

Intervention 9b – Development of Edinburgh Mass Transit strategies

1 Description of Package

Edinburgh Mass Transit is an enhanced level of public transport provision in the city region, including Bus Rapid Transit (BRT) and Tram. It would complement and integrate with the current bus, tram and heavy rail networks, providing improved connectivity.

Currently being led by the City of Edinburgh Council through their Edinburgh Strategic Sustainable Transport Study Phase 2, the initial focus is on delivering mass transit connectivity from the north of the city (Granton), through the city centre to the south/east extremities of the city boundary and on to East or Midlothian. It is envisaged that transit will be fully electric/ battery/ hydrogen powered from the outset, delivering low emission travel.

In addition to physical interventions, the system would be complemented by supporting measures that include integrated and smart digital ticketing and passenger information services.



This project would be further developed and appraised in 2021 and it is recommended Transport Scotland continues to engage closely with the City of Edinburgh and regional partners; however, in this Phase 1 the focus is on why the Edinburgh region would benefit from mass transit connectivity. Further extension could result in increasing frequency of mass transit services to Edinburgh from neighbouring local authorities or introducing a south suburban railway within the city and a cross-Forth Light Rail Transit system to Fife.

2 What we have heard?

A range of sources were used to identify the problems and opportunities with the strategic transport network in the Edinburgh and South East Scotland (ESES) region, including; data analysis, a review of existing policy, strategy documents and extensive stakeholder engagement. The key issues that this process highlighted were:

- The challenge to provide an extensive and inclusive public transport network given the rural nature of parts of the ESES region and the large geographic spread of the population,
- The configuration of the current bus and rail networks being primarily radial in nature, with a focus on Edinburgh city centre with a lack of orbital routes limiting connectivity to Edinburgh Airport / Gyle and the Royal Infirmary / BioQuarter,
- An increase in bus services connecting rural communities to other semi-urban areas in the region, other than the city of Edinburgh,
- A desire to improve levels of sustainable and active travel across the region, as car still accounts for most journeys to work in all parts of ESES,
- An improvement to the safety of 'on-road' cycle routes, given that the majority of cycle accidents take place on roads, and
- An improvement to bus priority, journey times and reliability with bus being viewed as a mode that often gets hampered by congestion making it less attractive.

Responses to the STPR2 Public Online Survey from the ESES Region highlighted public transport as a key problem, including the lack of services, the cost, and the lack of integration between public transport modes.

There is stakeholder frustration at the speed of bus journeys, both absolute and relative to the car. Existing morning and evening peak journey times to and from Edinburgh city centre can be extremely slow, taking nearly 50 minutes from Portobello and up to an hour and a half from Dalkeith.

Stakeholders note that while bus service frequencies remain high on the trunk and A road networks, connecting medium to large urban centres, outside Edinburgh and other larger towns, the frequency of services connecting rural settlements is lower and decreasing as operating costs increase and subsidies fall.

East-West travel connectivity by public transport across the region is considered poor. There are very few local rail services operating across Edinburgh; instead, interchange is required. Bus connectivity is better, but journey times are slow. As a result, car mode share for cross-region trips is high and there is a dependence on the A720 city bypass.

A number of stakeholders have suggested that orbital bus could be costly while delivering low patronage volumes. A second cross-city transit route could also serve orbital travel demand, albeit through the city centre (e.g. Dalkeith/ Sheriffhall to West Edinburgh and Airport to the Royal Infirmary/ BioQuarter). Travel times will need to be sufficiently fast and reliable; however, public transport is generally better suited to serving radial routes, even in the largest cities.

3 The evidence base to support a case for change

Edinburgh and South East Region GVA

In 2018, the Edinburgh and South East Region accounted for £42.27bn or approximately 30% of Scotland's total GVA of £142bn, with the City of Edinburgh contributing 17% and the wider region 12%. The region's GVA has also seen significant growth and increased by approximately 24% between 2013-2018 which is 9 percentage points more growth than the national benchmark increase¹.

Deprivation

Within the ESES region, 12% (71) of the total number of data zones within the City of Edinburgh (597) are ranked as being in the 20% most deprived data zones within Scotland. Key areas of deprivation across the region include locations within the following:

- Fife - east of Kirkcaldy, Methil, Leven, Cowdenbeath and Ballingry
- East Lothian – Prestonpans, Tranent and Wallyford
- Midlothian –North East Dalkeith, Mayfield and Easthouses
- West Lothian – Craigshill and Deans, Livingston, Blackburn and Whitburn
- Edinburgh – Muirhouse, Broomhouse, Wester Hailes, Craigmillar and Lochend

Nearly all locations suffer from relatively poor public transport accessibility, with a reliance on bus rather than rail networks. In Edinburgh, the identified second transit corridor would improve connectivity to a number of areas of deprivation including Muirhouse / Drylaw, The Inch / Moredun and Craigmillar / Greendykes. Areas of deprivation in east Fife will benefit from the proposed reopening of the Levenmouth rail link.

The overall index for ESES is shown in Figure 1 and demonstrates the varied SIMD position across the region.

¹ Office for National Statistics, Regional gross value added (balanced) by local authority in the UK, <https://www.ons.gov.uk/economy/grossvalueaddedgva/datasets/regionalgrossvalueaddedbalancedbylocalauthorityintheuk>

