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TRANSPORT IN THE TRANS-PENNINE CORRIDOR: PRESENT CONDITIONS AND FUTURE OPTIONS

Interregional Study Working Paper 3

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ABSTRACT

This paper reports on a desk study carried out by the Institute for Transport Studies as part of a wider study of opportunities for inter-regional working in the trans-Pennine corridor, considering economic, environmental and transport issues. It draws together available information on transport and movement flows in the trans-Pennine corridor. These patterns of movement are examined from a broad perspective which considers intra-regional, inter-regional and international movements within and across the study area. The report proposes a regional package approach to transport, based on demand management and modal transfer.

KEY-WORDS: transport planning, intermodal, demand management

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1. INTRODUCTION

In 1995, a team of researchers was commissioned to carry out an inter-regional study of the trans-Pennine corridor formed by the North West and Yorkshire and Humberside regions. The brief of the study was to examine the possibilities for closer cooperation between the regions on issues of common interest (Universities of Manchester and Leeds, 1995). This inter-disciplinary study contained three research strands: economy, environment and transport. This background paper reports on the work carried out by the transport research team, based in the Institute for Transport Studies at the University of Leeds. It draws together available information on transport and movement flows in the trans-Pennine corridor. These patterns of movement are examined from a broad perspective which considers intra-regional, inter-regional and international movements within and across the study area.

For the trans-Pennine corridor, it is the physical challenge of the Pennines which is regarded a key barrier to east-west communications. Rising to 2000' in places, and characterised by exposed open moorland, the Pennines are crossed by a relatively small number of road and rail routes. This report therefore focuses on the principal trans-Pennine road and rail corridors, in a regional setting. A further important element of this study is the examination the future possibilities for an east-west North European trade corridor, extending from Ireland through the study area across Northern Europe, reaching the Baltic. This study therefore considers these movements in detail, noting in particular the flows of goods between Ireland, the trans-Pennine corridor, and the continent. The Merseyside and Humber Ports are important in this respect. Both regions also benefit from well developed north-south communications corridors, and the relative importance of these is also examined. The roles of regional links to the South and to Channel Tunnel, and of regional airports, are examined.

This review of transport conditions is used to develop a broad view of current transport conditions in the trans-Pennine corridor. We then consider how changing contexts have created constraints and opportunities for change in these base-line conditions. Traffic forecasts are used in a discussion of the possible transport scenario that is likely to result from current trends. Finally, we consider possibilities for future action to address these trends.

Information presented in this report was obtained from a wide range of previous studies, policy documents, census data, and interviews with key experts. The information is diverse in nature, and incomplete. Where necessary, we draw attention to inadequacies or difficulties in information available, and suggest where further work is required to address these shortcomings. We recognise that, as a result, there may be inaccuracies or inconsistencies in the data. However, we trust that this report will nevertheless fulfil the role of drawing together diverse information to facilitate an informed strategic debate of future transport policy options, as part of a wider debate about inter-regional working across the trans-Pennine corridor.

2. TRANS-PENNINE TRANSPORTATION: A BRIEF HISTORICAL REVIEW

The North West and Yorkshire and Humberside regions are separated by the physical barrier of the Pennine hills. Their presence has shaped the patterns of trade and development, and presented difficult engineering challenges. The Pennines are slight by European standards, but the topography remains a formidable barrier.

Road connections were few and difficult in the pre-modern era. East-west traffic relied on packhorses while the roads to and from London were already thronged with carriages and coaches. The Yorkshire Turnpike Act of 1734 sought to improve the crossing from Lancaster via Elland, Halifax and Rochdale. However, no further east-west road improvements followed: in general, highways management by eighteenth century turnpike trusts tended to reinforce London's dominance (Barker and Savage 1974 ch1). Yorkshire and Lancashire traded with the capital, not between themselves. In the eighteenth century too, new canals provided links across the Pennines, connecting the Irish to the North Sea.

2.1 The rise and demise of the railways

1830 saw the opening of the Liverpool and Manchester Railway, Britain's first modern railway line. By joining Lancashire's two major centres, it created a new - and unforeseen - demand for intercity passenger and high value goods traffic (Dyos and Aldcroft 1969 p117). Promoters on the other side of the Pennines were soon seeking a similar link to Hull. The Leeds to Selby Line opened in 1834, and the Selby to Hull link in 1840. Links from Manchester to Leeds were completed in 1841, and Manchester to Sheffield via the Woodhead Tunnel in 1845. By 1850, there were five parallel east-west links from Humber to Mersey. The trans-Pennine corridor had the most dense railway network in Britain.

The development of the rail network was strongly influenced by competition between rival companies. In Manchester five separate terminii were built. The legacy was a lack of integration. Important connections, such as between Manchester Piccadilly and Victoria, did not exist.

The post 1945 shift to road seriously affected the viability of the rail network. During the period of closures following the Beeching Plan (BRB 1963) a number of Trans-Pennine rail links were closed, including the East Midlands - Manchester main line through the Peak District, and the Lune Valley line. The most direct route between South Yorkshire and the North West was the Woodhead, a main line which was upgraded by 1954 with a new, larger bore tunnel, electrification, and regenerative braking. The benefits were short lived: the route was closed in 1981 as a result of falling coal traffic. Further north, the Settle-Carlisle line has managed to survive, developing a role which combines community importance with economic opportunities, particularly tourism.

Electrification of the East Coast Main Line was completed in 1991 and it is now Britain's premier main line, but the West Coast Main Line, electrified over 20 years ago, requires investment to improve reliability, passenger comfort and line speeds. Trans-Pennine rail traffic is concentrated onto six routes, the principal of which is the North Trans-Pennine Route (figure 1). Like all the other routes this has seen little investment in infrastructure with no electrification or easing of alignments. The extent to which revival will continue is unclear in the light of rail privatisation.

2.2 Post 1945: the shift from rail to road

By the 1950's, a reasonable network of trans-Pennine all purpose roads had been developed. Already congestion was occurring at key junctions, and many towns became bottlenecks. The trans-Pennine routes all passed through built up areas, resulting in low average speeds.

In 1946, an outline plan for a national motorway network included the Pennine section of the M62. This was not formally announced until 1957, work beginning in 1966. The M62 was completed in 1976, though climbing lanes have since been added to several sections. The M62 was an enormous step change, buttressed by related infrastructure from Mersey to Humber: M57, M180, M63. The motorway programme also saw construction of the M6 and M1/A1M linking the regions to the Midlands and the south. Recent improvements include construction of the final section of the M66 Manchester orbital motorway (nearing completion); and online improvements to the existing network (4-lane widening of sections of the M62 and the M6, and improvements to the A1 and M1).

With the completion of the orbital motorway around Manchester, with radial routes provided by the M62 trans pennine route, the M61, M602, M56, M66 and M67, and the M6 north-south route only a few miles to the west, the Manchester area has one of the densest motorway networks in the country (figure 2). Further north the M65 was constructed between Blackburn and Colne, and linked to the M62 at junction 18 via an upgraded A56 together with the M66. The link westwards from Blackburn to the M6 is under construction.

Alongside the motorway network, upgrading of existing routes has taken place:

A66 - Significant sections of this route have been upgraded to fast single and dual carriageway;

A65 - Otley, Skipton, Settle and other bypasses; a series of improvements have upgraded sections of this route, which also connects with the M65 corridor via the A59/A56 and the A6068.

A628/A616 - construction of the M67 from Manchester eastward, and the Stocksbridge bypass from the M1 westwards, leave a strategic gap across the Woodhead Pass. Plans to build a motorway across the Woodhead in the 1970's were abandoned because of the impact on the Peak National Park.

Current conditions and prospects for these routes are discussed in more detail below.

2.3 Ports and Airports

For two centuries Liverpool was the main port in the north of England, with growth in associated activities such as ship building and repair, banking and insurance, and industries processing imported goods, notably sugar. As domestic transport improved and the industrial structure of the UK changed, the relative importance of Liverpool declined, exacerbated by by labour problems inherent in one of Britain's older ports. The Mersey estuary also provides access to the Manchester Ship Canal. Though there is no longer a port at Manchester, the canal is used to move grain and chemicals to canal-side sites including Trafford Park in Manchester.

Hull is historically the major port for Yorkshire and Humberside. Though deep sea services sailed from the port, its main function was handling coal and traffic to the Continent. As a fishing port, Hull also became a focus for food processing industry. Hull is now a specialist in unitised traffic, with RoRo ferry services to the Continent. In three decades the port of

Immingham, on the south side of the Humber has grown dramatically, handling bulk materials for the petrochemical industry which settled nearby, and for the steel industry at Scunthorpe, which now imports virtually all its raw materials. Immingham was also chosen as the East Coast hub port by several RoRo shipping companies, specialising in unaccompanied Roro trailer facilities. The Humber estuary contains several smaller ports, including Goole and Selby, and provides access to the Aire and Calder, the South Yorkshire canals, plus the navigable parts of the Trent and Ouse.

Manchester airport is the largest in the north of England with a wide range of long haul, European and domestic services. It is supported by Leeds-Bradford Airport, Humberside and Liverpool, providing scheduled services to UK and a limited number of Continental hub destinations.

Figure 1: Rail

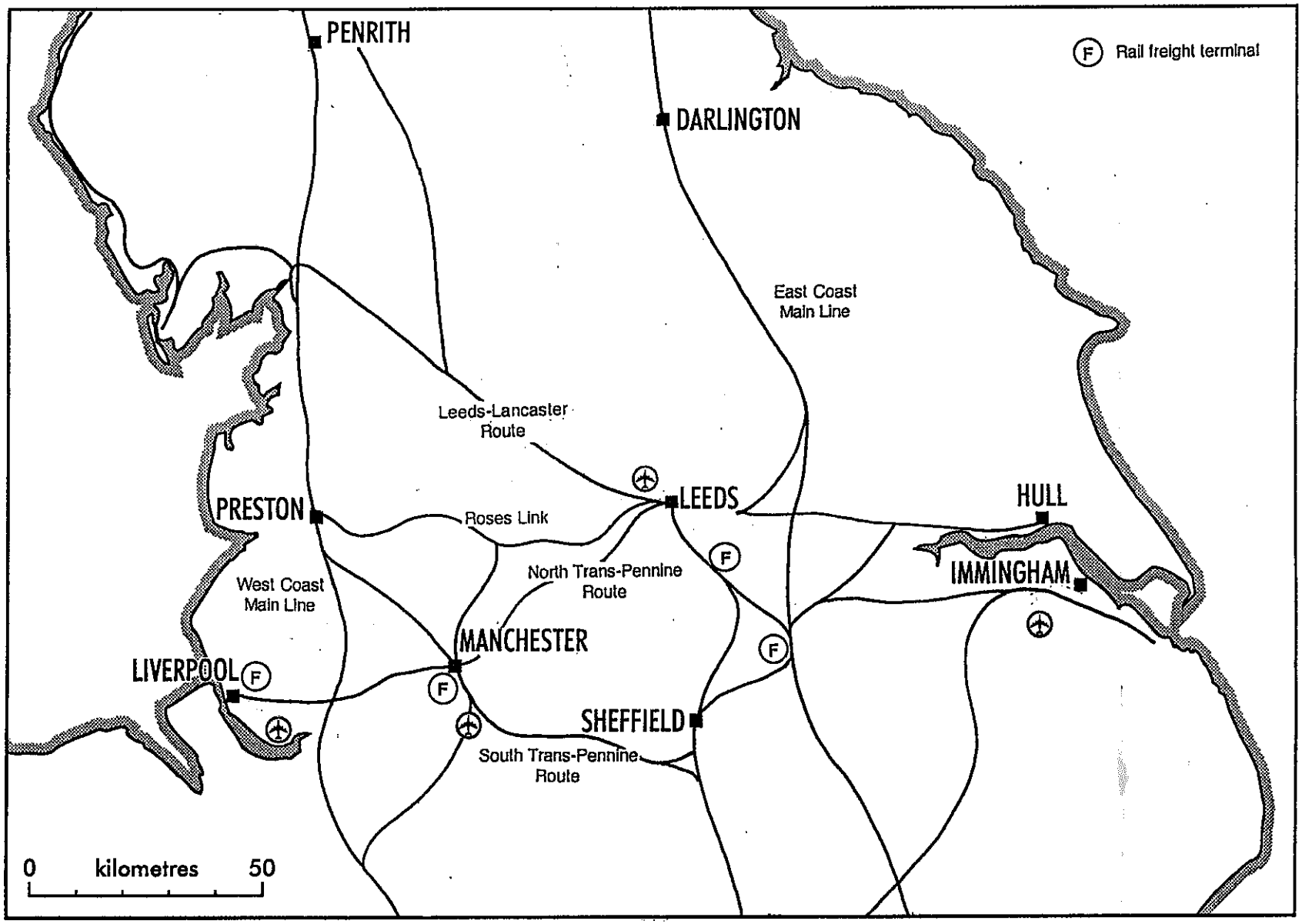
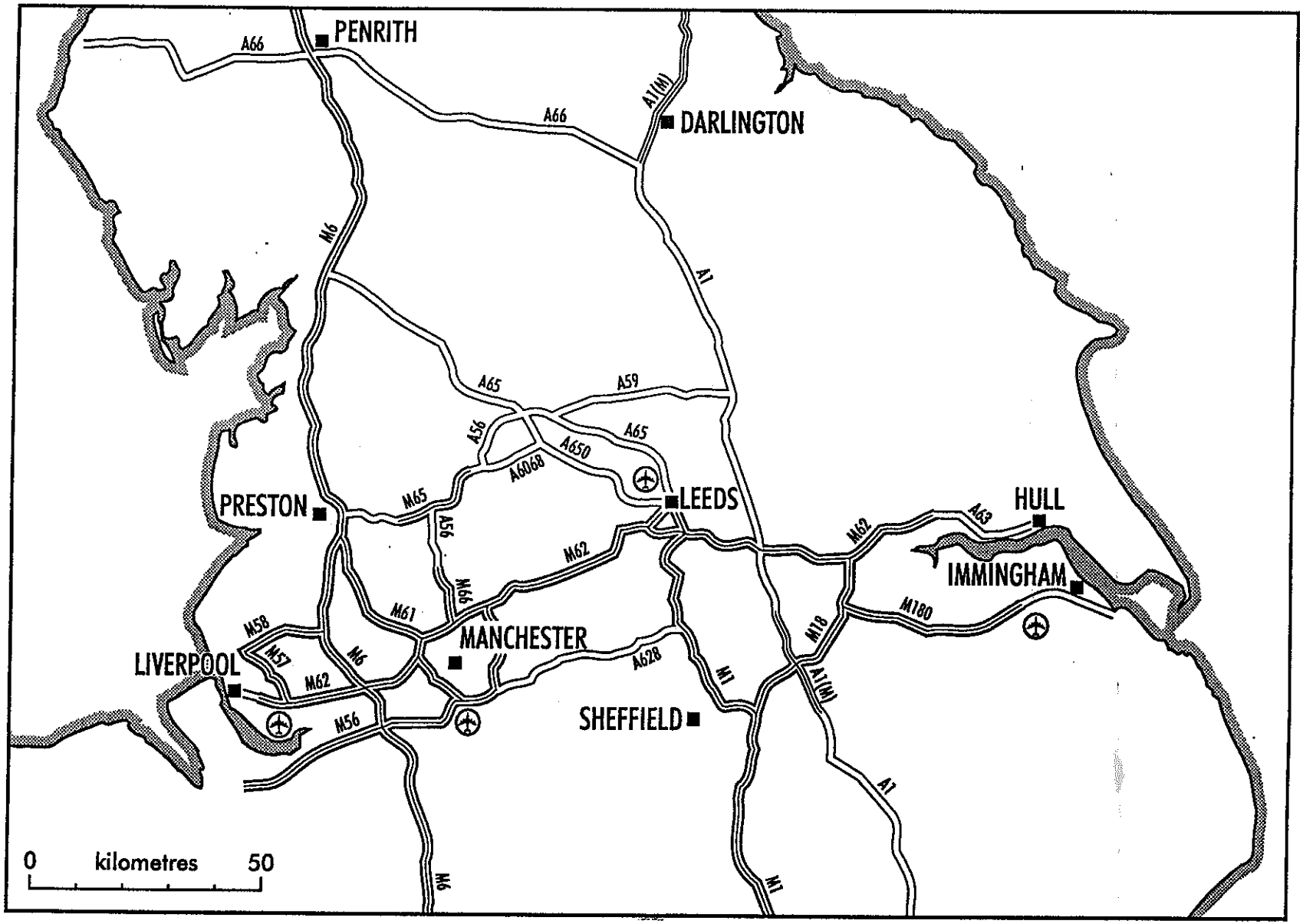


Figure 2: road networks



3. TRANSPORT PATTERNS

The modern transport system in the trans-Pennine corridor has to perform a very wide range of functions. Journeys may be for business, either freight haulage or people travelling in the course of their work. Other journeys are personal, for shopping, leisure or travel to work. These journeys may be local - just a few kilometres; within the region; to other regions; and to other countries - hundreds of kilometres. The road network is a seamless hierarchy of local and trunk roads and motorways which serves all these functions simultaneously. The rail network is more specialised, providing city to city and local passenger services, and freight movement over fixed routes. Air and sea ports are important nodes in these networks, providing a key resource for domestic and international movements. The core transport objective is to capitalise on the potential of these networks, by developing them as an integrated trans-Pennine transport system connected into national and international networks.

3.1 Overall flows

The trans-Pennine corridor possesses a high quality road network (figure 2): Its core is the letter 'H' pattern formed by the M62, the M6, M1, and the A1. The network is supported by strategic roads, including a number of routes linking the two regions across the Pennines. Similarly, the core elements of the rail network are the East and West Coast Main Line, and the North Trans-Pennine Route (figure 1). Other trans-Pennine routes complete the network. It is these routes which are critical to this study: forming a transport interface between the two regions, they are also vital for east-west movements to the regions' sea ports.

Over 190,000 vehicles crossed the Pennines daily in 1990, 40% of this flow concentrated onto one corridor: the M62. This route carries more traffic than the five other strategic trans-Pennine roads combined. Flows vary considerably along the Liverpool - Hull corridor. The heaviest flows are on the central section, the M62, particularly north of Manchester, where 150,000 vehicles each day bring the M62 to its design capacity, and south of Leeds. These are critical bottlenecks in the transport system. Figure 3 shows flows on trans-Pennine roads (across Pennine screenline).

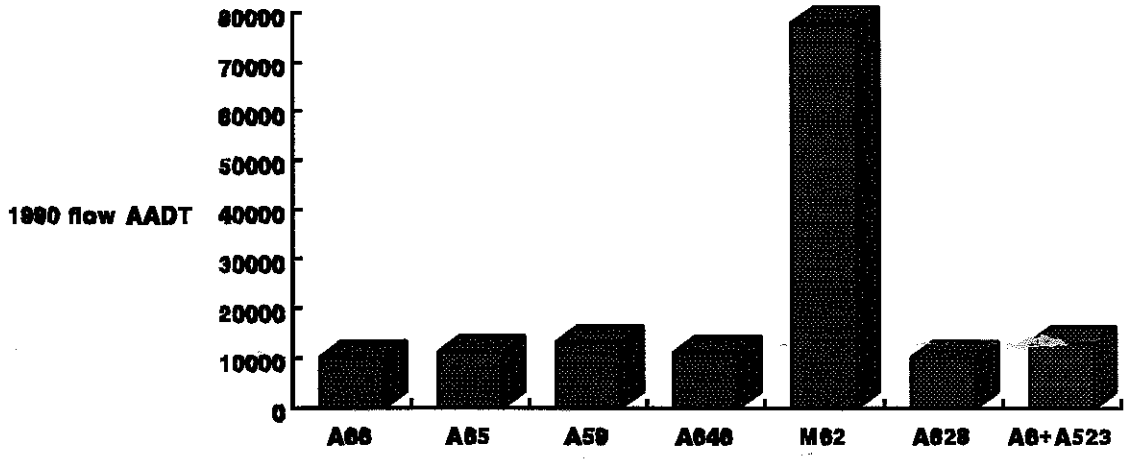


Figure 3: Trans-Pennine flows by corridor

The road network allows commercial distribution networks based in strategic locations to serve large catchments. From a depot close to the M62 return journeys can be made to the West Midlands or Tyneside within a single driver's shift. Consequently, a high proportion of UK warehousing has located along the M62 corridor, one of the most significant relationships between transport and land use.

