

A decorative graphic consisting of a grid of blue squares in various shades, arranged in a pattern that roughly forms the shape of the number '10'.

Northern Ireland Railways

Strategic Review

Final Main Report

May 2004



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Contents

- Introduction
- “As Is” Summary
- NIR Comparative Performance
- Appraisal Framework
- Findings
- Appendices
 - A. Demand Assumptions
 - B. Appraisal Assumptions
 - C. “Expanded Offering” Assumptions
 - D. Detailed Infrastructure Cost Estimates
 - E. Airport Rail Links
 - F. Issues for Implementation of Future Investments



Introduction

This Strategic Review of NIR comes at a critical time in the company's development

- Aggregate demand for services is showing an upward trend after a period of decline and relatively modest growth in the late 1990s.
- The railway Public Service Obligation (PSO) – the revenue support for NIR's annual deficit - has begun to rise significantly since FY1990/00.
- The history of under investment means that significant infrastructure renewals investment is required – the Bangor line relay project has recently been completed (circa £28m) and the Larne line relay is expected to begin in FY 2005/06 (estimated at circa. £23m).
- New DMUs (23 sets) are currently being delivered to replace life-expired Class 80 units (30 years old) at a cost of approximately £80m - a new timetable (commencing in 2005) is being planned to coincide with this major fleet upgrade.¹
- The Railways Review Group is currently considering the short to medium-term future of the lesser used lines – consistent with the findings of the Railways Task Force.
- The AD Little report (*Strategic Safety Review of NIR* – March 2000) identified various areas requiring safety improvements including poor permanent way and structures condition, a need to modernise signalling systems and a need to enhance level crossings.
- Rail transport is seen as an increasingly important contributor to NI's transport systems into the future, e.g Regional Transport Strategy (July 2002) sets a 60% growth target over next ten years.



NIR / Translink has commissioned detailed market research and public consultation which commenced early in 2004 which will, *inter alia*, address issues of timetabling preferences and future operational patterns which will need to be considered in developing future NIR services.

There is clearly a need to demonstrate the value of rail if further investment is to be secured....

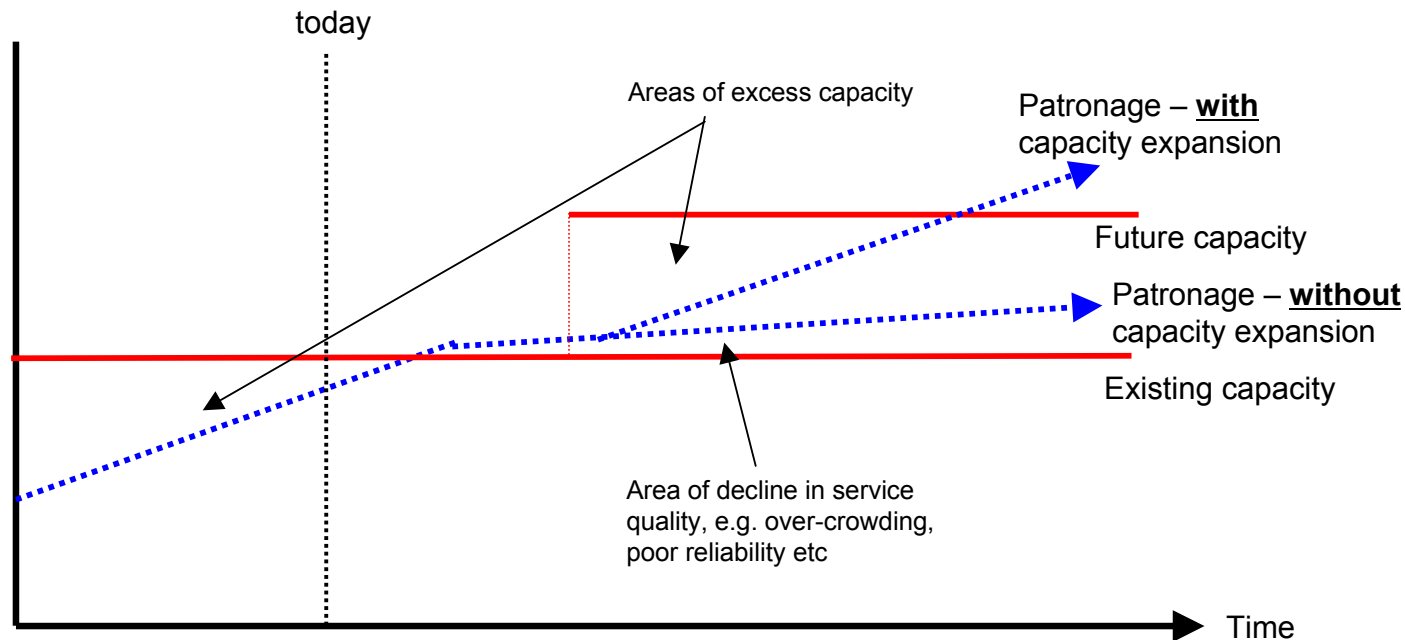
- Investment in the railway must compete with investment proposals from various other sectors of the NI economy.
- Rail transport can deliver a range of benefits which are not necessarily 'captured' by traditional estimation of measures of net economic worth.
- When properly delivered rail transport can offer:
 - A reliable and attractive alternative to other modes of transport (particularly, the private car);
 - Good access to city / major town centres;
 - High levels of accessibility along key economic corridors;
 - Good connectivity between people and communities across NI;
 - A safe and low risk mode of transport;
 - Lower environmental impacts than other modes;
 - An effective contribution to economic growth and development; and
 - A key element in an integrated regional transport system.