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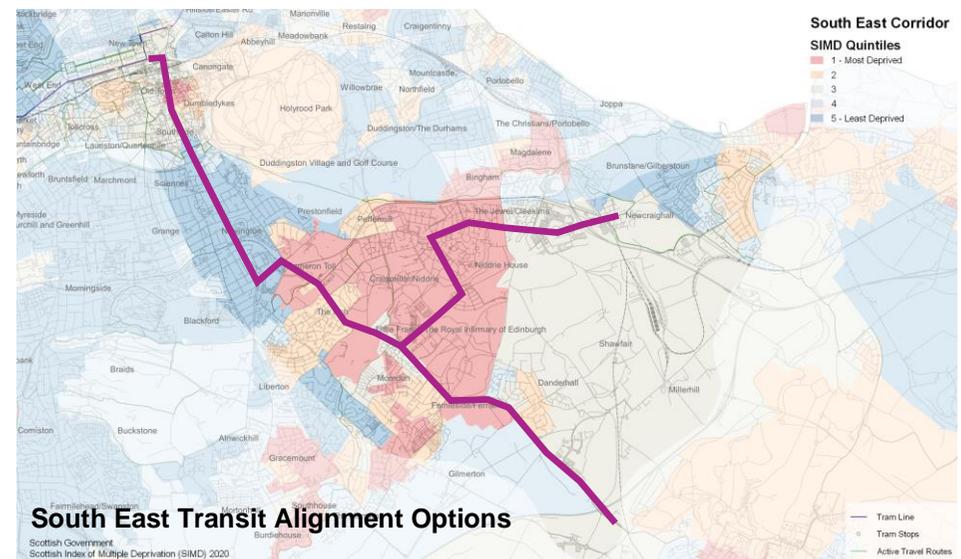
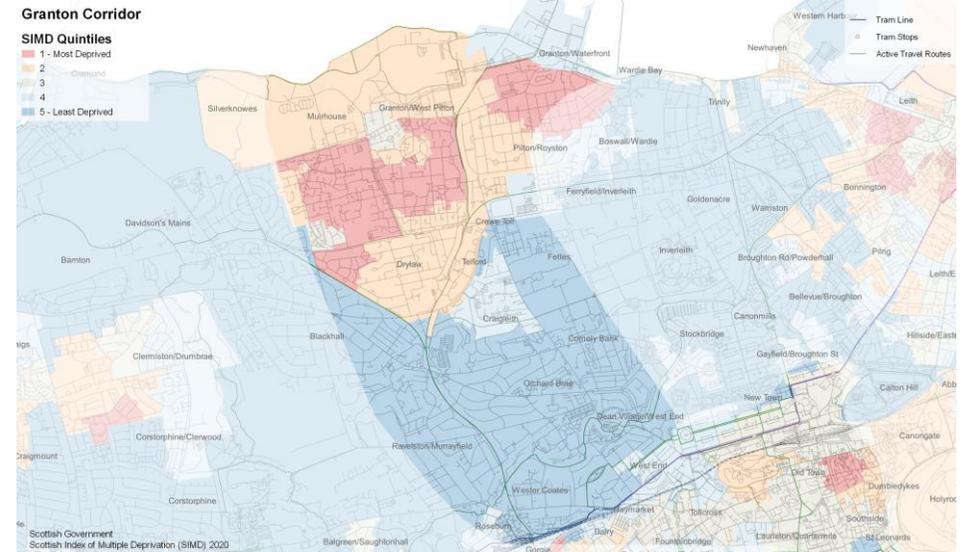
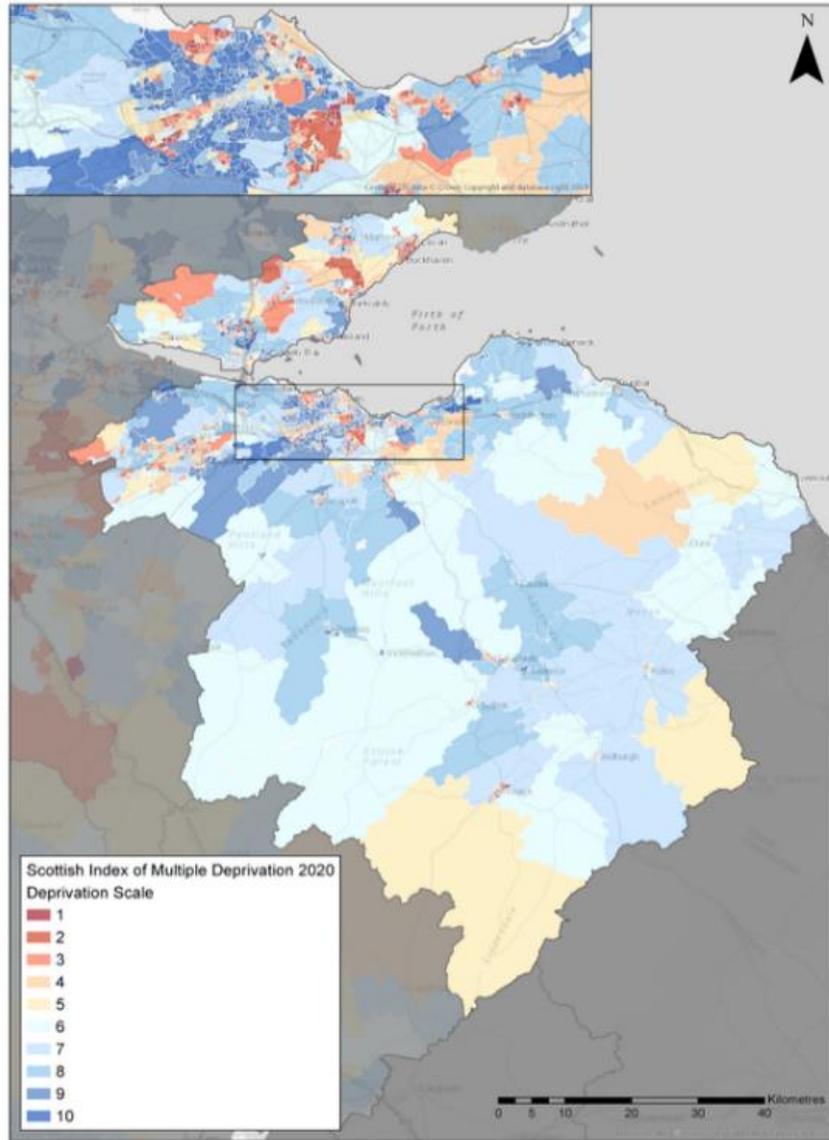


Figure 1: Scottish Index of Multiple Deprivation (SIMD) 2020 for ESES

Population and Employment

The population in the region² has approximately 65.0% of people of working age (16 to 64 years of age), 17.1% aged 15 and under, and 17.9% aged 65 and over. This compares closely to the proportions for Scotland with 64.0% of people being of working age, 16.9% aged 15 and under, and 19.1% aged 65 and over. Between 2012 and 2016, Edinburgh's population grew by 5%, which is the highest rate of growth when compared to the other 3 larger cities of Aberdeen (2%), Dundee (0.4%) and Glasgow (3.5%).

In the ESES region, 78.2% of the working age population (aged 16 to 64 years) in 2019 were economically active, which is 0.7 percentage points higher than the national benchmark. In the City of Edinburgh this is slightly lower at 77.4%, which is 1.8 percentage points higher than the Scottish city benchmark.

The NOMIS annual population survey in 2019³ shows that the mean employment rate in the region is 75.8%, which is 1.0 percentage point higher than the national benchmark. Within the City of Edinburgh, the mean employment rate is 75.1%, which is 2.6 percentage points higher than the Scottish city benchmark. The mean unemployment rate in the region is 3.0%, which is lower than the national benchmark, and within the City of Edinburgh the mean unemployment rate is 2.9%, which was 1.2 percentage points lower than the Scottish city benchmark.

In practice, the above rates mean that Edinburgh is close to full employment, resulting in pressure on wages and increased business costs. These are starting to impact on the city's ability to attract inward investment. Consequently, there is a need to enhance public transport networks, improve connectivity to reduce journey times, and expand the regions travel to work catchment and employee base. Transit has a key role to play in delivering these aims.

Figure 2 illustrates the accessibility in the region to key employment centres by public transport on a typical weekday morning. Key employment locations are mostly located in Edinburgh City. Access by public transport in the Edinburgh area is generally 30-50 minutes. A large proportion of the built-up areas in the region can be accessed by public transport within 50-60 minutes, although travel times toward the outer boundaries of the region can reach up to 90 minutes or longer. It is important to note that analysis is based on timetabled journey times and actual peak hour bus journey times can be 20% slower or more.

The ESES region has high density housing along corridors that feed into concentrated areas of employment. Figure 3 highlights the number of people in the ESES region travelling less than 10km by car to their place of employment.

