7 Performance of the Corridors

7.1 Corridor 1: Inverness to Wick / Thurso and Northern Isles

7.1.1 Setting the Context

Corridor 1 extends north from Inverness to the north of Scotland and onward to the Northern Isles, as shown in Figure 7.1.1. The corridor connects the city of Inverness with Wick, approximately 172 kilometres apart, and further north to Thurso. The total population of the main settlements within the corridor is approximately 37,000[308] and little change is forecast until 2022[309]. Growth in the supply of housing is expected, with future developments on both the mainland and the Northern Isles concentrated in existing settlements. Household numbers are expected to increase from 37,100 in 2005 to 39,700 by 2022, a seven per cent increase. It is considered there will be a dispersal of population as the number of households is increasing against a backdrop of little change in population. It is expected that there will be employment growth of approximately four per cent within the Highland area as a whole. Areas forecast to experience changes in population and employment are highlighted in Figure 7.1.2.

Car ownership in the Caithness, Sutherland and Easter Ross areas, measured as a percentage of households with access to a car, is 73 per cent. This percentage is lower than the average for the Highland area of 75 per cent and higher than the national average of 67 per cent. The above average percentage of 73 per cent reflects the rural nature of the corridor[310].

The economic inactivity rate within the Highlands area was around 16 per cent in 2005. This is slightly below the Scottish average of 21 per cent[311]. Economic inactivity in Orkney and Shetland is also lower than the Scottish average, at 14 and 12 per cent, respectively[311].

Income levels for the corridor are £386 per week in the Highlands, £424 per week in Orkney and around £446 per week in Shetland. This equates to 94 per cent of the national average in the Highlands, 103 per cent of the national average in Orkney and 108 per cent of the national average in Shetland[311].

[308] 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
[309] TELMoS
[310] Scotland's Census 2001 – www.scrol.gov.uk Table KS17.
[311] Scottish Economic Statistics 2006, table 4.3, 4.20

Figure 7.1.1: Setting the Context, Corridor 1 - Inverness to Wick/Thurso and Northern Isles