.... therefore the need to apply robust project appraisal to investment decisions will continue to be important

It is important to realise that unlocking the potential of rail may require a step change rather than an incremental approach to investment

- Many investments in the rail sector are 'lumpy' in nature.
- The nature of rail capacity expansion (e.g. infrastructure capacity expansion, fleet procurement etc.) is such that incremental expansion of capacity is rarely achievable.
- In order to gain capacity increases, for example, it is often necessary to provide a level of excess capacity in the short-term.



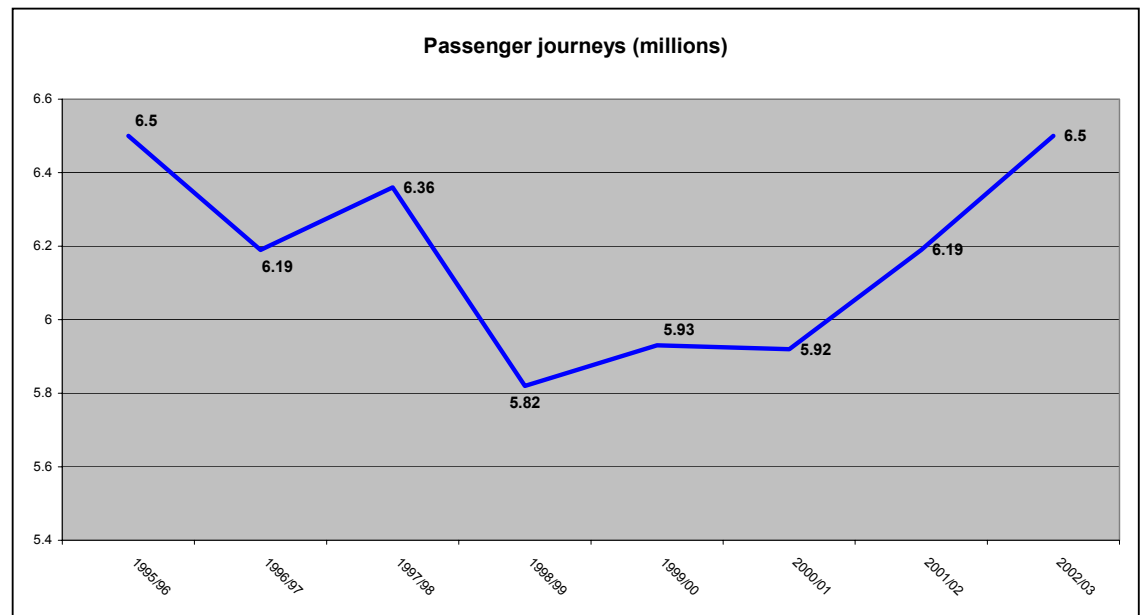


“As Is” Summary

- Network Summary
- NIR’s Operational Environment
- Operational Issues
- Network Infrastructure
- Rolling Stock
- Draft New Timetable

Northern Ireland Railways is one of the smaller public railways of the world

- Operating Route length of 189.5 miles (approx. 303 kms).
- Operating Track length of 272.5 miles (approx. 440 kms).
- Approximately 46,000 passenger trains annually.
- 6.5 million passengers journeys in 2002/03.
- Approximately 156 million passenger miles.