² NRS, Mid-year Population Estimates, 2019, *ibid*

³ ONS, NOMIS Employment Rate, 2018, <https://www.nomisweb.co.uk/census/2011/qs601ew>

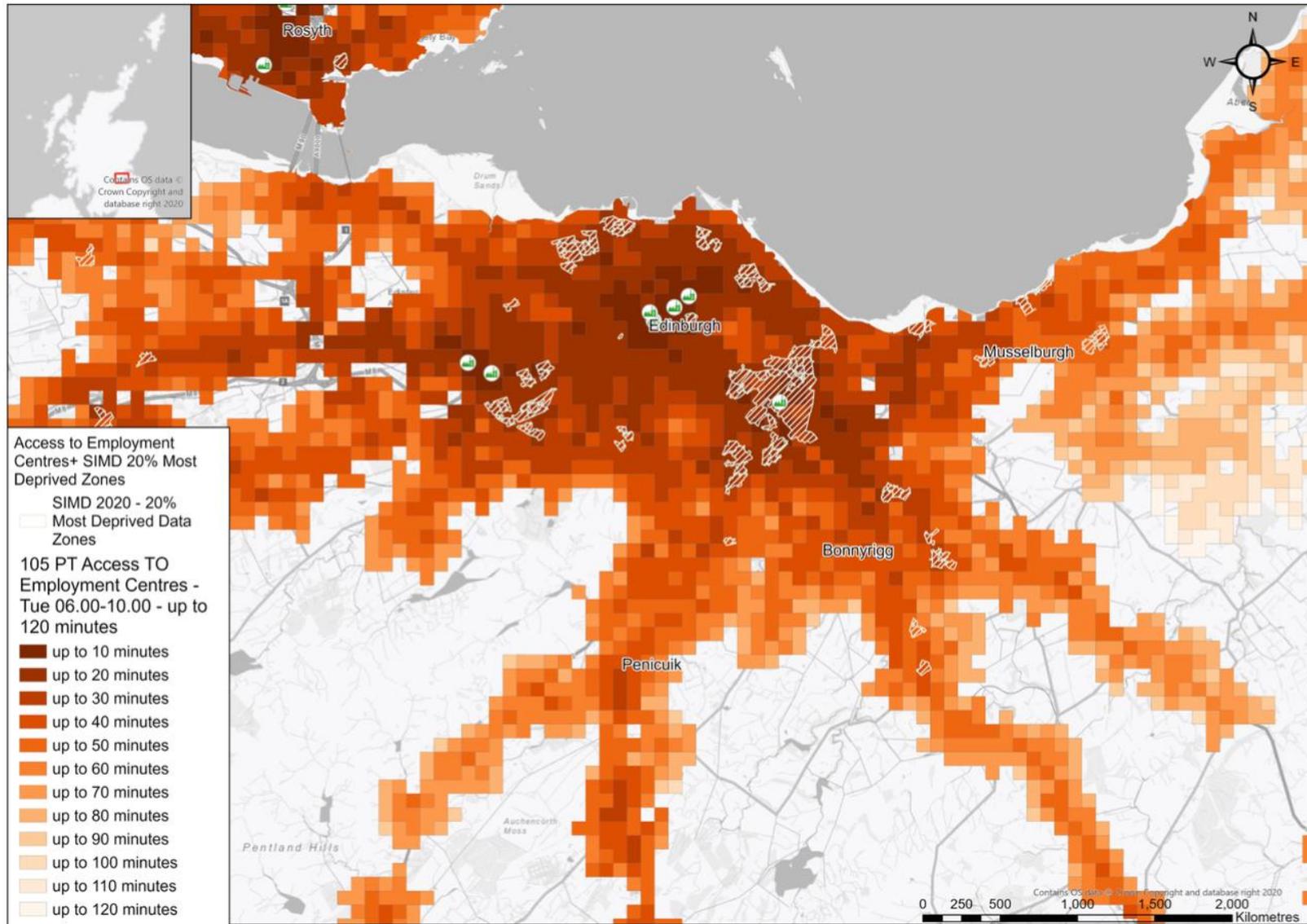


Figure 2: Public Transport to Employment Centres in the ESES Region, (typical Tue 06:00-10:00hrs)

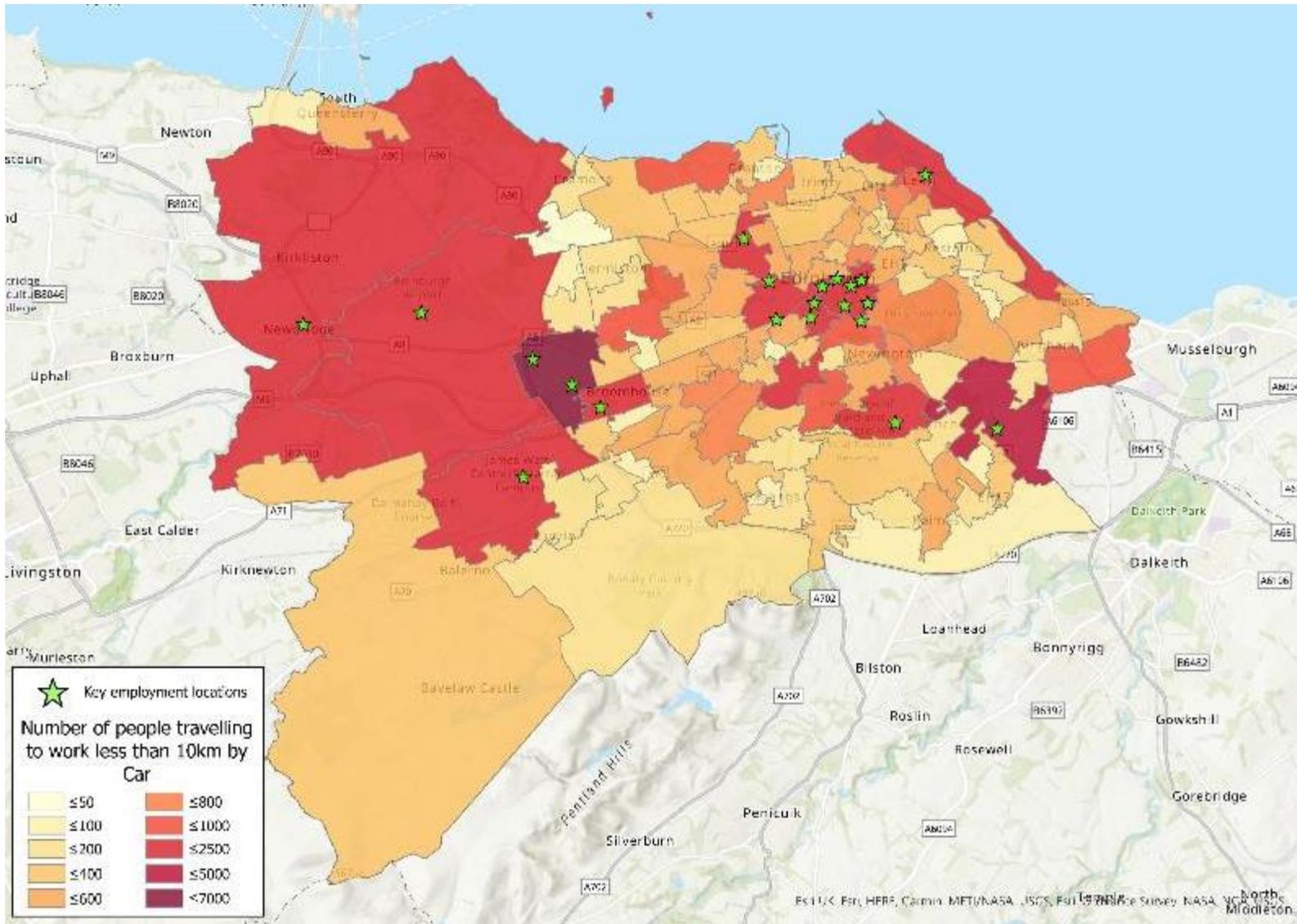


Figure 3: Number of People Travelling Less than 10km by Car to Employment

The figure above highlights an opportunity to deliver a mode shift from private vehicle to public transport. It demonstrates that there is a high density of people choosing to travel by car over a relative short distance that could easily be undertaken by other modes. Currently, a combination of available parking, slow public journey times (relative to the car) and limited service provision make car the most convenient mode to most non-city centre destinations. Investment in transit, together with complimentary parking restraint measures, is one of a number of interventions that can deliver mode shift and help Scotland's emission reduction targets.