Table 1: Warehouses located in the M62 Corridor

Sector	% of UK warehouses
Non food retailers	22
Food retailers	20
Food manufacturers	24

Source: A.C.McKinnon, 1989, Physical Distribution Systems

The network of high quality roads in the trans-Pennine corridor is of strategic important for the physical distribution sector. The M62 together with the M6, M1, and the A1 form an extended letter "H" pattern. By locating a depot close to an intersection of the M62 between Ferrybridge and Warrington it is possible for lorries to deliver goods to the West Midlands, or Tyneside, and for the driver to return within a single shift. In order to minimise inventory and other distribution costs, firms wish operate a minimum number of stock holding locations, so the maximum possible proportion of the population must be served from each site.

As a result, certain sites along the M62 have been developed extensively with warehouse and

distribution facilities. Most notable are Warrington, Middleton, Heywood, and Whitwood. Each of these sites has a number of warehouses operated by distribution contractors on behalf of major retailers or manufacturers.

The Trans-Pennine Road and Rail Studies (TPA 1992a and b) gathered a large amount of original data on movements on the key trans-Pennine corridors in 1990. The main findings of the survey were: the dominance of road movement (93% of travellers using a private car); the high relative volume of traffic on the M62 (40% of all trans-Pennine flows); and the high proportion of city centre to city centre travellers utilising rail.

Since the Trans-Pennine Studies were carried out in 1990-91, a number of new factors may have had an impact on road traffic flows. The most important of these relate to retailing, with the opening of Meadowhall Shopping Centre, and the advent of Sunday opening. The future development of the Manchester regional shopping centre at Dumplington could also have an impact on traffic flows. Similarly, the opening of light rail schemes in Manchester and Sheffield, and the introduction of rail services to Manchester Airport, may affect flows on strategic road and rail corridors.

3.1.1 Trans-Pennine road corridors

Nearly three quarters of all trans-Pennine road traffic (73.3%) uses six corridors. The majority of this traffic is concentrated on the M62 (Table 2). The highest HGV flows were on the A66, M62 and the A628. The A66(T), with a daily flow of 10,000 (AADT), is important for strategic, long distance trips and for commercial rather than commuting journeys (23% HGVs). The A65(T), with a daily flow of 11,000 AADT carries a low proportion of HGVs compared to other trans-Pennine routes, more in line with the national average. The A59/A6068 combined represent the eastward extension from the M65 in Lancashire. They carry a combined flow of 21,200 AADT. The daily flow in the A628 corridor, crossing the Peak National Park in the South Pennines, declined from 10500 in 1990 to 9700 in 1994. This is thought to be due to a contraction of the coal industry in Yorkshire, and the traffic levels settling following road improvements on the A616 Stocksbridge bypass, which provides a link between Sheffield and the M1. This route carries the highest proportion of HGVs of all trans-Pennine routes (27%) against a national average of 9% for major roads. For traffic between South Yorkshire and Greater Manchester the A628(T) (3146 movements) and M62 (1852 movements) provide the only adequate road links. Freight traffic will inevitably be channelled onto these corridors. Furthermore, the A628(T) is preferred to the M1/M62 route because it is more direct, although the gradients create difficulties for HGVs.

Table 2: Trans-Pennine flows by road corridor (AADT)

Trunk road	1990 flow (AADT)	% of TP flow	% HGVs	Average trip length (kms)	1994 flow (AADT)
A66(T)	10,000	5.2	23	254	
A59/A6068	21,200	11.0	10	*94	
A646	11,000	5.7	7	39	
M62 (J21-22)	77,900	40.3	20	137	83,300
A628	10,500	5.4	27	119	9,700
A65	11,000	5.7	9	103	
*A59 only					

The Road Study survey also provided 12 hour flows on the Pennine section of the M62. Table 3 compares this figure with the flow during the peak periods of 0800-0900 and 1700-1800, in the Manchester to Leeds direction. From this table, the slightly more even flow on the trans-Pennine section is revealed.

Table 3: M62: Peak flows

Link	All traffic (2 way)	In peak 2 hours	In peak 2 hours (%)
J19-20	73892	14396	20
J20-21	60358	11681	19
J21-22	-	-	-
J22-23	53789	10422	19
J23-24	56339	10252	18
J24-25	62399	12544	22

3.1.2 Trans-Pennine Rail corridors

The Trans-Pennine Rail Study gathered information on passenger flows on the key trans-Pennine routes, based on 1990 statistics. A significant finding was the high proportion of city centre to city centre movements captured by rail (Table 4). These figures are complemented by the finding that the average time taken by rail travellers to get to and from rail stations was 30 minutes. This may point to an accessibility threshold which may be valuable in promoting rail travel, as part of a package approach.

Table 4: Rail city-centre to city-centre market share

Services between	City centre to city centre rail share (%)	trips by rail	% TP rail trips in corridor
Liverpool-Leeds	56	200	4
Liverpool-York	82	100	2
Liverpool-Newcastle	71	110	2
Liverpool-Hull	36	40	1
Liverpool-Sheffield	73	150	5
Manchester-Leeds	40	650	12
Manchester-York	78	230	4
Manchester-Newcastle	55	200	4
Manchester-Hull	45	110	2
Manchester-Sheffield	67	650	23

The North Trans-Pennine Route (Manchester-Huddersfield-Leeds) is the most heavily used trans-Pennine corridor, competing directly with the M62 for trans-Pennine movements. It holds a 7% market share. 57% of all trips have their origin or destination within West Yorkshire. Greater Manchester is next most important with 37%. One third of trans-Pennine rail journeys are between Greater Manchester and West Yorkshire. However, 46% of all journeys on the North Trans-Pennine Route do not cross the Pennine watershed.

3.2 Journey purpose

Trans-Pennine roads are important for both commercial and personal travel. The relative importance of these flows is important in understanding transport conditions. For the M62, the split between commercial and personal journeys was found to vary between the core Greater Manchester - West Yorkshire, and longer distance journeys. As distance increased, the proportion of commercial vehicles increased (Figure 4).

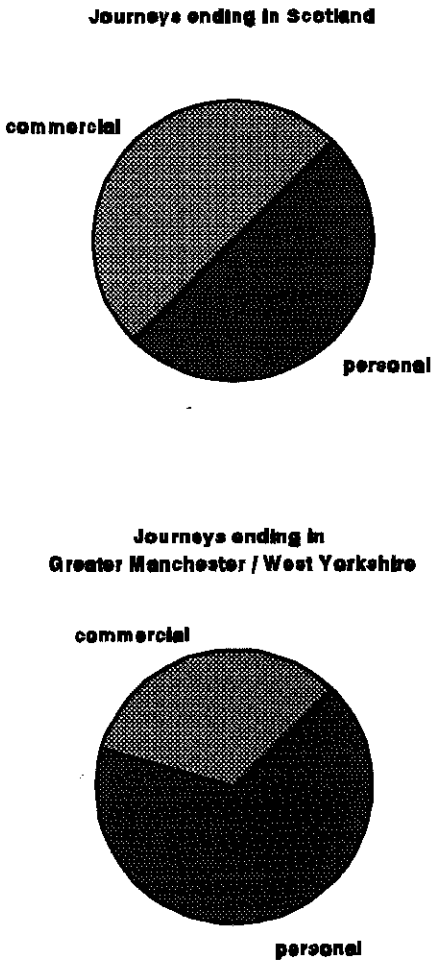


Figure 4: Freight/passenger split for the M62

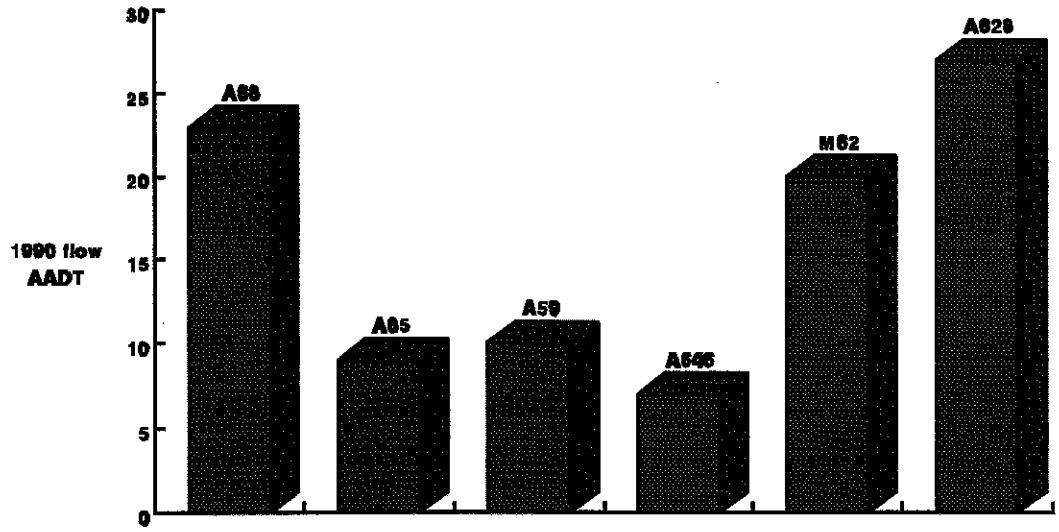


Figure 5: HGVs on trans-Pennine routes (at Pennine screenline)

The aggregate flows above need to be broken down by journey purpose to reveal and explain patterns of movement in more detail. Below, the journey to work patterns are examined, using statistics drawn from the 1991 Census. We will need to find out more about other journey types: for leisure, personal business, shopping, education and employers business. The national figures for these journeys are compared, in Table 5, with those for trans-Pennine road and rail journeys. The opening of Meadowhall Shopping Centre may have increased the number of shopping trips.

Table 5: Journey purpose by mode

Purpose	% of journeys (national car users)	% of journeys (Trans-Pennine rail users)	% of journeys (Trans-Pennine)
Leisure	29	13	25
Travel to work	20	35	35
Personal business	23	9	12
Shopping	19	3	6
Business	5	36	10
Education	4	2	10

Figure 6 shows travel to work and business travel feature much more highly than the national average, while shopping and leisure journeys are much less significant.

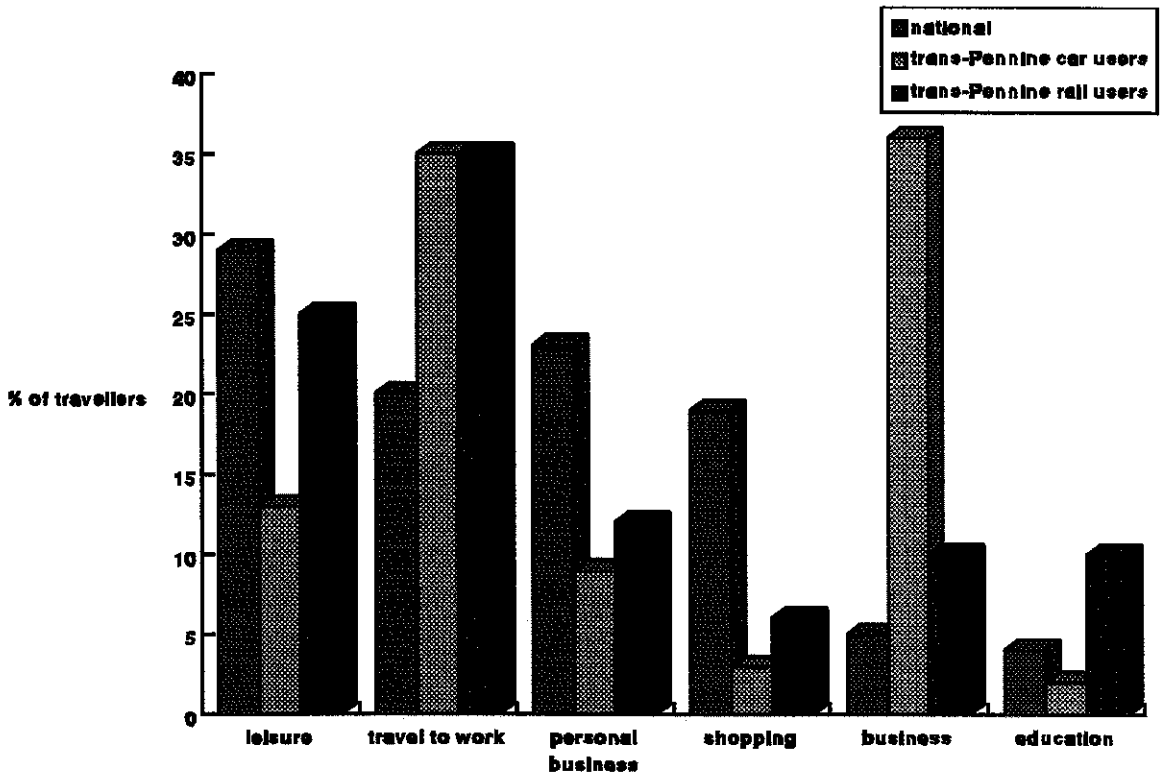


Figure 6: Journey purpose, national and trans-Pennine

Table 6 shows the different mix of journey purposes on the M62 for trips ending locally, in West Yorkshire and Greater Manchester, and in Scotland. From this table, the relatively high level of commuter traffic on the Pennine section of the M62 becomes apparent, constituting half of all passenger journeys, compared to the national average of 20%. For journeys ending in more distant regions, eg Scotland, a very different breakdown was obtained, with a much higher proportion of commercial traffic. This pattern was repeated for Merseyside and Humberside, possibly reflecting movements to the ports in these areas.

Table 6: M62 Journey Purpose and Destination

Journey purpose	Journeys ending in	
	West Yorkshire and Greater Manchester (%)	Scotland (%)
Home based work	33	14
Home based other	10	17
Employers business	20	10
Non-home based other	4	9
Commercial vehicles	33	50

3.3 Local and long distance journeys in the traffic mix

3.3.1 Analysis of journey to work

The elements of aggregate transport flows relating to journey to work patterns were analysed in more detail. As stated above, 33% of journeys in the M62 and North Trans-Pennine rail corridor were journey to work, which is significantly higher than the national average (20% of journeys, and 20% of distance travelled by individuals: RCEP 1994 p11). Travel to work patterns for the Trans-Pennine corridor were analysed using data from the 1991 Census Statistics, shown in Table 7. This table illustrates the high proportion of travel to work journeys occurring within districts. These local journeys account for 73% of travel to work trips in the Trans-Pennine corridor. The relatively high levels of inter-county movement originating in Cheshire and Merseyside is accounted for by a large number of journeys to Greater Manchester. Overall, there are nearly 5 million commuter trips in the trans-Pennine corridor each working day. Three quarters of these journeys are local, and only 7% leave the county of origin.

Table 7: Total journey to work flows by county, Trans-Pennine corridor ('000s):

	within district	%	ex-district in county	%	outside county	%
Greater Manchester	658	66	289	28	64	6
Merseyside	337	68	110	22	50	10
South Yorkshire	391	83	60	12	22	5
West Yorkshire	688	82	116	14	32	4
Cheshire	278	68	58	14	73	8
Cumbria	190	89	22	10	3	1
Derbys (High Peak)	26	-	12	-	-	-
Humberside	235	69	95	28	11	3
Lancashire	396	68	136	23	49	9
North Yorkshire	234	76	41	13	31	11
Clwyd	114	70	28	17	22	13
Gwynedd	64	85	7	10	4	5
Total	3609	73	974	20	374	7

Travel to work: Trans-Pennine corridor total - 4.9 million

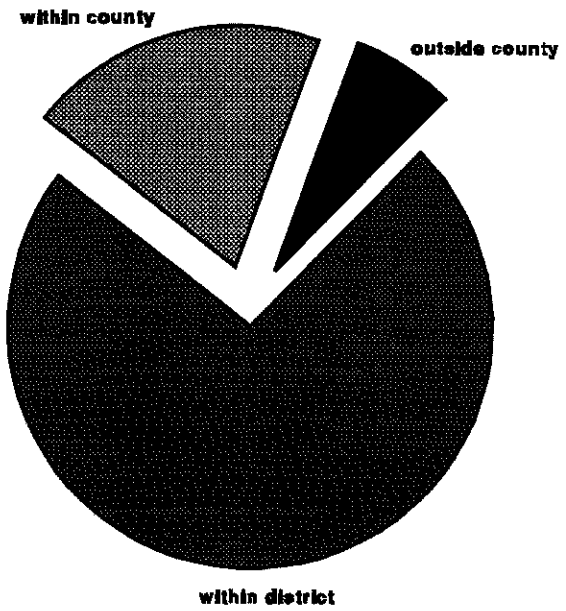


Figure 7: Commuter journeys in the trans-Pennine corridor

The travel to work statistics for Greater Manchester were further disaggregated to examine the share between different modes of transport (Table 8). This table shows a dramatic rise in

the use of cars for travel as commuting distances rise, from 46% to 83% of journeys. Car drivers travelling longer distances also carry fewer passengers. The high level of foot and cycle movements for local journeys is significant, as is the number of homeworkers. More commuter journeys are made by bus than rail.

Table 8: Travel to work flows by mode, Greater Manchester ('000s)

Mode	in district	%	ex-district in county	%	out county	%
BR train	5	1	16	6	2	3
Bus	100	15	41	14	3	4
Car driver	302	46	194	68	53	83
Car passenger	58	9	23	8	5	7
Cycle & foot	132	20	9	3	1	2
Not stated	20	3	3	1	1	1
Work at home	37	6	-	-	-	-
Total	652	100	285	100	63	100

Table 9: Trans-Pennine corridor: Travel to work by social class ('000s)

Social class	Trans-Pennine Region	Greater Manchester		
	Outside county total	Outside county	Ex-district within county	Within district
SCI	323	6	20	19
SCII	133	25	95	144
SCIII(N)	65	11	73	154
SCIII(M)	75	13	60	153
SCIV	38	7	32	129
SCV	10	2	8	50
Total	352	64	287	549

Table 9 reveals that inter county journeys are dominated by SCII (managerial and technical); medium distance journeys are dominated by SCII and SCIII(N+M) (skilled); and within district journeys are dominated by SCIII(N+M), SCII and SCIV (semi-skilled).

3.3.2 Freight movement

The national pattern is that the vast majority of freight is moved only a short distance. In 1993 the average length of haul of goods by road was 84 kilometres (52 miles) (DOT 1994a). For rail freight, bulk flows of coal (55% of traffic) are moved on average only 80km, while higher value goods (9% of traffic) move on average 250km. The average length of haul by road varied by commodity. The commodity group with the highest proportion of long distance traffic was food and drink; 20% of this traffic being carried more than 200km. At the other end of the scale 55% of sand, gravel and clay move less than 25km.

In terms of vehicle type the average length of haul by articulated vehicles was 135 kilometres (84 miles). Because of their greater capacity and length of haul, artics were responsible for 72% of the goods moved in 1993, measured in terms of tonne kilometres (DOT 1994a). It is estimated that the largest of these with 5 axles cover 46% of their annual mileage on motorways, and 33% on trunk roads (DOT 1993a). They are the main beneficiaries of a high quality strategic road network.

These patterns reflect the general nature of goods distribution. In general low value bulk commodities are moved a short distance directly to manufacturers premises where they are used as raw materials. On the other hand, high value finished goods are moved from a central manufacturing point to a storage and distribution centre near the market, with a final delivery to retail or industrial consumers.

