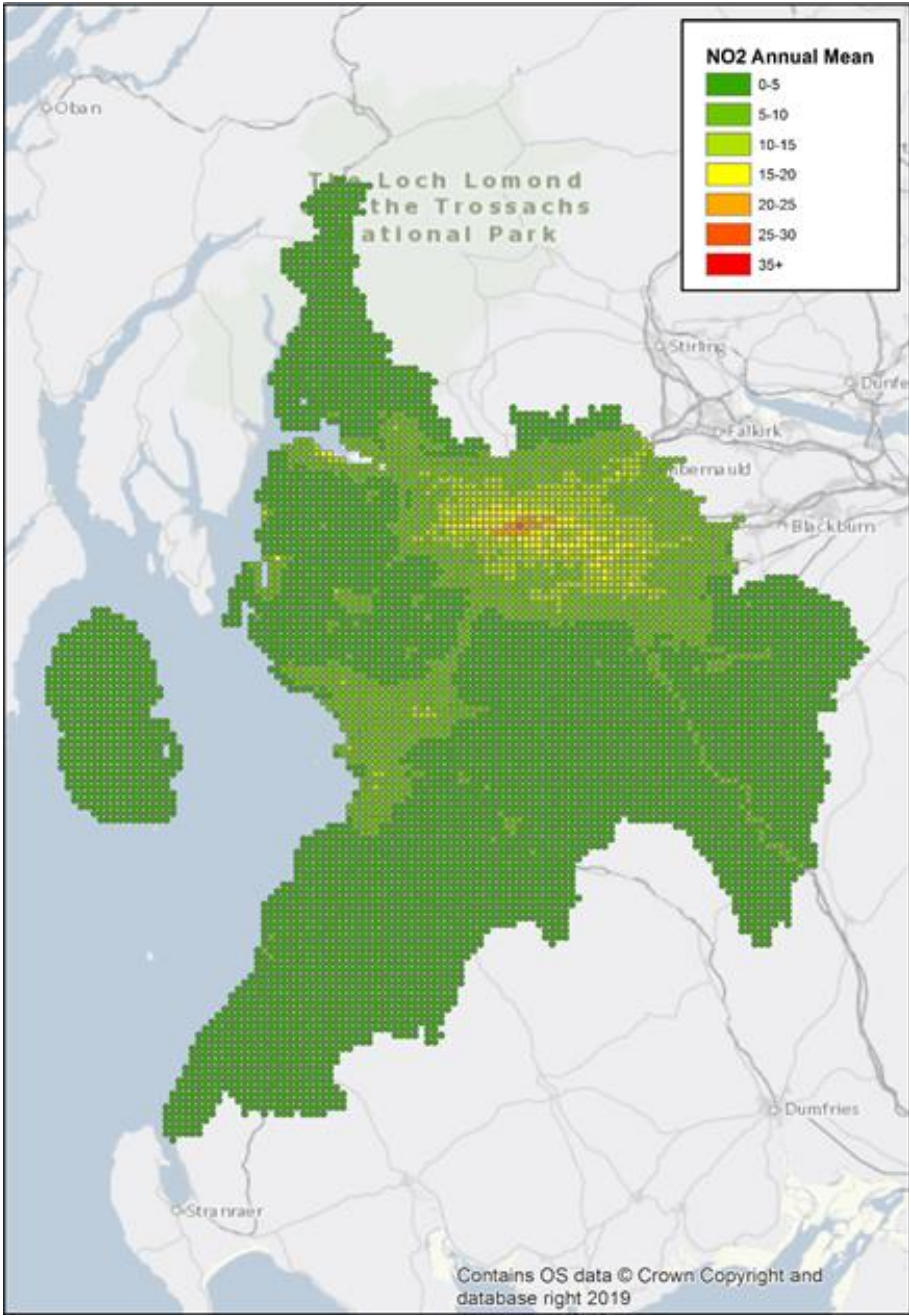
Figure 2.17 Nitrogen Dioxide (NO2) Annual Mean Emissions in Clydeplan Area

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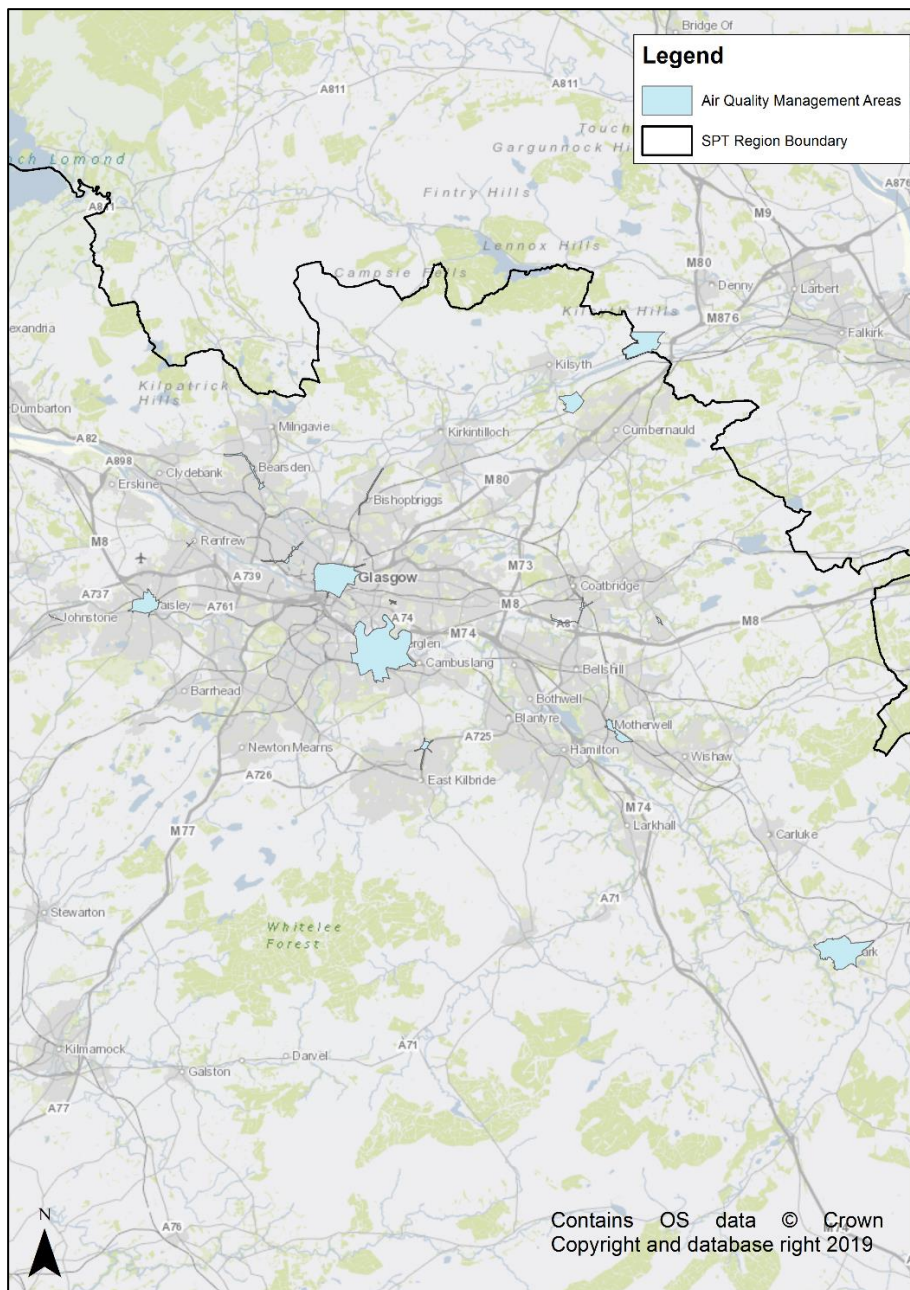
Figure 2.18 AQMAs in the SPT area

Particulates (PM10)

2.5.5   In the case of Particulates (PM10) the annual mean threshold target defined in the National Air Quality Strategy is 18 µg m^{-3}. Figure 2.19 shows the observed PM10 levels across the Clydeplan area.

2.5.6   Over 2018 no monitored areas in the SPT Region exceeded the annual mean threshold target. The highest observed value of particulates (13.25 µg m^{-3}) was observed at Junction 6 of the M8.

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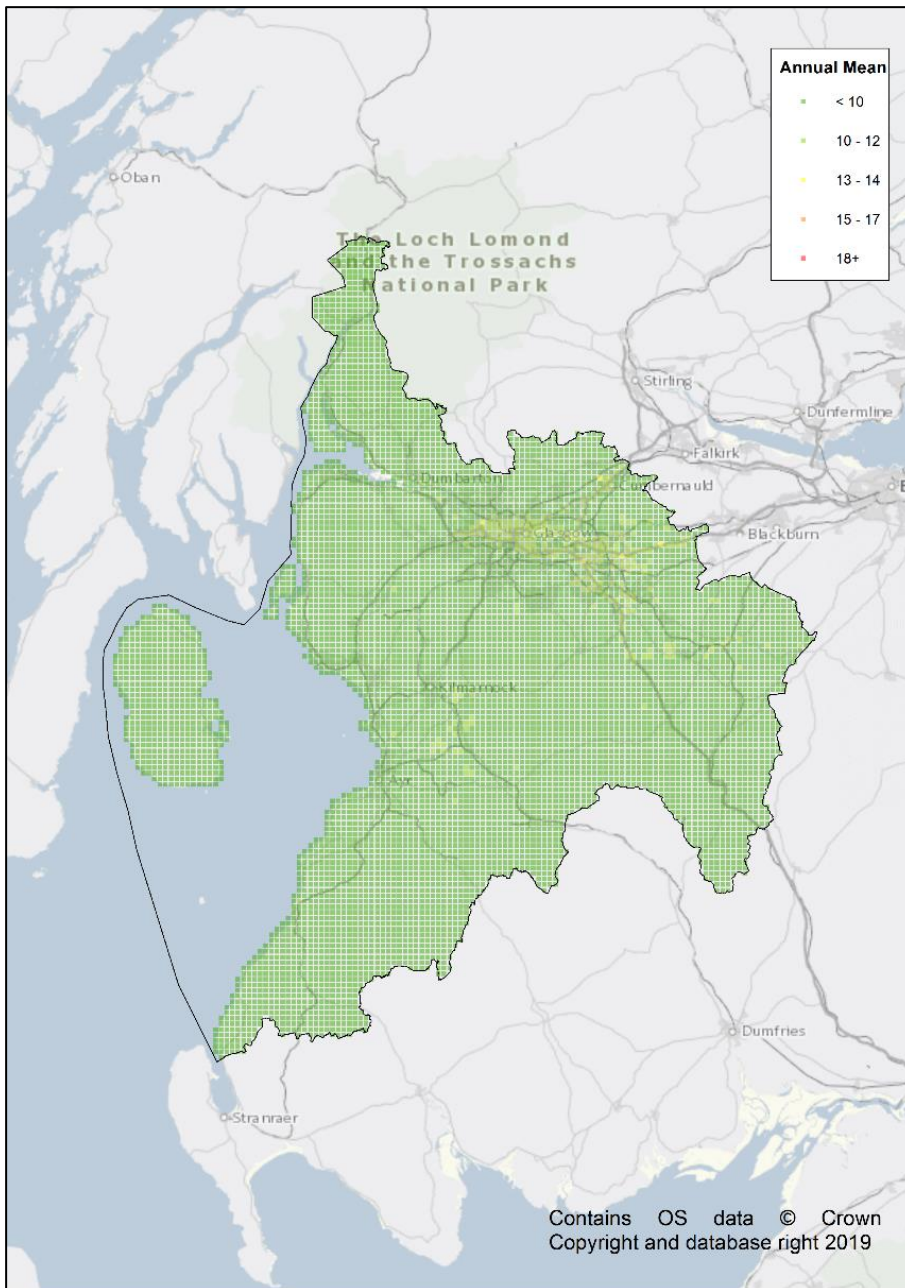
Figure 2.19 Particulates (PM10) Annual Mean Emissions in Clydeplan Area

2.6   Summary

2.6.1   Our analysis has identified the overarching trends and associated issues in the SPT area as:

Aging Population

In line with wider national and international trends the population of the SPT area is showing signs of aging with a lower proportion of children and higher proportion of people of retirement age. This has implications for the provision of essential services, particularly healthcare but also inclusive public transport.

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Socio-Economic Challenges

Strathclyde suffers from disproportionately high levels of multiple deprivation.

The rate of child poverty within Strathclyde is higher than for Scotland as whole, with overall income poverty also higher.

Levels of academic achievement in Strathclyde are lower than Scotland as a whole.

The health of residents in Strathclyde is relatively poor compared with the Scottish population.

Strathclyde has a higher crime rate than Scotland as a whole.

Working from Home

There is clear trend towards increased working from home which has a potential relationship with a decline in people travelling short distances (less than 2km) to work. Less short trips is also likely to have contributed to a reduction in the proportion of people walking and cycling to work.

Commuting to Glasgow

Journeys to work are heavily focussed upon Greater Glasgow whilst there is evidence of a more widespread pattern of residences across the SPT area. This suggests people are willing to commute to the employment opportunities in Greater Glasgow.

Car Dependency

Car dependency is greatest in the southern rural parts of the SPT area and is lowest in Greater Glasgow where regular public transport services are more widely available. Where population density is lower there is a corresponding likelihood of higher car ownership and usage.

Households are now less likely to not own a car and more likely to have 2 or more cars. Overall, there has been a small shift towards increased car ownership and usage in the SPT area.

Active Travel

The proportion of travel to work journeys made by walking and cycling is lower than may be possible given the distances being travelled.

Affordability

The real cost of car ownership has declined over the past decade whilst the real cost of train and bus fares has increased.

Air Quality

There are 15 active Air Quality Management Areas (AQMAs) within the SPT area. These localised pockets of poor air quality are often transport related at locations where high traffic flows, congestion and stationary vehicles lead to a concentration of emissions.

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3 Areas

3.1 Overview of Analysis

3.1.1 To understand the socio-economic and transport characteristics of each of the 40 Areas a comprehensive set of data to be analysed was identified. These are closely aligned with the structure of the analysis set out in Chapter 2 which provides an overview for the entire SPT area focussing primarily on trends.

3.1.2 This subsequent analysis provides more local detail with the findings and key issues presented in series of Area Profiles created for each of the 40 sectors within the SPT area. These are attached as Appendix A. The analysis is set out under five headings under which the relevant data sits including:

- Population

- Economy

- Travel

- Land-use

- Environment

3.1.3 It should be noted that, where possible and appropriate, the Area Profiles provide data for the SPT Area and Scotland so a comparison of local, regional and national circumstances can be undertaken. These are closely aligned with the structure of the analysis set out in Chapter 2 which provides an overview for the entire SPT area focussing primarily on trends.

3.1.4 This subsequent analysis provides more local detail with the findings and key issues presented in series of Area Profiles created for each of the 40 sectors within the SPT area. These are attached as Appendix A.

3.1.5 It should be noted that, where possible and appropriate, the Area Profiles provide data for the SPT Area and Scotland so a comparison of local, regional and national circumstances can be undertaken.

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4   Travel to Work Movements

4.1   Introduction

4.1.1   Based upon the initial analysis of the Census Travel to Work data undertaken to develop the Areas we then assessed the Movements that were taking place between them. This identified the need for a hierarchy to be applied to display the Movements. This approach was used to allow the greatest flows at a regional level to be displayed for the overall SPT area without being confused by smaller flows around the region.

4.1.2   Schematics were then developed showing:

- **SPT Area Strategic Overview:** individual diagrams showing all Movements within the SPT area broken down by three thresholds. All three consolidate Glasgow into one sector to minimise the complexity of the schematic;

- **External Movements:** from Areas within the west of Scotland to those in the rest of Scotland or beyond;

- **Glasgow Area Major Movements:** focussing in on the Glasgow sectors to examine all Movements greater than 1,000 trips; and

- **Local Movements:** focussing on key parts of the SPT area that exhibit their own localised travel Movements including Ayrshire, Lanarkshire and Renfrewshire. These have been defined for all Movements greater than 1,000 trips.

4.2   SPT Area Strategic Overview

4.2.1   The analysis examined both the current Movements that occur in the west of Scotland as well as forecasted future Movements. These are each set out in the following sections.

Current Movements

4.2.2   Whilst examining Movements that are significant at the regional level when analysing the Census Travel To Work, total demand was calculated using motorised modes of transport whilst excluding those which are not motorised, such as walking and cycling. This was intended to remove the mainly local trips which are mostly contained within the Area itself. As such, the modes which are included in the following analysis are:

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- Train or underground, metro, light rail or tram

- Bus, minibus or coach

- Taxi

- Motorcycle, scooter or moped

- Driving a car or van

- Passenger in a car or van

4.2.3   The analysis used three thresholds including:

Low: greater than 500 but less than 1,000 trips;

Medium: greater than 1,000 trips but less than 2,000 trips;

High: greater than 2,000 trips but less than 3,000 trips; and

Very High: greater than 3,000 trips.

4.2.4   Figure 4.1 shows the Motorised Movements at the Low threshold. It can be seen that these are comprised of:

Local Movements between closely located smaller Areas mainly outside of Greater Glasgow. In particular, there are clusters of Movements between Areas in Ayrshire, Lanarkshire and Renfrewshire;

Long-distance commuting from smaller Areas like Kilmacolm and Cumnock to Glasgow; and

Long-distance commuting from Glasgow to small and medium sized Areas both within and outside of Greater Glasgow.

4.2.5   A more dispersed pattern of Movements is to be expected at the Low threshold. The Areas with smaller populations will also generate less Movements so it is consistent that these would be apparent. In addition, the Movements also highlight that Areas which are located further from Greater Glasgow demonstrate lower demand for travel to Glasgow as anticipated.

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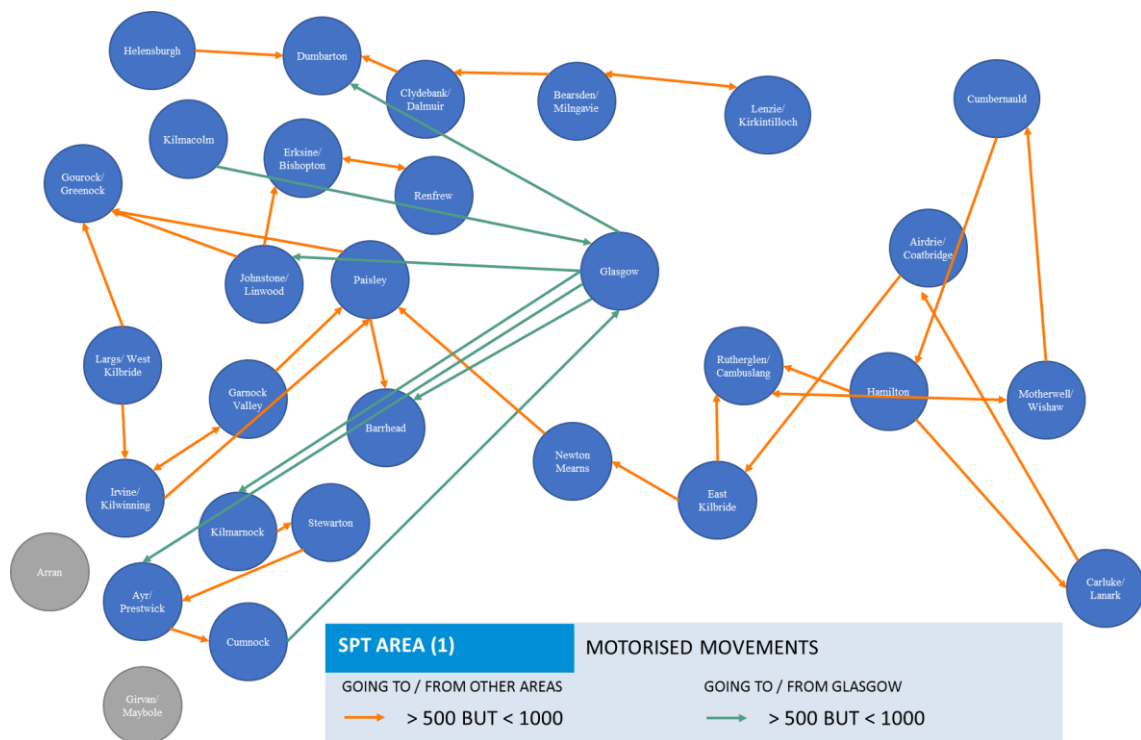
Figure 4.1 SPT Area Motorised Movements > 500 but < 1,000

4.2.6   At the Medium threshold shown in Figure 4.2 the Movements are comprised of:

- Consolidation of the Movements within Ayrshire, Lanarkshire and Renfrewshire showing their close internal integration;

- The emergence of Glasgow as a more prominent destination, particularly from Ayrshire; and

- Travel from Glasgow to Areas with larger populations and employment opportunities either at the periphery of or external to Greater Glasgow.

4.2.7   As the scale of the travel demand increases the greater prominence Glasgow has as both an origin and destination of Movements. This is most apparent at the High and Very High thresholds shown in Figure 4.3 and Figure 4.4 respectively. Here the main Movements are:

- Travel to Glasgow from the Areas with larger populations located outside or at the periphery of Greater Glasgow including Cumbernauld, Carluke / Lanark, the three main Ayrshire settlements, Inverclyde and Dumbarton;

- Travel to and from Glasgow and the Areas around the periphery of Greater Glasgow; and

- Internal travel between the largest settlements in Ayrshire, Lanarkshire and, to a lesser extent, Renfrewshire.

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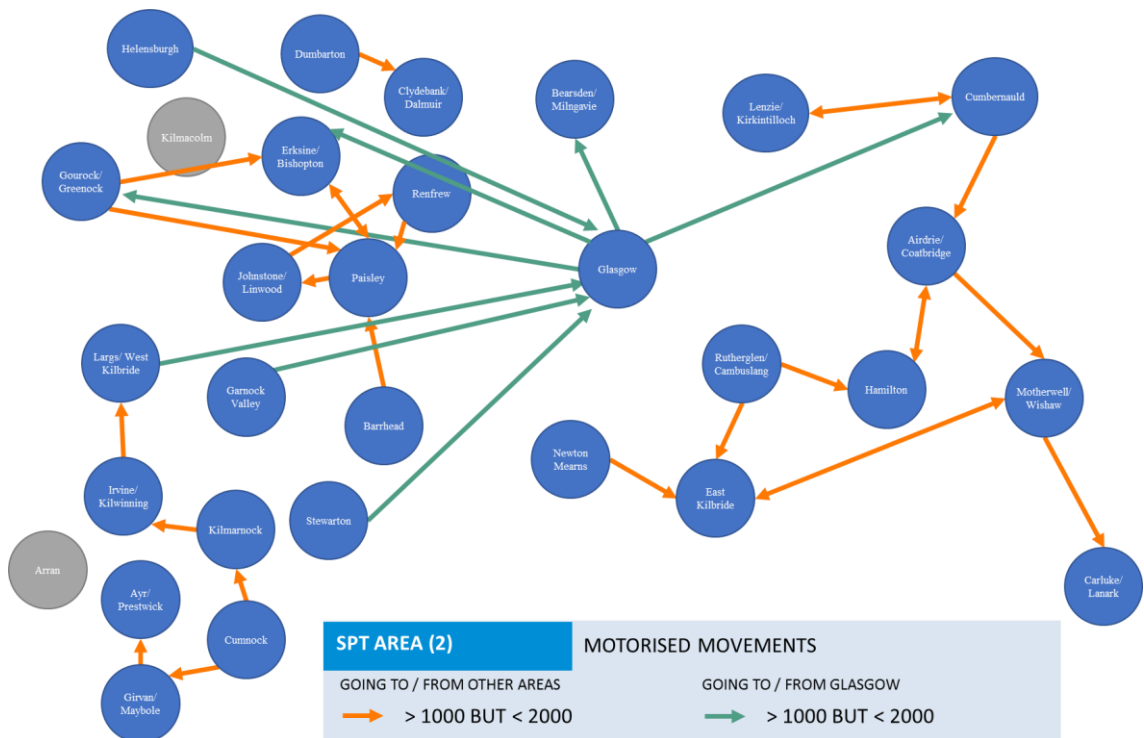
Figure 4.2 SPT Area Motorised Movements > 1,000 but < 2,000

Figure 4.3 SPT Area

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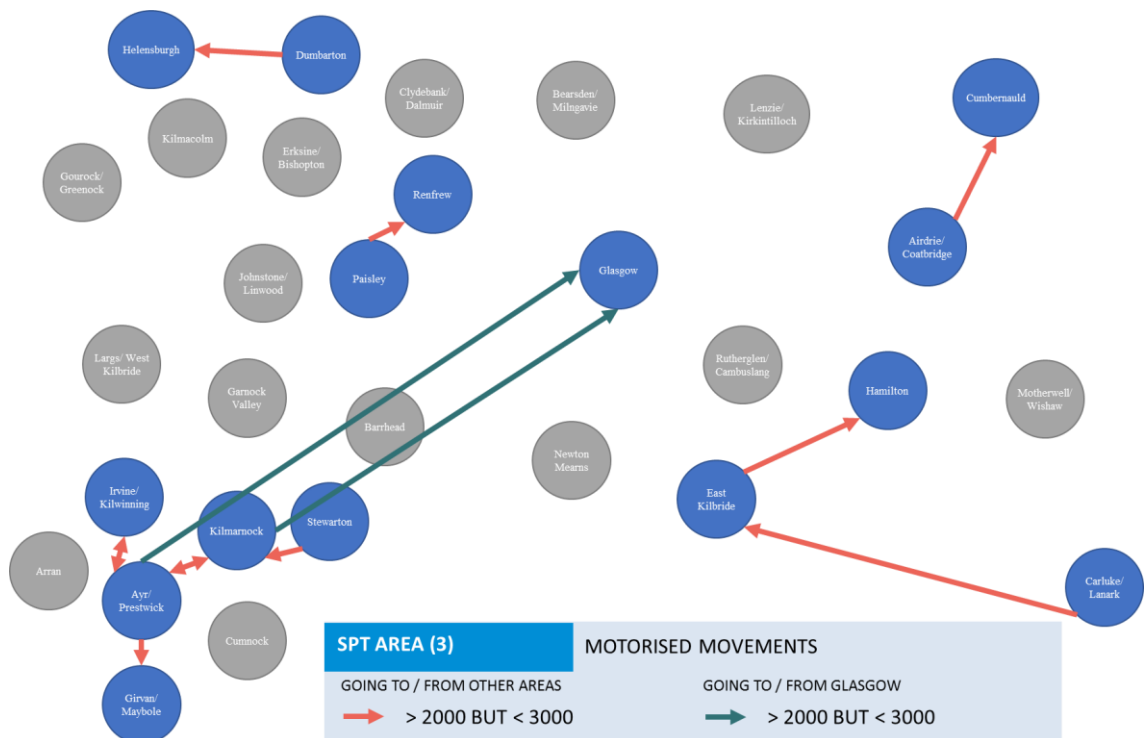
Figure 4.3 SPT Area Motorised Movements > 2,000 but < 3,000
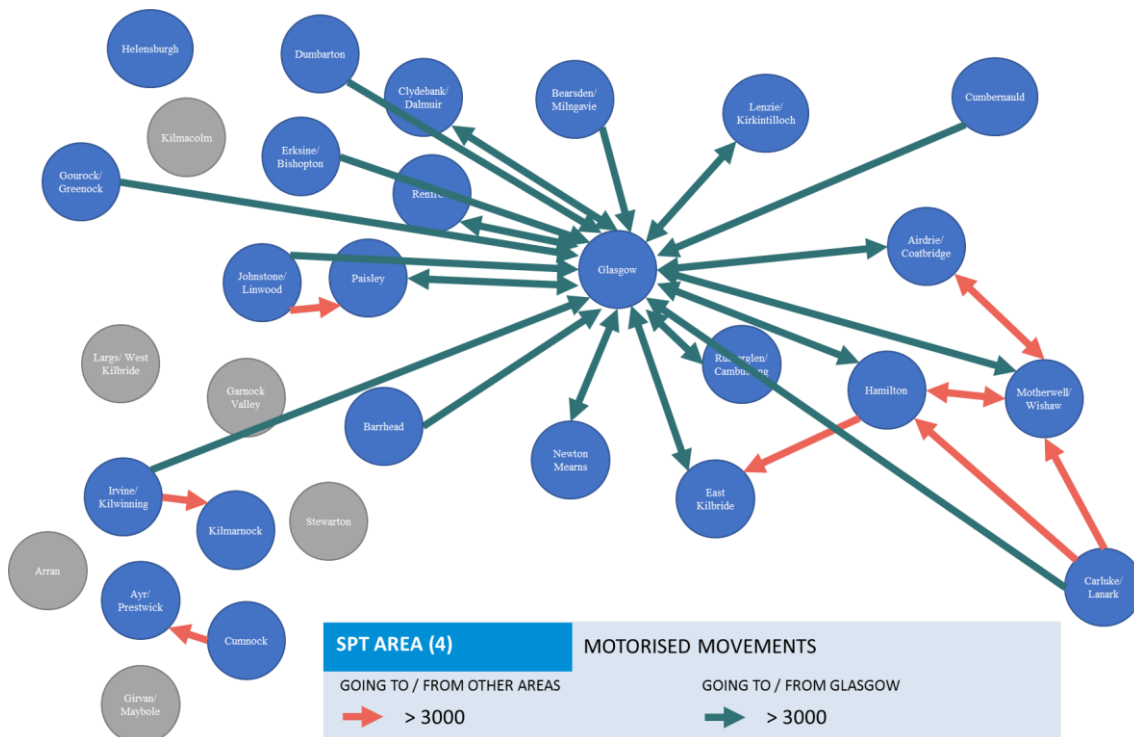
Figure 4.4 SPT Area Motorised Movements > 3,000

4.2.8 The analysis clearly demonstrates the importance of Glasgow and the high demand for travel within the Greater Glasgow conurbation whilst consolidating Ayrshire, Lanarkshire and Renfrewshire as being both closely linked both internally and to Glasgow.

4.2.9 Movements were then considered by mode. Figure 5.4 shows Car Movements at the Low threshold where the main Movements are:

▪ Travel from Glasgow to small to medium sized Areas in the west which are either outside or at the periphery of Greater Glasgow. These include Dumbarton, Inverclyde, Kilmarnock and Barrhead;

▪ Travel to Glasgow from small to medium sized Areas outside Greater Glasgow including Helensburgh, Largs / West Kilbride and the Garnock Valley; and

▪ Mainly local trips within Ayrshire, Dunbartonshire, Lanarkshire and Renfrewshire.

4.2.10 The Car Movements at the Low threshold closely reflect the overall Motorised Movements at this threshold suggesting car is the dominant mode for these journeys.

4.2.11 In Figure 4.6 the Car Movements at the Medium threshold are outlined. These are comprised of:

▪ Travel to Glasgow from Ayrshire and Inverclyde;

▪ Travel from Glasgow to Areas around the periphery of Greater Glasgow in Dunbartonshire and Lanarkshire; and

▪ Local travel in Ayrshire, Dunbartonshire, Lanarkshire and Renfrewshire.

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4.2.12　These again closely reflect the overall Motorised Movements and the dominance of the car for these trips. The exceptions are travel between Ayrshire and Glasgow as well as Inverclyde to Renfrewshire. The former drops from the High threshold of Motorised Movements to Medium threshold of Car Movements whilst the latter drops from the Medium threshold of Motorised Movements to the Low threshold of Car Movements.

4.2.13　The Car Movements at the High and Very High thresholds are shown in Figure 4.7 and Figure 4.8 respectively. These are mainly comprised of:

- Travel to Glasgow from the larger Areas around the periphery of Greater Glasgow including Barrhead, Newton Mearns, Carluke / Lanark, Hamilton, Cumbernauld, Lenzie / Kirkintilloch, Bearsden / Milngavie, Dumbarton, Erskine / Bishopton and Johnstone / Linwood;

- Travel to and from Glasgow from some of the larger Areas in Greater Glasgow which also have local employment opportunities including East Kilbride, Motherwell / Wishaw, Clydebank / Dalmuir, Renfrew and Paisley; and

- Local Movements between the larger Areas in Ayrshire, Lanarkshire and, to a lesser extent, Renfrewshire.

4.2.14　Comparing the Car Movements with the overall Motorised Movements shows close similarity with the exception of travel from Ayrshire to Glasgow and Inverclyde to Glasgow which are of a smaller scale and therefore evident at the lower threshold Car Movements.
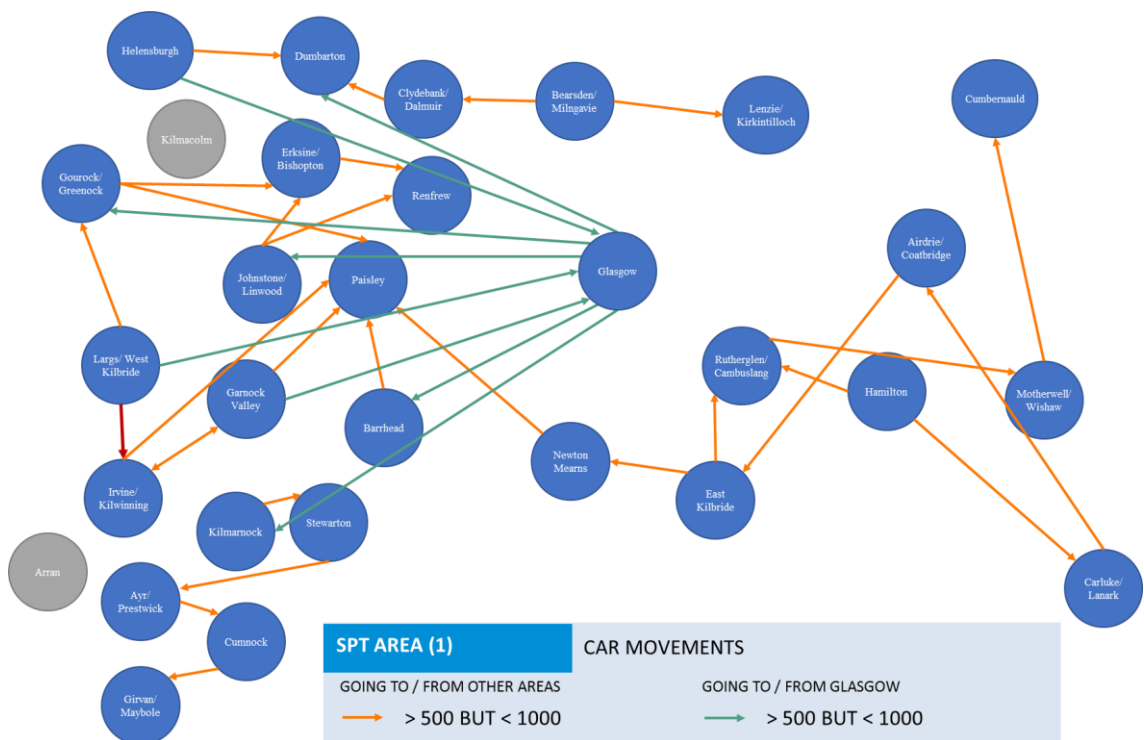
Figure 4.5 SPT Area Car Movements > 500 but < 1,000

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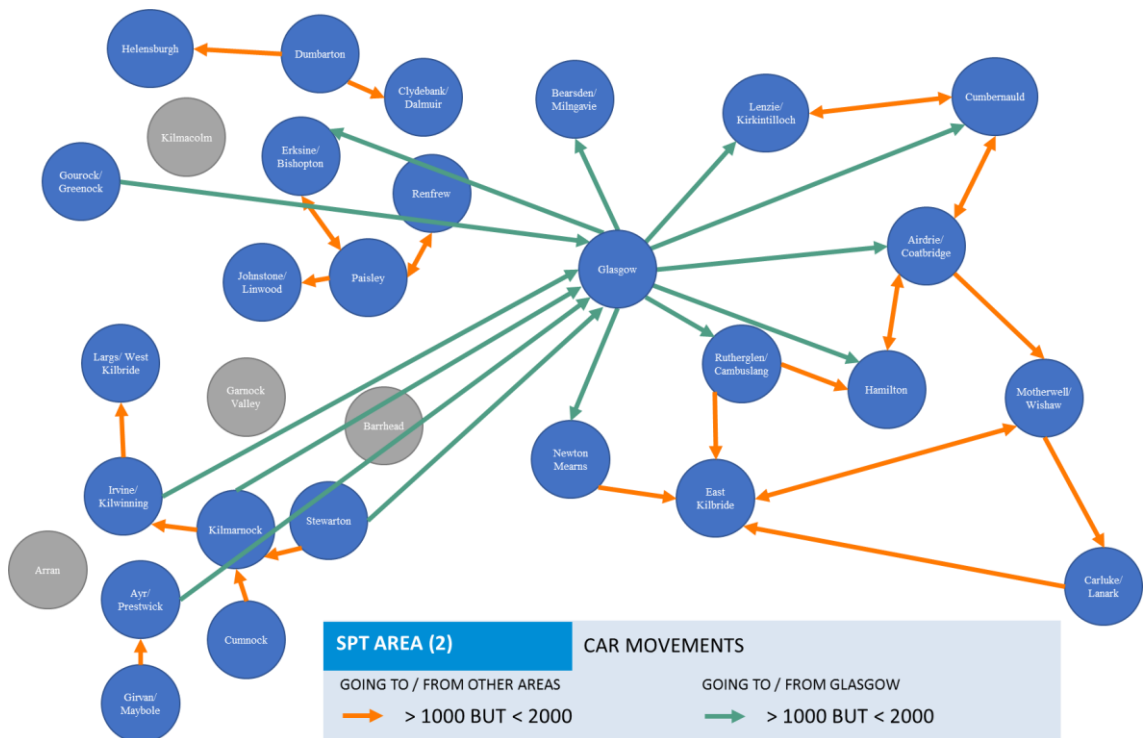
Figure 4.6 SPT Area Car Movements > 1,000 but < 2,000
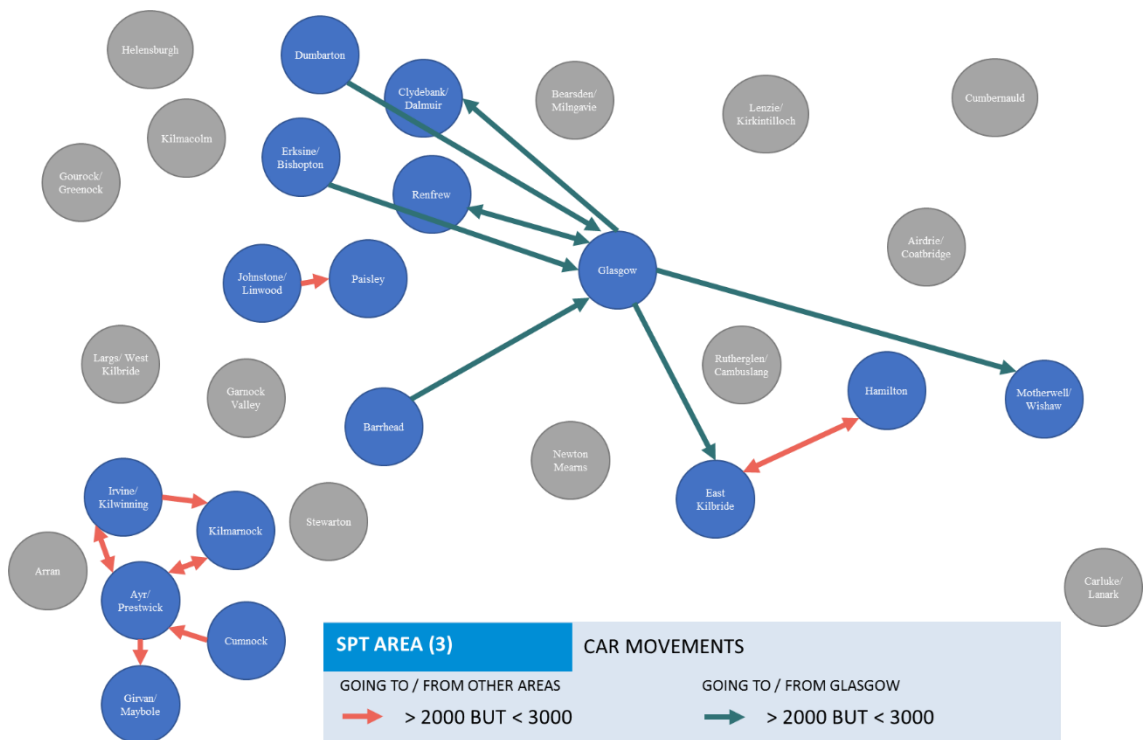
Figure 4.7 SPT Area Car Movements > 2,000 but < 3,000

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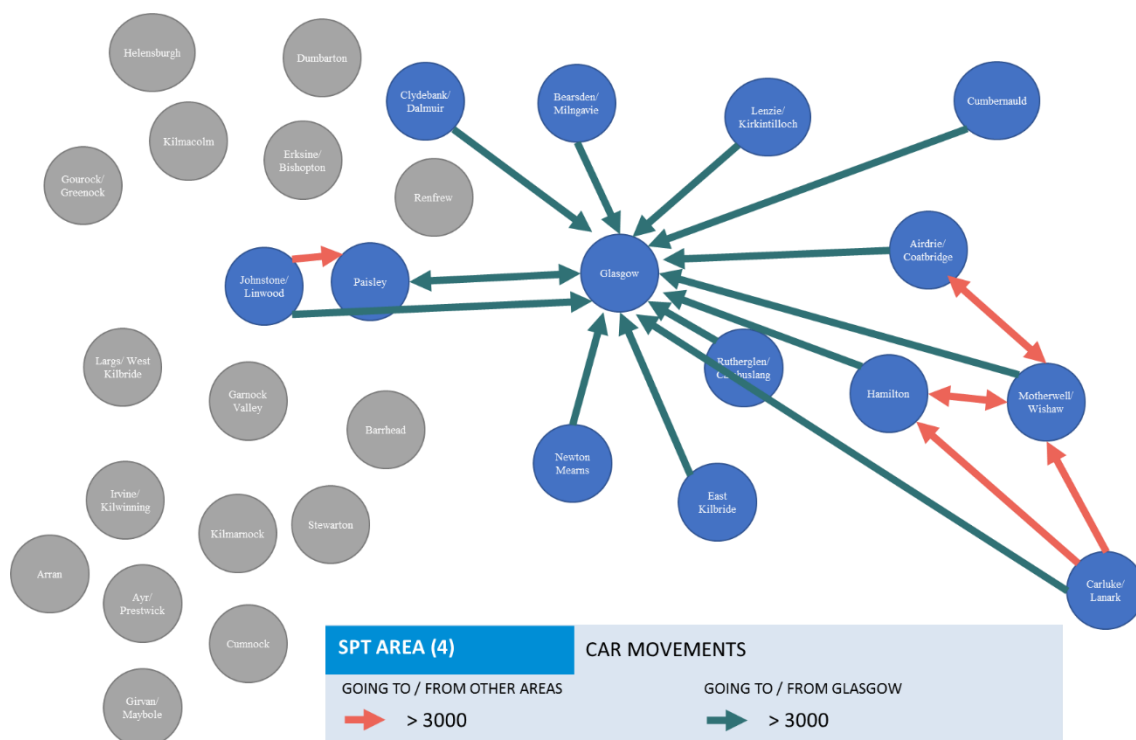
Figure 4.8 SPT Area Car Movements > 3,000

4.2.15 Public transport travel by bus and train was than examined. Figure 4.9 shows these Movements at the Low threshold. The prominence of Glasgow as a focal point for public transport travel is immediately apparent with only three Movements between Areas which do not include Glasgow. These reinforce the linkages between Areas in Ayrshire, Lanarkshire and Renfrewshire which are sufficient to support this level of public transport usage.

4.2.16 There is a split between bus and train with one mode being dominant for travel between a pair of Areas in some instances and both modes being used for others. This reflects the quality, frequency and distribution of public transport links which is particularly relevant to the rail network due to its fixed nature. Overall, the majority of travel is undertaken by bus at this threshold though.

4.2.17 At the Low threshold there is evidence of travel from Glasgow to other parts of Greater Glasgow including Clydebank, Renfrew and Paisley. Otherwise all travel is to Glasgow predominantly from Ayrshire, Dunbartonshire, Inverclyde and Renfrewshire.

4.2.18 Figure 4.10 shows the public transport Movements at the Medium threshold. Here, all travel is to Glasgow with the majority being by train. This is distributed across the SPT area with evidence of commuting to Glasgow from Ayrshire, Dunbartonshire, Inverclyde, Lanarkshire, and Renfrewshire.

4.2.19 Finally, at the High and Very High thresholds shown in Figure 4.11 and Figure 4.12 respectively train travel to Glasgow dominates, particularly from Lanarkshire but also the more affluent areas of Dunbartonshire and Renfrewshire. It is also noticeable that the majority of the travel is focussed around the east showing a dense concentration of public transport usage despite high levels of car use in this area as well.

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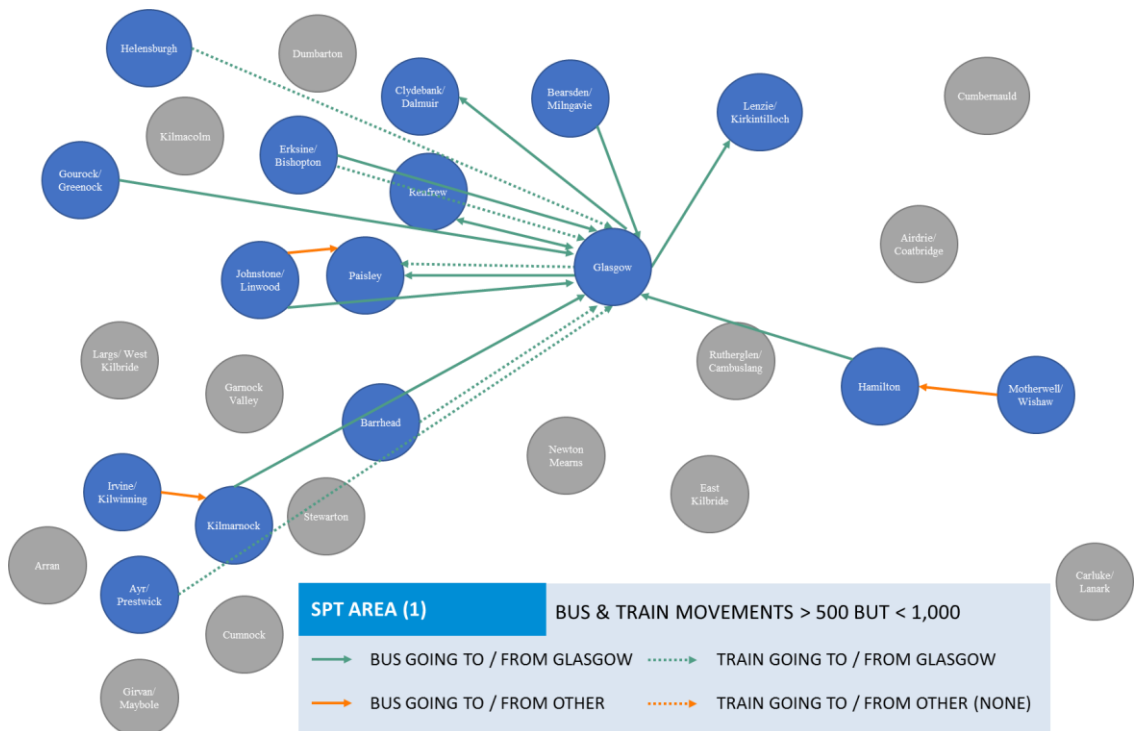
Figure 4.9 SPT Area Public Transport Movements > 500 but < 1,000
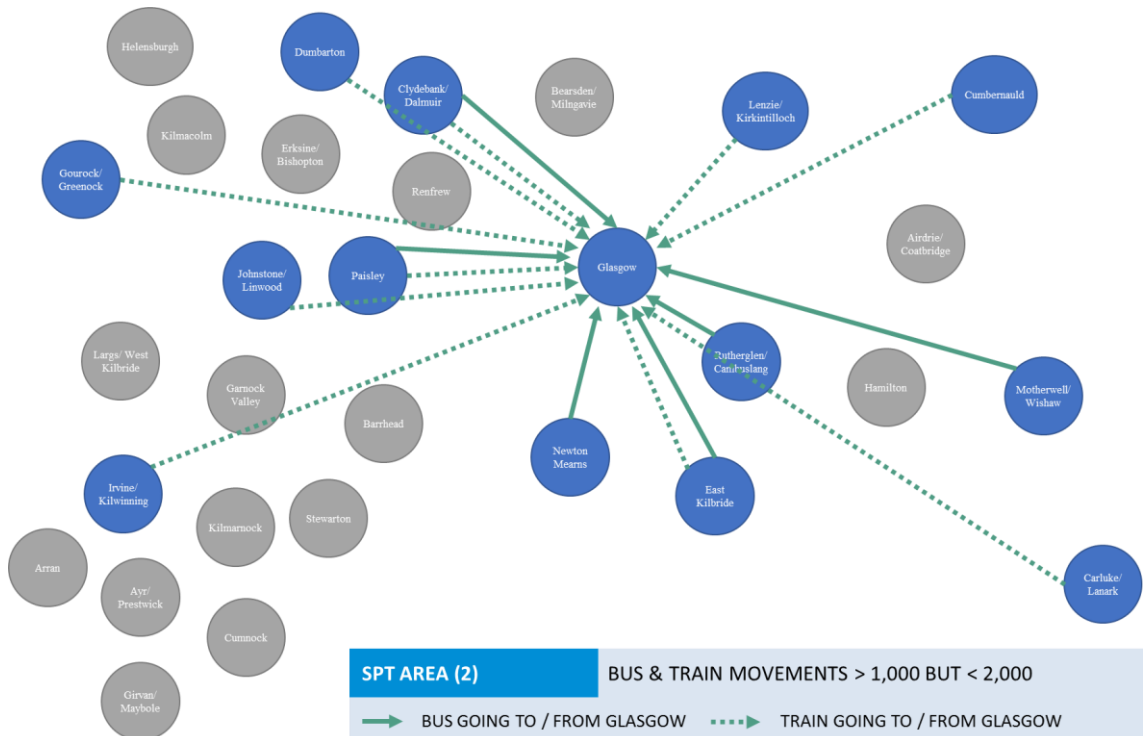
Figure 4.10 SPT Area Public Transport Movements > 1,000 but < 2,000

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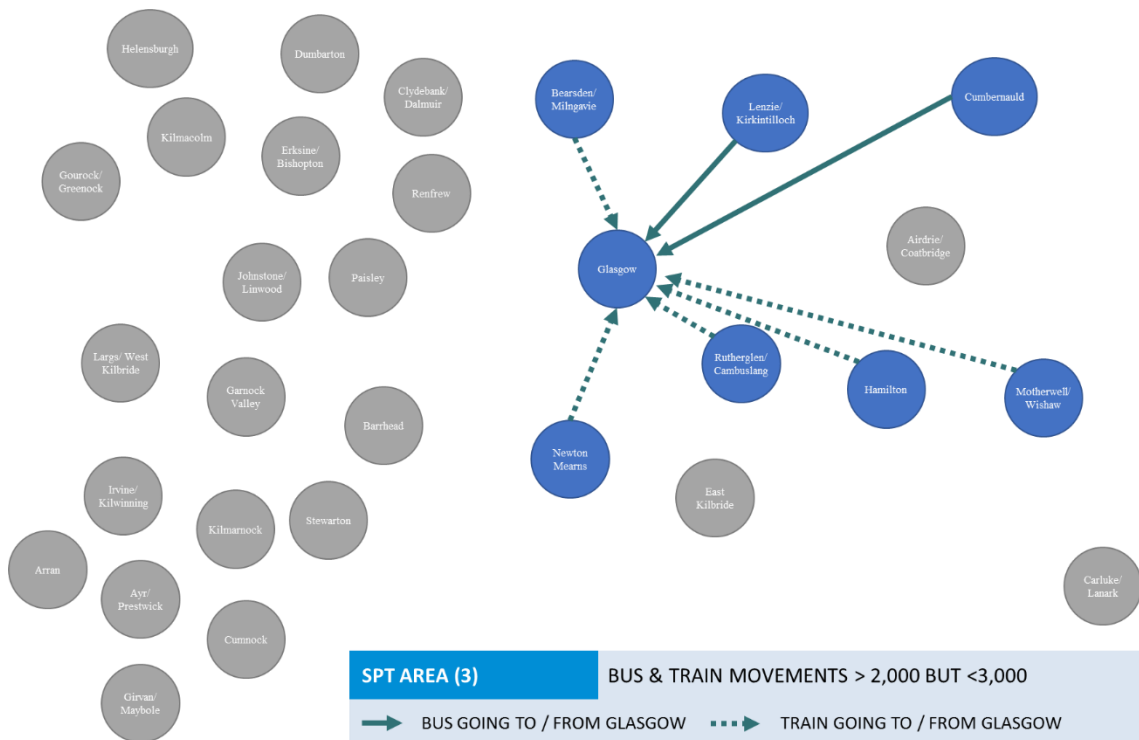
Figure 4.11 SPT Area Public Transport Movements > 2,000 but < 3,000
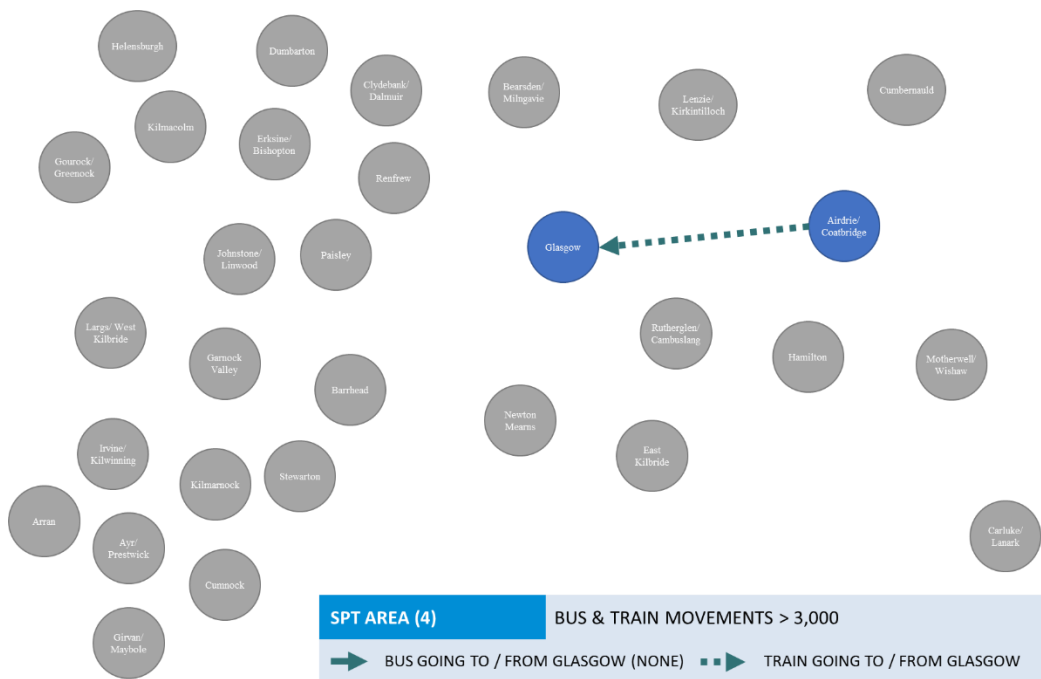
Figure 4.12 SPT Area Public Transport Movements > 3,000

KEY ISSUES

Smaller Movements are mostly local in nature or across longer distances between smaller Areas and Glasgow. Car is the dominant mode for these journeys.

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Ayrshire, Lanarkshire and Renfrewshire all demonstrate close internal linkages between their Areas. The majority of this travel is undertaken by car but there is evidence of public transport journeys between the largest Areas in these locations.

Movements from Glasgow are smaller for Areas located outside Greater Glasgow and larger for Areas which are closer and part of the urban area within Greater Glasgow. These are predominantly undertaken by car.

The largest Movements are dominated by Glasgow highlighting it as a major destination for Travel To Work journeys across the west of Scotland. This is particularly evident for public transport travel.

4.3   External Movements

4.3.1   The Travel to Work Movements to Areas outside the west of Scotland are shown in Figure 4.13. These are very limited with travel into Glasgow and out to Edinburgh, Livingston and Falkirk representing the majority of travel. It is noticeable that Movements are predominantly between Areas that are close geographically and that they are entirely contained to Areas in Glasgow and Lanarkshire.
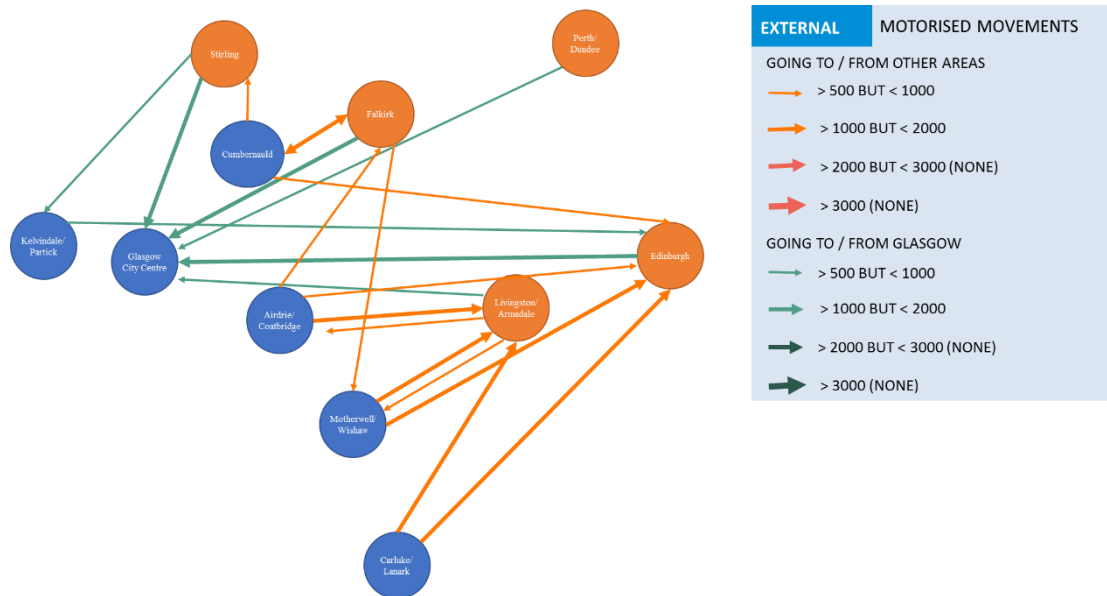
Figure 4.13 External Motorised Movements from SPT Area

KEY ISSUES

External Movements are mostly limited to travel into Glasgow and out to Edinburgh, Livingston and Falkirk.

These movements are entirely contained to Areas in Glasgow and Lanarkshire with no sizeable external Movements to or from any other Areas across the west of Scotland.