Bus Network

Figure 4 shows the change in share of population using the bus 4 or more days a week in the Scottish local authority areas between 2003-04 to 2017⁴ and highlights that there has been a wide variation in performance.

Overall, there is a trend for most local authority areas to show a general decline in bus use. However, the Highlands, Scottish Islands (excluding Eilean Siar) and areas of the ESES region show a trend for general increase over time (as do Dundee City, Perth and Kinross, Dumfries and Galloway and South Ayrshire).

⁴ Adults (16+) - use of local bus services, and train services, in the previous month. Transport and Travel in Scotland. Calculated on the basis of the average percentage change per annum across 2003/04, 2005/06, 2007/08, 2009/10, 2012/13, 2014, 2015, 2016 and 2017.

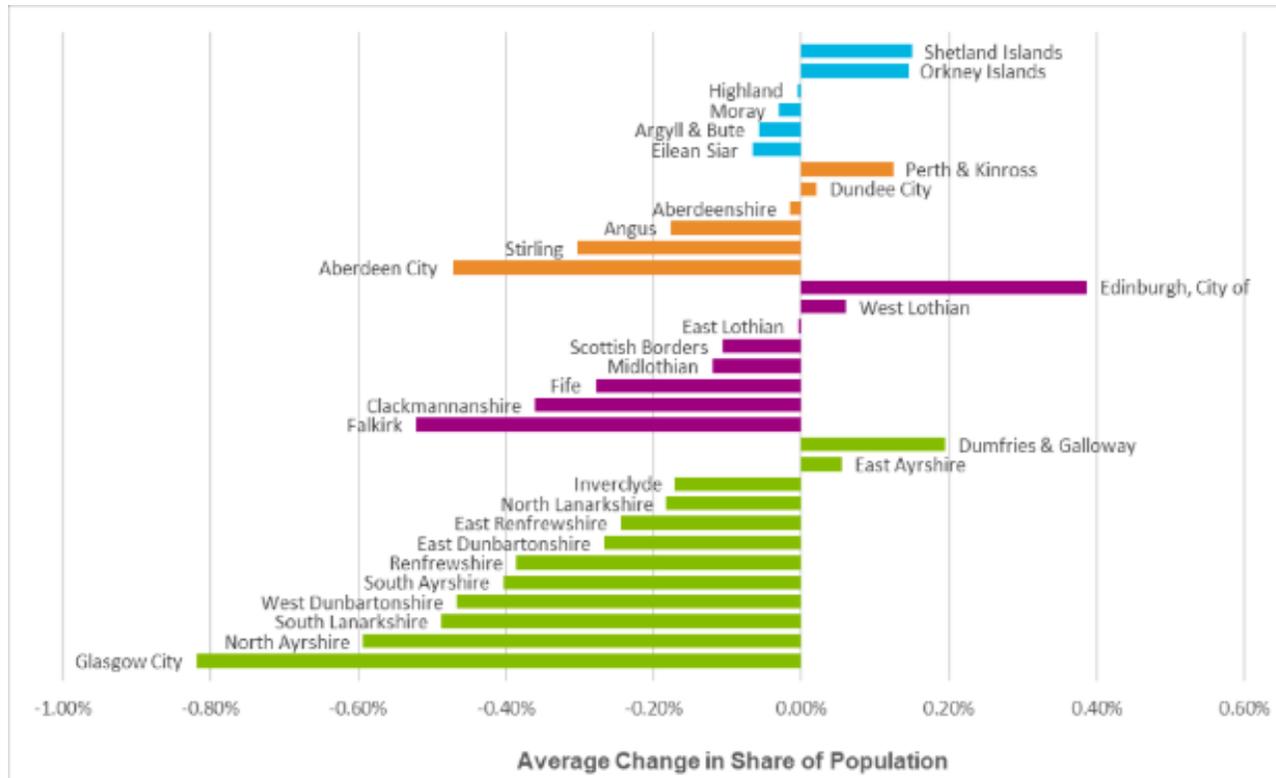


Figure 4: Change in share of population using the Bus Four or More Days a Week, 2003-2004 to 2017

Within the ESES region, the City of Edinburgh and West Lothian show increases of 0.4% and 0.05%. The Scottish Borders and Fife show a decrease of approximately 0.1% and 0.3% respectively. East Lothian shows little or no change.

Table 15 illustrates, by local authority area in ESES, the percentage of people using the bus 4 or more days a week and the percentage of people who use the bus as their main method of travelling to work.

5 Transport and Travel in Scotland 2019, Local Authority Table 11 and Table 1, 2019, <https://www.transport.gov.scot/publication/transport-and-travel-in-scotland-2019-results-from-the-scottish-household-survey/>

Table 1: People using the Bus Four or More Days a Week (%) and People who use Bus as the Main Mode of Travel to Work (%)

POPULATION USING BUS FOUR OR MORE DAYS A WEEK 2019 (%)		BUS: MAIN MODE OF TRAVEL WORK 2019 (%)	
City of Edinburgh	25	City of Edinburgh	28
East Lothian	9	East Lothian	11
Fife	8	Fife	10
Midlothian	14	Midlothian	21
Scottish Borders	2	Scottish Borders	3
West Lothian	6	West Lothian	6

The table shows the high percentage of bus use in Edinburgh, compared with both the rest of the ESES region and Scotland. The growth in rail and bus patronage to and within Edinburgh demonstrates a willingness of people use public transport; continued investment is required to provide sufficient future capacity while improving journey times to support the continued economic competitiveness of the region.

Within Edinburgh, the existing bus network is at or is near capacity in the city centre. Figure 5 below shows the number of buses on Edinburgh’s road network per hour. The figure indicates that all major corridors into the city centre have bus volumes in excess of 125 per hour (two-way). Volumes on Princes Street exceed 325 buses per hour (two-way) and stop congestion has a significant impact on service reliability, especially in the evening peak; . A second transit corridor could reduce the number of buses by between 20 and 30% - and even more if alternative routing and integration options were explored.

