7.14 Corridor 14: Edinburgh to Dundee

7.14.1 Setting the Context

Corridor 14 extends from the outskirts of Edinburgh (population 436,000[648]) to Dundee (142,000[648]), through Central Fife. The corridor is approximately 84 kilometres in length and has a total population of 242,800[648] and is largely rural, with Kirkcaldy (47,000)[649] and Glenrothes (38,600)[649] being the only sizeable towns in the corridor. Dunfermline is located adjacent to the corridor but has impacts on the transport network and economy of the corridor. The coverage of the corridor is shown in Figure 7.14.1.

Figure 7.14.2 shows the areas of change in population and employment over the period to 2022. The population in the corridor is forecast to decrease by approximately 16,600 between 2005 and 2022, a decrease of seven per cent[648]. During the same period the number of households in the area is forecast to decrease by around 3,200, three per cent, reflecting national trends to smaller household size.

Employment in the corridor is forecast to rise by four per cent between 2005 and 2022 reflecting the development of new businesses in the area. The economic inactivity rate in 2005 for Fife was 19 per cent, close to the national average of 21 per cent[650]. Income levels for the corridor are £395 (Fife) per week which is 96 per cent of the average for Scotland (£412)[650].

The corridor provides access to Edinburgh and Dundee airports, and to the ports at Rosyth and Dundee. Rosyth is seen as a significant employment centre for the corridor and an important location for inward investment.

Along the corridor there are a number of significant employment centres for both the manufacturing and services sectors. The corridor has recently become a major location for financial and business services companies. St Andrews acts as an economic driver for the whole of Fife with its university and long established tourist attractions.

About 71 per cent of households in the corridor have access to a car, which is higher than the national average of 67 per cent[651]. Future car ownership levels in the corridor are expected to increase in line with economic growth and remain above the average for Scotland.

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[648] TELMoS
[649] General Register Office for Scotland Mid-2004 population estimates for town/city populations:http://www.gro-scotland.gov.uk/files1/stats/04mid-year-estimates-localities-table3.xls
[650] Scottish Economic Statistics 2006, table 4.3, 4.20
[651] Scotland's Census 2001: www.scrol.gov.uk Table KS17