In the trans-Pennine corridor, of 353 million tonnes of goods lifted for British destinations in 1993, less than a third (106mt) left the region of origin. Only 23mt was moved between the study regions. The significance of long distance movements, however, becomes clear when measured in terms of goods moved (tonne kilometres) rather than goods lifted (tonnes). At least 60% of goods *moved* is likely to be inter-regional (Table 10).

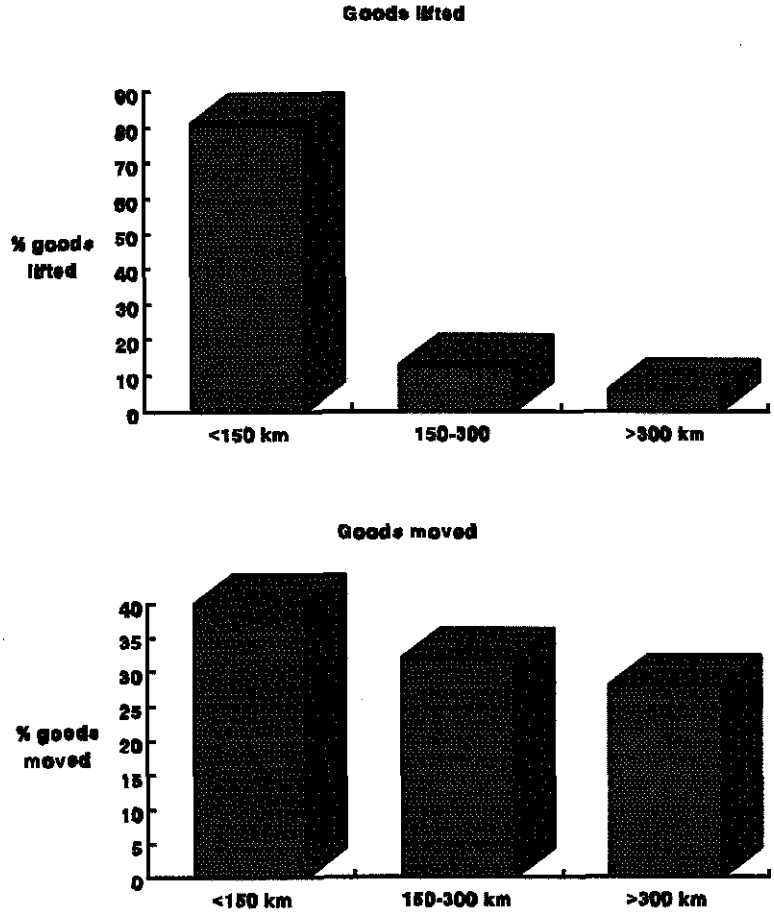


Figure 8: Goods lifted and moved in the trans-Pennine corridor

Table 10: Percentage of Goods Lifted and Moved by Length of Haul

Length of Haul (km)	Goods lifted (%)	Goods moved (%)
< 150	81	40
150 - 300	13	32
> 300	6	28

Source: Derived from **The Transport of Goods by Road in Great Britain 1993,** HMSO, London.

Traffic on trans-Pennine routes, and on north-south links also includes small transit flows between regions outside the corridor. Even so, Scottish traffic destined for the South East amounts to only 1 mt, 0.06% of the tonnes lifted nationally, though 0.3% of the tonnes moved in terms of tonne kilometres. Nevertheless, it has been estimated that 30% of all GB road haulage uses road infrastructure in the two regions (Garratt 1994).

3.4 Origin/destination patterns

The Trans-Pennine Road Study examined the patterns of origins and destinations of trans-Pennine movements. Large movements between Greater Manchester and West Yorkshire (24% of total trans-Pennine flows), Lancashire to West Yorkshire (9%) and South Yorkshire-Greater Manchester (5%) were identified. The key findings for each major trans-Pennine corridor are set out below. The figures indicate a high concentration of movements between counties directly adjacent to the Pennine chain rather than between more distant areas.

3.4.1 Trans-Pennine origin/destination flows: M62

The M62 corridor carries by far the largest volume of trans-Pennine road traffic. Of the 193,000 vehicles AADT crossing the Pennines in 1990, 40% (78,000 AADT) used the M62. Flows on the M62 are highly diverse. By far the most significant flow is between Greater Manchester and West Yorkshire, accounting for nearly one third of all movements across the Pennine watershed on the M62. By comparison, movements between Humberside and Merseyside constitute only 1% of the overall flow.

Because of its high quality, the M62 is a unique divide, attracting traffic in a wide area to the south and north. Several movements are shared among corridors. Between Greater Manchester and South Yorkshire, 1850 daily movements use the M62, while 3150 cross the A628. There is a significant level of synergy between these two corridors. Similarly, between Scotland and Humberside 387 movements use the M62, while 300 use the A66. This synergy indicates that conditions on the M62 may affect flows on other corridors.

The main flows, by county of origin and destination were (12 hour two way traffic):

Greater Manchester to/from:	West Yorkshire	25574
	North Yorkshire	2164
	North East	2030
West Yorkshire to/from:	Lancashire	4830

	Merseyside	3744
	Lancashire	1095
South Yorkshire to/from:	Greater Manchester	1852
Humberside to/from:	Lancashire	1288
	Merseyside	813

As part of wider studies of the M62 around Manchester, the Department of Transport analysed the nature of journeys made on the critical section between junctions 15 and 17. Table 11 shows the even split between journeys.

Table 11: M62 J15-17: journey type by trip end

Journey type	Flow (AADT)	% of total
Within Greater Manchester	43000	31
Start and end outside Greater Manchester	41000	30
One trip end in, and one outside, Greater Manchester	54000	39
Total	138000	

The main flows for transit traffic were between Yorkshire and Humberside and Merseyside, Cheshire, and parts of the west Midlands and South West, via the M6. A small number of flows were long distance north-south transiting the corridor, for example Scotland - south east (0.5% of total flows).

Table 12 shows the major flows within Greater Manchester between Junctions 15 and 17. This shows the importance of movements between Bury and Salford and Bolton on this section, but also the significane of a large number of other movements within the conurbation. These tables show the crucial balance between local journeys, longer journeys of local origin / destination, and long distance transit traffic, all of which are significant on this section of the M62. This is a key factor in developing policy measures.

Table 12: M62, Junctions 15-17: major flows within Greater Manchester

Flow	Volume	% of total traffic
Salford-Bury	7020	5.1
Bolton-Bury	6300	4.6
Bolton-Rochdale	3600	2.6
Salford-Rochdale	3300	2.4
Bury-Trafford	2920	2.1
Bolton-Oldham	2790	2.0
(Other routes within Greater Manchester)		12.2
Total within Greater Manchester		31

3.4.2 Origin/destination flows on other trans-Pennine roads

Flows on other corridors are less diverse and more obvious than for the M62 (see appendix 3). For the A66, the key flows are between the North East and Cumbria and Lancashire. On the A65, key movements are between West Yorkshire and North Yorkshire and Cumbria, and internally within North Yorkshire. In the A59/A6068 corridor, it is movements between Lancashire and West and North Yorkshire which are most prominent. On the A628, movements between Greater Manchester and South Yorkshire dominate.

3.5 Modal choice 1: Passenger rail

The findings of the Royal Commission report on transport and the environment (RCEP 1994), together with statements by many regional organisations, see the promotion of rail as a major plank in an integrated transport strategy. The targets proposed by RCEP for increased rail use are likely to require substantial investment in rail mainly by public sector bodies. The Trans-Pennine Road Study, however, concluded that there was only limited scope for solving the problems of Trans-Pennine road travel by rail improvements, and was criticised for its lack of an integrated approach (eg by the Council for the Protection of Rural England). This study of inter-regional communications offers an opportunity to explore the extent to which the rail market share can be increased, and what measures are appropriate to achieve this modal transfer. Some relevant themes are considered below.

3.5.1 Passenger issues

The principal drawback which faces passenger railway services across the Pennine regions is the lack of a clear hierarchy. Despite the fact that there are 3 different East-West rail routes still available (Hope Valley, Standedge, and Sowerby Bridge), each functions mainly as heavily subsidised commuter railway within the different conurbations served. There are a large number of intermediate stations between the major centres, limited park and ride facilities and train speeds are slow. Where limited stop trains do operate, they are inhibited by the stopping trains with which they share track.

This contrasts with conditions available in the South-East of England, where 4 track railways allow fast trains to pass commuter (stopping) trains, and the main centres are served by limited stop Inter-City trains passing beyond the region. Table 13 illustrates this contrast.

Table 13: Comparison of train travel times: South East and Pennine

South East		
Route	Distance (km)	Minutes
Reading-London	59	25
Peterborough-London	123	44
Colchester-London	83	55
Milton Keynes-London	80	36
Basingstoke-London	77	41
Pennine		
Route	Distance	Minutes
Liverpool-Leeds	124	115
Manchester-Leeds	68	60
Manchester-Sheffield	66	54
Liverpool-Manchester	56	51

In the most extreme case, we can see that while the 124 kms from Liverpool to Leeds takes 115 minutes, the 123 kms from Peterborough to London takes only 44 minutes.

It may well be that a less subsidised railway system would choose to operate faster services, and abandon many intermediate stations. Faster trains are more productive and therefore more profitable.

If we were to assume a 120 kph line speed between Liverpool and Leeds, with only a couple of intermediate stops, then it is reasonable to assume trains could complete the journey in 75 minutes, and not the 115 minutes presently on offer. It would, of course, then be impossible to serve intermediate stations such as Greenfield, Ashton-under-Lyne or Birchwood.

The absence of a clear hierarchy means that it is most difficult to develop a sound commercial case for rail investment across the regions. This is unfortunate. If train speeds could be raised by 50% as above, then not only would one reasonably expect a substantial increase in patronage (say + one third), but train operating costs per seat offered would fall by one third. Effectively, revenue would rise by a third without a significant increase in operating costs. Take for example, the rail route between Manchester and Leeds. The TPA report on trans-Pennine rail opportunities showed a daily patronage in 1990 of 7610 (TPA 1993). A one third increase would raise this volume by about 2500, 'worth' £3m annually in revenue terms, almost all of which would be devoted to infrastructure investment.

It will be important for the regions (and the railway operations and Railtrack) to consider priorities for the railway system. These issues are relevant from the point of view of freight if an enhanced gauge route is also to be established across the Pennines to allow Yorkshire and North-East traffic to feed into an enhanced WCML 'piggyback' route. That is, in considering any improvement in freight gauge, it will also be important to consider passenger developments which could make a radical impact on trans-Pennine communications.

Rail service improvements could include enhancements to stock, property, infrastructure, control systems. Widespread support exists for electrification of the key North Trans-Pennine rail corridor, linking Liverpool, Manchester, Leeds and York. The Trans-Pennine Rail study established an investment case for electrification, at a cost of £53m. Electrification could be extended to Hull for an additional £28m. Wider network benefits would be the possibility of electric running from Newcastle to Liverpool, and from east of the Pennines to Manchester Airport. It would also enable Eurostar services to the continent to be diverted via Leeds. Electrification would result in 15 minute journey time saving between Liverpool and Leeds (to 96 minutes), and could have an impact on road congestion, and bring wider economic and network benefits. . The strategy was also supported as part of the overall package of measures proposed in the South Pennines Transport Needs Study. A problem with this proposal is that the network benefits, particularly of cascading rolling stock to other TP routes, are now unlikely due to fragmentation of the network with rail privatisation.

The South Trans-Pennine Route was not considered to be a candidate for electrification because of the cost of electrifying Sheffield station. This study also proposed the reopening of the Matlock - Chinley rail line, but concluded that reopening the Woodhead Tunnel route would not bring significant benefits in terms of modal transfer.

The major trans-Pennine studies (the Trans-Pennine Road and Rail Studies, and the South Pennines Transport Needs Study) have concluded that public transport improvements can do little to reduce road traffic levels. We believe, however, that the opportunities for positive action to enhance the role of rail, in particular for passenger movements, are more positive than has been recognised. Recent work at ITS has focused on the potential for diverting inter-urban travellers to rail. The data from the Trans-Pennine Studies was re-modelled to evaluate the impact of a range of policy measures on road traffic demand. These measures included 'sticks' such as increased fuel duty, motorway tolling, and a 60mph motorway speed limit. 'Carrots' included reductions in rail journey times and fares. A key finding was that where the baseline rail service is poor, none of these measures are likely to achieve a significant reduction in road traffic demand. However, where rail services are good, further improvements to rail offer the possibility of a switch to rail, particularly for longer journeys, and for lone travellers. Against this background of a high quality rail service, demand management measures on the roads network are likely to achieve much larger reductions in demand. From this work, it is clear that baseline rail improvements are a prerequisite for any major modal switch away from road, and that in an integrated strategy, road traffic demand could be significantly reduced (Toner et al 1995).

Table 14: Effect on car demand (%) of various measures

Carrots	Reduction in rail fare			Reduction in rail journey time		
	-5%	-10%	-20%	-5%	-10%	-20%
Rail strong competitor Rail weak competitor	1.9 0.2	4.0 0.4	8.4 1.2	1.1 0.1	2.2 0.2	4.7 0.6
Sticks	Increase in fuel duty		Motorway tolls (ppm)		Motorway speed limit 60mph	
	+5%	+10%	1½	3		
Rail strong competitor Rail weak competitor	2.6 0.2	5.0 0.5	15.5 1.6	29.2 3.3	19.8 2.3	

For city-centre to city-centre movements, rail already captures a high market share. 67% of movements between Manchester and Sheffield city-centres, for example, are by rail. For Liverpool to York the figure is 82%. The share for Leeds - Manchester is lower, at 40%. Importantly, several trans-Pennine rail routes compete directly with roads: the South Trans-Pennine rail line, for example, competes with the A628 between Sheffield and Manchester. A level of synergy clearly exists between road and rail networks. In the M62 corridor, the North Trans-Pennine Rail line has secured a 7% market share of trans-Pennine journeys. Investment on this rail corridor to increase speed, reliability and quality of service is an opportunity to consolidate on and increase this market share.

Competition between modes on the principal corridors (M62 / North Trans-Pennine and A628(T) / South Trans-Pennine, as well as the M65 corridor) suggests that increasing the market share of rail depends on improving the quality of service, thereby influencing modal choice. A key measure of service quality is journey time relative to car based journeys. The Trans-Pennine Rail Study found that slow journey times were a key problem, as Table 15 illustrates for the North Trans-Pennine Route.

Table 15: North Trans-Pennine Route: speed and journey times

Route	Journey time (mins)	Average speed (mph)
Liverpool-Manchester	45	42
Liverpool-Leeds	111	42
Liverpool-York	143	43
Liverpool-Newcastle	235	47
Manchester-Leeds	58	44
Manchester-York	89	46
Manchester-Scarborough	145	46
Manchester-Hull	123	46
Manchester-Newcastle	185	48

The problem of low speeds is caused by speed restrictions - due to track curvature and the condition of structures - the steep gradients, and the need to make timetable allowances for delays on congested sections of track. The key areas of congestion are around Manchester Piccadilly, where trains must cross in front of all other platforms, and at the western end of Leeds station. The problem at Piccadilly may be exacerbated by the Trafford Park rail freight terminal, but eased by Manchester South resignalling. Resignalling at Leeds West End should be complete by 1996. A further problem is capacity, particularly between Huddersfield and York where overcrowding occurs.

Rail speeds are low compared to those achievable on the M62 in open flow conditions (70mph). A more detailed comparison between road and rail journeys in this corridor can be made by analysing journey times. For commuter movements between Manchester and Leeds, for example, the rail journey time is 58 minutes. Given a car door to door journey time of 90 minutes, rail can only compete on time for that set of journeys for which the combined access/egress time to the trunk rail service is around 30 minutes. This clearly limits the range of origins and destinations for which rail is currently competitive.

Two initiatives to reduce rail journey times merit further consideration: increasing the accessibility of stations (reducing overall journey times), and improving rail services. Improving access to the rail network from homes and workplaces will extend the capture area, particularly for commuter journeys. This could be achieved by:

- adopting accessibility of the rail network as a specific objective in TPP packages;
- improving public transport access to stations for bus and light rail;
- providing major park and ride facilities, especially at stations outside urban centres, and at key sites such as the M1/M62 Lofthouse interchange, and at Ashton;
- improving facilities for cyclists: cycle routes to stations, enhanced secure covered facilities;

These are measures which could be implemented through local authority TPPs. The Department's new guidance on the package approach, with more comparable appraisal and funding treatment of local road and public transport schemes is relevant.

The South Trans-Pennine corridor has benefitted from service improvements in recent years, including direct links to Manchester Airport, and by an initiative to encourage weekend use of the line for leisure travel. The South Pennines Transport Needs Study found that improving services in this corridor could attract up to 2300 passengers from road to rail (about 1700 vehicles). This would amount to some 1300 vehicles per day on the M62, 300 on the A628 and 100 on the A57. This Study proposed other network improvements in the South Pennines, in particular the reopening of the Matlock - Chinley rail line. However, the study concluded that reopening the Woodhead Tunnel route would not bring significant benefits in terms of modal transfer.

The conclusions to this section are, therefore, as follows:

(i) improvements to the trunk rail services and to the feeders to those services could increase the size of the rail market substantially;
(ii) the effect on road traffic volumes would be proportionately fairly small;
(iii) however, improvements to the rail mode may be a prerequisite for policy action

on road use as congestion worsens.

3.6 Modal choice 2: Rail freight

The future opportunities for rail freight are less clear. Rail has not been successful in gaining general merchandise traffic, which is largely responsible for the rapid expansion of the freight market since 1945. Between 1979 and 1993 the total goods moved by road increased by 29.5%. Within this total, foodstuffs and miscellaneous manufactured goods moved both increased by over 48%, while bulk products moved increase 12% and chemicals only 2%.

In any discussion of the freight market, it is important to distinguish between the movement of bulk and general (or liner) cargo. Bulk cargo (petroleum, iron ore, coal, aggregates etc) is normally moved most cheaply by sea, rail or pipeline. UK heavy industry is heavily dependent on imported raw materials, and is therefore concentrated in maritime industrial areas. In the Pennine regions, these include the Mersey - Manchester Ship Canal corridor, and the Immingham - Scunthorpe area. Movements of power station coal also rely heavily on the rail network. The circumstances where rail can do this economically require high volume flows from origin to destination, automated product handling, and intensive use of rail wagons and motive power equipment.

The volumes and length of haul are shown in Table 16. Clearly a large volume of rail freight moves only short distances. In the case of coal, the major consumers in the North are the Aire/Trent power stations plus Fiddlers Ferry. Much of the coal still originates from collieries in Yorkshire, Nottinghamshire and the North East. Imported coal is moved from Liverpool to Fiddlers Ferry, and from Immingham to Scunthorpe. Rail also carries substantial waste products from power stations in the form of pulverised fuel ash (PFA) and gypsum. A substantial length of route mileage in the coalfield is devoted almost exclusively to the movement of power station coal. As the flows decline it may become difficult to justify retention of all the network. Declining coal traffic was a major factor in the closure of the Woodhead line.

Table 16: Freight Traffic by Rail (1992/93)

Commodity	Tonnes lifted	Length of haul (km)
Coal	67.9	79.5
Metals	15.9	144.7
Construction	15.8	158.2
Oil & petroleum	9.5	210.5
Other traffic	13.2	250.0
All traffic	122.4	126.6

Source: Derived from TSGB 1993

Where bulk cargoes are sourced inland (e.g. limestone in the Peak District), it is possible to consider each flow on its merits and, if necessary, seek public sector subsidy to ensure goods move by rail on environmental grounds. As in the case of bulk shipping, where the tonnage of a single commodity between two discrete locations can correspond to the capacity of mode

involved (e.g. enough limestone required daily to fill a train), then the principal issue to consider is whether a suitable train or ship can directly access the source of the cargo.