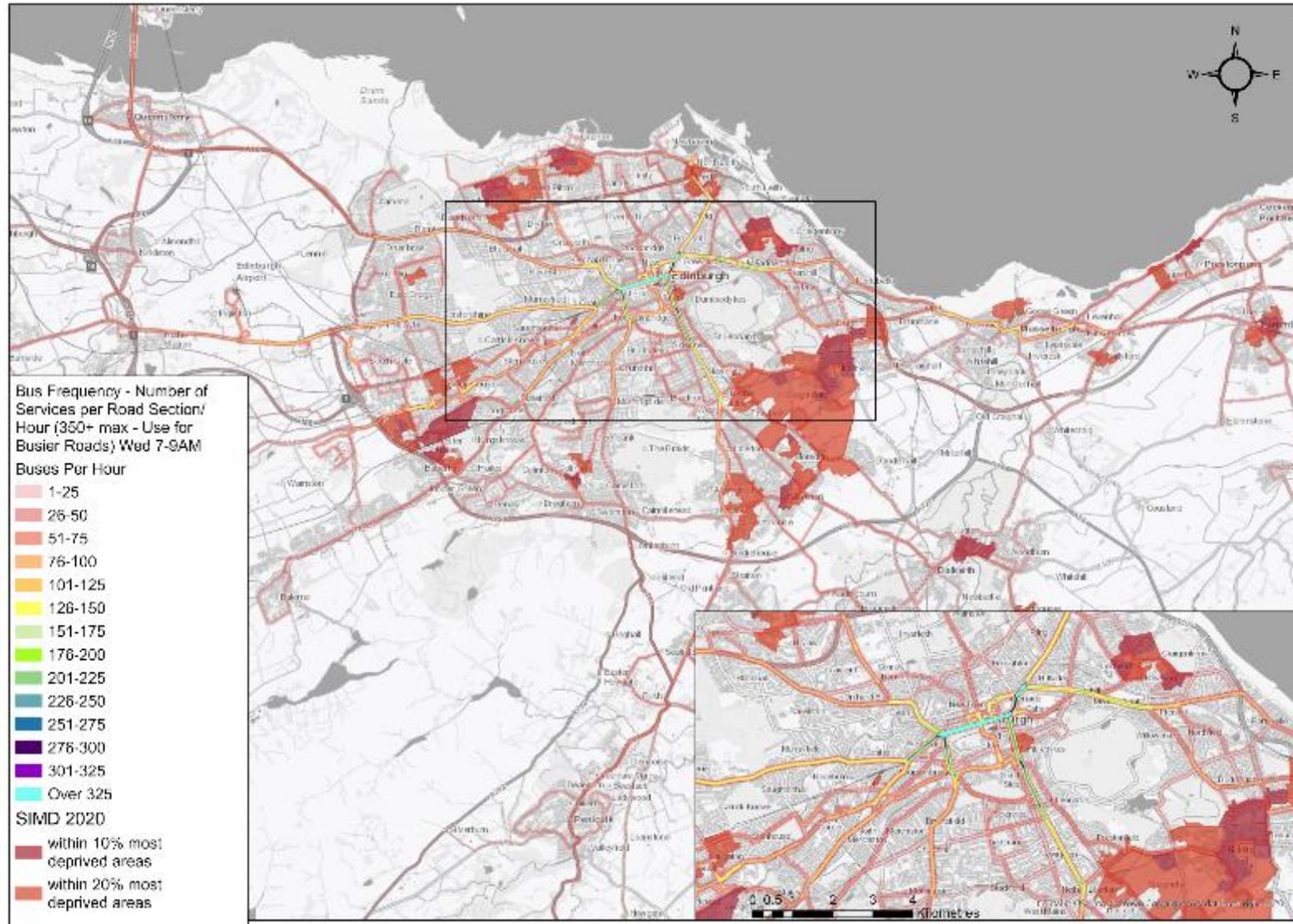


Figure 5: Number of Bus Services per Hour

Existing Travel Choice

Analysis of how people choose to travel can demonstrate where there is either a lack of access to public transport, and/or where the public transport offering is not providing an effective option for journeys. Figure 6 below shows the number of people by zone who are choosing car to travel less than 10km to a destination within Edinburgh City Centre. It shows a large concentration of car-based trips that are being generated in suburban Edinburgh. While some of these are in areas where public transport access, particularly the rail network, is poorer, other areas have relatively good public transport access but these tend to be radial-corridor focussed.

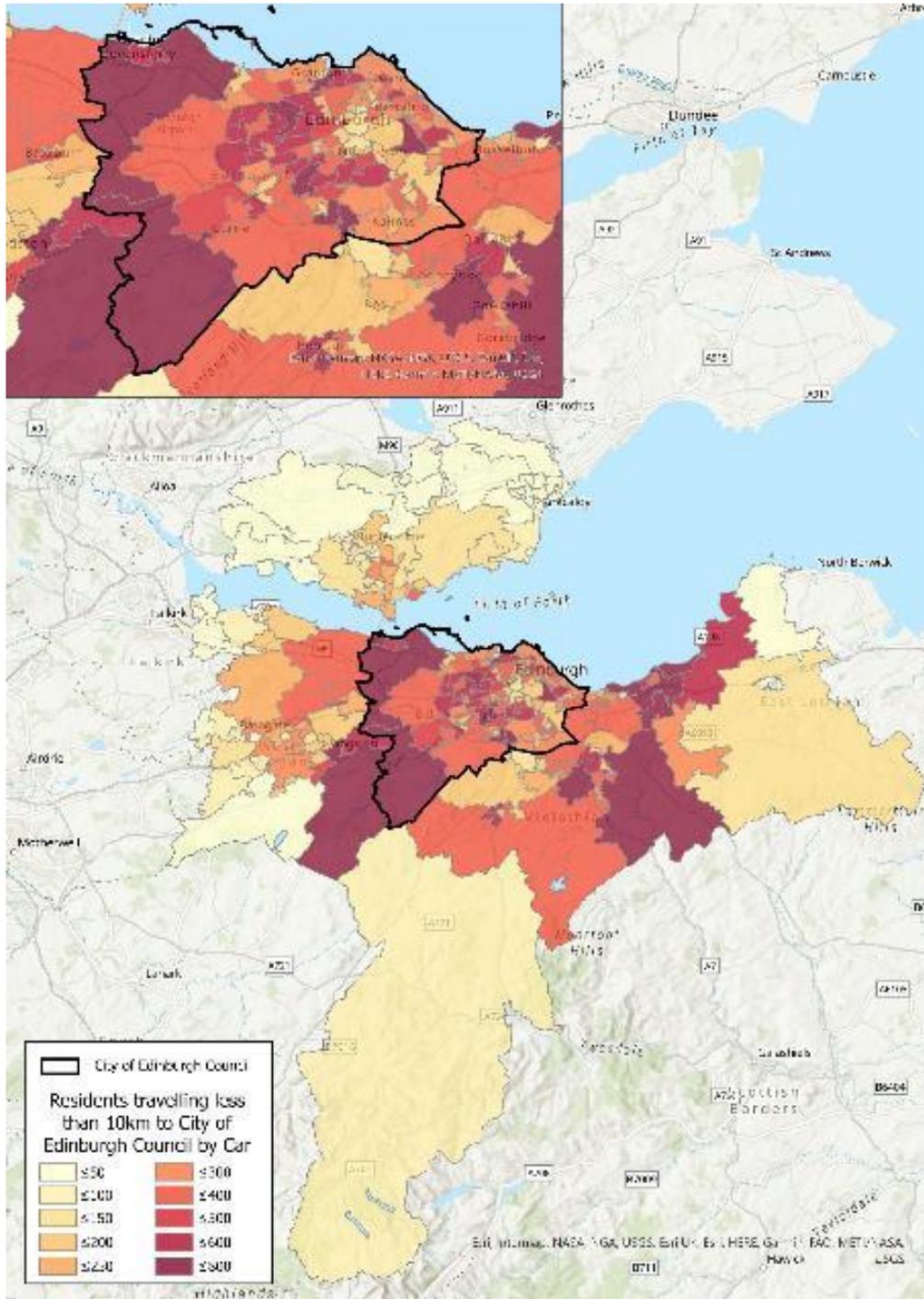


Figure 6: Number of Residents within a Zone travelling <10km to Edinburgh City by car

4 The Strategic Rationale

Transit (tram or BRT) has a key role to play in delivering Edinburgh and south east Scotland's future economic growth and supports the city's ambition to achieve Carbon Neutral status by 2030. Transit forms a core element of the City Mobility Plan and City Centre Transformation.

The region's rail network is limited with major commuter flows originating from beyond the city. Edinburgh is therefore heavily reliant on bus and, while the service is reliable, with comprehensive network coverage throughout the day and at weekends, high levels of passenger demand mean that journey times are slow and bus and network infrastructure is reaching maximum capacity.