Figure 7.14.1: Setting the Context, Corridor 14 - Edinburgh to Dundee

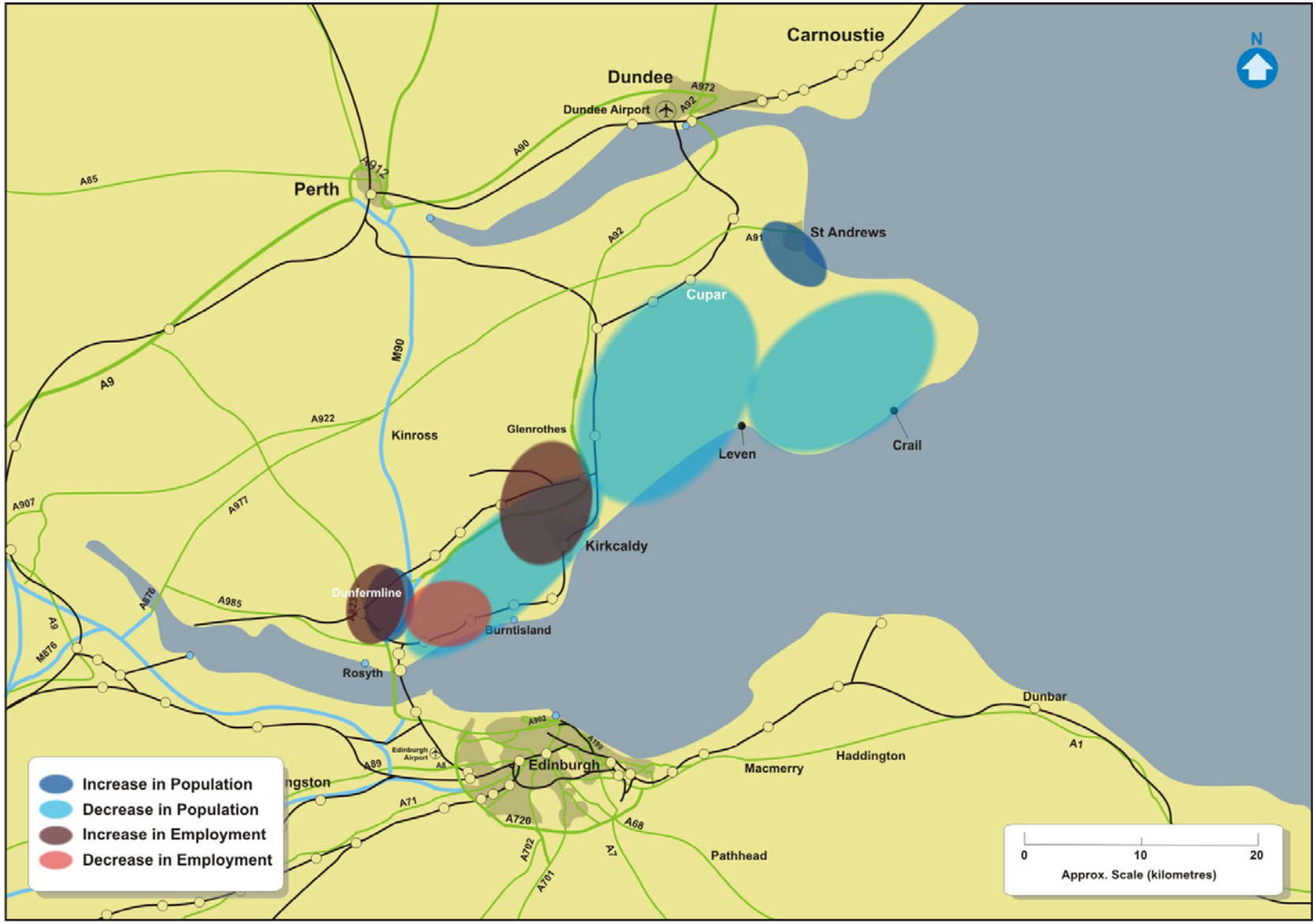

Figure 7.14.2: Changes in Population and Employment, 2005 & 2022, Corridor 14 - Edinburgh to Dundee

7.14.2 Transport Network and Operations

Infrastructure and Services

The principal elements of the transport network that play a national strategic role are shown in Figure 7.14.1.

The spine road for the corridor is the A92, which is dual carriageway between the M90 and Glenrothes. It is however recognised that a large number of trips between Edinburgh and Dundee currently use the M90 to Perth. Between Glenrothes and Dundee the A92 becomes mostly single carriageway with a short stretch of dual carriageway on the southern approach to the Tay Road Bridge. A number of single carriageway A Class roads in the area provide links between communities within the corridor.

The corridor is well served by the rail network. The Edinburgh – Aberdeen East Coast Mainline runs the length of the corridor and the south of the corridor is also served by the 'Fife Circle' line, connecting local stations in Fife with Edinburgh.

Service patterns are generally:

- One train per hour between Edinburgh and Aberdeen;
- Four trains per hour on the Fife Circle;
- One train per day between Aberdeen and Birmingham (Arriva Cross-Country);
- One train per day between Dundee and Bournemouth (Arriva Cross-Country);
- Three trains per day between London Kings Cross and Aberdeen (National Express East Coast); and
- One overnight sleeper service between London Euston and Aberdeen.

The corridor is served by the Stagecoach X54 bus which operates hourly in each direction between Edinburgh and Dundee via the A92, serving Ferrytoll Park-&-Ride, Dunfermline (in Corridor 12), Glenrothes and Ladybank. Glenrothes has a large, relatively modern bus station in the town centre. However its location does not provide interchange with the railway station.

The corridor links with both Dundee and Edinburgh airports and to the ports at Dundee and Rosyth. Demand to / from these locations is included within the review of this corridor; however the specific interchanges are discussed within the appropriate Urban Networks Chapter 5.

Integrated tickets in the corridor are available in the form of the *PLUSBUS* ticket and the 'One-Ticket'. *PLUSBUS* covers rail journeys into Edinburgh, Cowdenbeath, Kirkcaldy and Dundee and provides the addition of unlimited bus travel within the destination. The 'One-Ticket' gives unlimited travel on bus or bus and rail within designated zones radiating from Edinburgh towards Dundee, Perth, Stirling, Dunbar, Bathgate and Shotts.

Asset Management

In 2007, seven per cent of the trunk road network pavement[652] in this corridor is judged to require structural strengthening as it has no theoretical residual strength. This compares with a national level of four per cent[653]. Under Transport Scotland's planned maintenance schedule, the net figure for the corridor is expected to fall to four per cent by 2012.

Further details on asset management, including bus and rail, are provided in Chapter 4.

Demand Management

The City of Edinburgh Council endeavours to ensure that its parking provision does not encourage commuter traffic. Bus priority measures in Edinburgh have been developed to encourage public transport as an alternative to using the private car[654].

There are a number of car parks along the corridor at railway stations, and all are well used. Additionally, the Ferrytoll Park-&-Ride, located to the north of the Forth Road Bridge, provides 1,040 spaces[655] and a frequent bus connection into Edinburgh. This reduces traffic travelling across the Forth Road Bridge and into Edinburgh. Virtually all station car parks in the corridor are at capacity.

SEStran Regional Transport Strategy shows how more efficient use can be made of transport systems and road space in particular, allowing 'essential' economic links to be maintained, whilst encouraging those who can, to use public transport or make 'smarter' travel choices[656].

Programmed Schemes

Figure 7.14.3 presents details of the programmed schemes within this corridor. In addition, proposals have now been finalised for the removal of the tolls on the Forth and Tay Road Bridges.