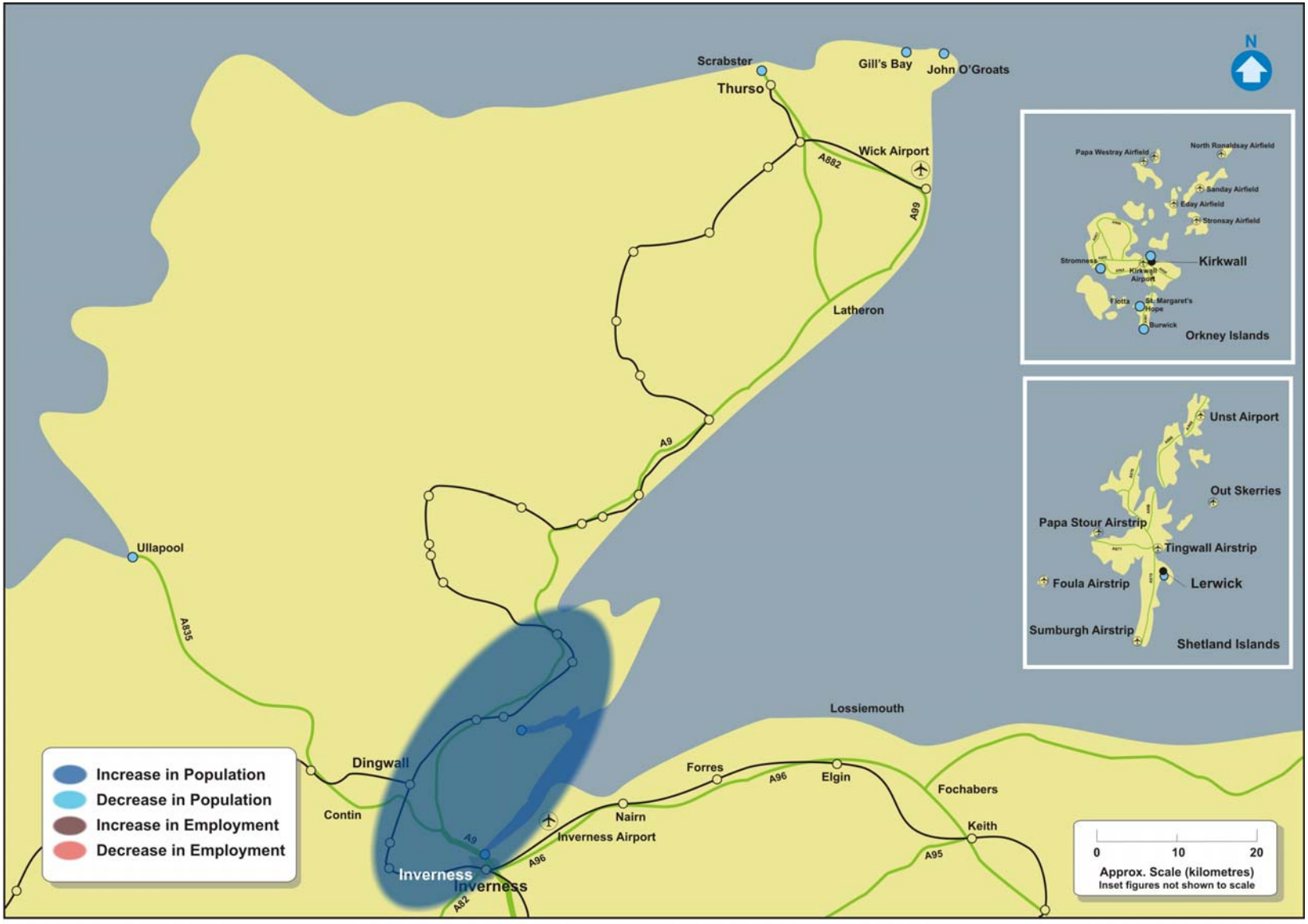

Figure 7.1.2: Changes in Population and Employment, 2005 & 2022, Corridor 1 - Inverness to Wick/Thurso and the Northern Isles

7.1.2 Transport Network and Operations

Infrastructure and Services

The principal elements of the transport network that play a national strategic role in this corridor are shown in Figure 7.1.1.

The A9 Trunk Road between Inverness and the port of Scrabster forms the main spine of the road network. North of Inverness, the A9 is primarily a two-lane single carriageway, with the exception of dual carriageway between Inverness and Tore Roundabout, approximately 10 kilometres north of Inverness. The A9 provides access for long distance journeys as well as direct access for several communities that it runs through, including Golspie, Brora and Helmsdale.

Other important elements of the road network include:

- A99 Trunk Road links Wick to the A9; and
- A882 (non-trunk) between Wick and Thurso.

Both of these roads are primarily two lane single carriageways.

A rail line serves the corridor between Inverness and Georgemas Junction, where the line splits to serve both Wick and Thurso. The line is single track with passing loops.

Service patterns are generally:

- Three trains per day between Inverness and Wick / Thurso.

Bus services are provided by Citylink and Rapsons with services running between Scrabster, Thurso, Wick and Inverness. The Scrabster journeys connect with the Stromness ferries.

Service patterns are generally:

- Two services per day between Inverness and Scrabster; and
- One service every two hours between Inverness and Thurso.

The corridor provides access to a small airport at Wick and a major freight and passenger port in the Cromarty Firth at Invergordon. This port provides a seasonal car ferry service to Nigg, a small town near Invergordon,[312] and freight services throughout Scotland, England and Europe[313]. The port of Scrabster provides lifeline ferry services to Stromness in Orkney. Scrabster also has an international ro-ro ferry service calling twice per week in summer: Smyril Line services connect Scrabster with Iceland, Faroes, Norway & Denmark. Other services to Orkney are provided from John O'Groats and from Gills Bay to St Margaret's Hope. There is a major port in the Orkney Isles comprising the various facilities in Scapa Flow and its approaches include Stromness and the Flotta Oil Terminal. Inter island ferries within Orkney are provided from the port in Kirkwall. Air and ferry services to Orkney link with onward connections to Shetland.

Asset Management

In 2007, eight per cent of the trunk road network pavement[314] in this corridor is considered to require structural strengthening as it has no theoretical residual strength. This compares with a national level of four per cent[315]. Under Transport Scotland's planned maintenance schedule, the net figure for the corridor is expected to fall to seven per cent by 2012.