4.4   Glasgow Area Major Movements

4.4.1   The analysis identified that there are extensive internal Movements between the Areas within Glasgow itself. Figure 4.14 and Figure 4.15 shows the Motorised Movements between Glasgow Areas. It can be seen that the largest demand is for travel to the City Centre. All but two Areas have demand in excess of 3,000 for travel to the City Centre. Beyond the City Centre most travel

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demand is to the West End and Southside. There is limited demand for travel to the parts of the city east of the City Centre.
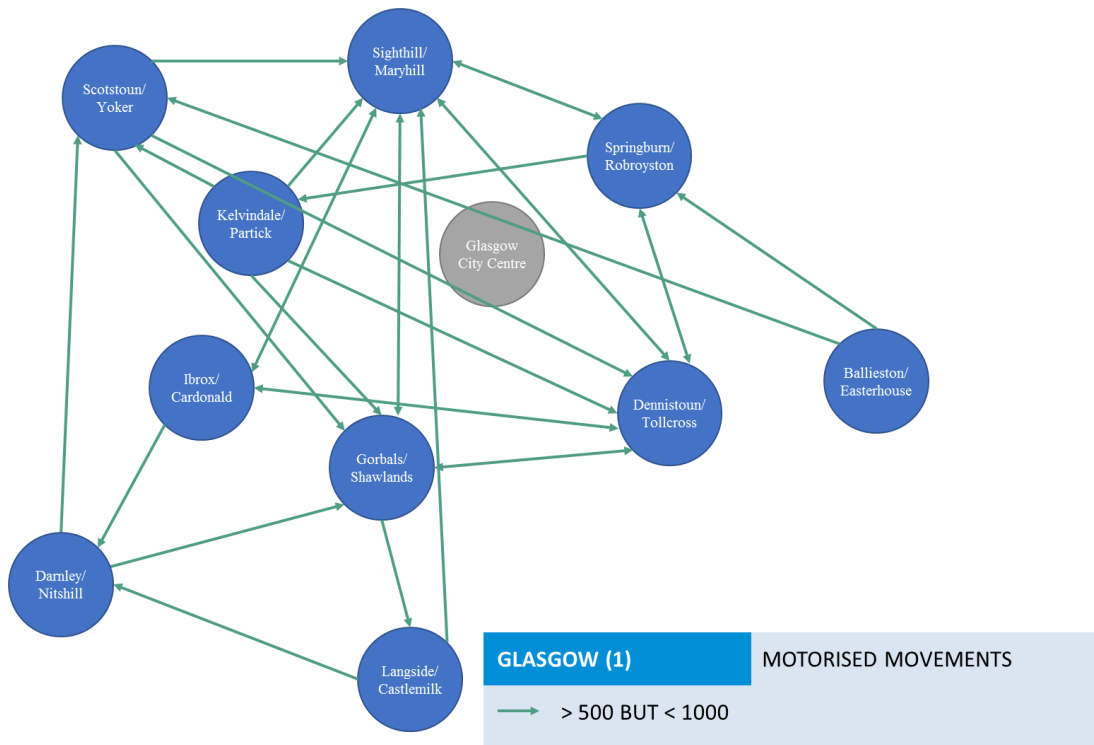
Figure 4.14 Glasgow Areas Motorised Movements > 500 but < 1,000
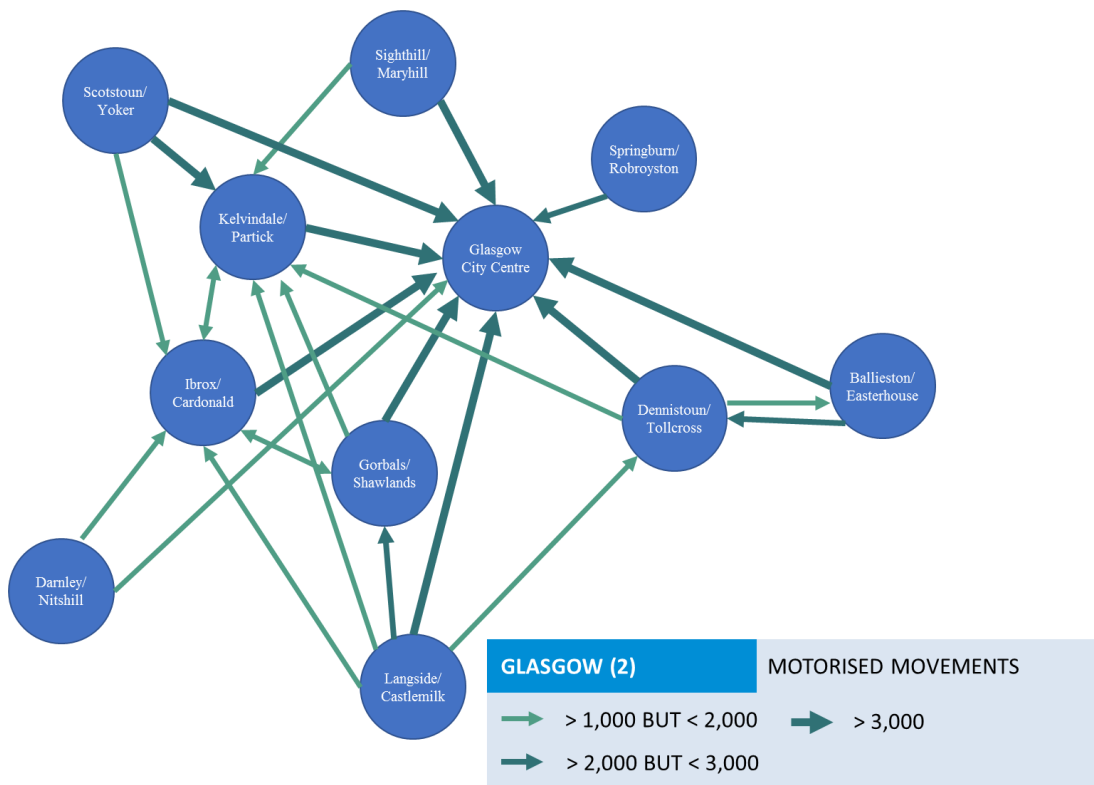
Figure 4.15 Glasgow Areas Motorised Movements > 1,000

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4.4.2   In Figure 4.16 Car Movements are considered which show a wider distribution of travel around the Glasgow Areas. The City Centre remains a dominant destination but there is also a much wider distribution of travel between the other Glasgow Areas as well. The demand for travel to the West End and Southside is still apparent but there is also more evidence of travel to the east of the City Centre as well. This suggests there is extensive travel around Glasgow by car showing close integration between the Glasgow Areas.
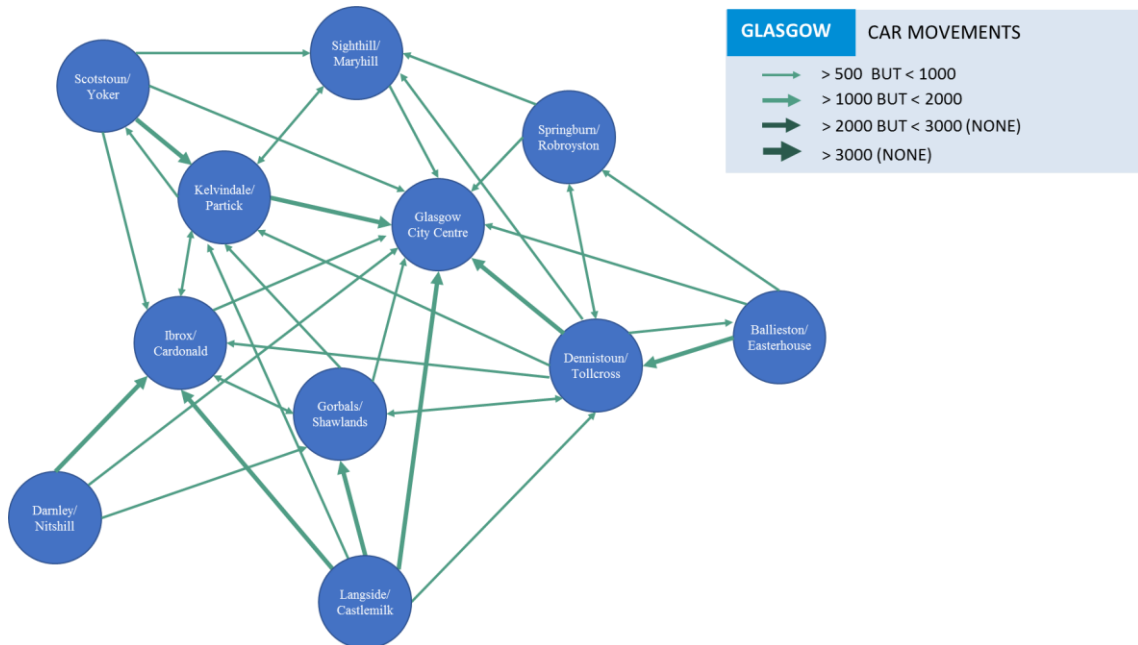
Figure 4.16 Glasgow Areas Car Movements

4.4.3   The public transport Movements are shown in Figure 4.17 and Figure 4.18 which display Bus and Train / Subway Movements respectively.

4.4.4   The largest Bus Movements are from Langside / Castlemilk and Dennistoun / Tollcross to the City Centre. This reflects the fact that the rail network is less dense in these areas creating more dependency on buses for public transport journeys. More widely the City Centre remains the focal point of Bus Movements whilst there is lower but still notable demand for travel to the Southside and West End.

4.4.5   In the case of Train / Subway Movements the largest demand can be seen from the West End and Southside to the City Centre. The former is underpinned by Subway Movements whilst the latter is formed by Train Movements. Beyond this the majority of Train / Subway Movements are to the City Centre with the only other notable destination being the West End. Overall, there is less diversity in the Train / Subway Movements than in the case of Car and Bus Movements. This reflects the fixed nature of Train and Subway routes compared to Cars and Buses which have flexibility.

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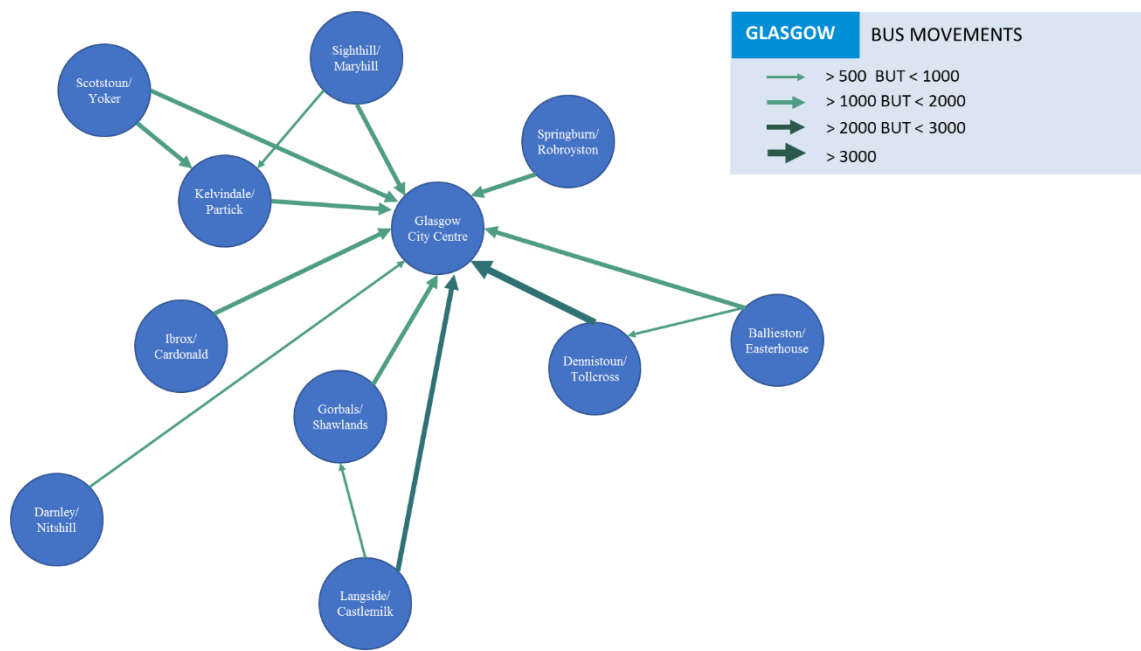
Figure 4.17 Glasgow Areas Bus Movements
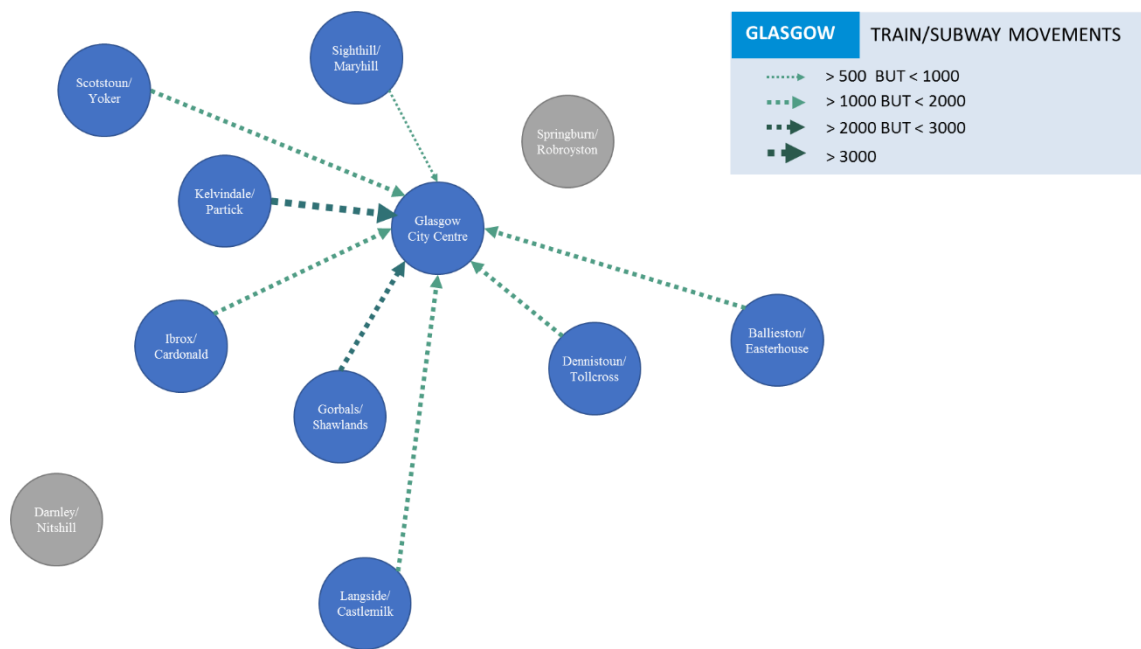
Figure 4.18 Glasgow Areas Train / Subway Movements

KEY ISSUES

The City Centre is the focal point for the largest travel demand within the Glasgow Areas.

Beyond the City Centre most travel demand is to the West End and Southside although it is noticeable that there are widespread linkages across the Glasgow Areas. However, there is more limited demand for travel to the parts of the city east of the City Centre.

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> Car and Bus Movements highlight the widespread integration between the Glasgow Areas whilst the fixed nature of the Train / Subway network is demonstrated by more focussed Movements around the City Centre, West End and Southside.

4.5 Local Areas

4.5.1 The analysis has shown that Ayrshire, Lanarkshire and Renfrewshire all have their own internal web of Travel to Work Movements. These have therefore been examined in more detail. In addition, for completeness Inverclyde has been included alongside Renfrewshire as there is evidence of linkages between these Areas as well.

Ayrshire

4.5.2 In Figure 4.19 the Movements between Ayrshire Areas are shown. The largest Movements are to Ayr / Prestwick and Kilmarnock. Indeed, there are close linkages between the three main Areas of Ayr / Prestwick, Irvine / Kilwinning and Kilmarnock. Beyond these the smaller Areas mainly feed into their closest main Area with little evidence of a significant number of cross-Ayrshire Movements being made. This suggests each of the main Areas of Ayr / Prestwick, Irvine / Kilwinning and Kilmarnock has a fairly localised labour market.
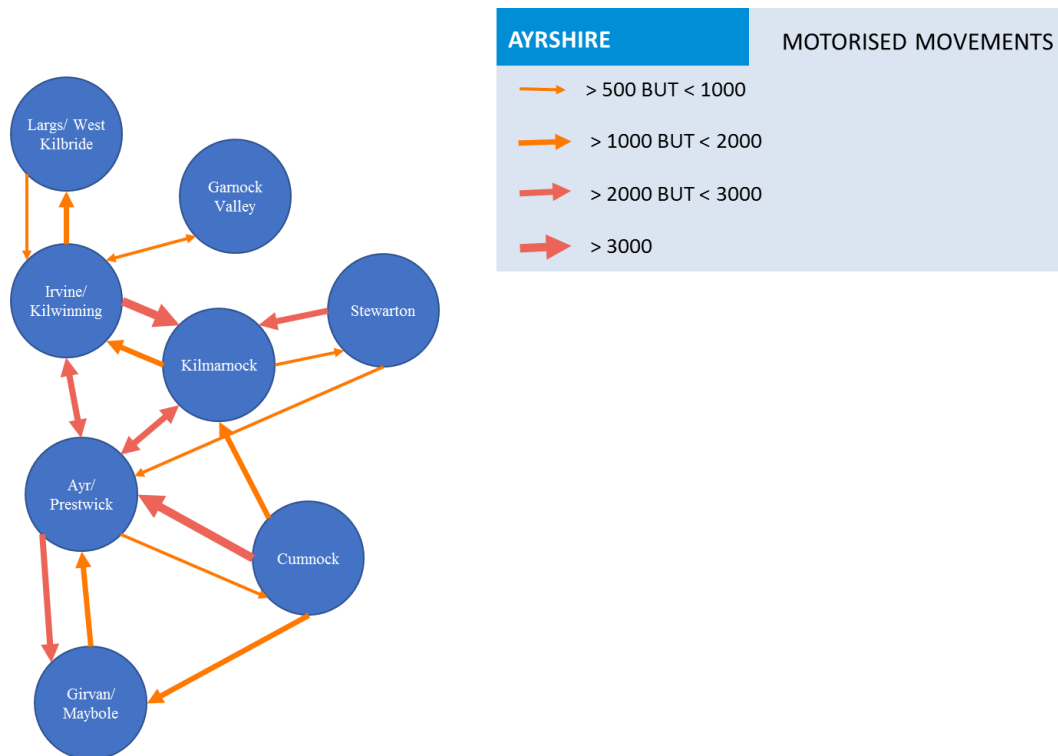
Figure 4.19 Ayrshire Areas Motorised Movements

Lanarkshire

4.5.3 The Movements between Lanarkshire Areas are shown in Figure 4.20. There are significant Movements between the largest Areas of Airdrie / Coatbridge, Carluke / Lanark, East Kilbride, Hamilton and Motherwell / Wishaw. Each of these Areas also appears to have a fairly localised labour market although there is some evidence of cross-Lanarkshire Movements between, for example, East Kilbride and Motherwell / Wishaw, Carluke / Lanark and East Kilbride as well as Cumbernauld and Motherwell / Wishaw. Overall, it is apparent that there is a large degree of integration between the Lanarkshire Areas and that the Movements are predominantly of a sizeable scale too.

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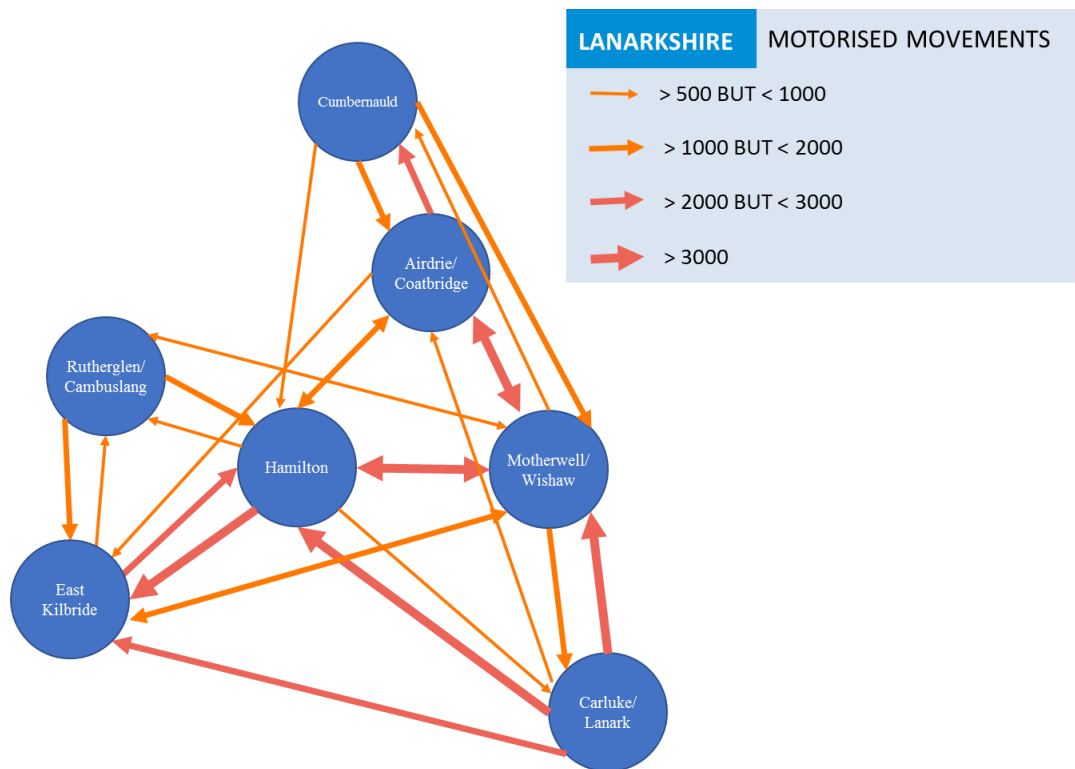
Figure 4.20 Lanarkshire Areas Motorised Movements

Renfrewshire and Inverclyde

4.5.4   The Movements around Renfrewshire and Inverclyde are shown in figure 4.21. The largest Movement is between Johnstone / Linwood and Paisley. There is evidence of Paisley being a focal point for Movements but also of close linkages between the central Areas of Erskine / Bishopton, Johnstone / Linwood, Renfrew and Paisley. Inverclyde can also be seen to be linked to the Renfrewshire labour market with demand for travel to and from the Paisley Area as well as to Erskine / Bishopton and from Johnstone / Linwood.
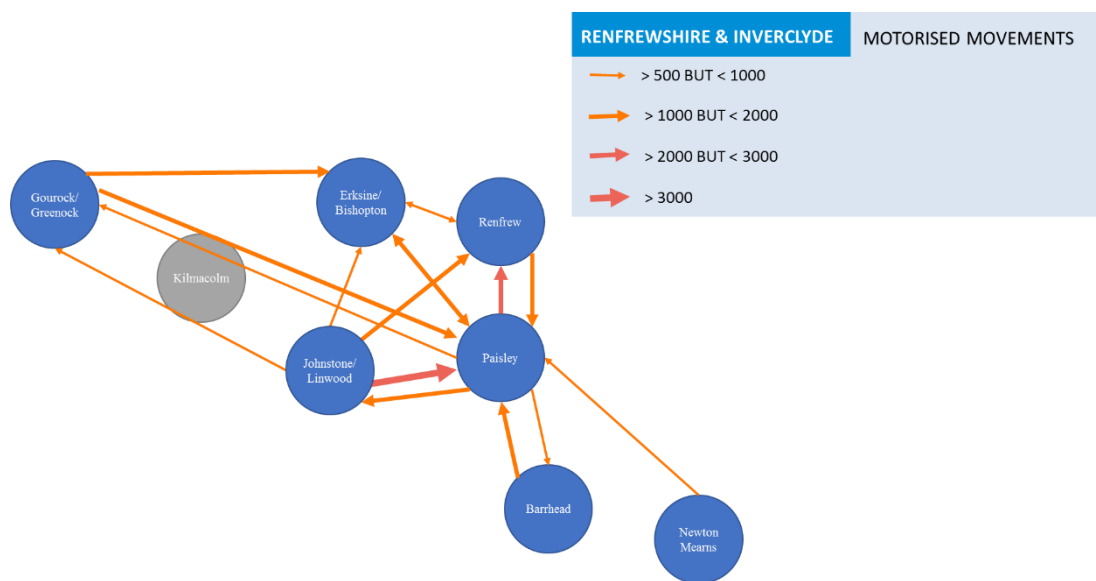
Figure 4.21 Renfrewshire & Inverclyde Areas Motorised Movements

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KEY ISSUES

In Ayrshire, there are close linkages between the three main Areas of Ayr / Prestwick, Irvine / Kilwinning and Kilmarnock.

Beyond these the smaller Areas mainly feed into their closest main Area suggesting a fairly localised labour market.

In Lanarkshire, there are significant Movements between the largest Areas of Airdrie / Coatbridge, Carluke / Lanark, East Kilbride, Hamilton and Motherwell / Wishaw.

It is apparent that there is a large degree of integration between the Lanarkshire Areas and that the Movements are predominantly of a sizeable scale too.

In Renfrewshire, there is evidence of Paisley being a focal point for Movements but also of close linkages between the central Areas of Erskine / Bishopton, Johnstone / Linwood, Renfrew and Paisley.

Inverclyde can also be seen to be linked to the Renfrewshire labour market.

4.6   Summary

4.6.1   Our analysis has identified the key travel to work patterns and associated issues in the SPT area as:

Dominance of Glasgow

The largest Movements are dominated by travel from and, particularly, to Glasgow. This underlines its importance to the economy of the West of Scotland. There is evidence of close integration within the labour market of Greater Glasgow.

Self-containment in Ayrshire, Lanarkshire and Renfrewshire

There are local labour markets in these locations which facilitate a high degree of travel between the key local Areas whilst each also has strong links to Glasgow as well. Inverclyde can be seen to be part of the Renfrewshire labour market.

Local Movements

The smaller Movements that occur are mostly local in nature. Where long-distance Movements take place in sizeable numbers these nearly always involve Glasgow.

Limited External Movements

Travel to and from the SPT area is largely confined to journeys to Edinburgh, Livingston and Falkirk as well as travel into Glasgow from larger settlements like Falkirk, Stirling, Perth / Dundee and Edinburgh.

Car Dominance

The car is the dominant mode for travel around the SPT area and is particularly relied upon for journeys between more dispersed origins and destinations.

Public Transport Serves Large Movements

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When public transport is heavily used this is predominantly serving large Movements to and within Glasgow. This is particularly the case for trains whilst buses are used more where the rail network is less dense.

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5 Non-Commuting Movements

5.1 Introduction

5.1.1 The analysis of Movements for purposes other than commuting was undertaken using modelled data drawn from Transport Model for Scotland (TMfS) 2014. The base model was used for this purpose with no amendments or updates made to the previously defined base year demand matrices.

5.1.2 The analysis considered employer's business (i.e. journeys undertaken for work purposes that are not commuting like attendance at meetings), leisure (journeys for non-work purposes) and freight. For the first two purposes analysis was broken down by car journeys and public transport journeys. For Freight only road-based journeys are available.

5.1.3 Schematics were then developed similar to those presented for commuting in Chapter 4. These are attached as Appendix B. The findings of this analysis are presented in the remainder of this chapter.

5.2 Employer's Business

Public Transport

5.2.1 The relevant schematic diagrams to accompany this are include as Section 1 of Appendix B.

5.2.2 Employer's business trips by public transport are focussed upon Glasgow with the greatest flows being to and from locations around Greater Glasgow. Beyond this area there is demand for employer's business trips to and from Glasgow also being generated in Ayrshire, Inverclyde and Lanarkshire as well. This broadly reflects the locations with the best rail connectivity. However, the demand is small in comparison to commuting trips with no locations generating more than 500 trips over a 12-hour period.

5.2.3 Within Glasgow employer's business trips are focussed upon the city centre with the West End (Kelvindale / Partick) and South Side (Gorbals / Shawlands / Langside / Castlemilk) being the other key origins and destinations.

5.2.4 Public transport journeys for employer's business to and from locations outside of Strathclyde and predominantly centred upon Glasgow although some minor flows were also generated by Ayrshire, East Dunbartonshire and South Lanarkshire as well.

Car

5.2.5 The relevant schematic diagrams to accompany this are include as Section 2 of Appendix B.

5.2.6 Car based employer's business journeys generate more demand than public transport and are more diversely dispersed across Strathclyde. Glasgow is again the focal point for the largest flows with greatest demand to and from Paisley. The next largest demand is centred around Glasgow based journeys to and from Lanarkshire and Dunbartonshire. This is followed by smaller demand from locations further from Glasgow like Ayrshire and Inverclyde.

5.2.7 Across Strathclyde there are internal employer's business markets within Lanarkshire, Renfrewshire and, to a lesser extent, Ayrshire. This broadly reflects the travel to work markets observed through the Census analysis presented in Chapter 4.

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5.2.8 Within Glasgow there is much greater diversity in the origins and destinations of employer's business journeys undertaken by car than there is by public transport. There is also less focus upon the city centre.

5.2.9 Similarly, employer's business journeys to and from locations outside Strathclyde are more diverse by car than public transport with less emphasis on Glasgow again.

5.2.10 However, demand for employer's business trips is still relatively low overall when compared with the commuter demand.

5.3 Leisure

Public Transport

5.3.1 The relevant schematic diagrams to accompany this are include as Section 3 of Appendix B.

5.3.2 Leisure trips by public transport are heavily centred around Glasgow which again reflects its position as the focal point of the public transport network in Strathclyde. The largest flows are comparable in size to the commuter demand and are predominantly generated by Greater Glasgow, East Dunbartonshire and Lanarkshire.

5.3.3 There are some more localised leisure markets within Ayrshire, Inverclyde, Renfrewshire and South Lanarkshire as well. This reflects their close integration within these communities which is similarly reflected in the travel to work markets.

5.3.4 Within Glasgow the city centre is an important focus of public transport based leisure journeys but it is also noticeable that there is a wide distribution of other locations as well which was not evident in the employer's business demand.

5.3.5 The major leisure demand for journeys to and from locations outside Strathclyde is entirely focussed upon Glasgow.

Car

5.3.6 The relevant schematic diagrams to accompany this are include as Section 4 of Appendix B.

5.3.7 The greatest demand for car-based leisure journeys is between Glasgow and the wider Greater Glasgow area as well as East Dunbartonshire and Lanarkshire. These are generating in excess of 5,000 car trips over a 12-hour period representing a significant amount of demand. It is also notable that demand centred in Lanarkshire around Airdrie / Coatbridge, Motherwell / Wishaw and Hamilton is of the same magnitude suggesting a significant localised leisure market within the area. There is slightly less but still sizeable demand within Ayrshire and Renfrewshire.

5.3.8 Smaller movements are more dispersed around Strathclyde and they suggest there is a high degree of interaction around the region for car-based leisure journeys. In addition, even the smaller demand is still sizeable in comparison to employer's business demand and some of the commuting flows.

5.3.9 Within Glasgow there is a large amount of interaction around the area. The city centre is a less obvious focal point for these trips than it is for others suggesting people are more inclined to use public transport for these leisure trips. The analysis indicates that journeys to other locations around Glasgow for leisure trips are more likely to be undertaken by car though.

5.3.10 There is also sizeable demand for car-based leisure journeys to and from locations outside of Strathclyde as well. These again show Glasgow as less of a focal point for these journeys with Dunbartonshire, Lanarkshire and Renfrewshire being more prominent.

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5.4 Freight

5.4.1   The relevant schematic diagrams to accompany this are include as Section 5 of Appendix B. All of the freight demand is roads-based.

5.4.2   The analysis suggests that the greatest freight demand is focussed upon Glasgow. However, there is also evidence of local markets in Ayrshire, Lanarkshire and Renfrewshire which reflects the findings of previous analysis.

5.4.3   Within Glasgow freight demand is fairly evenly distributed with no suggestion that the city centre attracts and more or less demand than other locations.

5.4.4   Freight journeys to and from locations outside of Strathclyde are centred around Glasgow and Lanarkshire with no sizeable flows to or from any other locations. This suggests that the freight market is largely localised within Strathclyde and that it predominantly comprises of intra-regional journeys.

5.5 Summary

5.5.1   Our analysis has identified the key employer's business, leisure and freight travel patterns and associated issues in the SPT area as:

Employer's Business

Employer's business trips by public transport are focussed upon Glasgow whereas car-based employer's business journeys generate more demand than public transport and are more diversely dispersed across Strathclyde. However, the demand is small compared to other trip purposes.

Across Strathclyde there are internal employer's business markets within Lanarkshire, Renfrewshire and, to a lesser extent, Ayrshire which broadly reflects the travel to work markets.

Leisure

Leisure trips by public transport are heavily centred around Glasgow which again reflects its position as the focal point of the public transport network in Strathclyde.

The greatest demand for car-based leisure journeys is between Glasgow and the wider Greater Glasgow area as well as East Dunbartonshire and Lanarkshire. There is also a sizeable local leisure market within Lanarkshire with slightly less, but still sizeable, demand within Ayrshire and Renfrewshire. There is also sizeable demand for car-based leisure journeys to and from locations outside of Strathclyde as well.

Freight

The analysis suggests that the greatest freight demand is focussed upon Glasgow. However, there is also evidence of local markets in Ayrshire, Lanarkshire and Renfrewshire.

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6 Movements by Mode

6.1 Introduction

6.1.1 Through engagement with SPT it was identified that data was available which could help to provide greater insight into Movements which involved the use of Park and Ride at stations or that were made by Subway. In addition, we identified the MOIRA rail demand model as a method to further understand rail related Movements.

6.1.2 High-level analysis of this data was undertaken to add to the understanding of Movements by mode which was developed through the analysis set out in Chapters 4 and 5.

6.2 Rail

6.2.1 Analysis of rail movements between local authority areas was undertaken using data from MOIRA 2.2 demand model. This is summarised in Figure 6.1 which shows that Glasgow is the main destination for rail journeys. This is particularly evident for East Dunbartonshire (83%), East Renfrewshire (80%), South Lanarkshire (80%) and North Lanarkshire (72%).

6.2.2 Large internal movements are evident within many local authorities and, particularly, Glasgow (39%), South Ayrshire (31%), West Dunbartonshire (22%), Inverclyde (17%) and North Ayrshire (16%). Renfrewshire is a popular destination for people originating in Inverclyde and it is evident that South Ayrshire and North Ayrshire also have a close relationship.

Table 6.1 Origins and Destinations of Rail Demand by Local Authority

							Destination						
	South Ayrshire	North Ayrshire	East Ayrshire	East Renfrew-shire	Renfrew-shire	Inver-clyde	Glasgow City	South Lanark-shire	North Lanark-shire	Argyll & Bute (Helens-burgh)	East Dunbart-onshire	West Dunbart-onshire	External
South Ayrshire	31%	16%	2%	0%	6%	0%	36%	1%	1%	0%	0%	0%	6%
North Ayrshire	14%	16%	0%	0%	11%	0%	53%	1%	1%	0%	0%	0%	3%
East Ayrshire	6%	0%	13%	2%	2%	0%	67%	1%	1%	0%	0%	0%	8%
East Renfrewshire	0%	0%	1%	10%	1%	0%	80%	3%	1%	0%	0%	0%	2%
Renfrewshire	3%	6%	0%	1%	12%	7%	65%	2%	1%	0%	1%	1%	2%
Inverclyde	1%	1%	0%	0%	19%	17%	56%	1%	1%	0%	0%	1%	3%
Glasgow City	2%	3%	1%	4%	6%	2%	39%	10%	9%	1%	5%	4%	15%
South Lanarkshire	0%	0%	0%	1%	1%	0%	80%	7%	4%	0%	1%	1%	3%
North Lanarkshire	0%	0%	0%	0%	1%	0%	72%	4%	7%	0%	1%	1%	14%
Argyll & Bute (Helensbur	0%	0%	0%	0%	1%	0%	68%	1%	2%	3%	1%	16%	8%
East Dunbartonshire	0%	0%	0%	0%	1%	0%	83%	2%	1%	0%	3%	2%	7%
West Dunbartonshire	0%	0%	0%	0%	1%	0%	64%	2%	2%	3%	2%	22%	3%
External	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	99%

6.3 Park and Ride

6.3.1 SPT undertook surveys at Park and Ride sites in 2011, 2013, 2014 and 2015 which identified which station passengers were travelling to. This data was assigned to Areas to allow analysis of the destinations to be undertaken. Figure 6.1 shows that over three quarters of Park and Ride Movements were destined for Glasgow City Centre with Edinburgh being the next most popular destination.

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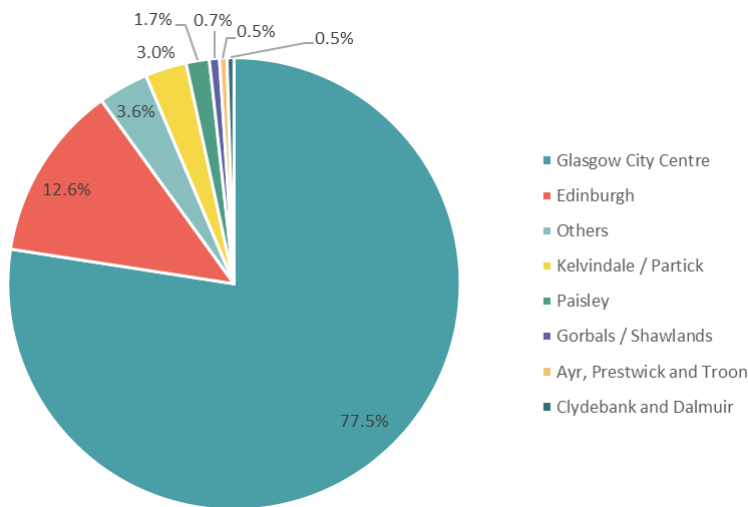
Figure 6.1 Park and Ride Destinations

6.3.2   In Figure 6.2 and Figure 6.3 the origins of the Park and Ride Movements to Glasgow City Centre and Edinburgh are shown. In both instances it can be seen that this is distributed around the SPT area with Cumbernauld and Moodiesburn accounting for the highest proportion of Movements which is largely attributable to Croy station. Movements to Edinburgh are highest from locations in the east of the SPT area whilst Movements to Glasgow are more widespread.

6.3.3   However, it's important to note that the data collected by SPT does not represent a comprehensive sample and is influenced by the locations where the survey was undertaken. It therefore provides indicative data on the Movements undertaken by Park and Ride only.
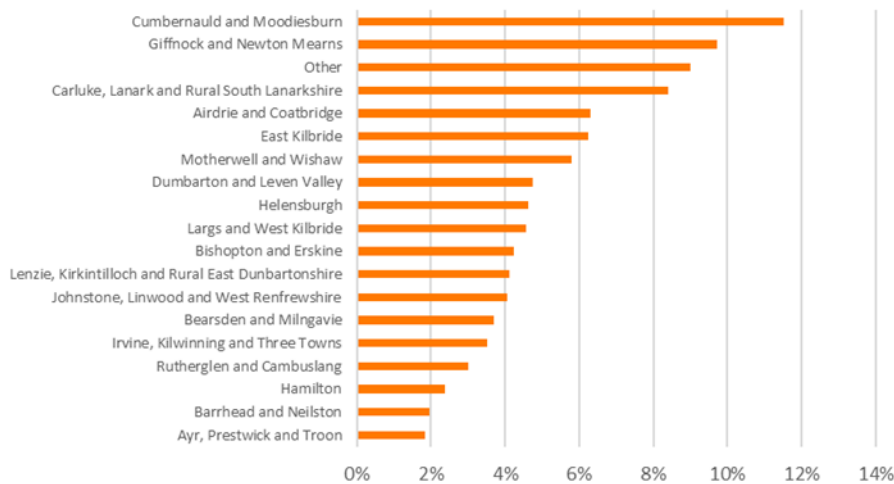
Figure 6.2 Origins of Park and Ride Movements to Glasgow City Centre

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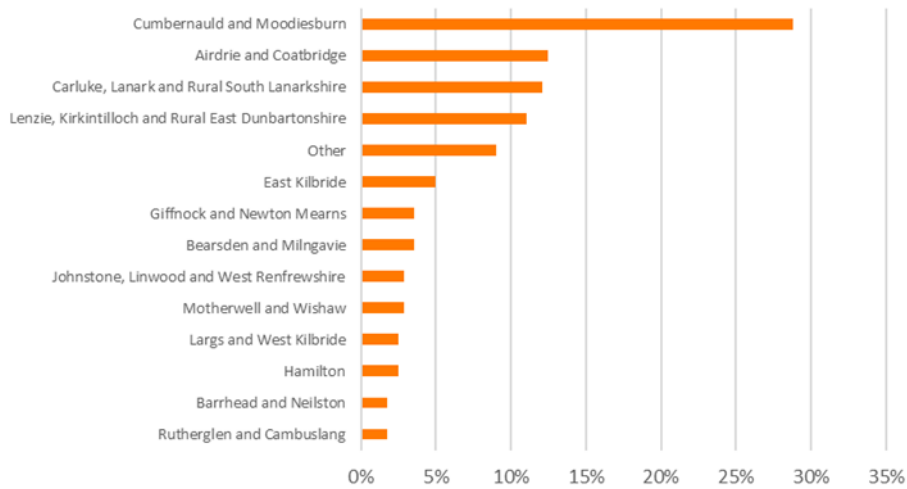
Figure 6.3 Origins of Park and Ride Movements to Edinburgh

6.4   Subway

6.4.1   SPT data of passenger origins and destinations for Subway passengers was provided for 2017. Figure 6.4 shows the destinations of Subway passengers with the majority travelling to Glasgow City Centre, Kelvindale / Partick or Ibrox / Cardonald. Together these account for over three quarters (77.9%) of passenger destinations.
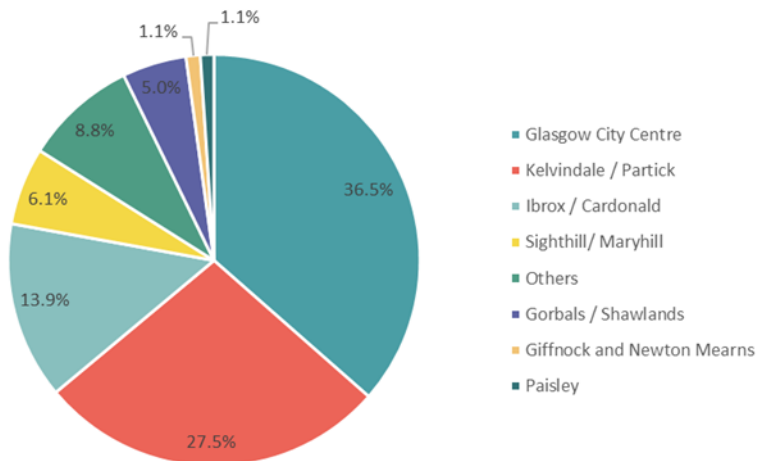
Figure 6.4 Destinations of Subway Passengers 2017

6.4.2   Each of these destinations were considered in turn to examine the origins of these journeys. Figure 6.5 shows that journeys to Glasgow City Centre primarily originate from three locations which are Kelvindale / Partick, Ibrox / Cardonald and Sighthill / Maryhill.

6.4.3   It can be seen from Figure 6.6 that Glasgow City Centre is overwhelming the primary origin for Subway journeys to Kelvindale / Partick. This is to be expected given most journeys will likely be return trips.

6.4.4   This highlights that the Subway predominantly serves local trips around Glasgow which is to be expected given the coverage of the network.

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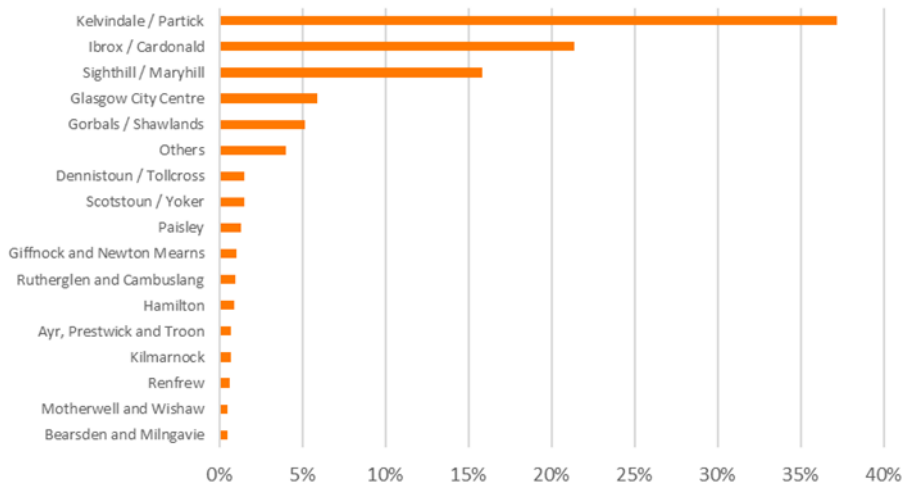
Figure 6.5 Origins of Subway Journeys to Glasgow City Centre
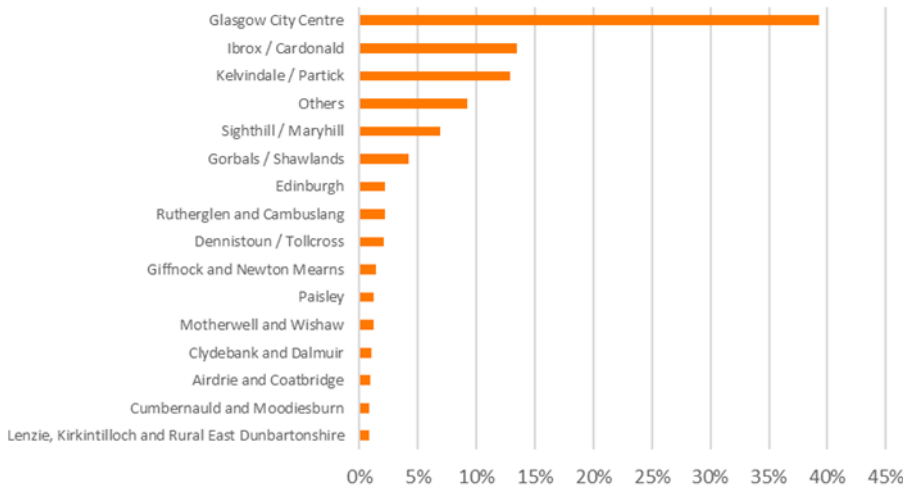
Figure 6.6 Origins of Subway Journeys to Kelvindale / Partick

6.5   Summary

6.5.1   This analysis confirmed the findings set out in Chapters 4 and 5. In particular, it highlights that Glasgow City Centre is a key focal point for rail-based travel and that the Subway primarily serves trips between Glasgow City Centre and the West End.

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7 Network

7.1 Introduction

7.1.1 The previous chapters have examined the socio-economic and transport characteristics of the SPT area as well as the travel demands that exist within, to and from the region. In this chapter we explore in more detail how this manifests itself in terms of the demand for and performance of the transport network and services across Strathclyde.

7.1.2 Analysis has been broken down primarily by mode of transport and examines performance of:

- Strategic Road Network;

- Rail;

- Bus;

- Subway;

- Air;

- Ferry;

- Freight; and

- Cycling.

7.1.3 It is also acknowledged that walking is an important mode of transport for residents and visitors to the SPT area. However, there is little information or evidence available relating to the use of walking networks. As such, this topic is primarily covered through the stakeholder and public consultation work being undertaken alongside the Baseline Analysis.

7.1.4 Furthermore, it should be noted that directly comparable data is not available across modes but we have consequently sought to use the most up to date and relevant data available.

7.2 Strategic Road Network

Traffic Flows

7.2.1 To examine the change in traffic flows data was requested from Transport Scotland for National Traffic Database Sites (NTDS) within the SPT area covering the period from 2008 to 2018. This dataset was then filtered to remove any counts that were obviously on slip roads or ramps. Following this, remaining sites were identified which had data available for the neutral month of May or September in both 2008 and 2018. Any sites which did not contain comparable data for these years were also filtered out.

7.2.2 Through undertaking this exercise it was identified that there was a gap on the M74 Completion in the south of Glasgow as well as upon the M80. Both these roads were constructed in 2011 and we consequently sought neutral month data for this year to enable a comparison with 2018 to be undertaken.

7.2.3 The change in Average Daily Flow (ADF) at each count site between the base year and 2018 was then examined. The observed changes in Greater Glasgow are shown in Figure 7.32 whilst Figure 7.33 shows the changes across Strathclyde. It should be noted that the data contains a combination of one-way and two-way sites. This approach was used to ensure as

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comprehensive a dataset as possible and as we are only examining the overall change in flows, the directionality of flow is not of direct relevance.

7.2.4   Across Greater Glasgow demand can be seen to have generally increased on the M8 west of the junction with the M74, on the M77, M74 extension and upon the M80. On the M8 east of Junction 20 traffic can generally be seen to have decreased. This can largely be attributed to rerouting from M8 to the M74 Completion.
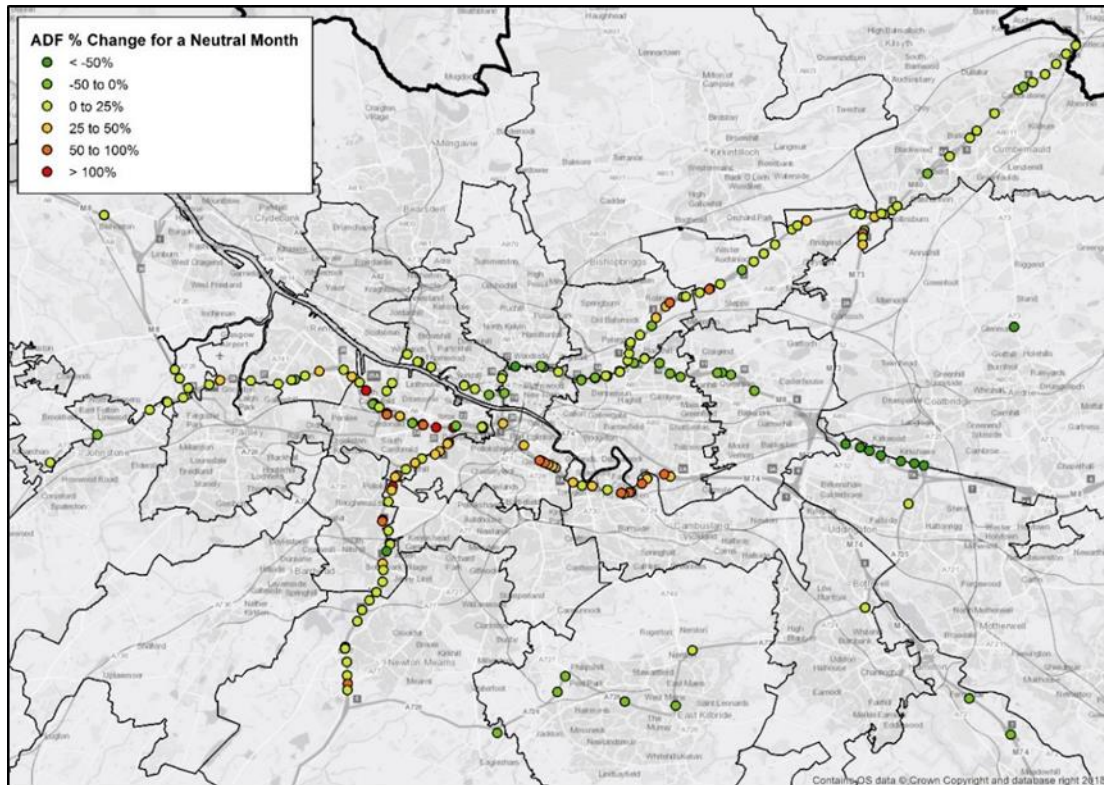
Figure 7.1 Change in Average Daily Flow at NTDS Sites in Greater Glasgow 2008 / 2011 – 2018

7.2.5   Across Strathclyde and outwith Greater Glasgow the trend is mainly of small growth in traffic flows on the Strategic Road Network. This is consistent with wider traffic trends across Scotland set out in Table 7.1 which have shown the majority of traffic growth has occurred on Motorways with demand on both Trunk and Non-Trunk A roads remaining broadly stable.

7.2.6   These trends can be partially attributed to a growth in the total length of Motorway in Scotland, contributed to by the M74 and M80 projects mentioned above, whilst the length of both Trunk and Non-Trunk A roads has remained reasonably stable over the period.

Table 7.1 Change in Traffic on Major Roads in Scotland 2006 – 2016 (million vehicle kilometres)

	2006	2016	Change	% Change
Motorways	6,433	7,757	1,324	20.6%
Trunk A Roads	9,942	9,975	33	0.3%
Non-Trunk A Roads	12,523	12,821	298	2.4%
All Major Roads	28,898	30,553	1,655	5.7%

Source: Scottish Transport Statistics No. 36, 2017

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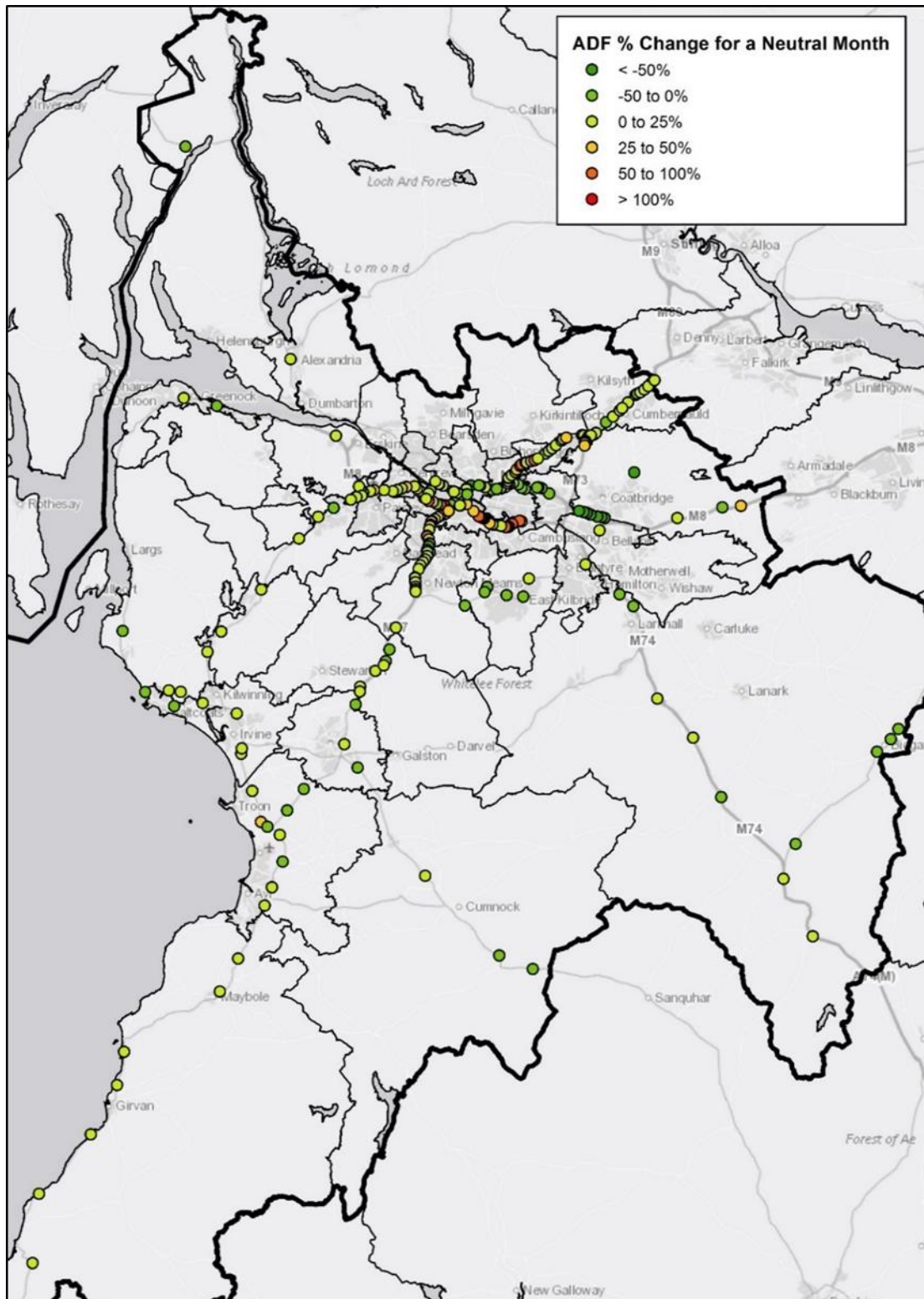
Figure 7.2 Change in Average Daily Flow at NTDS Sites in Strathclyde 2008 / 2011 – 2018

7.2.7   Traffic flows were also assessed using Transport Model for Scotland (TMfS) for the 2014 base year and 2042 forecast year. This allows a comparison of how traffic flows are expected to change in the future to be undertaken. The analysis was undertaken for the AM peak and PM peak periods with all mapping attached as Appendix C. The findings for the AM peak are summarised here. Figure 7.38 shows that the highest traffic flows in Greater Glasgow are on

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the motorway network which is consistent with the analysis of observed traffic counts. Comparison with Figure 7.40, which shows forecasted traffic flows in Greater Glasgow, shows growth across the network. Traffic flows on motorways increase but the most notable changes are on the local road network where many local roads can be seen to increase in flow. However, it should be noted that the modelled road network excludes many minor local roads which would potentially share the traffic growth reducing the impact on individual roads.
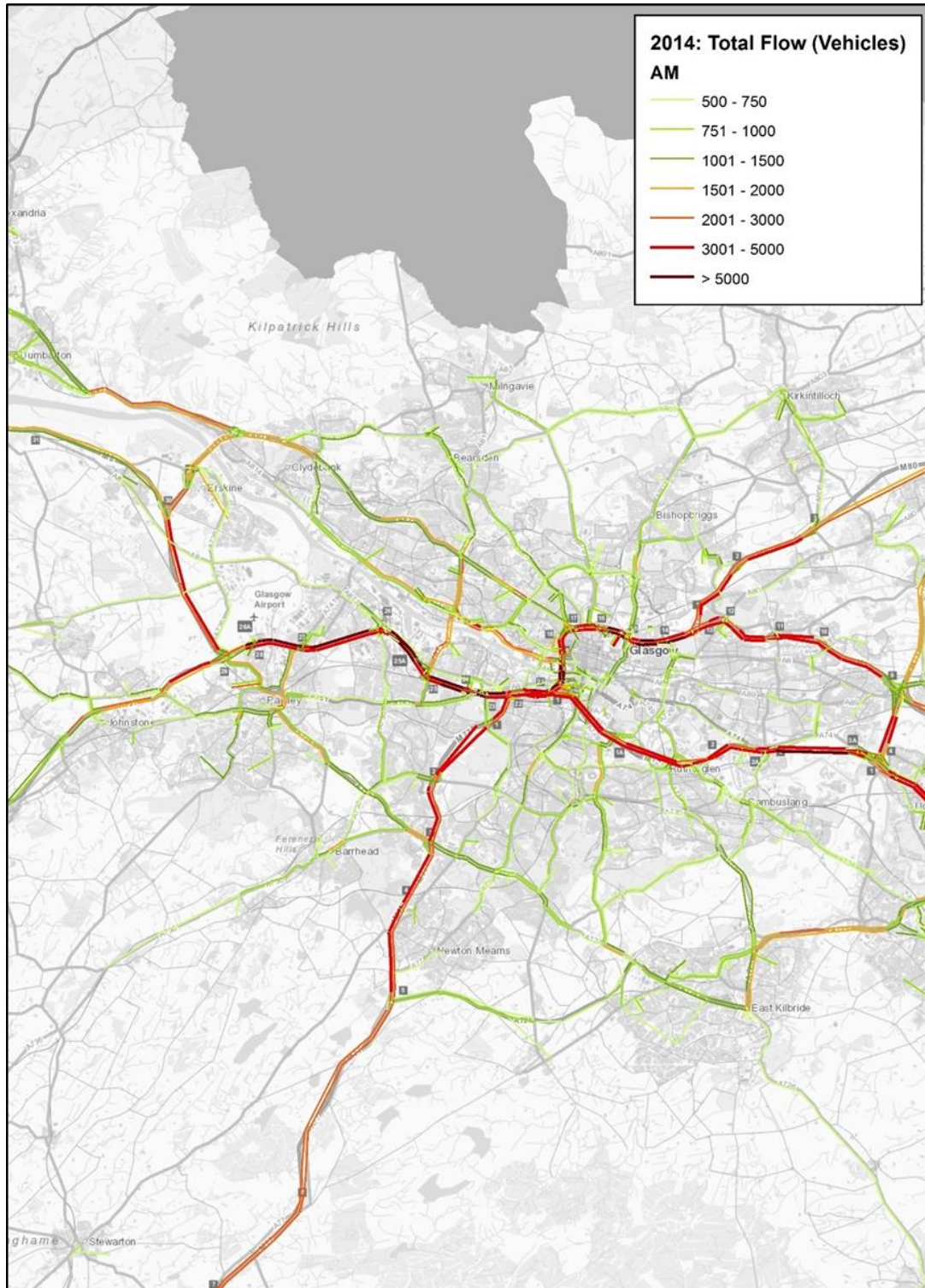
Figure 7.3 TMfS Total Flow in Greater Glasgow 2014 AM Peak

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2042 Core: Total Flow (Vehicles)
AM

500 - 750	
751 - 1000	
1001 - 1500	
1501 - 2000	
2001 - 3000	
3001 - 5000	
> 5000	
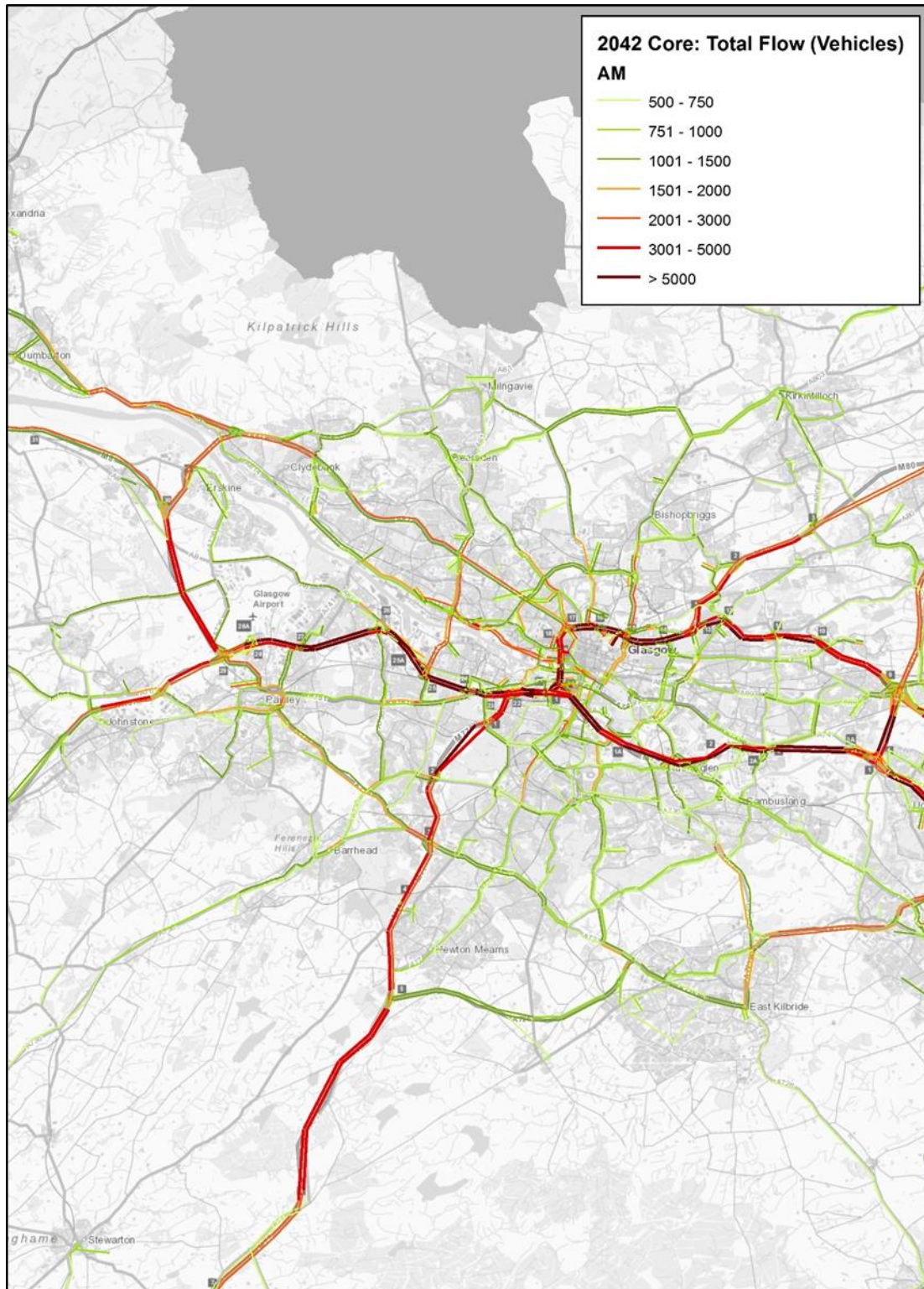
Figure 7.4 TMfS Total Flow in Greater Glasgow 2042 AM Peak

7.2.8   The modelled traffic flows on the network across Strathclyde in 2014 are shown in Figure 7.5. This shows the highest traffic flows around Greater Glasgow whilst there are also sizeable flows on the strategic road network in Ayrshire, Dunbartonshire, Inverclyde and Lanarkshire. Figure 7.6 shows forecasted flow in 2042 which again shows most noticeable growth across the local

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road network. However, the density of the modelled network will again influence the distribution of this demand.