- Annual ticket revenue of almost £16 million.
- Total annual expenditure of approximately £34 million.
- Nearly 700 operational staff.

Today the railway has to operate within the capacity and performance constraints of the infrastructure and aging rolling stock fleet

- With approximately 42% of route-miles single track, the potential for operating frequent reliable services is limited.
- The three cross-city double track routes (Portadown, Whitehead and Bangor) generally allow up to 6 trains per hour to operate, with headways as short as 2 minutes possible on the section between Belfast Central and Great Victoria Street. However, the single line between Lagan Junction and Yorkgate is a critical pinch point between Belfast Central and York Road depot, the Larne Line and the Londonderry Line.
- Availability of the current fleet of aging DMUs is critical to the level of service delivered. The morning peak timetable requires 21 DMUs in service, but frequently this is not achieved due to the poor reliability of the fleet resulting in short formations and, sometimes, cancellations with subsequent overcrowding.
- Operating speeds are low, with average speeds generally uncompetitive with other modes:
 - Belfast – Lisburn: 32 mph
 - Belfast – Larne: 31 mph
 - Belfast – Bangor: 26 mph*
 - Belfast – Ballymena: 38 mph.

This is not only a function of the speed limits imposed by the infrastructure but also by poor acceleration and braking capability of the rolling stock and by the high density of stations:

Average distance between stations	
Belfast-Lisburn	0.86 miles
Belfast-Bangor	1.45 miles
Belfast-Carrickfergus	1.71 miles