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

Demand Management

There are no bus priority measures in this corridor. Car parking is available at a number of railway stations and the station car park at Inverness is close to capacity.

Programmed Schemes

For road, there is one programmed scheme along the length of the A9 in Corridor 1, this being Phase 2 of the Helmsdale to Ord of Caithness improvement scheme. This scheme is intended to improve the alignment of the A9 to the north of Helmsdale and reduce the potential for accidents by removing the need for large vehicles to use the opposite side of the road when turning corners. The improvement will also provide overtaking opportunities through the inclusion of a climbing lane. For rail, short term aspirations include the reduction of journey times and the improvement of frequencies with the aim of improving the connectivity of the region and Inverness. The medium term aspiration is to renew signalling with a cost effective rural signalling system.

7.1.3 Travel Patterns

Travel patterns for the corridor are graphically presented in Figure 7.1.3 and a summary of demand levels in the corridor and mode share is included in Table 7.1.1.

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[312] http://www.black-isle.info/details.asp?id=180
[313] http://www.portservices.co.uk
[314] Transport Scotland SERIS Database
[315] STS No. 25 (2006) Table 5.5

TMfS:05 does not adequately cover Corridor 1. As such, data has been taken from the emerging Highland model which is being developed further in conjunction with TMfS:05, which became available for use in later packages at the end of 2007. This will be used to provide future year projections as the STPR progresses[316]. At this stage, future year forecasts in Table 7.1.1 are based on the central growth forecast of the National Road Traffic Forecasts [317].

[316] TMfS:05H
[317] Department for Transport National Road Traffic Forecasts 1997