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[652] Transport Scotland SERIS Database
[653] STS No. 25 (2006) Table 5.5
[654] The City of Edinburgh Council Car Parking Strategy 2006
[655] http://www.ferrytoll.org
[656] Sestrans Regional Transport Strategy 2008-2023, (Summary Section - Key Problems, Trends & Context)

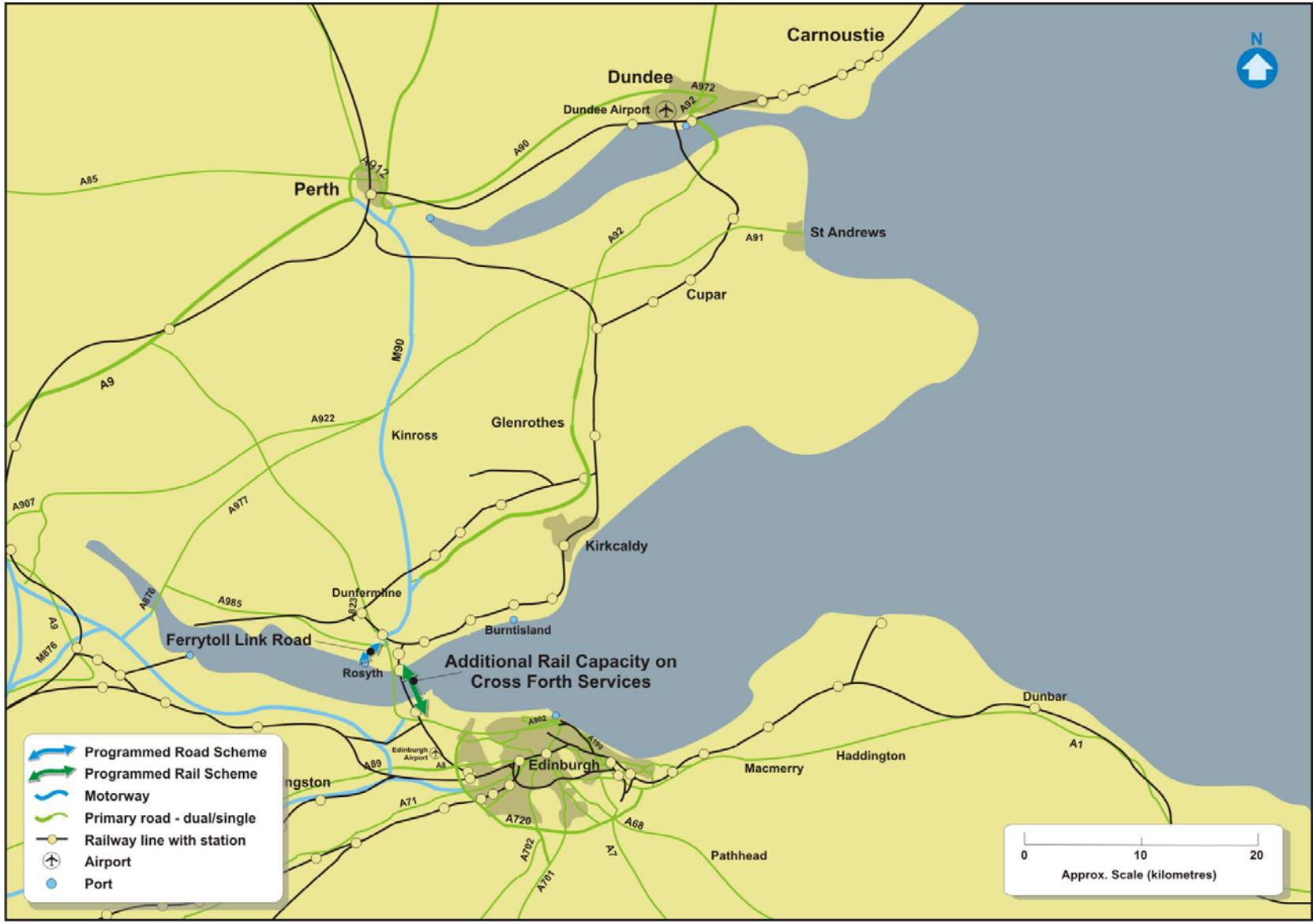

Figure 7.14.3: Programmed Transport and Land Use Developments, Corridor 14 - Edinburgh to Dundee

7.14.3 Travel Patterns

Travel patterns for the Corridor are graphically presented in Figure 7.14.4. A summary of the demand levels in the corridor and mode share is included in Table 7.14.1.

Table 7.14.1: Summary of Demand (12 Hour) and Public Transport Share[657]

		Between Edinburgh and Dundee	Within Corridor	Between Corridor and Dundee	Between Corridor and Edinburgh	Between Corridor and other destinations	Total Trips
2005	Total Trips	6,700	189,200	21,100	24,800	108,600	350,400
	% of Corridor	2%	54%	6%	7%	31%	100%
	PT Trips	1,500	200	2,000	6,900	1,500	12,100
	PT Share	22%	<1%	9%	28%	1%	3%
2022	Total Trips	6,900	199,400	28,000	28,100	135,800	398,200
	% of Corridor	2%	50%	7%	7%	34%	100%
	PT Trips	1,500	300	2,000	9,100	1,800	14,700
	PT Share	22%	<1%	7%	32%	1%	4%
Change	Total Trips	+3%	+5%	+33%	+13%	+25%	+14%
	PT Trips	0%	+50%	0%	+32%	+20%	+21%

In 2005, during a typical 12 hour working day, there were approximately 350,000 individual trips in the corridor. By 2022, it is forecast that both car and public transport daily trips will increase, to a combined total of approximately 398,000 trips per day.