Figure 7.5 TMfS Total Flow in Strathclyde 2014 AM Peak

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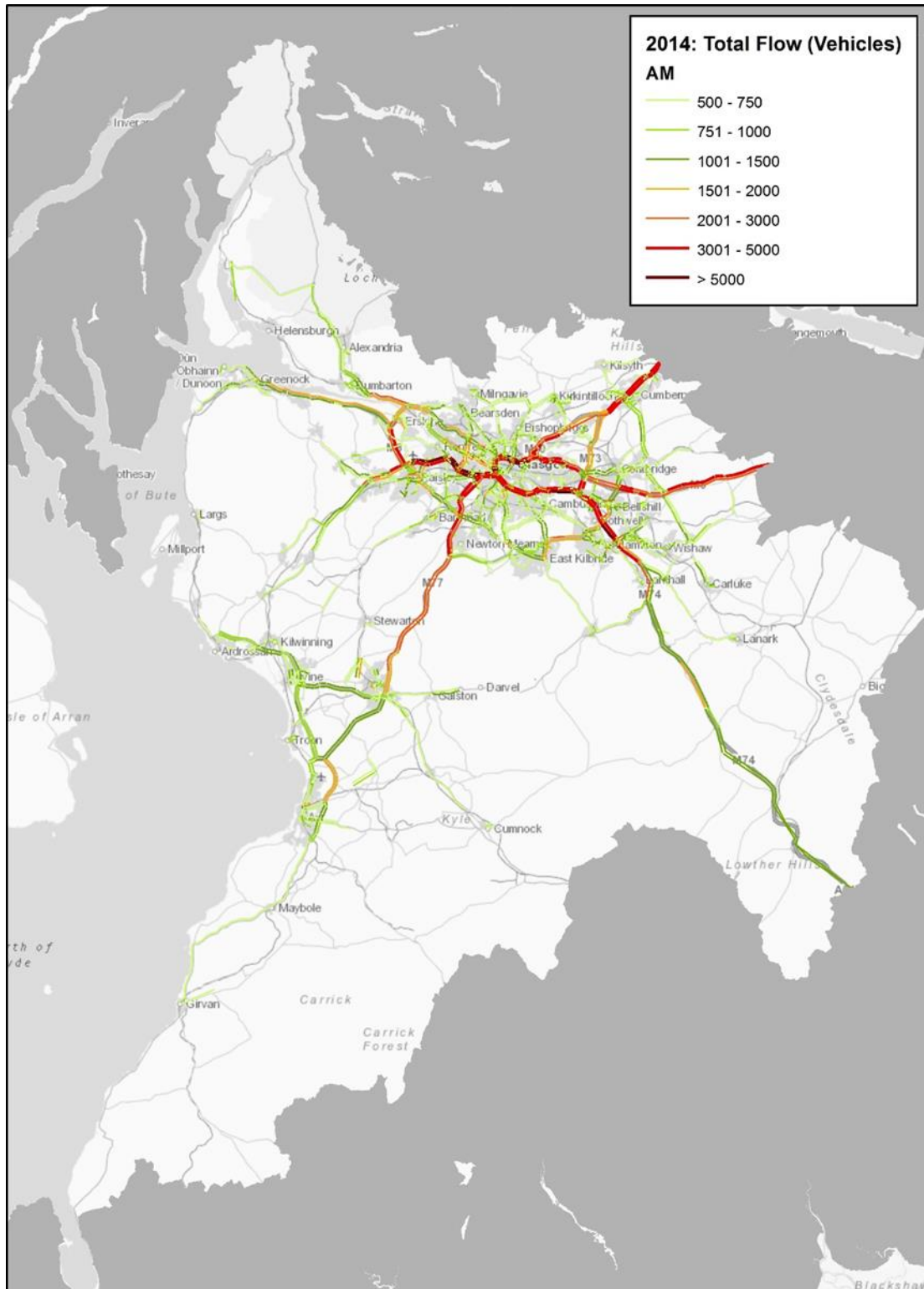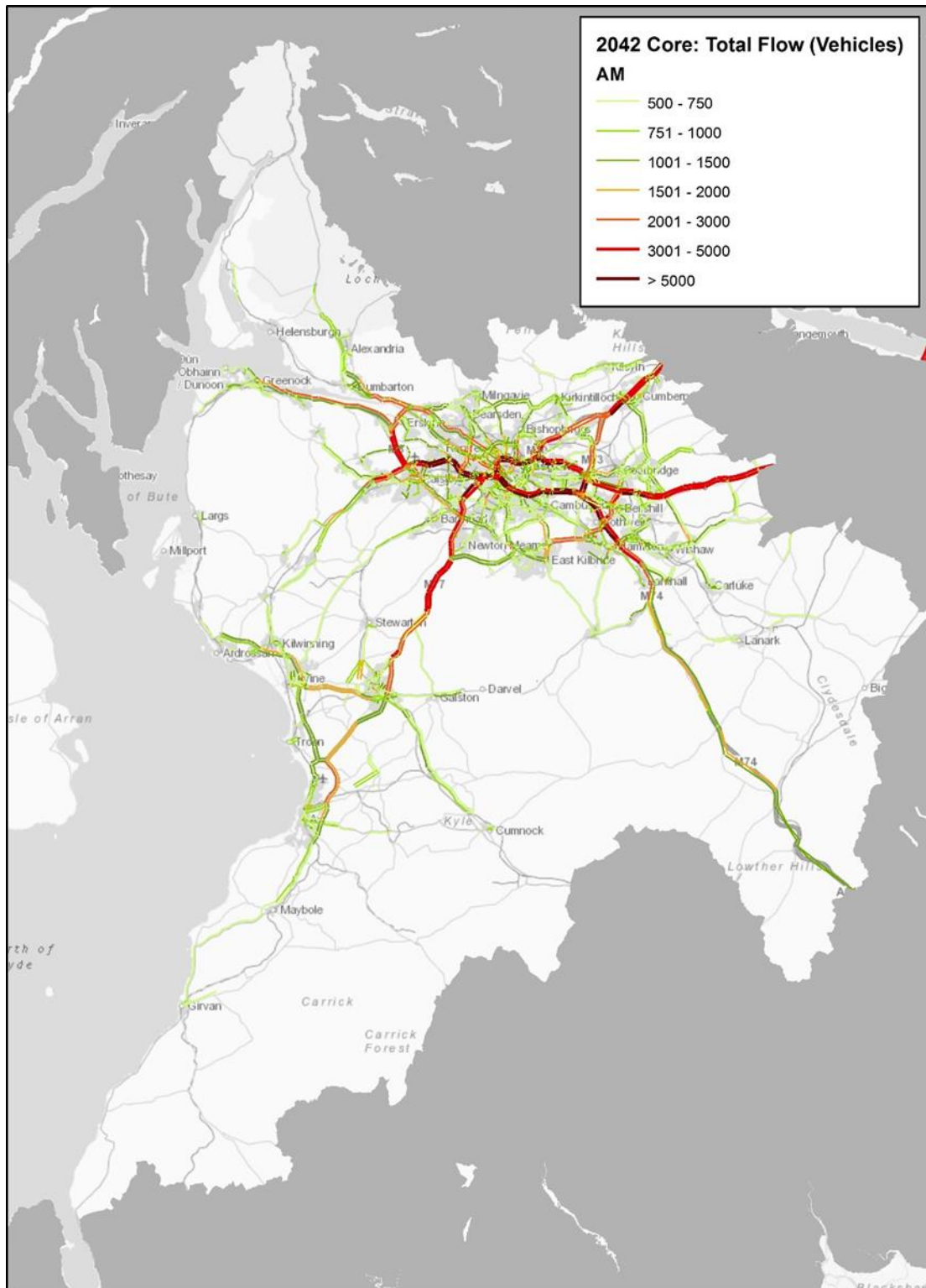
Figure 7.6 TMfS Total Flow in Strathclyde 2042 AM Peak

Volume Over Capacity

7.2.9   To understand the impacts this demand has upon the performance of the road network analysis of the TMfS volume over capacity was undertaken. This was again carried out for the 2014 base year and 2042 forecast year with full analysis of the AM peak and PM peak periods attached as

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Appendix D. The findings for the AM peak are summarised here. Figure 7.43 shows a small number of links in localised areas that are over practical capacity (>0.85). However, comparison with Figure 7.44 shows that the network is expected to be under significantly more pressure in 2042.
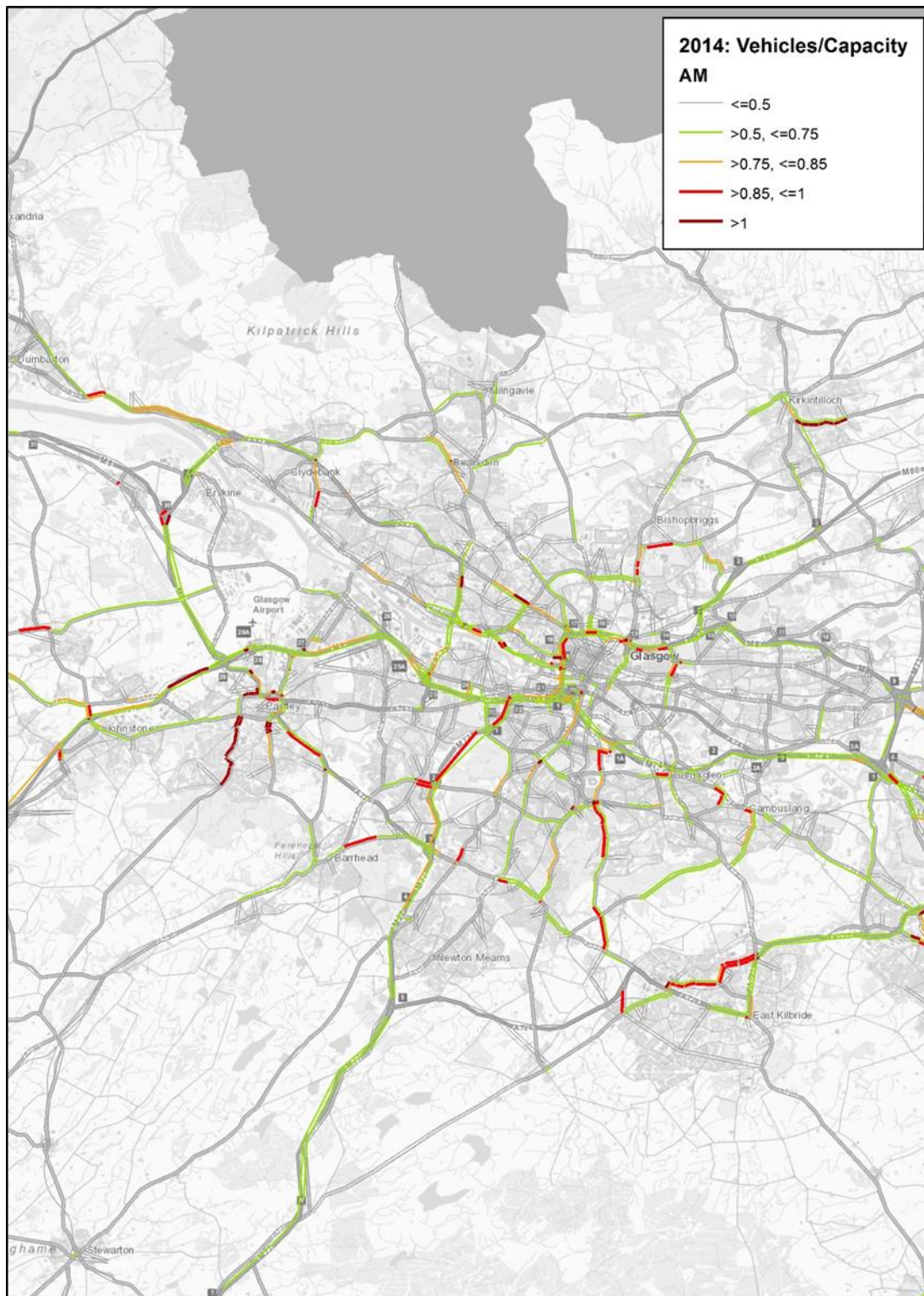
Figure 7.7 TMfS Volume Over Capacity in Greater Glasgow 2014 AM Peak

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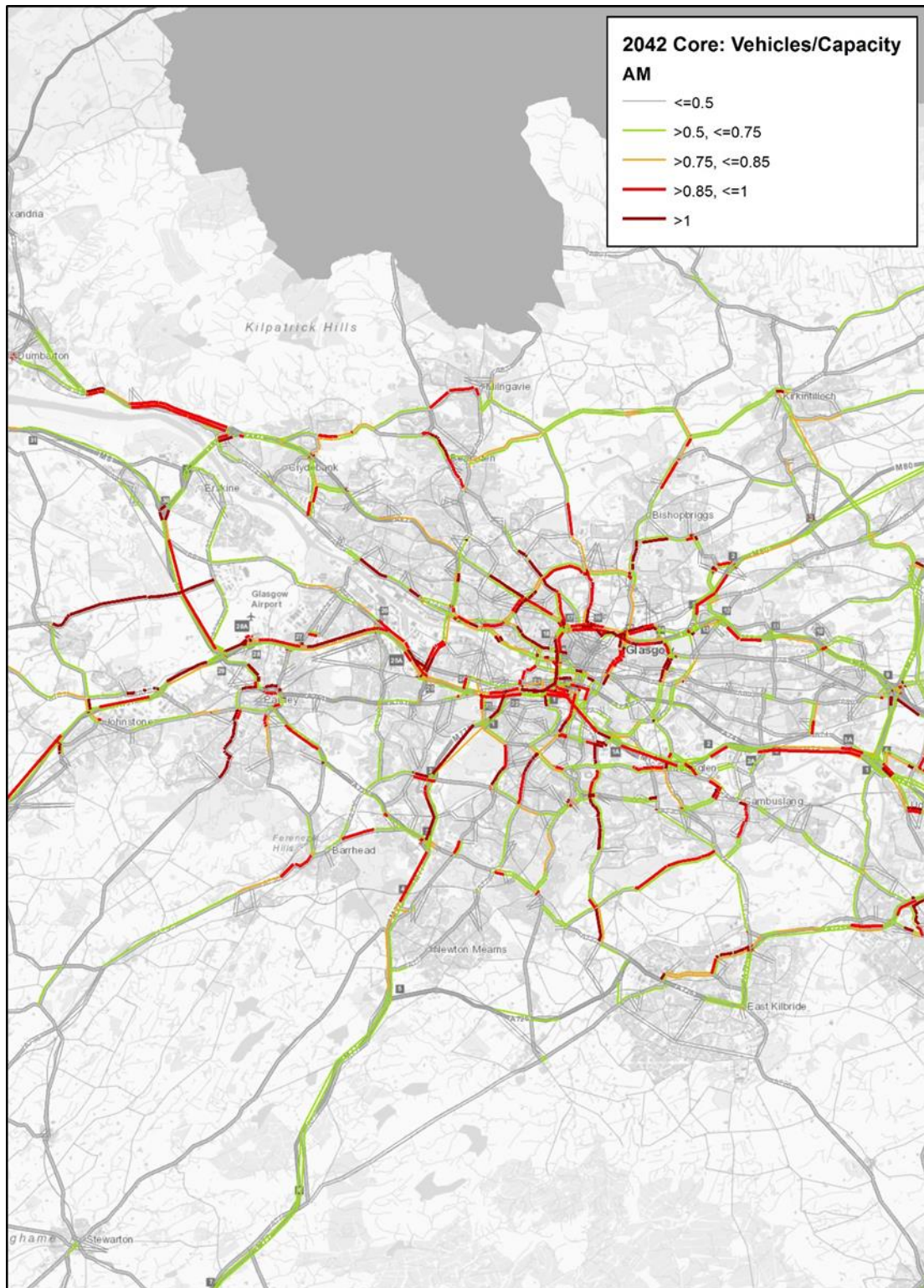
Figure 7.8 TMfS Volume Over Capacity in Greater Glasgow 2042 AM Peak

7.2.10   The analysis for Strathclyde shown in Figure 7.45 again suggests most locations where volume
exceeds practical capacity are across Greater Glasgow although out with this area there are
notable pockets in North Lanarkshire, South Lanarkshire and Renfrewshire. Comparison with
Figure 7.46 again highlights a significant increase in the extent of the network expected to be
operating over practical capacity.

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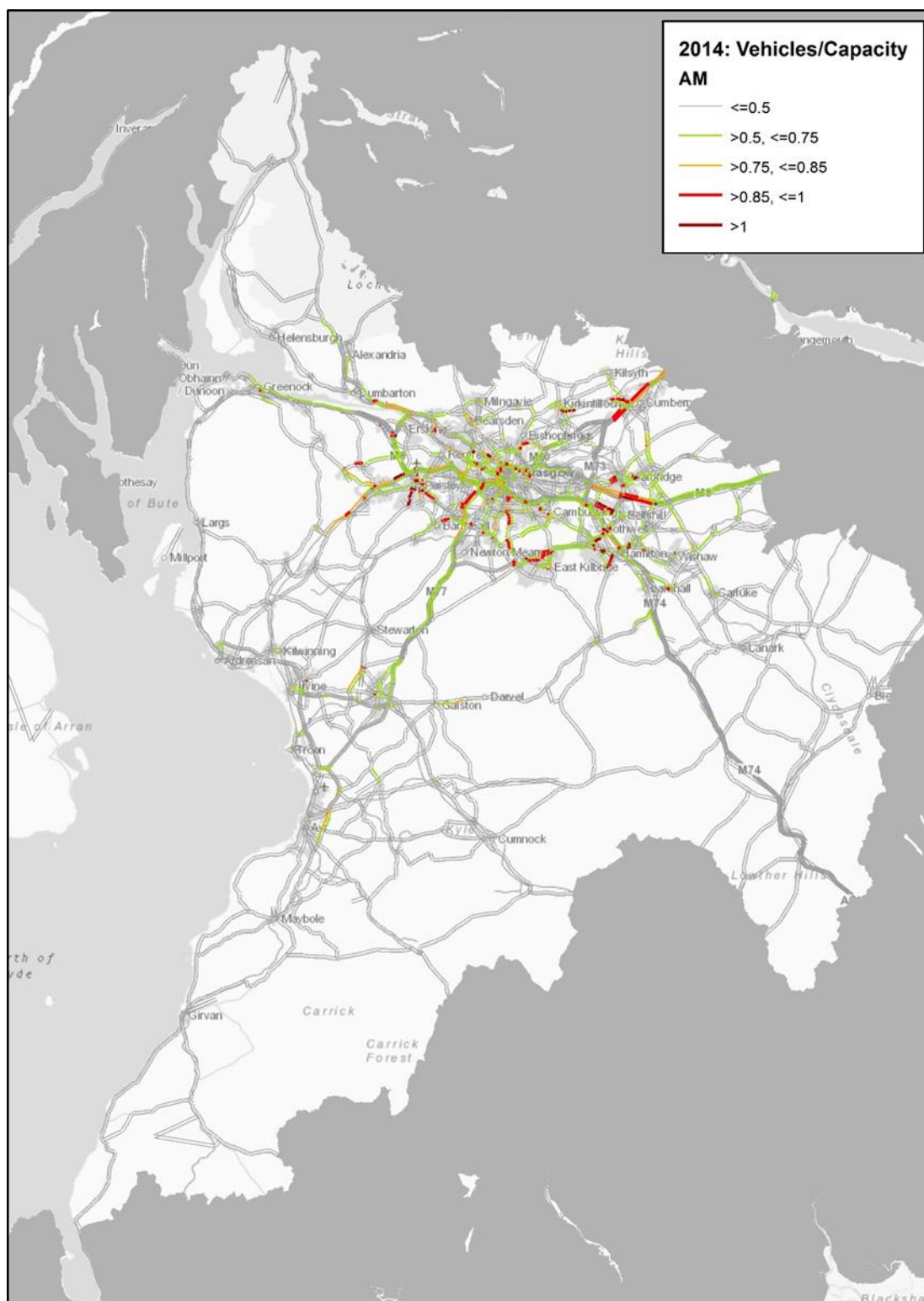
Figure 7.9 TMfS Volume Over Capacity in Strathclyde 2014 AM Peak

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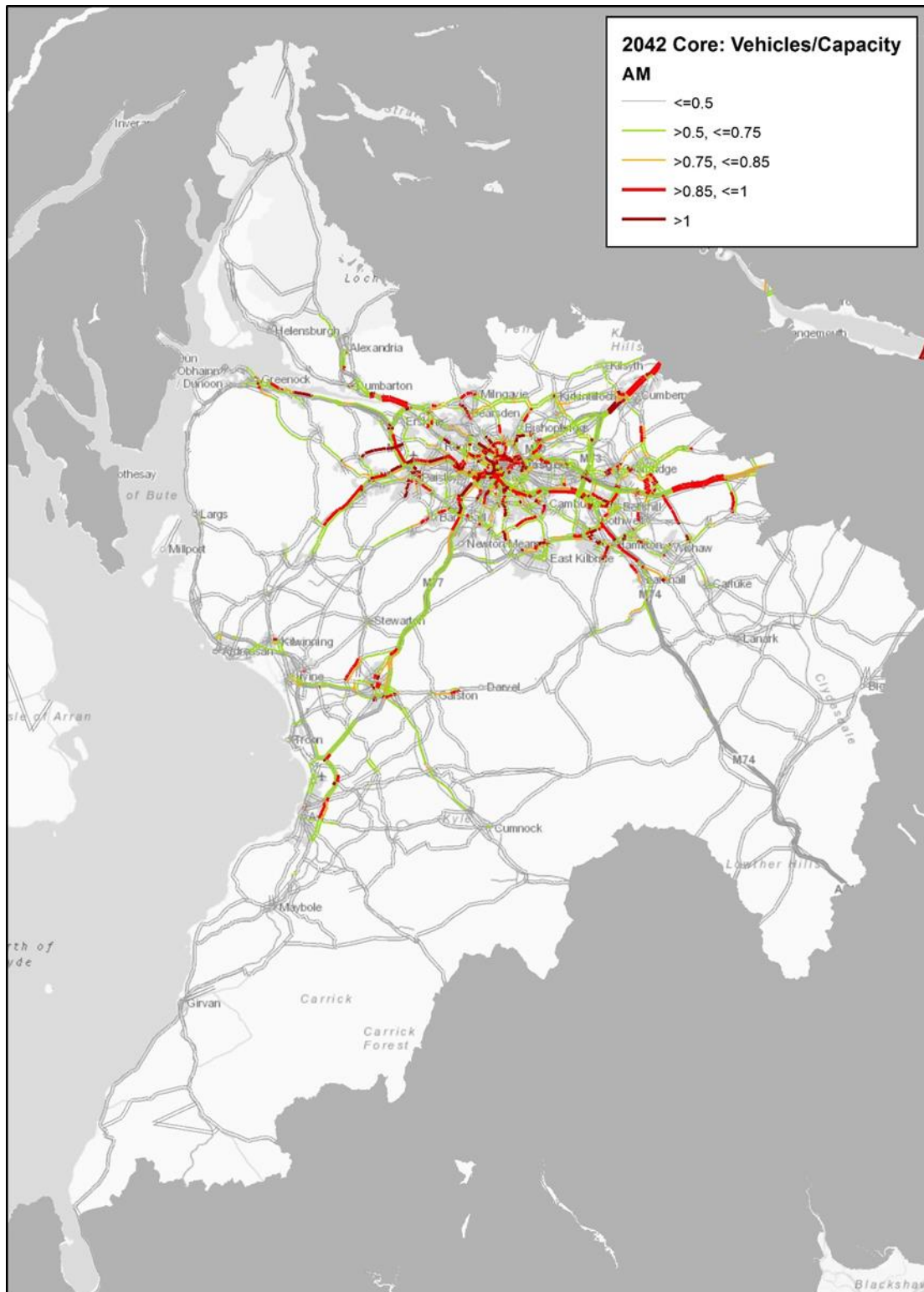
Figure 7.10 TMfS Volume Over Capacity in Strathclyde 2042 AM Peak

Average Speed

7.2.11   To further understand the current and predicted future performance of the road network analysis of journey times has been undertaken then converted to average speeds. This has been carried out using observed TomTom journey time data and modelled TMfS data which enables

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comparisons to be undertaken although it should be noted that these are not like for like comparisons due to variations in the networks used. The findings are therefore only indicative but provide an overview of likely congestion issues. For both the TomTom and TMfS data a comparison of the change in average speed between the AM peak and inter peak has been undertaken to understand where congestion on the road network leads to significant variations in average speed. Figure 7.47 shows analysis of the TomTom data for Greater Glasgow. This highlights that the biggest changes are observed on the motorway network, particularly the M77, M8 at Glasgow Airport and Alexandra, M80 and the M74.

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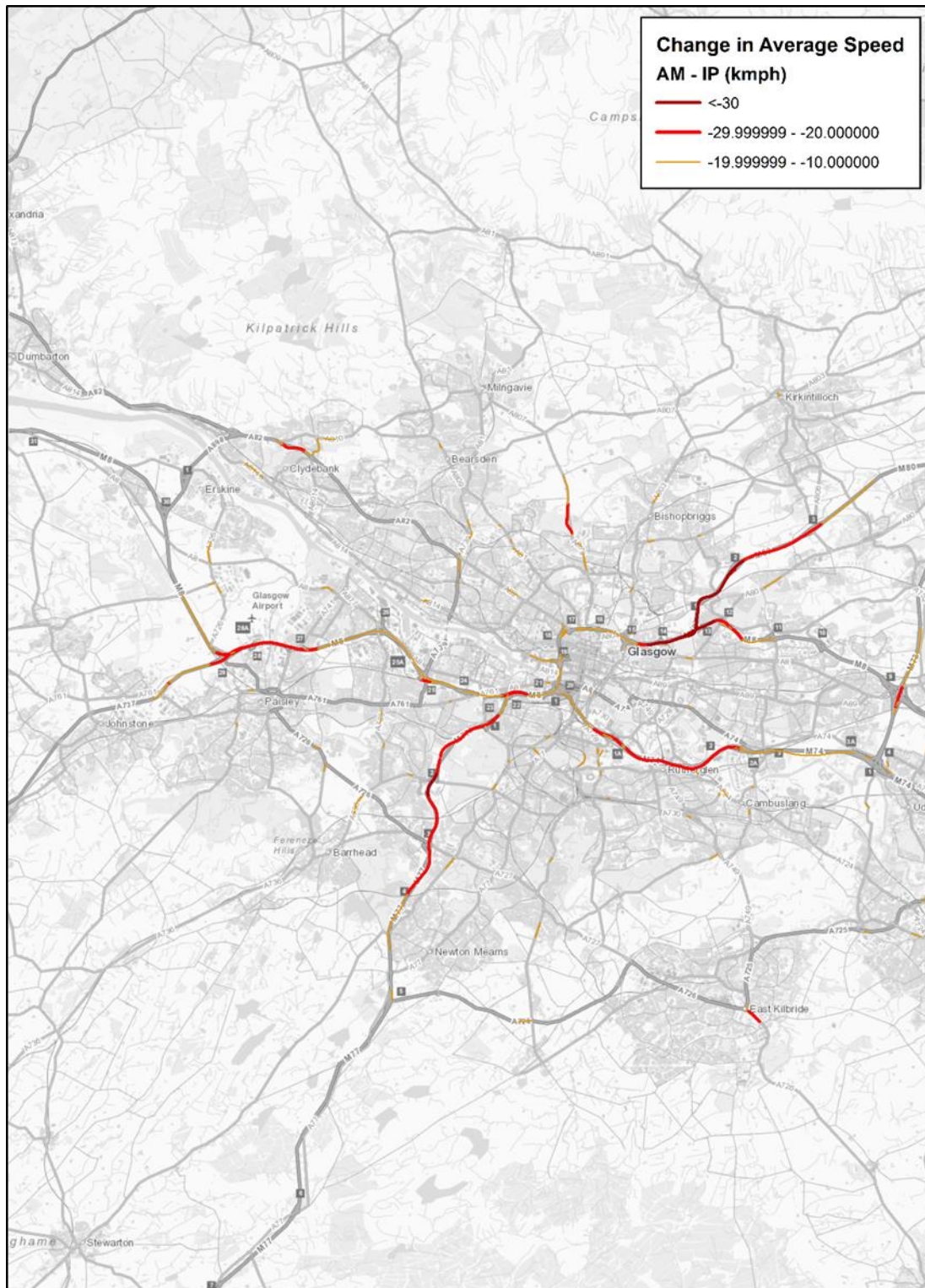
Figure 7.11 TomTom Change in Average Speed (AM Peak v Inter Peak) in Greater Glasgow 2014

7.2.12 Analysis of the TMfS data shown in Figure 7.48 suggests that model predicts congestion problems on the M8 west and east of Glasgow Airport and A737 which is more widespread than the observed data suggests. It also doesn't show the same magnitude of change on the M8 at Alexandra and M80 as the observed data whilst the problem on the M74 has shifted east. Both

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datasets are consistent with regards to the M77. Overall, the model suggests a more congested network than the observed data which needs to be considered in the context of future forecasts.
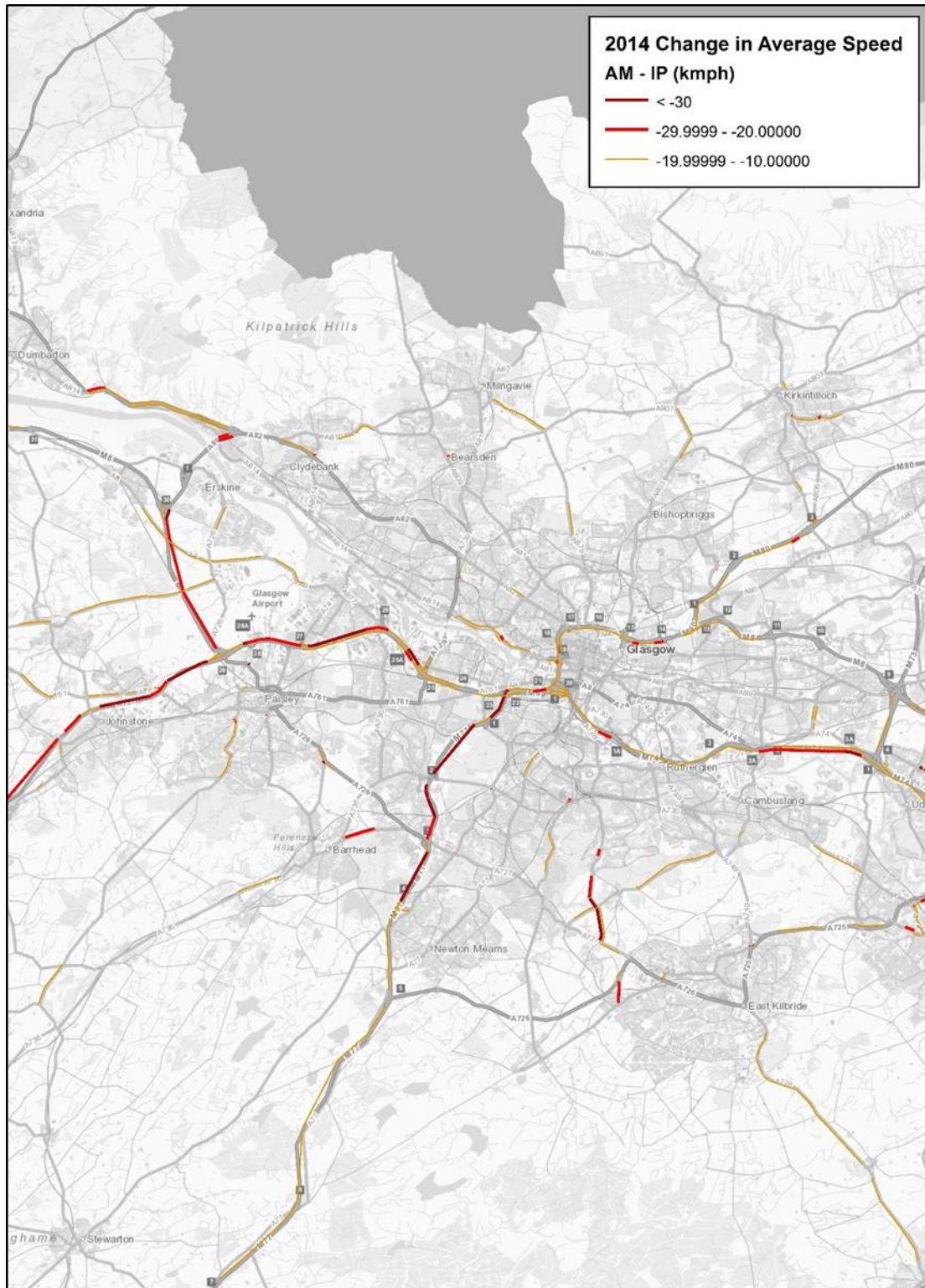
Figure 7.12 TMfS Change in Average Speed (AM Peak v Inter Peak) in Greater Glasgow 2014

7.2.13 The TMfS forecast change in average speeds for 2042 are shown in Figure 7.49. The routes identified as showing the greatest change in 2014 are still present in 2042 and, in most cases,

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the level of change is greater. The analysis suggests that there will be more congestion on the local road network which is consistent with the growth in traffic flows predicted by TMfS presented earlier in the chapter. Nonetheless, the greatest changes and anticipated congestion problems are still likely to be experienced on the motorway network.
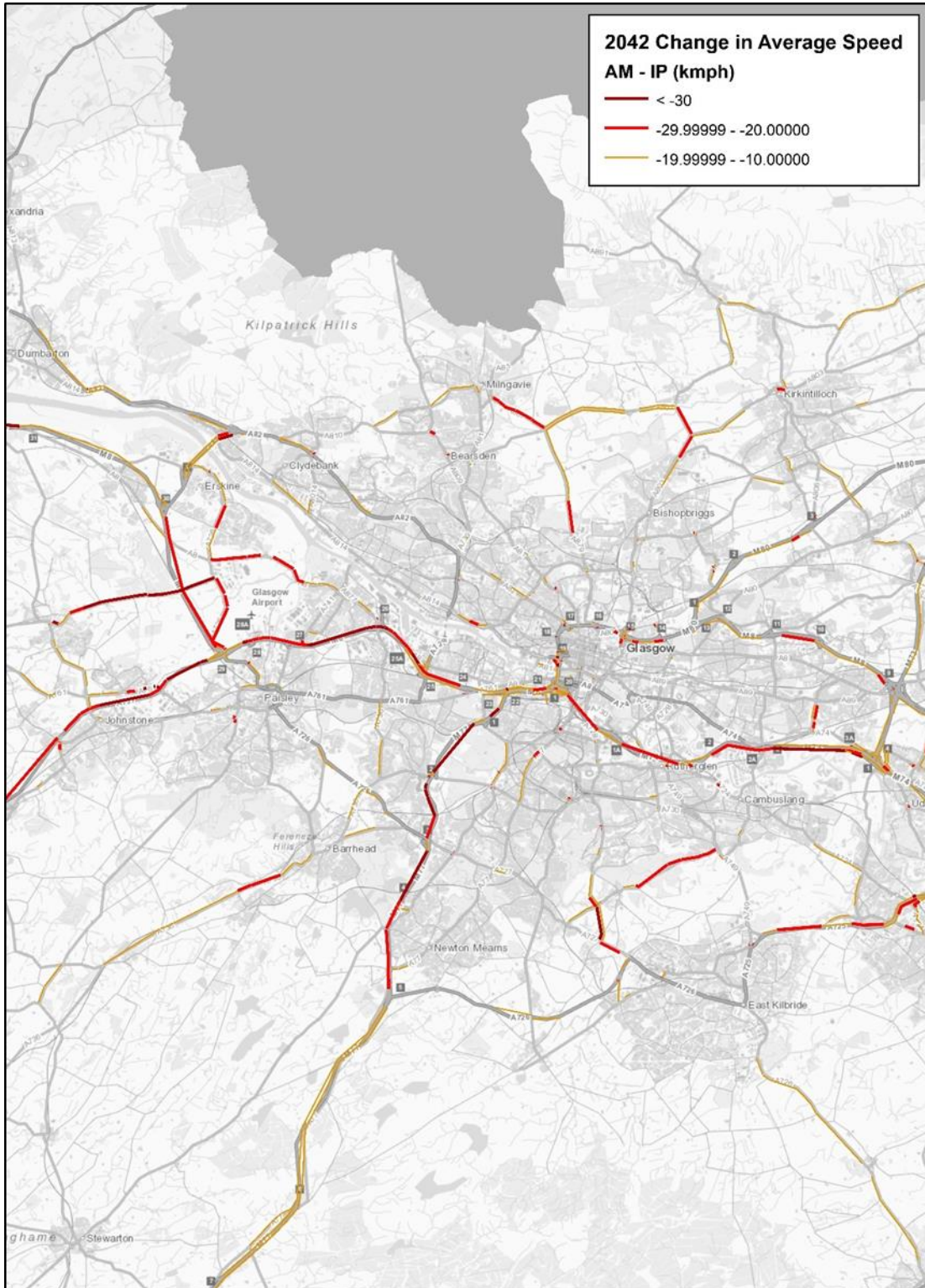
Figure 7.13 TMfS Change in Average Speed (AM Peak v Inter Peak) in Greater Glasgow 2042

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7.2.14   The change in average speed for the observed TomTom data across the whole of Strathclyde is shown in Figure 7.50. This shows nearly all the major changes in average speed impact upon the Greater Glasgow network suggesting this is the area which suffers from the greatest congestion.
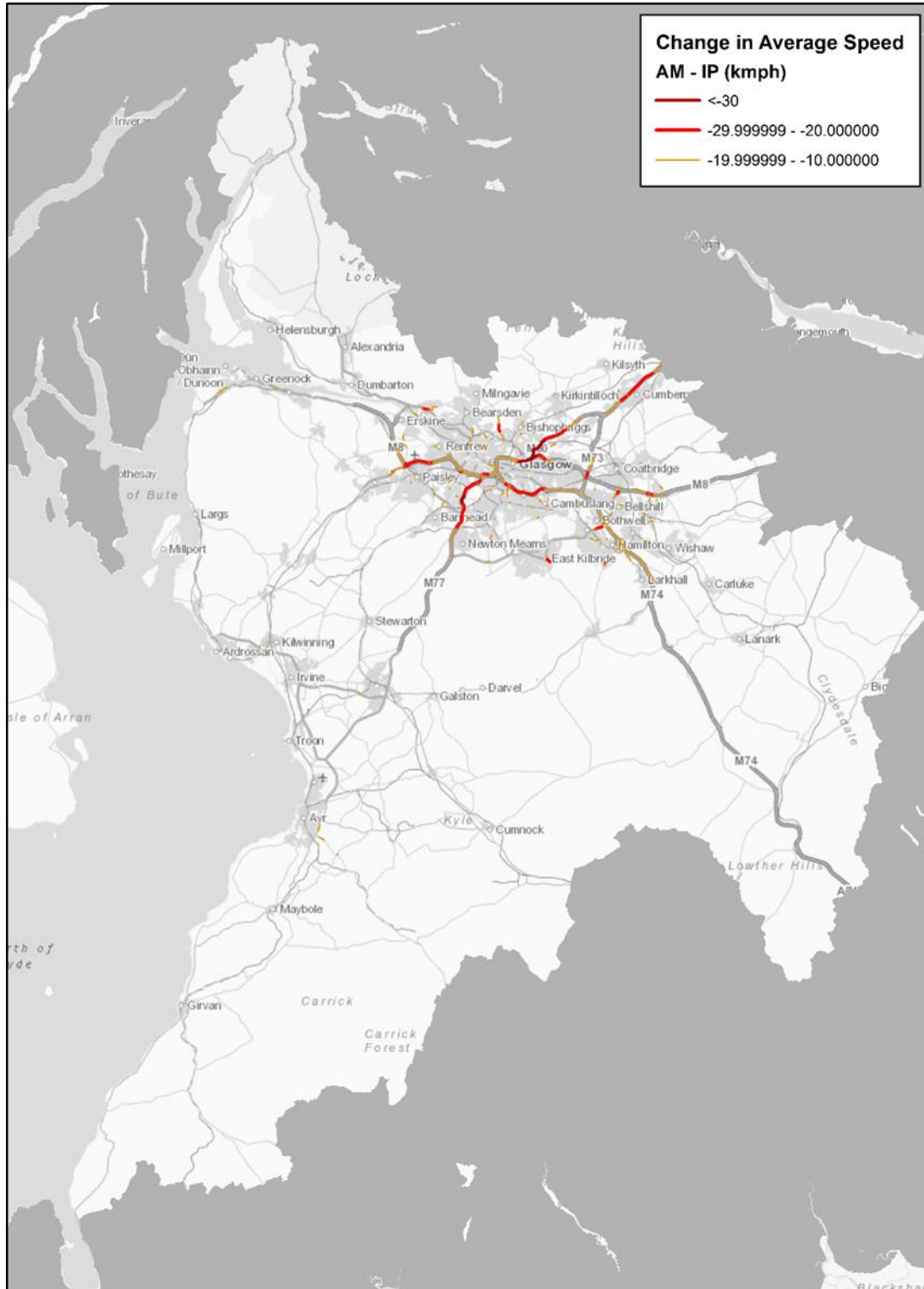
Figure 7.14 TomTom Change in Average Speed (AM Peak v Inter Peak) in Strathclyde 2014

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7.2.15 Analysis of the change in average speeds for the TMfS 2014 base year are illustrated in Figure 7.51. As with the analysis for Greater Glasgow this suggests more widespread congestion problems than the observed data. It is noticeable that length of affected route on roads like M80, M77 and A737, which show as suffering some potential congestion in the observed data, increases in the modelled data extending the impacts to a wider area. The largest variance can be seen on the M8 which demonstrated only limited changes in average speed in the TomTom data whilst these are extended further east and west in the modelled data. TMfS also suggests the M8 through Glasgow as experiencing less change in average speed than the observed data.

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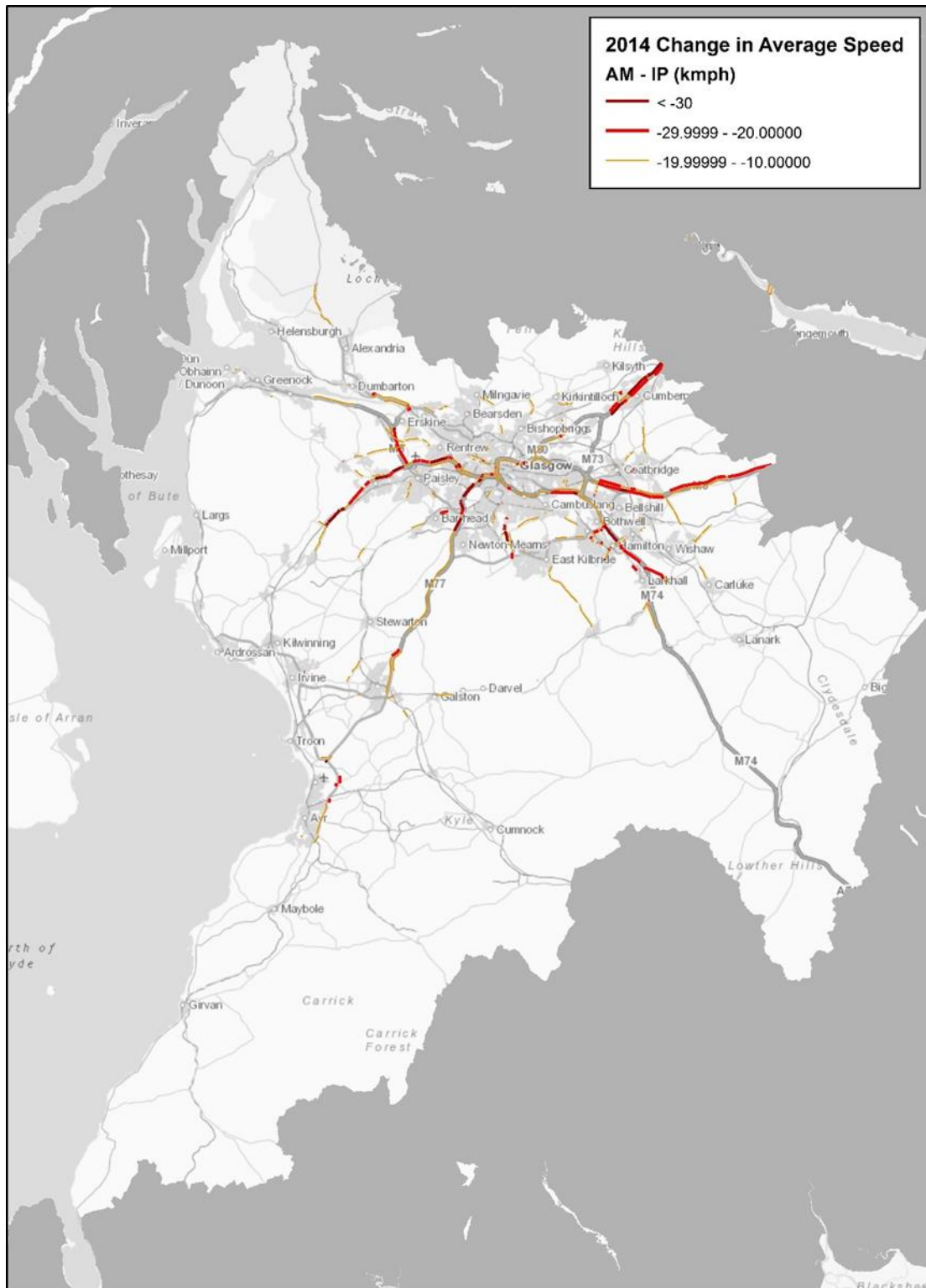
Figure 7.15 TMfS Change in Average Speed (AM Peak v Inter Peak) in Strathclyde 2014

7.2.16 The TMfS forecasted change in average speed for 2042 across the whole of Strathclyde is shown in Figure 7.52. This suggests that congestion problems could begin to impact more severely areas out with Greater Glasgow including Ayrshire, Renfrewshire, Inverclyde and, to a lesser extent, West Dunbartonshire. Impacts are again focussed on the strategic road network

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but with the local road network beginning to display signs of suffering from congestion as well which is in line with the forecasted traffic growth on these routes.
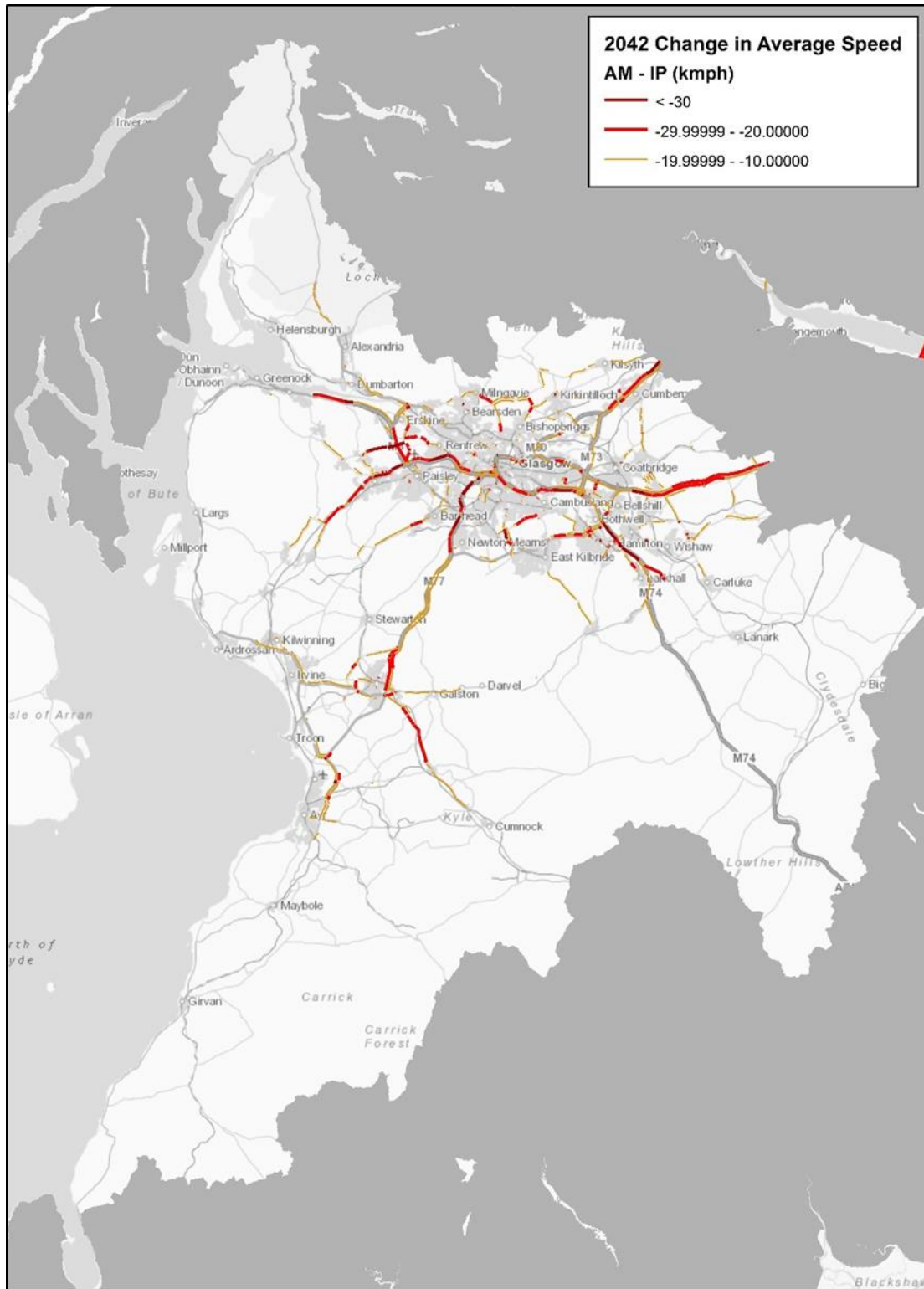
Figure 7.16 TMfS Change in Average Speed (AM Peak v Inter Peak) in Strathclyde 2042

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KEY ISSUES

Traffic growth on the strategic road network has been primarily focussed upon the motorway network with both the M74 Completion and M80 Upgrade contributing to this.

On both Trunk and Non-Trunk A roads traffic flows have remained broadly stable with some local instances of both increases and reductions in demand.

Modelling suggests that traffic flows on motorways will increase but the most notable growth will be on the local road network. However, it is important to note that flows may be more dispersed in reality as the modelled road network excludes many minor local roads.

The greatest traffic growth is forecasted to occur around Greater Glasgow.

Forecasting suggests much of the strategic and local road network across Greater Glasgow will be operating over practical capacity in 2042. It also suggest that capacity will be exceeded on the wider network across Strathclyde which was not evident in 2014.

Analysis of average speeds provides an indication of congestion problems but modelled data suggests more widespread issues than observed data. Based on the observed data most congestion occurs on the motorway network including M77, M8 at Glasgow Airport and Alexandra, M80 and M74. The greatest variance between modelled and observed data appears to be on the M8.

Modelling suggests more congestion on the local road network in the future which is consistent with the anticipated increase in flows. However, this needs to be considered in the context of the more widespread problems suggested in the base than demonstrated by the observed data.

7.3 Rail

Service Provision and Frequencies

7.3.1 There have been numerous changes made to rail service provision within the SPT area over recent years as part of the Principal timetable change which occurs in December and the Subsidiary timetable change which takes place in May. These are summarised below.

2014 Principal

Additional early morning return from Glasgow to Wemyss Bay.

2014 Subsidiary

Increase in the number of services on the West Highland Line.

Electrification of Cumbernauld. Falkirk Grahamston hourly service continues. Cumbernauld hourly removed and replaced with half-hourly low-level service.

Introduction of Edinburgh to Ayr through services.

Extension of Glasgow to Irvine services to Ayr.

Additional hourly off-peak Gourock express.

Motherwell to Cumbernauld some services linked to Argyle Line.

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2015 Principal

Electrification of Whifflet. Rewiring of Arygle Line and North Electric, including Whifflet services.

2015 Subsidiary

No significant change.

2016 Principal

Hourly service between Ayr and Girvan.

Two-hourly service between Girvan and Stranraer.

Two-hourly or better service between Ayr and Kilmarnock.

2016 Subsidiary

Late night trains to Lanark and Carstairs.

Changes to the Argyle Line, North Clyde and Airdrie-Bathgate.

2017 Principal

Strengthening Glasgow Central to Lanark peak services.

Dalmarnock and Bridgeton go from four to six trains per hour for most hours of the day.

2017 Subsidiary

Some Ayr to Kilmarnock services call additionally at Prestwick Town.

2018 Principal

Five additional return services between Dumfries and Carlisle.

Additional early morning service between Dumfries and Kilmarnock (to Glasgow).

Additional late-night service from Kilmarnock to Dumfries (from Glasgow).

Additional day time return from Kilmarnock to New Cumnock and return from Auchinleck (extension of Glasgow trains).

Reduction in the evening service level between Airdrie and Dalmuir after c.20:00 (to same level as start of franchise).

2018 Subsidiary

No significant change.

2019 Principal

Glasgow Queen St Low Level to Cumbernauld services terminate at Springburn.

Glasgow Queen St High Level to Falkirk Grahamston increased to half-hourly service. Until c.19:30, services continue from Falkirk Grahamston to Edinburgh calling at all stations.

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Some services between Glasgow, Stirling and Alloa have been accelerated by a few minutes. More capacity on the corridor.

Peak strengthening on North Electrics and Glasgow South Suburban.

2019 Subsidiary

More capacity between Edinburgh, Glasgow and Stirling with more new trains.

Journey time improvements between Edinburgh, Glasgow and Stirling.

Peak strengthening between Glasgow and Barrhead.

Peak strengthening between Glasgow and East Kilbride.

Peak strengthening on North Electrics, Argyle Line, Glasgow South Suburban.

A small number of additional peak services between Glasgow and Stirling.

Services between Glasgow Central and Edinburgh via Shotts operated by EMUs to give more capacity. Breich to get an hourly service all day.

7.3.2   Train service frequencies are an important factor in determining the attractiveness of rail to potential passengers particularly if the frequency is less than what could be considered a 'turn up and go' level. Based upon prior experience this would typically tend to be a frequency of 4 services per hour or greater ensuring a maximum waiting time of 15 minutes.

7.3.3   To understand the extent to which this may be an issue in the SPT area we undertook analysis of the service frequencies at each station drawing upon data from SRTM. Figure 7.53 and Figure 7.54 show trains per hour in the AM peak period where it can be seen that many stations have a service frequency of four trains an hour or greater. The highest service frequencies are within the Greater Glasgow area particularly in the north-western part of the city. Stations in more peripheral and rural locations tend to have lower service frequencies which is apparent on the coast of North Ayrshire and Inverclyde as well as rural South Ayrshire, East Ayrshire, Lanarkshire and Argyll and Bute.

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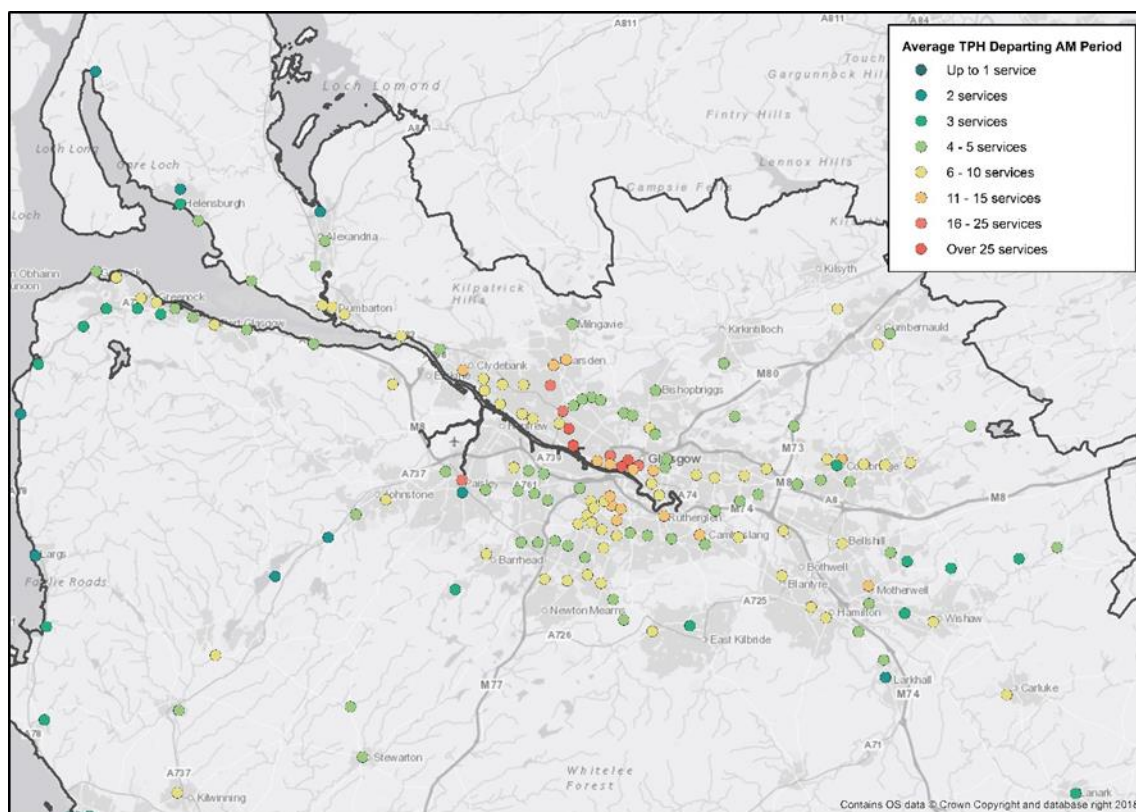
Figure 7.17 Average Trains per Hour Departing AM Peak Period – Glasgow Area

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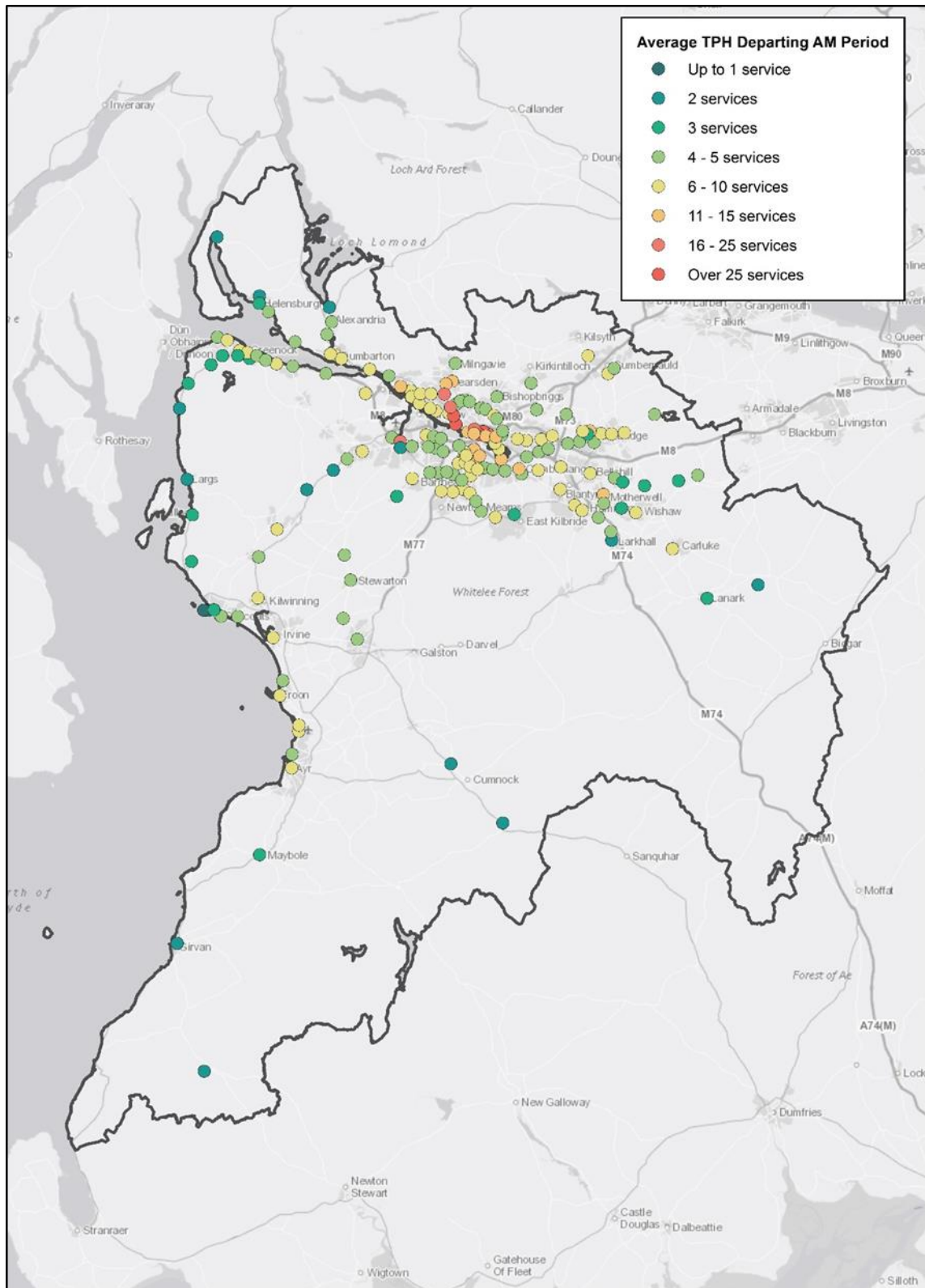
Figure 7.18 Average Trains per Hour Departing AM Peak Period – SPT Area

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7.3.4   Service frequencies in the inter peak period are shown in Figure 7.55 and Figure 7.56. The most obvious trend is a reduction in service frequency with more stations having a service frequency of less than four trains per hour.