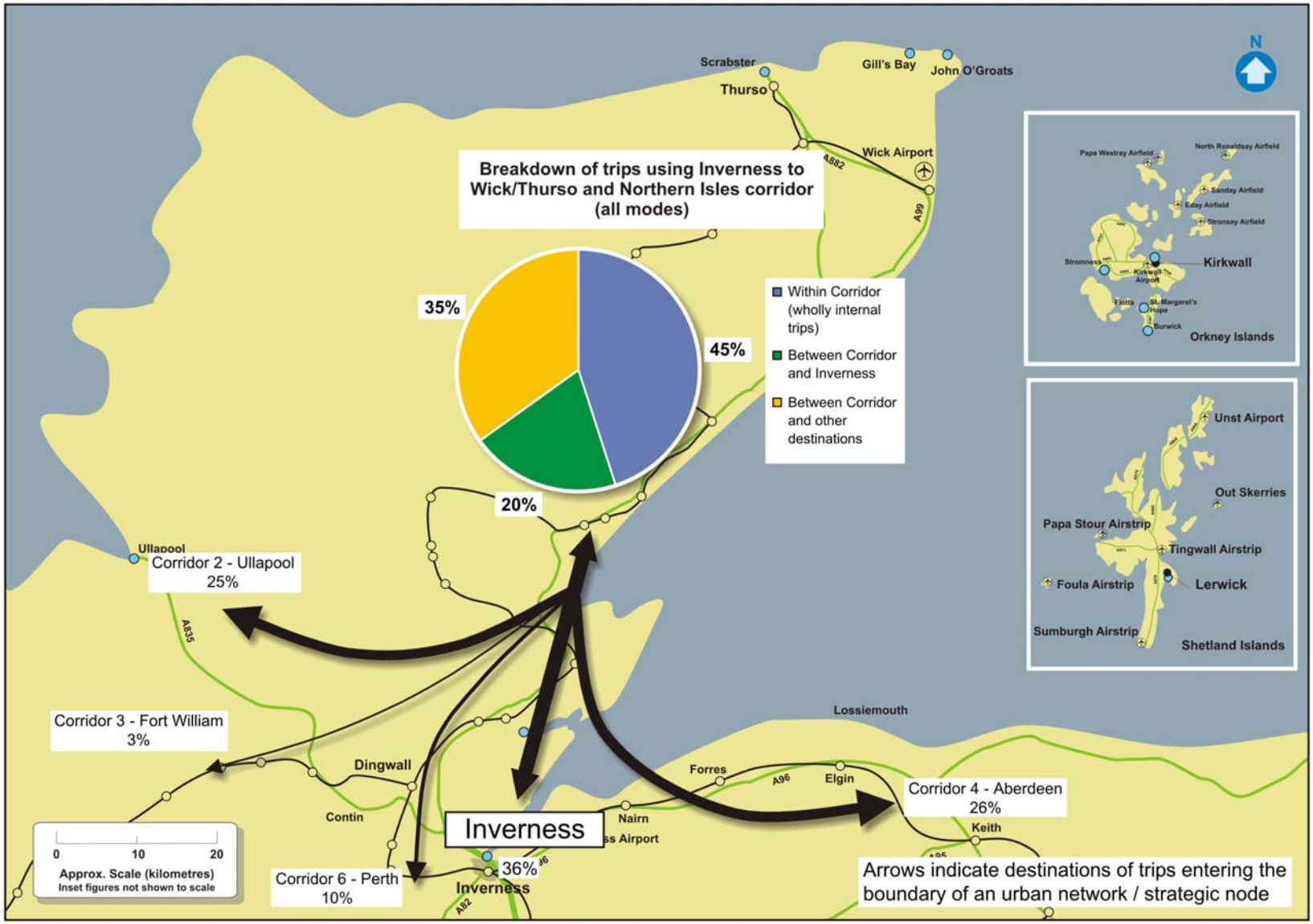

Figure 7.1.3 Travel Patterns 2005, Corridor 1 – Inverness to Wick/Thurso and the Northern Isles

Table 7.1.1: Summary of Demand (12 hour) and Public Transport Share

		Between Corridor and Inverness	Within Corridor	Between Corridor and other destinations	Total Trips
2005*	Total Trips	15,900	36,200	27,900	80,000
	% of Corridor	20%	45%	35%	100%
	PT Trips	1,100	4,800	1,200	7,100
	PT Share	7%	13%	4%	9%
2022	Total Trips	19,900	43,000	38,000	100,900
	% of Corridor	20%	43%	38%	100%
	PT Trips	1,400	6,000	1,500	8,900
	PT Share	7%	14%	4%	9%
Change	Total Trips	+25%	+19%	+36%	+26%
	PT Trips	+27%	+25%	+25%	+25%

*Based on TMfS:05H

Currently, the majority of travel demand in the corridor is between settlements in the corridor and between these settlements and Inverness. There is, however, significant demand to travel to other destinations, mainly in the Highlands, much of which passes though Inverness. Public transport provision enables access to services for those without access to private transport, but it is generally infrequent and is not an attractive alternative to private transport for many journeys. This impacts on the level of public transport mode share within the corridor. Nevertheless, nearly one in seven trips within the corridor is made by public transport indicating its strategic role in providing access.

Total trips in the corridor are expected to increase from 80,000 in 2005 to 109,000 in 2022, an increase of 26 per cent. The proportion of public transport mode share is expected to remain the same at nine per cent in the same period, with public transport trips increasing by 25 per cent, from 7,100 to 8,900.

ATC data from the Scottish Roads Traffic Database (SRTDb) gives a figure of approximately fifteen per cent HGV traffic on the A9 at Berriedale, ten per cent HGV traffic on the A9 north of Inverness, and of nine per cent HGV traffic on the A9 at Dornoch[318]. No HGV percentages are available from the SRTDb for the A99 from Latheron to Wick.

The railway stations in this corridor have a total throughput of some 0.2 million passengers per annum (2005), with Dingwall and Thurso the busiest stations.[319].

Rail freight within the corridor is limited, with only a weekly flow of oil from BP Grangemouth to Lairg.

[318] SRTDb
[319] Rail industry LENNON data (Station Usage 2004/2005)

Wick Airport, with scheduled flights to Aberdeen and Edinburgh has a throughput of around 16,000[320] passengers per year, while the port at Scrabster caters for around 145,000 passengers and 42,000 vehicles per year[321]. The port at Invergordon handled approximately 3.3 million tonnes of freight in 2005[322].

The AADT on the A9 north of the Dornoch Bridge is around 3,000 although it can exceed 4,000. However, the busiest section is the A9 approach to Longman Roundabout, on the outskirts of Inverness, which can reach 22,000 vehicles. The AADT on the A99 between Latheron and Wick is generally around 1,900.