More than half of the total trips are wholly within the corridor. In addition, nearly a third of trips are to 'other destinations', primarily in the adjacent Corridor 12 (Edinburgh to Perth). This reflects the relatively isolated and self-contained nature of East Fife. Dundee and Edinburgh together attract less than 15 per cent of all trips.

Nearly one third of all trips to Edinburgh are by public transport. The modal share for public transport is also high for longer-distance end-to-end trips and through trips. Passenger mode choice reflects the provision of good rail connections for corridor towns serving Dundee and Edinburgh and the bus priority measures into Edinburgh. Public transport links are enhanced through the Ferrytoll Bus Park-&-Ride which serves Edinburgh. This reflects a relatively competitive bus and rail service from Fife to Edinburgh against the road congestion approaching the Forth Road Bridge.

[657] TMfS:05

While the number of public transport trips is expected to rise overall by 2022, the absolute number will remain small and the public transport mode share is forecast to remain similar to 2005 levels. The projected increase in public transport use is concentrated on the route between the corridor and Edinburgh and primarily on the rail network with a forecast growth of approximately 25 per cent. This is caused by more people from Fife commuting to the city, facing higher road congestion while being provided with competitive bus and rail services.

The railway stations within this corridor have a total throughput of some 5.4 million passengers per annum (2005), with Kirkcaldy and Inverkeithing the busiest stations[658].

The Stagecoach X54 bus service hourly service in each direction provides about 6,000 bus journeys per year. The annual passenger volume is estimated to be 200,000 passenger journeys.

The road network in the corridor is well used by freight traffic. ATC data from the SRTDb gives a figure of approximately twelve per cent HGV traffic on the A92 between Lochgelly and Chapel and of ten per cent on the A92 at Ladybank.[659]. There is a considerable volume of coal freight transported on the corridor's southern rail network travelling predominantly from Hunterston to Longannet in Fife.