7.3.5   The stations with the lowest service frequencies in the AM peak have the same level of service in the inter peak suggesting they are served by what is deemed the minimum desirable service frequency. However, many more stations in Ayrshire and, to a lesser extent, Lanarkshire are reduced to 3 services per hour or less in the inter peak period although this issue is less evident in Inverclyde and Argyll and Bute. Service frequencies also drop in the southern part of Greater Glasgow although they are typically maintained at a minimum of a 15-minute headway.
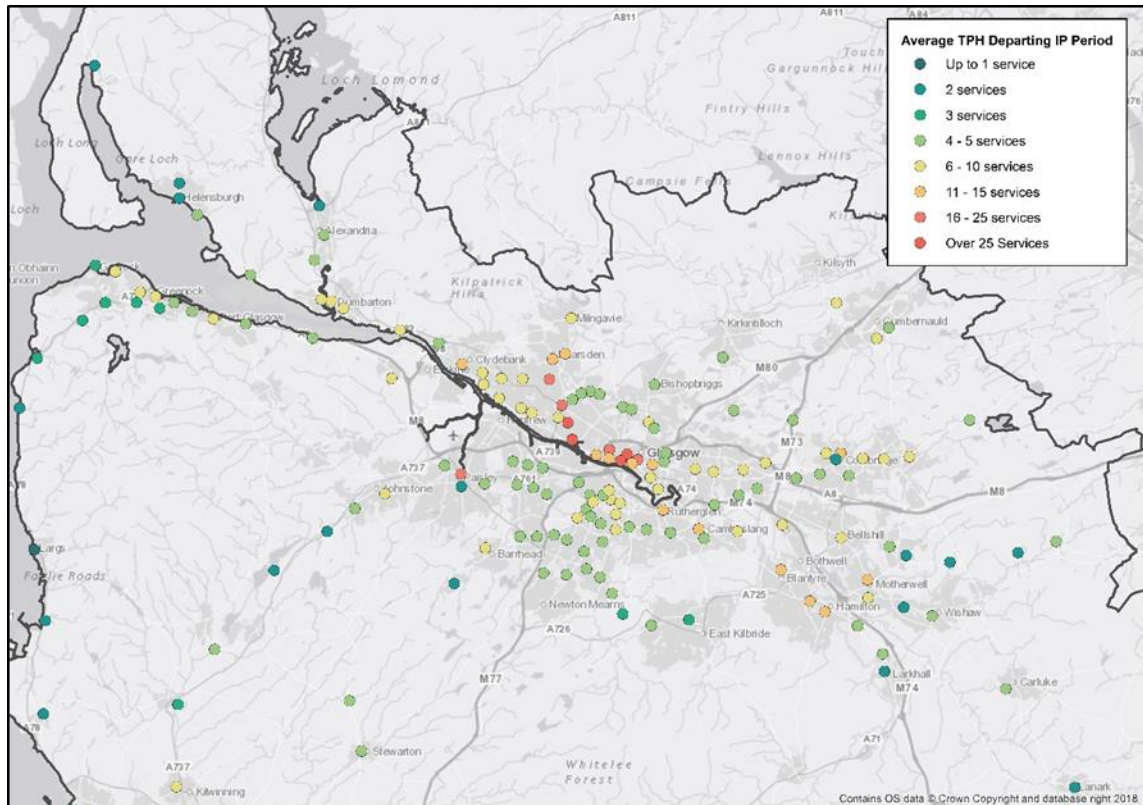
Figure 7.19 Average Trains per Hour Departing Inter Peak Period – Glasgow Area

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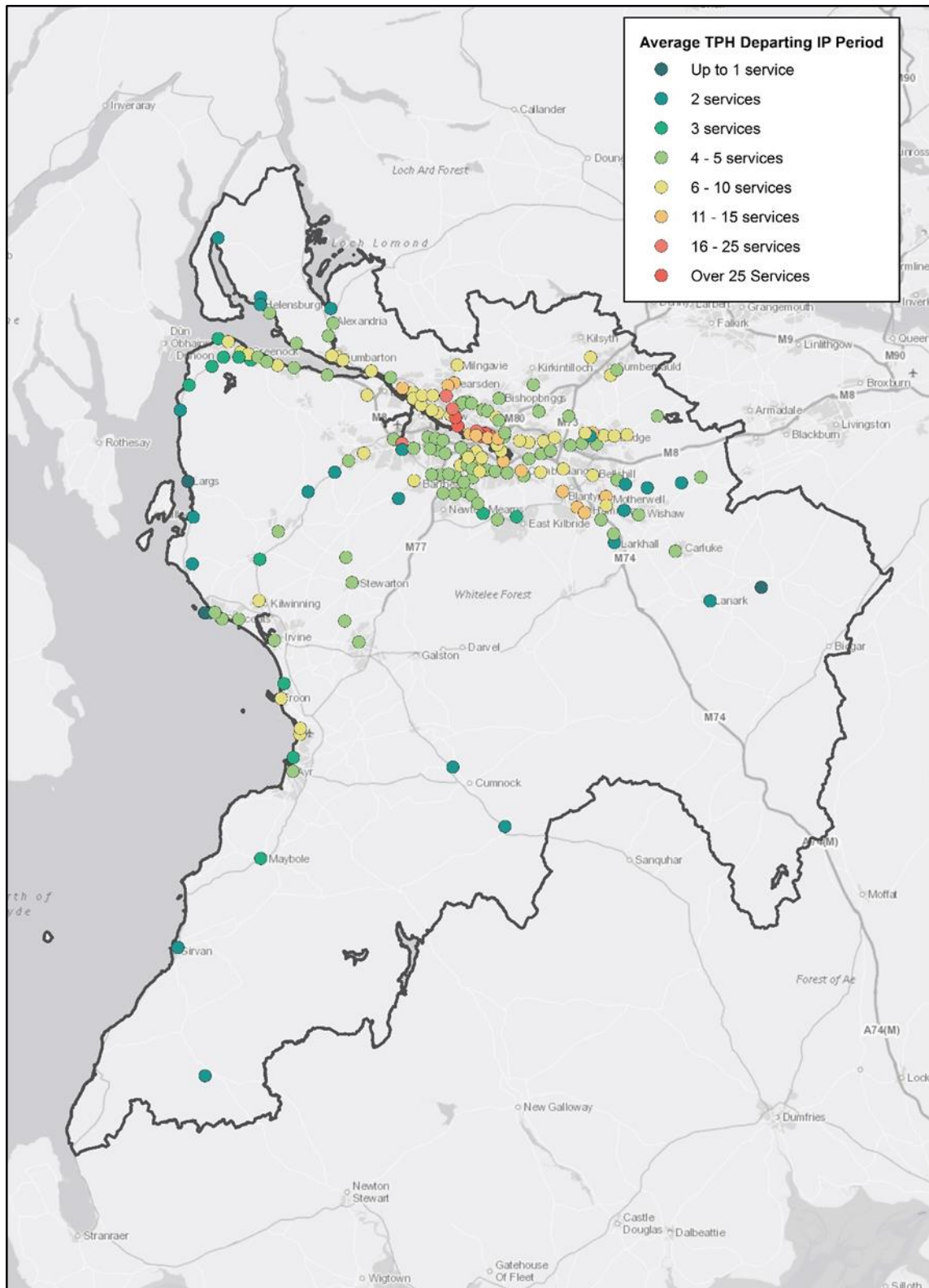
Figure 7.20 Average Trains per Hour Departing Inter Peak Period – SPT Area

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7.3.6   The service frequencies in the PM peak are shown in Figure 7.57 and Figure 7.58. Compared to the inter peak service frequencies increase across the network although there are some variations between the AM and PM peak provision.

7.3.7   On the northern side of Greater Glasgow and at stations in the urban part of South Lanarkshire there are increases in service frequency in the PM peak compared to the AM peak. However, in the southern part of Greater Glasgow and in parts of Ayrshire service frequencies are lower in the PM peak than AM peak.

7.3.8   Nonetheless, service frequencies remain at or above 4 trains an hour for the majority of stations in the PM peak with a small number in more peripheral or rural locations tending to have lower frequencies but similar levels of service throughout the day.
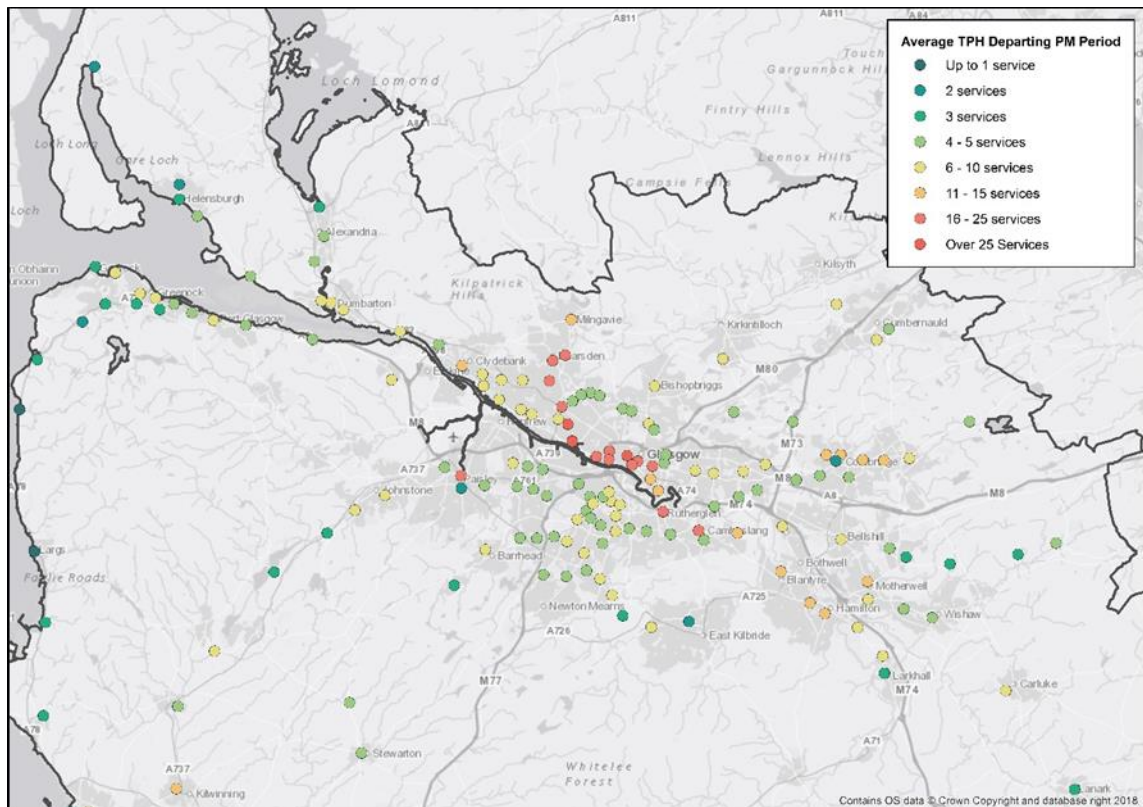
Figure 7.21 Average Trains per Hour Departing PM Peak Period – Glasgow Area

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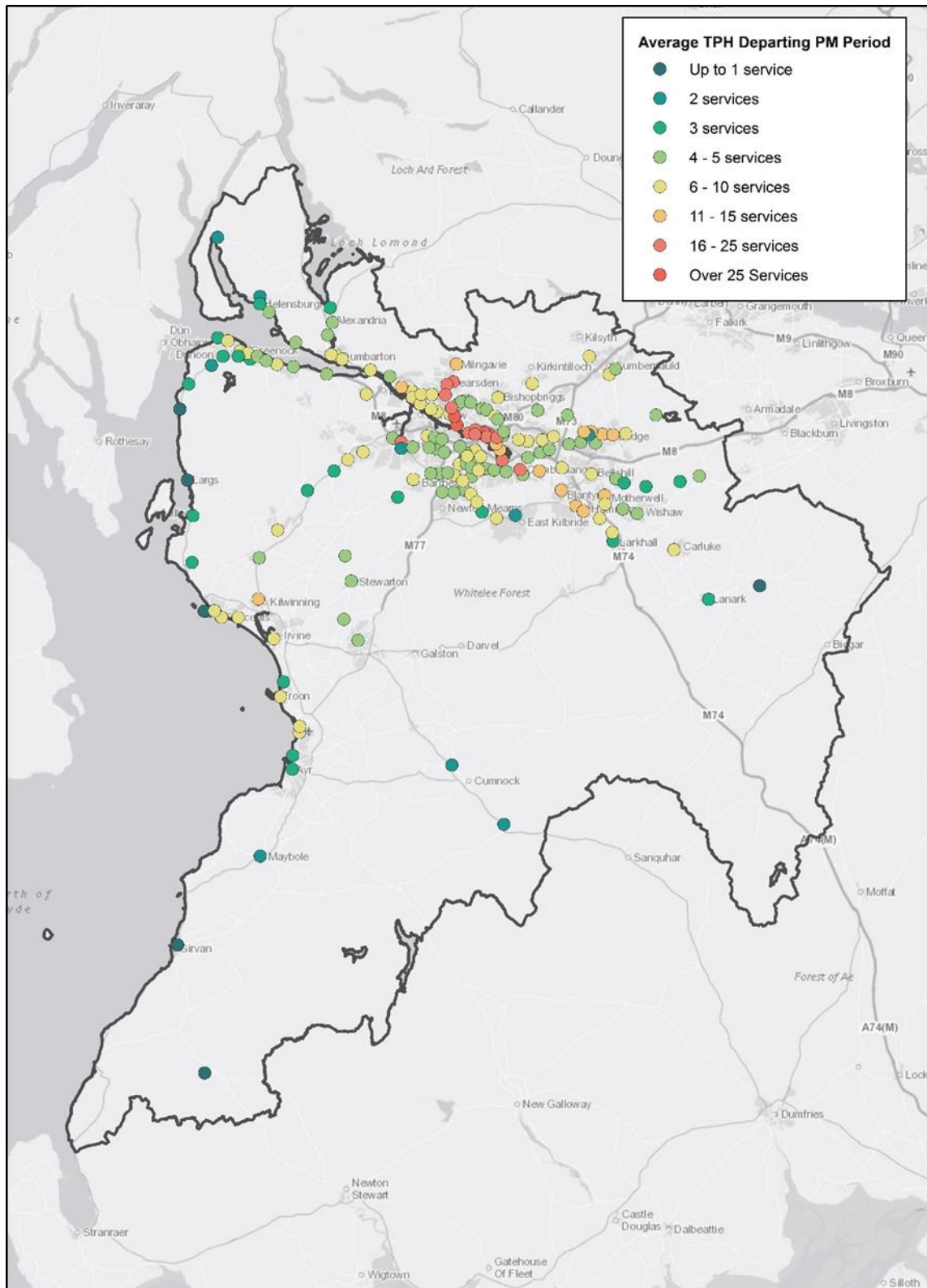
Figure 7.22 Average Trains per Hour Departing PM Peak Period – SPT Area

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Departure Times

7.3.9   Analysis of first and last departure times was undertaken to understand the extent to which people's accessibility may be inhibited by a lack of early morning and / or late night train services. It should be noted that this analysis does not take into account directionality. So whilst there may be a service shown in a given time period this does not mean that a service in each direction operates during this period.

7.3.10   Figure 7.5923 and Figure 7.4024 show the first departure time at each station across the SPT area. Only one station (Barrhill in South Ayrshire) has a first departure later than 7AM. On this basis it appears that the vast majority of SPT stations provide good early morning accessibility albeit there may be some local issues surrounding which locations can be accessed from the earliest departures.
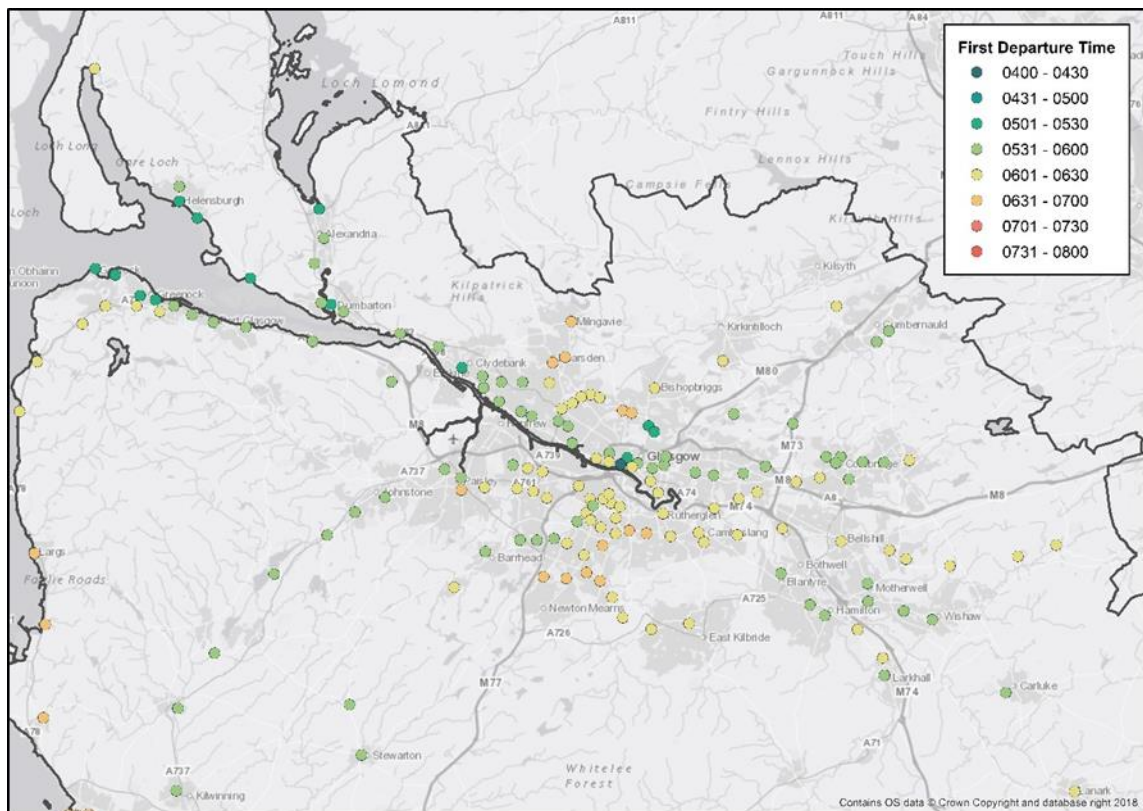
Figure 7.23 First Train Departure Time – Glasgow Area

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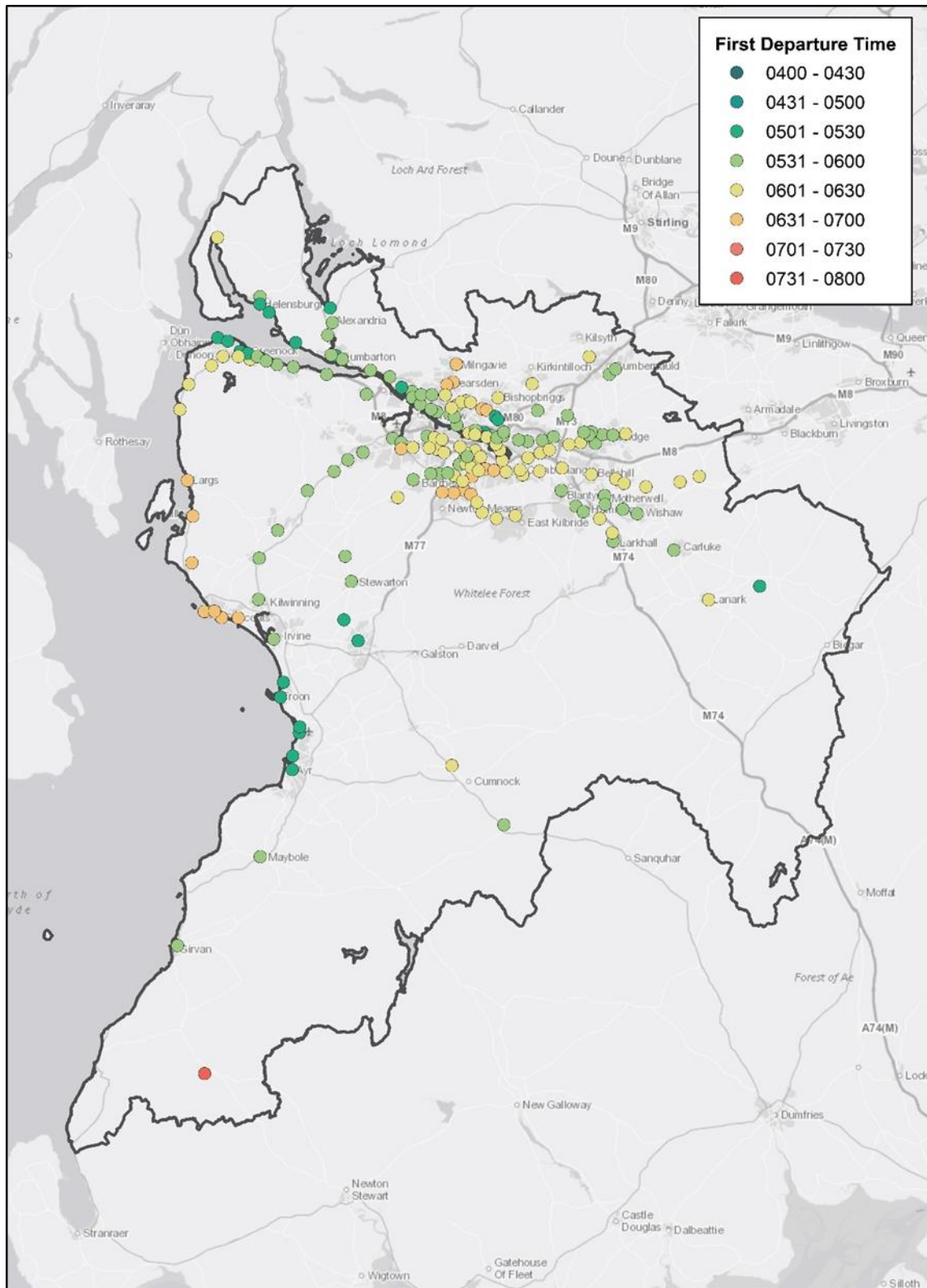
Figure 7.24 First Train Departure Time – SPT Area

7.3.11 The last train service departure times are illustrated in Figure 7.61 and Figure 7.62. There are only three stations with last departures earlier than 11PM which are Ardrossan Harbour and Ardrossan South Beach (both linked to the last ferry arrival from Arran) along with Coatbridge

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Central. The latter only presents a minor accessibility issue as it is located in close proximity to both Blairhill and Coatbridge Sunnyside which offer later departures.

7.3.12 This would again suggest the vast majority of stations provide good late-night accessibility although there may be issues regarding the last departure to particular locations from any given station.
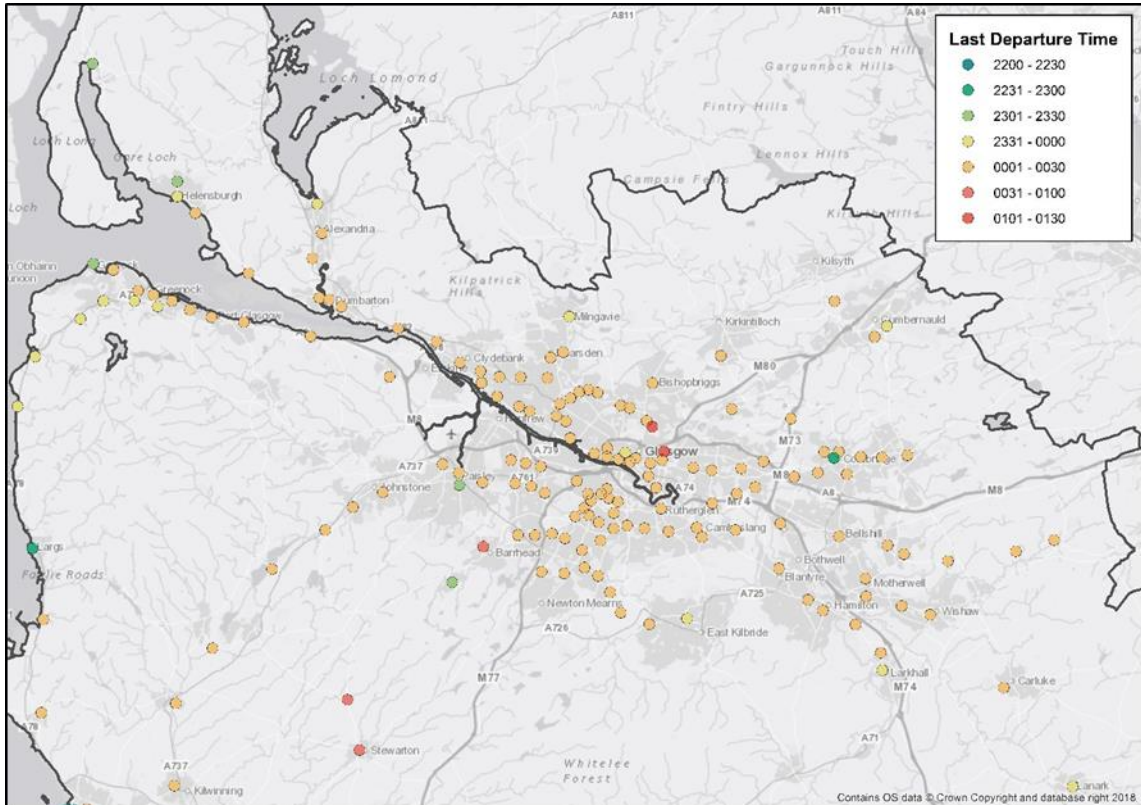
Figure 7.25 Last Train Departure Time – Glasgow Area

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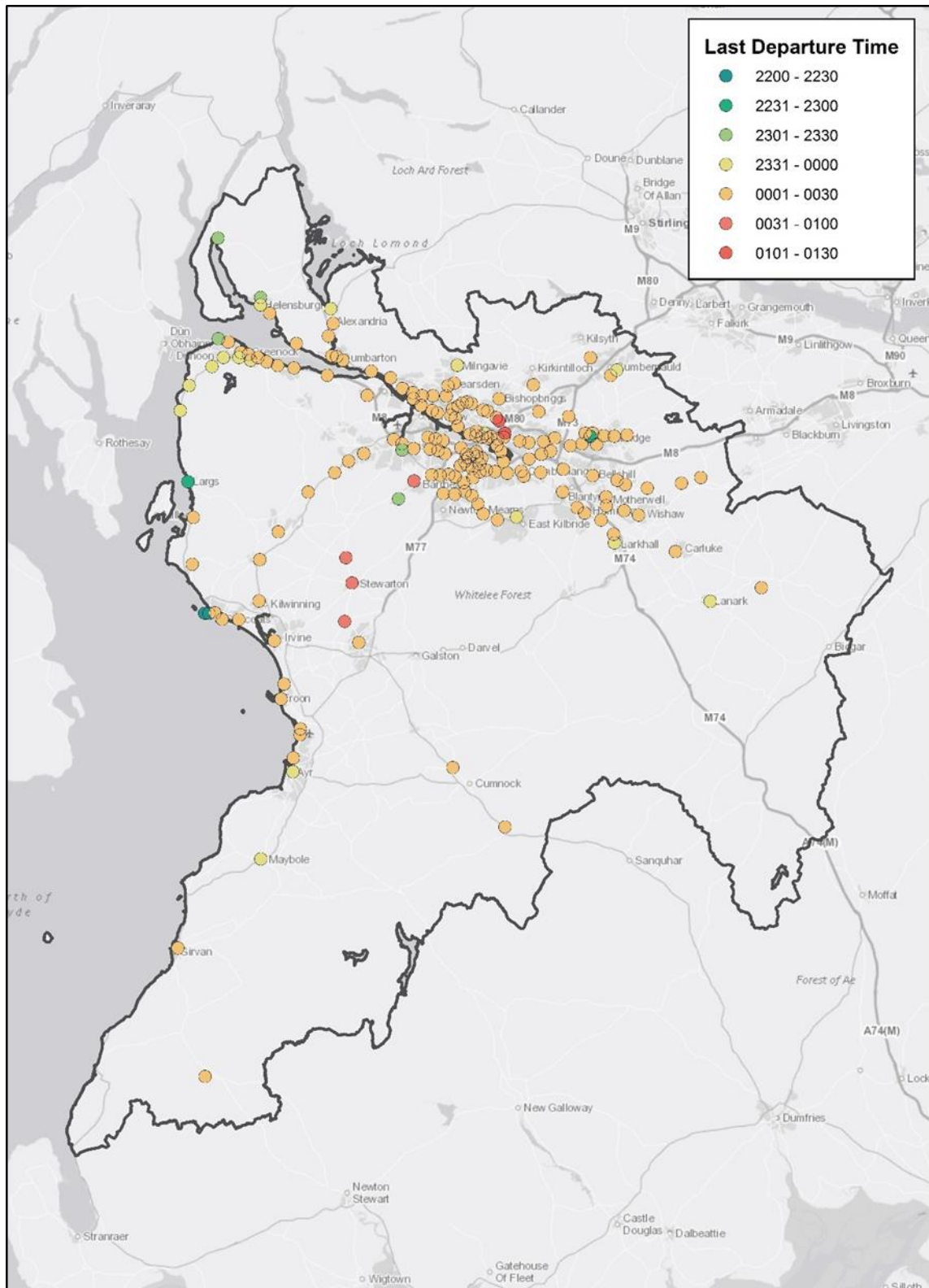
Figure 7.26 Last Train Departure Time – SPT Area

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Network Delays

7.3.13   ScotRail's service performance is assessed using the Public Performance Measure (PPM) which is the standard measure for train service performance throughout Great Britain. There are two elements to the PPM which include:

- **Punctuality** – the percentage of trains that arrive at their final destination within five minutes of the advertised time. When a specially advertised revised timetable is in operation, at times of engineering work for example, then the measure is against the revised times; and

- **Reliability** – the percentage of advertised train services that operate.

7.3.14   PPM data is typically published in an aggregated format for the SPT area but for this piece of work, ScotRail have provided more detailed data that is broken down by route between 2016/17 and 2018/19. It should be noted that the recording periods are four weekly from Sunday to Saturday based on a year from 1st April to 31st March. In addition, the data includes the full length of the service so where a route starts or ends outside of the SPT area this is included within the PPM data.

7.3.15   Figure 7.63 shows PPM on the services linking to Ayrshire. It can be seen that this has stayed consistently above 80% from 2016 but that there has been a slight decline and greater variability in performance over time. This is most notable on the Ardrossan line which typically exhibits lower performance than the other routes.
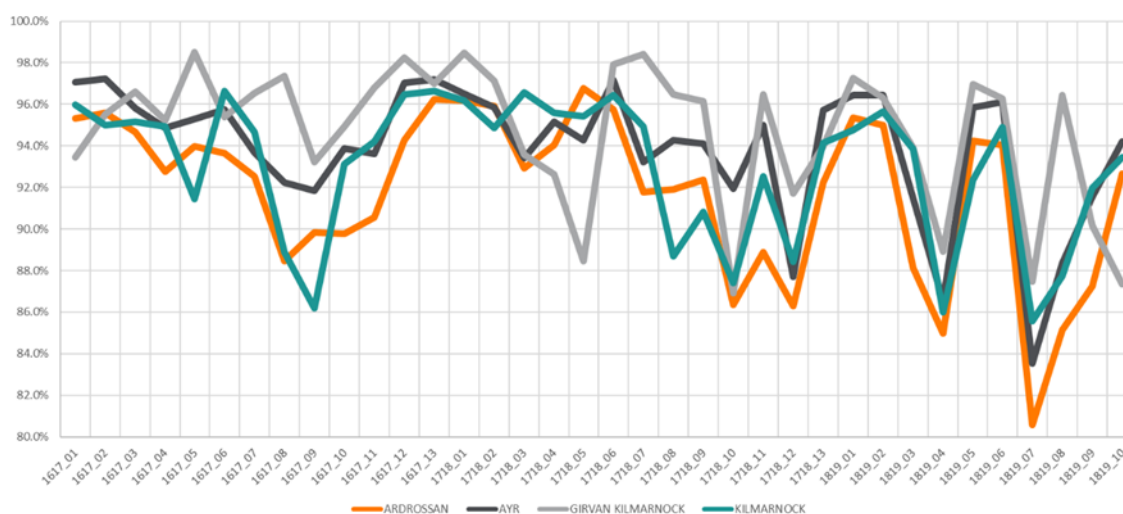
Figure 7.27 Ayrshire Rail Service Public Performance Measure 2016/17 – 2018/19

7.3.16   The performance of services on the Argyle and Inverclyde lines is illustrated in Figure 7.64. For the purposes of this analysis the Argyle line refers to all services via Glasgow Central Low Level.

7.3.17   This shows that PPM on the Gourock / Wemyss Bay route is consistently above 90% although there is a noticeable decline and increased variability over time. The Argyle line displays much greater variability and is regularly in the range between 70% and 90% with three distinct troughs across the time period. This suggests greater unreliability on this route.

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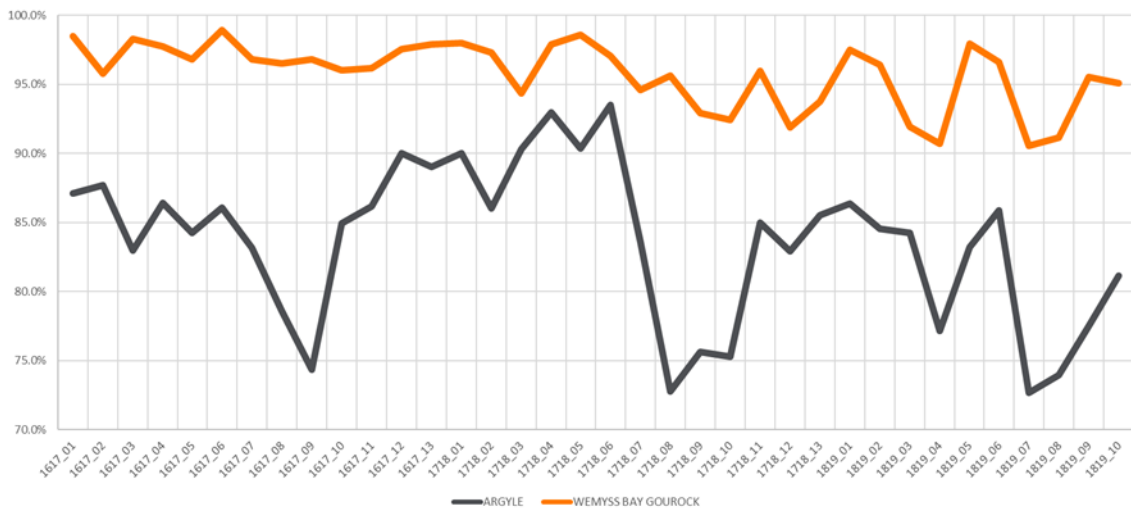
Figure 7.28 Argyle and Inverclyde Rail Service Public Performance Measure 2016/17 – 2018/19

7.3.18 The PPM for routes serving the Greater Glasgow city region and its immediate hinterland are shown in Figure 7.65. For the purposes of this analysis Glasgow North refers to all services via Glasgow Queen St Low Level, Glasgow South refers to all services on the Cathcart Circle, Neilston and Newton via Kirkhill whilst North Suburban refers to the Maryhill line.

7.3.19 Most notably the Glasgow North routes have lower PPMs than all others, typically in the region between 65% and 90% with two distinct depressions over the time period. Performance on the other routes appears to be declining slightly with a significant dip on the Paisley Canal line noticeable towards the end of the 2018/19 period. There is also a trough on the North Suburban line where it dips below 65% before stabilising after the gap in the data.
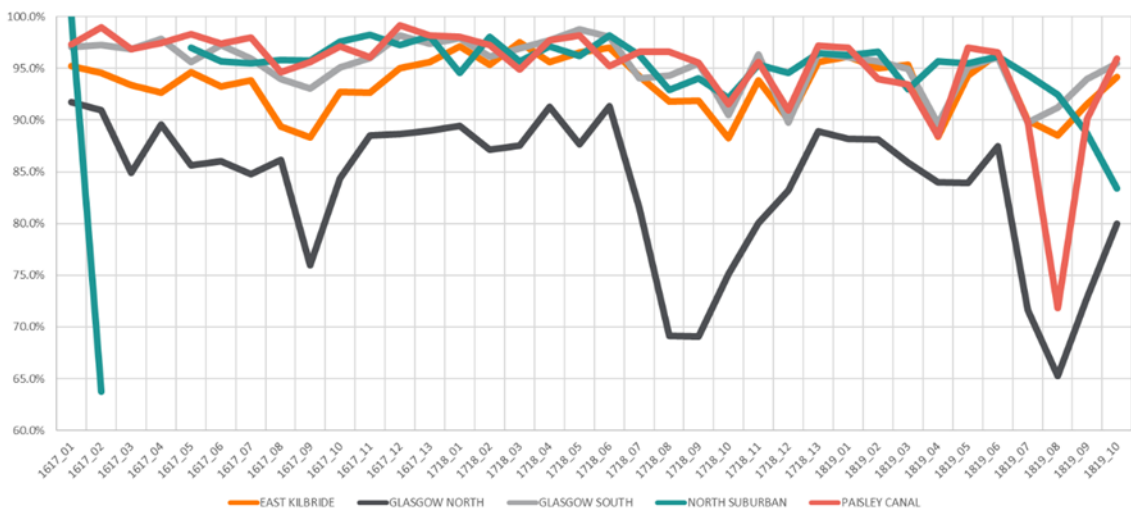
Figure 7.29 Greater Glasgow Rail Service Public Performance Measure 2016/17 – 2018/19

7.3.20 The performance of the routes to the east of Glasgow is shown in Figure 7.66. This highlights the Motherwell – Cumbernauld as having the lowest PPM which has dipped below 50% in 2017/18 and is regularly below 80%. This route also exhibits the greatest variability suggesting passengers are subject to unreliability on the route. The Glasgow – Dunblane and Falkirk – Grahamston services have the highest PPM levels which are typically at or above 85% although there is a noticeable dip in the most recent performance. This is replicated across all services with the Shotts route operating between 70% to 80% in recent periods and the Queen St – Cumbernauld service dipping down to 70% recently.

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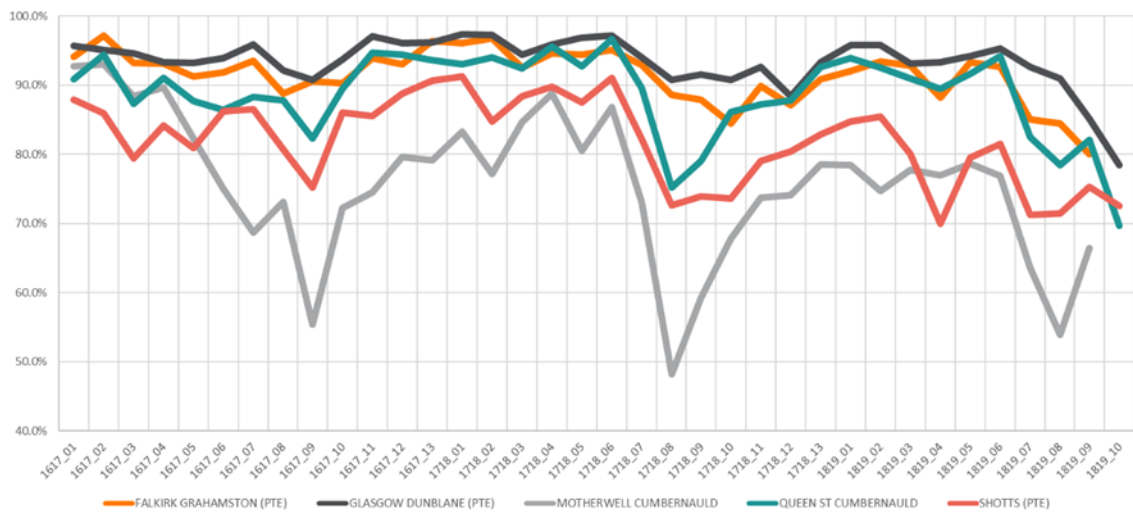
Figure 7.30 Eastern Rail Service Public Performance Measure 2016/17 – 2018/19

Demand, Crowding & Capacity

7.3.21 The demand at stations within the SPT area is shown in Figure 7.67 although it should be noted that this excludes Glasgow Central (32.9m ppa) and Glasgow Queen Street (16.4m ppa) to prevent them from obscuring the smaller stations in the area. This highlights the scale of demand across the rail network in the SPT area underlining its importance as a key part of the public transport network.

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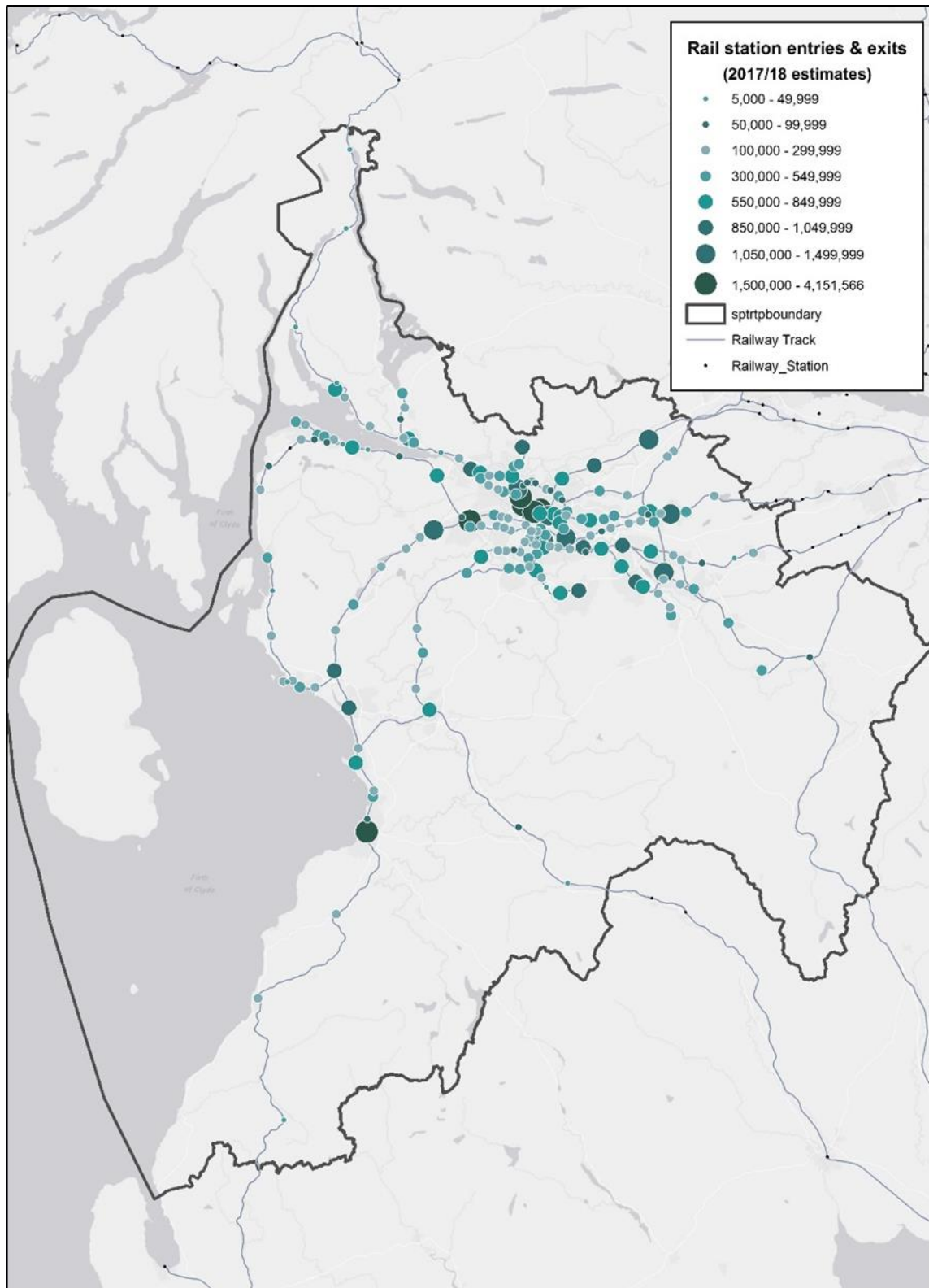
Figure 7.31 Rail Station Usage 2017 / 2018

7.3.22 The maps shown in Figure 7.32 and Figure 7.69 indicate the change in demand at stations across the SPT area and within the Greater Glasgow area between 1997/98 and 2017/18

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respectively[18]. It can be seen that the vast majority of stations have experienced growth in demand over this period whilst some have experienced growth that exceeds 1000%. This highlights a clear ongoing and growing demand for rail services. Stations that have experienced the highest growth are shown in Table 7.2.

Table 7.2 Stations with Growth in Passenger Demand Over 1000% (1997/98 – 2017/18)

Station	Percentage Change (1997/98 – 2017/18)*
Howwood	6480%
Helensburgh Upper	4095%
Chatelherault	2852%
Alexandra Parade	1706%
Duke Street	1160%
Shieldmuir	1086%
Carstairs	1005%

* For Howwood a base year of 2000/01 was used and for Chatelherault a base year of 2005/06 was used

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[18] Where stations opened after 1997/98 the first year of data has been used as the baseline. This affects Caldercruix (2010/11), Chatelherault (2005/06), Drumfrochar (1998/99), Gartcosh (2005/06), Howwood (2000/01), Kelvindale (2006/07), Larkhall (2006/07) and Merryton (2005/06).

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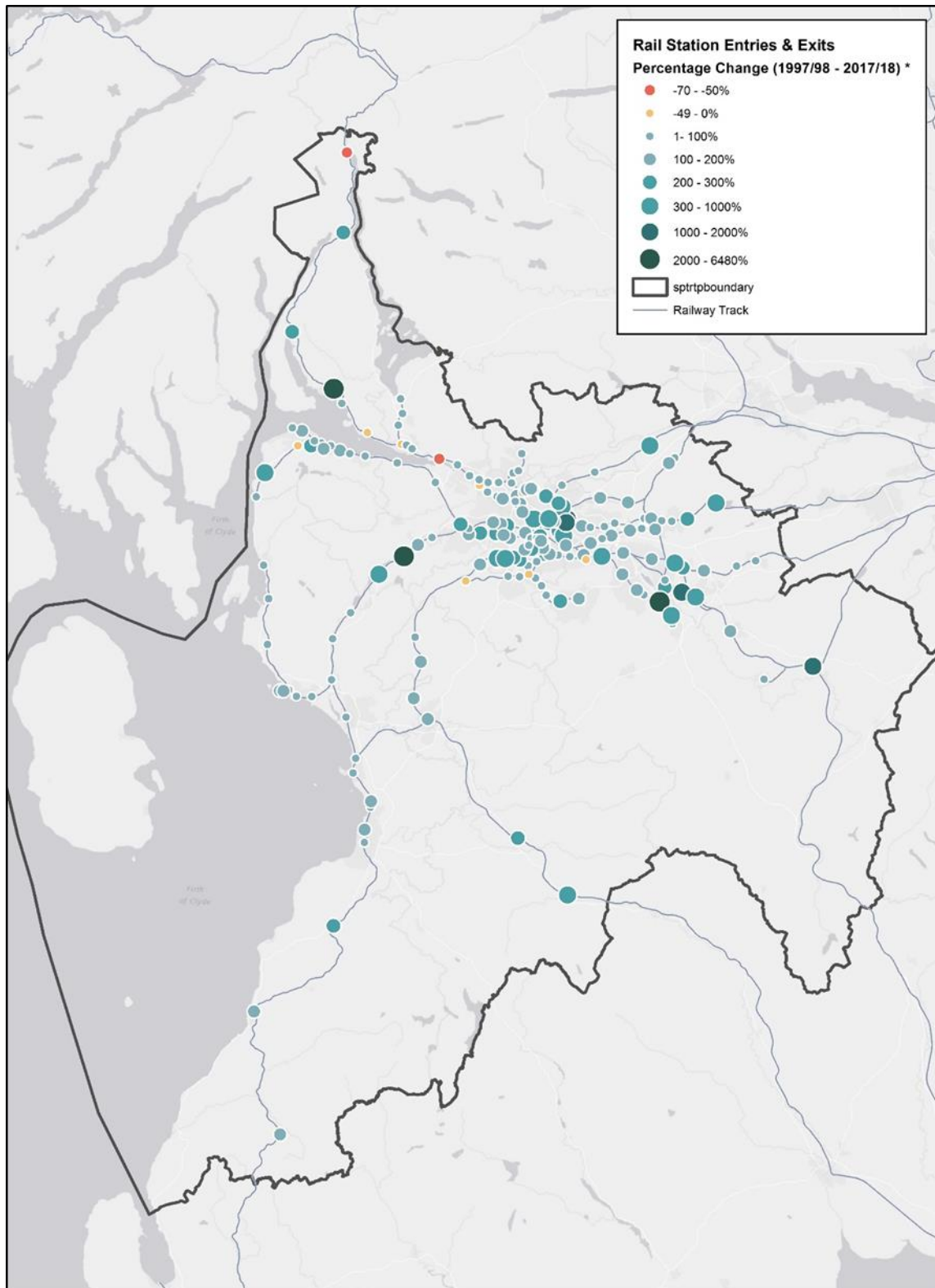
Figure 7.32 Change in Demand at Stations in SPT Area between 1997/98 – 2017/18[18]

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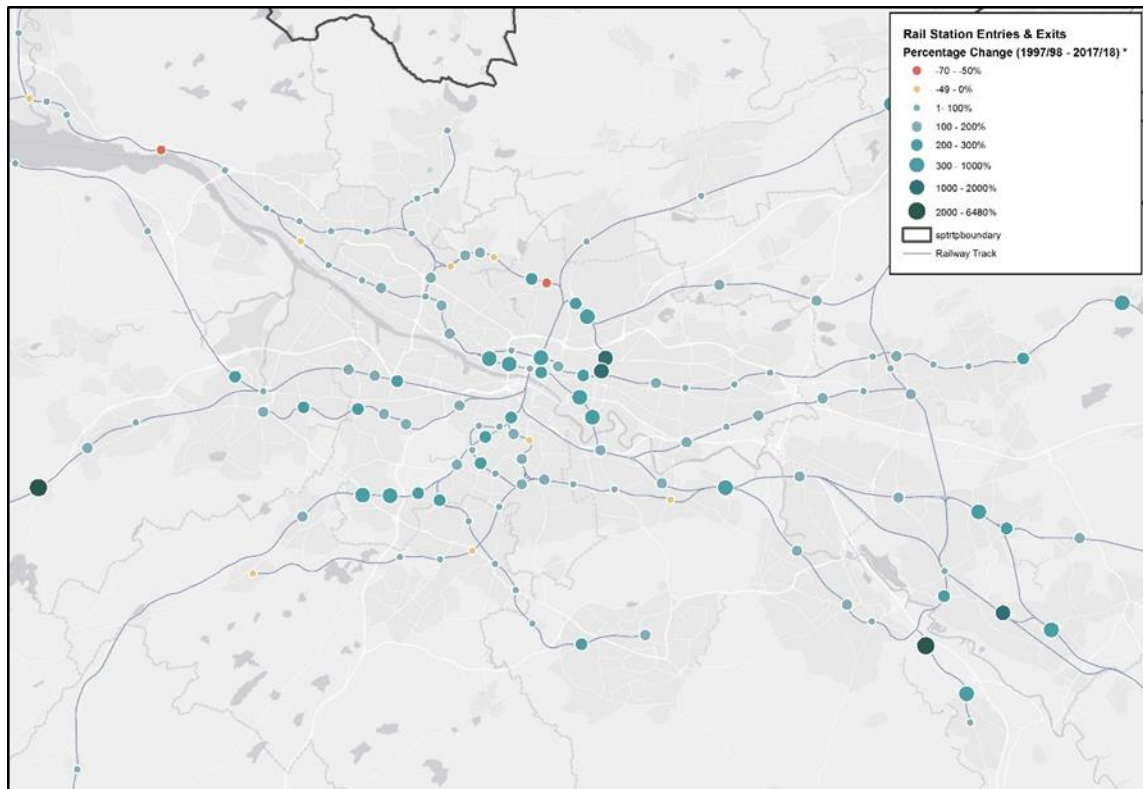
Figure 7.33 Change in Demand at Stations in Greater Glasgow Area between 1997/98 – 2017/18[18]

7.3.23   As demand at stations has increased this has had implications for the capacity of both train services, the network itself and supporting infrastructure like Park and Ride sites. Forecasting by Network Rail suggests further increases in demand are anticipated leading to a requirement to ensure the rail network and services can accommodate future demand. This has been recognised by Network Rail in their Scotland Route Study published in 2016. Within this they assessed the anticipated future demand against the capacity available on services and identified where demand may begin to exceed capacity by 2023/24 in the AM peak hour between 8AM and 9AM.

7.3.24   Figure 7.70 Average Passenger Capacity Utilisation for CalMac Ferry Servicesshows forecast demand versus capacity on the north suburban routes. These run from Helensburgh, Milngavie and Balloch in the north-west through interchange stations at Hyndland and Partick to Glasgow Central and Glasgow Queen Street Low Level stations to Whifflet, Cumbernauld, Airdrie, Edinburgh, Motherwell and Larkhall in the east. These routes are intensively used by commuters into Glasgow city centre and services are very frequent with up to 16 trains per hour each way serving the busiest stations.

7.3.25   In certain areas forecast demand exceeds the current ScotRail Franchise commitment of no more than 10 minutes standing time for passengers such as from Balloch and from Motherwell / Larkhall via Hamilton. In addition, all services are operating at capacity when they approach Glasgow city centre.

7.3.26   Services currently run as a combination of three and six car trains and Network Rail identified that strengthening peak services to all six car trains would reduce congestion on services from the west and from the east.

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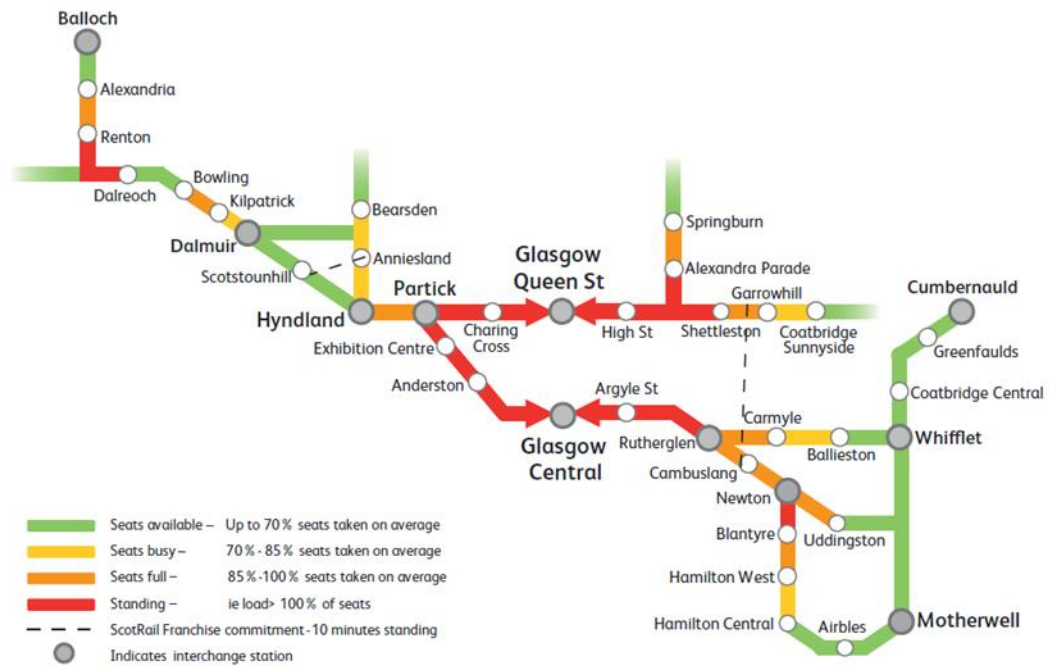
Figure 7.34 Train Demand v Capacity on Northern Suburban Routes AM Peak Hour 2023/24

7.3.27 Demand forecasts for the Ayrshire and Inverclyde routes shown in Figure 7.71 indicate that by 2023/24 services may exceed 100% seating capacity into Glasgow Central in the peak hour. This is a particular issue as each line approaches Paisley Gilmour Street. Both lines are heavily used by commuters with up to 14 trains per hour approaching Glasgow Central.

7.3.28 Network Rail identified that lengthening trains from Gourock and Ayr would reduce congestion on services in the morning peak hour. This would have implications on the provision of rolling stock and impact on the platform capacity at Glasgow Central. Lengthening Ayr services from 7 to 8 car trains would also require selective door opening at intermediate stations.

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Figure 7.35 Train Demand v Capacity on Ayrshire & Inverclyde Routes AM Peak Hour 2023/24

7.3.29 Services from East Kilbride are also expected to exceed capacity in the 2023/24 AM peak hour as illustrated in Figure 7.72. It is anticipated that passengers would be standing from Giffnock which exceeds the current ScotRail Franchise commitment of no more than 10 minutes standing time.

7.3.30 To accommodate forecast passenger numbers Network Rail recommend construction of a second platform at East Kilbride station along with sections of double track or loops between Hairmyres and Busby stations. This could facilitate an increased frequency of trains to East Kilbride and reduce the platform occupancy requirements at Glasgow Central. These measures would also maximise the benefits of the proposed electrification of the East Kilbride and Barrhead corridor. Network Rail suggest maximum benefit would be achieved by implementing these improvements prior to electrification.