7.1.4 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 7.1.4 shows the current and forecast future average speeds on the A9 between Inverness and Thurso. Average speeds remain close to the free-speed and are fairly constant throughout the day, suggesting that congestion is not an issue on the majority of the A9. Trip time variability is likely to be low due to the consistency of the average speed throughout the day, although the single carriageway nature of the road can limit overtaking opportunities.

[320] STS No. 25 (2006), Table 9.1
[321] STS No. 25 (2006), Table 10.15
[322] STS No. 25 (2006), Table 10.5

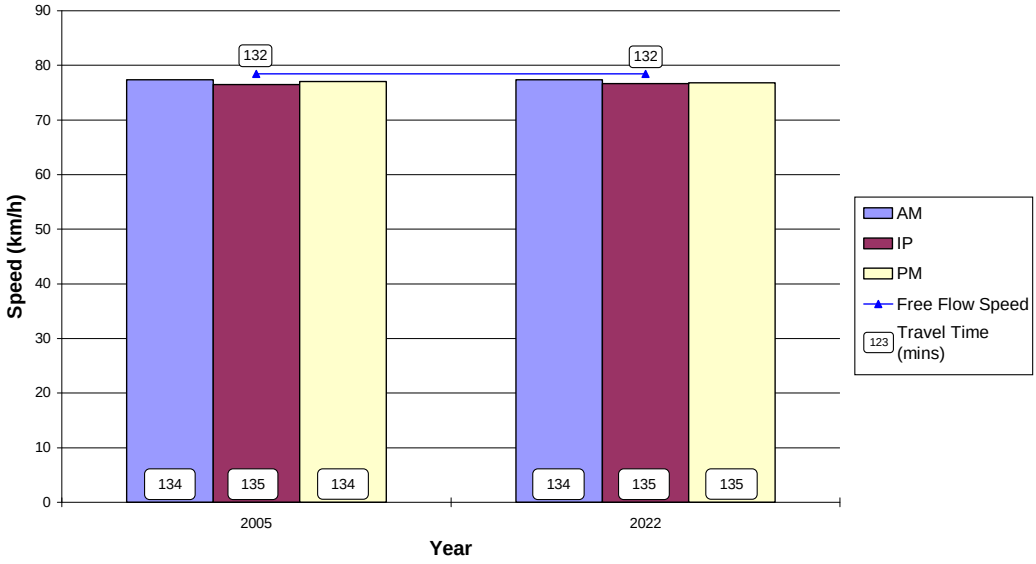

Figure 7.1.4: Average Road Speeds (Corridor 1)[323]

Travel time does not vary significantly between different peaks, constant at around 2 hours 14 minutes. Free flow travel time is approximately 2 hours 12 minutes, thus there is very minimal delay experienced. The situation does not change between 2005 and 2022.

Although the trip time variability is low, the approach to the busy at-grade Longman Roundabout north of Inverness can cause localised delay. Both the A9 and the A99 are operating effectively and reliably and are well within their respective design capacities[324]. There are no reliability problems with the road network in this corridor.

Comparisons of road and rail travel times indicate that rail services are not competitive, as shown in Figure 7.1.5[325], particularly for end to end journeys. The approximate travel time, from end to end, for rail travel is almost twice that of car travel. This is primarily due to frequent stops and geographical constraints resulting in a circuitous route.

Network Rail's Route Utilisation Strategy does not identify overcrowding on rail services in the corridor[326].

[323] TMfS:05
[324] SRTDb
[325] Journey times for bus/rail include a 20 minute walk/wait time
[326] Network Rail Scotland Route Utilisation Strategy – March 2007

Figure 7.1.5: Journey Time to Inverness City Centre by Road/Rail (2005 AM peak), Corridor 1 - Inverness to Wick/Thurso and the Northern Isles

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 kilometre is forecast to rise from 125 tonnes / million person kilometres to 165 tonnes / million person kilometres between 2005 and 2022 in this corridor. This is a result of a reduction in vehicle kilometres within this corridor by 2022, whilst the CO_2 emissions are forecast to increase[327].