***The busiest part of the network is also the slowest!**

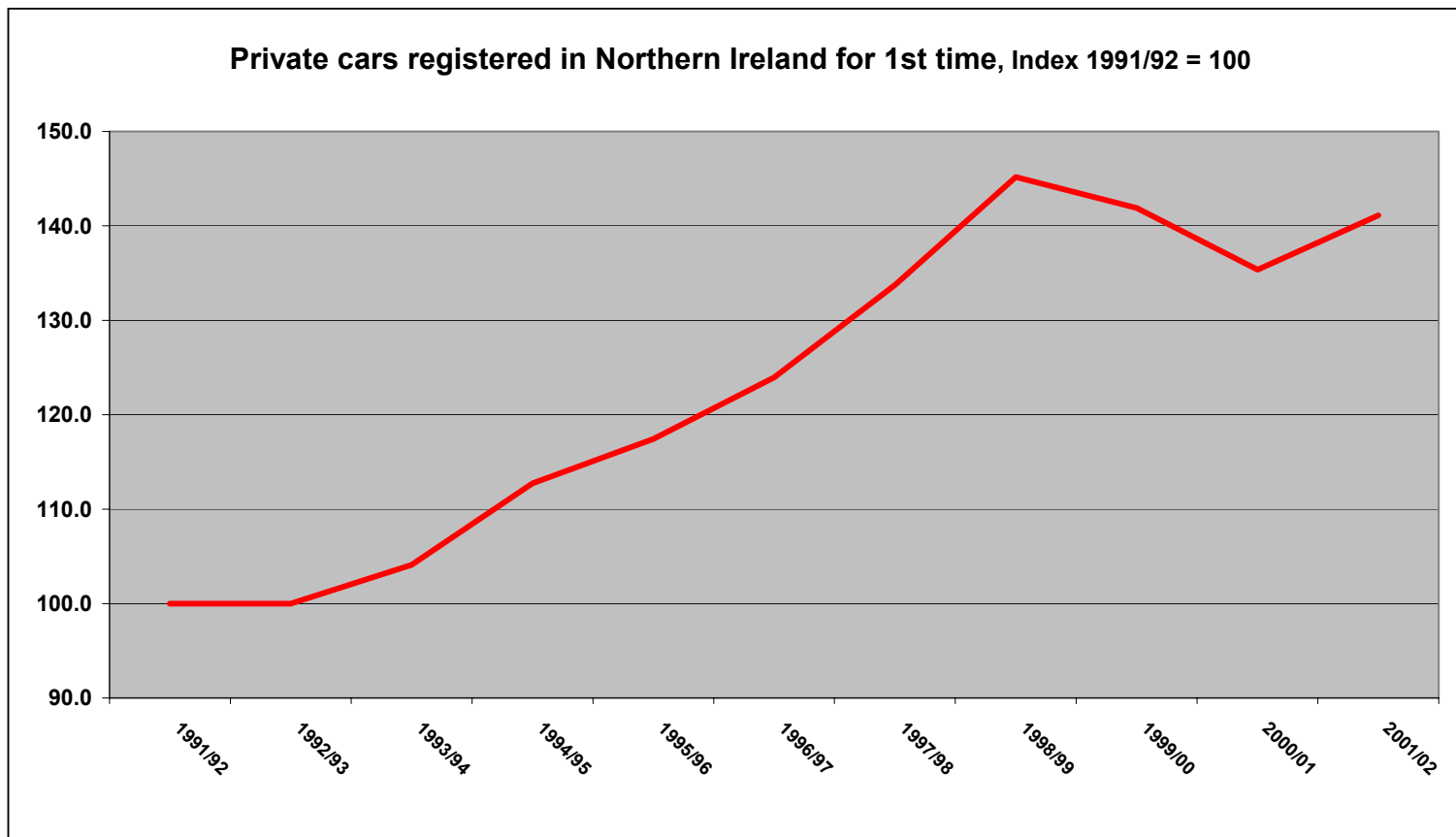


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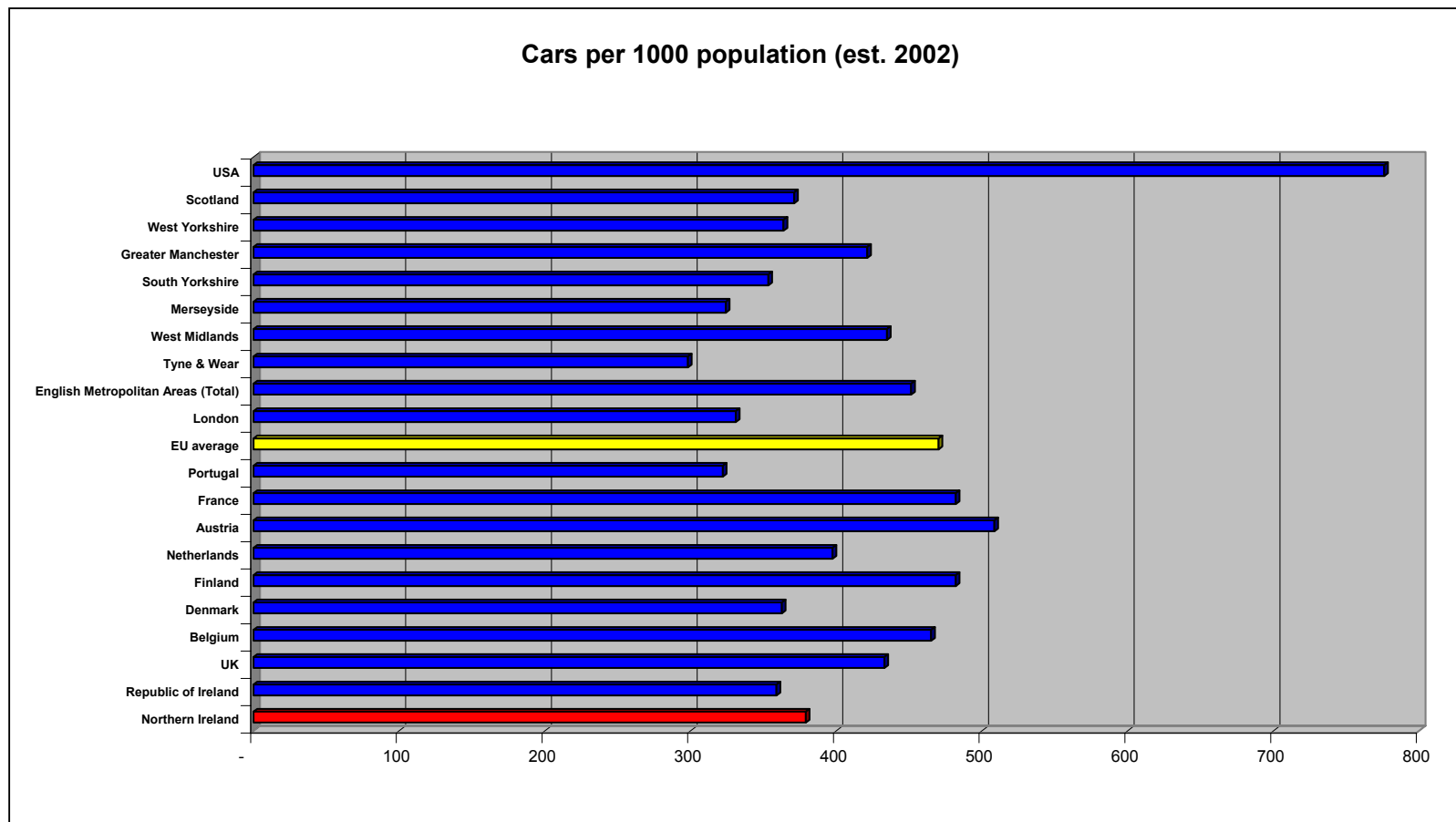
NIR operates in a very competitive environment with ‘pressures’ from many areas