For non bulk trades, the issues are entirely different. There can be little argument that rail or sea offers significant economies over road haulage on a tonne mile basis. Road haulage costs for intermodal traffics are at least 50p per kilometre. Rail traction plus wagon hire costs are approximately 15p per kilometre. Costs by container ship, even using smaller vessels of 200 - 300 TEU capacity, are less than 10p per kilometre at sea (MDS Transmodal 1995). However, rail and sea face several hurdles, including:

- the difficulty of consolidating ship or trainloads along a line of route
- the costs of road collection and distribution
- the cost of providing and operating terminals to effect modal interchange
- the management of an operation which requires coordination of the cargoes belonging to different shippers, and of the staff and equipment of different transport contractors and operators.

By contrast, road haulage can trade on a discrete, load by load basis, using 'just in time' (JIT) production methods. Many manufacturers are willing to pay a premium for such a service, offsetting higher transport costs against savings elsewhere in the production chain. Most goods in European trade currently using unitised transport tend to be of relatively high value or perishable. As a result JIT techniques are used to reduce inventory costs to a minimum and create a demand for high quality transport services. This may act as a further impediment to change of mode of freight traffic. However, it is possible that in the longer term the road freight industry may not be able to achieve the current levels of service, as a result of increasing congestion, road user charges and environmental restrictions.

The above factors apply to any region. For the Pennine regions, there are no serious policy issues in the bulk sector. Individual internal bulk flows can be treated on their own merits. Rail and inland waterways are used to move coal, quarry products, petroleum and chemicals. Further opportunities to switch bulk cargo to rail do exist (e.g. in cement and steel), but each opportunity can be considered individually. In many cases, the key may lie in an increasingly competitive environment for the supply of rail traction and in arguing for minimal rail track charges.

Insofar as bulk shipping is concerned, the Humber and Mersey ports are capable of handling large dry bulk and tanker ships. Liverpool can handle Panamax vessels within its enclosed dock system. Neither the Mersey or the Humber can handle the very largest of tankers at full draft, but the fact that most crude oil is sourced from the nearby North Sea fields means that maximum tanker capacity is of less importance than in the pre North Sea era. The important issues for the Pennine regions concern general cargo and liner shipping. These are discussed in Section 5.1.

3.7 International traffic

For both regions, a case is put for their relative peripherality in relation to the rest of England and Europe. It is argued that, in each case, transport flows to key markets in Europe will be important in ensuring the competitiveness of businesses in the regions. The North West region in particular, sees its position as a focus of transport routes between peripheral regions

and Europe, extending in future to Central and Eastern Europe.

International freight traffic originating in the regions mainly travels by road to the south coast, using north south corridors. Commercial vehicle journeys to and from the main port groups are shown in Table 17. Humber ports were second only to Thames and Kent in the number of HGV's carrying port related traffic, some 3500 vehicles per day. Traffic to ports in Lancashire and Cumbria is estimated at 1480 vehicles each day. Almost half of these travelled to or from the trans-Pennine corridor. Of port related traffic on GB roads 17.5% is to or from the Humber ports. Within Yorkshire and Humberside, 5% of road freight uses the Humber ports (7% by weight).

In order to provide data for the EC, the Department of Transport undertakes an annual survey of international road haulage (Dot 1994b). This only covers driver accompanied movements by UK registered hauliers, though estimates indicate that UK hauliers have 52.6% of the imported traffic and 60.4% of that exported in accompanied vehicles. Though data on the unaccompanied trailer traffic between northern England and northern Europe is not available, the survey does give an indication of the flow of goods from the region even though it covers only 29% of the UK's international RoRo traffic. Flows of goods to ports undertaken by UK registered vehicles should be included in the Continuing Survey of Road Goods Traffic (CSRGT). The DOT does not have jurisdiction to survey foreign registered vehicles, so details of their activities are not included in survey data, though estimates are derived from other surveys.

The main trade links using accompanied RoRo vary between regions. In the case of the North West the main links are with France, Germany and Italy for both imports and exports, this pattern reflecting the national situation. The North West has a large imbalance of traffic by this mode of transport, imports exceed exports by 54% whereas nationally the excess is only 10%. This is largely as a result of a high levels of imported agricultural products and foodstuffs, the North West region being the second largest recipient of these commodities after the South East.

The pattern of trade for the Yorkshire and Humberside region is different in that exports by this mode exceed imports by 18%, and Italy rather than France is the most important recipient of exports from the region. Important exports are foodstuffs, metal products and chemicals. The three northern economic regions account for nearly half the UK's chemical exports by road and as significant numbers of vehicles are carrying hazardous goods, the shipping routes are more restricted, in some cases to freight only sailings for such traffic.

It is clear that large numbers of accompanied road goods vehicles travel south to ports on the south coast and East Anglia. Again the north-south links are the most important the two regions. In addition accompanied vehicles serving regions to the north, as well as Ireland, use north south links through the two regions.

The opening of the Channel Tunnel has led to an expansion of capacity on the Dover Straits route, and increased competition with longer sea routes. In addition to the shuttle from Folkestone to Frethun, there are through rail services conveying intermodal traffic and classic rail wagon traffic. These are being expanded as traffic demands, UK - Italy promising to be the most successful corridor. Ultimately the capacity of the Channel Tunnel is limited. However the current allocation of some 35 'slots' for freight trains could be expanded by

investment in signalling and traction, increasing not only the number but also the length and weight of trains. Eurotunnel has recently ordered additional wagons to strengthen the Shuttle trains carrying lorries through the tunnel.

The growth of unitised traffic to the Continent has been rapid. Total unitised traffic increased by 79% between 1982 and 1992, RoRo traffic doubled and containerised traffic increased one third. The preference for the RoRo mode probably reflects the increased pressure on suppliers for faster and more reliable deliveries (DOT 1994d).

Most of the growth in RoRo traffic has been on routes to and from French and Belgium ports. In 1992 these accounted for 43% and 32% of the total. As yet evidence on the effect of the opening of the Channel tunnel is not available, though it is likely to have increased the concentration on the short Dover Straits crossing. This is partly because of the increase in capacity making delays less likely, and rate reductions on the route encouraging diversion from longer sea routes. The rapid expansion of trade means that any diversion of traffic from ports in the north of England will be more than compensated for by an increase in volume as a whole.

Although trade with Europe expanded rapidly, during the period 1982-1992 "other non-fuel" trade with other areas has increased by 90%. Flows of goods to ports serving destinations other than those on the Continent are also increasing.

Table 17: Port Related Traffic by Road 1991

Port Group	Region of Origin or Destination			
	Yorks & Humber		North West	
	Tonnes (000's)	Est. No. Veh. Loads (000's)	Tonnes (000's)	Est. No. Veh. Loads (000's)
Thames Kent	1476	117	1934	153
Lancs & Cumbria	543	43	2617	208
North East	455	36	564	45
Humber	5694	452	2148	170
Haven Ports	1380	110	1801	143
Other	900	72	1214	96

Note: Estimate of number of vehicle loads based on an average payload of 12.6 tonnes; Excess of imports on some corridors (1.8:1 Humber to North West) results in considerable numbers of empty vehicle movements
Source: Derived from Origins, Destinations and Transport of UK International Trade 1991 (Table III.2a)

3.7.1 Irish Traffic

Road freight traffic between Eire, Northern Ireland and the Continent either transits Great Britain, or is shipped direct to France. Many lorries are routed via Larne, taking advantage of short sea crossings and frequent sailings. Key ports for Irish transit traffic are Liverpool, Fleetwood, Heysham and Holyhead in the study area, and Stranraer/Cairnryan and Fishguard outside the study area. Most of Eire's international trade is with Great Britain (78% of imports and 74% of exports in 1989).

It is most difficult to track the flow of Southern Irish traffic to the Continent with any degree of accuracy, though the link via Great Britain is more tenuous than that of Northern Ireland. Of unitised trade with Northern Ireland 48% does not enter Great Britain, while 29% (0.2mt in 1991) was routed via ports in the Thames & Kent group. Only 3% used Humber ports (MDS transmodal). This indicates a low volume of Irish traffic traversing the trans-Pennine corridor, compared to the 23mt moving between the two regions, and the 353mt of goods lifted in the corridor. Irish traffic does not provide significant demands on transport infrastructure in the Trans-pennine corridor, while trade of the trans-pennine regions is expanding more rapidly than most.

There are a number of regular sea crossings between Eire and Great Britain, though many lorries are routed via Larne in order to take advantage of the short sea crossings and regular sailings. Those which generate road freight traffic in the Northern Regions are Holyhead, Liverpool, Fleetwood and Heysham (mainly unaccompanied trailers). In addition vehicles carrying Irish trade use the north south axis through the region to reach Stranraer and Cairnryan. Nevertheless, in 1991 total non-fuel trade with Eire through the Northern ports is small.

Accompanied RoRo traffic between Northern Ireland and the rest of the UK is also fairly low in volume, and predominantly uses the ferry routes from Larne (which handles more Roro traffic than any other UK port except Dover) to Scotland. Exports from Northern Ireland to GB in 1993 were 0.7mt while imports were 0.95mt (0.89mt and 1.1mt in 1994) out of total road goods movements of 3.3mt and 3.9mt. Total coastwise movements of 3.9mt and 7.6mt (DOT 1994a, DOT 1995).

Of the Northern Ireland inter-regional trade by accompanied RoRo, almost one quarter was with the North West, and a further 10% with Yorkshire and Humberside (Table 18). London and the South East were the most important regions for Northern Ireland trade by road, accounting for one third of the total, and a large part of which would use the north south axis through the region.

Table 18: Accompanied RoRo traffic with Northern Ireland (tonnes)

Region	Destination	Origin
North West	143,000	223,000
Northern	24,000	45,000
Yorkshire & Humberside	92,000	104,000
East Midlands	27,000	23,000
East Anglia	30,000	17,000
Greater London	38,000	82,000
South East	180,000	193,000
South West	30,000	19,000
Wales	7,000	10,000
West Midlands	61,000	99,000
Scotland	70,000	133,000

3.8 Nodal centres

The regions air and sea ports are important national and regional resources. Their future development needs to be closely linked into strategic transport planning.

3.8.1 Sea ports

The trans-Pennine corridor benefits from major sea ports on the east and west coast. The Humber ports, providing access to Northern Europe, are very important for RoRo traffic, second in volume to Dover, which is by far the largest port for RoRo traffic. Liverpool is a major port for Irish traffic, as well as a deep sea container port. In terms of total annual tonnage handled Immingham and Liverpool are important nationally (DOT 1994a). They also handle large volumes of dry and liquid bulk material, which are processed by the steel and petro-chemical industries close to the ports before being re-exported to foreign and other UK destinations.

The volumes through the Humber ports, when combined, come second only to London.. Immingham is in fact the UK's third largest port, following London and the Tees (Table 19) handling very large quantities of bulk traffic. In terms of RoRo traffic it handles more units than the other two, but only 36% of the number passing through Dover. Hull also has considerable flows of RoRo as well as container traffic. The northern ports tend to handle unaccompanied trailer traffic, whereas Dover (and other ports in Kent) tend to handle driver accompanied road goods vehicles.

On the west coast Liverpool is a major port for Irish RoRo traffic. However, Irish traffic is spread between a number of ports, Holyhead, Heysham, Fleetwood as well as Stranraer/Cairnryan and Fishguard outside the region. Liverpool is also a major deep sea container port.

Though both regions in the trans-Pennine corridor are well served by ports, large volumes of unitised cargo flow to ports outside the regions, using north south road and rail links.

The present trend is for increased flows of driver accompanied trailers through the southern ports, and a growth of unaccompanied traffic through the northern ports. The faster Channel crossing is highly attractive to haulage companies, enhanced by the additional capacity of the Channel Tunnel. Only 22% of unitised trade originating in the trans-Pennine corridor, for example, is shipped through the regional ports, and there is still considerable "leakage" of trans-Pennine unitised trade with Europe moving through ports in South East England (Garratt 1994). It seems likely that this route will remain important for goods to destinations in western and southern Europe. The growth of the European Union however seems likely to open up new markets in Scandinavia and Central Europe, which could be readily served through the Humber Ports.

The major RoRo port in the UK is Dover which handles over a quarter of the national total of this type of cargo, while Felixstowe handles over two thirds of the UK's container traffic. The reasons why so much traffic uses these ports is, in the case of accompanied RoRo traffic, the Dover Straits route is the shortest sea crossing, and can give the fastest door to door journey times from locations in the UK to a considerable part of Europe by the highest quality transport services available. Minimum cost is not necessarily the primary requirement. In the case of container traffic, many deep sea cellular ships make only one UK call at a southern port. Felixstowe is the most attractive port for many lines whose European itinerary may also include Le Havre, Rotterdam and Gothenburg. As a result, containers for all regions of the UK pass through Felixstowe or the main alternatives, Southampton and Tilbury.

The average weight of cargo in each loaded RoRo vehicle was 12.6 tonnes in 1993; 13.1 tonnes in the case of containers. However, the averages were significantly higher in the case of North East ports between Whitby and Berwick (17.7 tonnes and 15.1 tonnes respectively in the case of the Tees), a reflection of the region's trade in chemical and steel products.

Other Unitised Cargo

Detailed surveys are not routinely undertaken regarding the routing of unaccompanied trailers and containers, or indeed of cargo that is shipped using conventional methods. Information available indicates that, in general, traffic tends to use a port close to the UK origin or destination that provides a short, practical and cost effective overall route (DoT 1993). However, for many years Freightliner trains have operated to the major container ports of Felixstowe, Tilbury and Southampton from Leeds and Manchester, as well as servicing the port of Liverpool. Both the west and east coast rail routes are used by Freightliner trains serving Scotland and the North East.

Table 19: Major Ports, Selected Statistics 1993

	London	Liverpool	Hull	Grimsby+ Imm.	Tees	Felixstowe	Dover
Total (000 tonnes)	50,932	30,504	8,966	41,290	42,741	20,333	13,773
of which RoRo	3,114	2,339	3,144	4,727	1,832	3,703	13,156
LoLo & other unitised	3,423	2,774	1,379	198	987	16,038	-
No. of units (000's)							
RoRo	236	169	195	255	88	323	1,132
LoLo & other unitised	292	233	91	15	77	1,087	-

Source: Port Statistics 1993, Department of Transport

3.7.2 Airports

Manchester Airport is the third largest in the UK, and the dominant airport in the North of England (Figure 9). Other commercial airports within the trans-Pennine corridor are located at Liverpool, Leeds/Bradford and Humberside. There are proposals for an urban airport near Sheffield. All the airports in the trans-Pennine corridor handle large volumes of charter flights, subject to seasonal peaks. Leeds-Bradford and Humberside charter destinations are almost entirely European, whereas Manchester also handles long haul charter flights (Table 20). Leeds-Bradford airport has been given permission for 24 hour operation from May 1995, with some restrictions on the type of aircraft using the airport at night. Scheduled services to European destinations have increased steadily, providing direct access to the main industrial regions of Europe, and interchanges with long haul flights at airports such as Amsterdam.

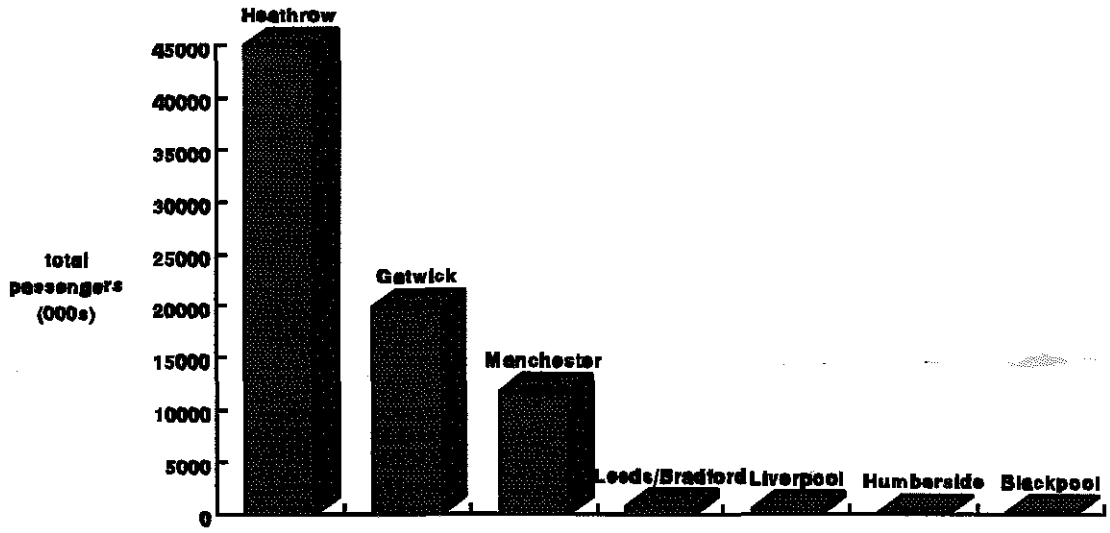


Figure 9: Major UK & Pennine airport traffic in 1992

Table 20: Major UK & Pennine airport traffic in 1992

Airport	Total Terminal Passengers	Passenger Split			Number of Scheduled Destinations served	
		International		Domestic		
		Scheduled	Charter		Domestic	Inter-national
Heathrow	44968000	84.6%	0.5%	14.9%	---	---
Gatwick	19841000	49.4%	44.8%	5.8%	---	---
Manchester	11678000	24.9%	58.6%	16.5%	15	66
Leeds/Bradford	699000	19.8%	30.6%	49.6%	6	5
Liverpool	445000	41.1%	6.9%	52.1%	2	2
Humberside	151000	35.3%	38.8%	25.9%	5	3
Blackpool	109000	5.7%	35.9%	58.4%	2	2

Notes:

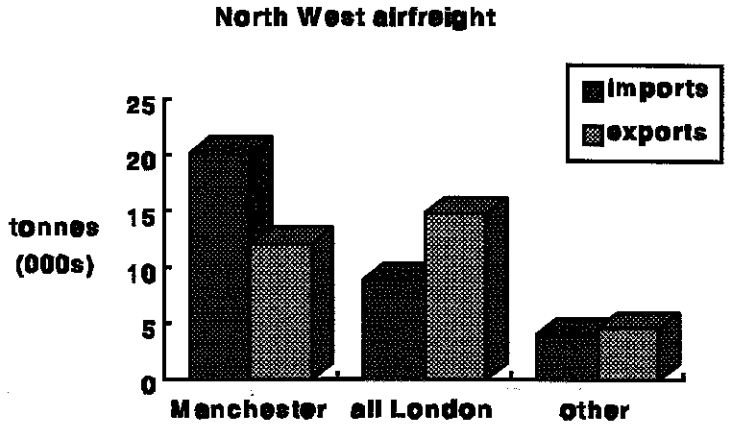
1. Terminal Passengers and traffic split for 1992 (Source: Civil Aviation Authority)
2. Scheduled destinations are shown only for the regional airports, based on ABC World Airways Guide, July 1993.

Manchester and the London airports are the major centres for airfreight. Most North West freight is moved through Manchester, while Yorkshire and Humberside freight favours London.

The study regions' airfreight flows in 1991 are shown in Table 21.