The road based transport network produced 67,000 tonnes of CO_2 in Corridor 1 in 2005. This equates to approximately one per cent of the total road based transport related CO_2 emissions in Scotland.

By 2022, it is forecast that CO_2 emissions in Corridor 1 will increase to around 73,000 tonnes[328].

The rail network produced 500 tonnes of CO_2 in Corridor 1 in 2007. This equates to less than one per cent of the total rail based CO_2 emissions in Scotland.

Therefore, it is estimated that the road and rail based transport network collectively produced 67,500 tonnes of CO_2 in Corridor 1 in 2005. This equates to approximately one 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?

Access to key services by both car and public transport is generally better in the more populated parts of the corridor, particularly close to Inverness. However, Corridor 1 generally consists of small, remote, and dispersed populations. The critical mass of population necessary to support large scale service provision (including public transport), cost-effectively, is therefore not present.

[327] TMfS:05
[328] AEA (2001) Rail Emission Model Final Report; www.nationalrail.co.uk and www.networkrail.co.uk

Consequently, the general population is more dependent on cars to access key services, compared to in more urbanised areas of Scotland. For a minority of the population, however, (particularly the young, disabled and elderly) car-based travel is not feasible. As a result "*In small communities some young people may feel isolated.., while elderly people …may grow concerned about levels of local support*"[329].

For these people, access to key services is maintained through innovative land-use and travel schemes, often dependent on public sector support. These include demand-responsive transport systems such as community car schemes. National concessionary fares reduce the costs of bus travel for the over 60s and young. The Air Discount Scheme complements this by providing discounted travel on 'lifeline' air links for residents of remote areas. Other innovations include mobile services (e.g. libraries, food vans, and post-buses) and multi-purpose single site operations (e.g. post-offices with grocery services). Services are often operated at smaller scales in combination with each other to maximise available resource and minimise cost. These enable minimum service provision levels to be provided to support local populations.

Whilst providing for long-distance access to services for those without access to a car, rail services in this corridor are not generally competitive with private car journey times and lack the flexibility of road-based transport options for access to services outside major centres. The rail services are also relatively slow with low speeds and speed restrictions due to a large number of level crossings.

Thurso railway station is about 2 miles from the Scrabster ferry terminal. Buses provide the connection between the railway station and the ferry terminal. There are also problems in integrating bus and rail services as a result of low frequencies however both the bus and rail stations in Wick are both located near the town centre. The Citylink service to Scrabster connects with the Stromness ferry.

Bus services in the corridor include commuter services to Inverness from settlements to the immediate north, longer distance services from Wick and Thurso into Inverness and local lifeline services between the settlements within the corridor, including services on Orkney/Shetland. Table 7.1.2 provides an assessment of bus service quality on the strategic long distance services in the corridor on a scale of one to five, with one being 'poor' and five being 'excellent'. Frequency and coverage have been defined as good, with all other factors average.

The limited public transport provision and the proximity of Inverness from either Wick or Thurso restricts effective commuting and business interaction on this corridor.

[329] Community Plan for Highland 2004/07 (Highland Well-Being Alliance)

Table 7.1.2: Assessment of Bus Service Quality[330]

Service	Service Operators	Annual Journeys	Reliability	Frequency	Simplicity	Value	Coverage	Vehicle Quality
958 (joint service)	Rapsons, Citylink	3,500	3	4	3	3	4	3

An integrated ticket is available for rail journeys into Inverness from the corridor in the form of the *PLUSBUS* ticket. This ticket covers rail journeys and unlimited bus travel within Inverness.

The accident rate on the A9 in this corridor is in line with the national average for non built-up A class trunk roads in Scotland. The fatal accident rate on the route is slightly higher (0.9 per 100MVKm) than the corresponding national rate (0.76 per 100MVKm). Initial analysis of severe accident clusters indicated a number of locations on the A9 where road safety may need to be addressed. The proportion of severe accidents in the corridor (37 per cent) is significantly greater than the national average (25 per cent)[331].

Based on accident data from January 2001 to December 2005, the A99 from Latheron to Wick has an accident rate approximately four times that of the national rate in the same period[331]. Accident clusters exist at two locations.