- Private motor vehicles registered for the first time in Northern Ireland increased by over 40% in the past decade; rising from 63,000 in 1991/92 to almost 89,000 in 2001/02.



There appears to be a strong correlation between increased car ownership and decline in public transport use

- Over the ten year period from 1992 to 2001, licensed vehicle stock in NI increased by 33%, compared with 19% in Scotland, 18% in England and 17% in Wales.
- NI is still below most areas of the UK and the EU in terms of private car ownership levels.

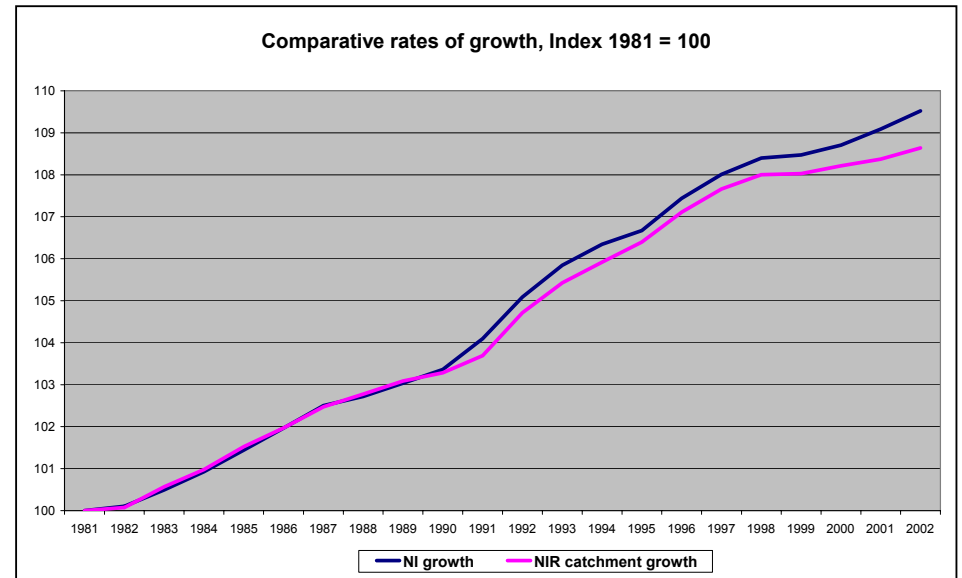
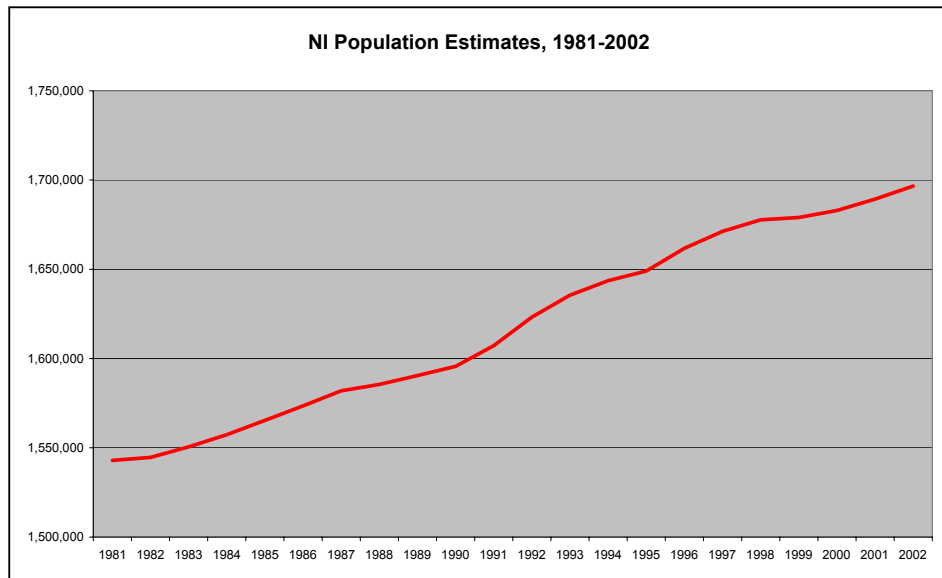