Table 21: Airfreight flows, North West and Yorkshire and Humberside Regions, 1991

Region	Total	Manchester	All London
North West			
Imports Tonnes (000's)	33.0	20.1	8.9
Value (£m)	1,250	710	430
Exports Tonnes (000's)	31.5	12.1	14.8
Value (£m)	2,670	1,140	960
Yorkshire and Humberside			
Imports Tonnes (000's)	17.4	4.8	11.8
Value (£m)	370	150	190
Exports Tonnes (000's)	13.8	3.5	9.5
Value (£m)	440	90	330



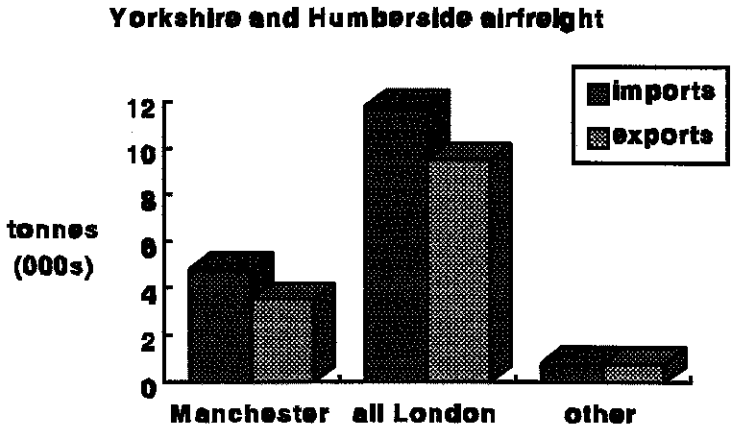


Figure 10 **Regional airfreight imports and exports**

Though most of the smaller commercial airports act as collection and distribution points for airfreight, substantial quantities are moved by road to Heathrow, Gatwick and Manchester for loading on both international scheduled flights and all cargo planes. Some European airfreight does not in fact fly, travelling across the Channel overnight.

The North West ranks as the highest in terms of exports by value, 12% of the national total, whereas it is the fourth in terms of imports with 5% of the national total. This is reflected in the value per tonne, £84,762/t in the case of exports and £37,879/t for imports. The equivalent figures for Yorkshire and Humberside are £31,884/t and £21,264/t.

The values per tonne by various modes for the UK as a whole are shown in Table 22.

Table 22: UK imports and exports, value by mode (per tonne)

Mode	Imports (£)	Exports (£)
Air	53,638	69,658
Short sea	1,071	1,384
Bulk cargo	96	112
Semi-bulk	663	1,045
RoRo	2,397	2,991
LoLo	1,715	2,096
All sea	533	656
All sea (non fuel)		
North West	1,086	1,565
Yorkshire & Humberside	612	1,110

Source: Origins, Destinations and Transport of UK International Trade 1991. DOT Statistics bulletin (93)32, London.

3.7.3 Inland Waterways

Although there are several canal routes across the Pennines, these are now only suitable for tourist and leisure activities because of their restricted dimensions. Commercial waterway networks are available on both sides of the Northern Regions with extend the access of waterborne traffic on the Mersey and Humber estuaries. That on the east is more extensive, incorporating Rivers Trent and Ouse together with the South Yorkshire and the Aire and Calder Navigations. On the west the network is restricted mainly to the Manchester Ship Canal, which can handle large vessels and push tow barges of 6,000 tonnes capacity. Generally these waterways have retained much of the bulk traffic they traditionally carried such as coal and oil products. They have won new flows of such traffics and handle large volumes of aggregates.

A major advantage of the inland waterway system is in allowing sea going vessels access to inland locations such as Manchester and Selby. Coastwise and foreign traffic benefits from this facility, and reduces the volume of transport by inland modes. Water transport primarily competes with rail for bulk traffic between UK locations, and is not generally capable of offering the service levels required by consignors of most manufactured goods. Given these factors, a modern trans-Pennine waterway is unlikely to generate sufficient traffic to be a viable proposition. A major constraint is that relatively few origin and destination points are situated on the canal network resulting in a costly and time consuming modal transfer.

Though a more detailed study may reveal unknown potential traffic, a new trans-Pennine waterway would suffer from this restriction in its ability to attract traffic as rail, and would offer less flexibility than improved trans-Pennine rail infrastructure.

3.9 Telematics and telecommunications

3.9.1 Telematics

The Department of Transport is evaluating the use of telematics to improve management of the heavily congested sections of the M62. Applications could include providing warnings of road conditions and congestion, using information gathered from the MIDAS detection system, installed by the Highways Agency.

Other possible developments include the proposed TROPIC project, currently at an early stage of development, which would develop a network of some 200 variable message signs on the Manchester motorway box.

Telematics possibilities are being examined more broadly in the VADE MECUM project: an initiative to develop a telematics corridor along the trans-Pennine axis, linking with Irish and European projects. This project aims to bring together available information on transport network conditions to provide an information service for network managers and travellers.

The application of telematics to make more effective use of the transport networks offers significant potential, justifying further study. An integrated approach to the implementation of these systems will maximise their potential contribution to network management objectives.

The regions have not responded quickly to initiatives to develop IT networks with European partners (RERO 1993). The VADE MECUM proposal aims to develop such an approach for the trans-Pennine corridor. The aim is to increase the efficiency of transport systems, and influence corridor and modal choice through the development of an integrated information and control network. The system would build on present investment in traffic control and communications systems, command and control centres, and sub systems deployed by highway authorities such as vehicle detection, CCTV surveillance and variable message signs. VADE MECUM would also integrate with parallel developments in public transport information systems.

The proposal recognises 'strong political desires to encourage: the use of certain routes (central Irish Sea corridor, M62 (TERN) transpennine route, and the Eurodelta network); modal change/interchange for freight and travellers; and in the light of increasing traffic congestion to reduce the construction of new roads by the improved dissemination of driver information'

3.9.2 Telecommunications

As part of the overall Inter-Regional study, interviews were conducted with telecommunications executives and commentators. It is difficult to obtain hard data on patterns of demand in this highly competitive industry. Our respondents were, however, unanimous that business information traffic along the Transpennine Corridor has experienced above-average growth. Unable to force more traffic into the existing narrow-band cables, operators such as Mercury and British Telecom are racing to enlarge capacity with broad-band fibre optic cables. This has opened up an equally energetic competition between utility companies to provide convenient 'soft-dig' routes over the massif for cable layers, whether under the towpaths or in the waters of the Manchester Ship Canal Company and British

Waterways, or along the pylons of Energis, or alongside the tracks of Railtrack, or under the verges of the M62.

In this survey, private-sector respondents were unanimous that the current environment of intense competition, in which everyone is competing for the same routes and contracts, may hinder rather than help the establishment of effective Transpennine information links. Executives yearned for a Japanese-style 'culture of collaboration' to coordinate the investment strategy and ensure that local authorities and private utility companies work to the same highly desirable common end of wiring up the Corridor.

The North-West is involved in a pilot project for the development of a strategy to accelerate the emergence of the information society under the EU's IRIS (Inter-Regional Information Society) initiative. Partners include the CBI, English Partnerships, INWARD, HEIs, Chambers of Commerce, TECs and the TUC, together with the European Commission and five other regions in Europe. The aim is to encourage telematic- related initiatives which will produce benefits for the region (directly or by technology transfer) for its European partners. The North West Partnership is monitoring the North West's progress towards awareness, use and trans-national collaboration on telematics and information initiatives. Working groups are being established to investigate information needs and activities in areas such as SMEs, local authorities, tourism, arts and leisure, voluntary groups, education, health, industry and infrastructure. IRIS is a fine initiative - it's a pity that the North-West's "inter-regional" partners could not have included its Transpennine neighbour, Yorkshire & Humberside.

3.10 Current conditions and options for trans-Pennine road corridors

Congestion of the local and strategic road network is a recurrent theme in regional studies and policy documents. The non-motorway trans-Pennine routes are described as 'hilly, tortuous, low capacity roads unsuitable for high volumes of traffic, especially HGVs' (TPA 1992). The Yorkshire and Humberside region state that motorway and trunk road links within the UK are generally good (YHRA 1994 p1), while the North West region advocates more strongly the need for investment in the road network to redress past under-investment (NWRA 1993 p2).

As we have described, the M62 forms the major link between the regions in the trans-Pennine corridor. The outcome of the Trans-Pennine Road Study was to focus any future capacity development of trans-Pennine roads on the M62. The conditions and future development of this route are therefore of major importance for the regions. Increasingly heavy use of the M62, particularly around the urban conurbations of Greater Manchester and West Yorkshire, is causing worsening levels of congestion. To address this problem, the Department of Transport proposed, in 1993, the construction of the Manchester Northern Relief Road: a new 6 lane motorway parallel to the existing M62 between Junctions 12-18. At the same time, four lane widening of the Pennine section of the M62 (J18-24) was proposed. The new relief road would carry strategic traffic, leaving the existing M62 for local traffic. The M62 around Manchester has been described by the DOT as 'one of the busiest sections of road in the country, having to carry 150,000 vehicles some (peak) days' (DOT Sept. 1993). Commenting on the proposed relief road, Robert Key, Roads Minister, stated: 'without the new road, strict controls would have to be introduced on the use of the M62, including closing some junctions to improve traffic flows.' However, these proposals have been postponed for two years following public opposition to the scheme, and a study of alternatives is being carried out. Further east, the M1/M62 link has been abandoned after a prolonged political campaign. The

result of this hiatus means that any significant improvements to the M62 are likely to be long term. The limited widening projects which are being progressed are likely to bring only temporary relief to congestion levels. The development of the M62 therefore remains one of the critical issues for inter-regional communications.

To the north, Lancashire and the North West region have pressed for an eastward extension of the M65 corridor, to form a high standard Pennine crossing north of the M62. This has not been identified as a strategic requirement by the Yorkshire and Humberside region, and is not supported by the Department of Transport. Further north, the A66(T) is important for strategic, long distance trips and for commercial rather than commuting journeys. It is important mainly to Scotland, Cumbria, the North East and to a lesser extent North Yorkshire. The route has benefitted from significant improvements in recent years.

Crossing the Peak District National Park, the A628 has long been regarded as a critical but inadequate link in the strategic network. Kenneth Carlisle, Roads Minister at the time of the Trans-Pennine Studies, stated that upgrading the route to dual carriageway, with possible tunnelling under moorland plateau, would not be taken forward, because of the national park status of this section. The recent South Pennine Transport Needs study has examined limited upgrading of the route, as part of a traffic management strategy for the park as a whole. Significant upgrading of either this route, or alternatives around the national park, would have major environmental impacts.

The South Pennine Study considered the creation of an improved road box to enable strategic traffic to bypass the Peak National Park. This option, however, may not be feasible, due to the knock-on environmental implications for the area south of the national park. The remaining option appears to be the limited upgrading of the A628 corridor, which crosses the national park, balanced with traffic management measures on other cross-park roads. A full economic and environmental appraisal was recommended to resolve this issue. Traffic restraint measures on roads through the national park were also proposed. It was suggested that such measures would encourage traffic to divert mainly to the M62 and A523. Such measures would be relatively cheap and quick to implement. A further measure proposed by the consultants was the removal of the A6 Disley High Lane bypass from the Roads Programme, in view of its likely impact of redistributing traffic on all cross-park roads rather than concentrating it onto the A628.

In 1994, the national trunk road and motorway programme was reviewed (see appendix 1 for details). Significant high priority schemes include 4 lane widening to sections of the M62 and M63; completion of the Manchester motorway box; and construction of bypasses at Tintwistle (A628 corridor); the A1-M1 link; and improvements to the strategic road network towards the Humber ports. A number of other schemes, including improvements in the A65 corridor, are programmed for development but with no start date.

3.11 Forecast growth of road traffic

In the Trans-Pennine Road Study, future flows on trans-Pennine roads were predicted. However, the modelling on which the forecasts were based did not take into account conditions on the road network. The South Pennines Transport Needs Study explored the effects of actual transport conditions on the forecast flows in the southern corridors (Table 23). This study presented a capacity restrained forecast based on the limitations of road

capacity, public transport availability and likely changes in travel patterns, but no new initiatives. Table 23 (columns 2 and 3) shows that the unrestrained demand forecasts in the study are comparable with the original Trans-Pennine Study forecasts, but the capacity restrained forecasts are significantly lower, with growth of only about 1% per annum.

Table 23: Flow forecasts for trans-Pennine roads

Corridor	1990 flow (AADT)	2016 traffic flows (AADT) TP study	2015 traffic flows(AADT) South Pennines Study Demand	Capacity restrained
A66(T)	10000	14000-17000		
A59+A6068+A65	32200	51000-64000		
M62(J21-22)	77900	122000-152000	123300	104000
A628(T)/A616(T)	10500	16000-20000	22100	14800
other South Pennine	44100*	51000-63000	57100	39700

* 1994 figure
Sources: TPA, 1992, Trans-Pennine Road Study, and Oscar Faber TPA, 1995, South Pennine Transport Needs Study

3.12 Conclusions

Roads in the trans-Pennine corridor bear heavy traffic flows, and forecasts suggest that these flows are likely to increase over the next two decades. These flows are divided between local and long distance journeys, and between goods and passenger movements. On the M62, these different uses are all significant, competing for space on increasingly congested roads. This situation leads inevitably towards the question of prioritisation which has already arisen in the debate over the M62 Manchester Northern Relief Road.

Rail is unable to offer a real alternative, its competitiveness limited by a recent history of inadequate investment and present uncertainty, which creates a perception (and a reality) of a rail system which is not of high quality. Nevertheless, rail is competing strongly for travel between city centres in the regions, where its market share reaches 67% for Sheffield - Manchester trips. Rail does have a role to play in reducing traffic demand, but requires a high quality service base to become an effective part of an integrated transport strategy. A measure of the poor base level of services is the slow journey times between cities across the corridor, compared to travel from these cities to London, and compared with journey times over similar distances by rail elsewhere. East-west rail services are inferior to the north-south lines (notwithstanding the need for investment to the West Coast Main Line). Urban public transport has fared better, and the introduction of light rail in Manchester and Sheffield (and planned in Leeds) is a positive initiative. Market shares by bus are high for local journeys. However, urbancongestion is an increasing problem in the regions' major cities.

Rail freight services have been unable to compete with the emergence of a road distribution network, centred on the M62, and consequently the majority of goods are moved by road. The possibilities for east-west rail are severely limited by basic economics: the distance between Mersey and Humber is too short for the modal transfers to be cost effective. Rail freight possibilities are therefore likely to be more fruitful along the north-south routes.

Box 1: Key findings

- all roads, even the M62, are multi-purpose, carrying a wide mixture of local and inter-regional traffic;
- journeys to work, employers business and commercial vehicle types are strongly represented;
- rail traffic accounts for 6% of the total traffic across the Pennine screenline, but much higher shares of city-centre to city-centre traffic;
- international freight movements crossing the Pennines screenline are a very small proportion of total freight movements;
- 70-75% of tonnage lifted is intra-regional, though the remainder accounts for 60% of the tonne-kms;
- sections of the road network are approaching design capacity at peak times under existing flow conditions;
- there is clear potential for rail to increase passenger market share and reduce road traffic demand, although this is constrained by the poor quality of trans-Pennine services;
- an intermodal trans-Pennine freight route is not viable under current market conditions;
- a positive strategy is required to manage road traffic demand within the corridor, taking into account the inter-relationships between flows on routes and synergy between modes.

There is growing awareness, following the Royal Commission Report on transport and the environment, that expanding out of trouble may well conflict with environmental objectives. The increasingly heavy reliance on road transport by people and business in the trans-Pennine corridor must be seen as one of the most serious environmental problems faced by the regions. The effects are many, including a suite of toxic emissions which pollutes the air of the cities, and in a band extends across the Pennines, affecting health of people and habitats alike; an increasing pressure for development of commercial sites in the principal road corridors (these issues are covered in more detail in TP paper no 2: Environmental Issues). The prognosis is that, unless these basic trends are altered, the environmental quality of the trans-Pennine corridor will decline. The effects will be felt in the major cities as well as in the remoter areas - the national parks and other upland areas.

The trans-Pennine transport network is a key resource for intra-regional and inter-regional communications. Routes such as the M62 perform a multiplicity of local, regional, national and international functions. A high proportion of traffic is business related (freight, employers business, journey to work). As competition for space between different types of traffic (local

vs long distance, business vs leisure, passenger vs freight) becomes more acute, it is questionable whether these demands can be met. Moreover, recent events concerning the level of objections to the further development of the Manchester Northern Relief Road and the abandonment of the M1/M62 link road demonstrate that capacity expansion is also subject to serious social and financial constraints. It is therefore becoming critically important to develop a strategy at a regional level for managing demand and capacity so as to avoid compromising economic and environmental objectives. A number of previous studies have examined transport problems, and set out many possible measures, both pragmatic and visionary, but it remains unclear what are the deliverable options for investment and what the timetable might be.

4. POLICY CONTEXTS

Transportation in the trans-Pennine regions provides the platform which allows industry and commerce to prosper, and meets social needs. However, the potential of the transport system to meet these needs is constrained by a combination of social, financial and environmental factors.

In this section, we discuss policy issues which are relevant to the development of an integrated transport policy for the trans-Pennine corridor. We then explore the implications of these issues and current transport trends. We ask the question: how well will the transport system fulfil its social and economic role in the future? In this way, we develop a baseline scenario which is characterised by negative impacts on business and communities, and a worsening of the regional environment.

4.1 An integrated approach to transport

Above, we have examined the transport conditions for the North West and Yorkshire and Humberside regions. Here, we argue that transportation is not only fundamental to the prosperity and health of the regions, but that it must be considered in an integrated way if regional assets are to be used most effectively, and opportunities are to be grasped firmly. A series of critical relationships between economy, transport and the environment, which can be represented by this triangular model in Figure 11.

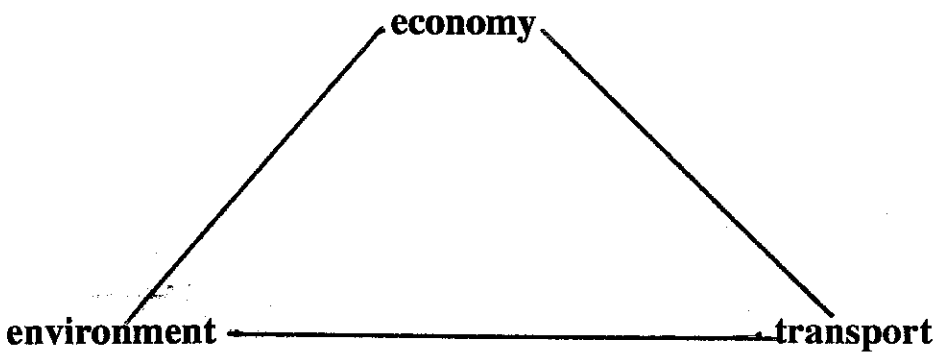


Figure 11: Relations between transport, economy and environment

Below, two of these critical relationships are considered: between transport and the economy

and between transport and the environment.

4.2 Transport and the economy

Historically, and in certain locations such as some developing countries, poor quality transport systems have placed absolute constraints on economic development. During the industrial revolution, the pace of economic development depended on the speed with which access could be opened up to regional, national and world markets.

Today, however, transport infrastructure in the UK has been developed to a high standard. The motorway network is well developed, particularly in the Greater Manchester area, and regional distribution networks use the strategic road network effectively. Transport infrastructure in this context has become a facilitating factor for economic activity rather than an absolute constraint. Transport costs continue to be only a small fraction, some 5-6%, of total delivered costs of manufactured goods. There are few locations in the trans-Pennine region where the absence, or poor quality of infrastructure places absolute limits on economic activity. For this reason, transport infrastructure investment is most unlikely to have a dramatic effect on regional competitiveness. However, there is a range of circumstances where transport infrastructure of high quality is key:

(a) for certain economic activities, transportation remains a critical factor. Such activities include physical distribution networks. For high value goods which are moved long distances, the availability of high quality, rapid long distance transport routes are a requirement;

(b) access to high quality transport infrastructure is a key locational factor for certain economic activities, as we have described for the M62. The construction of new infrastructure may in this way be used strategically to open up sites for regeneration. It should be borne in mind, however, that a variety of other factors, such as the availability of a suitably qualified pool of labour, may also be decisive in such inward investment decisions;

(c) a further important role for the transport system is in moving people to places of work, and for business travel. Here, issues such as public transport integration, and accessibility to key nodes such as airports, is central.

