

7.12 Corridor 12: Edinburgh to Perth

7.12.1 Setting the Context

Corridor 12 extends from the outskirts of Edinburgh north across the Firth of Forth, through Fife and on to Perth as shown in Figure 7.12.1. The area is largely rural with Dunfermline (population 44,000), Inverkeithing (population 5,500) and Kinross (population 4,500) being the only sizeable towns in the corridor. The corridor is 67 kilometres in length and has a total population of approximately 114,800⁵⁸⁸.

Figure 7.12.2 shows the expected changes in population and employment over the period to 2022. The population in the corridor is forecast to decrease by approximately 6,200 (five per cent⁵⁸⁹) between 2005 and 2022. At the same time, the number of households in the area is forecast to increase by 4,900 (nine per cent)⁵⁸⁹. This is consistent with the national downward trend in household size. Major housing developments are taking place in the town of Dunfermline⁵⁹⁰.

Employment in the corridor is expected to increase by 14 per cent between 2005 and 2022⁵⁸⁹ reflecting the development of new businesses in the area. In particular, the projected increase in employment at Rosyth will have a major impact on the regional economy. The economic inactivity rate within the Fife council area of around 19 per cent in 2005, and at 20 per cent in Perth and Kinross is broadly comparable with the national average of 21 per cent⁵⁹¹. Income levels for the corridor are £388 per week in Perth and Kinross and £395 per week in Fife, ranging from 94 per cent to 96 per cent of the average for Scotland (£412)⁵⁹¹.

This corridor plays an important role in supporting the Fife economy. The accessibility provided by the road and rail bridges across the Firth of Forth plays a key role in the economic development of the corridor.

As a result of the development of Rosyth port, Dunfermline has become host to a number of general industrial and warehousing sites. Tourism and the service sector in general are important economic drivers for the whole of the corridor. These are driven by through traffic to the Highlands of Scotland, and the fact that Edinburgh, Perth and the coastal areas on the corridor are attractors in their own right.

Car ownership in the corridor, measured as a percentage of households with access to a car, is above the national average of 67 per cent, particularly in the more rural areas.

- Fife: 70 per cent; and
- Perth and Kinross: 76 per cent⁵⁹².

⁵⁸⁸ General Register for Scotland Mid-2004 population estimates for town/city populations: <http://www.gro-scotland.gov.uk/files1/stats/04mid-year-estimates-localities-table3.xls>

⁵⁸⁹ TELMoS

⁵⁹⁰ Dunfermline and the Coast Local Plan 2002

⁵⁹¹ Scottish Economic Statistics 2006, table 4.3, 4.20

⁵⁹² Scotland's Census 2001: www.scot.nhs.uk Table KS17



Figure 7.12.1: Setting the Context, Corridor 12 - Edinburgh to Perth



7.12.2 Transport Network and Operations

Infrastructure and Services

The principal elements of the transport network that play a national strategic role are shown in Figure 7.12.1.

The M90 Motorway forms the main spine of the road network between Edinburgh and Perth. This road connects to the A90, providing a route to Dundee, and the A9. Access to Edinburgh is over the Forth Road Bridge, the most easterly connection between Fife and Edinburgh and the Lothians. The Kincardine Bridge, about 20 kilometres upstream, offers an alternative to the Forth Road Bridge for trips to and from the western areas of Fife and Perth and Kinross. The bridge also forms part of the strategic diversion route for the Forth Road Bridge.

The rail line between Edinburgh and Perth via Kirkcaldy carries freight and passenger services, with the latter including a mix of long-distance, inter-urban, and local services. This mix of services can give rise to conflict between long-distance and commuter services within the corridor. Service patterns are generally:

- Three trains per day between Aberdeen and London (National Express East Coast);
- One train per day between Dundee and Bournemouth (Arriva Cross-Country);
- One train per day between Aberdeen and Birmingham (Arriva Cross-Country);
- One train per hour between Edinburgh and Aberdeen;
- One train every two hours between Edinburgh, Perth and Inverness;
- Four trains per hour on the Fife Circle;
- One overnight sleeper service between London and Aberdeen; and
- Various freight services (including coal trains from Hunterston to Longannet).