Enhancements to the road network will in the longer term impact on the competitiveness of rail journey times

- In the short term, during major construction works there will be an opportunity for NIR to ‘capture’ travellers seeking transport alternatives on routes subject to major construction related disruption; the issue will be NIR’s ability to retain some of this diverted ridership once road works have been completed.
- Funding of £2.2 billion (incl. £1.2 billion for maintenance works) is planned for the NI highway / roads network in the period 2002-2012 under the Regional Transportation Strategy, and within this, an amount of £528 million is identified for the Regional Strategic Transportation Network of which £375 million is for strategic highways improvements.
- Major strategic schemes identified on the basis of the Government’s key criteria include:
 - M2 widening / Sandknowles, Belfast;
 - A1 3 grade-separated junctions;
 - A2 Broadbridge dualling near Londonderry;
 - A26 / M2 Ballee Road east, Ballymena;
 - A515 Crescent Link, Londonderry (completion of dualling); and
 - Additional ‘climbing lanes’ across the network (30+ locations).

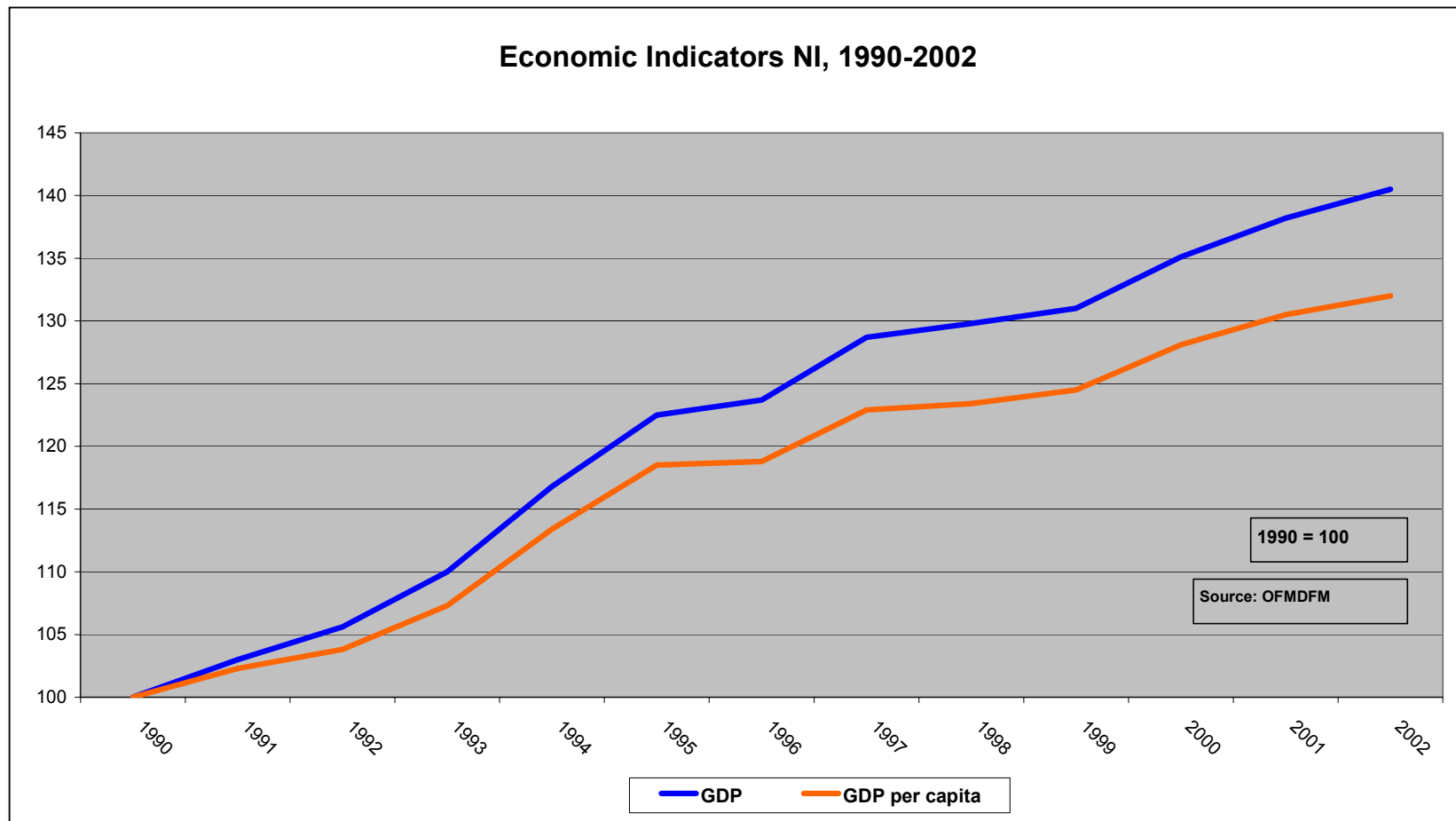
There is a strong relationship between economic activity and patronage on NIR