The A99 has been identified by the European Road Assessment Programme as having one of the worst accident risk ratings in Scotland, however this must be viewed in the context of the limited traffic demand on the very short length of the A99. In addition to consideration by the STPR, Transport Scotland's Strategic Road Safety Action Plan will be examining the A99 in detail[332].

There have been a number of fatalities on level crossings caused by road users within the corridor.

Summary of Infrastructure and Operational Constraints

Key constraints and congestion points are shown in Figure 7.1.6 including:

- Congestion on the A9 approach to Longman Roundabout;
- Restricted road layout including hairpin bends at Berriedale Braes on the A9;
- Lack of available train paths at the southern end of rail route; and
- Running speeds on the rail route are restricted by:
  - Track quality in some places;

[330] Bus Users UK (Qualititative Assessment -1: very poor; 5: excellent)
[331] Transport Scotland SERIS database
[332] Transport Scotland SERIS database

- Loop entry / exit speeds;
- Signalling system (time required for token exchange and route setting); and
- Speed restrictions for level crossings.

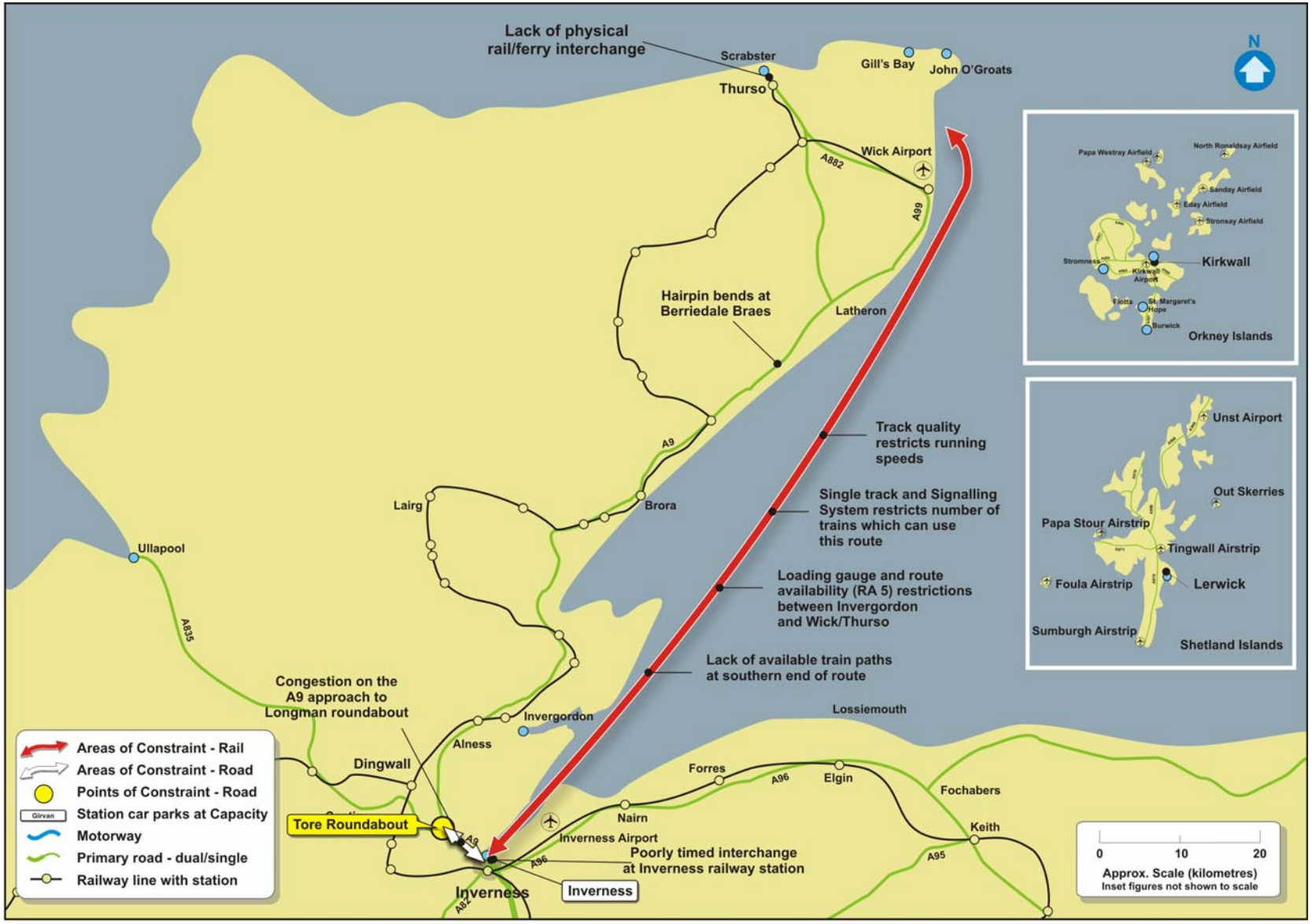

Figure 7.1.6: Areas of Constraint on the Network, Corridor 1 - Inverness to Wick/Thurso and Northern Isles

7.1.5 Summary and Conclusions

Overall, how well does the transport network perform?

In general, the road network operates effectively and reliably within its design capacity over most of the route for most of the day. There is a low population density and consequently a low travel demand. However, the topography, road alignment and the lack of overtaking opportunities can lead to localised delays. Journey time reliability is an important issue for users of this corridor who have to ensure they will be able to meet ferry connections.

The majority of the demand is in the southern half of the corridor, with a significant proportion of trips being to and through Inverness with most of these trips made by car. The demand is a mix of local traffic accessing the city and longer distance trips to and through the city. This leads to some delays on the approaches to Inverness, particularly in the peaks. Although the flows are within the design limits of the road, it is the at-grade junction at Longman Roundabout that causes congestion. As there are no bus priority measures, buses are also affected by these delays.

Along the corridor, the A9 passes through communities giving rise to associated severance, environmental and safety issues. There are particular safety issues on the A99 from Latheron to Wick, which has an accident rate (between 2001 and 2005) of approximately four times that of the national rate in the same period.

Generally rail is not competitive with car due to infrequent services and a much longer journey time caused by a circuitous route, many stops, the single track coupled with the associated signalling system and reversing movements required at Georgemas Junction.

The capacity of the rail network is constrained by single track sections limiting journey times and options to improve frequency. There is also no direct rail connection to the port at Scrabster.