A limited direct service also operates between Edinburgh and Perth via Stirling, with further journey opportunities on this route available by changing trains.

Bus services in this corridor are provided by Megabus and Citylink. Megabus provides service M90 between Edinburgh and Perth using the A90, M90, Perth Park-&-Ride and the A93. Citylink provides service M91 between Edinburgh and Perth via Dunfermline using the A90, M90 and the A922.

Service patterns are generally:

- One service per hour between Edinburgh and Perth (Megabus / Citylink).

This corridor also gives access to Edinburgh Airport from the north, and the port of Rosyth.

The port of Rosyth is located around 2 kilometres to the south of Dunfermline and has facilities to handle dry bulk commodities and bulk liquid products. There is no container handling capability. The port also has a roll-on / roll-off berth which is used by Superfast Passenger Ferries for services to Zeebrugge, Belgium. The site is connected to the rail network, although no passenger services currently run. The site is also well connected to the Scottish trunk road network, with the M90 and Forth Road Bridge only a few kilometres away.

Integrated tickets in the corridor are available in the form of the *PLUSBUS* ticket and the 'One-Ticket'. *PLUSBUS* covers rail journeys into Edinburgh, Perth and Dunfermline 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, 11 per cent of the trunk road network pavement⁵⁹³ 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 cent⁵⁹⁴. The section with the poorest residual strength is the M90. Under Transport Scotland's planned maintenance schedule, the net figure for the corridor is expected to fall to eight per cent by 2012.

Issues regarding the asset management of the Forth Road Bridge are dealt with in the separate Forth crossing study.

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

Demand Management

The City of Edinburgh Council has designed its public parking provision so as not to encourage commuter traffic. In addition bus priority measures in Edinburgh have been developed to encourage public transport as an alternative to using the private car⁵⁹⁵.

Demand management within the corridor is evident on the A90, on the northern approach to the Forth Road Bridge. The Ferrytoll Park-&-Ride provides 1,040 spaces and a frequent bus connection into Edinburgh⁵⁹⁶. Bus priority measures are in place between the Ferrytoll Park-&-Ride site and the bridge. To the south of the Forth Road Bridge, on the A90, a queue relocation scheme is used in conjunction with a bus lane to facilitate bus priority as far as Barnton Junction where the A90 meets the A902.

There is also a Park-&-Ride site at Broxden, on the southern approach to Perth, offering 250 free car parking spaces and frequent dedicated buses to the city centre⁵⁹⁷.

⁵⁹³ Transport Scotland SERIS Database

⁵⁹⁴ STS No. 25 (2006) Table 5.5

⁵⁹⁵ The City of Edinburgh Council Car Parking Strategy 2006

⁵⁹⁶ Ferrytoll Park-&-Ride: www.ferrytoll.org

⁵⁹⁷ Perth and Kinross Council: www.pkc.gov.uk

Programmed Schemes

There are a number of programmed road schemes in the corridor shown on Figure 7.12.3, which include:

- Removal of tolls on the Forth Road Bridge;
- Ferrytoll Link Road (eases congestion through Rosyth for east Fife regional traffic); and
- Park-&-Ride scheme at Halbeath for bus services into Edinburgh;

There are also proposals for further rail services across the Forth, including the provision of additional Edinburgh to Perth services.



Figure 7.12.3: Programmed Transport and Land Use Developments, Corridor 12 - Edinburgh to Perth

7.12.3 Travel Patterns

Travel patterns in the corridor are presented in Figure 7.12.4. In 2005, there were approximately 199,000 trips per day in the corridor, of which 7,500 were public transport trips per day. By 2022, it is forecast that daily car trips will increase to approximately 240,000, whilst trips by public transport will remain relatively unchanged if the current level of capacity is maintained. Table 7.12.1 shows the breakdown of trips and the public transport share within the corridor in 2005 and the forecast for 2022.