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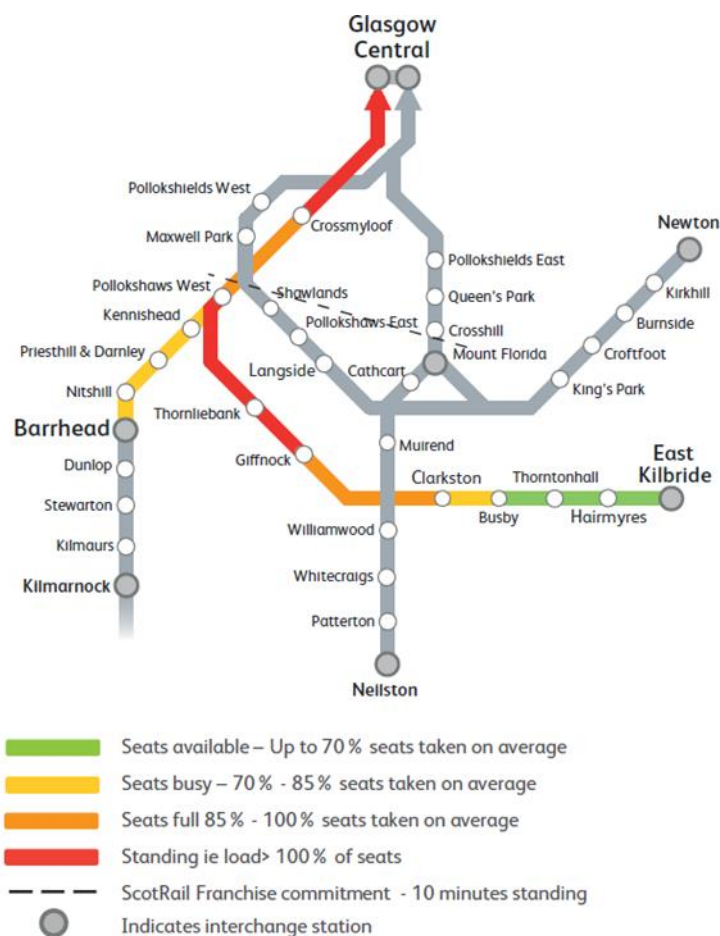
Figure 7.36 Train Demand v Capacity on East Kilbride Route AM Peak Hour 2023/24

7.3.31   The provision of longer trains and additional services also has implications for Glasgow Central station which is already capacity constrained. Network Rail identified that one strategy to address this issue is to extend platforms or create new ones to meet forecast demand, though this will reduce the current space available for passenger circulation and facilities in the station. Expanding the station footprint to extend existing and / or create additional platforms may require the demolition of a number of adjoining buildings, and possibly the reinstatement of the Clyde Bridge (taken out of use in 1967). In light of this, several other options have been developed which would reduce the pressure to expand the existing Glasgow Central (High Level), but some of these alternatives are also likely to be challenging and expensive.

Fares & Ticketing

7.3.32   There are two types of rail fare which are regulated and unregulated. Regulated fares are those that are overseen by Transport Scotland and the amount an individual regulated fare can rise is linked to the Retail Prices Index (RPI). Unregulated fares are set by train operating companies at commercial rates. The changes in regulated fares since 2014 are set out in Table 7.3.

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Table 7.3 Changes in Regulated Rail Fares

	2014	2015	2016	2017	2018
Peak Fares	3.1%	2.5%	1.0%	1.9%	3.6%
Off Peak Fares	0.0%	0.0%	0.0%	0.9%	2.6%

Park & Ride

7.3.33   The Park & Ride capacity at railway stations across the SPT area is shown in Figure 7.73. There are 107 stations with Park & Ride facilities out of a total of 189 stations in the SPT area. There are 20 stations with more than 150 spaces.

7.3.34   There is no data available on the utilisation of Park & Ride but the forecasted increase in rail usage is expected to have a corresponding impact upon demand for Park & Ride.

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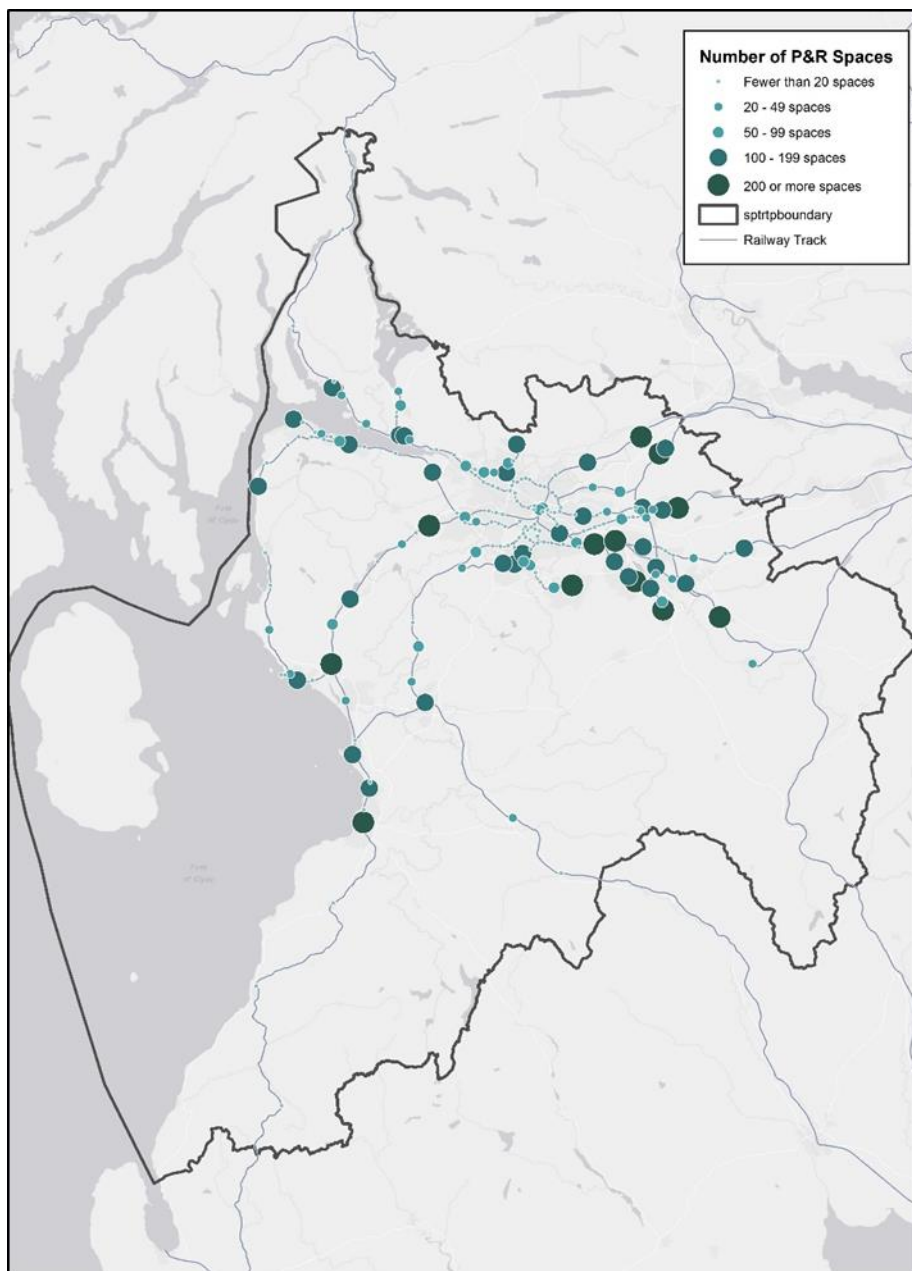
Figure 7.37 Park and Ride Capacity at Stations

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> **KEY ISSUES**
>
> Train service frequencies across the SPT area are lowest in peripheral and rural areas including the coast of North Ayrshire and Inverclyde as well as rural South Ayrshire, East Ayrshire, Lanarkshire and Argyll and Bute.
>
> Beyond these areas train frequencies can generally be considered to be sufficiently regular as to offer a 'turn up and go' level of service.
>
> The first and last departure times from each station suggest that there are good levels of early morning and late night accessibility although some local issues relating the first or last departure to particular destinations may exist.
>
> The reliability of services across the SPT area has typically been declining over time with increased variability and lower performance being exhibited. The routes demonstrating the lowest levels of performance are Argyle, Glasgow North, Motherwell – Cumbernauld and Shotts.
>
> Demand at the vast majority of train stations has been increasing over the past 20 years with some now experiencing 10 times or more demand.
>
> Passenger demand is expected to exceed capacity at peak periods on the North Suburban, Ayrshire, Inverclyde and East Kilbride routes by 2023/24. Network Rail have put forward potential solutions to provide additional capacity to accommodate this demand.
>
> Growth in demand will also impact upon the already capacity constrained Glasgow Central station. Network Rail have identified options to alleviate this but all are challenging and likely to require significant investment.
>
> The need for increased Park & Ride capacity is expected in line with growth in demand for rail services.

7.4 Bus

Service Provision and Frequencies

7.4.1 Buses are the most flexible mode of public transport and are frequently relied upon where people have no or limited access to a car and / or rail services. The majority of services in the SPT area are operated on a commercial basis but where this isn't feasible and bus links are required for social inclusion purposes SPT has powers to subsidise services.

7.4.2 Section 2.3.2 highlighted a decline in bus usage for travel to work. The reduced patronage has implications for the ongoing commercial viability of bus services potentially leading to the requirement to subsidise more bus services as well as an overall decrease in bus service provision. This could result in a reduction in public transport accessibility for residents of the SPT area.

7.4.3 To understand the extent to which these are or could be issues for the SPT area an analysis has been undertaken of bus service provision drawing upon a range of data sources.

7.4.4 Figure 7.74 is based upon data published in Scottish Transport Statistics No. 36 which highlights that total bus vehicle-kilometres have decreased by 22.1% over ten years (2006/07 – 2016/17) across the South West and Strathclyde area[19]. This compares to a decrease of 8.7% across the

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[19] This includes all local authorities within the SPT area with the exception of Argyll and Bute and also includes Dumfries and Galloway.

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Rest of Scotland which shows that the decline in bus service provision is markedly steeper in the SPT area than that occurring in the other parts of Scotland.
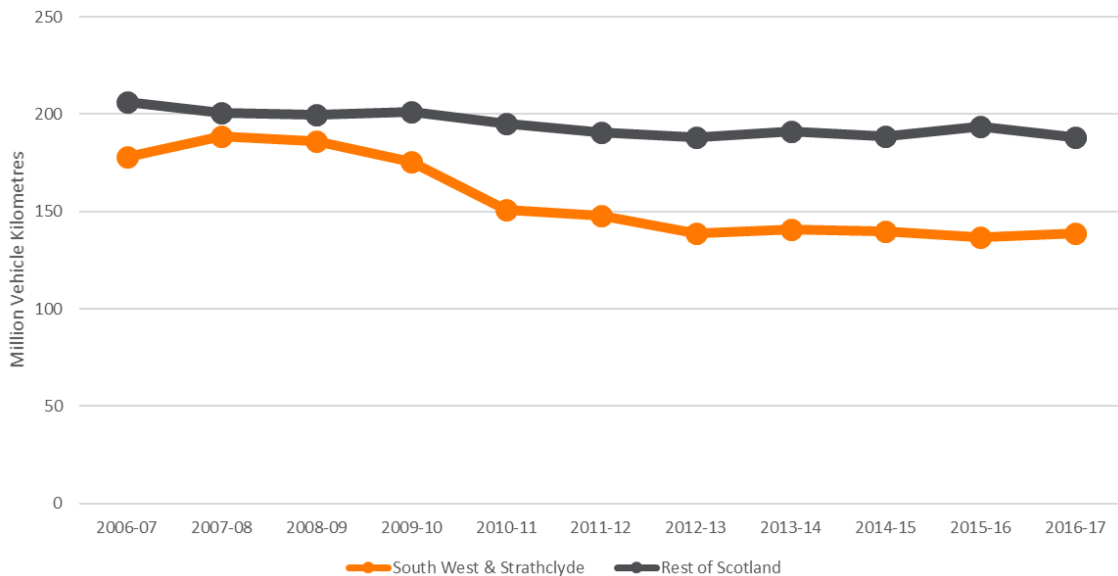
Figure 7.38 Annual Bus Vehicle Kilometres by Region

7.4.5   Data provided by SPT provides greater insight into this issue as shown in Figure 7.75. This highlights that registered bus mileage in the SPT area was about 83 million miles in 2017/18 – a decrease of 13.6% in total mileage from 2005/06. Commercial mileage decreased by 16.4% whilst supported mileage increased by 25.8% between 2005/06 and 2017/18.

7.4.6   This is again indicative of a general trend in decreasing bus service usage and provision. It is also apparent that the public sector is increasingly being required to provide subsidies for bus services with a corresponding impact upon demand for public funding.
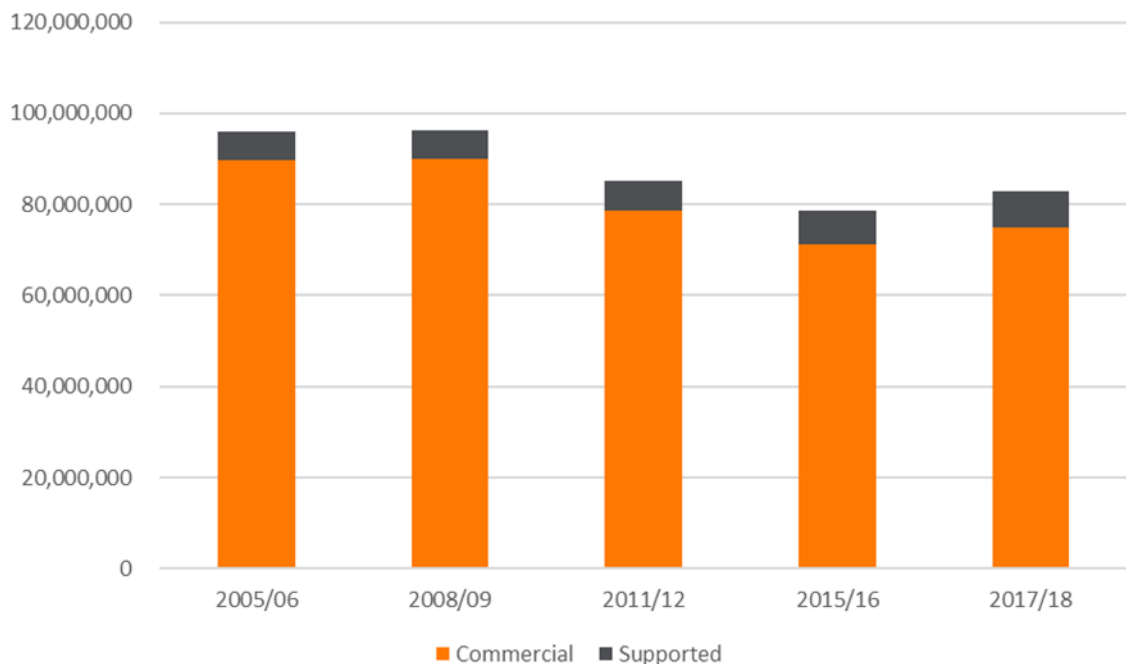
Figure 7.39 Annual Bus Mileage in SPT Area

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Bus Stations

7.4.7 SPT owns and/or manages 7 bus stations. The trend in bus departures per annum is shown in Figure 7.40.

7.4.8 Most stations have seen a decrease in departures although Greenock has remained stable at 180,000 per annum and Buchanan experienced a small increase in departures between 2016/17 and 2017/18.
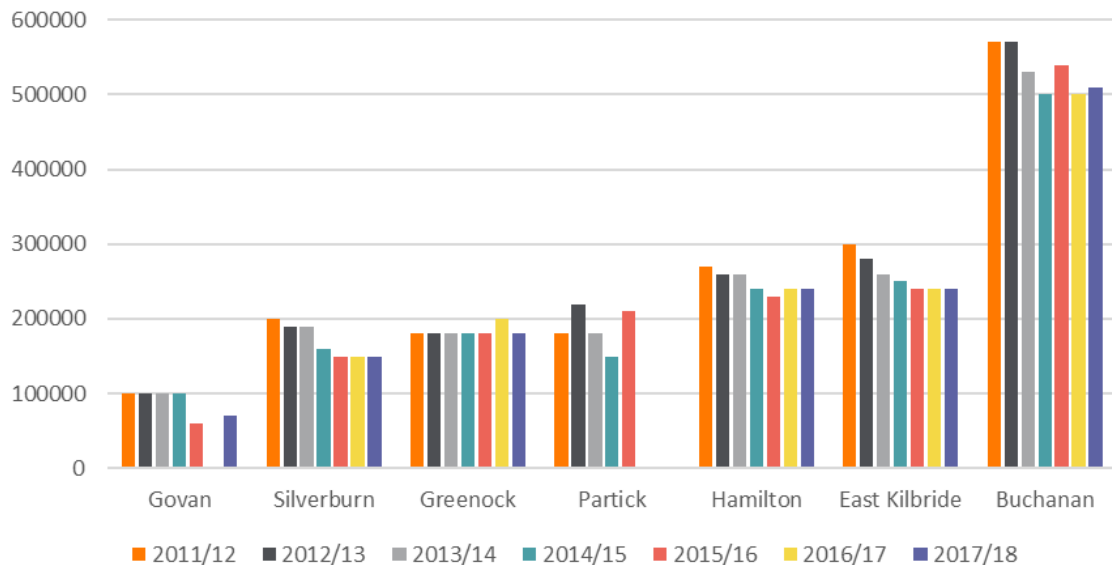
Figure 7.40 Bus Station Departures Per Annum[20]

Journey Time Variations

7.4.9 SPT has Real Time Passenger Information (RTPI) data for the majority of bus services which operate in its area. This records the position of each bus every 30 seconds and allows a comparison of journey times to be undertaken.

7.4.10 A series of high frequency bus corridors were defined which represent the routes that are of greatest regionally strategic importance. These were then split into sections to allow an understanding of the variation of the performance along the route to be developed.

7.4.11 Data was drawn for the last 90 days but time periods which were considered not to be typical (e.g. holiday periods) were excluded.

7.4.12 Analysis of the AM peak (0700 – 1000) and PM peak (1600 – 1900) was then undertaken to compare the difference in journey times between the peak periods and Inter peak (1000 – 1600). An average journey time for each period was calculated and then used to calculate the percentage difference between the peak and inter peak.

7.4.13 The analysis was split between inbound (heading towards Glasgow city centre) and outbound (heading away from Glasgow city centre).

7.4.14 In Figure 7.41 the performance of the bus network in Ayrshire in the AM peak can be seen. This shows that the greatest variation is on the M77 inbound which is consistent with the tidal commuting pattern into Glasgow at this time period.

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[20] Govan and Partick figures incomplete for some years due to partial closures for infrastructure works

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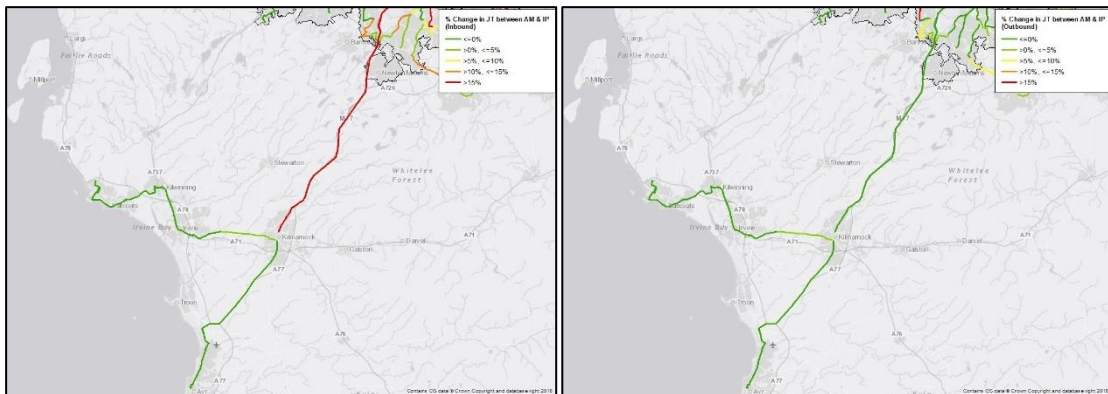
Figure 7.41 Ayrshire % Change in Bus Journey Time Between AM Peak and Inter Peak (Inbound v Outbound)

7.4.15 The performance of the bus network in Greater Glasgow during the AM peak is shown in Figure 7.42. This shows greatest variation on inbound routes particularly upon the motorway network including M8, M77, M80, M74 and M73. Other routes that demonstrate high variability include A803 in Bishopbriggs, Knightswood, A814 Dumbarton Road, A728 Aitkenhead Road, Gartloch Road and A74 / Hamilton Road at Mount Vernon. The outbound route with the greatest variation is on the A736 through Crookston.
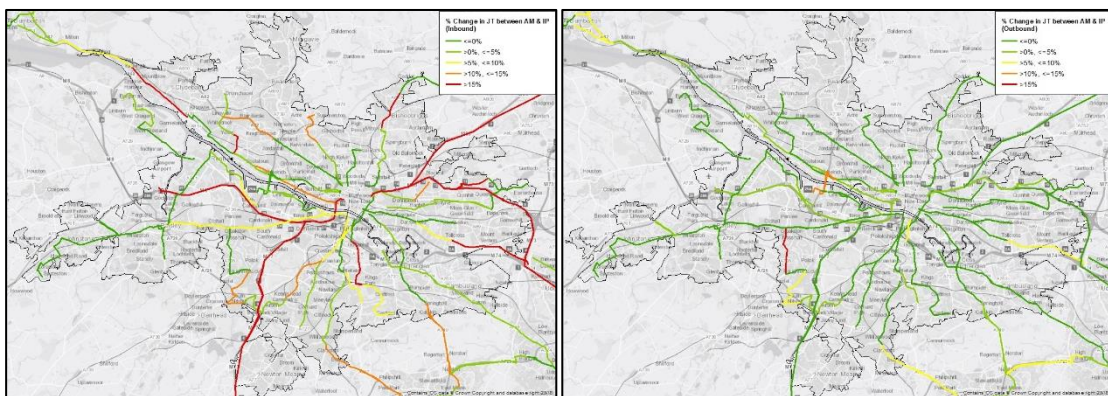
Figure 7.42 Greater Glasgow % Change in Bus Journey Time Between AM Peak and Inter Peak (Inbound v Outbound)

7.4.16 In Inverclyde and West Dunbartonshire the routes with greatest variability in the AM peak are inbound on A78 through Greenock and A814 Dumbarton Road as shown in Figure 7.43.
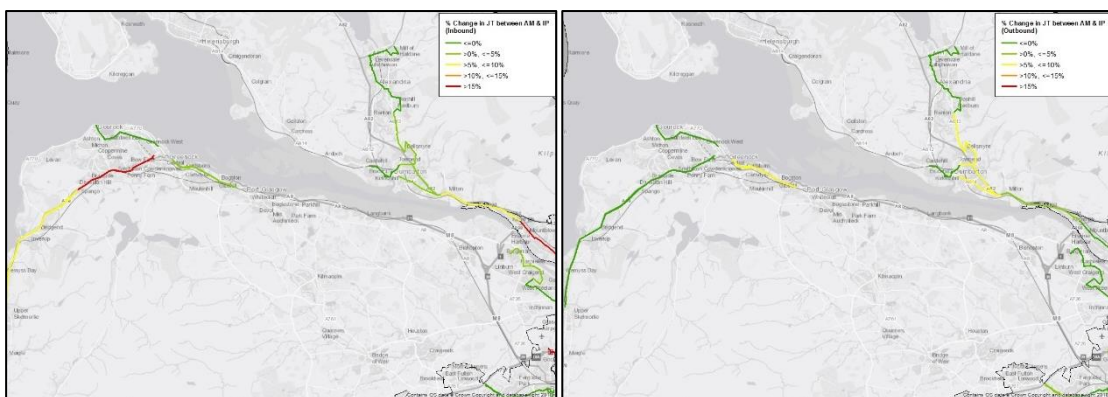
Figure 7.43 Inverclyde % Change in Bus Journey Time Between AM Peak and Inter Peak (Inbound v Outbound)

7.4.17 The routes showing the greatest variation during the AM peak in Lanarkshire are again focussed upon inbound routes to Glasgow on the motorway network as shown in Figure 7.44. These are

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the M74 and M80 with the preceding sections of the latter route along A8011 Glasgow Road in Cumbernauld and B802 Main Road through Condorrat also showing high variation.
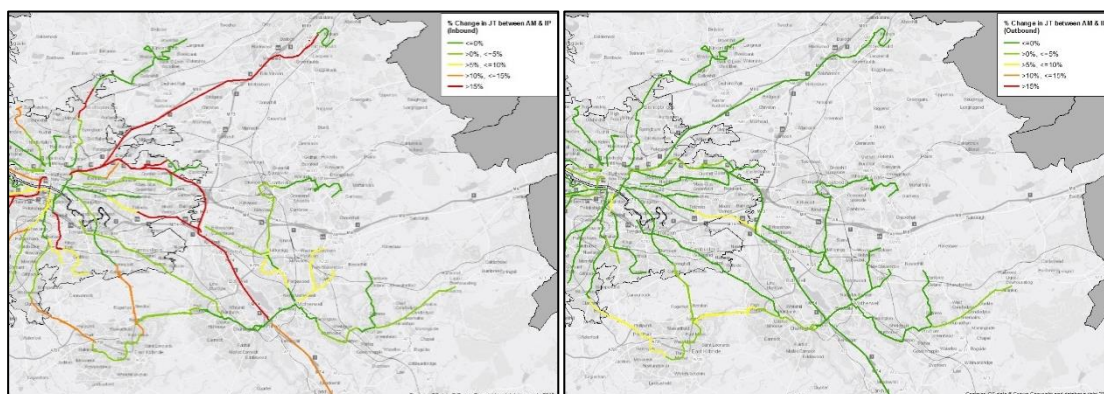
Figure 7.44 Lanarkshire % Change in Bus Journey Time Between AM Peak and Inter Peak (Inbound v Outbound)

7.4.18   The variation on the bus network in Ayrshire during the PM peak is shown in Figure 7.45. This mirrors the AM peak but in the opposite direction with greatest variability being on the M77 outbound as people return home from work.
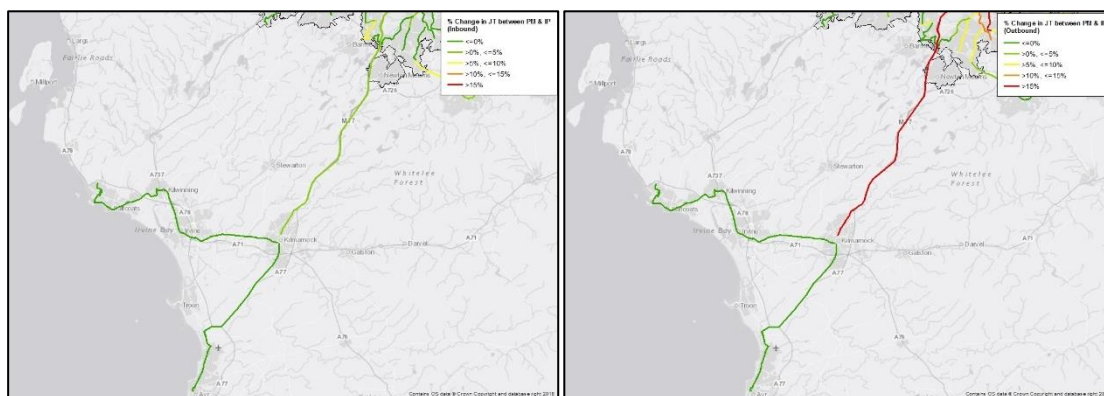
Figure 7.45 Ayrshire % Change in Bus Journey Time Between PM Peak and Inter Peak (Inbound v Outbound)

7.4.19   As shown in Figure 7.46, in Greater Glasgow there is a similar picture to the AM peak but in reverse again although it is notable that outbound on the M8 east of the city centre, M74, M73 and M80 show less variance in the PM peak than inbound during the AM peak. Outbound on the M8 west of the city centre, M77 and A728 Aitkenhead Road show similar variance to inbound in the AM peak whilst the variance on A814 Dumbarton Road extends to include the section between the city centre and Scotstoun. Furthermore, there is also high variability for inbound journeys on the M8 west of the city centre and through the Clyde Tunnel.

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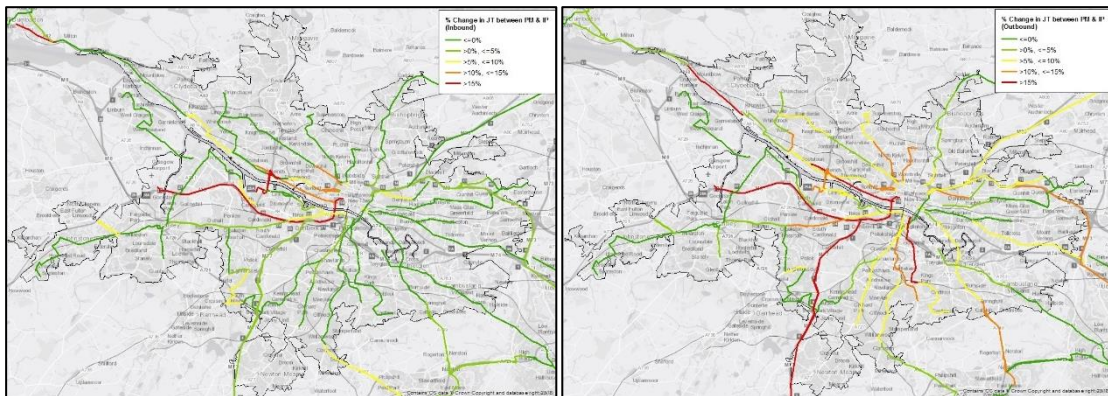
Figure 7.46 Greater Glasgow % Change in Bus Journey Time Between PM Peak and Inter Peak (Inbound v Outbound)

7.4.20   In Inverclyde and West Dunbartonshire the routes with greatest variability in the PM peak are outbound on A8 from Greenock and inbound on A814 Glasgow Road in Dumbarton as shown in Figure 7.47.
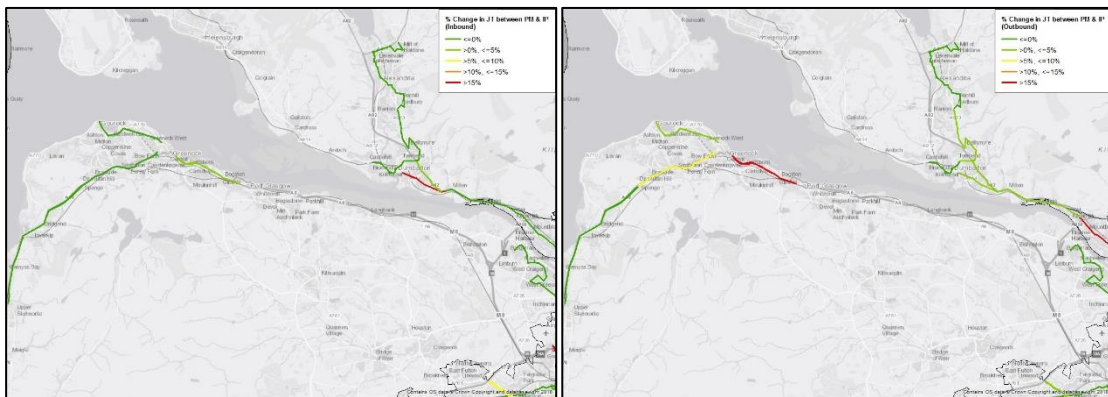
Figure 7.47 Inverclyde % Change in Bus Journey Time Between PM Peak and Inter Peak (Inbound v Outbound)

7.4.21   In Figure 7.48 it can be seen that there are no routes either inbound or outbound that show the same degree of variability in the PM peak as they do in the AM peak.
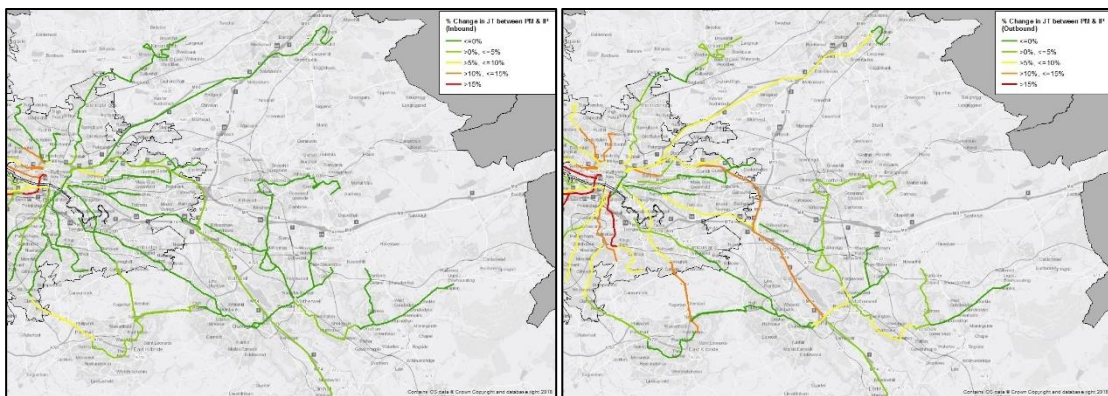
Figure 7.48 Lanarkshire % Change in Bus Journey Time Between PM Peak and Inter Peak (Inbound v Outbound)

Average Speeds

7.4.22   The RTPI data was also used to develop an understanding of the average speeds in the AM peak, inter peak and PM peak periods for both inbound and outbound buses. All the mapping which was produced is attached as Appendix E and key findings summarised here.

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7.4.23   The average speed of bus services in Ayrshire is shown in Figure 7.49 and Figure 7.50. These show no variations between inbound or outbound bus speeds in either the AM peak or PM peak. This suggests that speeds remain within the same thresholds regardless of time period or direction of travel at peak periods.
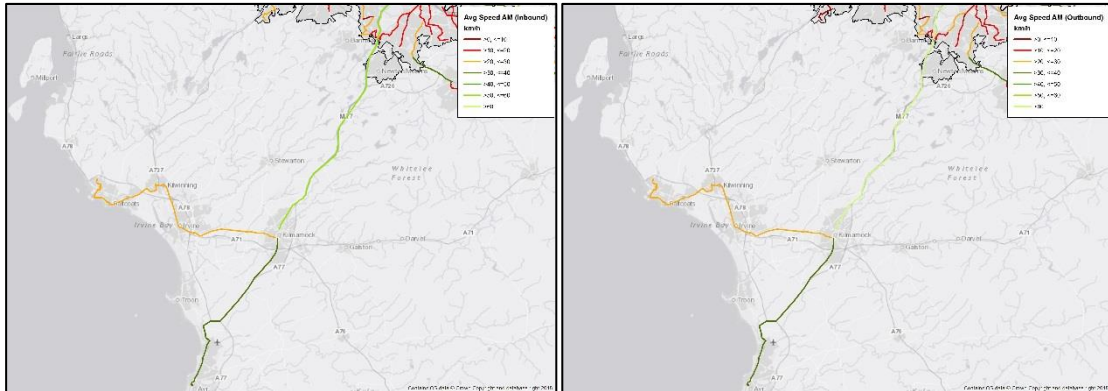
Figure 7.49 Ayrshire AM Peak Bus Average Speeds (Inbound v Outbound)
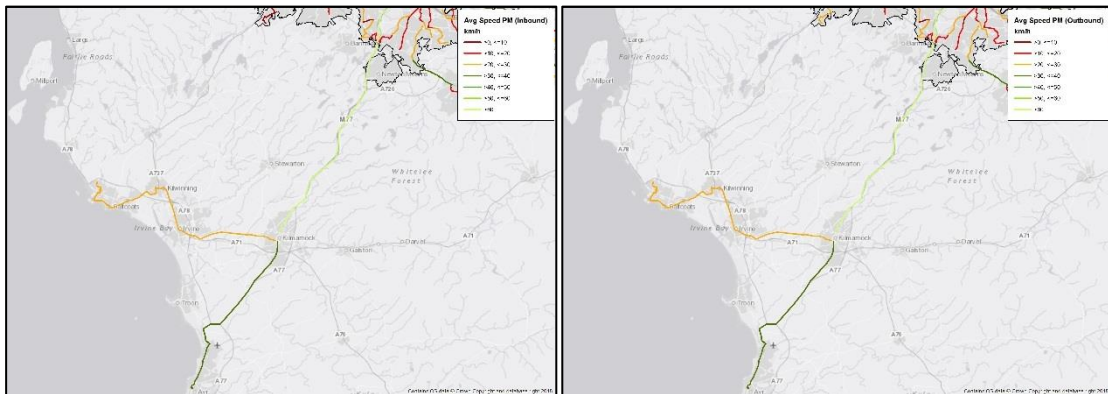
Figure 7.50 Ayrshire PM Peak Bus Average Speeds (Inbound v Outbound)

7.4.24   Figure 7.51 shows inbound and outbound speeds for Greater Glasgow in the AM peak. It is clear that a number of routes into the city are slower than those out of the city reflecting the tidal nature of commuting flows. The only routes where this trend is not apparent are in Johnstone and between Renfrew and Inchinnan.
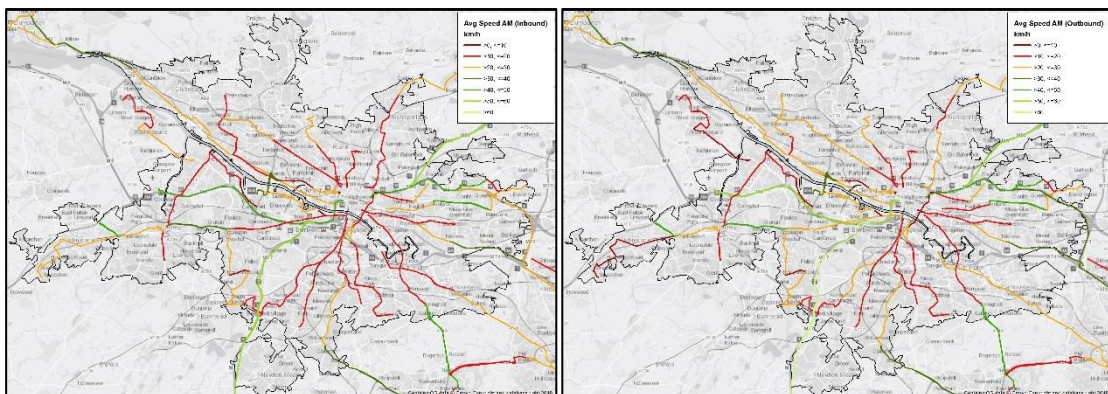
Figure 7.51 Greater Glasgow AM Peak Bus Average Speeds (Inbound v Outbound)

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7.4.25 Figure 7.52 shows that there is less variance between inbound and outbound speeds in the PM peak than the AM peak with average speeds largely remaining within the same thresholds.

7.4.26 However, in the south west section of the city the A761 Paisley Road West corridor to Johnstone and M8 between the city centre and Glasgow Airport can be seen to be noticeably slower for inbound buses than they are for outbound. This is contra to the tidal flow at this time suggesting there is high demand for travel into or across the city from this area even when commuters are mainly flowing out of it.

7.4.27 Around the rest of the city routes generally follow the expected trend with slower speeds for outbound buses than for inbound buses.
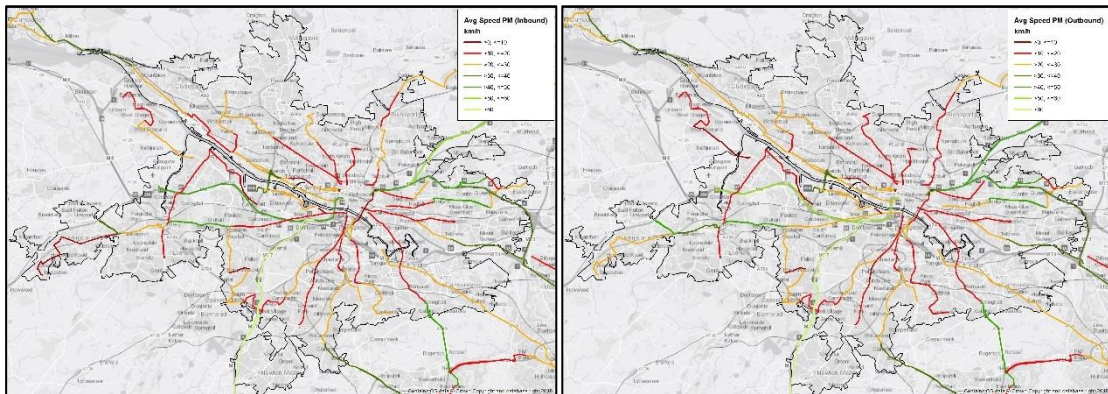
Figure 7.52 Greater Glasgow PM Peak Bus Average Speeds (Inbound v Outbound)

7.4.28 In Inverclyde and West Dunbartonshire in the AM peak the only significant variation between inbound and outbound bus speeds is on the A78 south of Greenock. This is shown in Figure 7.53 where it can be seen that inbound speeds are slower than outbound which is consistent with commuting trends.
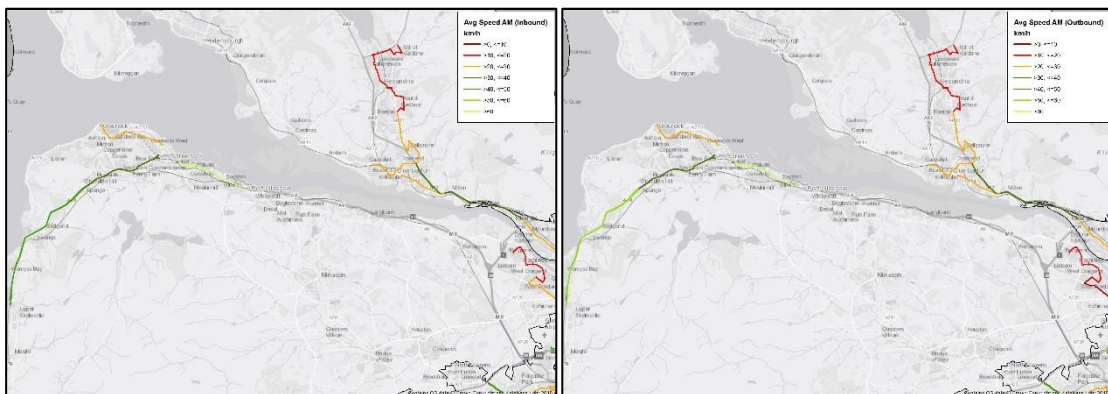
Figure 7.53 Inverclyde AM Peak Bus Average Speeds (Inbound v Outbound)

7.4.29 Figure 7.54 shows that there are no variations between inbound and outbound average speed thresholds in the PM peak.

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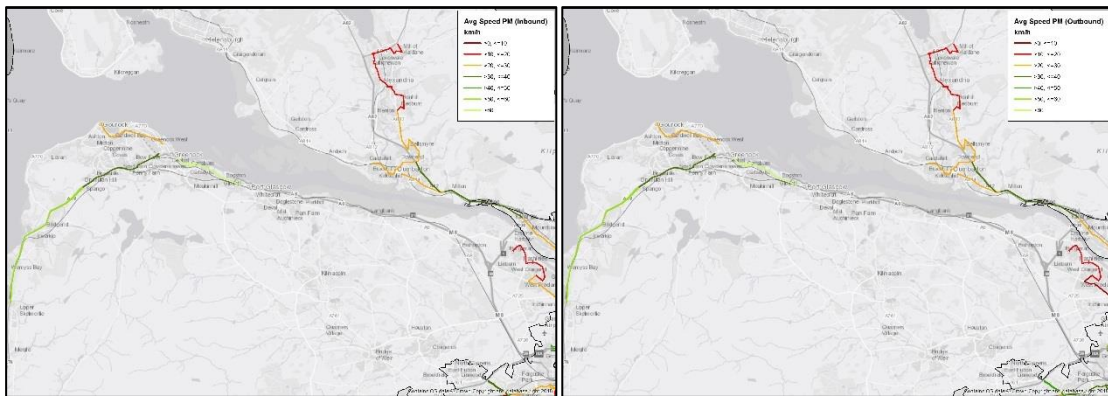
Figure 7.54 Inverclyde PM Peak Bus Average Speeds (Inbound v Outbound)

7.4.30 In Figure 7.55 the average bus speeds in Lanarkshire in the AM peak are shown. This shows that inbound buses are slower than outbound buses on the M74 and in Bellshill. Otherwise average speeds fall within the same thresholds.
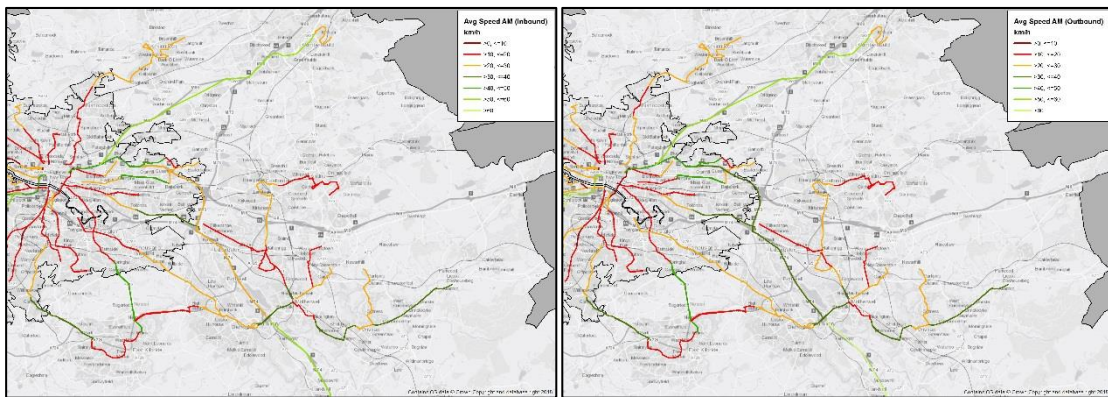
Figure 7.55 Lanarkshire AM Peak Bus Average Speeds (Inbound v Outbound)

7.4.31 The average inbound and outbound bus speeds in Lanarkshire in the PM peak are shown in Figure 7.56. This highlights that outbound journeys are slower in Kirkintilloch, M80 / A80 corridor, Bellshill and Netherton which reflects tidal commuting flows.
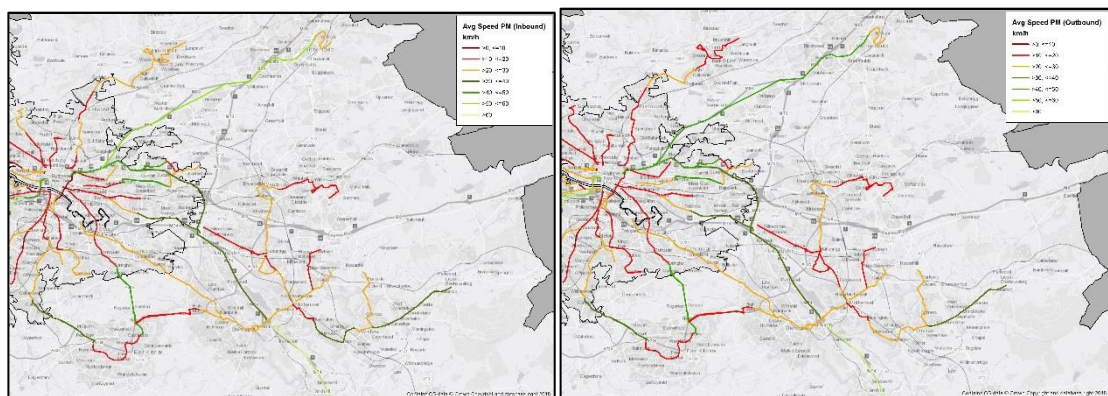
Figure 7.56 Lanarkshire PM Peak Bus Average Speeds (Inbound v Outbound)

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KEY ISSUES

Bus service provision is declining at a significantly steeper rate within the SPT area than across the rest of Scotland. There has also been a sizeable increase in subsidised bus mileage whilst commercial bus mileage has declined. This is indicative of an increasing requirement of the public sector to subsidise more bus services which will continue to grow if current trends continue. Furthermore, this will likely lead to an overall decline in public transport accessibility.

Variations in journey times are more acute in the AM peak than the PM peak with greatest variability on the motorway network. The analysis also suggests that the bus network on the west side of Glasgow is more subject to journey time variability than that in the east with the M8 west of the city centre being particularly notable as experiencing regular variability.

Bus average speeds typically vary in line with tidal commuting flows with slower inbound journeys in the AM peak and outbound journeys in the PM peak. The main exception to this is A761 Paisley Road West corridor to Johnstone and M8 between the city centre and Glasgow Airport which exhibits slower inbound than outbound speeds in both the AM and PM peak.

7.5 Subway

7.5.1 SPT provided data on the Subway operation from 2007 until 2018. The total demand observed over the period is shown in Figure 7.57. It can be seen that there has been a general decline in Subway patronage and that there is evidence of seasonal variations in demand. This demand has been more recently trending upwards. The sharp decrease observed in July 2016 is attributable to the period when the Subway was closed as part of the modernisation programme undertaken by SPT.
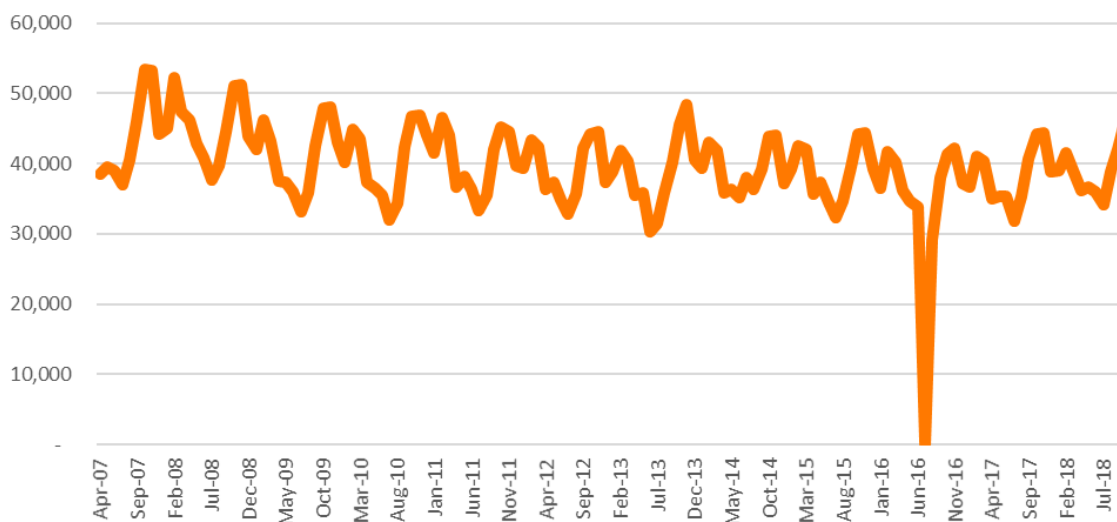
Figure 7.57 Subway Total Demand 2007 – 2018

7.5.2 We then examined the change in demand at each station as shown in Figure 7.58. All but one station have experienced a decrease in demand ranging from 3% at Kelvinbridge to 31% at Govan and Bridge Street. Only Kinning Park has experienced an increase in demand.

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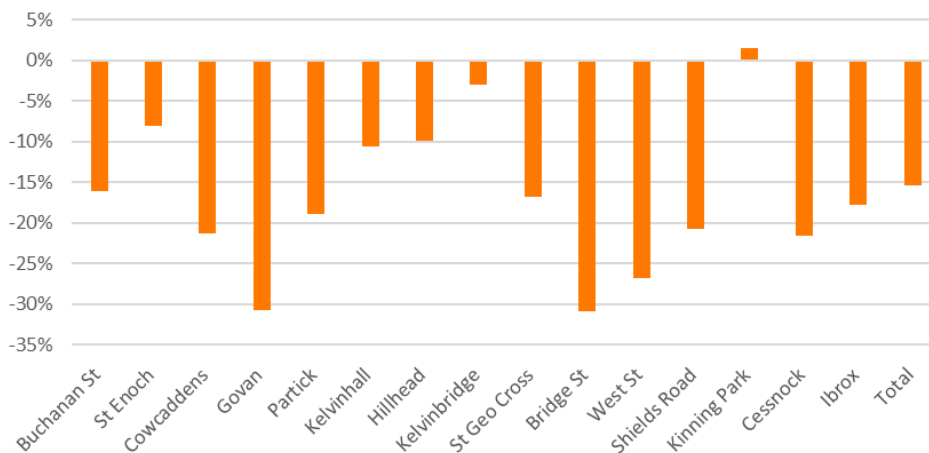
Figure 7.58 Change in Subway Demand 2008 – 2017

7.5.3   The breakdown of demand by station in 2017 is shown in Figure 7.59. This highlights that Buchanan Street, St Enoch and Hillhead account for nearly half the demand (49%) reinforcing the finding that the Subway plays a pivotal role in linking the City Centre and West End.
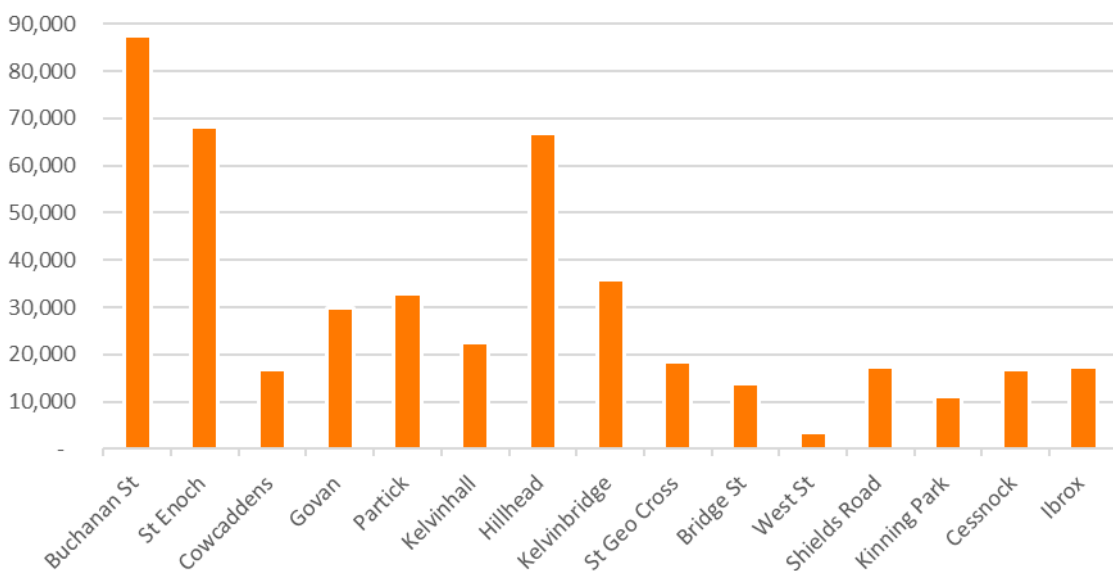
Figure 7.59 Total Annual Demand by Subway Station 2017

7.5.4   Based upon the service frequency set out in Figure 7.60 and capacity data provided by SPT it was calculated that the average level of utilisation of available capacity as shown in Figure 7.61. This highlights that utilisation has remained fairly consistently between 30% and 50% over the period.

7.5.5   However, it is noticeable that utilisation has been increasing in 2018 which appears contradictory to the observed decline in demand set out previously. Further analysis identified that this seems to be attributable to increased demand on Sundays when a reduced service operates.

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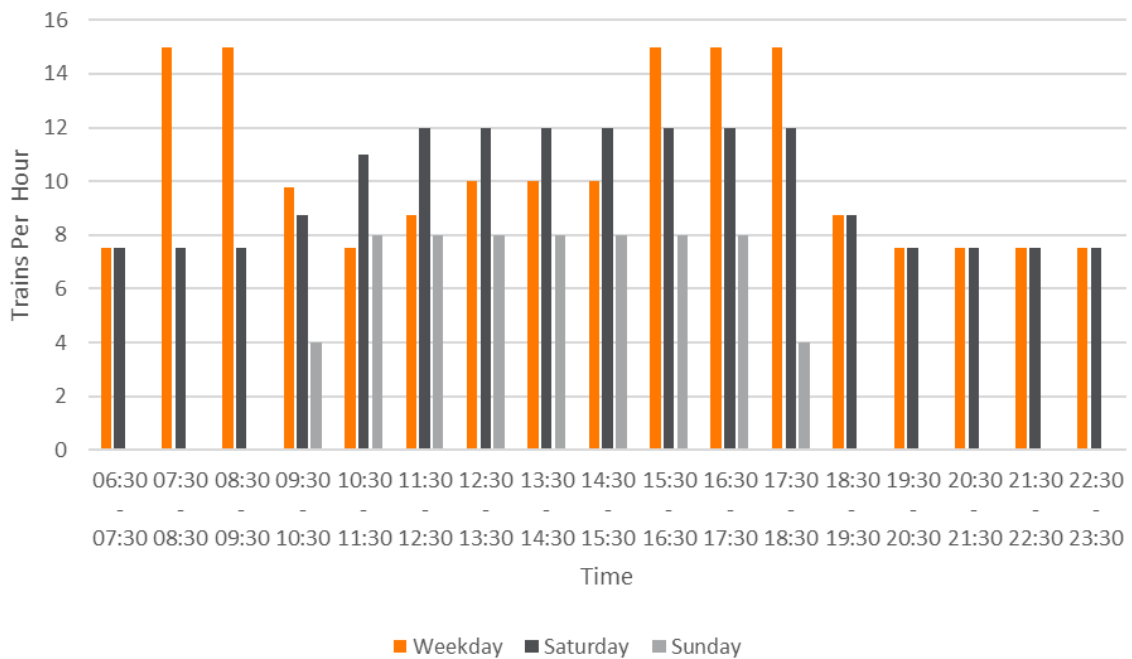
Figure 7.60 Subway Hourly Service Frequency by Day
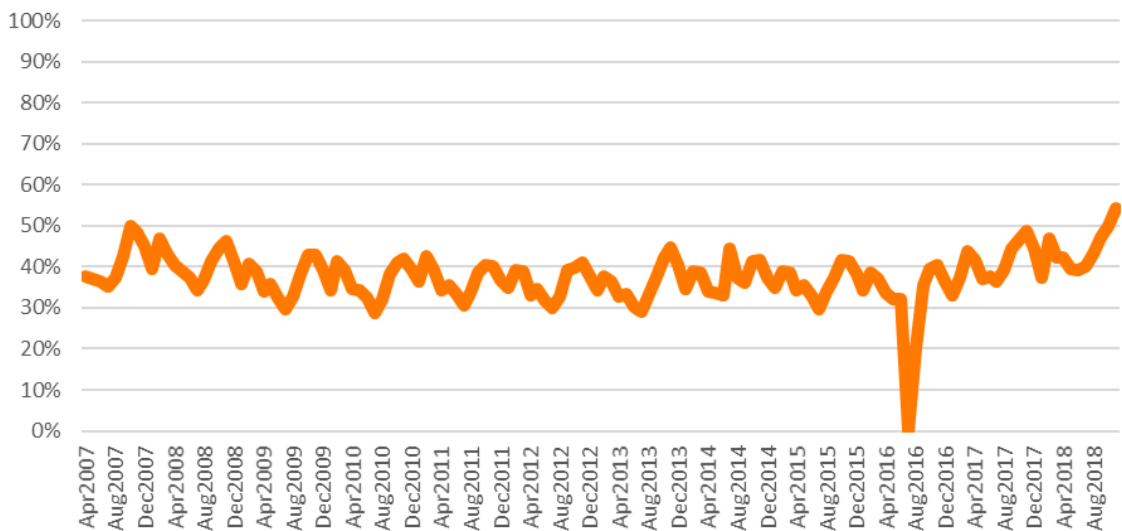
Figure 7.61 Subway Average Capacity Utilisation by Month 2007 – 2018

7.5.6   Finally, analysis was undertaken to examine the level of car park utilisation at the Park and Ride sites situated adjacent to Bridge Street, Kelvinbridge and Shields Road stations. This is outlined in Figure 7.62 although it is important to note that this only reflects car park entries and not exits so in some instances daily capacity could be exceeded by turnover. Therefore, levels of utilisation are likely to be lower than those shown.

7.5.7   Nonetheless a trend in increased usage of the Park and Ride sites between 2015 and 2018 can be observed. The drop in demand in 2016 can again be attributed to the closure for the Subway modernisation.

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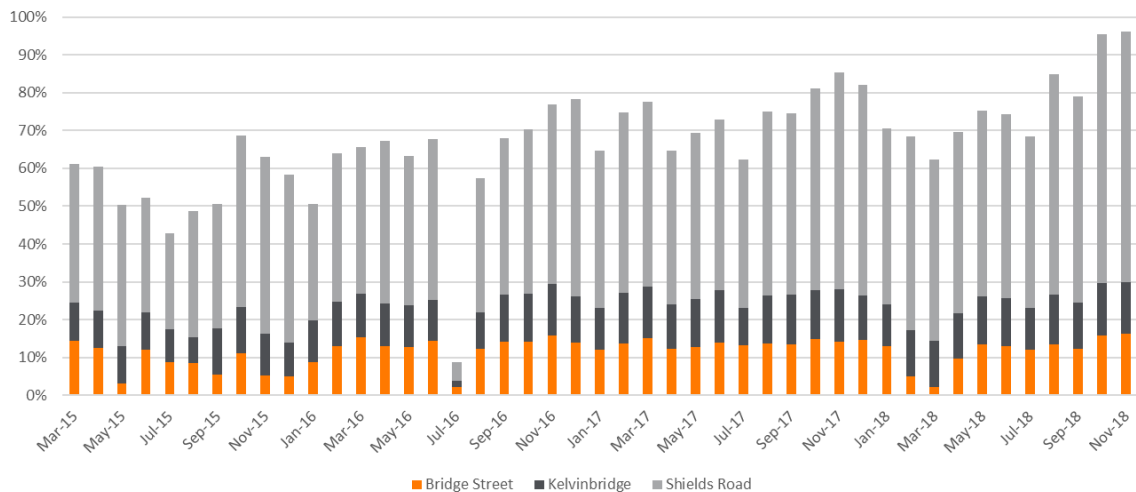
Figure 7.62 Average Monthly Park & Ride Utilisation at Subway Stations 2015 – 2018

KEY ISSUES

Demand for Subway services has been slowly declining with all stations except Kinning Park experiencing a decrease in passengers between 2008 and 2017.