However, nearly half of all trips are within the corridor and this is where the public transport share is highest. The rail route serves many settlements on its circuitous route but greater accessibility is at the cost of longer end to end journey times. Integration of bus and rail services as a result of low frequencies is an issue. Safety at level crossings within the corridor are also of concern.

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

Planned growth to the north of Inverness, in areas not served by rail, may be expected to increase travel demand and capacity issues immediately north of Inverness, which would impact negatively on journey times, reliability and quality of service for all road users including bus passengers.

While the increased traffic flows will still be within the design capacity of the roads, lack of overtaking opportunities due to the road alignment will make localised delays more likely and thus journey times more unreliable.

The greatest increase in trips is expected to be within the corridor. The relative unattractiveness of rail for longer journeys is not expected to change significantly.

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

While the population is expected to remain at a similar level, a growth in housing supply combined with a growth in employment indicates increased travel demand. The degree of integration between land use planning (for housing and jobs) and transport will influence the modal share for public transport.

With the identified issue of the proportion of serious accidents being higher than the national average, safety will also be a key driver for performance.

Promoting both social inclusion through rail development and economic growth through tourism are key drivers. Without development the rail routes will fail to attract new customers and costs will remain high.

What are the key problems associated with delivering the KSOs?

Journey times for both road and rail are heavily influenced by the alignment of the routes.

On the road, the lack of passing opportunities due the road alignment will be exacerbated by the increased traffic flows. Even if public transport holds its current share, the increased traffic volumes will impact on the level of emissions.

Although the overall accident rate on the main road is lower than the national average, the proportion of severe accidents is significantly higher than national levels.

For rail, the time to travel the circuitous route is compounded by the single track formation, which limits the end to end speed and the frequency of services. Without improving the competitiveness of rail, the majority of the increased travel demand will be by road.

With over a quarter of households not having access to a car, and with median gross weekly earnings being less than the national average, affordable public transport has a key role to play in providing accessibility. The rural nature of much of the corridor, in conjunction with housing developments that are remote from core public transport infrastructure, is a significant challenge to improving accessibility.