Table 7.12.1: Summary of Demand (12 hour) and Public Transport Share⁵⁹⁸

		Between Edinburgh and Perth	Within Corridor	Between Corridor and Edinburgh	Between Corridor and Perth	Between Corridor and other destinations	Total Trips
2005	Total Trips	14,900	55,400	20,900	6,500	101,300	199,000
	% of Corridor	7%	28%	11%	3%	51%	100%
	PT Trips	2,400	400	3,200	300	1,200	7,500
	PT Share	16%	1%	15%	5%	1%	4%
2022	Total Trips	14,900	63,000	23,700	7,700	130,700	240,000
	% of Corridor	6%	26%	10%	3%	55%	100%
	PT Trips	2,300	400	3,100	300	1,300	7,400
	PT Share	15%	1%	13%	4%	1%	3%
Change	Total Trips	0%	+14%	+13%	+18%	+29%	+21%
	PT Trips	-4%	0%	-3%	0%	+8%	-1%

More than half of the trips within this corridor are between the 'corridor and other destinations'. This reflects the central location of this corridor, where large numbers of trips are made to surrounding areas of employment such as Kirkcaldy, Glenrothes, Dundee, Stirling and Glasgow.

In 2005, 28 per cent of trips were wholly within the corridor. The level of travel between the corridor and Edinburgh, at 11 per cent, is significantly influenced by commuter travel from the Fife and Perth and Kinross areas, whilst trips between the corridor and Perth is significantly lower at three per cent. The percentage of trips between Perth and Edinburgh is relatively low at seven per cent.

Public transport trips are mainly focused on the two cities at either end of the corridor. In 2005, Edinburgh had 43 per cent of all public transport trips and Perth 32 per cent. All other movements have low public transport modal shares.

⁵⁹⁸ TMfS:05

The railway stations within this corridor have a total throughput of some 4.9 million passengers per annum (2005). One million of these trips are through Kirkcaldy station⁵⁹⁹.

Between 2005 and 2022, rail demand is forecast to increase by approximately 25 per cent, and bus patronage is forecast to decline (based on the existing service provision).

⁵⁹⁹ Rail industry LENNON data (station usage 2004/2005)