[658] Rail industry LENNON data (Station Usage 2004/2005)
[659] SRTDb

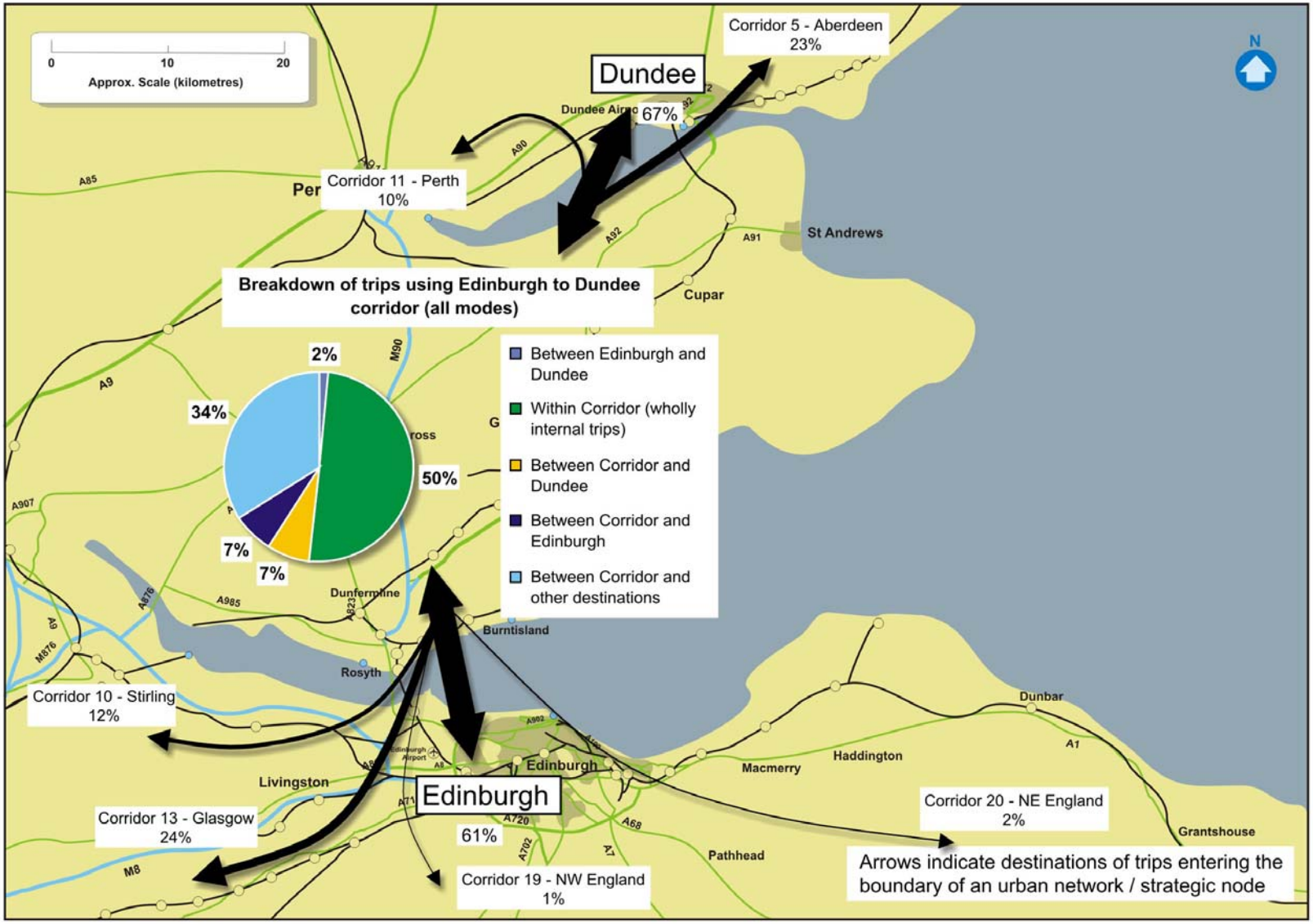

Figure 7.14.4 Travel Patterns 2022, Corridor 14 – Edinburgh to Dundee

7.14.4 Performance Review

Journey Times and Connections

This section addresses the following questions from Table 3.1:

- Does the network offer competitive journey times?
- Is the network operating efficiently and reliably?
- Where are the delays and when do they occur?

Improving Journey Times and Connections

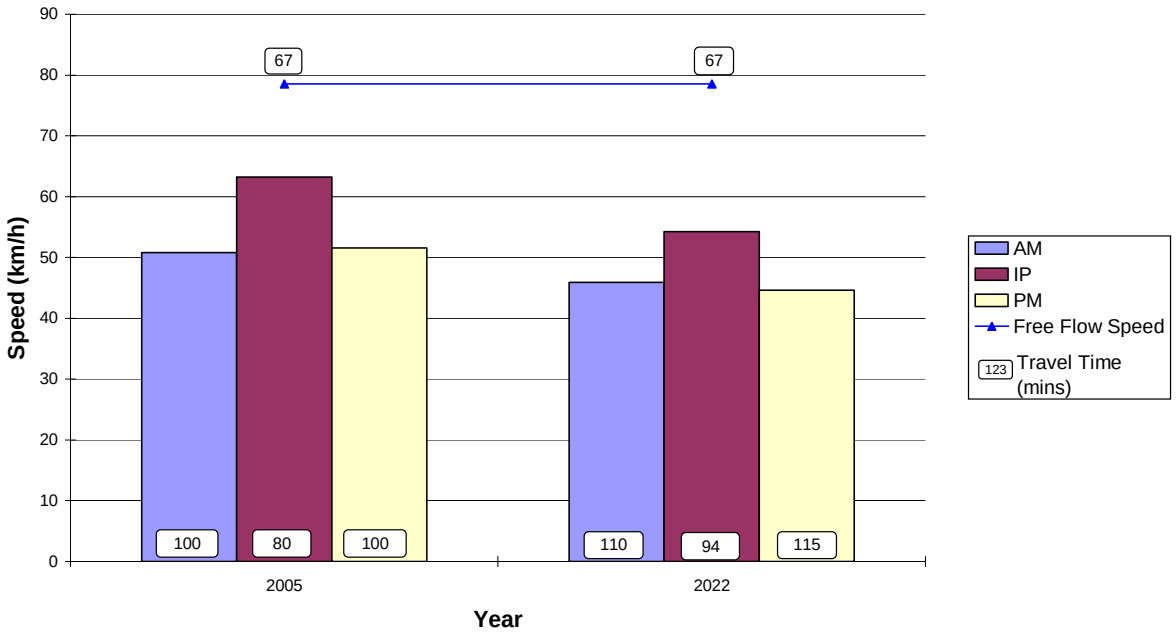

Figure 7.14.5: Average Road Speeds (Corridor 14)[660]

Travel time along the corridor in 2005 is the same for both the morning and evening peaks at 1 hour 40 minutes. The off peak period is significantly quicker at 1 hour 20 minutes, however this is still slower than the free flow travel time of 1 hour 7 minutes. In 2022 the travel times have increased to 1 hour 34, 1 hour 50 and 1 hour 55 minutes for the off peak, morning peak and evening peak respectively. The free flow travel time remains constant at 1 hour 7 minutes between 2005 and 2022.

Figure 7.14.5 shows that the average road speeds for the morning peak, inter-peak and evening peak are forecast to decrease by 10 to 20 per cent in the period up to 2022. This reflects the impact on the constraint points on the network as higher levels of trip making by car result in increased congestion. The speeds are approximately two-thirds of the free-flow level, and the significant difference between the peak and inter-peak speeds reflect the heavy dominance of commuters.