Evening peak bus delays are significant and are primarily driven by city centre stop capacity. Services patterns have already been split across multiple stops and now there is no physical space to separate service patterns further. Princes Street is effectively catering for the maximum number of buses possible, leaving no room for further expansion. How public transport can continue to serve an expanding city is a key driver of the move towards transit.

Transit has an important role to play in supporting the continued vitality of the city centre. A rapidly changing retail and employment environment means there is a need to reinforce the city centre as an engaging and exciting experience. Topography and the built environment combine to create a sense of theatre. Nevertheless, the environment of major streets, including Princes Street and North and South Bridge, is heavily influenced by bus, creating a poor overall experience.

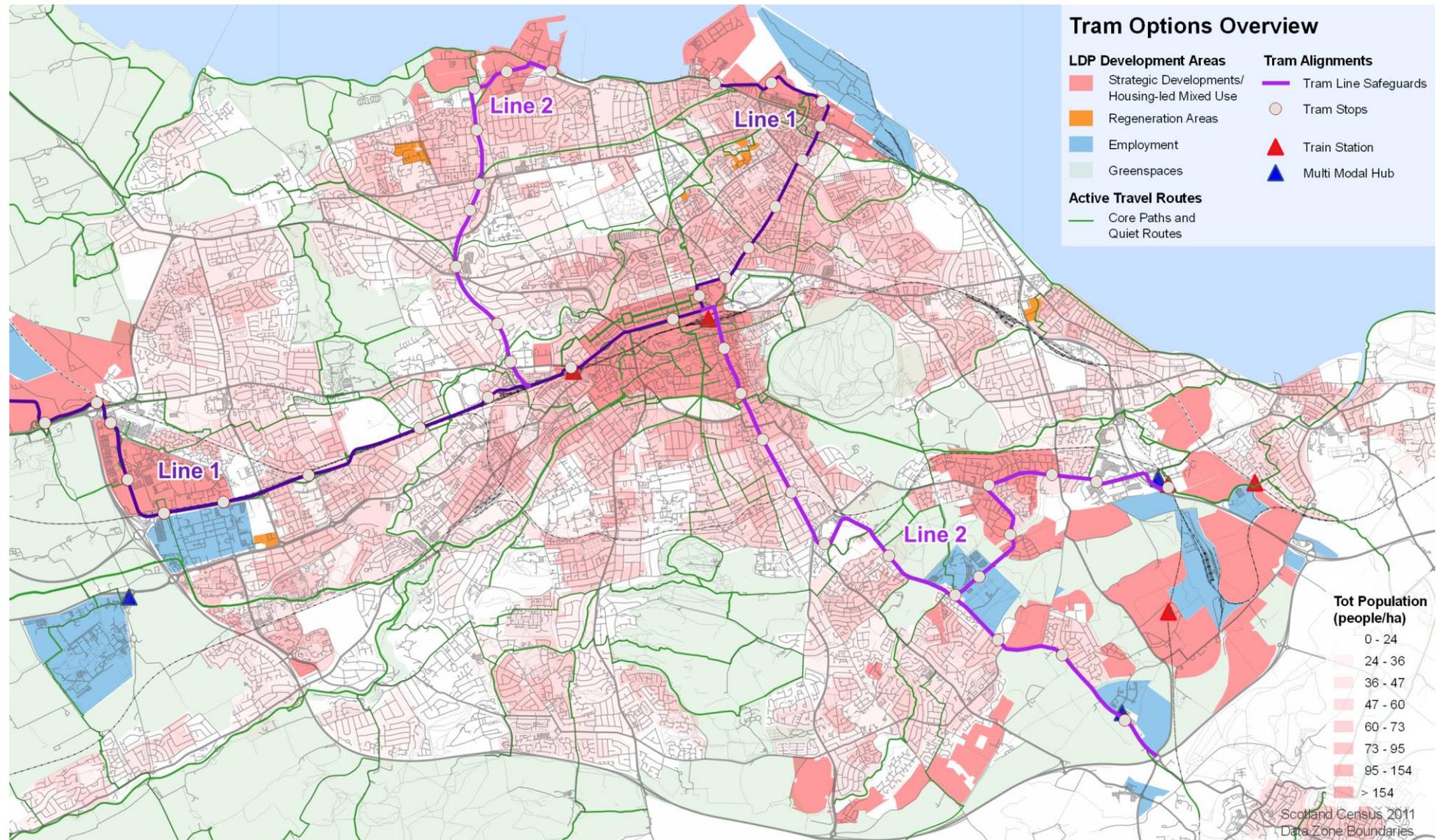
With each vehicle providing more capacity, transit could significantly reduce the number of buses on Princes Street, improving air quality and reducing noise. More space provides an opportunity to create a sense of place and an attractive environment in which to work, shop or dwell.

Bus journey times continue to slow and are increasingly uncompetitive and unreliable. As an example, the travel time from Portobello to the city centre is 50 minutes by bus, a distance of only 5km; travel times from Dalkeith are up to 90 minutes, a distance of only 10km. These times are not competitive with comparable international cities, impacting on the local and regional economy and residents' quality of life.

Integrating land-use and transport planning provides a step-change in spatial accessibility that will significantly contribute to sustainable economic development. Delivery of new transit lines shows a strong level of commitment to the BioQuarter and Waterfront sites, as an example, encouraging additional investment, faster delivery and higher densities.

Figure 7 illustrates how a second transit line could serve strategic development areas in Edinburgh, East and Midlothian.

Figure 7: Potential Second Transit Line and Strategic Local Development Sites



As an example of the impact of transit, Edinburgh Tram has reduced the peak hour city centre to Edinburgh Park journey time from 50 minutes to 15. Once extended to Newhaven, the peak public transport journey time from the Foot of the Walk to Princes Street will reduce from approximately 25 to 10 minutes by tram. Figure 8 illustrates the change in 15 minute travel time isochrone.

Similar journey time savings are possible along the route of future transit corridors.

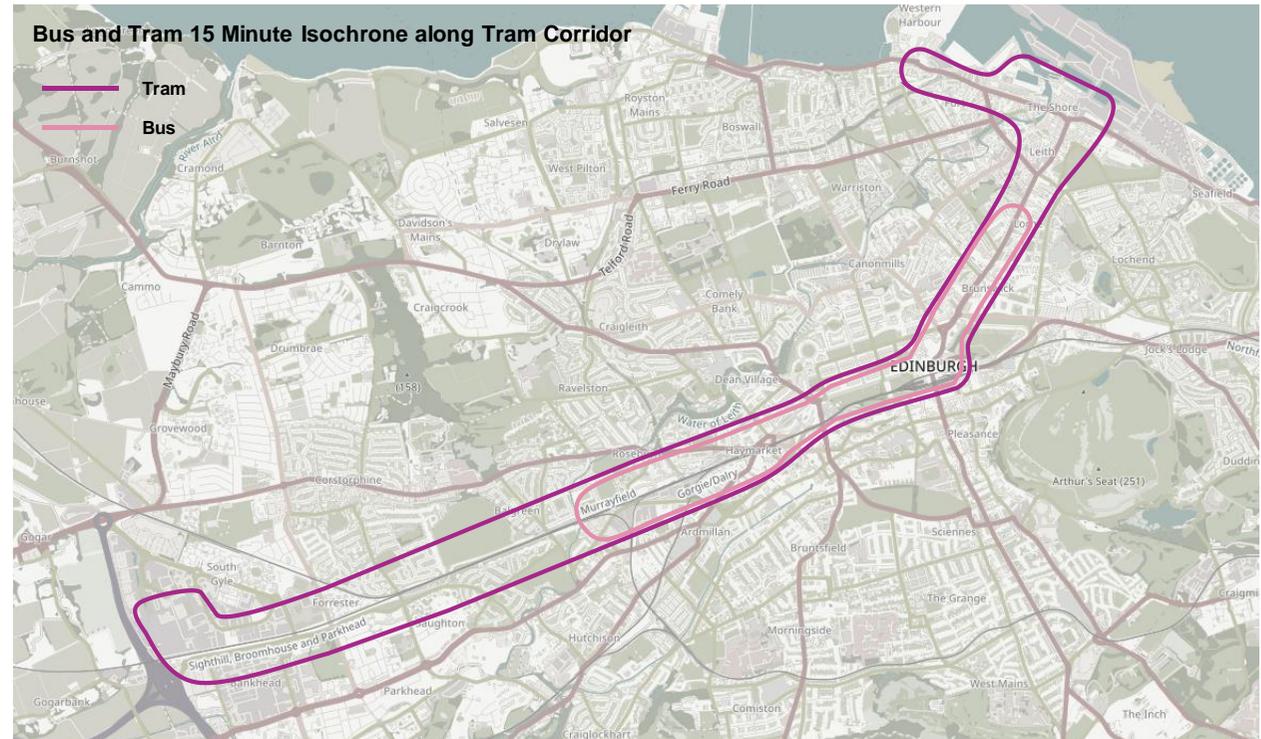
Transit also has a significant role to play in improving sub-regional connectivity. Providing interchange with the Borders Railway, links Midlothian and the Scottish Borders to South East Edinburgh, would provide new employment opportunities and improved sustainable access to the region’s major hospitals. Dalkeith, the Penicuik corridor, the East Lothian coast are all locations where transit could provide a step change in accessibility, journey times and a resulting quality of life.