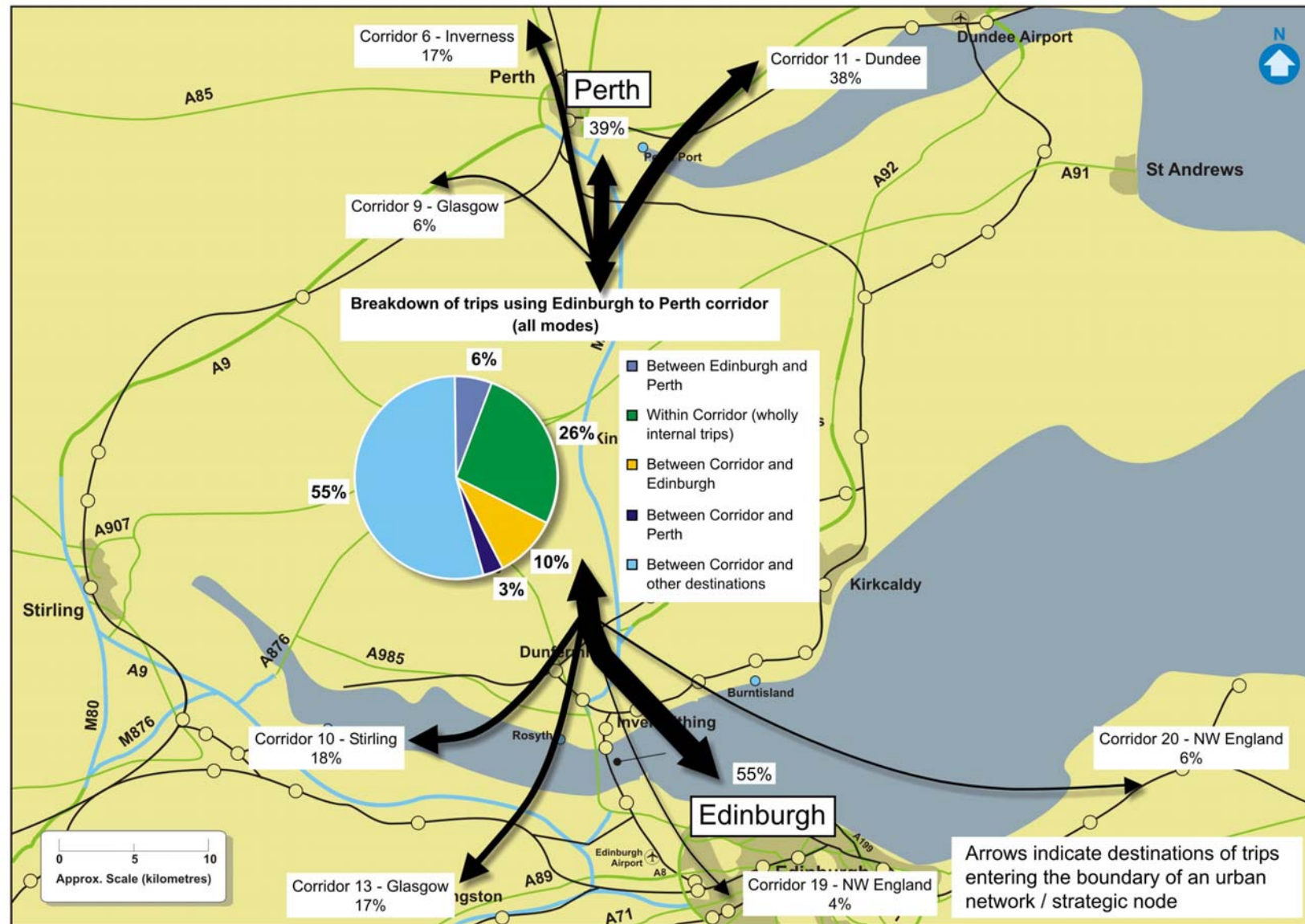


Figure 7.12.4 Travel Patterns 2022, Corridor 12 – Edinburgh to Perth

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 M90 between Junction 3 and Junction 4⁶⁰⁰.

The corridor provides access to the ports of Rosyth and Leith. In 2005, Rosyth handled 183,000 passengers on services to Belgium and 2.2 million tons of freight, mainly roll-on / roll-off road traffic⁶⁰¹.

7.12.4 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?

Figure 7.12.5 shows the average speed on the M90 between Edinburgh and Perth. A typical city centre to city centre journey time is also shown. Average speeds on the M90 are currently at only 60 per cent of free flow speed, and are forecast to decrease over all three time periods between 2005 and 2022⁶⁰⁰.