[660] TMfS:05

Some specific locations are forecast to be operating at close to or in excess of capacity during the peak periods by 2022[661]:

- The approaches to the Forth Bridge;
- The Redhouse Roundabout to the North of Kirkcaldy, where the A92 Trunk Road intersects the B9130 (non-trunk); and
- The junction at the north end of the Tay Bridge, where the corridor meets the Dundee Urban Network.

The AADT levels in 2006 on the A92 varied along the corridor from approximately 6,600 vehicles per day south of Letham and Ladybank, 22,000 at New Inn, 27,000 at the Chapel to Redhouse section of dual carriageway, and up to 43,000 vehicles per day on the approaches to Dundee and Edinburgh and up to 24,000 on the A92 at Glenrothes[662]. Overall, the roads in the corridor currently operate within their capacity over the course of the day and there are no journey time reliability issues. Further details of the levels of congestion are presented in Chapter 7.13.

On the A92 approach to the Tay Road Bridge, AADT levels are 18,000[661] vehicles per day reflecting the capacity constraint over the bridge.

A comparison of road, bus and rail travel times is shown in Figure 7.14.6[663] for trips along the corridor in the morning peak. This indicates that the journey times of all three modes are broadly comparable. The capacity of both the road and rail networks have an impact on journey times within the corridor, and this will increase journey time in the future year if forecast growth within the corridor is realised.

Rail service reliability is measured as the percentage of trains actually run in the last 12 months, split into seven service groups. The reliability of the services in this corridor are:

- First ScotRail Express 94.2 per cent (target 92 per cent); and
- First ScotRail East 88.6 per cent (target 90 per cent)[664].

[661] TMfS:05
[662] Transport Scotland Scottish Roads Traffic Database
[663] Journey times for bus/rail include a 20 minute walk/wait time
[664] http://www.firstgroup.com/scotrail/content/aboutus/ourperformance.php

Figure 7.14.6: Journey Time to Edinburgh City Centre by Road/Rail (2005 AM peak), Corridor 14 - Edinburgh to Dundee

Emissions (CO_2 only)

This section of the report addresses the issue:

- What is the level of transport based emissions within the corridor?

CO_2 per person kilometres are forecast to rise slightly from 130 tonnes / million person kilometres to 137 tonnes / million person kilometres between 2005 and 2022 in this corridor[665].

The road based transport network produced 265,500 tonnes of CO_2 in this corridor in 2005. This equates to approximately four per cent of the total road based transport related CO_2 emissions in Scotland. By 2022, it is forecast that the CO_2 emissions will rise to around 305,000 tonnes, approximately four per cent of Scotland's road based transport related CO_2 emissions in 2022.

The rail network produced 5,500 tonnes of CO_2 in Corridor 14 in 2007. This equates to approximately seven per cent of the total rail based CO_2 emissions in Scotland[666].

Therefore, it is estimated that the road and rail based transport network collectively produced 271,000 tonnes of CO_2 in Corridor 14 in 2005. This equates to approximately four per cent of the total road and rail based transport related CO_2 emissions in Scotland.

Quality / Accessibility / Affordability

The following paragraphs address the issues of:

- Does public transport provision match origin/destination analysis?
- How competitive is public transport compared with the car?
- Do capacity issues impact on public transport service?
- How safe is the network?

Although across this corridor, some slight increase in public transport competitiveness can be expected, this will not be significant compared with the continued growth in car use. Travel by rail, for those close to railway stations, is expected to become relatively more attractive as road congestion rises affecting travel times for both car and bus users. However, rural areas will continue to have poor access to an acceptable level of services.

The infrastructure and service provision provide for effective business interaction between the centres of this corridor. In other words, commuting opportunities by public transport and private car allow suitable return journeys to be made within a working day.

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[665] TMfS;05
[666] AEA (2001) Rail Emission Model Final Report; www.nationalrail.co.uk;

With the exception of the areas in the south of the corridor such as Inverkeithing, public transport is not as competitive as the car in this corridor. For some areas (e.g. Glenrothes and Ladybank) slight increases in public transport competitiveness are forecast in the future. This is largely due to rail service improvements on the Fife Circle combined with increased car travel costs associated with road congestion, in particular across the Forth Road Bridge and into Edinburgh. Around five per cent of the corridor population are people without cars in the former Social Inclusion Partnership areas of Lochgelly, Wemyss, Kirkcaldy and Buckhaven with a greater dependency on public transport to meet their needs. Public transport accessibility in these areas is very low, suggesting that transport-related social exclusion occurs. This is forecast to continue in the future.

Table 7.14.2 shows the projected morning peak load factors (ratio of demand to supply) on the rail services in the corridor for the various years, as reported in Network Rail's Route Utilisation Strategy. As these figures are averages across a number of train services, it suggests that some peak trains suffer overcrowding which is consistent with the observed situation.