Park and Ride utilisation has increased despite the underlying trend of decreasing overall patronage on the Subway.

7.6   Air

7.6.1   Glasgow Airport and Prestwick Airport are the two major airports located within the SPT area. Figure 7.63 shows the passenger demand at each between 2007 and 2017. It can be seen that demand decreased at Glasgow Airport between 2007 and 2010 during the financial crisis before consistently growing ever since.

7.6.2   However, the demand at Prestwick Airport has declined consistently from 2007 onwards with Glasgow Airport now handling ~9 million more passengers per annum than Prestwick Airport.
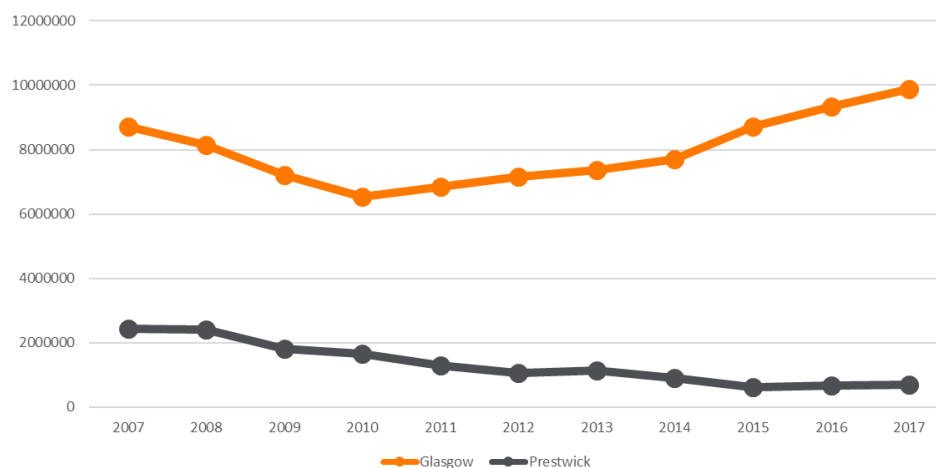
Figure 7.63 Airport Terminal Passengers Per Annum 2007 – 2017

7.6.3   Glasgow Airport serves over 160 destinations with the demand for the 30 routes with the highest passenger flows shown in Figure 7.64. Heathrow, Gatwick and Stansted account for ~2 million

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passengers per annum whilst the top 10 destinations generate ~4.6 million passengers per annum which is around 46% of total demand.
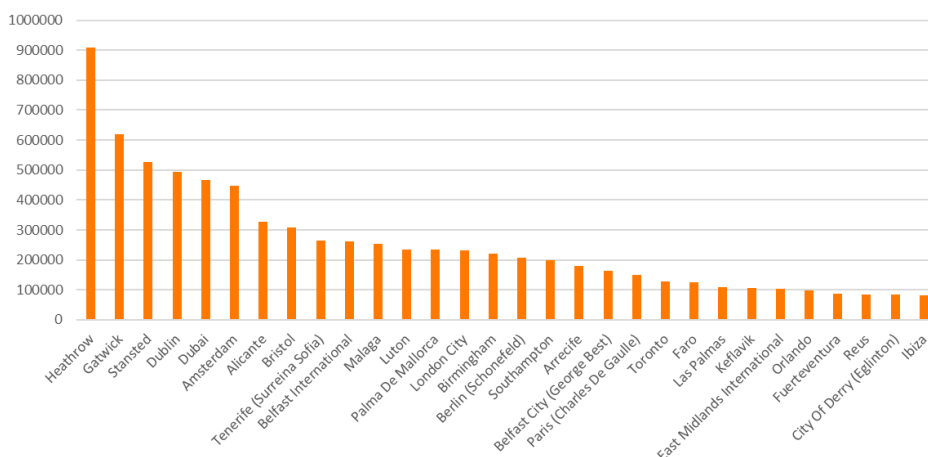
Figure 7.64 Glasgow Airport Passengers Per Annum by Route 2017

7.6.4   Prestwick Airport serves ~40 destinations with all the routes responsible for 1,000 or more passengers per annum shown in Figure 7.65. The top six destinations account for ~470,000 passengers which is around 66% of total demand. This highlights how dependent the airport is on a small number of routes and services.
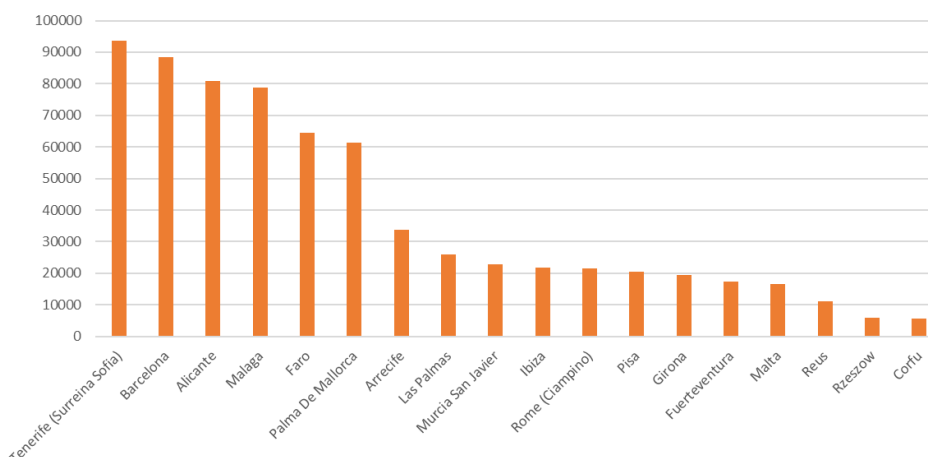
Figure 7.65 Prestwick Airport Passengers Per Annum by Route 2017

7.6.5   Glasgow Airport is well connected to the strategic road network as the M8 motorway provides road access by car, taxi and bus services. However, the strategic road network around the airport, the M8 and Glasgow city centre are all prone to congestion during peak periods. The airport is currently served by six bus services, including the First 500 direct shuttle between Glasgow city centre and the airport. There are no direct rail links to the airport. The nearest major station is Paisley Gilmour Street which is around 1.5 miles away.

7.6.6   The current mode shares for passengers travelling to or from Glasgow Airport are shown in Figure 7.66. This shows that it is heavily dependent on road-based transport with 99% of passengers using either car, hire car, bus or taxi.

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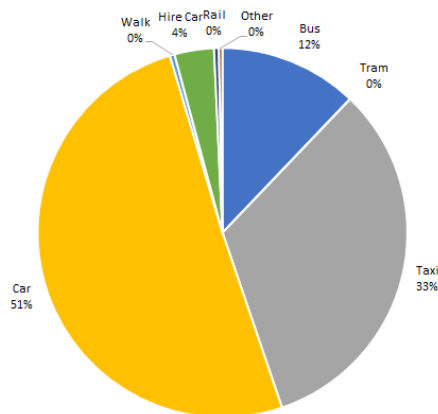
Figure 7.66 Mode of Transport Used by Passengers at Glasgow Airport 2015 – 2016

7.6.7   Prestwick Airport is the only airport in Scotland with its own railway station with 30% of passengers arriving at the airport by rail. It is also directly accessible from the motorway network via the M77[21].

KEY ISSUES

Glasgow Airport has experienced consistent growth in passenger demand from 2010 onwards whereas demand at Prestwick Airport has been declining since 2007.

Glasgow Airport is heavily dependent on road-based transport with no alternative forms of access and whilst Prestwick Airport has its own railway station the passenger demand has been declining.

7.7   Ferry

Routes & Service Frequencies

7.7.1   The ferry routes that operate either within or via at least one harbour in the SPT area include:

- **Ardrossan – Brodick (CalMac):** Passenger and vehicle service;

- **Ardrossan – Campbeltown (CalMac):** Passenger and vehicle service;

- **Claonaig / Tarbert – Lochranza (CalMac):** Passenger and vehicle service;

- **Largs – Cumbrae (CalMac):** Passenger and vehicle service;

- **Wemyss Bay – Rothesay (CalMac):** Passenger and vehicle service;

- **Gourock – Dunoon (Argyll Ferries – owned by CalMac):** Passenger only service;

- **Gourock McInroy's Point – Dunoon Hunter's Quay (Western Ferries):** Passenger and vehicle service;

- **Gourock – Kilcreggan (Clyde Marine on behalf of SPT):** Passenger only service; and

- **Renfrew – Yoker (Clyde Link):** Passenger only service.

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[21] Glasgow Prestwick Airport Strategic Plan 2017 - 2022

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7.7.2   Their frequencies are shown in Figure 7.67. The highest frequency is provided on the Largs –
Cumbrae route during the Summer although this halves in the Winter which reflects the
seasonal demand for the service.

7.7.3   Western Ferries provide the most frequent service on a year-round basis providing a vehicular
link between Gourock and Dunoon.
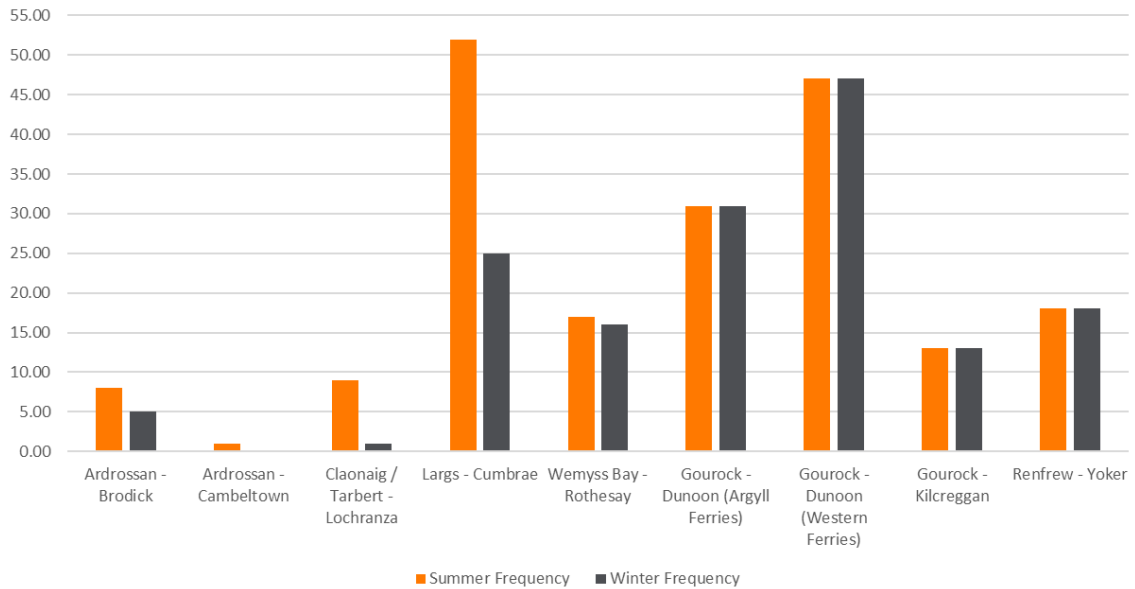
Figure 7.67 Ferry Service Frequencies

Demand, Crowding & Capacity

7.7.4   The change in passenger demand for ferry services in the SPT area is illustrated in Figure 7.68.
It can be seen that demand has remained reasonably constant on most services with the
exception of Wemyss Bay – Rothesay and the Gourock – Dunoon (Argyll Ferries) service where
a noticeable decline has occurred. In the case of the former this has been partially offset by the
introduction of cheaper fares in 2015 when Road Equivalent Tariff (RET) was introduced on the
route. This has also had a noticeable impact on the Ardrossan – Brodick, Claonaig / Tarbert –
Lochranza and Largs – Cumbrae demand which all increase after RET is implemented.

7.7.5   By far the highest passenger demand is on the Gourock – Dunoon (Western Ferries) route
which carries over a half a million more passengers per annum than the next busiest service
between Ardrossan and Brodick.

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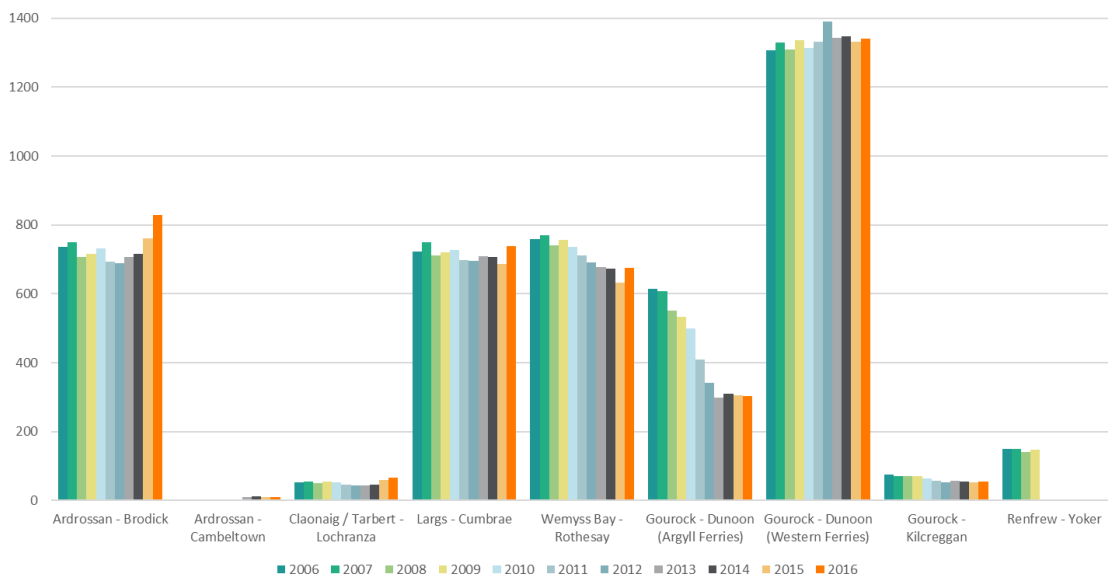
Figure 7.68 SPT Area Ferry Services Passenger Demand 2006 – 2016[22]

7.7.6   The change in vehicular demand on the services which carry them (or did previously) is shown in Figure 7.69. This again highlights the Gourock – Dunoon (Western Ferries) service as having by far the highest demand carrying three times more than the number of vehicles on the next busiest service between Ardrossan – Brodick.

7.7.7   Furthermore, the impact of the introduction of RET is even more pronounced leading to spikes in demand on all the CalMac routes after it was introduced in 2015.
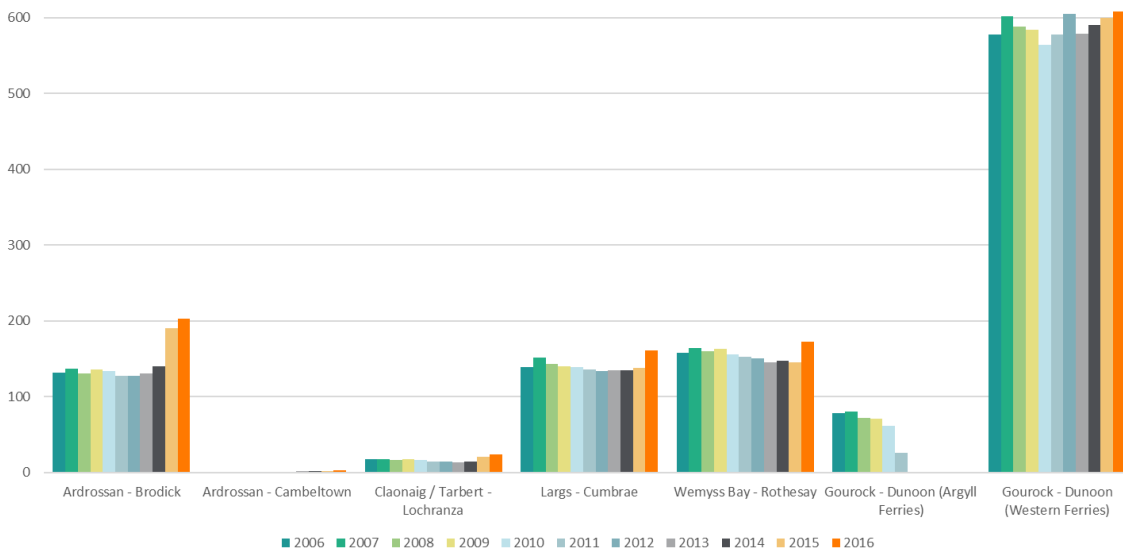
Figure 7.69 SPT Area Ferry Services Vehicle Demand 2006 – 2016[22]

7.7.8   In order to explore the capacity utilisation of ferry services we obtained sailing by sailing data from CalMac for their services over the past three years. Similar data was not available for the

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[22] Gourock – Dunoon (Argyll Ferries) was operated by Cowal Ferries between 2006 and 2010 then Argyll Ferries from 2011 onwards when it became passenger only.

Renfrew – Yoker was operated by SPT until 2009 then by Clyde Link from 2010 onwards. Passenger data is not available for the Clyde Link service.

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services provided by other operators and the following analysis consequently focuses on CalMac services only.

7.7.9   Figure 7.70 shows average passenger capacity utilisation which suggests that all services are operating with ample spare capacity throughout the year. However, when peak passenger demand is analysed as shown in Figure 7.71 it can be seen that all but two services have operated at or above theoretical peak capacity over the past three years. Only the Ardrossan – Campbeltown and Claonaig / Tarbert – Lochranza services have not experienced peak passenger demand at or above capacity.
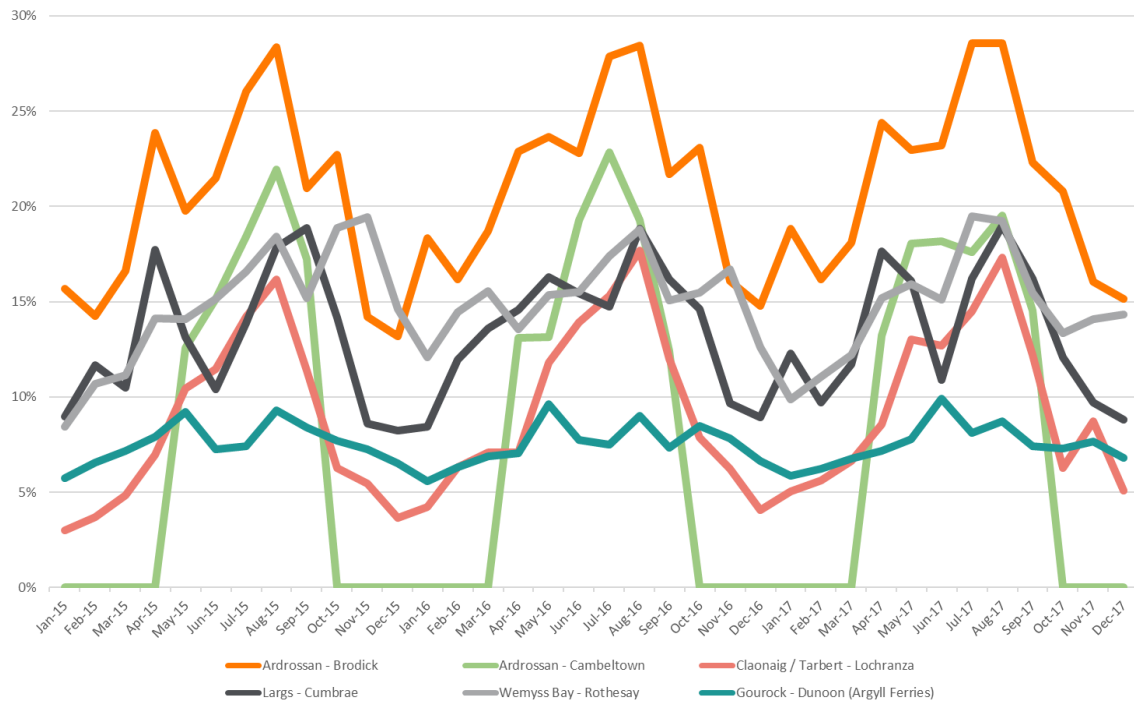
Figure 7.70 Average Passenger Capacity Utilisation for CalMac Ferry Services[23]

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23 The Ardrossan – Campbeltown service only operates in the Summer between May and September. The Wemyss Bay - Rothesay service operated from Gourock - Rothesay from October 2015 to March 2016 so the data for the two services has been combined.

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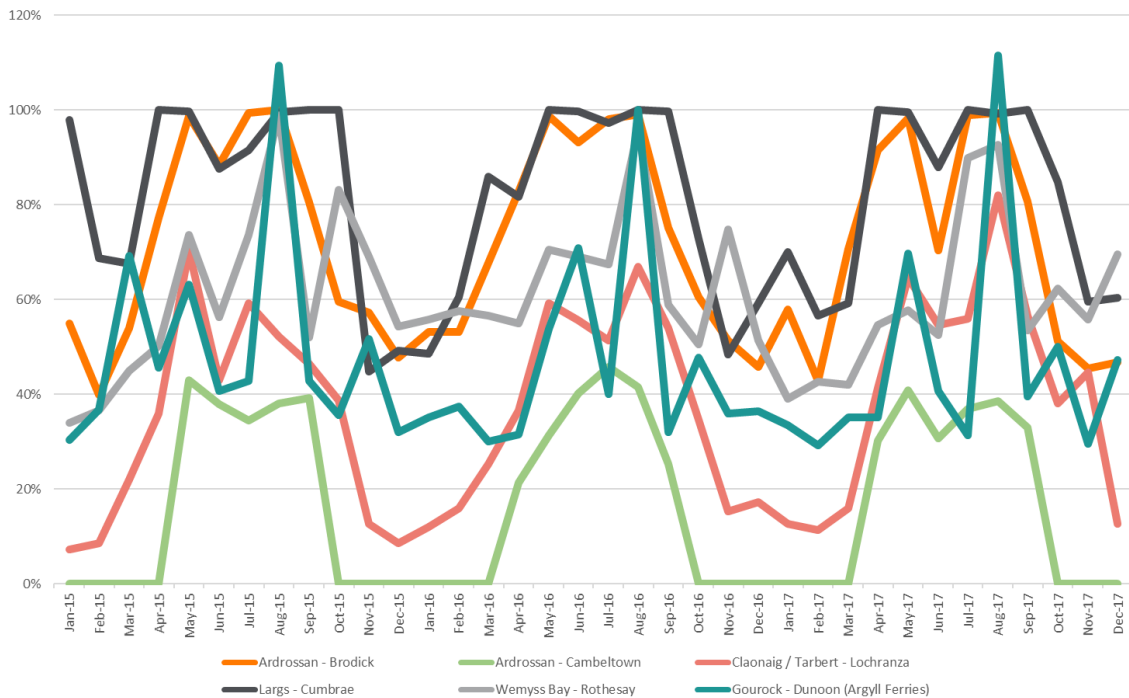
Figure 7.71 Peak Passenger Capacity Utilisation for CalMac Ferry Services[23]

7.7.10   Looking at the average vehicle capacity utilisation on the CalMac services which carry vehicles shown in Figure 7.72 suggests that no services have a shortage of capacity. The highest levels of utilisation can be seen on the Ardrossan – Brodick service which is frequently at 60% of capacity or greater.

7.7.11   When peak vehicle capacity utilisation is examined in Figure 7.73 though it can be seen that all CalMac ferry services operate at or above theoretical capacity. This is a particular issue on the Ardrossan – Brodick, Largs – Cumbrae and Wemyss Bay – Rothesay services which all regularly exceed theoretical capacity.

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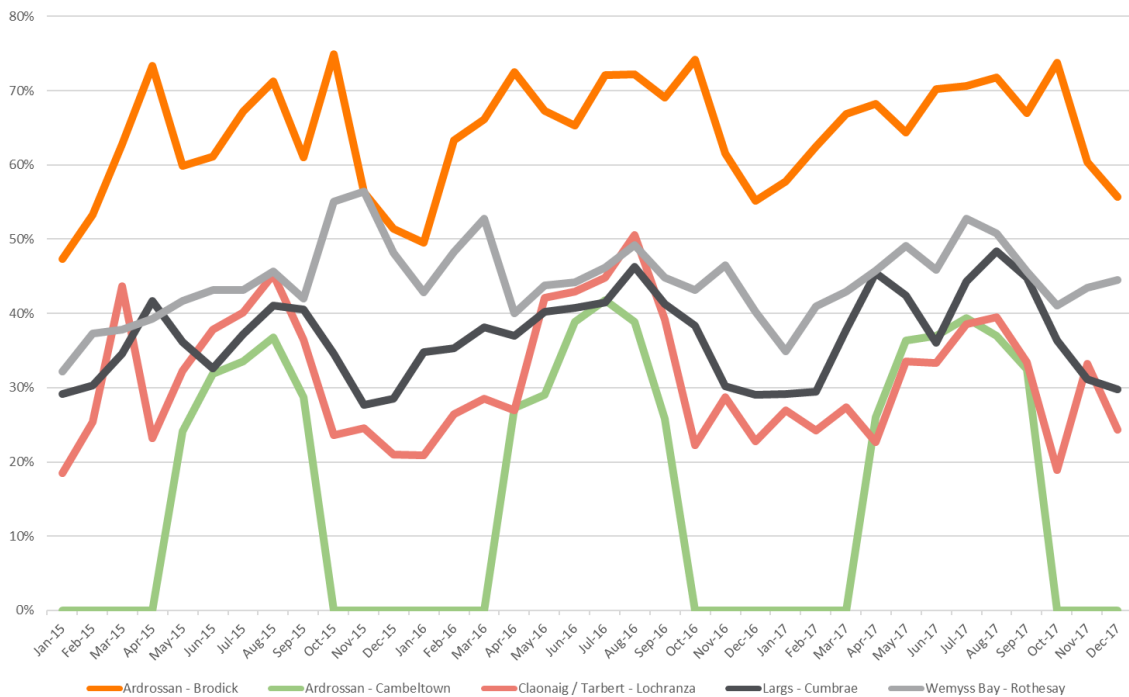
Figure 7.72 Average Vehicle Capacity Utilisation for CalMac Ferry Services (% of PCUs)[23]
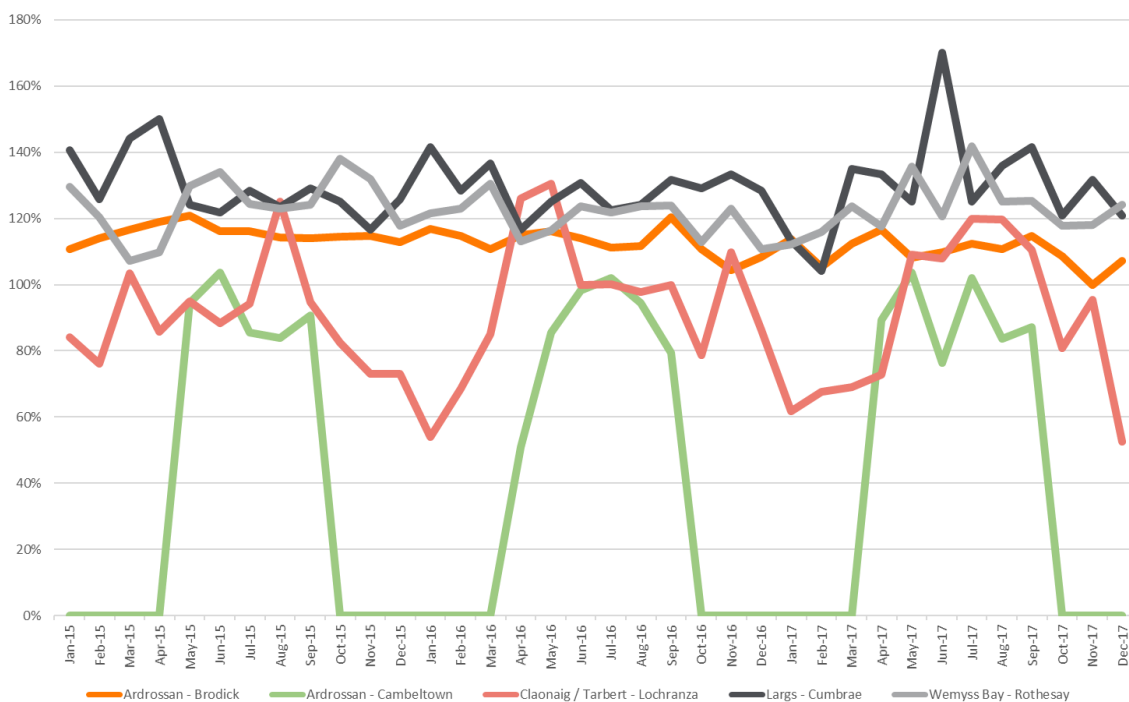
Figure 7.73 Peak Vehicle Capacity Utilisation for CalMac Ferry Services (% of PCUs)[23]

Departure Times

7.7.12 The analysis summarised in Figure 7.74 shows the maximum potential time on the mainland (ToM) and time on the island (ToI) that the ferry services allow based on their first and last departure times in the 2018/19 timetable data. It should be noted that where neither end of the service connects to an island the more remote area is considered as the 'island' in the analysis.

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7.7.13   In addition, where variations exist between weekdays we have chosen the day that provides the longest ToM or ToI respectively.

7.7.14   Only the CalMac services provide differing levels of ToM and ToI between the Summer and Winter which reflects the seasonal demand on the services. The lowest ToM and ToI is provided by the Claonaig / Tarbert – Lochranza service which falls as low as 6 hours 40 minutes in the Winter.

7.7.15   All other services provide sufficient time to undertake a working day albeit this does not take into account any travel time to or from the harbour. The greatest ToM and ToI are provided by the Gourock to Dunoon services operated by Argyll Ferries and Western Ferries respectively.

7.7.16   In the case of the Ardrossan – Campbeltown service this only operates once a day in a single direction at the end of the week during the Summer. It therefore necessitates an overnight stay in either location so no comparable ToM or ToI figure can be calculated.
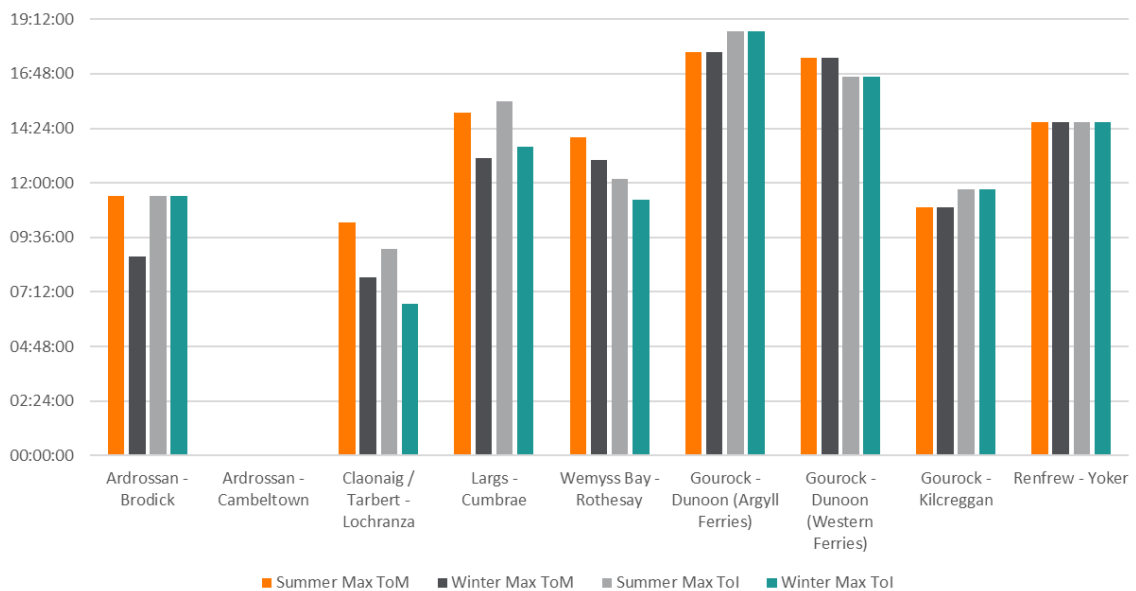
Figure 7.74 SPT Area Ferry Services - Maximum Time on Mainland and Time on Island

Cancellations and Delays

7.7.17   Drawing upon the sailing by sailing data provided by CalMac as well as data provided by SPT for the Gourock – Kilcreggan route we examined the proportion of total scheduled services which were cancelled as shown in Figure 7.75. Most routes have a cancellation rate which is typically under 20% although performance on the Gourock – Kilcreggan route has varied.

7.7.18   The highest cancellation rate is upon the Ardrossan – Campbeltown route but this needs to be considered in the context of the small number of services that operate in comparison to the other routes. For example, in April 2015 100% of services were cancelled but only 1 was scheduled so the absolute number was very small. Overall, the analysis suggests that there are no chronic problems with cancelled services on any of the routes but that there are short periods when the level of cancellations is likely to adversely affect user's accessibility.

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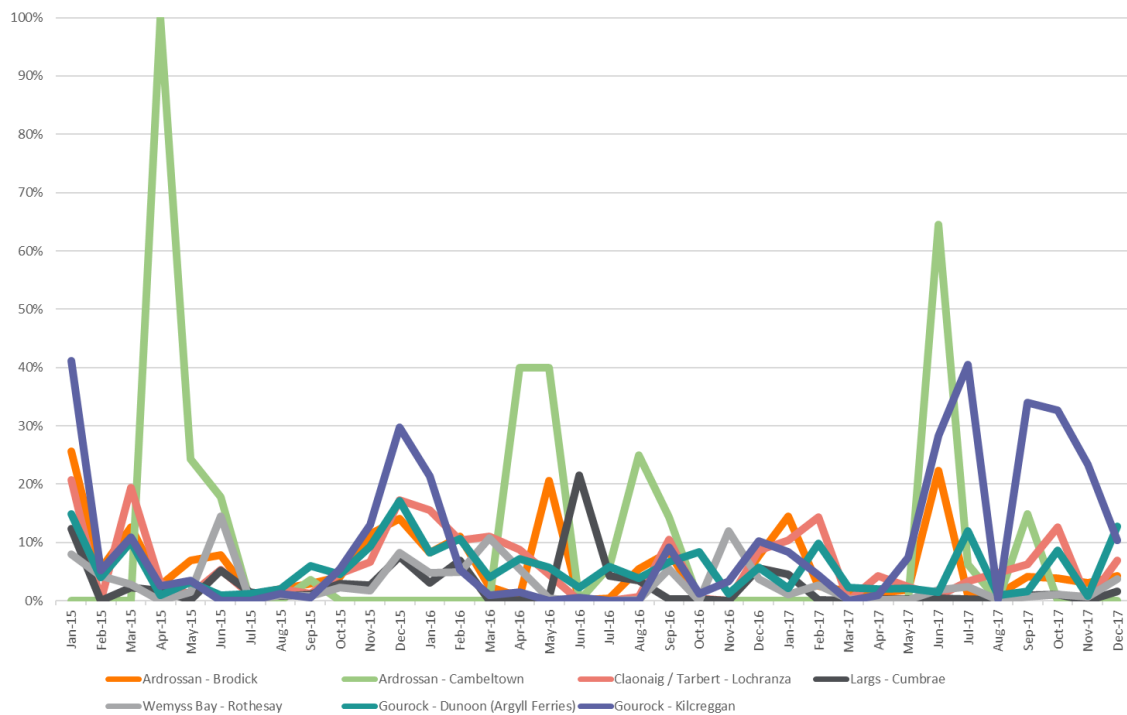
Figure 7.75 Percentage of Scheduled CalMac and SPT Ferry Services that are Cancelled[23]

7.7.19 Figure 7.76 examines the percentage of total scheduled CalMac ferry services that experienced delays. It can be seen that the Ardrossan – Brodick route and Wemyss Bay – Rothesay route both suffer from regular delays with each route typically having 20% or more of scheduled services delayed.

7.7.20 Between October 2015 and March 2016 the route to Rothesay was operating from Gourock and it can be seen that significant problems with delays were experienced between October and December 2015. Since then the levels of delay have reduced and are consistently lower although still at a level that could cause regular inconvenience to passengers.

7.7.21 The Ardrossan – Brodick route has the longest journey time of all services with the exception of the Ardrossan – Campbeltown route making it more likely to be subject to small delays. This is unlikely to cause major disruption to passengers although longer delays would impact on the ability of passengers to make connecting train services from Ardrossan Harbour. Similarly, ferry passengers at Wemyss Bay also connect with train services and large delays would also impinge on their ability for onward travel.

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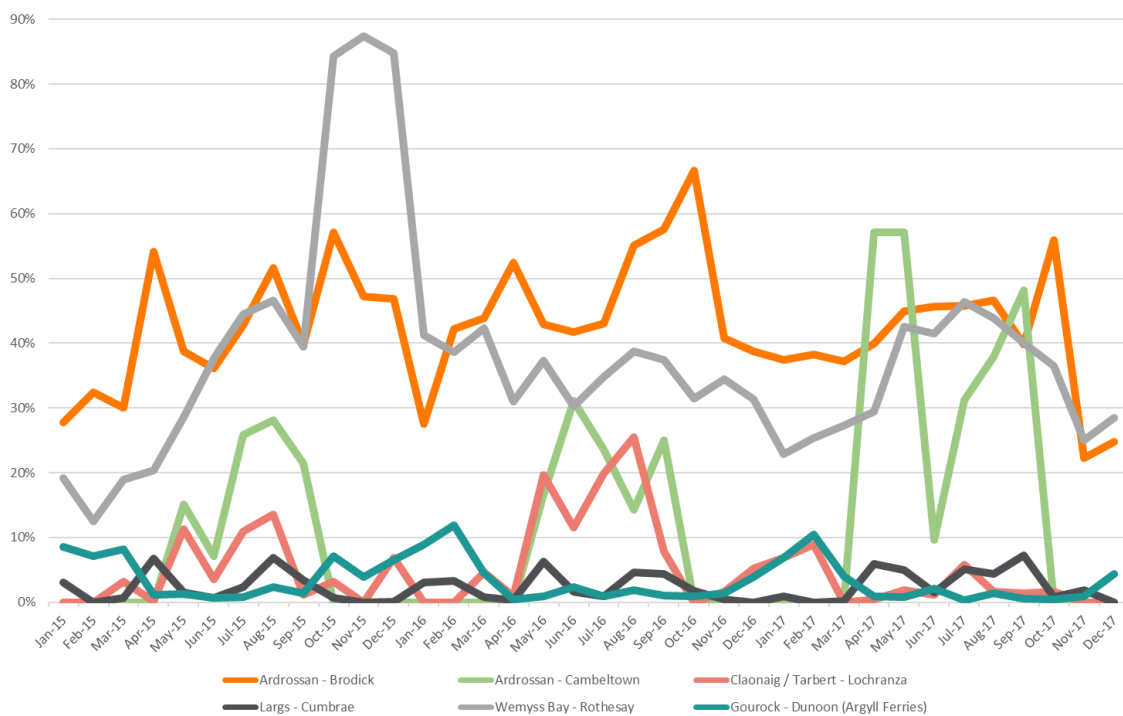
Figure 7.76 Percentage of Scheduled CalMac Ferry Services that are Delayed[23,24]

KEY ISSUES

The Gourock – Dunoon service provided by Western Ferries is by far the busiest in the SPT area reflecting the regular service and long operating hours it offers on a year round basis.

The introduction of RET fares has increased passenger and vehicular demand on all CalMac services in the SPT area.

Peak demand has been seen to exceed capacity on Ardrossan – Brodick, Largs – Cumbrae, Wemyss Bay – Rothesay and Gourock – Dunoon (Argyll Ferries) ferries over the past three years.

Service cancellations are not a chronic problem but the majority of CalMac routes and SPT's Gourock – Kilcreggan service undergo short periods where the culmination of cancellations may impact on the accessibility of users.

Delays are a persistent problem on the Ardrossan – Brodick and Wemyss Bay – Rothesay routes.

7.8 Freight

7.8.1 Drawing upon readily available data high level analysis of road, air and sea freight demand has been undertaken.

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[24] Excludes services which operated but were not timetabled. Includes services that were diverted or returned to the departing port.

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Road Freight

7.8.2   Figure 7.77 shows that the SPT area is responsible for the highest proportions of freight lifted in Scotland both for those journeys that start in the area and end in it accounting for around a third of each.

7.8.3   Looking at freight lifted in the SPT area shown in Figure 7.78 it can be seen that almost three quarters of journeys started in or ended in the SPT area itself. Beyond this only the SEStran area accounts for more than a negligible amount. This clearly demonstrates that the majority of road freight demand in the SPT area is intra-regional.
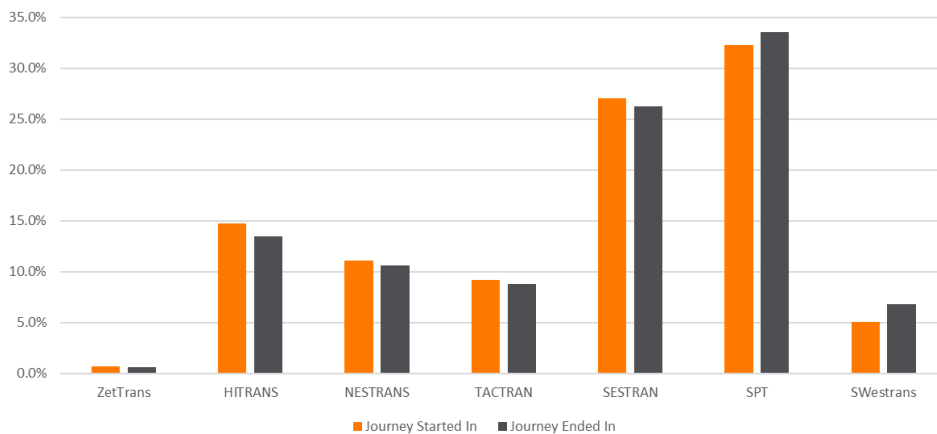
Figure 7.77 Average Freight Lifted in Scotland by UK HGVs 2012 – 2016
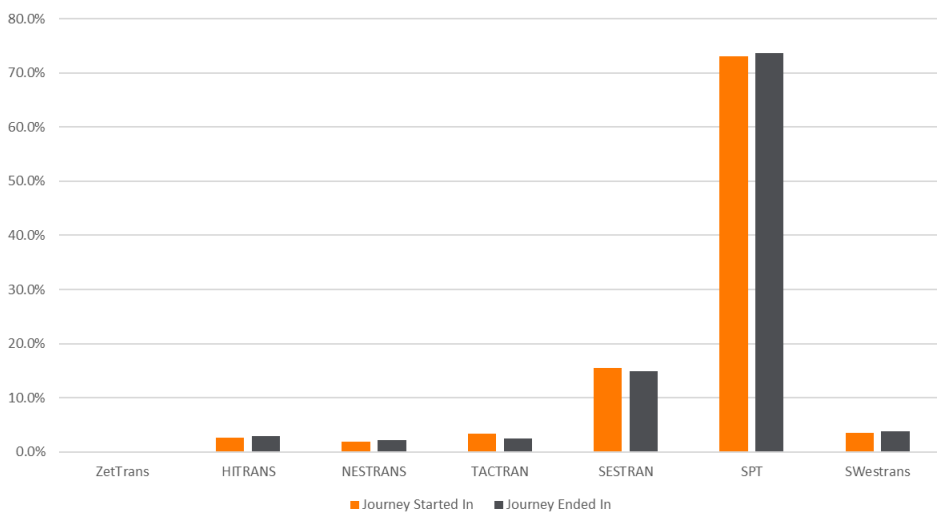
Figure 7.78 Average Freight Lifted in SPT Area by UK HGVs 2012 – 2016

Air Freight

7.8.4   The trend in air freight at airports within the SPT area is shown in Figure 7.79.The total amount of freight handled has decreased from almost 36,000 tonnes in 2007 to just over 27,000 tonnes in 2017. In addition, there has been a significant change in the composition of this demand with Glasgow Airport having overtaken Prestwick Airport as the region's main freight airport.

7.8.5   The implications of this trend will be less demand for the movement of freight to and from Prestwick Airport with an increased demand on the surface access network serving Glasgow Airport.

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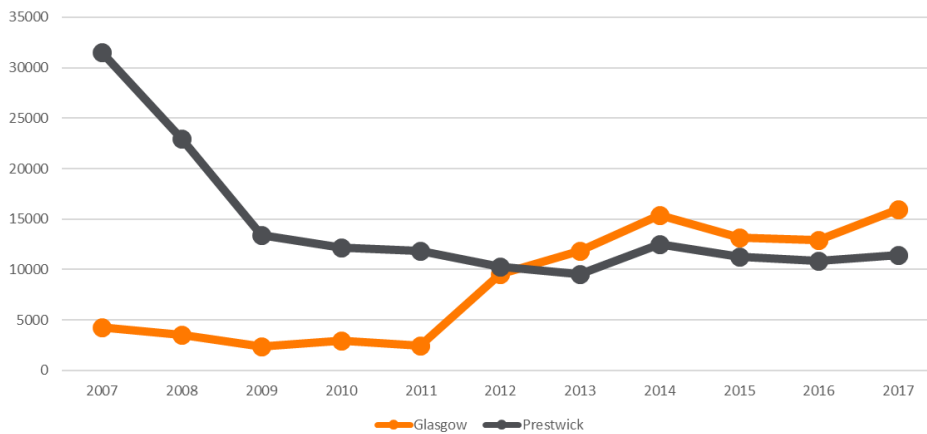
Figure 7.79 Air Freight (Tonnes) 2007 – 2017

Sea Freight

7.8.6   Data on sea freight is aggregated with the Clyde Ports grouping covering all the facilities in the SPT area. Figure 7.80 shows the composition of demand at Clyde Ports where it can be seen that total tonnage has reduced by ~6,200 thousand tonnes (42%) between 2006 and 2016. However, it is also apparent that there is variability in freight demand with the highest tonnage reported in 2014. There appears to be no obvious trend to the total demand or the composition of demand although it is worth noting that the closure of Longannet Power Station in 2016 is the likely cause of the decline in dry bulk traffic as much of the coal it used was landed at Hunterston in Ayrshire.
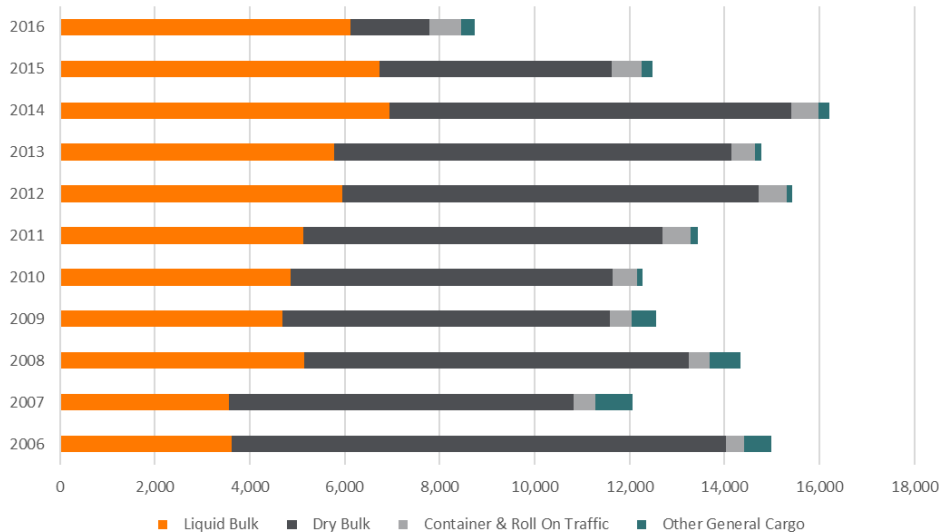
Figure 7.80 Clyde Ports Freight Composition (Thousand Tonnes)

7.8.7   In Figure 7.81 the percentage of total freight at Scottish ports conveyed through Clyde Ports is shown. It is clear that the SPT area plays an important role with regards to foreign imports accounting for 52% of the total.

7.8.8   Foreign exports generate the largest freight tonnages through Scottish ports creating 52% of total freight tonnage. Clyde Ports only play a small role within this accounting for just 4% of the Scottish total. Overall, the ports in the SPT area account for only 14% of total tonnage through Scottish ports. The tonnage and breakdown of this demand is shown in Figure 7.82.

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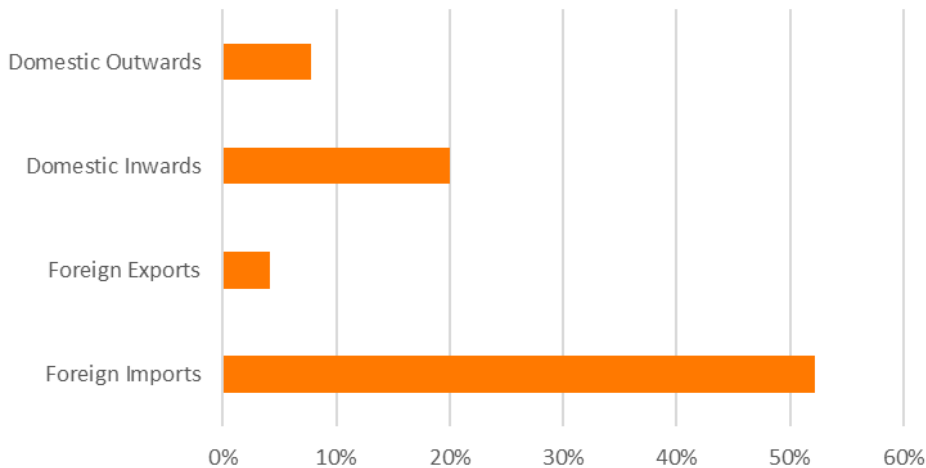
Figure 7.81 Clyde Ports Percentage of Total Scottish Ports Freight 2016
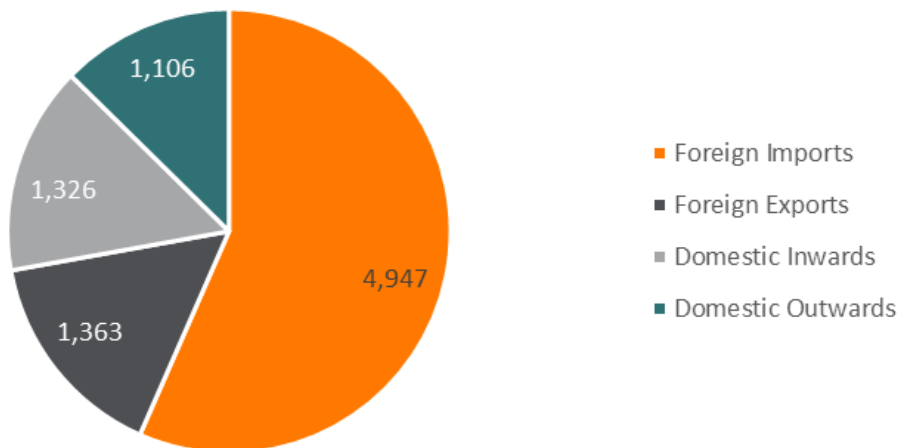
Figure 7.82 Clyde Ports Foreign and Domestic Freight (Thousand Tonnes) 2016

KEY ISSUES

Road freight is largely self-contained within the SPT area suggesting demand is primarily regional in nature.

Whilst both airports in the SPT area cater for freight traffic Glasgow Airport has overtaken Prestwick Airport as the primary freight airport in recent years.

Sea freight in the SPT area accounts for a small proportion of total tonnage passing through Scottish ports. Demand has fluctuated with no clear trend developing but a decline in dry bulk freight can likely be attributed to the closure of Longannet Power Station as much of the coal it used was landed at Hunterston in Ayrshire.

7.9   Cycling

Network

7.9.1   The National Cycling Network (NCN) is managed by Sustrans. In 2017 there was 286 km of NCN in the SPT area, which is about 12% of the total Scottish NCN kilometres. There are 8 routes in the SPT area including:

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- **NCN Route 7:** Sunderland – Inverness via Ayrshire, Renfrewshire, Glasgow and West Dunbartonshire;

- **NCN Route 73:** Lochranza – Brodick – Ardrossan – Kilmarnock;

- **NCN Route 74:** Gretna – Glasgow via South Lanarkshire;

- **NCN Route 75:** Leith – Argyll via North Lanarkshire, Glasgow, Renfrewshire and Inverclyde;

- **NCN Route 754:** Glasgow – Edinburgh via Forth and Clyde Canal, Falkirk, and Union Canal;

- **NCN Route 755:** Kirkintilloch – Strathblane;

- **NCN Route 756:** Glasgow – East Kilbride; and

- **NCN Route 753:** Gourock – Ardrossan. This is a future route with only the Gourock – Inverkip and West Kilbride – Ardrossan currently open.

7.9.2   These routes are shown indicatively in Figure 7.83 which also highlights connections to other parts of Scotland.

7.9.3   In addition, the SPT area has around 300 miles worth of the Scotland's Great Trails network within it. These are nationally promoted trails for non-motorised journeys which include all or parts of the Clyde Walkway, River Ayr Way, Ayrshire Coastal Path, John Muir Way, Southern Upland Way, West Highland Way and Three Lochs Way.

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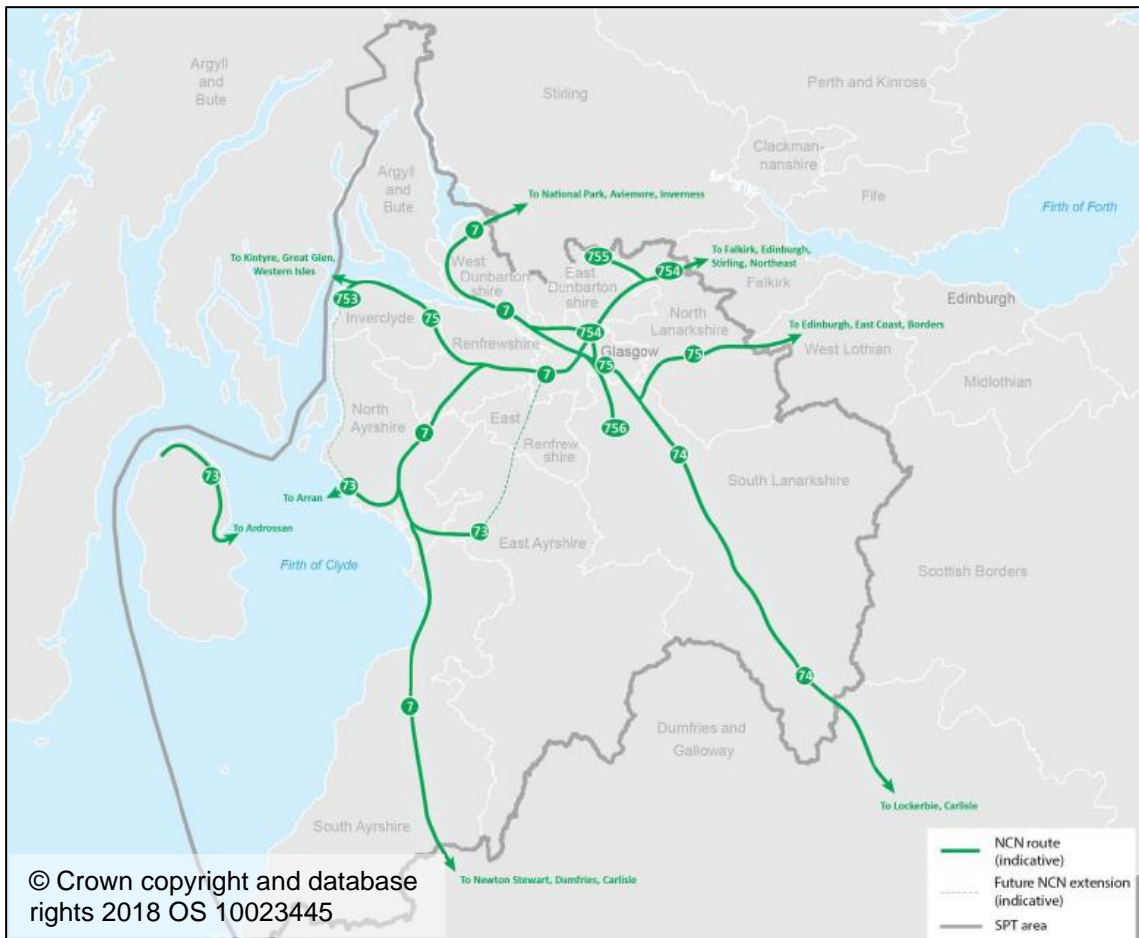
Figure 7.83 National Cycle Network Routes in SPT Area

Demand

7.9.4   SPT have previously undertaken analysis of cycle trip generation drawing upon Census Travel to Work data from 2011. Figure 7.84 shows cycle trips up to 8km[25] with a minimum number of 6 trips between data zone pairs. This threshold was identified as the maximum distance for shorter trips (up to 30 minutes) where cycling is a viable option if suitable infrastructure is provided.

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[25] Distance measured between data zone centroids. For larger rural or industrial data zones the distance may be skewed, especially if work locations are focussed in a small part of the zone.

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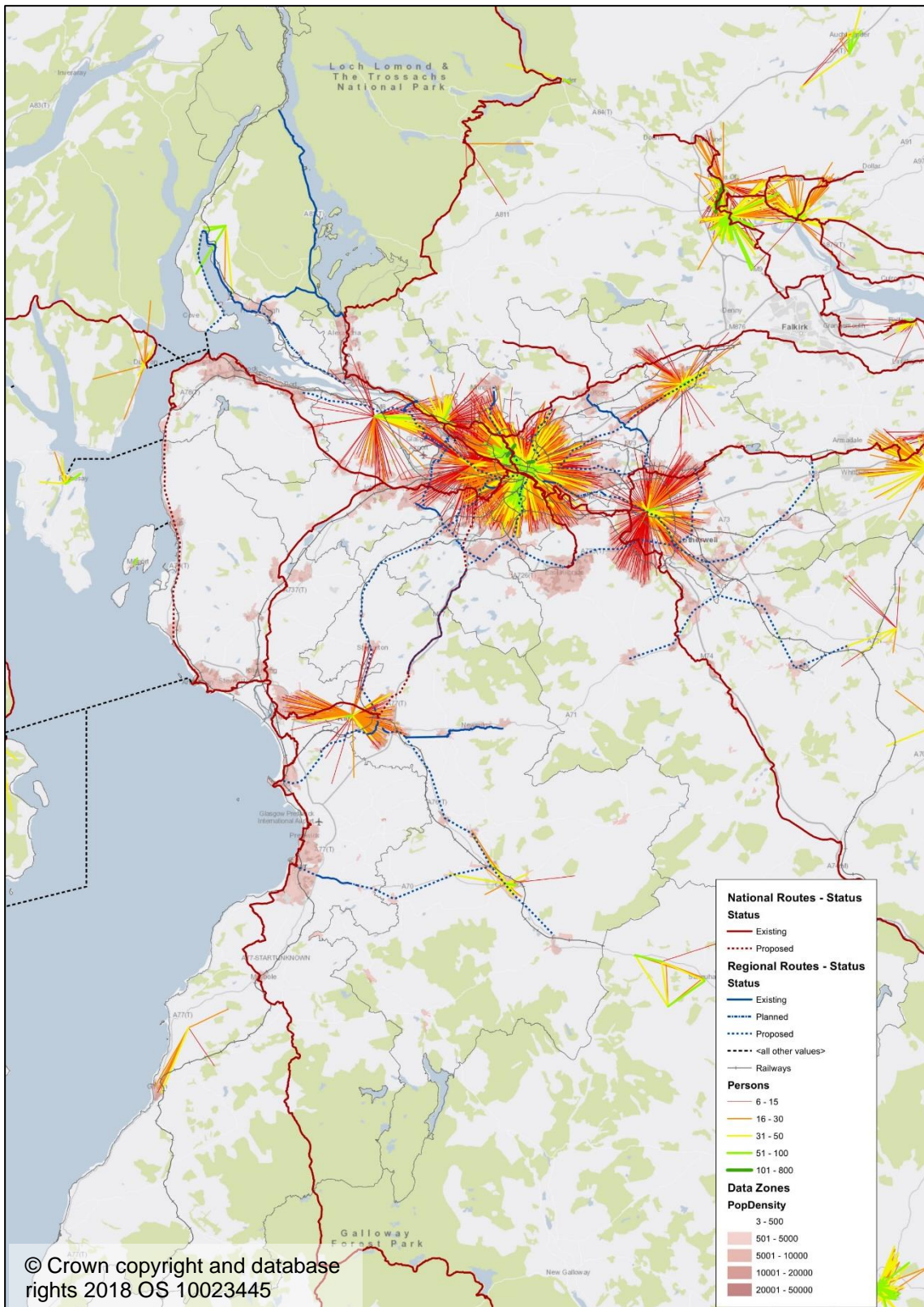
Figure 7.84 Cycle Trip Generation Up To 8km 2011

7.9.5   The analysis identified the key cycle trip attractors in the region as:

▪   Glasgow City Centre;

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- Glasgow University of Glasgow;

- Glasgow Shieldhall (Queen Elizabeth University Hospitals);

- Clydebank Town Centre;

- Inchinnan / Erskine (likely: Inchinnan Business Park & HP Campus Erskine);

- Garelochhead (Faslane);

- Cumbernauld Central;

- Bellshill Fallside (Strathclyde Business Park);

- Kilmarnock Crosshouse (University Hospital);

- Cumnock;

- Carrick South Girvan (likely: Turnberry Golf Resort & Hotel – limited numbers);

- Carstairs (State Hospital, limited numbers); and

- Biggar (limited numbers).