⁶⁰⁰ SRTDb

⁶⁰¹ STS No. 25 (2006) Table 10.12b

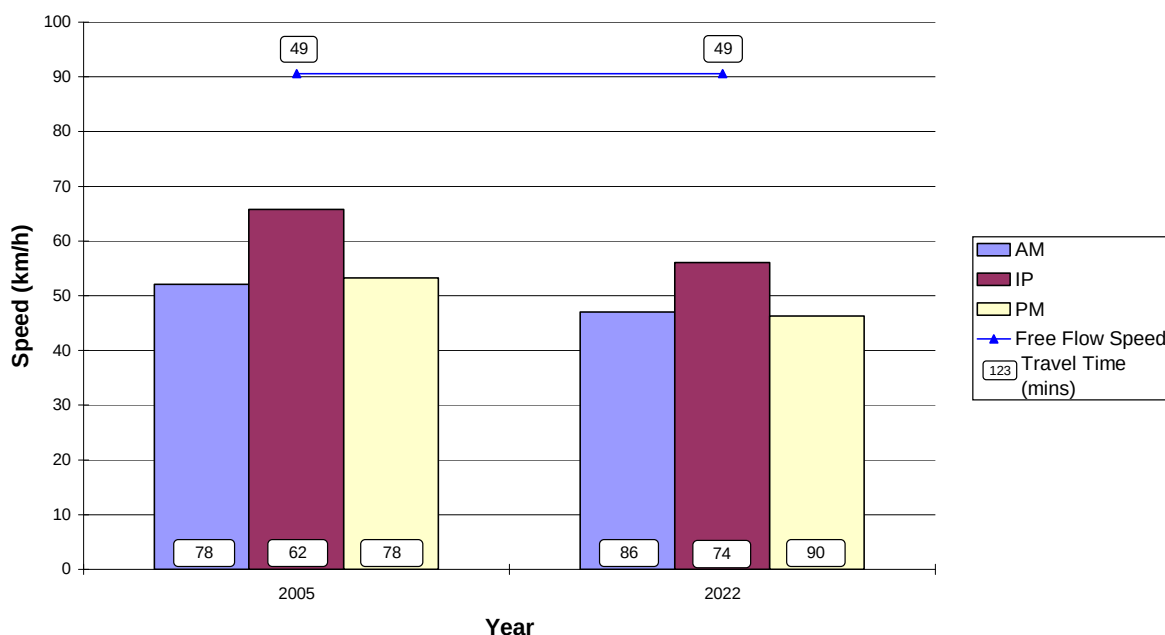


Figure 7.12.5: Average Road Speeds (Corridor 12)⁶⁰²

Travel time along the corridor in 2005 is the same for both the morning and evening peaks at 1 hour 18 minutes. The off peak period is significantly quicker at 1 hour 2 minutes, however this is still significantly slower than the free flow travel time of 49 minutes. In 2022 the travel times have increased to 1 hour 14, 1 hour 26 and 1 hour 30 minutes for the off peak, morning peak and evening peak respectively. The free flow travel time remains constant at 49 minutes between 2005 and 2022.

This reduction is most noticeable in the inter-peak, dropping from 66kph in 2005 to 56kph by 2022. While over most of its length, the M90 allows speeds close to free flow speeds, end-to-end speeds are reduced by congestion at several locations:

- Approaches to the Forth Road Bridge;
- A90 between the Forth Road Bridge and Barnton;
- Broxden Roundabout; and
- M90 Bridge of Earn to Friarton and Broxden⁶⁰³.

This congestion impacts on the journey time reliability of the road network meaning that journeys in the morning and evening peak are 15 – 20 per cent or 5 – 10 minutes longer than the daily average⁶⁰⁴

⁶⁰² TMfS:05

⁶⁰³ Congestion on Scottish Trunk Roads, 2003 and 2004, Transport Scotland

⁶⁰⁴ <http://scottishexecutive.itisholdings.com/>

Figure 7.12.6⁶⁰⁵ provides a comparison of road, car and bus travel times for trips from Edinburgh along the corridor in the morning peak and indicates that road and rail journey times are broadly similar within this corridor.

The AADT levels in 2006 on the M90 varied along the corridor from about 28,000 to 30,000 over its mid sections, with higher volumes on approaches to the urban networks with 35,600 between Junction 9 and 10 at the south of Perth and 59,400 on the A90 at Ferrytoll, north of the Forth Road Bridge. The flow south of the bridge, prior to the tollbooth, is 66,000 vehicles⁶⁰⁶. Given that the design capacity for this type of road is typically around 41,000, significant levels of congestion are evident during the peak periods. With the exception of the approaches to the Forth Road Bridge, the M90 is operating within its design capacity.

⁶⁰⁵ Journey times for bus/rail include a 20 minute walk/wait time

⁶⁰⁶ Transport Scotland, Scottish Roads Traffic Database



Table 7.12.2 shows the historical and forecast morning peak load factors (ratio of passenger numbers to capacity) on the commuter rail services in the corridor at points in time between 2005 and 2026 as reported in Network Rail's Route Utilisation Strategy. The load factors reported reflect the busiest section of the route. As these figures are averages across a number of train services, it suggests that some peak trains will suffer overcrowding, with this overcrowding expected to worsen in future years unless additional capacity is provided.