Table 7.14.2: Rail Peak Load Factors[667]

	2005	2011	2016	2026
Fife – Edinburgh Inter-urban	0.77	0.77	0.80	0.85
Fife Circle – Edinburgh	0.84	0.86	0.91	0.98

There is some overcrowding at present in the evening peak period with some passengers having to stand for part of their journey between Dundee and Edinburgh. However, the re-opening of the Stirling-Alloa-Kincardine railway line will allow coal trains to Longannet power station to be operated via Stirling instead of via this route, and is expected to free track capacity to overcome this problem. In the longer term, as rail travel becomes increasingly more attractive the incidence of overcrowding is expected to return.

There are bus stations in Glenrothes and Kirkcaldy that are near the town centres. However they are not close to the railway stations in the towns resulting in poor integration between the modes.

Table 7.14.3 provides an assessment of the quality of strategic bus services within this corridor on a scale of one to five, with one being 'poor' and five being 'excellent'.

[667] Network Rail Route Utilisation Strategy (RUS) - Scotland

Table 7.14.3: Assessment of Bus Service Quality[668]

Service numbers	Operators	Annual Journeys	Reliability	Frequency	Simplicity	Value	Coverage	Vehicle Quality
X54	Stagecoach	6,100	4	3	3	3	4	3

Corridor bus services operate between Edinburgh and Dundee stopping at the towns of Dunfermline and Glenrothes. Bus operations in the corridor have poor interchange with other modes of transport. Reliability and coverage have been identified as good, with all other factors average. Journey times on the bus services will be impacted by increasing congestion which will slow buses and reduce their relative attractiveness, in the absence of priority measures.

The accident and fatal accident rates on the A92 within this corridor are similar to the national rates for this road type. Initial analysis of severe accident clusters indicated safety issues at the A92 / A909 Junction at Cowdenbeath and the A92 / A910 Junction near Chapel[669].

[668] Bus Users UK (Qualititative Assessment – 1: very poor; 5: excellent)
[669] Transport Scotland SERIS Database

Summary of Infrastructure and Operational Constraints

Locations which are expected to become key constraints and congestion points over the period of this review are shown in Figure 7.14.7.

The constraints include:

- Peak time congestion on the A92 Cowdenbeath to Forth Road Bridge;
- Congestion at peak times at the junction at the north end of the Tay Bridge, where the corridor meets the Dundee Urban Network;
- Congestion experienced on approaches to the Forth Road Bridge in the peak hour;
- Congestion in the peaks at the Redhouse Roundabout to the North of Kirkcaldy, where the A92 Trunk Road intersects the B9130 (non-trunk);
- Most station car parks in the corridor are fully used;
- Peak period overcrowding on Fife to Edinburgh services;
- Restrictive signalling headways between Edinburgh and Fife, and in particular over the Forth Bridge, limit the number of trains that can operate over the corridor and result in increased delays during the perturbed running; and
- Restrictive signalling on Tay Bridge.