(d) high quality infrastructure is widely believed to play a catalytic role in economic development by helping to promote confidence and a successful image. Industrialists' mental maps include the motoring, inter-city rail and airport systems.

A further complexity in assessing the likely economic impact of infrastructure is uncertainty about where economic benefits will accrue. Improvements in transport infrastructure tend to have centralising effects. By reducing transport costs relative to production/inventory costs, they encourage concentration of production, and distribution over wider areas in order to gain scale benefits. The case of distribution centres on the M62 illustrates this point. Additionally, high quality networks, particularly motorways and high speed rail with few access points, may concentrate benefits at key nodes or in urban areas, creating a shadow effect of areas which become relatively less competitive. Effective integration of strategic and subregional transport networks becomes necessary to ensure that benefits are evenly distributed. Clearly, simply providing new infrastructure between centre and periphery may have unpredictable effects on local markets.

Within the study regions, there exist areas which are regarded as being peripheral, because of their poor links to the strategic communications networks and hence to other regions in the UK and Europe (West Cumbria and North Yorkshire). As a result, it is argued, local economies suffer. West Cumbria, in response, has developed a detailed case for prioritising investment in road links to the M6. Clearly, the need to consider the peripherality of localities within the study regions is important in developing a transport strategy. However, in view of the uncertainty of drawing general conclusions about the economic benefits of infrastructure investment, it may be wise to carry out a more detailed analysis of exactly what benefits are likely to accrue from proposed investments, through the application of economic appraisal. Local authorities in West Cumbria have developed a case for investment in road building on this basis. A difficulty in addressing the infrastructure needs of peripheral areas has been this uncertainty. This has been compounded by the lack of a framework for comparative evaluation of different modal investment options. The approach adopted in the Trans-Pennine Rail Study was to prepare economic justifications for its investment proposals, and we suggest that this could serve as a model for the evaluation of rail (and possibly other modal) options alongside road.

A further complication arises from the recent work by SACTRA on traffic generation resulting from road construction. The outcome of this work was criticism of the COBA cost benefit analysis used by the DOT. The outcome has been a decision by the Department to re-evaluate projects in the roads programme, to take account of generated traffic, which is likely to alter the viability of road schemes in the regions.

An assumption in the case for new road building has traditionally been based on public investment, providing cheap and rapid mobility. However, the trend towards private sector involvement in infrastructure provision, coupled with the possible introduction of user charges, suggests that new roads may not remain such a 'simple' solution to economic development. The question remains as to the extent to which private investment will fill the gap resulting from a decline in public investment in transport infrastructure. In some cases, companies may only invest in new infrastructure if they take over, and manage, existing infrastructure which offers an alternative to a new road. This has been the pattern adopted in the case of the Dartford crossing and the new Severn Bridge. An alternative would be to use 'shadow' tolling, but this is unlikely to have he same effect on traffic volumes as actual tolling in cases where traffic restraint is desired.

Overall, we conclude that in the emerging context of a European single market, with inter-regional and inter-European competition, it is nevertheless important to continue to invest in high quality infrastructure. Such investment should be carefully targetted to maximise economic benefits rather than being planned in a 'scattergun' manner. The potential risks to the regions associated with failing to develop and manage high quality transport networks properly are real. For these reasons, careful appraisal and integrated strategic planning of transport infrastructure investment is required, to ensure that investment is targetted on projects that are likely to bring clear economic benefits.

4.3 Transport and the environment

Both regions recognise the increasing problems of congestion on the road networks, and the need to transfer demand to other modes:

'it is now widely acknowledged that national traffic growth projections cannot be accommodated by roads alone, particularly in urban areas, where there is a need for packages of measures designed to counter further growth in congestion. It will be crucial to manage demand, especially in urban areas and wherever congestion affects the efficiency of bus transport' (Regional Transport Strategy for North West England)

'the region needs to accommodate increasing travel needs by encouraging the use of environmentally friendly modes of transport' (Yorkshire and Humberside Region: Transport Issues, p1)

This recent emphasis on sustainable transport is in line with government policy expressed in the more recent Government's national sustainable development strategy documents, and other advice such as Planning Policy Guidance Note 13 on transport.

The publication in 1994 of the Royal Commission Report on Transport and the Environment provided a strong criticism of the 'predict and provide' approach of the national roads programme. This, together with the SACTRA report which concluded that road construction generates additional traffic, provided clear directions for sustainable transport planning.

In the regional documents, there is frequent mention of measures to reduce congestion, to benefit business and other users, and bring environmental benefits. Broader principles of sustainable transport were less apparent. This may be explained by the publication of many of the documents before these groundbreaking reports, and before the Government's change in policy was 'concrete'. However, it suggests a need to reconsider how transportation objectives which are predominantly based on enabling a continued increase in mobility, in a European context, will measure up to broader sustainability criteria.

A key issue for this study, therefore, will be to consider how to develop a policy mix which will address key issues of demand, in addition to fostering alternatives to road movement. Many of the investment proposals are based on anticipated needs, and in particular on an anticipated need for strategic movement of freight and people. For example, the Yorkshire and Humberside Regional Association identify a key transport objective as 'accommodating increasing transport needs by environmentally friendly modes' (YHRA 1994), but alongside this is the objective of ensuring 'that the region's (Yorkshire and Humberside) highway network allows uninterrupted inter- and intra-regional trade both within the UK and Europe to occur (RERO 1993).

We have argued above that our regions have environmental quality and capacity which enhances their attractiveness relative to what is often seen as a congested and environmentally impoverished South-East. It is obviously necessary to promote economic development within the environmental capacity. Nowhere is this more critical than in the transport sector.

Transport has wide ranging impacts on the environment. For our purposes, they can be broadly grouped as follows:

Impacts on pollution
- greenhouse gases
- oxides of nitrogen
- particulates

Impacts on assets	-	natural assets
	-	biodiversity/species
	-	heritage assets
Impacts on land	-	land-take, particularly in urban areas
	-	loss of housing
Local impacts	-	noise, vibration
	-	severance
	-	local pollution (e.g. lead)

It needs to be recognised that transport policies can have complex impacts with a mixture of positive and negative environmental outcomes. Environmental impacts occur at local, corridor and strategic levels. New infrastructure may improve town centre conditions at the expense of the loss of natural assets on the line of the new road. Poor quality infrastructure which leads to heavy congestion is associated with poor vehicle emissions performance per mile of travel. Even traffic management measures may involve traffic signs, use of sites for park and ride, and other measures which can be bitterly controversial at local level. All credible transport policies involve a balancing act.

Recent years have seen a considerable shift in thinking on how best to achieve a policy balance. This shift is associated partly with the recognition of the importance of transport-related pollution for environmental and health policy, and partly with the recognition of the social, environmental and financial costs of providing sufficient capacity to meet the growth in road traffic forecast by the Government (DOT 1989).

This realisation paralleled the Government's adoption of sustainable development as a guiding principle in its environment White Paper (DOE 1990). Further recognition of the interaction between transport and the environment came in the Government's Sustainable Strategy (UK Government 1994).

The first details of how the relationship between transport and the environment should be addressed came in PPG13 (DOE/DOT, 1994), which set out the new agenda to enable local authorities to 'help meet the commitments in the Government's Sustainable Development Strategy to reduce the need to travel; influence the rate of traffic growth; and reduce the environmental impacts of transport overall'. 'The key aim... is to ensure that local authorities carry out their land use policies and transport programmes in ways which help to:

- reduce growth in the length and number of motorised journeys
- encourage alternative means of travel which have less environmental impact; and hence:
- reduce reliance on the private car'.

Also in 1994, the Royal Commission published the findings of their study of the relationship between transport and the environment (RCEP 1994). This report contains a wide ranging analysis of the environmental problems caused by transport, and a series of possible policy responses.

The message of all these reports is clear: reducing the environmental impacts of transport should be pursued through a variety of measures which centre on the principles of demand management.

4.4 In the Pennines?

We have detailed in this chapter how transport conditions in the Pennines are worsening, as sections of the networks near their technical capacity. The impacts on the environment, as identified above, range from direct, local effects to secondary strategic effects. The overall finding that the environmental impact of transport in the trans-Pennine corridor is one of the most serious trends for the regional environment. It is therefore important to develop a linkage between the transport problems on the networks, and the resulting environmental impact. There are three, related dimensions to this linkage, which form a cycle in transportation planning:

- as technical capacity is neared, congestion results in increased pollution loading and energy use;
- provision of infrastructure to meet increased demand results in construction impacts;
- as mobility increases, overall transport emissions increase, and technical capacity is approached again.

It should be stated clearly that this phenomenon does not occur everywhere. There are many locations and times of day when the capacity of the existing transport network is sufficient to deliver a good quality of service at acceptable environmental standards for many years to come. The quality of the core networks of the cities, and the inter-urban motorways linking them are, however a concern. We see a serious risk in current policy of a very undesirable policy mix, which we explore further in the next chapter:

- few or no constraints on road traffic demand growth
- reliance on "technical fixes" to improve the pollution performance of road vehicles, giving only slow improvements
- great difficulty for both social and financial reasons in promoting major new road investments, and great delays in doing so
- inadequate efforts to improve the quality of public transport
- therefore worsening conditions on the road network, with low quality performance threatening both the economic and environmental objectives of the regions.

The challenge therefore is to develop an integrated package approach to transport policy at regional level which can improve materially on this, when measured against economic and social aspirations.

5. TRANSPORT FUTURES

5.1 Transport futures 1: An international Trade Corridor

European integration and the development of the single market has created new opportunities in the trans-Pennine corridor. Trade flows to and from the continent are increasing rapidly, as is international business travel. The trans-Pennine corridor also plays a role in communications between Ireland and the continent. This emerging international orientation places new demand on transport networks, which must increasingly fulfill an international role, in addition to their national, regional and local functions.

There is a strong emphasis in many of the documents prepared by the regional groupings on the importance of this new European dimension. This emphasis is based on both political and economic arguments. The North West and Yorkshire and Humberside regions both stress their peripherality to Europe, and the need to create networks which will provide links between the regions and external markets. Access to markets is regarded as a key factor in ensuring the competitiveness of businesses in the regions.

As part of our study, we commissioned a report from the specialist consultant MDS Transmodal. As a first step, they developed a picture of international trade from the two regions. They identified the 11 most important export commodities from the regions defined as 'liner' tonnes (i.e excluding commodities moved in bulk). In each case, they considered recent growth and forecasts in exports from the UK to its major partners European trading then compared that with export performance for all European OECD members. Forecasts were based on the consultant's in-house model, and results summarised in Table 24.

Table 24: Actual & forecast trade growth: commodities most significant for the regions

Commodity	* UK Export '000s tonnes			% p.a.
	1988	1994	2000	Growth
05 Fruit and veg	271	373	436	4.0
11 Beverages	269	448	571	6.5
51 Organic chem.	411	622	736	5.0
52 Inorganic chem.	262	386	473	5.0
53 Dyes	155	236	314	6.1
55 Essential oils	268	468	682	8.1
57 Plastics	358	614	801	6.9
59 Misc. chemicals	547	738	919	4.4
64 Paper	308	570	808	8.4
66 NMMM	575	1279	1883	10.4
67 Steel	481	802	1032	6.6
Total all above	3904	6537	8656	6.9

* to France, Belgium, Netherlands, Germany, Italy, Ireland and all Scandinavia
Sources: 1991 origin - destination survey, using the SITC trade classification system

On this evidence, therefore, growth in UK exports of those commodities most important to the Transpennine regions is significantly faster than for European economies as a whole, reflecting the UK's continuing integration with the continental economy. This may suggest that growth will slow down at some stage as this integration is completed. The UK market share in commodities important to the regions is growing.

The principal findings of the work by MDS Transmodal are as follows:

(i) Of the eleven commodity groups most important for the regions' exports, all show fast growth between 1988 and 1994, and fast projected growth to year 2000. The

UK market share of European exports of those commodities is growing, reflecting the UK's continuing integration with the continental economy. Rates of growth of imports are far lower than for exports. About 7% of the two regions unitised European trade is with the Irish Republic.

(ii) Almost two thirds of international unitised traffic to and from the North-West and Yorkshire and Humberside uses ports outside the two Pennine regions (Table 25). Nevertheless, over 5 million tonnes of unitised trade from the two regions passes through ports in the corridor. The regional ports account for 20% of UK total unitised trade, 16% through the Humber ports alone.

(iii) It is most difficult to track the flow of Irish traffic to the continent with any degree of accuracy. In 1991, 48% of Northern Ireland unitised traffic, and an estimated 70% of Republic of Ireland traffic moved directly by sea to the Continent. The remainder, approximately 1.35 million tonnes in 1994, landbridges Great Britain en route to its final destination.

(iv) Of this traffic, the two regions' ports capture only a small market share. Irish trade via the Lancashire ports is overwhelmingly transhipment to North America. The evidence is clear. Irish traffic which is urgent moves overland across Britain by road, using the shortest and most frequent ferry services, normally via Dover (or now the Channel Tunnel). Deepsea traffic is mainly via Felixstowe, Southampton or Tilbury. Less urgent cargo goes directly from Irish ports to the continent, by far the cheapest approach. The Humber's share is small - perhaps 30-40,000 tonnes per annum - being neither the cheapest nor the quickest routeing for Irish cargo to the most important European destinations.

(v) In addition the corridor is an important conduit of domestic traffic between the two regions and Northern Ireland. Of the Northern Ireland inter-regional trade by accompanied Roro, almost a quarter (360,000 tonnes) is with the North-West and a further 10% (190,000 tonnes) is with Yorkshire and Humberside. Much of this traffic uses the ferry routes from Larne to Scotland, then travelling via M6 and A66 or M62.

When the volume of Irish traffic traversing the trans-Pennine corridor is compared to other movements, its relative importance becomes clear. Compared to the 23 million tonnes moving between the two regions annually, Irish traffic places relatively small demands on transport infrastructure in the trans-Pennine corridor.

Therefore, the trans-Pennine corridor plays a most important role for trade between the two regions and Europe, and with Ireland. It plays a lesser though politically significant role in handling a part of the Irish landbridge traffic to the Continent.

5.1.1 Analysis and Future Prospects

As we saw in Section 3.6, in any discussion of the freight market, it is essential to distinguish between the movement of bulk and general (or liner) cargo. There are few, if any serious transport policy issues in the bulk sector; individual flows can be treated on their merits.

The important issues for the Pennine regions concern unitised traffics. The key policy questions are:-

- why is the share of total traffic taken by the regions' ports so modest (table 25), and what are the prospects for improvement?

- are there opportunities to encourage a switch of traffic from road to rail to protect the environment and relieve road congestion.

Unitised traffic is carried by three sub-modes:- driver accompanied trailer, unaccompanied trailer and container (lift-on lift-off). The factors which drive the choice of mode and route are cost and time; high value traffics tend to take the fastest route, while low value traffics take the cheapest one. This means that the market position of the South Coast ports and Felixstowe is immensely strong for the time sensitive driver accompanied traffic to France, Belgium, Iberia, Italy and parts of Germany. The Humber ports come into their own for traffic to the Netherlands and northern Germany, especially for the fast growing unaccompanied traffic. These ports are also well placed to take advantage of improving access to Scandinavian, and to a lesser extent Baltic and Central European markets.

The opening of the Channel Tunnel marginally strengthens the hand of the southern nexus, but does not pose a real threat to the Humber traffic. Indeed there are some factors which favour the long-term market position of the Humber and Tees ports with their trans-Pennine links. First there is the accession of the Scandinavian countries to the European Union, and the likely future opening to the east, which should swing the centre of gravity in favour of the northern ports. Faster and more frequent ferries would in turn improve market share. Secondly, there is the possibility of road congestion on M1/M6/M25 and port congestion at Felixstowe affecting routeing choices for marginal traffics. More speculatively, there is the vision of developing a northern European trading axis in which the two Pennine regions would play a key role. Quality transport infrastructure would be a facilitating rather than a determining factor in this.

The second policy question concerns the possibilities for the transfer of long-distance freight traffic to rail. It is vital to consider the legal, policy and commercial framework within which commercial freight operators function.

Firstly, commercial freight operators operate almost entirely within a competitive private sector. The only exception in Britain is railfreight, but this will be transferred into the private sector within the year. In a competitive environment, freight will only be moved by the most cost effective method, disregarding any externalities.

Secondly, the owners of both the road (the Department of Transport) and rail (Railtrack) networks are obliged to offer access to operators on a non-discriminatory basis as between operators. This requirement is backed up by EU directives.

Thirdly, no local taxation systems are likely to be available which allows specific regional flows to be diverted through a targeted rolling system, and there are no provisions for subsidising operating costs. There are provisions for reduced or zero track charges and the subsidy of capital equipment for rail. There are no such provisions for reducing road track

Brussels, domestic scheduled services, and international charter services.

This hierarchy of airports in the regions serves the business and leisure travel purposes very well, and the natural growth of the market will ensure that the range of destinations and the service frequencies expand over time. However, for the full benefit of international nodes such as Manchester Airport to be realised, regional transport networks must facilitate efficient access to them. The trans-Pennine rail service from Middlesbrough and Leeds to Manchester Airport is an example of what can be achieved. Physical upgrading of the North Trans-Pennine rail line, with improvements at and around Leeds and Manchester Piccadilly, would further improve regional access.

5.1.3 Trans-European Networks

The European Commission is currently developing proposals for Trans-European Networks (TENs). In the field of communications this initiative includes networks for road, conventional and high speed rail, combined transport, airports, waterways and telecommunications.

The aim of TENs is to remove the critical gaps between national transport systems, and create long distance international strategic corridors and networks. The primary objectives are to facilitate the single market and encourage regional development.

Consideration of the potential of TENs for the English regions is beginning, and it seems clear that there will not be large amounts of new European funding for the development of TENs. However, there is a strategic requirement to consider how the international communications dimensions of the trans-Pennine corridor may be developed in the context of TENs. Our initial review has clearly identified the importance of the transport network in the trans-Pennine region for international movements, but the lack of integration of separate elements remains a problem.

The wider trans-Pennine region is served by a network of key inter-regional corridors, containing the principal motorway and railway links: north-south corridors in the west and east, and a single Trans-Pennine east-west corridor. These corridors create links to the south of England and the Channel Tunnel; and the east and west coast ports and Ireland/the continent. Within these corridors, all the motorways are designated as components of the Trans European Roads Network. The rail corridors are also recognised: the East and West Coast Main Lines are designed as part of the high speed rail and combined transport networks, while the North Trans-Pennine Route is designated as a combined transport and conventional rail corridor. The West Coast Main Line has also been listed as one of 14 European priority TEN projects by the Christopherson Working Group.

In addition to these strategic corridors, a number of transport 'gateways' of regional significance exist in the trans-Pennine corridor:

- International airports including Manchester, Leeds-Bradford, Liverpool
- Humber and Mersey Ports
- Euro freight Terminals, including Wakefield, Doncaster, Seaforth and Trafford Park

5.1.4 Next steps

There is therefore a need for a comprehensive strategy linking together international transport nodes, key transport corridors, and access networks to them. For the trans-Pennine corridor further work is required to develop this strategic view, in order to make the most of the opportunities offered by TENs (and other European programmes). This perspective of considering local networks, nodes, and corridors in an integrated way could identify achievable investment opportunities, supported by strong strategic arguments.