Table 7.12.2: Peak Load Factors (Rail)⁶⁰⁷

Service Group	2005	2011	2016	2026
Fife Circle	0.84	0.86	0.91	0.98

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 Corridor 12 is:

- First ScotRail Express 94.2 per cent (target 92 per cent); and
- First ScotRail East 88.6 per cent (target 90 per cent)⁶⁰⁸;

Emissions (CO₂ only)

This section of the report addresses the issue:

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

CO₂ per person kilometres are forecast to rise from 129 tonnes / million person kilometres to 140 tonnes / million person kilometres between 2005 and 2022 in this corridor. This is a result of CO₂ emissions rising at a slightly greater rate than person kilometres between 2005 and 2022⁶⁰⁹.

The road based transport network produced 250,500 tonnes of CO₂ in Corridor 12 in 2005. This equates to approximately four per cent of the total transport related CO₂ emissions in Scotland.

By 2022, it is forecast that CO₂ emissions in Corridor 12 will rise to around 323,500 tonnes, approximately four per cent of Scotland's road based transport related CO₂ emissions in 2022.

⁶⁰⁷ Network Rail: Scotland Route Utilisation Strategy March 2007 Table 8

⁶⁰⁸ <http://www.firstgroup.com/scotrail/content/aboutus/ourperformance.php>

⁶⁰⁹ TfMS:05

The rail network produced 2,500 tonnes of CO₂ in Corridor 12 in 2007. This equates to approximately three per cent of the total rail based CO₂ emissions in Scotland⁶¹⁰.

Therefore, it is estimated that the road and rail based transport network collectively produced 253,000 tonnes of CO₂ in Corridor 12 in 2005. This equates to approximately four per cent of the total road and rail based transport related CO₂ 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?

Bus services in this corridor include commuter services from Edinburgh to Fife, longer distance services from Edinburgh to Perth and Inverness and local services between the settlements in the corridor. Therefore, trips to and from Edinburgh are generally well catered for.

Rail based public transport is relatively competitive when compared to travel by car along the corridor, however road based public transport is not competitive with travel by car.

Despite this, overall public transport infrastructure and service provision provide for effective business interaction between the centres of this corridor, with commuting opportunities by public transport and private car allowing suitable return journeys to be made within a working day.

Table 7.12.3 provides an assessment of bus service quality on the strategic long distance services in the corridor. Reliability, frequency and coverage have been defined as good, with all other factors average. Assessment scores range from 1 as the poorest to 5 as the best available score.

Table 7.12.3: Assessment of Bus Service Quality⁶¹¹

Service Numbers	Service Provider	Annual Journeys	Reliability	Frequency	Simplicity	Value	Coverage	Vehicle Quality
M90/M91	Citylink, Megabus	19,400	4	4	3	3	4	3

⁶¹⁰ AEA (2001) Rail Emission Model Final Report; www.nationalrail.co.uk; and www.networkrail.co.uk

⁶¹¹ Bus Users UK (Qualitative Assessment – 1: very poor; 5: excellent)

The M90 accident and fatal accident rates in this corridor are lower than the national average rate for a motorway. Initial analysis of severe accident clusters indicated safety issues on the M90 near Junction 2, where remedial measures may be required⁶¹².

No exceptional issues were raised regarding perceived security of use of either bus or rail⁶¹³.

⁶¹² Transport Scotland SERIS Database

⁶¹³ Scottish Household Survey 2003/2004: Perceptions of safety from crime during evening bus/rail travel

Summary of Infrastructure and Operational Constraints

Key constraints and congestion points are shown in Figure 7.12.7, including:

- Peak period congestion on the approaches to the Forth Road Bridge, at Halbeath Interchange (east of Dunfermline) and Barnton Junction (north west periphery of Edinburgh), and on the western radial approaches to Edinburgh (A90, A8 / A89 (non-trunk) and on the M8 / A720 Edinburgh City Bypass);
- Peak period overcrowding on Fife to Edinburgh rail routes;
- The single track section between Ladybank Junction and Hilton Junction (between Glenrothes and Perth);
- Capacity at station car parks is fully utilised before the end of the morning peak;
- 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
- Rail freight is restricted on the Forth Bridge because of weight, occupancy and speed restrictions.