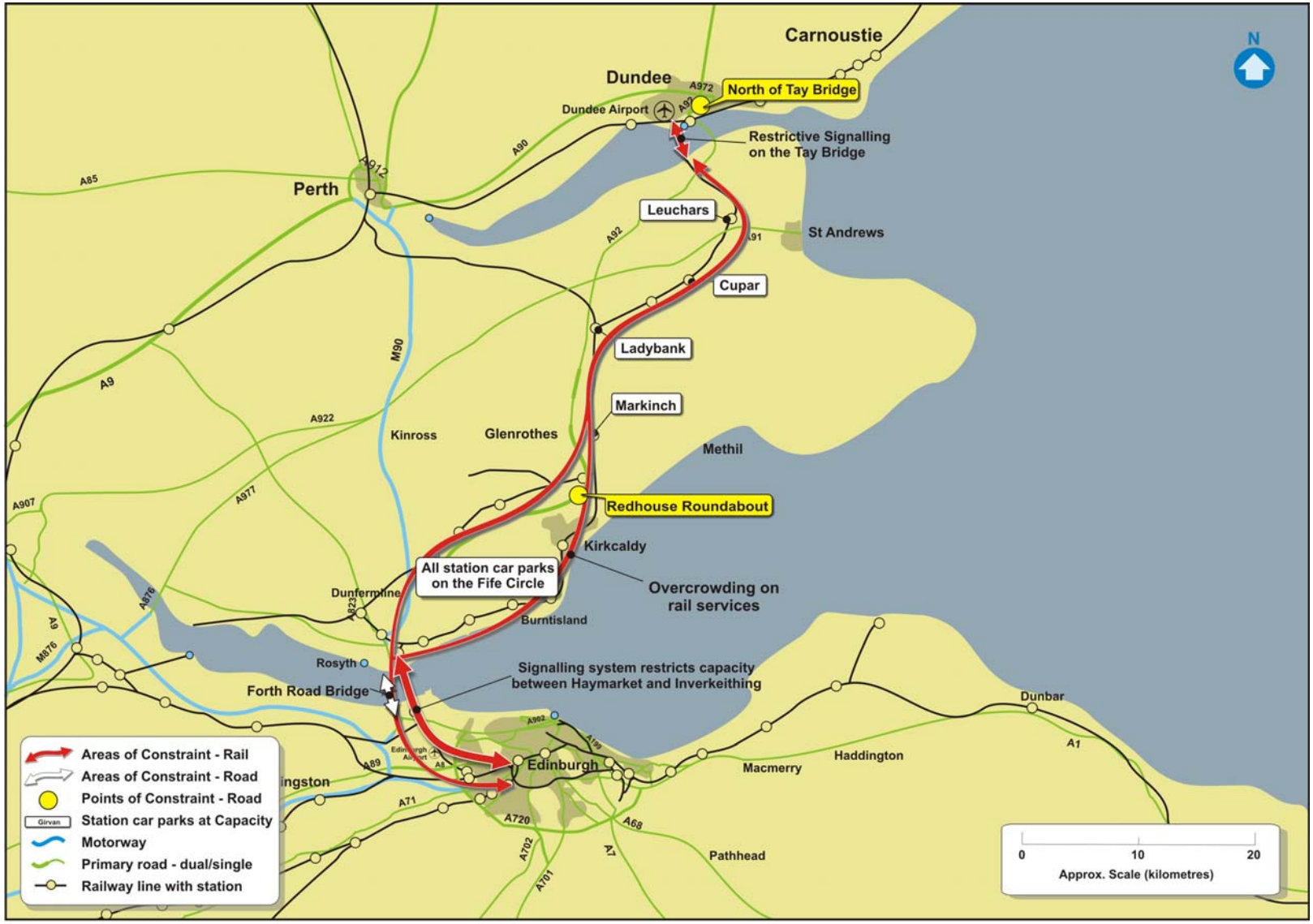

Figure 7.14.7: Areas of Constraint on the Network, Corridor 14 - Edinburgh to Dundee

7.14.5 Summary and Conclusions

Overall, how well does the transport network perform?

With the exception of the approaches to the Forth and Tay Bridges, the road network in this corridor is operating effectively and reliably for most of the day with the dualled sections of the A92 providing good connectivity with other corridors and the M90 motorway. Speeds on the road network are reasonable given the mix of dual and single carriageway. However there are capacity issues during peak periods at some junctions on the A92 north of Kirkcaldy. The single carriageway section of the A92 between Glenrothes and Dundee is a constraint leading to congestion at peak periods in particular. This also has a detrimental effect on journey times. It is recognised that this results in substantial use of the M90 to Perth for onward journeys to Dundee.

The corridor is well served by rail and there is a significant demand especially for trips to Edinburgh. The Fife circle is seen to be a well performing part of the transport network. However, the rail station car parks are generally full and at capacity and there are ongoing issues with overcrowding of trains on the Dundee–Edinburgh service during the peaks. There is also a limited service between Kirkcaldy and Glasgow.

The corridor also has an express bus service operating well between Dundee and Edinburgh. This additionally serves the Ferrytoll Park-&-Ride north of the Forth Road Bridge and is operating successfully.

Will the transport network meet future demand, particularly in areas of economic activity?

The A92 will continue to provide a good level of service for connection across the corridor to west Fife and economic opportunities. It will also provide good levels of service for the economies of Kirkcaldy and Glenrothes to access the national motorway network. However the single carriageway sections from Glenrothes–Dundee will become an increasing issue and may make the alternative route via the M90 more attractive. This and certain key junctions along the A92 north of Kirkcaldy will not meet future demand during the peak periods. As a result of this, the ratio of average morning peak hour speeds to free flow speeds is less than 60 per cent.

Passenger overcrowding is forecast to increase on inter urban services from Fife to Edinburgh. The re-opening of the Stirling-Alloa-Kincardine Rail Link in 2008, which will divert freight traffic away from the Forth Bridge, in addition to the recent Waverley station remodelling, will create an opportunity to restructure the Edinburgh - Fife timetable to provide a more reliable service. At present there are operational difficulties in accommodating the current mix of heavy freight trains, all station stopping trains and expresses on this route.

Constraints from adjacent corridors will have an effect on this corridor and in particular the issues of congestion to travel to Edinburgh and the south. This will be exacerbated by a lack of parking provision at rail stations within the corridor which are already at capacity.

What are the key drivers that will impact on performance in the future?

Although the population of the corridor as a whole is forecast to decline, some growth in population is forecast to occur mainly in the south, thereby increasing the level of demand in this area. This is forecast to place increasing pressure on the crossings of the Forth.

The use of the M90 as an alterative to trips to Dundee from Edinburgh may release capacity at a local level to reduce congestion at the key node points on the trunk road network.

What are the key problems associated with delivering the KSOs?

Public transport is forecast to become more competitive when compared against the car mainly as a result of increasing congestion on the roads. However the capacity of the rail network both in terms of overcrowding and car park provision may be a constraint on this forecast. In addition, utilisation of the additional paths over the Forth Bridge to increase capacity for south Fife will need to be balanced against the potential for increasing frequencies on longer distance express routes.

A high degree of trips within the corridor and to other corridors are undertaken east to west and most of the public transport provision is north to south. With the decrease in population and increase in employment levels the east to west trip movement could increase but with no public transport provision to accommodate it.

Poor public transport accessibility is a significant contributor to social exclusion for a number of communities.