Table 25: Unitised trade (1991), regional trade by port area ('000s tonnes)

Port area	NWY exports	H exports	NW exports	Y&H imports	Total imports
Lancs & Cumbria	429	195	434	229	1287
Humberside	700	1167	1011	1168	4046
Thames & Kent	793	817	1193	721	3524
Sussex & Hants	382	279	376	246	1283
W. Country	30	24	63	56	173
Bristol Channel	29	25	27	41	122
W & N. Wales	34	19	7	13	73
Scotland	3	-	17	5	25
North East	113	118	343	108	682
Wash & NE	38	46	184	67	335
Anglia	776	771	1356	757	3660
Haven	2	-	-	-	2
Northern Ireland	-	-	-	-	-
Other UK					
Totals	3328	3461	5010	3411	15210

Source: MDS Transmodal 1995

5.2 Transport Futures 2: Business as usual?

The issues and prospects for transport are best outlined by considering first a trend scenario, representing the position as it might be in 10 - 15 years time on present policies. This scenario is set out in box 2.

The problems associated with this scenario are evident. Firstly, very little happens to improve the performance of transport in the region's cities. Present trends are maintained; private car use rises slowly, while public transport continues its long decline. A variety of responses to this occurs including the spreading of peak period conditions to adjacent times of day. More seriously, the cities find it difficult to maintain their competitive position against alternative locations which may be superior in accessibility and environmental terms. There is great pressure on the development control system; some further decentralisation of homes and jobs occurs. Journey distances increase, and the pattern of origins and destinations becomes more

charges (as levied through fuel taxes and vehicle licensing charges).

Fourthly, intermodal rail transport can only be competitive for hauls in excess of 200 kms except in highly unusual circumstances. Typical track charges do, in fact, raise the minimum cut-off distance to 300 kms. At existing toll levels, Channel Tunnel traffics are only competitive by rail in excess of 800 kms.

Fifthly, the overwhelmingly majority of domestic unit load freight is by trailer, as is 75% of that between the UK and the continent. More traffic is likely to be attracted to rail if it is able to accommodate piggyback systems.

A large amount of continental traffic operates at distances over which rail should have a substantial cost advantage. A question naturally arises, then, as to why rail does not currently have a much larger market share where such services are already operating. Of international traffic inter-modal had a share of 4% in 1987, though its market penetration varied between 2% on non-trans-Alpine continental routes to between 9% and 23% on routes through the Alps (ECMT 1993). This is in part a result of the restrictions placed on road transport in Switzerland and Austria. Though we have not investigated the issue in detail, discussions with those in industry leave us in little doubt that it is the failure to achieve a quality of service at all close to that offered by road that is the major problem. Unless the railways of Europe can work together to overcome this obstacle they will fail to gain the potential offered by inter-modal services.

The possibilities for trans-Pennine intermodal railfreight were explored in the Green Links in Europe Project (Tyler 1995). In this study, the potential rail traffic generated by a new intermodal service was modelled. Based on optimistic assumptions, a 16% transfer was predicted, which exceeds the European Commission's expectations for even long-haul high-density routes. However, the resulting flow - some 2000 units per day - would support at most one train load towards the North West region. Significantly, two train loads for Scotland and the South East, half a train load daily for the West Midlands illustrate that the prospects ironically, are better for north-south rail corridors than trans-Pennine. The corresponding effect on the M62 of this traffic would be a reduction in overall flows of the order of 0.1% (0.6% of HGVs). The conclusion is that, under current market conditions, rail is unable to compete significantly for trans-Pennine freight movements.

A key opportunity for the Pennine regions is to make maximum use of existing ports and railheads. There are several factors. An enforced change of mode renders a site particularly attractive for storage, distribution or even processing activities. A modal interchange requires a large supply of road haulage. Local direct rail and shipping services reduce the peripherality of the region.

Insofar as the regions' ports are concerned, the Mersey's intermodal role is probably limited to North American, Irish, Iberian and Mediterranean routes. The Humber is suitable for Scandinavian, continental and (perhaps) other deepsea routes, if a suitable deepwater container facility was built at Immingham.

The area will soon be well served for intermodal railheads. There are two existing terminals in Merseyside (Seaforth and Garston), three in Manchester (two at Trafford Park and one at

Barton Dock Road), and one in Leeds. New terminals are being developed at Agecroft, Leyland, Wakefield and Doncaster. None of these is suited to serve local ports (distances are too short for rail). Their role will be to serve Channel Tunnel markets and the South East deepsea ports. However, there may in the future be opportunities to develop rail based domestic distribution to the North and South from warehouses built within terminal sites (e.g. by rail ex Manchester to Glasgow, London and Bristol).

Previous work undertaken by ITS concluded that there appears to be potential for a trunk intermodal service on the main London - West Midlands - North West -Scotland corridor, served by the West Coast Main Line. The break even distance was found to be around 600 km where transfers between mode were required at each end, and there was sufficient traffic to form at least one train per day (Fowkes et al 1991). If a piggyback route is cleared in Britain, then it will almost certainly be in this corridor, as this will serve the maximum proportion of the market, and will be relatively cheap to achieve because of the clearances created during the electrification campaign of the 1960's. A report for the Piggyback Consortium (MDS Transmodal 1994) forecast that such a service, redeveloped to accept standard road trailers could attract 9% of the overall trailer market (including ex-Ireland by ferry). This is based on a train network serving 4 British and 13 Continental terminals and it was estimated that 450,000 trailers could be conveyed by the year 2003.

These factors suggest that the optimum strategy would be:

- to promote the maximum use of the Pennine regions ports by improving road access across the Pennines. In that way, the regions will maximise their share of value added within the transport chain.

- to promote the maximum use of rail through encouragement of local railheads serving traffic on a north - south orientation, whether domestic, to the Channel Tunnel or to South East deepsea ports. In the longer term, to consider extending the rail piggyback network from Manchester via the Standedge or Woodhead routes to Yorkshire. That would not only link Yorkshire into an enhanced gauge network but also allow the Humber ports to develop piggyback services to Scotland and the Severn estuary.

These measures could succeed in reducing the peripherality of the regions and the net volume of road haulage, and support local rail and seaport facilities. That, in turn, promotes the development of industrial estates which are well located to capitalise on for European rail and shipping networks.

5.1.2 Airports and air transport

In section 3, we explored the role of airports for passenger and freight movements for the two regions. High quality air transport links are an acid test of accessibility for business leaders, for whom access to London, Western European capitals and world trading centres is critical. For that reason, Manchester Airport, third largest in the UK, with 12 million passengers in 1992, is a world class asset for the North of England. It operates as a major hub, serving 15 domestic and 66 international destinations by scheduled services. The other commercial airports play an important role for the regions which they serve, providing a mix of scheduled flights to the most important European destinations such as Paris, Amsterdam, Dublin and

Box 2: The baseline scenario

- Continued growth of demand for road transport, especially on the motorway and trunk road network.
- Decline in patronage of local bus services.
- No significant investment in rail infrastructure, static demand for passenger services, no recovery of rail freight sector.
- Static demand for rail passenger services, no recovery of rail freight sector.
- A few key trunk road schemes including limited widening of M62 (J12-14 westbound), construction of the M1-A1 Link Road and completion of the M66 Denton - Middleton. Few local road schemes.

difficult to service except by private car.

On the trunk routes the critical sections of the motorway network, most obviously junctions 12-18 of M62 from Worsley to Whitefield, but also the adjoining sections to Rochdale and from south of Bradford to M1, shows serious signs of stress. As a result, congestion increasingly occurs, spreading out in time and space, and leading to increased unreliability for freight distribution networks and personal journeys and diversion back to the local network. The improved emissions performance which results from technical improvements to vehicles is partially offset by the increased overall traffic flows, coupled with rising congestion levels. This scenario does not lead to gridlock, because a range of mechanisms come into play. Peak spreading occurs; a greater proportion of commercial vehicle operation is scheduled at night; there is a degree of relocation/diversion away from the most congested parts of the network. Much of the network is able to cope. However, average journey quality (speed, comfort) on the motorway network deteriorates, and journey times become significantly less reliable.

An indication of the likely worsening of journey times can be gained from the modelling work performed for the South Pennines Transport Needs Study. The model, which applies to the southern half of our study area was run for 2015 on the basis of two growth assumptions shown in Table 26. The 'fixed' case represents the expected demand for travel, unconstrained by any capacity limitations and was derived by applying the high growth National Road Traffic Forecasts. The 'variable' case takes account of the capacity of the road network to handle additional traffic and of people's willingness or otherwise to accept increased travel times as a result of increased congestion. The base network includes only firmly committed schemes - the option 12 network includes an improvement of the A628 to good quality single carriageway standard with severe speed restraint gates on all other entry and exit points to the Peak Park. In the fixed demand case, for the seven chosen long distance journeys, average travel times increase by 22% and in the variable demand case average travel times increase

by 6%. The journeys served by the M62 (Wakefield - Warrington and Doncaster - M61) are particularly badly affected by congestion. Relative to do-minimum, option 12 reduces journey times between South Yorkshire and Greater Manchester by about 10 minutes, but with little or no effect on journey times further north. The other effect of this option is to concentrate traffic on the A628, rerouteing journeys such as Sheffield-Manchester and Penistone-Bury from other cross-Park roads such as the A57 and A635.'

Table 26: Modelled journey times on south trans-Pennine roads (minutes)

Route	Current	Do Minimum, 2015		Option 12, 2015
		Fixed	Variable	Fixed
Sheffield-Manchester	75.1	88.5	80.1	79.9
Rotherham-Ashton	64.8	75.7	68.0	72.4
Barnsley-M61	62.0	76.1	66.9	66.6
Wakefield-Warrington	64.8	94.8	74.8	95.2
Huddersfield-Stockport	46.4	44.5	40.5	43.6
Penistone-Bury	44.5	50.2	46.3	51.6
Doncaster-M61	59.3	85.9	68.4	88.9

Source: Modelling based on South Pennine Transport Needs Study, Oscar Faber TPA 1995

Passenger rail does not emerge as a solution to these problems because of low speeds, capacity problems around Leeds and Manchester, and - crucially - the lack of a quality network of feeders to improve the penetration of the trunk rail system. Rail continues to be relevant for a few specific freight flows where flow densities and travel distances are right (for example, coal to power stations and Channel Tunnel unitised traffic). Even these depend on the sectors which they serve, such as the coal-fired power stations, remaining in business.

We have argued above that the performance of the transport sector is a critical element in the economic competitiveness and environmental quality of the regions. It follows from this that this baseline scenario, involving a gradual but appreciable decline in the quality of the transport system, is not acceptable. We are clear that very serious attention needs to be given to developing packages of measures which can improve the performance of the core transport network. This will require the transport planning community - both politicians and officials - to cross many institutional boundaries between central and local government, public and private transport, infrastructure and operations, demand management and investment, hardware and software. A coherent approach is essential.

In an outline study of this kind, it is not possible to do more than to point towards the elements of the package of measures for this key European corridor. All these measures will

require serious appraisal in economic and environmental terms, using methods which recognise the interaction between transport network supply conditions and travel demand, and which permit the economic and environmental evaluation of the forecast outcomes. This is the type of appraisal envisaged by the Royal Commission on Environmental Pollution (1994) and by the Standing Advisory Committee on Trunk Road Assessment (DOT 1994).

The key policy problem is to improve the economic, social and environmental performance of the transport network relative to the baseline scenario. Even significantly moderating the deterioration which will otherwise occur would be a success. Within a 10-15 year planning horizon, we cannot rely on infrastructure investment alone to achieve that, for two reasons. First, there is little prospect, given the social and financial climate, that major new investment in the most critical sections of the network is deliverable within that period. Secondly, even if it is, such investments tend to create new problems while resolving others. For example, enhancing the capacity of key sections of the motorway network, while resolving particular problems, may accelerate the forces of decentralisation as well as creating problems for adjacent sections of route. Such measures may, however, buy time in which to address the underlying trends.

In any case, in the prevailing climate, the regions will have to present a united front in order to achieve even the improvements which are regarded by some as being in the baseline. For example, dual 4 lanes on M62 from J18 to J21 is only priority 2 within the Department's programme, while the section from Bradford to the M1 at Lofthouse has yet even to be studied. We are clear that capacity on the M62 will fail to match demand on the Manchester ring road sections, and may fail to do so elsewhere.

We are, therefore, faced with an unpalatable set of policy choices. If we allow the 'business as usual' scenario, this will mean rationing by congestion, which is inefficient in economic terms and dirty in environmental terms. Yet, accommodating demand growth in key sections of the network such as north and west of Manchester through strategies such as parallel widening is deeply controversial, very expensive, involves protracted planning and land acquisition procedures, and raises questions about the capacity of the trunk motorway. It is therefore time to see whether there is a third way.

5.3 The elements of a package approach

Many of the policy tools which can influence the performance of the transport system at city or regional level are national rather than regional or local policies. Government policies for example on road user taxation, tolling and road pricing, the company car, public transport provision, and on land-use are fundamental determinants of what may happen. In this study, however, we focus on the elements which are within the scope of regional action.

So far, the Department of Transport's 'package approach' has been applied at district level. A similar philosophy is required at regional level, bringing the resources for the trunk road and rail networks together with local resources. For this package to work, close co-operation is required between LAs, PTEs, Government Offices and network providers and operators (Highways Agency, Railtrack and Train Operating Companies). The Regional Associations can play a key role in facilitating such co-operation.

It is important to remember that policies are implemented against very powerful background trends, and should be seen as moderating or modifying those trends. We have therefore developed a series of broad transport objectives which address these underlying trends:

- to promote an accessibility rather than a mobility culture so as to reduce the need for travel;

- to promote the quality of locations, such as city centres, which can be served and linked well by public transport;

- to improve the quality of public transport and promote its competitive position relative to private transport for those types of journeys which it is capable of serving;

- as a result, to decant a range of traffic (particularly car-based commuting) from the strategic road network, so as to protect the quality of the network for inter-regional and international traffic movements;

- to improve the capacity utilisation of the stressed sections of the trunk road network;

- to appraise proposals for capacity enhancement within a strategic economic and environmental context.

The main elements of a regionally-based package are shown in Box 3. This policy mix is proposed against the background of a transport network which will be under stress at certain key points, so that the quality of the network will be compromised, and will be a constraint on regional, economic and environmental performance under the 'business as usual' scenario.

Box 3. A regional package approach

1. Demand reduction measures

- land use policy to reduce the need to travel
- promoting accessibility rather than mobility

2. Demand switching measures

- public transport investment in trunk and feeder services/infrastructure
- park and ride schemes
- city centre policies to discourage car-based commuting
- promoting walking and cycling
- city centre development and environmental improvement
- strict development control policies; implementation of PPG 6/13

3. Network capacity management measures

- making the most of existing capacity
- calming traffic
- improving information to travellers and network managers

4. Selective capacity measures

- investment in and strategic management and maintenance of the road network
- subject to regional as well as local economic and environmental appraisal

5.4 Particular measures and schemes

A full appraisal of particular management measures and investment projects is beyond the scope of this study. We have, however, read many project reports and held a number of discussions. Our view is that there is no magic wand and that delivering a transport package such as that shown in Box 3 will be difficult and controversial. The prize, however, is great. This will require co-operation between local authorities, Government Offices and relevant agencies/bodies, to ensure that local and strategic policy measures combine and support each other towards agreed objectives.

Speed limits on urban sections:

Imposing lower speed limits on the strategic network allows better use of limited road space, and can help in reducing congestion. Lower speeds allow a higher density of traffic in a given road space. Where the flow of traffic on strategic roads approaches its design capacity, breakdown of free flow occurs, leading to congestion. One of the factors in breakdown is when fast moving traffic slows and bunches, then speeds up again as the point of congestion is passed. This pattern sets up instability in the flow of traffic, which leads to an inefficient

use of space. One solution to this problem is to impose lower speed limits on sections of motorway which are experiencing congestion due to flows at or near design capacity. The result of limiting speeds is to stabilise traffic speeds, with the benefit of increasing safety and energy efficiency, and decreasing pollution loading.

Junction closures and other local network management measures:

The density of traffic that can be accommodated on the network is limited by not only the number of carriageways on a strategic road, but more importantly by the limitations of junctions and local networks which are used to access and leave motorways and strategic roads. In some cases, junctions may be altered to relieve congestion. For the M62 in particular, there are limitations to the possibilities for junction improvements, as the motorway passes through the conurbations of Greater Manchester and West Yorkshire. Where chronic congestion occurs on the M62, particularly around Manchester, problems are worsened by frequent junctions, and traffic blocking back onto the motorways. Congestion on the local networks feeds back to create severe motorway congestion problems. A possible response is to consider junction closures, which would help to maintain free flow conditions on the M62, in addition to preventing certain journeys using the strategic network. Related management measures on the local network could further encourage drivers to use alternative modes / routes.

Maintenance policies to maximise usable capacity:

The programming of maintenance of strategic roads has an impact on traffic. Minimising the incidence of downtime for maintenance, through high standard construction and repair, could contribute to a reduction in overall delays due to maintenance.

Public transport infrastructure investment:

The objective here is to ensure that public transport performs the functions for which it has a comparative advantage over other modes as effectively as possible. The aim is to facilitate a modal switch from private car to public transport, alongside demand management strategies. Patterns of car use can be affected by the strategic provision of park and ride schemes, and public transport investment which alters the attractiveness of particular destinations. The package approach which has been adopted for local authority TPPs creates a positive opportunity in this respect. Package bids encourage an integrated approach to transport investment.

Possible measures include investment in the rail network, with electrification of the North Trans-Pennine Route, discussed in Section 3. Benefits included reduced journey times, allowing more effective competition with road; provision of new light rail and guided bus schemes, local rail projects and park and ride. Projects such as Manchester Metrolink and Sheffield Supertram, and the guided bus project in Leeds, are important in introducing high quality public transport systems into urban areas. The further development of LRT is encouraged in the context of integrated transport plans, which carefully consider the best options in given situations. This approach enables modes to be integrated together, and initiatives such as park and ride to be planned strategically.

Enhance quality of bus services:

The deregulation of bus services has led to difficulties in managing the quality of service, and in planning public transport networks to meet particular objectives. For example bus routes may compete against LRT routes rather than feed into them. However, the enhancement of the quality of public transport is a key factor in encouraging modal transfer. Measures are likely to include the introduction of real-time timetabling systems, passenger information systems, and careful planning of interchanges.

Land use/transport planning integration:

The transport sector does not operate in isolation. Transport conditions interact with the pattern of land use and development in a two-way process. Given that transport is a critical constraining resource, the transport and environmental implications of land-use decisions must be fully considered within a broadly based appraisal and development control framework. Again, given the number of local authorities involved, the development of a concerted policy approach is one in which the Regional Associations have a key role to play. A longer term measure is therefore to change travel patterns by influencing land use planning. The land use planning system is beginning to respond to this problem. Government planning policy guidance (DOE 1994 and 1995a) states that out of town development will be limited in future, and that planning should seek to reduce the need to travel. Regional Planning Guidance (currently in draft form for both regions - DOE 1995 b & c) recognises these problems, identifying, for example the following objectives:

'6.1 Development plans should take particular account of the need to integrate transport and land-use planning and on the need to manage demand' (DOE 1995b)

'6.7 ...reducing the need for long-distance travel to work, with its increased energy consumption, vehicle emissions and wider environmental effects' (DOE 1995b)

'6.6 Authorities will undoubtedly face demand for industrial and commercial sites adjacent to and with access to major arterial routes; but they must balance in their development plans the competing demands of such economic pressures and the need for jobs against the need to preserve the quality of local environments and the quality of life of local people' (DOE 1995b)

Road infrastructure investment:

There are several fundamental difficulties related to strategic road investment as a solution to transport problems:

(a) Difficulties of implementation

Road infrastructure is highly expensive. For example, building the M62 relief road could cost over £300 million (source: NW RPG), compared with £45 million for Liverpool-York electrification of the North Trans-Pennine Rail Route (source TPA Jan 1992). In the current economic climate, infrastructure investment is being reviewed, and closer attention to the likely economic benefits is given. At the same time, the 1990s have seen a growing public

concern over the impact of road transport on the human and natural environment. This concern has expressed itself through increasingly strong opposition to elements of the national roads programme. In the trans-Pennine corridor, this has been illustrated by strong public protest and the postponement of the Manchester Northern Relief Road, direct action affecting the construction of the M65 in Lancashire, and long term campaigns against improvements to the A65 and A628 corridors. These factors have combined to complicate and slow down the implementation of road infrastructure. Any proposals for significant development of trans-Pennine infrastructure will face these problems.