Figure 7.12.7: Areas of Constraint on the Network, Corridor 12 - Edinburgh to Perth

7.12.5 Summary and Conclusions

Overall, how well does the transport network perform?

The main road, the M90, operates reasonably well over most of its length but overall travel speeds and journey time reliability are affected by congestion and delay at the Forth Road Bridge and at a number of intersections between the bridge and Edinburgh, particularly at Barnton.

The M90 is a relatively safe route compared with the national average, although some accident clusters will require attention.

Direct rail services are provided between Edinburgh and Perth as part of long distance services to Inverness. Local services are provided to Fife via the Fife circle route. The capacity for additional services on this corridor is constrained by restrictive signalling headways and infrastructure, and the single track between Ladybank and Hilton Junction. The restrictive signalling limits the number of trains that can operate over the corridor and can result in increased delays during the perturbed running. Demand for rail is further constrained by the fact that station car parks are generally full before the end of the morning peak. Some peak overcrowding exists on the Fife to Edinburgh rail routes with some passengers having to stand on trains between Inverkeithing and Haymarket.

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

Total trips on the corridor are forecast to increase, with the public transport share declining. With the existing infrastructure constraints, this level of demand increase is forecast to lead to increases in road congestion.

With reduced average speeds on the road network caused by this additional congestion, it is forecast that public transport journey times, particularly rail, will become more competitive compared with private road transport by 2022. It is likely, however, that the existing level of capacity on rail and bus will act as a constraint to modal shift from private to public transport.

Despite the provision of additional cross Forth services following the diversion of coal trains to Longannet via Stirling, services between Inverkeithing and Haymarket are forecast to continue to suffer from overcrowding, as additional demand will fill the services provided. With these overcrowding constraints there is still forecast to be substantial growth in the number of passengers boarding or alighting from services through stations on the Fife Circle. However, the increase in passenger usage is not split evenly across all stations, with most of the forecast increase in demand to occur at stations closest to the Forth bridgehead area, in particular at Rosyth, Inverkeithing, Dalgety Bay and North Queensferry.

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

Capacity constraints are likely to impact on future performance, through road congestion and overcrowding on public transport services.

The ports of Rosyth and Leith handle a considerable volume of Scotland's freight. Most of this freight is transported along this corridor's road network and future increases in freight volume through these ports will impact on the operation of the network in their immediate vicinity.

Utilisation of the additional paths over the Forth Bridge to increase capacity for south Fife will have an impact.

What are the key problems associated with delivering the KSOs?

Some of the current and forecast congestion and public transport overcrowding is caused by physical constraints, such as the capacity of the Forth Road and Rail Bridges. With the forecast increase in demand, this situation will be compounded, hence the significant increase in road journey times forecast by 2022. It is likely that significant investment would be required to create additional capacity on these corridor bottlenecks. This will be further impacted by the fact that future maintenance requirements for the Forth Road Bridge are likely to lead to congestion on the bridge and its approaches.

The extent of overcrowding on the rail network in the future will depend on the availability of parking at stations in the northern Forth bridgehead area and proposals for a replacement Forth Road crossing, which is the subject of a separate study⁶¹⁴.

The Forth Replacement Crossing is to be a cable-stayed bridge upstream of the existing road bridge. The option agreed by Ministers will be delivered in the quickest possible timescale and at the lowest cost. It will also improve transport connections and reduce the CO₂ emissions generated by the current crossing.

Rail journey times are competitive with road despite the indirect route and low running speeds giving rise to difficulties in accommodating the current mix of express services and all stations stopping services on the routes.

⁶¹⁴ Forth Replacement Crossing Study, Report 4 Appraisal of Options, Transport Scotland, April 2007