7.9.6   For longer trips a combination of cycling / walking and public transport should be considered. Figure 7.85 shows cycle trips up to 8km with a minimum number of 16 trips between data zone pairs.

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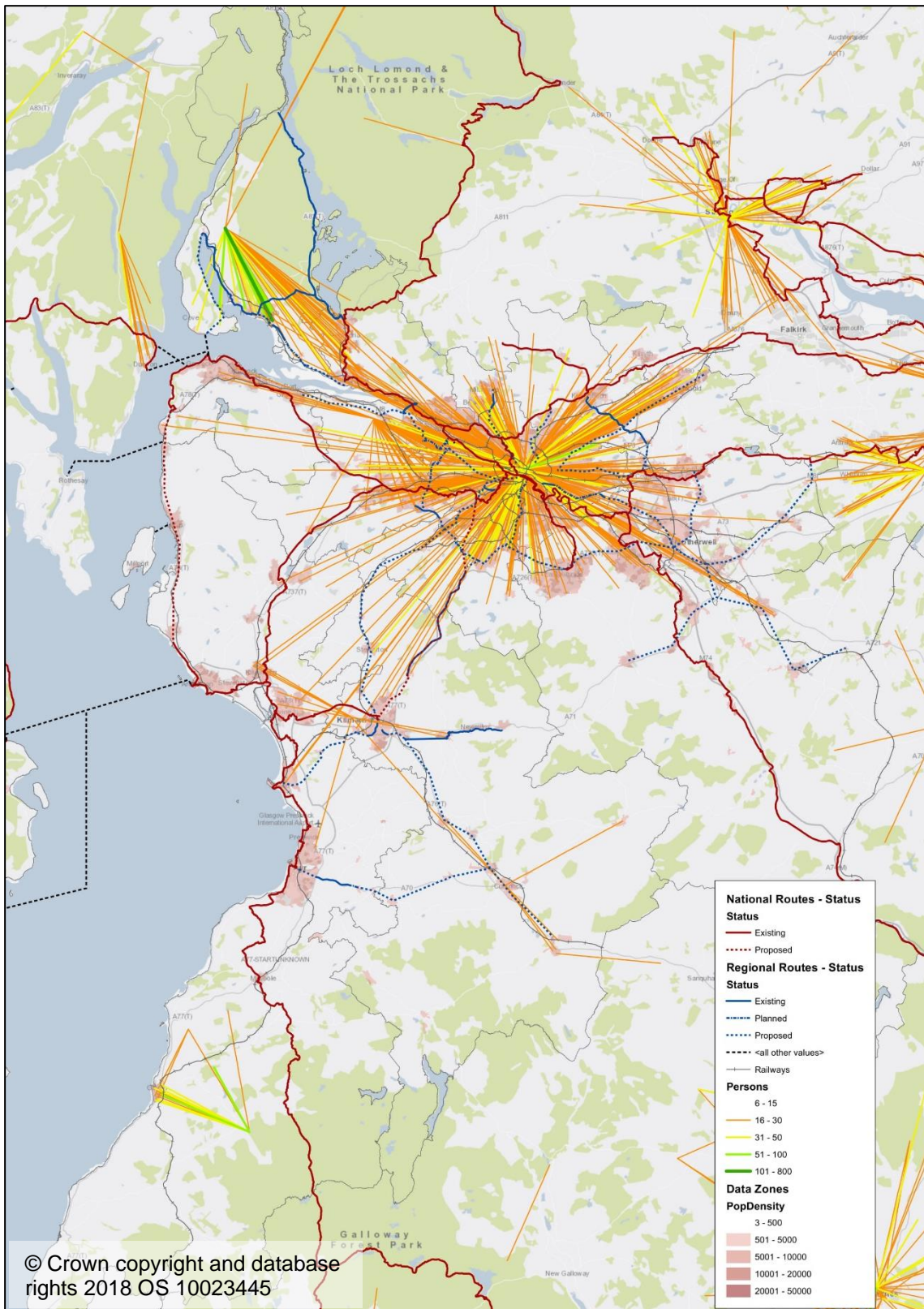
Figure 7.85 Cycle Trip Generation over 8km 2011

7.9.7   This illustrated the key cycle trip attractors for trips over 8km as:

- Glasgow City Centre;

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- Inchinnan / Erskine;

- Garelochhead (Faslane);

- Kilmarnock Crosshouse (University Hospital); and

- Carrick South Girvan (limited numbers).

KEY ISSUES

Cycle demand for travel to work is predominantly for journeys up to 8km and there are several locations identified as key attractors for these journeys. There is consequently an opportunity to develop enhanced cycle infrastructure focussed upon the routes where demand is greatest.

7.10 Summary

7.10.1 The analysis has identified the key travel patterns and associated issues in the SPT area as:

Road

Traffic growth on the strategic road network has been primarily focussed upon the motorway network with both the M74 Completion and M80 Upgrade contributing to this.

On both Trunk and Non-Trunk A roads traffic flows have remained broadly stable with some local instances of both increases and reductions in demand.

Modelling suggests that traffic flows on motorways will increase but the most notable growth will be on the local road network. However, it is important to note that flows may be more dispersed in reality as the modelled road network excludes many minor local roads.

The greatest traffic growth is forecasted to occur around Greater Glasgow.

Forecasting suggests much of the strategic and local road network across Greater Glasgow will be operating over practical capacity in 2042. It also suggest that capacity will be exceeded on the wider network across Strathclyde which was not evident in 2014.

Analysis of average speeds provides an indication of congestion problems but modelled data suggests more widespread issues than observed data. Based on the observed data most congestion occurs on the motorway network including M77, M8 at Glasgow Airport and Alexandra, M80 and M74. The greatest variance between modelled and observed data appears to be on the M8.

Modelling suggests more congestion on the local road network in the future which is consistent with the anticipated increase in flows. However, this needs to be considered in the context of the more widespread problems suggested in the base than demonstrated by the observed data.

Rail

Train service frequencies across the SPT area are lowest in peripheral and rural areas including the coast of North Ayrshire and Inverclyde as well as rural South Ayrshire, East Ayrshire, Lanarkshire and Argyll and Bute.

Beyond these areas train frequencies can generally be considered to be sufficiently regular as to offer a 'turn up and go' level of service.

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The first and last departure times from each station suggest that there are good levels of early morning and late night accessibility although some local issues relating the first or last departure to particular destinations may exist.

The reliability of services across the SPT area has typically been declining over time with increased variability and lower performance being exhibited. The routes demonstrating the lowest levels of performance are Argyle, Glasgow North, Motherwell – Cumbernauld and Shotts.

Demand at the vast majority of train stations has been increasing over the past 20 years with some now experiencing 10 times or more demand.

Passenger demand is expected to exceed capacity at peak periods on the North Suburban, Ayrshire, Inverclyde and East Kilbride routes by 2023/24. Network Rail have put forward potential solutions to provide additional capacity to accommodate this demand.

Growth in demand will also impact upon the already capacity constrained Glasgow Central station. Network Rail have identified options to alleviate this but all are challenging and likely to require significant investment.

The need for increased Park & Ride capacity is expected in line with growth in demand for rail services.

Bus

Bus service provision is declining at a significantly steeper rate within the SPT area than across the rest of Scotland. There has also been a sizeable increase in subsidised bus mileage whilst commercial bus mileage has declined. This is indicative of an increasing requirement of the public sector to subsidise more bus services which will continue to grow if current trends continue. Furthermore, this will likely lead to an overall decline in public transport accessibility.

These trends are also reflected in a decline in bus station departures over recent years.

Variations in journey times are more acute in the AM peak than the PM peak with greatest variability on the motorway network. The analysis also suggests that the bus network on the west side of Glasgow is more subject to journey time variability than that in the east with the M8 west of the city centre being particularly notable as experiencing regular variability.

Bus average speeds typically vary in line with tidal commuting flows with slower inbound journeys in the AM peak and outbound journeys in the PM peak. The main exception to this is A761 Paisley Road West corridor to Johnstone and M8 between the city centre and Glasgow Airport which exhibits slower inbound than outbound speeds in both the AM and PM peak.

Subway

Demand for Subway services has been slowly declining with all stations except Kinning Park experiencing a decrease in passengers between 2008 and 2017.

Park and Ride utilisation has increased despite the underlying trend of decreasing overall patronage on the Subway.

Air

Glasgow Airport has experienced consistent growth in passenger demand from 2010 onwards whereas demand at Prestwick Airport has been declining since 2007.

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Ferry

The Gourock – Dunoon service provided by Western Ferries is by far the busiest in the SPT area reflecting the regular service and long operating hours it offers on a year round basis.

The introduction of RET fares has increased passenger and vehicular demand on all affected services in the SPT area.

Peak demand has been seen to exceed capacity on Ardrossan – Brodick, Largs – Cumbrae, Wemyss Bay – Rothesay and Gourock – Dunoon (Argyll Ferries) ferries over the past three years.

Service cancellations are not a chronic problem but the majority of CalMac routes and SPT's Gourock – Kilcreggan service undergo short periods where the cumulation of cancellations may impact on the accessibility of users.

Delays are a persistent problem on the Ardrossan – Brodick and Wemyss Bay – Rothesay routes.

Freight

Road freight is largely self-contained within the SPT area suggesting demand is primarily local in nature.

Whilst both airports in the SPT area cater for freight traffic Glasgow Airport has overtaken Prestwick Airport as the primary freight airport in recent years.

Sea freight in the SPT area accounts for a small proportion of total tonnage passing through Scottish ports. Demand has fluctuated with no clear trend developing but a decline in dry bulk freight can likely be attributed to the closure of Longannet Power Station as much of the coal it used was landed at Hunterston in Ayrshire.

Cycling

Cycle demand for travel to work is predominantly for journeys up to 8km and there are several locations identified as key attractors for these journeys. There is consequently an opportunity to develop enhanced cycle infrastructure focussed upon the routes where demand is greatest.

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8 Future Forecasts

8.1 Introduction

8.1.1 In addition to understanding the current socio-economic context and transport demand in the SPT area it is also essential to develop an understanding of the potential future situation as well.

8.1.2 The demand for transport will be influenced by socio-economic factors which determine where people live, where they work and changes in the scale and composition of the population. On that basis, the following socio-economic drivers were identified as being central to understanding the future context for the SPT area:

- **Demographics**: the size of the population, its composition and where it is located;

- **Economy**: planned changes in the scale, type and distribution of economic activity; and

- **Land-use Development**: the way in which the first two drivers will be manifested in terms of developments on the ground.

8.1.3 The transport impacts of these socio-economic drivers will be manifested through:

- **Demand and Congestion**: the anticipated performance of transport networks and services without interventions;

- **Proposed and Committed Transport Schemes**: projects and interventions that are currently being taken forward which will impact upon the future performance of the transport network;

- **National Targets**: policies which will influence the direction and context within which the RTS must sit as well as making a contribution to their delivery; and

- **Transport Innovation**: market disrupting innovations which could change the way people travel in the future.

8.1.4 The rest of this chapter explores each of these aspects in detail to provide the future context for the development of the RTS.

8.2 Demographics

8.2.1 National Records of Scotland (NRS) produce population forecasts based upon migration trends as well as births and deaths. The latest forecasts are based upon 2016 mid-year population estimates and are broken down to a local authority level. The forecasts cover the period to 2041 but for the purposes of this analysis we have focussed primarily upon the horizon years of 2026 and 2036 being 10 and 20 years from the base date respectively and more closely aligned to the period covered by the RTS.

8.2.2 It should be noted the NRS forecasts take no account of economic drivers of population. For example, if a major employer moves from an area or enters a new location this could draw people to move home as a result, but these impacts are not modelled for NRS forecasts.

8.2.3 Figure 8.1 shows the forecast change in the total population of the SPT area between 2016 and 2041. It can be seen that steady growth is anticipated until 2035 before a slight decline is expected.

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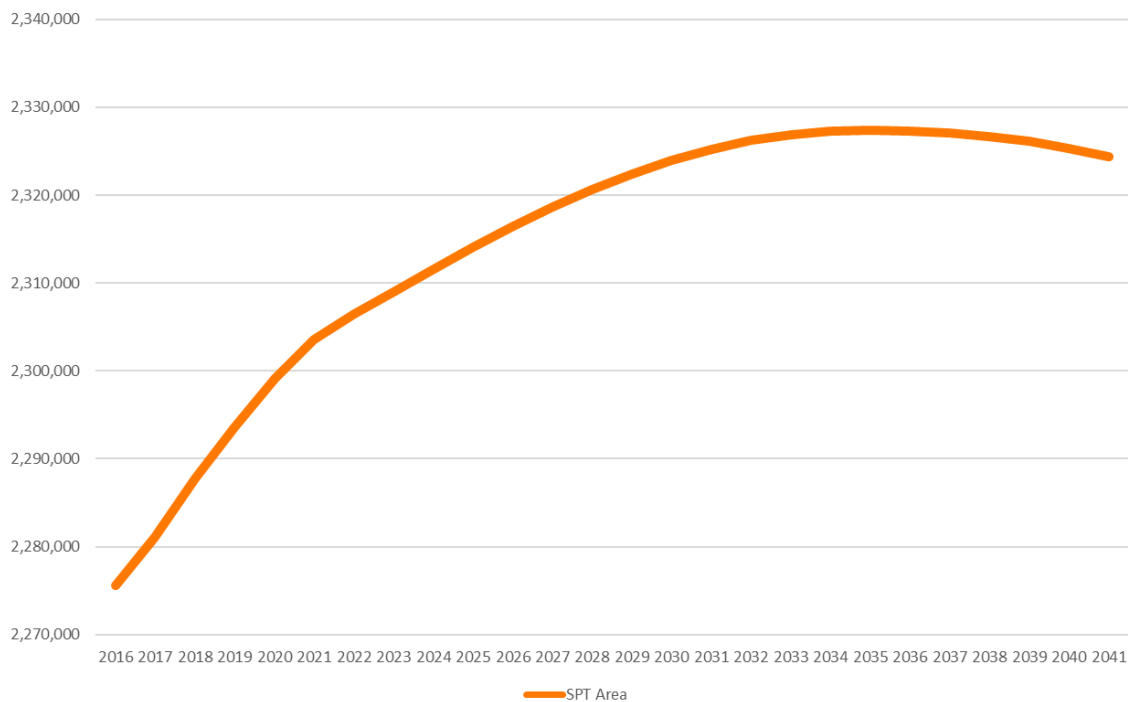
Figure 8.1 Forecast Population in SPT Area 2016 – 2041

8.2.4   In Figure 8.2 the forecast population change is broken down by local authority. Glasgow can be seen to compose the majority of the population in the SPT area and its population is expected to increase between 2016 and 2026 then again between 2026 and 2036. Outside of Glasgow the change in population in absolute terms is fairly small for most local authorities. However, this doesn't reflect the relative change compared to the existing population in each local authority area.
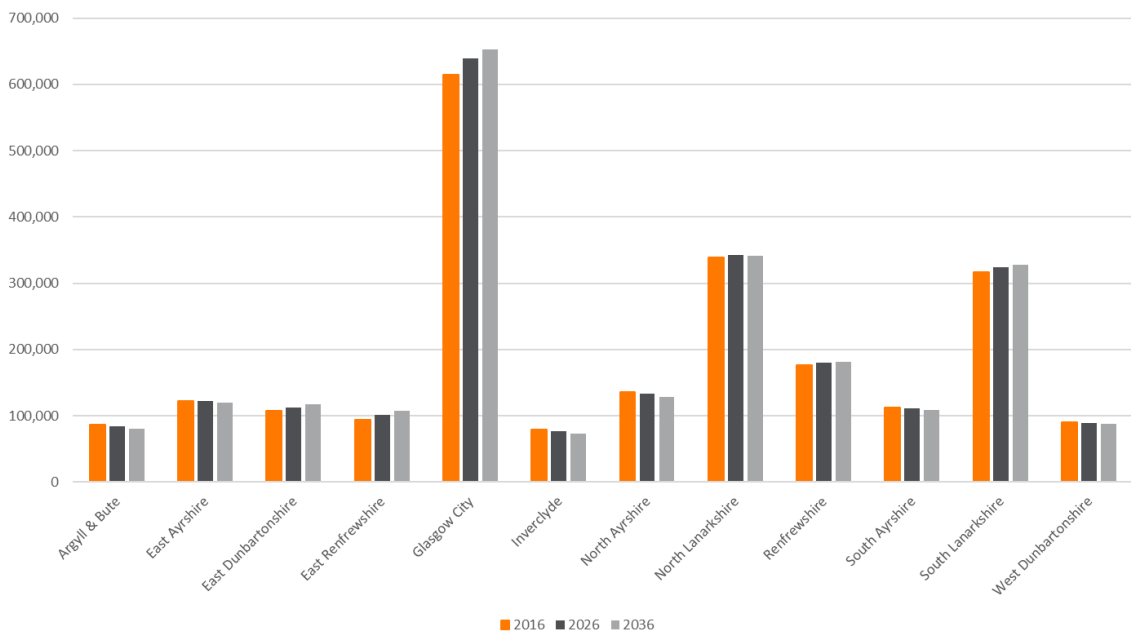
Figure 8.2 Forecast Population by Local Authority 2016 - 2036

8.2.5   Figure 8.3 shows the percentage change in population by each local authority area between 2016 and 2026. This highlights variability across the SPT area with Argyll and Bute (-3.4%),

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East Ayrshire (-0.1%), Inverclyde (-3.8%), North Ayrshire (-2.1%), South Ayrshire (-0.9%) and West Dunbartonshire (-0.7%) all expected to experience a decline.

8.2.6   Growth is forecast in East Dunbartonshire (4.7%), East Renfrewshire (7.6%), Glasgow (4.0%), North Lanarkshire (1.0%), Renfrewshire (2.1%), South Lanarkshire (2.4%) and the SPT area as a whole (1.8%).
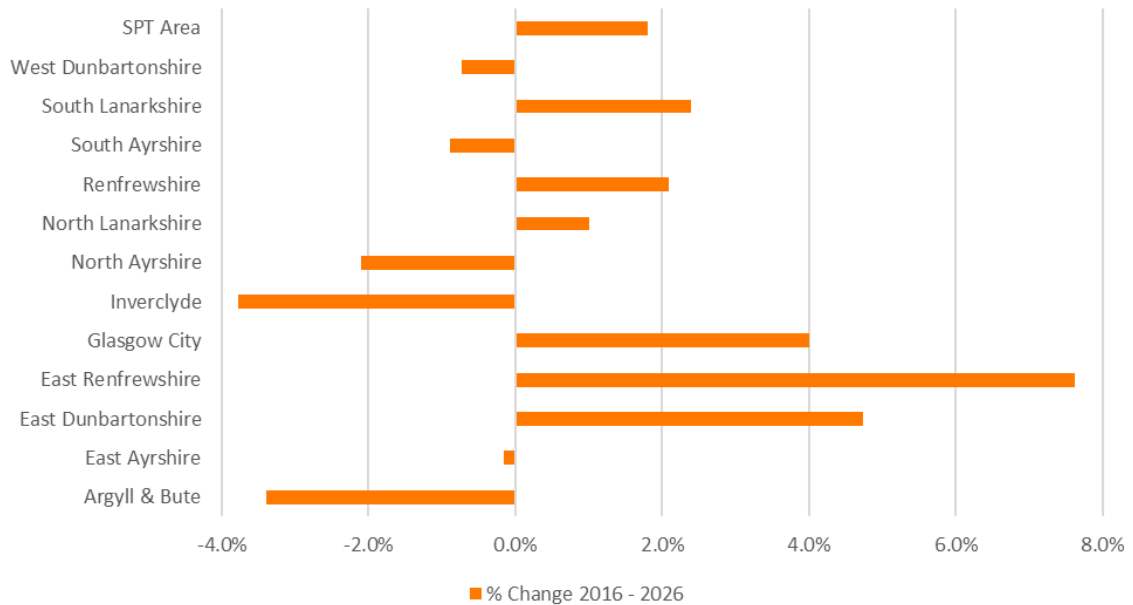
Figure 8.3 Percentage Change in Population by Local Authority 2016 - 2026

8.2.7   Looking further ahead to 2036 it can be seen in Figure 8.4 that the trends are predominantly expected to continue with all local authorities expected to experience a decline in population and those expected to experience an increase remaining the same. For all local authorities except North Lanarkshire the prevailing trend has increased in magnitude. North Lanarkshire is the only local authority where the magnitude of the forecast has decreased going from 1.0% growth in 2026 to 0.7% in 2036.

8.2.8   The largest growth is expected in East Renfrewshire where population is expected to increase by 14.7% by 2036 followed by 8.7% growth in East Dunbartonshire and 6.2% growth in Glasgow. The largest decrease is forecast for Inverclyde at -8.3% followed by Argyll and Bute with a forecast decrease of -7.7%.

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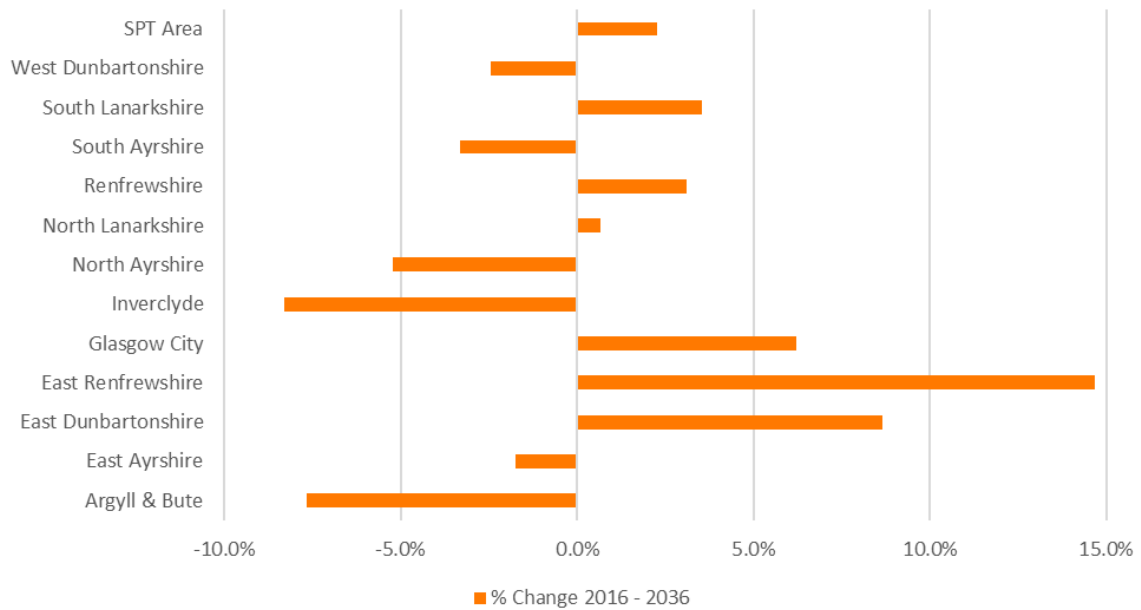
Figure 8.4 Percentage Change in Population by Local Authority 2016 - 2036

8.2.9 Finally, analysis of the age breakdown of the forecast changes was undertaken with the 2016 to 2026 period shown in Figure 8.5. This highlights that the vast majority of local authority areas are expected to experience a decline in the working age population particularly those aged 16 to 29 and 30 to 59. Only Glasgow and East Renfrewshire are expected to experience growth in either of these age groups.

8.2.10 Alongside this all local authorities are expected to experience a growth in those aged 60 and over. This highlights that even in areas where population is expected to decline that the trend towards an aging population is expected to be experienced.
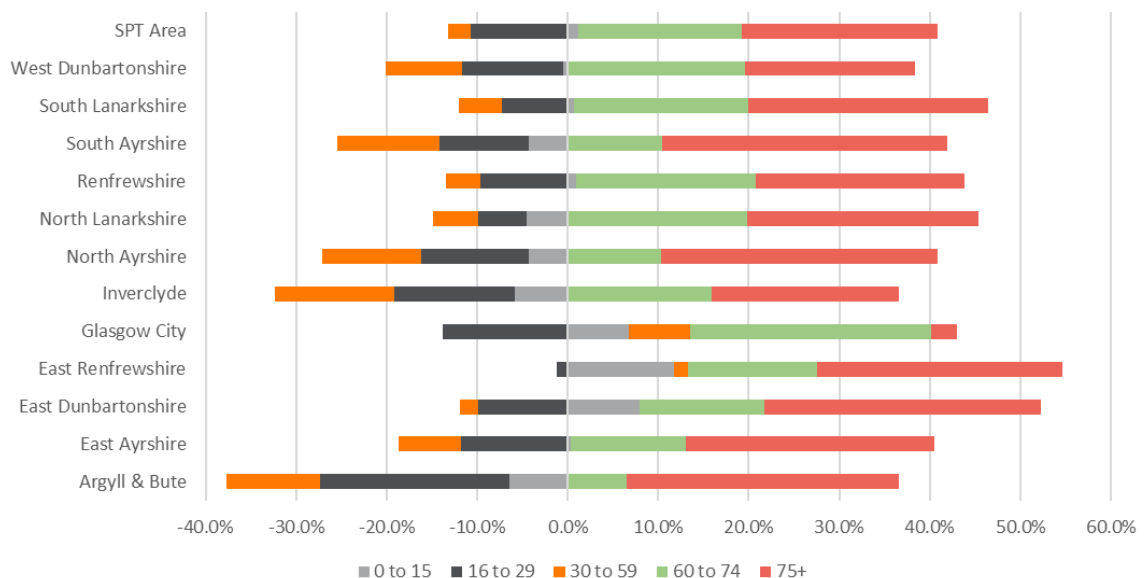
Figure 8.5 Percentage Change in Population by Age Group and Local Authority 2016 - 2026

8.2.11 Figure 8.6 shows the breakdown by age group between 2016 and 2036. This reinforces the trends observed between 2016 and 2026 although it can be seen that more local authorities are expected to experience a decline in the proportion of people aged 0 to 15 along with those aged

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between 16 and 59. This again highlights the trend towards an aging population in the SPT area.
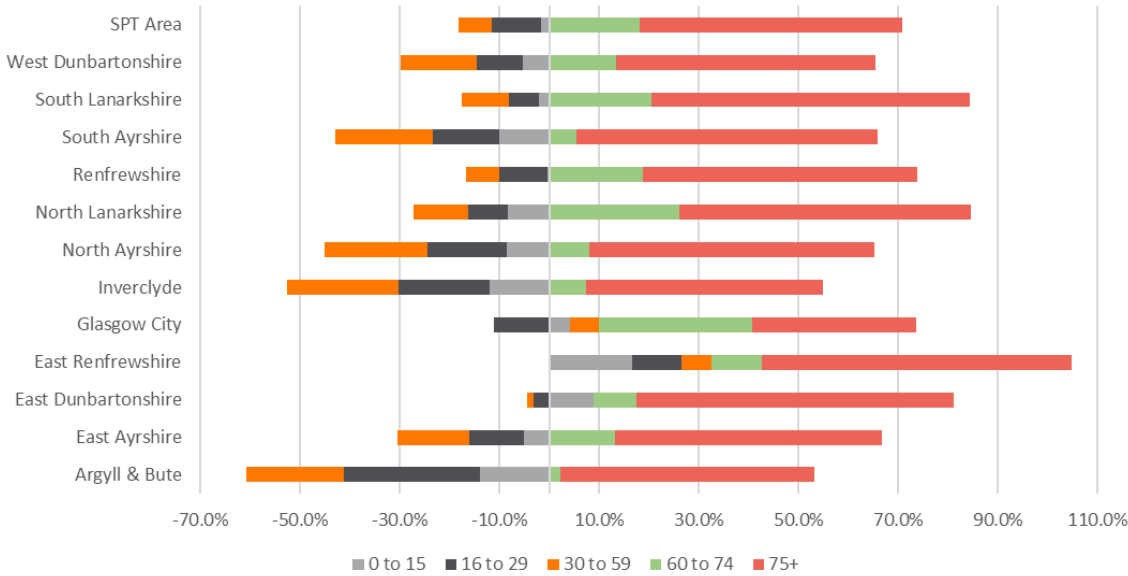
Figure 8.6 Percentage Change in Population by Age Group and Local Authority 2016 - 2036

KEY ISSUES

The population of the SPT area is expected to increase but within this some local authorities are expected to experience a decline in population including Argyll and Bute, East Ayrshire, Inverclyde, North Ayrshire, South Ayrshire and West Dunbartonshire. The largest growth is expected in East Renfrewshire followed by East Dunbartonshire and Glasgow.

The vast majority of local authority areas are expected to experience a decline in the working age population (16 to 59 years old) with only Glasgow and East Renfrewshire expected to see growth.

Alongside this all local authorities are expected to experience a growth in those aged 60 and over highlighting that, even where population is expected to decline, the trend towards an aging population is expected to be experienced.

8.3   Economy

External Forecasts and Trends

8.3.1   The RTS is emerging in the context of macroeconomic trends out with the control of regional public bodies. This section presents an overview of available macroeconomic forecasting and how these trends may be experienced through the transport system.

Forecasting

8.3.2   Macroeconomic forecasting is wrought with difficulties and uncertainties. Forecasters tend to focus on historical trends and project these into the future. While many economists foretell disruptive changes in technology and the labour market, they are unable to predict how these disruptive changes will manifest themselves at a macro-level. Markets are dynamic and socially-constructed and can therefore be expected to respond and adapt to exogenous changes.

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8.3.3   This section utilises regional economic forecasts published by Experian © to provide an overview of anticipated changes to gross value added (GVA), employment, which largely reflects the population projections discussed above, and productivity. These forecasts provide a high-level consideration of the economic climate in which the RTS will sit, notwithstanding current political uncertainties relating to Brexit.

8.3.4   The value of the SPT area economy is projected to grow by 25% over 2019-2038 from c.£57.8 billion to c.£72.3 billion GVA in 2019 prices.[26] Projected growth is geographically uneven, concentrated primarily in Glasgow (52% of GVA growth), followed by North Lanarkshire (12%); South Lanarkshire (11%); and Renfrewshire (6%). This is depicted graphically in Figure 8.7.

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[26] Experian © projections have been uprated to current prices using the GDP deflator published by the Office for Budget Responsibility, 2019.

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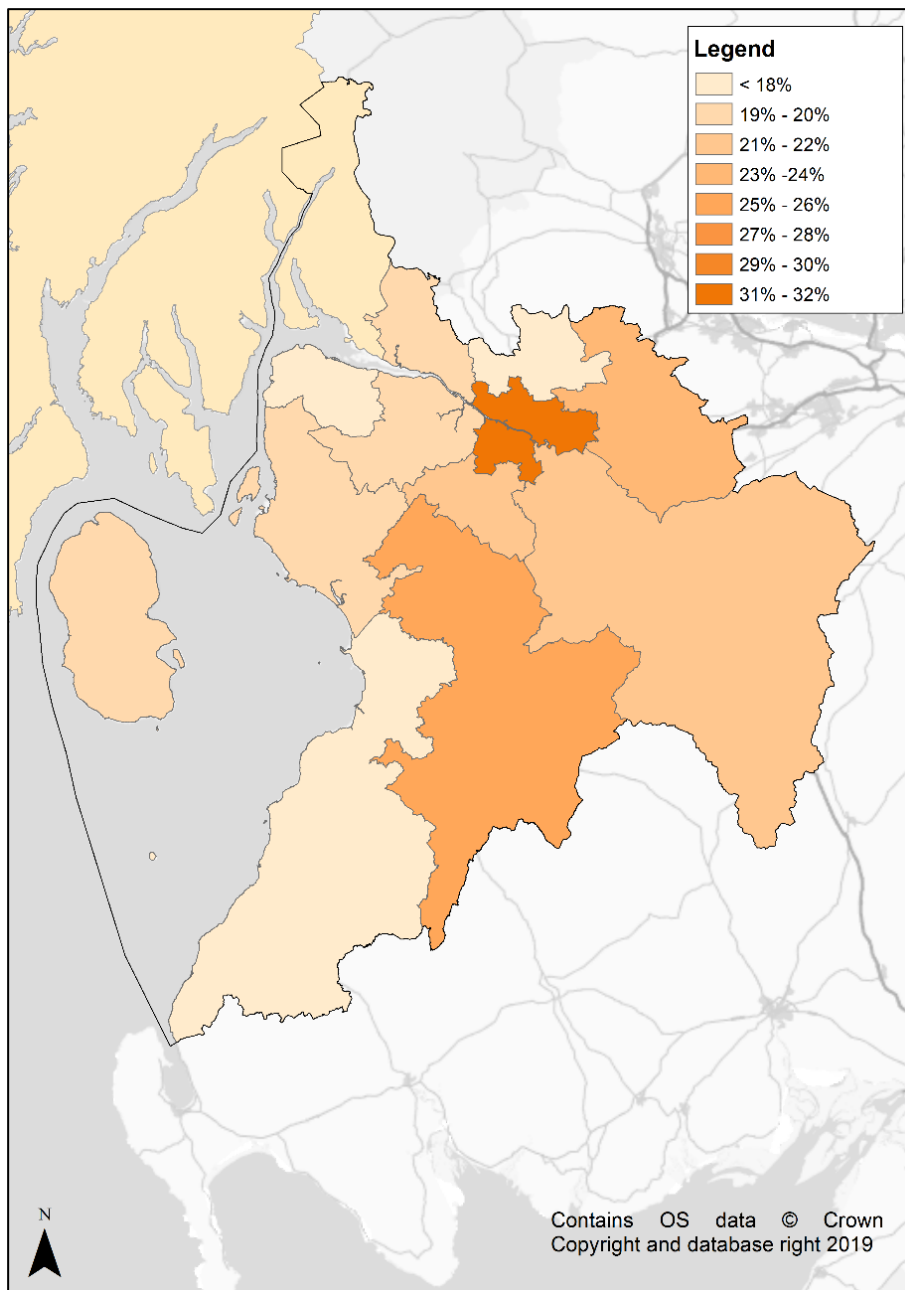
Figure 8.7: Projected growth in GVA 2019-38

8.3.5   Projected GVA growth in the SPT area over 2019-2038 (25%) is below that of both Scotland (28%) and the UK (38%). This discrepancy is largely accounted for by the falling population projections discussed above. Productivity, measured as the GVA generated per full-time equivalent (FTE) employee, is projected to grow 28% over 2019-2038 in the SPT area and Scotland as a whole. Productivity growth was higher at the UK level (30%), but at a lower differential than GVA growth. This relationship is shown graphically in Figure 8.8.

8.3.6   Across the SPT area, the absolute number of FTE employees is projected to decrease by 19,600 over this period. Consistent with population projections presented above, the largest decrease is anticipated in Inverclyde (-8%), North Ayrshire (-7%) and East Dunbartonshire (-7%). Glasgow City is the only local authority area where an increase in FTE employment is projected.

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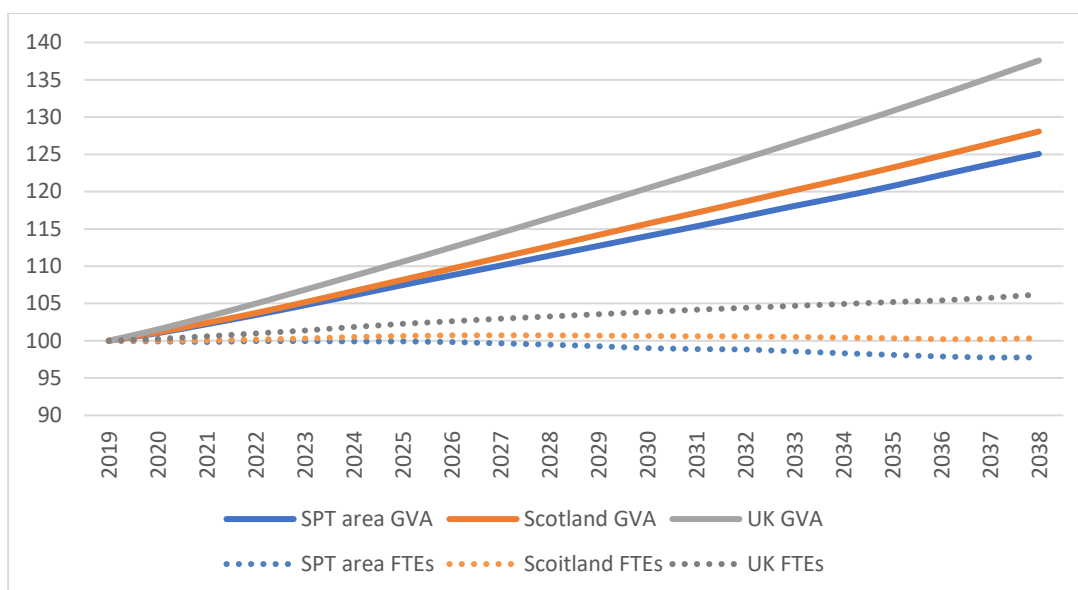
Source: Experian ©

Figure 8.8: Index of projected GVA and employment 2019-2038

8.3.7   Table 8.1 below presents the projected change in productivity across major sectors in the SPT area over 2019-2038. While declining in FTE employment, large productivity increases are anticipated in the wholesale & retail (+42%); information & communication (+41%); and manufacturing (+38%) sectors. The productivity in the extraction & mining is projected to decrease, however this sector is relatively small employing only an estimated 700 FTEs in 2019.

Table 8.1: Change in productivity by sector 2019-38, 2019 prices

Sector	GVA per FTE		% change
	2019	2038	
Accommodation, Food Services & Recreation	29,926	34,659	+16%
Agriculture, Forestry & Fishing	39,483	39,931	+1%
Construction	73,154	87,620	+20%
Extraction & Mining	213,862	197,042	-8%
Finance & Insurance	103,571	135,525	+31%
Information & communication	95,363	133,986	+41%
Manufacturing	96,123	132,896	+38%
Professional & Other Private Services	115,645	153,074	+32%
Public Services	52,243	65,785	+26%
Transport & storage	51,233	61,002	+19%
Utilities	139,176	174,987	+26%
Wholesale & Retail	49,705	70,370	+42%

8.3.8   The GVA, FTE employment, and productivity projections for each of the constituent local authority areas are presented in Table 8.2 below.

Table 8.2: Economic projections 2019-38

Local Authority	GVA	Employment	Productivity
Argyll & Bute	+15%	-9%	+27%
East Dunbartonshire	+17%	-7%	+26%

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Local Authority	GVA	Employment	Productivity
East Ayrshire	+24%	-5%	+31%
East Renfrewshire	+20%	-5%	+26%
Glasgow City	+32%	3%	+28%
Inverclyde	+17%	-8%	+28%
North Ayrshire	+18%	-7%	+28%
North Lanarkshire	+22%	-6%	+30%
Renfrewshire	+20%	-6%	+27%
South Ayrshire	+18%	-7%	+26%
South Lanarkshire	+22%	-5%	+28%
West Dunbartonshire	+18%	-7%	+27%
SPT area	**+25%**	**-2%**	**+28%**

Source: Experian ©

External Trends

8.3.9 Disruptive technological and socio-political factors will have a direct impact on the transport environment in which the RTS is emerging. The following factors are likely to influence the delivery and effectiveness of the emerging RTS:

- **Agile working:** labour market shifts towards home and flexible working are anticipated to change the nature of travel to work trips made across the SPT area.[27] As stated in Section 2.4, 10% of people in the SPT area regularly work from home. For such employees, public transport plays a different, more elastic role – becoming less essential and more sensitive to quality of service;

- **Retail market shifts:** increasing demand for online shopping has reinforced broader retail market shifts away from traditional high streets. It is estimated that across the SPT region, total online retail turnover has increased from £802,000 to £1.79 billion over 2010 – 2017.[28] As a result, fewer trips are made to town centres, which in many cases are attempting to redefine themselves as cultural, residential, and leisure centres. This will change the quantity and timing of trips made to town centres; and

- **Trends in logistics:** the digital economy is increasing the number of local or "final mile" delivery services. This will increase the numbers of light goods vehicles on the road network, as reflected in recent statistics,[29] as well as driving logistics technology including designated time slots for delivery and remote drop-offs.

8.3.10 Wider political-economic trends linked to Brexit are also likely to impact on transport markets in the SPT area. These include fluctuations in the strength of the pound, renegotiation of trade deals, capital redistribution and associated sectoral impacts.

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[27] Flexible working enables staff to commute outside the congested peaks and removes the imperative to be at work by a designated time. See: Talbot et al. *Journey to work: Exploring difficulties, solutions, and the impact of aging* in International Journal of Sustainable Transport v.10, 2016.

[28] Retail trade turnover sourced from Scottish Annual Business Statistics, 2019, and aggregated to the SPT region. This assumes that the proportion of online sales has grown at a rate consistent with the UK as outlined in: Retail Sales Index, 2019.

[29] The number of new light goods vehicles registered annually has increased to c.28,000 a year from a base of 18,000 in 2012. See: Scottish Transport Statistics, 2018, p.39.

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8.3.11 The Department for Transport (DfT) published guidance for transport users in the case of a no deal Brexit in October 2018. This has been reviewed as a 'worst case' scenario. The greatest uncertainties face the haulage and aviation industries.

8.3.12 Economic impacts will therefore be indirect. Disruption, a less competitive pound, and potentially detrimental trade renegotiations would induce retractive employment and expenditure effects. This would result in a reduction in transport use and potentially revenue funding to SPT and local authorities through a reduced tax base. However, with the current uncertainties around Brexit and the broader shifting geopolitical landscape it is impossible to fully identify the potential economic implications for Strathclyde at this time.

Regional Economic Policymaking

8.3.13 The RTS is emerging into a revitalised regional economic policymaking environment, where a series of Growth Deals initiated by the UK and Scottish Governments are being used to direct economic development. There are three Growth Deals active in the SPT area, the Glasgow City Region City Deal; the Ayrshire Growth Deal; and the Rural Growth Deal for Argyll & Bute.

8.3.14 The emerging RTS can interface with each of these deals. This section surveys these deals and their constituent projects to demonstrate the value of transport policy and infrastructure in achieving economic growth objectives and policy aims.

8.3.15 Finally, it should be noted that the regional economy is heavily integrated into the wider national and global economies. While effective policymaking will increase resilience to external macroeconomic trends, they are ultimately out of the control of regional public bodies and these uncertainties consequently need to be taken into consideration.

The Glasgow City Region

8.3.16 Eight of the SPT local authorities are the Glasgow City Region (GCR) City Deal member authorities. These local authorities established the City Region Cabinet in June 2016 to oversee the GCR City Deal, a £1.13 billion investment programme.

8.3.17 In December 2016 the City Region Cabinet published the Regional Economic Strategy (RES) and the three-year Economic Action Plan with the overarching vision of a "strong, inclusive, competitive and outward-looking economy, sustaining growth and prosperity with every person and business reaching their full potential."

8.3.18 The RES recognises an existing disconnect between transport planning and economic growth strategy within the GCR. One of the actions arising from this document is for the Cabinet to liaise with SPT in the review of the RTS.

8.3.19 While transport features heavily in City Region economic policy, these documents were not written from a solely transport perspective. Transport infrastructure is seen as an accelerator of growth, but not a key driver in and of itself. As such, regional policy does not comment extensively on such emerging trends.

8.3.20 A review of these documents and the Skills Investment Plan (2018) has identified the following four key drivers of economic growth:

- Improving productivity;

- Increasing real incomes;

- Strengthening the business base; and

- Increasing the working age population.

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8.3.21   These key drivers are interrelated through the primacy of employment effects. City Region policy suggests productivity and earnings are increased through a redistribution of jobs into more productive, higher paid sectors – itself a strengthening of the business base. To increase the working age population, the RES emphasises the role of skills retention and supporting people into work. Enabling housing delivery is also noted as a priority and is prevalent in project business cases.

8.3.22   Investment in transport infrastructure is seen as critical to developing these economic drivers. The City Deal Infrastructure Fund will contribute over £500 million to road and rail projects. The RES recognises an existing disconnect between transport planning and economic growth strategy within the GCR. One of the actions arising from this document is for the Cabinet to liaise with SPT in the review of the RTS.

Improving Productivity

8.3.23   The RES aims to facilitate improvements in agglomeration and increase the proportion of highly skilled employees in productive businesses. Specifically, the strategic objectives of the GCR City Deal aims to "stimulate an £800m improvement in productivity, based upon a re-distribution of jobs from less productive to more productive activity, and improvements in connectivity, or economic mass."[30]

8.3.24   A review of proposed City Deal projects identified the following role of transport infrastructure and public transport improvements in improving productivity:

- **Promoting agglomeration:** developing clusters of related development and sector hubs engenders network effects, boosting productivity. This is being delivered by the City Deal through:

  o   The **Clyde Waterfront and Renfrew Riverside (CWRR)** project which seeks to create greater linkages between businesses in North Renfrew and Clydebank and Yoker through a new vehicle, pedestrian and cyclist bridge across the Clyde.

  o   The **Collegelands Calton Barras** project aims and objectives illustrate how improved public transport links can be used to capitalise on existing agglomeration from creative, education and research clusters.

  o   Transport infrastructure including improved public transport links and services as part of the **Glasgow Airport Investment Area (GAIA)** proposals which are aimed at creating an international investment and development cluster. GAIA aims to link existing business parks and economic development sites clustered around the airport, fostering advanced manufacturing agglomeration.

- **Supporting Growth Sectors:** the Scottish Government has identified key sectors where Scotland exhibits a competitive advantage. Supporting these is seen as a national economic priority. This is being delivered by the City Deal via:

  o   The development of sustainable transport modes along the waterfront of the Clyde to enable agglomeration which was cited as part of the rationale of the **Clyde Waterfront West-End Innovation Quarter (CWWEIQ)**. Access improvements around the Queen Elizabeth University Hospital will enable sites preferred by the Life Sciences industry – a key Growth Sector.

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[30] GCRCD Annual Implementation Plan, 2018-2019. p.8.
https://www.glasgow.gov.uk/councillorsandcommittees/viewSelectedDocument.asp?c=P62AFQDN2U0G2UZ3DX

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- o The **Enabling Infrastructure – Integrated Public Realm (EIIPR)** OBC which noted the demand for high quality, safe, and attractive pedestrian and cyclist environments from Creative Industries that can support late and flexible working patterns.

- o The **Collegelands Calton Barras** project which will capitalise on Growth Sectors through the proposed reconfiguration of existing public transport infrastructure (High Street Station). This will provide space for the expansion of existing Life Sciences and Creative Industries clusters. Enhanced east-west connections on the road network will also promote such sites.

Increasing Real Incomes

8.3.25 Boosting the income of GCR residents is considered a key driver of economic growth in regional policy. Annual median earnings in the GCR (£27,530) are slightly higher than the national median (£27,321), however many of the region's constituent local authority areas exhibit below-average earnings.[31] The SPT area is overrepresented in the most income deprived Scottish Index of Multiple Deprivation quintile, making up 66% of the total despite accounting for only 41% of total output areas.[32]

8.3.26 The RES seeks to incorporate the Inclusive Growth agenda, ensuring that regional growth is distributed equitably. City Region policy is primarily focussed around in-work progression schemes and work programmes to address low-pay. Submitted City Deal business cases indicate that effective transport planning can have the following impacts:

- ▪ **Improved network connectivity:** poor public transport provision and network inefficiencies can act as a barrier to work. This is being addressed by the City Deal through projects such as:

  - o The **Cathkin Relief Road** which was designed to improve the accessibility of relatively deprived communities to key employment sites such as Clyde Gateway. Increasing bus and cycle usage was integral to the design of the new road.

  - o Road improvements delivered through the **Greenhills Road Project** which aim to increase the accessibility of manufacturing, distribution and administration sites in East Kilbride to the strategic road network. The rationale for this deliverable relates to stopping the outflow of such sectors and boosting workplace earnings.

Strengthening the Business Base

8.3.27 Around 7,000 new businesses start in the GCR annually, but many of these do not survive beyond five years. Improving this rate is recognised by policy-makers to stimulate economic growth.

8.3.28 City Region policy aims to attract inward investment to the GCR, develop supply chains, de-risk vacant and derelict land, and support innovation to diversify and strengthen the business base. Investment in transport infrastructure is central to these policies, with strategic and outline business cases identifying the following impacts:

- ▪ **Attracting inward investment:** the City Deal Infrastructure Fund aims to lever £3.3 billion of private sector investment, providing space and infrastructure to support existing and new firms. This is being achieved by:

  - o The **EIIPR project** which references the EY Scotland Attractiveness Survey where transport infrastructure was identified as the second most important criteria to inward

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[31] Annual Survey of Hours and Earnings, 2018.

[32] Scottish Index of Multiple Deprivation Domain Ranks, 2016.

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investors. Transport infrastructure is consequently seen as critical in linking development areas to existing sites of inward investment.

- o The **CWRR project** which was designed to maximise the impact of forthcoming private sector investment in Renfrewshire to West Dunbartonshire and Yoker. Similar ambitions linking Govan to development at the QEUH through improved transport infrastructure are described in the rationale for the **CWWEIQ project**.

- o The **Gartcosh-Glenboig Link Road** is an example of a City Deal funded project that directed transport infrastructure to improve the attractiveness of economic development sites. The design of the road incorporated ambitions to accelerate development at the Gartcosh business park.

- ▪ **Developing supply chains:** directed supply chain development ensures that additional private sector expenditure will benefit local businesses, maximising multiplier effects. The City Deal is achieving this through:

- o Improved and reliable public transport enabled by the freeing-up of road space by the **CWRR project** which was anticipated to assist in the revitalisation of existing businesses in Renfrew town centre and their related supply chain.

Increasing the Working Age Population

8.3.29 Increasing the absolute number of people participating in the economy is a priority in City Region policy, particularly in the context of the current stagnant working age demographic growth. Indeed, the working age population of the GCR is projected to decrease by 25,000 over the period 2017-2027.[33]

8.3.30 The RES and Economic Action Plan proposes supporting people into work and attracting and retaining talent through improving access to highly-skilled employment and increased housing delivery. City Deal funded transport infrastructure has contributed to this aim in the following ways:

- ▪ **Unlocking constraints on housing:** increased public transport provision and road network capacity is crucial to alleviating constraints on housing delivery, and subsequently boosting the working age population. For example:

- o The construction of transport infrastructure designed to enable housing development such as the **Gartcosh-Glenboig Link Road** and the **Westburn Roundabout** has demonstrated the role transport planning can have in enabling economic growth at a regional level.

- ▪ **Facilitating sustainable transport connections:** quality public and sustainable transport infrastructure is a primary determinant in where working age residents choose to live and work.

- o The provision of extended public transport infrastructure such as the expansion of the Park and Ride facility proposed under the **Newton Community Growth Area** project was assessed as having a positive impact on working age demographic growth.

- o Proposals under the **M77 Strategic Corridor** project include enabling infrastructure for a new rail station in Newton Mearns, unlocking further housing and promoting working age population growth.

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[33] Skills and Investment Plan, 2018. p.21.

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> **KEY ISSUES**
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> The above survey of key drivers of economic growth and the contribution of transport infrastructure to these demonstrates scope for transport strategy to play an integral role in regional economic development. Public transport improvements contribute to each of the key drivers.
>
> The existing SPT RTS (2008) sought to realise economic development through improved connectivity. A lack of transport was correctly identified as a barrier to work and providing efficient network connections for business was deemed as a priority.
>
> Improved connectivity remains relevant to economic growth at a regional level. The above survey indicates there are other economic development objectives emerging which may relate directly to key drivers of growth at the regional level. Synergies exist between regional transport and economic strategies that can be exploited to maximise inclusive and sustainable economic growth.
>
> While out with the control of regional public bodies, the uncertainties surrounding Brexit and the wider shifting international political-economic landscape underscore the importance of linking transport and economic policy. Co-ordinated policy offers scope to ensure Strathclyde is more resilient to such external factors.

8.4   Land-use Development

8.4.1   The location and scale of planned land-use developments will influence the scale of future demand for travel as well as the locations that people want to travel to and from. To understand this in more detail analysis was undertaken of the proposals set out in the relevant Strategic Development Plans and Local Development Plans. These include the Clydeplan SDP, East Ayrshire LDP, North Ayrshire LDP, South Ayrshire LDP and Argyll and Bute LDP. In particular, the allocations for housing land development and industrial land development were analysed and mapped as set out in Appendix F.

8.4.2   It should be noted that not all the data available is consistent with some local authorities providing more detailed information than others. The data for the eight local authorities which are part of the Clydeplan area (East Dunbartonshire, East Renfrewshire, Inverclyde, North Lanarkshire, Glasgow, Renfrewshire, South Lanarkshire and West Dunbartonshire) is the most comprehensive and consistent.

8.4.3   The data for Ayrshire and Argyll and Bute is less comprehensive but has been made as consistent as possible with that for the Clydeplan area to enable comparisons to be undertaken. However, in some instances it has not been possible to do this as the phasing of proposed developments was not available and for around 50 housing sites in East Ayrshire the size of the developments was also not available.

8.4.4   Where phasing was available the developments have been split into those scheduled for construction within the next 7 years and those scheduled for 7 years or more. If phasing was not available, it was assumed that development would take place within the next 7 years and the relevant developments were included in this analysis.

Ayrshire

8.4.5   The largest housing developments are clustered around Ayr, Kilmarnock, Troon and Auchinleck. These are all connected to the rail network and strategic road network which will provide good accessibility. However, with the exception of Troon, the locations of the developments are around the periphery of the settlements making them distant from the train stations which are all located in town centres. The development at Troon is located in close proximity to Barassie station.

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8.4.6 The largest industrial land allocations are at Hunterston, Galston, north east Kilmarnock, south east Ayr around the hospital and Grangeston north of Girvan. All of these sites are located on the strategic road network with the exception of the north east Kilmarnock site.

Greater Glasgow

8.4.7 Within the next 7 years the largest housing allocations in Greater Glasgow are at Silverburn, Pollokshaws, south of Newton Mearns, Anderston, the Gorbals and at Clyde Gateway. All of these sites have good accessibility by road but public transport links are more variable. There is also a concentration of housing sites around the north east boundary of Greater Glasgow which are smaller in scale but could have a cumulative impact on the transport network.

8.4.8 In the longer term there are large housing allocations across Greater Glasgow including a corridor focussed along the River Clyde with sites at Erskine, Clydebank, Renfrew, Whiteinch, Finnieston, Anderston and the Gorbals. There are also large housing sites on the periphery of Greater Glasgow at Thornliebank, Newton Mearns, and north east Glasgow at Easterhouse, Craigend, Cardown and Robroyston. These will undoubtedly increase transport demand in the area with a corresponding impact on road and public transport networks.

8.4.9 The industrial land supply in the Greater Glasgow are is limited with the largest allocation being situated at the Glasgow Airport Investment Area (GAIA). The site is located adjacent to the M8 but has limited public transport links.

Inverclyde & West Dunbartonshire

8.4.10 The largest housing developments are focussed around Bishopton, Helensburgh and Cartsdyke which are all located in close proximity to existing train stations providing good public transport accessibility for commuters.

8.4.11 There is limited industrial land in the area with the largest sites located south of Bishopton and at Bowling. It is not anticipated that these would have sizeable transport impacts.

Lanarkshire

8.4.12 As set out above there is a concentration of housing developments around the north east boundary of Greater Glasgow which will have implications for the transport network in this vicinity. In addition, there are sites at Wishaw, Ravenscraig, south west Hamilton, western East Kilbride, Bellshill, Coatbridge, Carluke and Cumbernauld all allocated for sizeable housing developments. These are predominantly located around existing settlements which have good existing transport links but the scale of the development is such that it could have implications for network capacities in the vicinity.

8.4.13 In Lanarkshire there are large industrial land allocations at Kelvin South to the south of East Kilbride, Eurocentral adjacent to Bellshill, Glenboig, Plains and Rigside. All are located in close proximity to the strategic road network with the exception of Plains.

8.5 Proposed and Committed Transport Schemes

8.5.1 The currently proposed and committed transport schemes will have a material bearing upon the new RTS. They will inform the understanding of what the 'future' will look like as well as where current and forecast future problems and issues will be addressed as well as where additional interventions may be required.

8.5.2 To develop a comprehensive understanding of the proposed and committed transport schemes an extensive review of relevant documents was undertaken. These include:

- West Of Scotland Conurbation Public Transport Study;

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- South West Scotland Transport Study;

- Scottish Government Infrastructure Investment Plan;

- Transport Scotland Strategic Transport Projects Review;

- Network Rail Scotland Route Study;

- Clydeplan Strategic Development Plan;

- National Planning Framework 3;

- National Transport Strategy;

- Ferries Plan;

- Glasgow City Region Deal;

- Ayrshire Growth Deal; and

- Argyll and Bute Rural Growth Deal.

8.5.3   The rest of this section explores the proposals relevant to the SPT area contained within these documents.

West of Scotland Conurbation Public Transport Study

8.5.4   SPT commissioned the West of Scotland Conurbation Public Transport Study (WSCPTS) in 2008 which sought to produce a 20-year vision of potential transport improvements and interventions which could strategically serve the conurbation, taking account of committed, planned and projected developments over the time period.

8.5.5   The study set out wide-ranging proposals for a mass transit network to serve the conurbation which included a combination of heavy rail, light rail, Subway and Bus Rapid Transit (BRT) supported by local bus services, walking and cycling.

8.5.6   Heavy rail services were categorised into:

- **Inter City / Inter Regional Services**: which must be operationally integrated with suburban services, but which otherwise have little impact on transport provision in the conurbation, e.g. Glasgow to Edinburgh, Aberdeen, Inverness, Dumfries and England;

- **Regional Services**: which operate beyond the conurbation, but which also provide for significant journeys within it e.g. services from Glasgow to Ayrshire which are also a fundamental part of the provision to Paisley and Johnstone; and

- **Suburban Services**: which are primarily concerned with travel wholly within the conurbation. A target of a train every 15 minutes on these services was proposed which required a complete recast of suburban services and development of lighter rolling stock more suited to the characteristics of metro-type operation, like Tyne & Wear Metro.

8.5.7   On corridors where lower demand was identified, a lighter approach to mass transit was proposed. Two principal approaches were suggested encompassing high quality, low floor infrastructure / vehicles, electric traction (eliminating local emissions), and tram-style priority on affected city streets. The two approaches proposed were:

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- **LRT Services:** building on the successful Manchester Metrolink concept by converting selected heavy rail lines to LRT operation but taking advantage of the opportunity to upgrade infrastructure and adopt low-floor vehicles. It was recommended that services operate at least every 10 minutes, and in some cases be extended off the existing rail network to support new planning developments. A new city centre terminus was suggested to reduce pressure on mainline termini; and

- **Bus Rapid Transit (BRT) Services:** where lighter mass transit is appropriate and no existing rail infrastructure is available, it was recommended that BRT could be used to provide a network of high quality "trams on rubber tyres" capable of delivery more quickly and more cost effectively than street-running trams.

8.5.8 Provision of supporting bus services as well as enhanced walking and cycling links to transit routes and stops was also recommended. Seamless interchange was highlighted as being vital to the successful operation of an integrated transport system.

8.5.9 Many of the proposals set out in the WSCPTS remain relevant and can provide a useful input to the option generation stage of the RTS development.

South West Scotland Transport Study

8.5.10 This STAG Case for Change report was published in June 2019. The key aim of the work was to consider the rationale for improvements to road, rail, public transport and active travel on key strategic corridors in the South West of Scotland, including those served by the A75, A76, A77, A701 and A709 as well as the railway corridors to Stranraer and Carlisle via Kilmarnock / Dumfries with a particular focus on access to the ports at Cairnryan. Whilst the study did not examine the SPT area many of the routes considered play an important role linking Strathclyde to South West Scotland and beyond.

8.5.11 It identified a series of potential interventions to be taken forward for appraisal through the STAG process which include:

- Improved integration at main hubs;

- Strategic active travel network;

- New rail stations and / or enhanced services on Glasgow & South Western line (GSW);

- New rail stations and / or enhanced services on West Coast Main Line (WCML);

- Rail link between Dumfries and Stranraer;

- Rail link between Cairnryan and Stranraer;

- Rail link between GSW and WCML;

- Enhanced rail freight capacity;

- Development of the timber transport network;

- Development of enhanced diversionary routes;

- Development of enhanced service, rest areas and laybys;

- HGV speed limit increase to 50mph;

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- Capacity and safety enhancements on A75, A76, A77 as well as between Dumfries and A74(M); and

- Junction improvements on M6.