(b) Consistency between capacities of urban and strategic road networks

Developing the strategic road network does not in itself solve congestion problems. As the capacity of the strategic network increases, the capacity of local networks becomes the limiting factor. The implications of simply investing in the strategic network are increasing pressures on these local networks, increasing congestion problems which will need to be addressed by local authorities.

(c) Possible undesirable land use effects

The development of the strategic network has had a number of effects on land use patterns. It has enabled distribution systems to be developed which depend on rapid access to the network. The consequence is a demand for locations at key junctions, which are often in areas of otherwise undeveloped countryside, and in green belts. Similarly, the network has enabled business parks, and retail centres to locate in out of town locations. Current policy (ref PPG6, PPG13) attempts to reverse this trend, but land use planning could be compromised by further development of road networks.

From the point of view of the strategic network, the most difficult problems concern the urban sections of the M62, particularly the western and northern sections around Manchester, where demand management measures are urgent. The purposes of the measures in Box 4 are to maximise flow, to minimise incidents, and to improve the level and quality of information. In heavy flow conditions, 50mph is close to the flow-maximising speed. In such conditions, performance is acutely sensitive to incidents and accidents. Such incident are associated particularly with distractions on the opposite carriageway, and with weaving movements caused by the need to enter and exit the motorway. The close proximity of junctions makes this a particular problem on the M62 Manchester section, and although controversial, we believe that careful study of the case for peak-only or permanent closure of Junctions 13, 15 and 17 is needed. This should reduce the proportion of local traffic on this section of the motorway (currently 30%) as well as eliminating some of the problems associated with merging traffic. When incidents do occur, the fast transmission of information to network managers and, where appropriate, to drivers is needed. The completion of the M66 from Denton to Middleton, while not relieving the critical North-West section of M62, will give a degree of flexibility for managing the longer-distance flows when disruption occurs. These measures can reduce unreliability and provide limited but useful increases in capacity - perhaps 10 per cent in total, leaving aside the controversial junction closures.

It is obvious that parallel widening of the critical section of the M62 from Worsley to Whitefield (Junctions 12-18) poses formidable political and social difficulties, and could easily

Box 4. Particular Measures and Schemes

Demand Management Measures - initially on M62 Manchester sections

Measures include

Speed limits (50 mph)
Ramp metering
Junction closures (Jns 13, 15, 17) either peak only or permanent
Improved driver information, variable message signs (TROPIC and VADE MECUM)
Incident detection systems (MIDAS)
High occupancy vehicle lanes
Opaque central barrier (reduce incidents/accidents)

Road Investment measures

Dual 4 lane M62 Jns 12-21, 24-29
A628 - on line improvements
A66 - improvements
A63 - improvements on Humberside

Public Transport Investment

York - Manchester electrification
Leeds/Manchester/Sheffield LRT and guided busway development

Land-use Planning System

Strict controls on development. PPGs 6 & 13 taken seriously

take twenty years to complete. Therefore an action plan is required to manage demand within dual 4 lane capacity on this section, using some combination of the measures listed in Box 4. Provided this can be done, then widening to dual 4 lane to junction 21 and from junction 24 to 29 is probably worthwhile and deliverable. Given the capacity constraints and flows on the urban sections, whether expansion of the Pennine section to dual 4 can be justified must be more doubtful.

Maintaining the quality of the M62 is by far the most important target for the regions strategic roads policy. However, the network should be seen as a hierarchy. Other trunk roads carry significant quantities of inter-regional traffic and may warrant improvement. The programmed improvements to the Transpennine section of the A66 in Cumbria and A63 on Humberside are seen as deliverable. Further improvements of the A66 in North Yorkshire need to be brought forward.

The A628 Woodhead route has been studied extensively, most recently in the South Transpennine Study. It is a route between the major cities of Manchester and Sheffield, and

is seen as having a significant degree of interaction with the M62 as well as with other routes across the Peak Park. It appears that a package deal involving environmentally sensitive improvements to the A628 together with traffic restraint measures on other Peak Park routes may be justified in environmental and safety terms as well as from a traffic point of view. The first steps would be a limited capacity Mottram/Tintwistle by-pass, and on-line improvements to the Saltersbrook - Stocksbridge section.

Similarly, in the more northerly corridor between East Lancashire and North Yorkshire, four schemes in Airedale between Skipton and Shipley are currently programmed. The question of what, if any, improvements are required between M65 and North Yorkshire, and of the relative merits of improving the A6068 and A56/A59 routes is unresolved. There is an institutional dimension to this because of the large number of interested parties including the Department of Transport, the Highways Agency, Lancashire and North Yorkshire County Councils, Leeds and Bradford, as well as the District Councils. Given that the M65 extension will be completed within two years, we recommend the establishment of a working party to develop a strategy which is capable of being funded and implemented within a reasonable timescale. This strategy may involve some on-line improvements and local by-passes. The justification for any such schemes, both separately and in combination, should be in local and sub-regional economic and environmental terms, but taking full account of any implications for the network further to the east. Such schemes must not be seen as a palliative or alternative to dealing with the problems on the M62.

On Merseyside, a recent major study has confirmed the need for additional road capacity across the Mersey within the next ten years. The provision of this strategic link between M62 and M56 is seen as critical to the long term regeneration of Merseyside and North Cheshire, both currently benefitting from EC structural funding. However, an imaginative solution will be required to limit the potentially damaging environmental effects of such a crossing.

5.5 Trans-Pennine Rail

The outstanding priority for public transport within the corridor must be to improve the cross-country rail connection. The Transpennine service links Liverpool, Manchester, Blackpool, Leeds, Bradford, York and Hull, with through services to Durham and Newcastle, and all-important connections to Manchester Airport. Linking three seaports and the corridor's international air gateway, the Transpennine railway is recognised by the European Commission as a link in the Trans European Rail Network (TEN). Despite its importance, physical conditions on the network restrict the achieved speed to around 40mph, and the service's reputation for reliability is jeopardised by frequent delay around the Leeds and Manchester signalling bottlenecks. The inadequacy of Transpennine rail is, or should be, one of the great issues of common concern to all parties in the corridor. The experience of arrival by train will be a litmus by which many visitors to Transpennine 1997 and the Commonwealth Games 2002 will judge the regions.

Effort must be focused on the physical upgrading of the route. The most important priority is to achieve track improvements not only to the Leeds and Manchester approaches, but also at points such as Guide Bridge and Stalybridge. Electrification is desirable, but secondary. We have been struck by the great institutional uncertainties surrounding the scheme under rail privatisation, particularly as the case for electrification depends on cascading existing rolling

stock to other services. As an essential first step, local authorities, PTEs, Government, railtrack and the rail operators must agree the institutional arrangements for the promotion of the scheme, so that the real fundraising and engineering work can begin.

One key task will be to get Transpennine rail moved up the list of priority projects for European Union funding. It was not included amongst the 34 projects identified by the Commission Vice-President Mr Christophersen and approved for support at the Essen Summit in November 1994. Yet the scheme perfectly matches the priorities for Community action: it benefits an urban corridor with more than 11 million residents; it will bring congestion relief on the M62 and other roads; it represents a tangible step towards reduction of atmospheric pollution; it will help to counterbalance the dominance of wealth and population in South East England; and (through the ports and airports) it will directly improve connections between the trans-Pennine corridor and European and international networks.

The performance of a fast trunk rail line between Leeds and Liverpool will be greatly enhanced by connection into local networks of high quality public transport within the corridor. A strategy for widening access is an essential part of the TEN philosophy. It is not merely a matter of physical linkages, but also of developing a network which is easily understood, user-friendly, and can offer good quality information. It implies further development of high quality city public transport systems such as Metrolink, Supertram and guided bus, both in order to encourage modal substitution for local journeys and to create 'seamless' longer-distance journeys on the German U-bahn model.

Beyond the corridor itself, urgent attention clearly needs to be given to the quality of the West Coast Main Line linking Scotland, Cumbria, the North West and Merseyside with the midlands and South East.

At a late stage in the project, a set of suggested railway improvement schemes was received from Railtrack LNE, York. This list is reproduced as Appendix 4.

5.6 The link to land use

The transport sector does not operate in isolation. Transport conditions interact with the pattern of land use and development in a two-way process. Given that transport is a critical constraining resource, the transport and environmental implications of land-use decisions must be fully considered within a broadly based appraisal and development control framework. Again, given the number of local authorities involved, the development of a concerted policy approach is one in which the regional associations have a key role to play.

5.7 Conclusions

In this report, we have set out a challenging view of transport conditions in the trans-Pennine corridor. Conditions are becoming increasingly difficult for the movements which are crucial to the economic and social prosperity of the regions, and for their environment. If current trends are left unchecked, worsening congestion and air pollution are among a range of serious consequences. We have set out what we see as the central issues in this debate. The need for demand management as a central principle cannot be avoided. Difficult measures will be required to address the key bottlenecks, particularly on the M62 around Manchester, along

with other measures to manage capacity. The opportunities for public transport to reduce road traffic demand should be grasped firmly. Rail has a major role to play for passenger travel, but requires significant baseline investment, not only on flagship projects but across the network. Railfreight should be focused on north south routes, and the Channel Tunnel, rather than prolonging the false hope of an economically viable trans-Pennine intermodal route. This cannot be attained in the current market conditions of transportation.

To implement these measures will require a new approach, based on cooperation. A view of transport is needed which integrates different modes. This cannot be achieved without the close cooperation of local authorities, government departments, rail operators and the private sector. Hopefully then, the prolonged uncertainty which has surrounded many of the trans-Pennine corridors can be ended in a manner which is responsive to economic, social and environmental concerns.

We hope that this report will inform a serious debate on these issues, and that the inter-regional study will focus attention on the need to consider transport, economy and environment in the trans-Pennine corridor as a whole.

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Regional Transport Strategy for North West England

Yorkshire and Humberside Regional Strategy - Executive Summary
Yorkshire and Humberside Regional Strategy
Yorkshire and Humberside Regional Strategy - Appendix 1, Economic Review
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Appendix 1: Trunk Road and Motorway Programme for North West and Yorkshire and Humberside Regions

Source: DOT (1994), Trunk Roads in England 1994 review.
Where known, the status of schemes has been added (as at August 1995)

North West Region

Priority 1:
M6 J16-20 widening (Cheshire)
M62 J12-14 widening westbound (Bury)
M63 J6-9 widening (Salford and Trafford)
M66 Denton - Middleton (Tameside, Manchester, Oldham, Bury and Rochdale)
A51 A41-54 improvement (Cheshire)
A57/A628 Mottram - Tintwistle bypass (Tameside and Derbyshire)
A66 Stainburn and Great Clifton bypass (Cumbria) [decision made following inquiry]
A570 Ormskirk bypass (Lancashire)
A523 Poynton bypass (Cheshire)
A595 Parton-Lillyhall improvement (Cumbria)
A550 Ledsham-M53 and Deeside Park-Ledsham improvements (Cheshire)
A5117 M56-A550 improvement (Cheshire)

Priority 2:
M62 J6 improvement and J6-7 widening (Knowsley); J18-21 widening (Rochdale); J12-18 Relief Road (Salford and Bury);
A6(M) Stockport north / south bypass
A6(M)/M56 Manchester Airport Link West (Trafford)
A66 Temple Sowerby bypass [preferred route announced]
A556(M) M6-M56 improvement (Cheshire)
A49/A51 Calveley-Tiverton bypass (Cheshire)
A51 Duddon and Clotton bypass (Cheshire)
A59 Bank Hall diversion (Lancashire)
A500 Basford / Hough/Shavington bypass (Cheshire)
A523 Poynton-Macclesfield improvement (Cheshire)
A590 High and Low Newton bypass (Cumbria)
A595 Carlisle southern bypass (Cumbria)
A595 Duddon bridge improvement (Cumbria)
A5225 Wigan - Westhoughton bypass (Bolton, Wigan)

Longer term:
A6 Disley and High Lane bypass (Stockport, Cheshire and Derbyshire)
M6 extension Carlisle-Guardsmill (Cumbria)
A49 Weaverham-lower Whitley improvement (Cheshire)
A65 Moss Side-Lupton improvement and Hornsbarrow diversion (Cumbria)
A570 Scarisbrick & Pinfold bypass (Lancashire)
A590 Ulverston-Dalton bypass (Cumbria)

Yorkshire and Humberside region

Priority 1:
M1 J31-32 widening
M1/M62 Lofthouse interchange diversion
M62 east-M606 link
A1(M) Wetherby-Walshford; Hook Moor-Bramham; Ferrybridge-Hook Moor; Leeming-Scotch Corner
A63 Castle Street Hull improvement; Melton grade-separated junction
A650 Shipley eastern bypass [preferred route announced]
A1033 Hedon Road improvement
M1-A1 link road

Priority 2:
M1 J28-31 and 31-32 widening
A1(M) Dishforth-Leeming; Wetherby bypass; Redhouse-Ferrybridge;Bramham-Wetherby
A63 Selby bypass
A65 Gargrave bypass [orders made]; Coniston Cold bypass [preferred route announced]; Hellifield and Long Preston bypass [orders made]; Manor Park Bends improvement [orders made]
A616/628 Salters Brook-Stocksbridge improvement
A629 Skipton-Kildwick improvement [decision made following inquiry]
A650 Bingley relief road [orders made]; Hard Ings road improvement [orders published]; Saltaire relief road [technical appraisal]
A1079 Shiptonthorpe bypass

Longer term:
M62 J21-24 widening
A19 Shipton by Beningborough bypass; Thormanby bypass
A64 York - Malton bypass improvement; Malton-Seamer bypass
A65 Ilkley bypass [not programmed]

Schemes withdrawn

M606/A6177 Staygate (Bradford)
A56/A682 junction (Lancashire)
A59 east & west Marton bypass (North Yorkshire)
A63 west of A1, Leeds
A580 corridor (Liverpool-Manchester)
A585-M55 link (Lancashire)
A1079 Bishop Burton bypass (Humberside)
A1237 York North bypass (North Yorkshire)
A6120 Leeds outer ring road and Seacroft-Crossgates bypass (Leeds)
Preston southern and western bypass
Lancashire east-west route

(source Guardian 1994)

Appendix 2: Validation of Trans-Pennine Survey Data

This report draws from two very different sets of data: the 1990-91 surveys of road and rail movements carried out for the Trans-Pennine Road and Rail Studies, and data originating from the 1991 Census returns. To test whether the data from these different sources support each other, comparison was made of the journey to work results from each source.

The Trans-Pennine Studies found that there were 144,400 single journey passenger movements across the Pennines AADT. Survey results found that 35% were journey to work across all modes, equivalent to 50,540 journeys, or 25,270 travellers.

From the 1991 Census Travel To Work statistics for the trans-Pennine corridor, the number of movements across the Pennine screenline were abstracted. These amounted to 26,190 travellers, or 52,380 single journeys each day.

There is clearly a close correlation between these two figures, which is helpful in validating the findings from both sources of data.

Appendix 3: Origin / destination flows on trans-Pennine roads

(Principal 2 way 12 hour flows)

A66

A66	North East to/from	
	Cumbria	1740
	Lancashire	940
	Scotland	500
Cumbria to/from	North Yorkshire	500
	West Yorkshire	210
	Humberside	140
	South Yorkshire	140
	Lincs & East Anglia	100
Scotland to/from	North Yorkshire	450
	Humberside	300
	Lincs & E Anglia	290
	West Yorkshire	240
	South Yorkshire	200

Comparison of Scotland-Humberside flows on the A66(T) and M62 reveal 300 daily movements on the A66(T), and 387 on the M62, which may indicate a relatively even choice between these corridors.

A65

North Yorkshire to/from	internal	2180
	Cumbria	390
West Yorkshire to/from	North Yorks	2580
	Cumbria	1180
	Lancs	500
	internal	510
	Scotland	470

A59/A6068

West Yorkshire to/from	Lancashire	6730
	Greater Manchester	810
	North Yorkshire	580
	internal	360
North Yorkshire to/from	Lancashire	4660
	internal	470
Greater Manchester to/from	North Yorkshire	540
	Lancashire to/from internal	1020
	North East	520

A628

South Yorkshire	Greater Manchester	3150
	Cheshire	780
	Merseyside	370
Greater Manchester to/from	Nottinghamshire	510
	Lincs & E Anglia	460
	West Yorkshire	390
	South/South East	330
	Derbyshire	300

The total number of journeys to/from Humberside on this corridor were 190 (12 hour, 2 way).

Appendix 4: Trans-Pennine transport routes: Railway improvement schemes

Name	Brief Description	Status	Benefits
Hebden Bridge - Milner Royd capacity	Enhanced signalling to relieve congestion on Calder Valley railway route West of Halifax	Planned for implementation 1996	Will significantly reduce delay to Freight traffic and permit 4 passenger trains per hour all day on the route.
Halifax - Huddersfield : new service	Reopening of railway chord lines in Elland/Brighouse area and provision of two new stations.	Subject to PTE funding - 96/97 implementation planned.	
Leeds - Manchester (short term)	Journey time improvements. (Passenger) Potential to increase speeds and reduce journey time by 1 min. per year (max. 5 mins.) at minimal cost.	Ongoing programme.	Minimal cost. Ready to "sell" to train operators if willing to purchase.
Diggle - Manchester resignalling/ remodelling	Modernisation of existing signalling infrastructure west of Huddersfield to Manchester via Stalybridge and Guide Bridge. Includes substantial speed improvements for non-stop trains at Stalybridge and Guide Bridge.	In development.	High cost - part of long-term Manchester area resignalling strategy. Benefits in improved reliability (increased capacity) and speed. (4-5 mins. at least reduction in journey time.
Trans Pennine Electrification	Study of longer term options to enhance all rail routes over the Pennines, mostly concentrating on potential to electrify Liverpool - York/Hull/Middlesbrough.	Earlier study being updated. While electrification may be one final aim, using work to justify other less radical improvements (highlighted elsewhere on list).	Substantially increased capacity and reliability and speed on Newcastle/Middlesbrough/York/Hull - Manchester/Liverpool axis.

Leeds area resignalling	Renewal of Leeds signalling area. Potential to increase capacity.	In initial development. More work now involved in improving reliability of what is the currently pending outcome of WCML studies into transmission based signalling.	Reduced congestion in this area. Removes constraint of Leeds station area on service enhancements on routes, particularly to the West and South.
Sheffield - Manchester	Doubling of Dore curve and other capacity enhancements in Hope Valley.	Early thoughts.	Could increase capacity by 2 - 3 trains per hour.
Sheffield - Barnsley - Penistone	Signalling modernisation with possible increased capacity.	In development	
Sheffield - Doncaster	Increased capacity by removing bottleneck track arrangements at Rotherham and Doncaster.	Rotherham - early thoughts. Doncaster - could feature in regeneration package being championed by Council for station area.	Will reduce delays and permit some increase in capacity for local trains.
Newcastle - Carlisle	Speed improvements	Ongoing programme.	Minimal cost - ready to "sell" to train operators if willing to purchase.

Note:- The schemes contained within this tabulation are those which have been proposed, not necessarily by Railtrack. Inclusion of any scheme should not be interpreted as implying endorsement by Railtrack of the proposal or the notional benefits thereto ascribed or any assertion that it will be implemented at all or by a certain date. The information contained within the tabulation is provided for the purpose of academic research.

Source: Railtrack London North Eastern, York, October 1995