Why now?

Policy context supports taking urgent action now. NTS2 sets out four priorities around reducing inequalities, taking climate action, helping to deliver inclusive economic growth and improving our health and wellbeing. Transit supports all of these priorities.

- The City Growth Deal, Scotland’s Agenda for Cities and the work of the Scottish Cities Alliance all emphasise the importance of the City Region economy and that effective connectivity is a prerequisite for inclusive economic growth
- Edinburgh’s population is growing and development of sustainable public transport systems that allow for improved active travel

Figure 8: Tram vs Bus Isochrone



- provision and connectivity is needed in order to meet emission reduction targets
- Emerging transit options have the potential to aid social inclusion by providing improved connectivity to areas of multiple deprivation and a step-change in regional access to healthcare.
 - Improved connectivity with the national rail network, supports regional connectivity, widening the city’s employment catchment and providing new travel opportunities
 - Expanding the mass transit network meets many of the STPR2 objectives and aims for this region, particularly in terms of the accessibility to public transport, increasing access to key centres of employment and the aim to increase public transport mode share
 - Investment in public transport infrastructure is a gateway enabling Edinburgh to compete with comparator international cities and further improve the economic performance of the city
 - Edinburgh’s bus network, while excellent, is at capacity in the city centre. Journey times are already impacted and there is limited opportunity for further population and employment growth
 - Edinburgh is a city with pockets of high density land-use. Connecting these areas with fast and reliable mass transit will improve people’s access to education, employment, healthcare and overall quality of life

While the transition to electric vehicles will make a significant impact on emissions, substantive impact will still require modal shift. In addition, tackling congestion in our cities will require more capacity in alternative modes, active travel and public transport. Transit would be fully electric/ hydrogen, supporting the transition to net zero carbon emissions.



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5 Meeting the STPR2 Transport Planning Objectives

TRANSPORT PLANNING OBJECTIVE	CONTRIBUTION	SCALE OF IMPACT (-3 to +3)
 <p>A sustainable strategic transport system that contributes significantly to the Scottish Government’s net zero emissions target.</p>	<p>The analysis contained in the case for change report and benchmarking against comparable cities in Europe demonstrates a gap in the public transport hierarchy. This option provides an opportunity to target people who currently choose to use car due to either a perceived or actual lack of effective alternative. It is envisaged that Transit modes will be electric/ battery/ hydrogen powered from the outset; delivering low emission travel.</p>	<p>✓✓✓</p>
 <p>An inclusive strategic transport system that improves the affordability and accessibility of public transport.</p>	<p>A priority for Transit is to target high density areas that are not currently served by the rail network and where existing public transport journey times are slow. It will seek to link key employment, education, health and retail hubs.</p> <p>Many target areas correlate with higher levels of deprivation, low levels of employment and lower educational achievement. It is unknown what the fares structures would be at this time; however a successful business case will require fares to be competitive with other transport modes.</p>	<p>✓✓</p>
 <p>A cohesive strategic transport system that enhances communities as places, supporting health and wellbeing.</p>	<p>Transit provides a major opportunity both around the linear infrastructure and at stations/ stops to support placemaking, and in particular the formation of local interchange hubs. Integration with walking and cycling for journey start and end will also be extremely important.</p>	<p>✓</p>
 <p>An integrated strategic transport system that contributes towards sustainable inclusive growth in Scotland.</p>	<p>By integrating transit with land-use planning (including BioQuarter, Waterfront, Shawfair and various regional university developments) and existing bus, tram and rail and modes, the scheme provides a step-change in regional accessibility that will significantly contribute to sustainable economic growth.</p> <p>A second transit line, being developed by CEC would connect with the Borders Railway providing new public transport opportunities towards the south of the</p>	<p>✓✓✓</p>

	<p>city, including the Royal Infirmary.</p> <p>Options for the South Suburban railway can be explored, potentially creating new east-west journey opportunities, avoiding the city centre.</p>	
<p> A reliable and resilient strategic transport system that is safe and secure for users.</p>	<p>By providing a 'step-change' in capacity and new facilities, it is envisaged that transit will add significant resilience to Edinburgh's public transport network. In addition, the controlled and modern nature of these systems tends to result in high levels of reliability. New infrastructure gives the opportunity to include modern safety and security systems from the outset.</p>	<p>✓</p>

6 Addressing the Post Covid-19 Priorities

POST-C19 PRIORITIES	CONTRIBUTION
Employment	<p>Corridors and alignments will be planned to target improving accessibility for journeys to work, with faster more reliable journeys. Improved interchange with the national rail network will provide a step-change in regional connectivity.</p> <p>Transit can connect centres with limited travel choices and slow bus journey times (e.g. Dalkeith, Penicuik, Broxburn).</p> <p>Transit can also help encourage inward investment (e.g. BioQuarter, Waterfront, QMU) and support the development of new urban centres (e.g. Shawfair). Transit presents an opportunity to gain access to areas that are remote from the existing heavy rail network, and where bus does not provide a desirable option.</p>
Environment	<p>Transit provides additional public transport capacity, supporting modal shift from car. Modal shift to public transport and active travel will help improve air quality and reduce greenhouse gas emissions. Transit provides an opportunity to reinforce local placemaking and reduce general traffic volumes through the design of corridors and stations/stops.</p>
Education	<p>Major education hubs represent significant nodes for potential Transit services, particularly those somewhat remote from their student catchment – Heriot-Watt, Queen Margaret and the University of Edinburgh East Bush Campuses. The accessibility of major further and higher education campus facilities is a driver for the development of Transit routes.</p>
Equalities	<p>Within Edinburgh, the identified second transit line between Granton and the southeast (to either East or Midlothian) would aid social inclusion by providing improved connectivity to a number of areas of multiple deprivation including Muirhouse/ Drylaw, The Inch/ Moredun and Craigmillar/ Greendykes.</p> <p>The transit line would provide significantly improved access to healthcare with both the Royal Infirmary and Western General hospitals being served. Interchange with the national rail network at Haymarket and Shawfair would provide region wide connectivity. Access-for-all would be further promoted with stop facilities, by definition, required to have full DDA compliance.</p>

7 Risk and Uncertainty

A number of risks and uncertainties will need to be considered as Transit is developed through the various stages of appraisal and business case development. Many of these will link to technical aspects, interface and construction, statutory processes, public relations, environment and others. The table below sets out some key areas of risk and uncertainty that should be considered as further work by CEC adds more detail to potential networks, phasing and technologies.