Infrastructure Investment Plan 2015 (including Project Pipeline Update 2018)

8.5.12 This plan sets out why the Scottish Government invests, how it invests and what it intends to invest in up to 2040.

8.5.13 The transport investment hierarchy of maintaining and safely operating, making better use and then lastly promoting targeted improvements, makes best use of limited resources and ensures that new infrastructure is identified only after other approaches have been considered. It promotes and supports a more sustainable transport network by encouraging efficient use of existing road and rail resources, encouraging sustainable mode choices through targeted rail enhancements and providing better opportunities for strategic public transport and freight movements.

8.5.14 The National Transport Strategy and related investment priorities also reflect the geographic dispersal of Scotland's population and the importance of transport in supporting rural and island communities through the stimulation of social and economic growth.

8.5.15 The diverse geography of Scotland means a critical part of the maintenance of the existing networks is to continue to provide opportunities for everyone to access transport. This includes ensuring that ferries are able to operate, that airports remain open and that lifeline services and connections for remote and rural communities are maintained. Beyond investing in the right infrastructure this requires continuing investment in schemes including roll out of the Road Equivalent Tariff scheme as the basis for ferry fares, the Air Discount Scheme, Bus Service Operators Grant, the evolution of the concessionary fares scheme, contracts for ferry operation as well as the ScotRail franchise.

8.5.16 The Plan supports delivery of the National Transport Strategy and reiterates support for the transport hierarchy, with improved digital connectivity supporting a reduction in the need to travel and then encouraging walking and cycling through provision of easy, safe and attractive active travel facilities. Transport's role in tackling inequalities is set out including improving connectivity to reduce inter-regional inequalities, improve access to employment and reducing physical barriers to mobility through accessible facilities and vehicles.

8.5.17 Relevant investments set out in the Plan include:

Roads

- Forth Replacement Crossing;

- M8 / M73 / M74 Motorway Improvements Project;

- Aberdeen Western Peripheral Route;

- Inveramsay Bridge;

- A9 Dualling Perth to Inverness (Kincraig to Dalraddy section completed);

- A77 Maybole Bypass (currently awaiting confirmation of preferred tenderer);

- A737 Dalry Bypass (currently under construction and due for completion in late 2019);

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- A90 / A96 Haudagain Junction Improvement;

- A9 / A96 Dualling;

- A876 Kincardine Refurbishment; and

- A82 Improvements (partially complete).

Rail

- Edinburgh to Glasgow Improvement Programme;

- Shotts Line Electrification (completing);

- High Speed Rail;

- Glasgow Terminal Stations Improvements;

- Aberdeen – Central Belt Rail Improvements (not in the SPT area but improves access to jt);

- Highland Main Line (not in the SPT area but improves access to jt); and

- Glasgow Subway Modernisation.

Ferry

- Two new major ferries for Clyde and Hebrides services; and

- Brodick harbour redevelopment and other Ferry and Harbour projects (complete).

Sustainable and Active Travel

- ChargePlace Scotland network;

- Switched On Fleets initiative;

- National Cycle Network and local active travel networks; and

- Maintaining accessibility for all.

Strategic Transport Projects Review

8.5.18 The Strategic Transport Projects Review (STPR), published in December 2008, sets out the Scottish Government's 29 transport investment priorities over the period to 2032. The Scottish Government have also commissioned STPR 2 which is currently under development.

8.5.19 The following relevant schemes were defined in STPR 1:

- Strategic Road Safety Plan;

- A83 Improvements including the Rest and Be Thankful;

- ITS / managed motorways;

- Integrated ticketing;

- A737 Dalry Bypass (currently under construction and due for completion in late 2019);

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- A77 Maybole Bypass (currently awaiting confirmation of preferred tenderer);

- Working Group established regarding the South West Scotland Transport Options (11) which links to the original STPR recommendation regarding access to Cairnryan;

- Shotts Line Electrification (completing);

- A82 Tarbet to Inverarnan (under construction - other A82 works complete); and

- Edinburgh Glasgow Improvements Programme.

Network Rail Scotland Route Study

8.5.20 The Scotland Route Study 2016 is a key part of the rail industry's Long-Term Planning Process. The proposals and choices presented are fundamental to informing investment decisions for the next ten years and beyond.

Control Period 6: 2019 - 2024

- Carstairs Junction Remodelling;

- East Kilbride and Barrhead options (including electrification); and

- Gartcosh - options to deal with parking issues and capacity.

Control Period 7 Onwards

- Projects to be identified through STPR 2.

Clydeplan Strategic Development Plan

8.5.21 The current SDP was approved by Scottish Ministers in July 2017 and replaces the first SDP, which was approved by Scottish Ministers in May 2012.

8.5.22 SDPs are intended to be 'concise and visionary' documents which set out a clear vision and spatial strategy for their area. SDPs focus on the key land use and development issues that cross the planning authority boundaries.

8.5.23 The current Clydeplan SDP defines the following relevant policies and projects:

Policy

- Maximising the use of existing transport infrastructure recognising the important role of bus services as the principal public transport mode across the city region in order to reduce carbon emissions and urban air pollution;

- Improving the level and quality of public transport provision particularly in terms of frequency and reliability, including supporting proposals to extend rail electrification;

- A focus on regional rail and bus hubs and interchanges, and on strategic corridor improvements, including expansion of park and ride;

- Support for measures such as integrating ticketing e.g. SPT's Smartcard, and regional real time passenger information systems which will support the public transport offer across the city region;

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▪ Increasing the levels of active travel through the provision of safe and convenient opportunities for walking and cycling;

▪ Modal shift from private to public modes and in terms of freight movement by rail or water;

▪ Support for the provision of a network of electric vehicle charging points; and

▪ Support for water-based travel.

Radial Corridors

▪ **Glasgow North Lambhill / Possil**: quality bus corridor;

▪ **Springburn / Sighthill / Bishopbriggs / Kirkintilloch / Kilsyth**: quality bus corridor, EGIP as well as park and ride;

▪ **North East Stepps / Cumbernauld / Stirling / Robroyston / Gartcosh / Cumbernauld Community Growth Areas**: new rail station at Robroyston, quality bus corridor, EGIP, park and ride;

▪ **Eastern M8 Corridor / Easterhouse / Glenboig / Airdrie / Coatbridge / Eurocentral / Mossend / Broomhouse Community Growth Areas**: strategic freight transport hub, City Deal projects, quality bus corridor / bus rapid transit, park and ride;

▪ **Gateway / Motherwell / Ravenscraig / Clyde Gateway / Parkhead / Wishaw / Carluke Clyde Gateway Strategic Centres**: improve heavy rail frequencies; quality bus corridor / bus rapid transit, park and ride, Motherwell interchange;

▪ **Hamilton / M74 Newton / Larkhall / Poniel Strategic Centre**: City Deal projects, improve heavy rail frequency and revise routings, improve core bus frequencies and routing, park and ride, improve inter-modal interchange;

▪ **Rutherglen / East Kilbride Strategic Centre**: heavy rail conversion to light rail transit, quality bus corridor, interchange improvements, park and ride;

▪ **Shawlands / Newton Mearns / Ayrshire Strategic Centre**: heavy rail conversion to light rail transit, quality bus corridor;

▪ **Pollok / Barrhead Strategic Centre**: City Deal projects, quality bus corridor, park and ride;

▪ **Paisley / Johnstone / Ayrshire / Hillington Strategic Centre**: quality bus corridor;

▪ **Clyde Waterfront / Braehead / Glasgow Airport / Bishopton / Inverclyde**: strategic freight transport hub, City Deal projects, modernise Subway, quality bus corridors and bus rapid transit, interchange improvements, cross-river links, surface access improvements to Glasgow Airport;

▪ **Clyde Waterfront / Clydebank / Partick / Dumbarton / Vale of Leven Strategic Centres**: City Deal projects, modernise Subway, improve rail frequency and service quality, quality bus corridor and bus rapid transit, Partick interchange;

▪ **Clydebank / Great Western Road / Dalmuir Strategic Centre**: City Deal projects, improve heavy rail frequency and service, quality bus corridor and bus rapid transit; and

▪ **Maryhill / Bearsden / Milngavie / West of Scotland Science Park**: improve heavy rail service frequency, quality bus corridor.

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Non-Radial Corridors

- **Barrhead to Renfrew / Glasgow Airport and Riverside North / Clyde Waterfront / Paisley / Braehead / Clydebank**: strategic freight transport hub, quality bus corridors, cross-river links;

- **Cumbernauld to Motherwell / Gartcosh / Airdrie / Coatbridge / Ravenscraig**: strategic freight transport hub, City Deal projects, improve heavy rail services, quality bus corridor, park and ride, improve interchanges;

- **Motherwell to East Kilbride / Hamilton**: City Deal projects, quality bus corridors;

- **Glasgow City Centre**: new high speed rail station, EGIP and other heavy rail improvements, modernise Subway, cross-city links, heavy rail conversion to light rail transit (south electrics lines), City Centre Transport Strategy, Fastlink, service integration, interchange improvements; and

- **City Centre / Clyde Waterfront / Partick / Byres Road**: modernise Subway, improved integration between modes.

National Planning Framework 3

8.5.24 The third National Planning Framework was published in 2014 by the Scottish Government. It sets out a long-term vision for development and investment across Scotland over the next 20 to 30 years.

8.5.25 It identifies the following developments of national significance which impact upon the SPT area:

- **Ravenscraig:** The masterplanned development of Ravenscraig, a national development, will transform one of Europe's largest areas of vacant and derelict land into a new, sustainable community;

- **Central Scotland Green Network:** improving quality of place, addressing environmental inequalities and enhancing health and well-being. A delivery plan to 2025 is currently in development;

- **National Walking and Cycling networks**:

  o Route 73 (north) of the National Cycle Network – Brodick to Corrie. Ongoing;

  o Route 753 of the National Cycle Network – Gourock to Ardrossan;

  o Largs to Inverkip. Up to 15km new traffic free and on road route. Ongoing;

  o In and around Fairlie. Up to 10km of new traffic free route. Complete;

  o Clyde Walkway extension. 20km of path creation and upgrades. On hold; and

  o John Muir Way: Strathblane to Glasgow. 15km of paths and improvements. Ongoing.

- **High Speed Rail:** between Glasgow and Edinburgh, and in time on to London; and

- **Strategic Airport Enhancements:** Glasgow Airport improvements progressing through City Deal. Prestwick Airport options being developed through Ayrshire Growth Deal / STPR2.

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National Transport Strategy

8.5.26 The National Transport Strategy (NTS) sets the long-term vision for the Scottish Government's transport policies. It was first published in 2006 and subsequently refreshed in 2016. An updated NTS is currently being prepared by Transport Scotland.

8.5.27 The current NTS identifies a range of relevant interventions including:

Tackling Inequality

- Access for all programme (rail);

- Ferries Accessibility Fund;

- Road Equivalent Tariff;

- Accessible Travel Fund;

- Air Discount Scheme;

- Concessionary Travel; and

- Funding for public transport - BSOG and Bus Investment Fund.

Economic Objectives

- STPR projects;

- Air route development;

- Air Passenger Duty;

- Improving maritime links; and

- Supporting innovation.

Low Carbon

- Decarbonising vehicles (Switched on Scotland);

- Cleaner Air for Scotland framework;

- Support for Scottish Planning Policy and reducing the need to travel;

- Active Travel & Smarter Choices;

- Freight: Freight Facilities Grant, mode shift revenue support and Waterborne Transport Grant;

- Support for 'green technology' growth;

- Scottish Green Bus Fund;

- Road: climate change adaptation issues and recommendations;

- Rail: Network Rail Route Weather Resilience and Climate Change Adaptation Plan

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- Traffic Scotland service; and

- Traveline Scotland.

Ferries Plan

8.5.28 The Scottish Ferry Services: Ferries Plan (2013 - 2022) sets out the future of ferry services until 2022. Relevant proposals include:

- Two vessels for Arran service all summer (May-September) resulting in an increased number of sailings. This has been delivered;

- Introduce a new two-year summer only (May-September) pilot ferry service between Campbeltown and Ayrshire, via Arran – 3 days per week. This has been delivered and the pilot was made permanent in summer 2016;

- Offer on a pilot basis an additional later evening sailing to Cumbrae. Late Friday evening services are now provided during the summer timetable; and

- Extend the operating day on the Colintraive – Rhubodach service until 9pm all year round. This has been delivered.

Glasgow City Region Deal

8.5.29 The Glasgow City Region City Deal will fund major infrastructure projects, create thousands of new jobs and assist thousands of unemployed people back to work. It will improve public transport and connectivity, drive business innovation and growth as well as generating billions of pounds of private sector investment.

8.5.30 The projects defined within the Glasgow City Region City Deal along with their current status are set out in Table 8.3.

Table 8.3 Glasgow City Region Deal Projects

Project
East Renfrewshire - M77 Strategic Corridor: £44 million investment focused on six key projects including Aurs Road upgrade (between Barrhead and Newton Mearns) and Barrhead South rail station
Glasgow - Canal and North: Improved access to the cultural and creative hub at Spiers Lock and Port Dundas including enhanced public realm, improved access and remediation at Cowlairs as well as the remediation of land. Project would also create services and circulation roads at Sighthill as well as helping fund the building of a new pedestrian and new traffic bridge.
Glasgow - City Centre: Improvements to the public realm including resurfacing of streets and pavements as well as 'smart' infrastructure such as surface water management systems and adaptable lighting systems. Proposals also include the creation of avenues of trees with segregated cycle lanes, underground facilities and reductions in vehicle traffic. The general principle is that the projects, in combination with other policies, seek to make car travel within and through the city centre less attractive and to improve access by sustainable and active modes, to improve liveability of city centre and quality of place.

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Project
Glasgow - Clyde Waterfront: A new bridge connecting Govan and Partick along with a new pedestrian cycle route between the Queen Elizabeth University hospital and the city centre. A new south bank pedestrian route between Cessnock Underground and Pacific Quay would be created as well as a new north bank cycle and pedestrian route connecting Glasgow University and the West End with Govan, Glasgow Harbour, the SECC, the Partick-Govan Bridge and the city centre. Works also include public realm improvements at Govan Cross, Byres Road, Church Street and University Avenue.
Inverclyde - InchGreen: Project to promote, make market ready and secure key sector investment in the site at Inchgreen including redevelopment of a brownfield site, development of underutilised quay assets and the Inchgreen dry dock to offer a dedicated on-shore marine hub.
Inverclyde - Inverkip: Infrastructure and development project to address network and junction capacity at four locations on the A78 around Inverkip. Designed to enable development of a major brownfield site (600 houses and 6000 sq. m commercial).
Inverclyde - Ocean Terminal: Expansion of the quayside and delivery of a new visitor centre to further expand Greenock as the cruise ship capital of Scotland.
North Lanarkshire - A8 / M8 Access Improvements: Projects include: • Holytown Link Rd. Provision of missing road / roundabout infrastructure from Holytown into Eurocentral; • New Park and Ride within Eurocentral. In excess of 200 new spaces to link with future bus service provision; and • New Roundabout at A8 Orchard Farm.
North Lanarkshire - Gartcosh / Glenboig Community Growth Area: Projects include: • A80 Link Road. Provision of a new road, to provide an alternative route from the Gartcosh / Glenboig area to the A80 and the trunk road network; • Gartcosh Business Park to Glenboig Link Road. Construction of a new link road with adjoining shared-use footway / cycleway, delivering increased accessibility to the core road network and to Gartcosh Station; • Gartsherrie Freightliner Link Road and M73 Junction 2a Improvement. A new road from Gartcosh Business Park to Freightliner and Gartsherrie, with associated junction improvements to M73 Junction 2A, which will promote stalled investment and enable delivery of the Kilgarth railhead, a strategically integrated rail to road facility; and • Gartcosh Station Park & Ride extension. Up to 300 new spaces to expand capacity and performance at this existing facility.
North Lanarkshire - Pan Lanarkshire Orbital Transport Corridor: Projects include: • East Airdrie Link Road. A new single carriageway from Carfin / Newhouse to Stand; • Muir Street Extension. A new carriageway that will complement and improve the existing Motherwell town centre ring road; • Motherwell Train Station Park and Ride; and • M74 / A723 Junction Improvements. Improved access from Junction 6 of the M74 into Motherwell.
Renfrewshire - The Glasgow Airport Access Project (AAP)
Renfrewshire - Clyde Waterfront and Renfrew Riverside: An 'opening' bridge across the River Clyde will link Renfrew and Yoker.
Renfrewshire - Glasgow Airport Investment Area: This includes the realignment of Abbotsinch Road, a new bridge across the White Cart and new cycle routes.
South Lanarkshire - Cathkin Bypass
South Lanarkshire - Stewartfield Way: The entire length of Stewartfield Way will undergo a £62m upgrade, becoming a dual carriageway in both directions.

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Project
South Lanarkshire - Greenhills Road: The widening of Greenhills Road / A726 is a £23m project which will see two sections of road transformed into dual carriageways.
South Lanarkshire - Community Growth Areas in Newton, Hamilton, Larkhall and East Kilbride
West Dunbartonshire - Exxon site: Includes the creation of new A82 link road.

Ayrshire Growth Deal

8.5.31   The £251.5 million Ayrshire Growth Deal was agreed in March 2019, kick-starting a range of projects across the region. The UK and Scottish Governments will each invest £103 million. This will be supported by South, East and North Ayrshire Councils which will be investing upwards of £45.5m in total.

8.5.32   It is hoped the deal will create approximately 7000 jobs across a wide range of sectors. The investment will be delivered over a 15-year period.

8.5.33   The deal will position Ayrshire as the UK's leading hub for aerospace and space and sees approximately £80m being invested to support the ambition of establishing a horizontal space launch facility and visitor centre at Prestwick Airport, and a range of high-quality flexible commercial business space around the airport to support the continued growth of the sectors.

8.5.34   The further development of Ayrshire's proud history in manufacturing and engineering will be significantly enhanced with approximately £60m being invested to create a range of high-quality business spaces to support entrepreneurial businesses to start up and grow.

8.5.35   The aim is for Ayrshire to be the go-to region for smart manufacturing through approximately £12m of investment to support digital infrastructure and digital automation.

8.5.36   Transport studies are ongoing to identify the projects required to improve connectivity to Prestwick Airport, intra-regional connectivity and accessibility of labour markets to the development sites.

Argyll and Bute Rural Growth Deal

8.5.37   Argyll and Bute Council have laid out proposals for a Rural Growth Deal in a bid to the UK and Scottish Governments. This would see investment in areas as wide ranging as transport, broadband, education and market-leading business innovation. The relevant proposals are set out below.

Roads

8.5.38   The rural growth deal investment would deliver appraisals / technical feasibility work to:

- Improve route resilience by removing pinch points and addressing accident black spots;

- Improve journey times by installing climbing / safe overtaking lanes and other similar enhancements on the A83 network;

- Unlock strategic development sites for business and housing as well as supporting key sectors such as tourism and aquaculture, by rerouting the A85. This would support island communities served by Oban as well as the wider Oban area;

- Identify options for developing local transport routes of strategic importance to the economy of Argyll and better accommodating visitor pressure; and

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- Deliver improvement action where evidence-based improvements are substantiated for strategic routes.

Air

8.5.39 This centres on growth of Oban airport as a west coast regional hub linked strongly with Glasgow Airport. This is a key issue for the SPT area in relation to inter-regional connectivity and maintaining the importance of Glasgow Airport as a national / international hub.

> **KEY ISSUES**
>
> There are a wide range of transport proposals in varying stage of development and implementation. City Deal and Growth Deal funding is currently pushing forward projects across the SPT area and close monitoring of these schemes will be required throughout the development of the RTS.
>
> More long-term strategic transport proposals and policies have been identified through the National Transport Strategy and Strategic Transport Projects Review. The RTS will need to closely integrate with these as they evolve through their current review and update process.
>
> Beyond this the planning system is driving the need for transport investment to fulfil development aspirations which also need to be reflected in the RTS.

8.6 National Targets

8.6.1 The future of transport in the SPT area will also be shaped by the targets and aspirations defined by the Scottish Government. These set the direction and context within which the RTS must sit. The RTS will also need to make a positive contribution towards delivering these targets by defining projects, policies and proposals which are consistent with the objectives underpinning the targets. A review of relevant national targets is set out in Table 8.4.. This has been separated by the key policy areas of Environment, Health and Economy.

Table 8.4 National Targets Relevant to the RTS

Topic	Targets	Source
Environment		
Emissions: Overall	Scotland has the most ambitious greenhouse gas emissions reduction targets in the world including an interim target of a 42% reduction by 2020 and an 80% reduction by 2050, as established through the Climate Change (Scotland) Act 2009. At the time of writing, the Climate Change (Emissions Reduction Targets) (Scotland) Bill is currently at Stage 1 in the Scottish Parliament. As introduced, the new Bill will increase the 2050 target from 80% to 90% emissions reduction on the 1990 baseline and adjust the way emissions are accounted for in relation to the targets.	Climate Change (Scotland) Act 2009 and Climate Change (Emissions Reduction Targets) (Scotland) Bill
Emissions: Transport Specific	37% reduction in greenhouse gas emissions from transport up to 2032	Climate Change Plan: 3rd Report on Proposals 2018-32
Vehicle Fleet Composition	▪ Phasing out petrol and diesel cars and vans by 2032. ▪ Reducing emissions from heavy goods vehicles.	Climate Change Plan: the third

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Topic	Targets	Source
	▪ Increasing the proportion of the Scottish bus fleet which is low emission to 50% by 2032. ▪ Increasing proportion of ferries in ownership of Scottish Government which are low emission by 30%. ▪ Electrifying 35% of rail network. ▪ Encouraging wide adoption of low emission solutions at Scottish ports and airports. ▪ Increasing proportion of passenger journeys travelling by active modes.	Report on Proposals and Policies 2018-2032 (RPP3)
Energy	50% of the energy for Scotland's heat, transport and electricity consumption will be supplied from renewable sources by 2030.	Scottish Energy Strategy
Air Quality	To have the best air quality in the world based upon the following key performance indicators: ▪ % change in NO2 at each monitoring location, averaged over a three-year period; ▪ % change in PM10 at each monitoring location, averaged over a three-year period; ▪ Share of public transport journeys in the overall modal split – % change and/or comparison to the national average; ▪ Share of low emission vehicles in the overall modal split – % change and/or comparison to the national average; and ▪ Share of cycling and walking journeys in the overall modal split – % change and/ comparison to the national average.	Cleaner Air for Scotland
Electric Vehicles: Air Quality & Emissions	By 2050, Scotland's towns, cities and communities will be free from the damaging effects of petrol and diesel fuelled vehicles	Switched on Scotland: A Roadmap to Widespread Adoption of Plug-in Vehicles
Biodiversity	The Route Map includes transport-related targets and actions to increase regular visits and active travel in greenspace through improved infrastructure, information, and campaigns, and the provision of activities and events; delivering the National Walking and Cycling Network and promoting its use by the public; Proportion of adults who live within a 5-minute walk of their local green or blue space.	2020 Challenge for Scotland's Biodiversity National Performance Framework (Communities themes)
Health		
Inequalities	There are 3 headline indicators: ▪ Healthy Life Expectancy; ▪ Premature Mortality from all causes (aged under 75 years); and ▪ Mental Wellbeing of adults (aged 16+).	Equally Well / Long Term Monitoring of Health Inequalities
Activity Rates	▪ % of adults meeting physical activity recommendations. ▪ % of adults usually travelling to work by public or active transport. ▪ 10% of everyday journeys to be by bike by 2020.	National Performance Framework

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Topic	Targets	Source
		Obesity Route Map Active Scotland Framework Cycling Action Plan
Economy		
Productivity	Scotland's Rank for productivity against key trading partners in the Organisation for Economic Co-operation and Development (OECD).	National Performance Framework & National Economic Strategy
Income Inequality	Income share of the top 10% of the population in Scotland divided by income share of the bottom 40% (Palma ratio) expressed as a percentage.	National Performance Framework
Growth	The annual GDP gap (%) of Scotland with the UK.	National Performance Framework

KEY ISSUES

The national targets are seeking to deliver a reduction in emissions through new technology, health improvements through more active travel and an increase in the economic productivity of Scotland.

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8.7 Summary

8.7.1 The analysis has identified the key future issues which affect the SPT area and must be considered during the development of the RTS as:

Population Growth and Change

The overall population of the SPT area is expected to increase but this masks forecast population decline in Argyll and Bute, East Ayrshire, Inverclyde, North Ayrshire, South Ayrshire and West Dunbartonshire. The largest growth is expected in East Renfrewshire followed by East Dunbartonshire and Glasgow.

The vast majority of local authority areas are expected to experience a decline in the working age population (16 to 59 years old) with only Glasgow and East Renfrewshire expected to see growth.

Alongside this all local authorities are expected to experience a growth in those aged 60 and over highlighting that, even where population is expected to decline, the trend towards an aging population is expected to be experienced.

Land-use Development

There are sizeable housing and industrial developments planned for across the SPT area. These will have an impact upon the scale of travel demand and locations that people want to travel to and from.

Emerging Transport Interventions

There are a wide range of transport proposals in varying stage of development and implementation. City Deal and Growth Deal funding is currently pushing forward projects across the SPT area and close monitoring of these schemes will be required throughout the development of the RTS.

More long-term strategic transport proposals and policies have been identified through the National Transport Strategy and Strategic Transport Projects Review. The RTS will need to closely integrate with these as they evolve through their current review and update process.

Beyond this the planning system is driving the need for transport investment to fulfil development aspirations which also need to be reflected in the RTS.

Policy Direction

The national targets are seeking to deliver a reduction in emissions through new technology, health improvements through more active travel and an increase in the economic productivity of Scotland.

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9 Transport Innovation

9.1 Introduction

9.1.1 The new RTS is being developed at a time when there is considerable focus upon emerging technologies and transport innovations. Changes are being driven by advances in data science, artificial intelligence and sensing technology which offer potential for cleaner, more coordinated and automated transport systems. In turn, these present an opportunity to transform how people, goods and services travel. However, they also bring with them uncertainty and there is a need to ensure the focus is upon what we want these innovations to deliver to ensure unintended consequences like less use of sustainable modes do not result.

9.2 Mobility as a Service

Defining MaaS

9.2.1 Technological innovation presents an opportunity to travel smarter and to offer a personalised travel service based on user preferences. Many of these innovations can be collectively drawn together under the umbrella of Mobility as a Service (MaaS) which, through integration, offers potential to enable faster, more efficient, more sustainable and less expensive movement of people and goods.

9.2.2 The delivery of MaaS is facilitated through digital platforms where users are able to meet their individual mobility needs by accessing a range of private, public, and shared transport services within one integrated system that facilitates the planning, booking, paying and management of travel.[34]

9.2.3 MaaS offers potential to facilitate a shift to a more user-centric, service-based model of transport provision where users purchase packages of integrated travel services rather than the means of transport (e.g. private car ownership) and transport operators are able to respond more dynamically to individualised travel requirements and desires aided by improved data and analytics.

9.2.4 This means users of a MaaS Scheme wanting to travel from A to B could plan, book and pay for the journey as one integrated, seamless door-to-door service through a single point of contact even when multiple modes or operators are involved in the provision of the transport assets and services necessary to fulfil the journey. Through this the service could be more tailored to individual requirements including speed, cost, comfort, accessibility and physical activity. Payment could potentially be undertaken on a pay-as-you-go or subscription basis.

9.2.5 Delivery of MaaS is likely to be through a range of stakeholders, referred to as the 'ecosystem', combining to deliver an integrated transport service. The ecosystem includes:

- the users, who specify requirements for mobility and consume the services;

- the MaaS provider, who designs and provides the MaaS offering;

- the data provider, who meets the data and information sharing requirements of the MaaS provider and transport operators; and

- the transport operators, who provide the transport assets and services.[35]

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[34] House of Commons Transport Committee Mobility as a Service HC590, December 2018

[35] Transport Catapult Exploring Mobility as a Service in the UK 2016

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9.2.6   Whilst MaaS is still in its infancy there are examples of operational schemes. In Helsinki, the Whim platform has grown to 60,000 active users per month since initial launch in 2016. A survey of Whim users found journeys made by public transport had increased from 48% to 74% whilst car journeys decreased from 40% to 20%.[36] In the UK pilot schemes have been introduced including Whim in the West Midlands and NaviGoGo in Dundee and parts of Fife.[37] In addition, the Mobility Innovation Living Lab (MILL) has been established in Dundee and is taking forward development of the ShareMORE platform which will integrate operators of car clubs, bike sharing, parking and electric vehicle charging services with Dundee City Council acting as the MaaS service broker.[38]

9.2.7   The Scottish Government has also acknowledged the need for more practical application of MaaS to establish its viability and has created a £2 million MaaS Investment Fund (MIF) to test its implementation in Scotland. This will focus on the application of MaaS in a rural islands / communities, tourism and accessibility context.[39]

Potential Benefits of MaaS

9.2.8   A fully developed MaaS ecosystem could provide more personalised, simplified and user-focussed transport services that result in more reliable and affordable journeys, improved accessibility, increased physical activity and reduced need for private car ownership.[40],[41] In urban areas, it is anticipated that MaaS will offer customers more flexibility and could facilitate more efficient use of transport networks by improving travel demand management, reducing congestion, improving reliability and improving air quality.[42]

9.2.9   However, it is crucial that MaaS does not solely provide more travel options for wealthier, digitally connected users who live in urban areas. It must also improve mobility for poorer and more isolated communities as well as vulnerable users that have additional transport needs. In rural areas MaaS offers potential to provide a data-led understanding of where service gaps exist which can be tackled by new mobility options to deliver improved sustainability and accessibility.

9.2.10   Overall, the key areas where MaaS can help us to travel smarter are:

- Using data to **maximise usage of available transport network and service capacity** through measures such as advanced route and journey planning, intelligent traffic management, autonomous vehicles and provision of real time data to enable informed travel decision making;

- **Integrating and simplifying access to transport** by helping users identify their best value and most convenient travel options through seamless journey planning and ticketing across modes integrated with flexible payment solutions;

- Provision of **new transport services and opportunities** like bike share schemes, car clubs, on demand carpools as well as industry disrupting service providers like Uber which can **break the traditional ownership models**;

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[36] www.mass-market.com/sites/default/files/CHRIS%20PERRY_0.pdf

[37] https://www.youngscot.net/wp-content/uploads/2018/09/NaviGoGo-Pilot-report.pdf

[38] https://urbanforesight.org/wp-content/uploads/2019/06/UrbanForesight_MaaS_Playbook_8.pdf

[39] https://www.transport.gov.scot/our-approach/mobility-as-a-service/maas-investment-fund-mobility-as-a-service/

[40] House of Commons Transport Committee Mobility as a Service HC590, December 2018

[41] SCDI Scotland's Big Mo: Industrial Strategy: Inclusive Growth and the Future of Mobility

[42] House of Commons Transport Committee Mobility as a Service HC590, December 2018

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- **Encouraging** and **incentivising** the use of **public transport**, **shared modes** and **active travel** over private car use, potentially reducing congestion and environmental impacts;

- Improving **integration of first / last mile** travel needs **with core route** services;

- **Lowering costs** and **improving accessibility** for users by widening the range of services available to them;

- Identifying where **network or service improvements are required** to meet the demand of users; and

- Enabling **improved monitoring, management** and **evaluation** of transport networks and services.

Potential Disbenefits of MaaS

9.2.11 However, if not implemented in a manner consistent with policy aspirations MaaS presents a number of broad risks including the potential for enabling and inducing additional car journeys, increasing inequalities of access and reducing integration of transport networks. For example, a subscription based MaaS scheme could motivate users to choose car-based travel if the pricing model does not incentivise sustainable transport whereas a lack of diversity in the ecosystem may limit travel choices to car-based modes.[43]

9.2.12 There is also a risk that people that do not have access to digital technology could be excluded by entirely digital MaaS schemes.[44] In addition, people who have personal needs in relation to accessible information, journey planning criteria, vehicle types or personal safety and security concerns could also be excluded by MaaS if the scheme is not designed to accommodate these needs.[45,46]

9.2.13 It is also possible that limitations in the geographical coverage of MaaS schemes could affect inter-scheme travel or to an area without a scheme, which may have adverse results like poorer connectivity in rural areas and reduced access to labour markets.

9.2.14 Additionally, there is potential that a single provider, acting across multiple roles, could monopolise the ecosystem that eventually could lead to reduced choice and efficiency, increased cost to the user and inequalities of access for socio-economically disadvantaged people or communities.

9.2.15 So implementation of MaaS needs to be taken forward bearing in the mind the disbenefits that could occur if it is not planned and delivered holistically.

Challenges to Implementation

9.2.16 There are also a number of key challenges to the successful implementation of MaaS. These include a lack of tested schemes and local evidence of the most appropriate delivery models, developing the open data environment necessary for a diverse and mature marketplace, improving digital connectivity in rural areas and for people with limited access to digital resources as well as defining the roles and capabilities of the private and public sector to achieve mutually beneficial collaborative relationships and partnerships.

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[43] West Midlands Combined Authority HC590

[44] Inequality in Mobility and Access in the UK, 2017 - 2040; Future of Mobility Evidence Review

[45] West Midlands Combined Authority - submission to HC590

[46] Dft Future of Mobility

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9.2.17 As such, there is uncertainty about the ways that MaaS will develop at this time, but it is reasonable to believe that MaaS will be delivered fully in Strathclyde within the timeline of the new RTS. Therefore, it is essential that the Strategy seeks to help guide and shape MaaS provision 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;

- Co-ordination and scaling of infrastructure and services;

- Equality of access and meeting the needs of all passengers;

- Performance, monitoring and evaluation; and

- Future proofing.

Opportunities to Improve Rural Accessibility

9.2.18 The current transport industry disruptors have focussed upon urban mobility presenting passengers with a wider range of affordable and accessible mobility options than ever before. There have been few organisations seeking to explore the opportunities for similar digitally enabled innovation in rural transport networks though. Rural accessibility is a significant issue in Strathclyde but the provision of viable public transport services has always been difficult. However, research undertaken by the Transport Systems Catapult has identified opportunities for transport innovation in rural areas which could provide enhanced accessibility and mobility for residents.[47]

9.2.19 They state that the category of users who have the greatest potential to benefit from improvements in rural transport are those with lower levels of independence. This encompasses a wide range of ages and personal circumstances including young people without access to a car or convenient bus services, older people who no longer drive and single car or no car families.

9.2.20 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. 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.

9.2.21 Transport innovators should be seeking to either increase convenience or decrease cost to customers, or ideally do both in order to help create a desirable proposition for passengers. The greatest opportunity lies in the field of Demand Responsive Transit (DRT) as illustrated in Figure 9.1. Whilst DRT is not a new concept and is already widely operating across rural areas of Strathclyde 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.

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[47] https://s3-eu-west-1.amazonaws.com/media.ts.catapult/wp-content/uploads/2017/07/18105529/00090-Rural-MaaS_Ready-for-Innovation-Small.pdf

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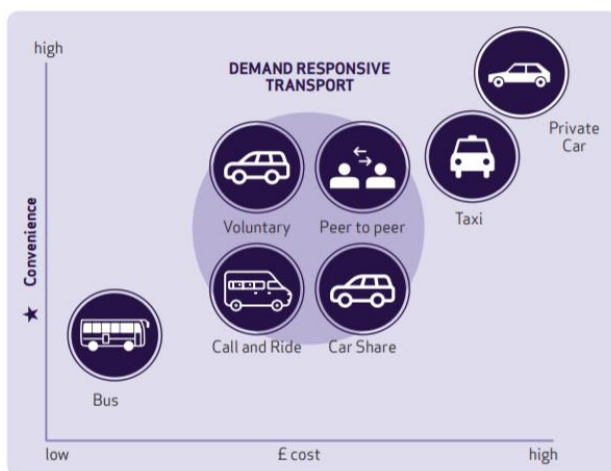& Objectives Baseline Analysis Report Final

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Figure 9.1 Convenience v Cost of Rural Transport Modes

9.2.22 For the public sector there is scope to move away from being a top-down commissioner and planner of services towards becoming an enabler by stimulating and supporting the local transport suppliers to use their knowledge and experience to develop new services. In particular, there is scope for the public sector to become a broker by using digital technology and community engagement to make better use of their assets. For example, public sector bodies could act as the operator of a digital booking system that links demand from passengers in their area with capacity available from a range of transport suppliers.

9.3 Managing Emerging Innovations

9.3.1 With the pace of emerging innovations and technology advances being so rapid this can present issues in terms of how they are implemented, meet customer needs or impact upon existing networks and services. In addition, they also create opportunities to change how we travel and make more efficient use of existing networks and services. Managing the development and implementation of these innovations is therefore essential and these issues are explored further in the rest of this chapter.

Connected Autonomous Vehicles

9.3.2 Innovation in the Connected Autonomous Vehicles (CAVs) field has evolved so rapidly that policy and regulatory frameworks have been overtaken and are still under development. Extensive research is being undertaken in the field of CAVs including three pilot projects backed by the UK Government in Edinburgh and London.[48] Project CAV Forth will convert 5 single decker buses to autonomous operation running between Ferrytoll Park and Ride and Edinburgh Park commencing in 2020. This will enable buses to travel every 20 minutes, providing an estimated 10,000 weekly journeys.[49]

9.3.3 Improved safety, more efficient use of the road network, reduced congestion and greater mobility for those without driving licenses or that are physically unable to drive are all potential benefits of CAVs. However, research undertaken by the DfT has also suggested that congestion could actually increase if in vehicle time can be used productively which could lead to increased use of CAVs. Indeed, it is estimated that, if users cannot be encouraged to share CAVs, road traffic could grow by 71% between 2015 and 2050. In addition, if highly automated vehicles can travel without a driver there could be empty running occurring which would increase road traffic

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[48] https://www.gov.uk/government/news/from-science-fiction-to-reality-people-in-london-and-edinburgh-set-to-be-the-first-to-trial-self-driving-vehicle-services

[49] https://www.gov.uk/government/news/from-science-fiction-to-reality-people-in-london-and-edinburgh-set-to-be-the-first-to-trial-self-driving-vehicle-services

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further.[50] Autonomous vehicles will also affect the disabled as there would be no driver to assist them which would need to be considered to ensure mobility for all.

9.3.4 Regulation and policy for CAVs is not devolved and the Law Commission is working on a regulatory framework which is due to be completed by 2021. This mirrors the timeframe for development of the new RTS and will be closely monitored as the strategy develops.

Taxi & Private Hire Licensing

9.3.5 Another area where innovation has outpaced the regulatory system is in relation to taxi and private hire licensing. The introduction of Uber into the Strathclyde market in late 2015 has had a significant impact on the number of taxi and private hire licences. As shown in Figure 9.2, Glasgow has seen private hire licences grow by 61% whilst taxi licences have declined by 12%. East Dunbartonshire has experienced 300% growth in private hires and 12% reduction in taxis whilst similar but smaller trends are apparent in Argyll and Bute, East Renfrewshire, North Lanarkshire and South Lanarkshire.
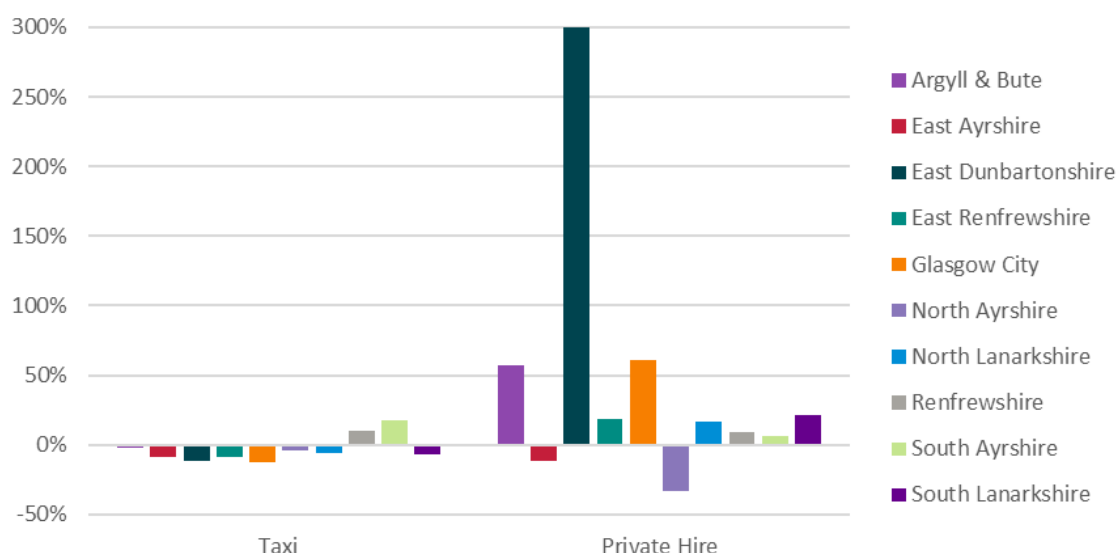
Figure 9.2 % Change in Private Hire and Taxi Licences in Glasgow 2014 - 2018

Source: Scottish Transport Statistics, 2015 and 2019 [51]

9.3.6 The entry of Uber into the private hire market can consequently be seen to have spiked demand for private hire licences around Greater Glasgow. This has implications for accessibility as only taxis are required to provide disabled access whilst private hires are exempt from this requirement. This presents a possible problem in terms of mobility for physically disabled people, particularly if private hires expand further and taxis begin to decline as a result of the competition.[52]

9.3.7 Local authorities do have powers to refuse the granting of licences to limit the number if there is there is no significant demand that would not be met. Glasgow City Council have now limited

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[50]

https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/740399/road-traffic-forecasts-2018.pdf

[51] Data was not available for Inverclyde and West Dunbartonshire

[52] https://www2.gov.scot/resource/0039/00391287.pdf

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the granting of private hire licences since it was deemed that there was an overprovision and no new licenses will be granted until there are less than 3,195 licences.[53]

Smart Ticketing

9.3.8   Buses have been equipped to accept smart tickets as part of the National Concessionary Travel scheme whilst the major operators like First, Stagecoach and McGills also offer their own smart cards and accept contactless payments by card or mobile.[54,55,56,57,58,59,60] In Greater Glasgow bus operators have also come together to offer the joint Glasgow Tripper smartcard that allows use of all services.[61] SPT offer smart ticketing on the Subway whilst ScotRail also offers smart train tickets with each being able to be used on the other as well.[62,63] Contactless payments can be made but not at the gates which control entry and exit to stations.

9.3.9   Whilst smart ticketing is available it can be seen that the current arrangements lack integration and the provision of a coordinated system that allows fully seamless journeys and payments. Ticketing arrangements across public transport modes are complex, don't facilitate joined up journeys, make use of best technologies nor are they easy for travellers to understand.

9.3.10   In recognition of the current fragmented approach Transport Scotland have been working to deliver a multi-modal and multi-operator smart ticketing system across Scotland which would provide paper-free access to travel across multiple modes of public transport using smartcards or mobile tickets.[64] This forms part of a 10 year delivery plan published in 2018.[65]

9.3.11   So, whilst work is being taken forward in this area the creation of a fully seamless smart ticketing and payment solution is still some way off. There is consequently a need for ticketing to evolve to become fully smart, integrated across modes and user-friendly.

Intelligent Traffic Management

9.3.12   Intelligent Traffic Management (ITM) incorporates technology and communications to improve efficiency and safety for transport users. Traditionally it has included equipment like CCTV, traffic detection sensors, speed control and queue management systems like gantry signalling and providing information to drivers through Variable Message Signs (VMS), online services and radio broadcasts.[66]

9.3.13   As ITM systems progress they offer the opportunity to improve capacity utilisation, reduce congestion, further enhance safety and resilience on the network as well as reducing environmental impacts like emissions. They will also be critical to widespread implementation and operation of CAVs where advances in mobile and broadband systems will facilitate more

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[53] https://glasgow.gov.uk/CHttpHandler.ashx?id=45068&p=0

[54] https://www.transport.gov.scot/concessionary-travel/

[55] https://www.firstgroup.com/buy-ticket/contactless-payments

[56] https://www.firstgroup.com/greater-glasgow/tickets/mtickets-0

[57] https://www.stagecoachbus.com/promos-and-offers/national/stagecoachsmart

[58] https://www.stagecoachbus.com/promos-and-offers/national/contactless

[59] http://www.mcgillsbuses.co.uk/gosmart.aspx

[60] http://www.mcgillsbuses.co.uk/news/go-contactless.aspx

[61] https://glasgowtripper.co.uk/

[62] http://www.spt.co.uk/corporate/about/projects/smartcard/

[63] https://www.scotrail.co.uk/smartcard

[64] https://www.transport.gov.scot/public-transport/smart-and-integrated-ticketing/about-smart/#53975

[65] https://www.transport.gov.scot/media/42380/smart-ticketing-and-payments-delivery-strategy-2018.pdf

[66] https://www.transport.gov.scot/media/40406/its-strategy-2017-final.pdf

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connected equipment and locations. Indeed, by 2026 it is anticipated that all new vehicles will be equipped with connected technology.[67]

9.3.14 This would enable traffic information and messages to be displayed within vehicles which could also potentially be tailored to the journey that person is undertaking. It will allow vehicles to safely follow and warn each other when they are braking, approaching road works or bad weather ahead to automatically reduce their speed.[66] Information could also be provided to electric vehicles to inform them if their charge is sufficient for their journey and to advise on the nearest charging locations.

9.3.15 The advances in ITM therefore also offer potential to increase autonomy, facilitate uptake of electric vehicles and increase mobility options which the RTS must plan for as part of a coordinated future transport network. It will also significantly increase the data available that will assist in better understanding, planning and managing transport networks and services along with the most appropriate charging mechanisms for their usage.

Car Sharing

9.3.16 Car Sharing is not new with SPT already operating a JourneyShare scheme in collaboration with LiftShare.com. This allows you to match your trip with others travelling the same journey. However, it has never been mainstreamed for a variety of reasons including safety concerns about sharing with strangers, the inflexibility to accommodate multiple purposes into a single journey (e.g. shopping, dropping or picking up children, etc.) and the lack of alternative transport options in an emergency.

9.3.17 The concept is now evolving to incorporate other forms of car sharing such as work pool cars, car clubs covering towns or cities as well as peer to peer car sharing where people can rent their car to someone else. These offer potential to reduce the requirement for car ownership by allowing people access to a car on an 'on demand' basis which could help to reduce growing levels of car ownership. In addition, they offer scope to make cars more available to people who traditionally haven't been able to afford to own cars improving accessibility and reducing transport poverty.

Bike Sharing

9.3.18 Public bike share schemes have been introduced across the UK with Next Bike commencing operation in Glasgow in 2014.[68] These provide convenient access to bikes in public locations which encourages people to cycle rather than using their car helping to reduce local air pollution, reduce congestion, improve health and lessen the demand for car parking spaces. The main impediments to public bike share schemes are vandalism and theft but, if these can be overcome, they offer potential to increase cycling use.

Freight

9.3.19 Innovation is also occurring in the freight industry at both the bulk movement level and final mile delivery. Online platforms are emerging which allow bulk movements to be coordinated, planned and automated to maximise efficiency and the use of capacity. Empty running is also being reduced through software that enables drivers to find loads they prefer, save time and money and drive fewer miles with no freight.

9.3.20 For last mile journeys there has been increasing use of bicycle couriers in urban areas. In particular, this is being driven by takeaway food delivery which is being facilitated by online platforms like Just Eat, Deliveroo and Uber Eats. Companies have also been experimenting

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[67] https://www.consultancy.uk/news/1763/kpmg-connected-cars-to-deliver-huge-uk-jobs-boost

[68] https://www.bbc.co.uk/news/uk-scotland-glasgow-west-27984471

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with urban drone deliveries with trials being undertaken in Finland, Ghana, Australia and China.[69],[70]

9.4   Summary

9.4.1   The analysis has identified the key future issues which affect the SPT area and must be considered during the development of the RTS as:

Harnessing technology and a shift towards **Mobility as a Service** (Maas) offers an opportunity to **travel smarter, maximise usage of available capacity** and provide a more **seamless and integrated transport offer** across all modes;

MaaS also presents an opportunity to **break the traditional link with car ownership** through the provision of on demand services;

There are also potential disbenefits from MaaS if not planned in a way to **encourage** and **incentivise** the **use of public transport, shared modes** and **active travel;**

The emergence of **Connected Autonomous Vehicles** and the associated regulatory framework along with the **Intelligent Traffic Management** systems that will enable them to **maximise use of capacity** by communicating with each other and supporting infrastructure;

Impacts of **industry disruptors** like Uber on the **private hire** and **taxi market**;

Evolution of **smart ticketing** to provide a **fully seamless**, **integrated** and **multi-modal** ticketing and payment solution.

The opportunity presented by **Intelligent Traffic Management systems** to improve **capacity utilisation**, **reduce congestion**, further **enhance safety** and **resilience** on the network, **reduce environmental impacts** like emissions and informing the selection of the **most appropriate charging mechanisms**.

The emergence of new **car sharing** arrangements like **pool cars**, **car clubs** and **peer to peer** car sharing which could help to change the traditional ownership models and make cars available to people who traditionally couldn't afford them.

The role that **public bike sharing schemes** can play in encouraging active travel and reducing car use.

Innovations in **freight and logistics** that are changing how **bulk** movements and **final mile deliveries** are being undertaken.

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[69] https://dronelife.com/2019/03/21/first-urban-drone-delivery-near-an-airport-a-reality-in-helsinki-skyports-and-partners-complete-trials/

[70] https://dronelife.com/2019/05/30/dhl-and-ehang-partner-on-urban-drone-delivery-in-china/

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10 Summary

10.1 Introduction

10.1.1 This chapter pulls together the key issues which have been identified from the analysis presented in this report. These have been set out under the headings of:

- **Socio-Economic Trends**: the demographic and economic characteristics of the SPT area;

- **Travel Demand**: the prevailing movements that take place within the SPT area as well as to and from external locations; and

- **Transport Network**: the performance of the existing transport network.

10.2 Socio-Economic Trends

Aging Population

10.2.1 In line with wider national and international trends the population of the SPT area is showing signs of aging with a lower proportion of children and higher proportion of people of retirement age. This has implications for the provision of essential services, particularly healthcare but also inclusive public transport.

Population Growth and Change

10.2.2 The overall population of the SPT area is expected to increase in the next 10 to 20 years but this mask forecast population decline in Argyll and Bute, East Ayrshire, Inverclyde, North Ayrshire, South Ayrshire and West Dunbartonshire. The largest growth is expected in East Renfrewshire followed by East Dunbartonshire and Glasgow.

10.2.3 The vast majority of local authority areas are expected to experience a decline in the working age population (16 to 59 years old) with only Glasgow and East Renfrewshire expected to see growth.

10.2.4 Alongside this all local authorities are expected to experience a growth in those aged 60 and over highlighting that, even where population is expected to decline, the trend towards an aging population is expected to be experienced.

Economic Activity

10.2.5 Despite the shock of the economic crisis in 2008 the SPT area has demonstrated resilience with an increase in the proportion of people economically active over the last 10 years. However, comparison between the SPT area and Scottish level suggests that the economic performance is lower than the national average.

10.2.6 This is demonstrated by a lower proportion of the population that are economically active, more houses in the lowest and less in the highest Council tax bands, a higher unemployment claimant count as well as higher proportion of people with no qualifications and lower proportion of people with degree or equivalent qualifications.

10.2.7 However, there are variations in economic performance across the SPT area which can be summarised as follows.

10.2.8 More economically prosperous areas:

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- **Argyll & Bute**: Helensburgh;

- **East Dunbartonshire**: Bearsden, Milngavie, Lenzie, Kirkintilloch, Rural East Dunbartonshire;

- **East Renfrewshire**: Giffnock, Newton Mearns;

- **Glasgow**: Kelvindale, Partick, City Centre;

- **Inverclyde**: Kilmacolm, Rural Inverclyde;

- **North Ayrshire**: Arran, Largs, West Kilbride;

- **Renfrewshire**: Bishopton, Erskine; and

- **South Ayrshire**: Ayr, Prestwick, Troon.

10.2.9 Average economic prosperity:

- **East Ayrshire**: Stewarton, Rural East Ayrshire;

- **East Renfrewshire**: Barrhead, Neilston;

- **Glasgow**: Gorbals, Shawlands, Langside, Castlemilk;

- **Renfrewshire**: Johnstone, Linwood, Rural Renfrewshire, Renfrew;

- **South Ayrshire**: Girvan, Maybole, Rural South Ayrshire; and

- **South Lanarkshire:** East Kilbride, Carluke, Lanark, Rural South Lanarkshire.

10.2.10 Less economically prosperous areas:

- **East Ayrshire**: Kilmarnock;

- **Glasgow**: Scotstoun, Yoker, Sighthill, Maryhill, Springburn, Robroyston, Baillieston, Easterhouse, Dennistoun, Tollcross, Darnley, Nitshill, Ibrox, Cardonald;

- **Inverclyde**: Gourock, Greenock, Port Glasgow;

- **North Ayrshire**: Garnock Valley, Irvine, Kilwinning, Three Towns;

- **North Lanarkshire**: Cumbernauld, Moodiesburn, Airdrie, Coatbridge, Motherwell, Wishaw;

- **Renfrewshire**: Paisley;

- **South Lanarkshire**: Hamilton, Rutherglen, Cambuslang; and

- **West Dunbartonshire**: Clydebank, Dalmuir, Dumbarton, Levern Valley.

Working from Home

10.2.11 There is clear trend towards increased working from home which has been facilitated by improved IT and more flexible working arrangements. This has had a corresponding impact on people travelling short distances (less than 2km) to work with many it appears now working from home instead. The implication has been a reduction in the proportion of people walking and cycling to work.

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10.3 Travel Demand

Car Dependency

10.3.1 The car is the dominant mode for travel around the SPT area and is particularly relied upon for journeys between more dispersed origins and destinations.

10.3.2 Car dependency is greatest in the southern rural parts of the SPT area and is lowest in Greater Glasgow where regular public transport services are more widely available. Where population density is lower there is a corresponding likelihood of higher car ownership and usage.

10.3.3 Households are now less likely to not own a car and more likely to have 2 or more cars. Overall, there has been a small shift towards increased car ownership and usage in the SPT area.

Commuting to Glasgow

10.3.4 Journeys to work are heavily focussed upon Greater Glasgow whilst there is evidence of a more widespread pattern of residences across the SPT area. This suggests people are willing to commute to the employment opportunities in Greater Glasgow.

10.3.5 The largest Movements are dominated by travel from and, particularly, to Glasgow. This underlines its importance to the economy of the West of Scotland. There is evidence of close integration within the labour market of Greater Glasgow.

Self-containment in Ayrshire, Lanarkshire and Renfrewshire

10.3.6 There are local labour markets in these locations which facilitate a high degree of travel between the key local Areas whilst each also has strong links to Glasgow as well. Inverclyde can be seen to be part of the Renfrewshire labour market.

Local Movements

10.3.7 The smaller Movements that occur are mostly local in nature. Where long-distance Movements take place in sizeable numbers these nearly always involve Glasgow.

Limited External Movements

10.3.8 Travel to and from the SPT area is largely confined to journeys to Edinburgh, Livingston and Falkirk as well as travel into Glasgow from larger settlements like Falkirk, Stirling, Perth / Dundee and Edinburgh.

Public Transport Serves Large Movements

10.3.9 When public transport is heavily used this is predominantly serving large Movements to and within Glasgow. This is particularly the case for trains whilst buses are used more where the rail network is less dense.

10.3.10 This reflects the radial nature of the public transport network which provides good links to major urban centres like Glasgow but poor links along orbital corridors.

Future Policy Direction

10.3.11 The national targets are seeking to deliver a reduction in emissions through new technology, health improvements through more active travel and an increase in the economic productivity of Scotland.

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10.4   Transport Network

Road

10.4.1   Traffic growth on the strategic road network has been primarily focussed upon the motorway network with both the M74 Completion and M80 Upgrade contributing to this.

10.4.2   On both Trunk and Non-Trunk A roads traffic flows have remained broadly stable with some local instances of both increases and reductions in demand.

10.4.3   Analysis of average speeds provides an indication of congestion problems but modelled data suggests more widespread issues than observed data. Based on the observed data most congestion occurs on the motorway network including M77, M8 at Glasgow Airport and Alexandra, M80 and M74. The greatest variance between modelled and observed data appears to be on the M8.

Rail

10.4.4   Train service frequencies across the SPT area are lowest in peripheral and rural areas including the coast of North Ayrshire and Inverclyde as well as rural South Ayrshire, East Ayrshire, Lanarkshire and Argyll and Bute.

10.4.5   Beyond these areas train frequencies can generally be considered to be sufficiently regular as to offer a 'turn up and go' level of service.

10.4.6   The first and last departure times from each station suggest that there are good levels of early morning and late night accessibility although some local issues relating to the first or last departure to particular destinations may exist.

10.4.7   The reliability of services across the SPT area has typically been declining over time with increased variability and lower performance being exhibited. The routes demonstrating the lowest levels of performance are Argyle, Glasgow North, Motherwell – Cumbernauld and Shotts.

10.4.8   Demand at the vast majority of train stations has been increasing over the past 20 years with some now experiencing 10 times or more demand.

10.4.9   Passenger demand is expected to exceed capacity at peak periods on the North Suburban, Ayrshire, Inverclyde and East Kilbride routes by 2023/24. Network Rail have put forward potential solutions to provide additional capacity to accommodate this demand.

10.4.10 Growth in demand will also impact upon the already capacity constrained Glasgow Central station. Network Rail have identified options to alleviate this but all are challenging and likely to require significant investment.

10.4.11 The need for increased Park & Ride capacity is expected in line with growth in demand for rail services.

Bus

10.4.12 Bus service provision is declining at a significantly steeper rate within the SPT area than across the rest of Scotland. There has also been a sizeable increase in subsidised bus mileage whilst commercial bus mileage has declined. This is indicative of an increasing requirement of the public sector to subsidise more bus services which will continue to grow if current trends continue. Furthermore, this will likely lead to an overall decline in public transport accessibility.

10.4.13 These trends are also reflected in a decline in bus station departures over recent years.

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Subway

10.4.14 There has been a general decline in Subway patronage over the period from 2007 onwards and there is evidence of seasonal variations in demand too. However, demand has been trending upwards more recently. The sharp decrease observed in July 2016 is attributable to the period when the Subway was closed as part of the modernisation programme undertaken by SPT.

10.4.15 Park and Ride utilisation has increased despite the underlying trend of decreasing overall patronage on the Subway.

Air

10.4.16 Glasgow Airport has experienced consistent growth in passenger demand from 2010 onwards whereas demand at Prestwick Airport has been declining since 2007.

10.4.17 Glasgow Airport is well connected to the strategic road network as the M8 motorway provides road access by car, taxi and bus services. However, the strategic road network around the airport, the M8 and Glasgow city centre are all prone to congestion during peak periods which causes journey time delays.

Ferry

10.4.18 The Gourock – Dunoon service provided by Western Ferries is by far the busiest in the SPT area reflecting the regular service and long operating hours it offers on a year round basis.

10.4.19 The introduction of RET fares has increased passenger and vehicular demand on all CalMac services in the SPT area.

10.4.20 Peak demand has been seen to exceed capacity on Ardrossan – Brodick, Largs – Cumbrae, Wemyss Bay – Rothesay and Gourock – Dunoon (Argyll Ferries) ferries over the past three years.

10.4.21 Service cancellations are not a chronic problem but the majority of CalMac routes and SPT's Gourock – Kilcreggan service undergo short periods where the cumulation of cancellations may impact on the accessibility of users.

10.4.22 Delays are a persistent problem on the Ardrossan – Brodick and Wemyss Bay – Rothesay routes.

Freight

10.4.23 Road freight is largely self-contained within the SPT area suggesting demand is primarily local in nature.

10.4.24 Whilst both airports in the SPT area cater for freight traffic Glasgow Airport has overtaken Prestwick Airport as the primary freight airport in recent years.

10.4.25 Sea freight in the SPT area accounts for a small proportion of total tonnage passing through Scottish ports. Demand has fluctuated with no clear trend developing but a decline in dry bulk freight can likely be attributed to the closure of Longannet Power Station as much of the coal it used was landed at Hunterston in Ayrshire.

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Cycling

10.4.26 Cycle demand for travel to work is predominantly for journeys up to 8km and there are several locations identified as key attractors for these journeys. There is consequently an opportunity to develop enhanced cycle infrastructure focussed upon the routes where demand is greatest.

Emerging Transport Interventions

10.4.27 There are a wide range of transport proposals in varying stages of development and implementation. City Deal and Growth Deal funding is currently pushing forward projects across the SPT area and close monitoring of these schemes will be required throughout the development of the RTS.

10.4.28 More long-term strategic transport proposals and policies have been identified through the National Transport Strategy and Strategic Transport Projects Review. The RTS will need to closely integrate with these as they evolve through their current review and update process.

10.4.29 Beyond this the planning system is driving the need for transport investment to fulfil development aspirations which also need to be reflected in the RTS.

10.5 Strategic Connectivity

10.5.1 The geographically specific strategic connectivity issues identified through the analysis set out in this report have been summarised on a series of maps set out in Appendix G.

10.6 Next Steps

10.6.1 The analysis and findings set out within this report form part of the detailed technical analysis which underpins the SPT RTS Issues and Objectives Report. These will subsequently be used along with the findings from other work streams to develop a comprehensive list of problems and issues.

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