RISK / UNCERTAINTY	DESCRIPTION
<p>Travel pattern changes following COVID-19</p>	<p>The ongoing COVID-19 pandemic and its restrictions have changed travel patterns and mode choice in the short term. It is not yet understood what the impacts will be in the longer term. Much of the office based commuting travel in the region is directed towards Edinburgh City Centre and West Edinburgh/ Gyle. Given the large number of people working in financial and service industries, it is likely that a significant number will choose to continue to work from home, reducing commuting flows. Current trends also suggest a move towards local centres, closer to their home.</p> <p>Longer term, future developments may be more residential/ mixed use focused with less office development, further reducing peak period movements to existing business centres.</p> <p>Additionally, attitudes towards public transport may change which could present a wider problem for the aspirations of the NTS2 but also challenges for a viable transit network.</p> <p>Timescales to develop future transit options are significant and work to understand the potential network can progress whilst further analysis on post COVID-19 travel is undertaken.</p>
<p>Economic Recovery and Public Sector Funding</p>	<p>Transit solutions would be expected to require substantial funding and delivery models would have to be considered as part of further assessment. It is acknowledged that the pressures on the public sector budgets may become more acute in the efforts to recover from the COVID-19 pandemic and its associated public funding support packages.</p>
<p>Integration with other modes and with the wider STPR2</p>	<p>The Edinburgh region has a number of transport networks and new transit provision will integrate and support these. Various new transport schemes are being proposed through STPR2, and by CEC and regional partners. It is important that transit is consistent with the wider objectives of these schemes and is at the heart of a comprehensive package of measures which seek to address climate change.</p>

8 SEA, EqIA and other Impact Assessments

ASSESSMENT	COMMENTARY
SEA (Strategic Environmental Assessment)	Modal shift from car to Transit would result in reduced greenhouse gas emissions and improved air quality. There are potential localised negative impacts on the Population and Human Health SEA topic (noise and vibration, construction dust, accessibility and visual impacts) but. With effective design and construction Environmental Management Plans in place, this intervention is likely to ultimately complement the SEA and help progress the SEA objectives. Effective placemaking and streetscaping design would also provide environmental mitigation and potential enhancements in the operational phase.
EqIA (Equality Impact Assessment)	<p>Within Edinburgh, the identified second transit line between Granton and the southeast would improve connectivity to a number of areas of multiple deprivation including Muirhouse/ Drylaw, The Inch/ Moredun and Craigmillar/ Greendykes.</p> <p>Transit provides fast and accessible public transit. New stations/ stops will require to be fully DDA compliant and there will be an opportunity with new infrastructure to design-in level access.</p> <p>Transit networks are more legible than typical bus networks. Fixed networks, with bespoke branding aid mental mapping of the user’s environment, are particularly important to the elderly and passengers with a disability who might otherwise find the perceived complexity of public transport a barrier to use.</p>
ICIA (Island Communities Impact Assessment)	n/a
CRWIA (Children’s Rights and Wellbeing Impact Assessment)	Depending on final alignments, transit may provide improved access to education for children and young people. New alignments may provide enhanced opportunities and access to education facilities (even over a relatively short distance), in the context of a modern, safe and reliable system.
FSDIA (Fairer Scotland Duty Impact Assessment)	Work contained in the Case for Change report demonstrates the challenge in the South East Scotland Region around SIMDs and the significant number of people who are at a socio-economic disadvantage. The need to improve connectivity and accessibility to higher quality public transport for many of these areas will be a major driver for the development of routes. It is anticipated that Transit will have a net positive benefit in this regard.

9 Implementability and Interdependencies

IMPLEMENTABILITY CRITERIA	COMMENTARY
Feasibility	<p>The necessary cross-section for BRT is wider than for tram and so the track design is better suited to radial routes where, there is sufficient space, and new dedicated alignments.</p> <p>BRT is more flexible than tram and the design allows vehicles to leave the core route at the start and end of the line, enabling a greater number of origins and destinations to be served.</p> <p>BRT is less successful in core city centres. The additional width and track design can result in a higher visual impact. Limited vehicle capacity and frequency constraints mean that overall BRT capacity is up to 50% lower than for a tram system on the same corridor.</p> <p>Tram is restricted to a gradient of a maximum of 6% and a turning radius of approximately 25m creating potential constraints in dense urban centres.</p>
Affordability	<p>Likely to be delivered in multiple phases over a significant time period . May involve a mix of modes ranging from BRT through to tram; with a consequent range of implementation costs. Has the potential to generate income through increased public transport patronage and wider economic benefits.</p>

Key Interdependencies

Transit will interchange with active travel, and bus networks at a local level, and the railway network at a strategic level.

New active travel corridors will be delivered parallel to transit; in addition, adequate crossing opportunities will reduce severance.

Integration with bus and rail will ensure that transit complements rather than competes and that passengers benefit from new connectivity and faster, more frequent journeys

A higher level of development density is supported by transit and this in turn helps support the need for transit. This virtuous circle is at the heart of the development of sustainable cities. Higher density development supports local shops, restaurants and promotes a sense of place. Reduced travel distances and clean and fast public transport connectivity compliment active travel. Together, these elements can help ensure Edinburgh meets its commitment to be carbon neutral by 2030.

IMPLEMENTABILITY CRITERIA	COMMENTARY
Public Acceptability	<p>Investment in high quality public transport facilities generally enjoys a high degree of public support where effective engagement is undertaken during the development of schemes and benefits are identified and communicated/experienced.</p> <p>Where new systems have been introduced (e.g. Copenhagen Metro, Manchester Metrolink), they have proven popular and there has been substantial public pressure for system expansion.</p> <p>It is acknowledged that there was resistance to the original phase of tram construction in Edinburgh; however, there has been a far more positive reaction to the Newhaven completion stage.</p> <p>Ongoing investment in public transport is key to improving local regeneration while maintaining Edinburgh’s competitiveness and attracting wider international spending.</p> <p>Clearly future transit lines will create specific impacts that will require mitigation; however, the benefits in terms of reduced car use, improved air quality and placemaking, make further investment essential.</p>

Summary

The city of Edinburgh bus, rail and tram networks already provide a transport system for movement throughout the city. However, bus journey times throughout many key corridors in the ESES region are significantly longer compared to other major cities. Without a public transport system robust enough to accommodate forecast demand, congestion would increase, the quality of public transport services would decrease and the transport system within Edinburgh would be unable to safely, efficiently and sustainably move people to, from and around the city.

The continued land-use growth across the city provides an opportunity to expand the existing and create a new network into a world class multi modal Mass Transit system that seamlessly integrates tram, suburban rail and bus to provide a safe and sustainable transport system that offers highly attractive travel choice between destinations within the city and satellite locations.

Furthermore, a transport system that encourages a mode shift away from the private car is therefore a critical priority of the transport network in order to cater for increasing demand for travel in a sustainable manner, not only within the city but for cross boundary movements to/from the city