- A key element of economic growth is population growth:
 - The estimated population of Northern Ireland at 30 June 2002 was 1,696,600, an increase of 7,300 (0.4 per cent) on the 2001 population of 1,689,300 and an increase of 73,300 (5 per cent) on the 1992 population of 1,623,300 (NISRA, Aug.2003);
 - Since 1981, the population of Northern Ireland has increased by around 10%.



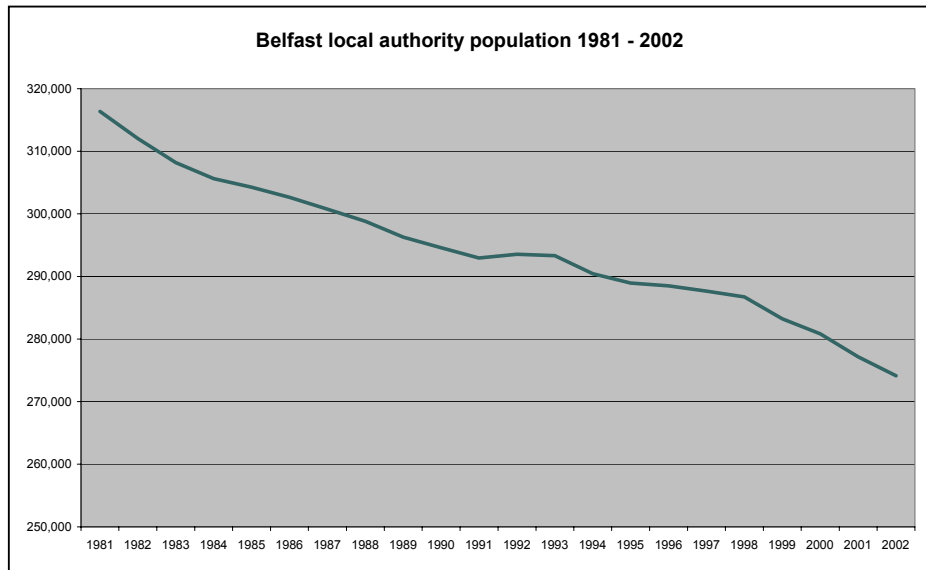
Economic activity as measured by real GDP growth has been steady in NI over the past decade or more

- A key issue has been NIR’s inability to readily tap into the growth potential associated with modest to good economic growth due to a mix of aged assets, unreliable services and limited service offering.

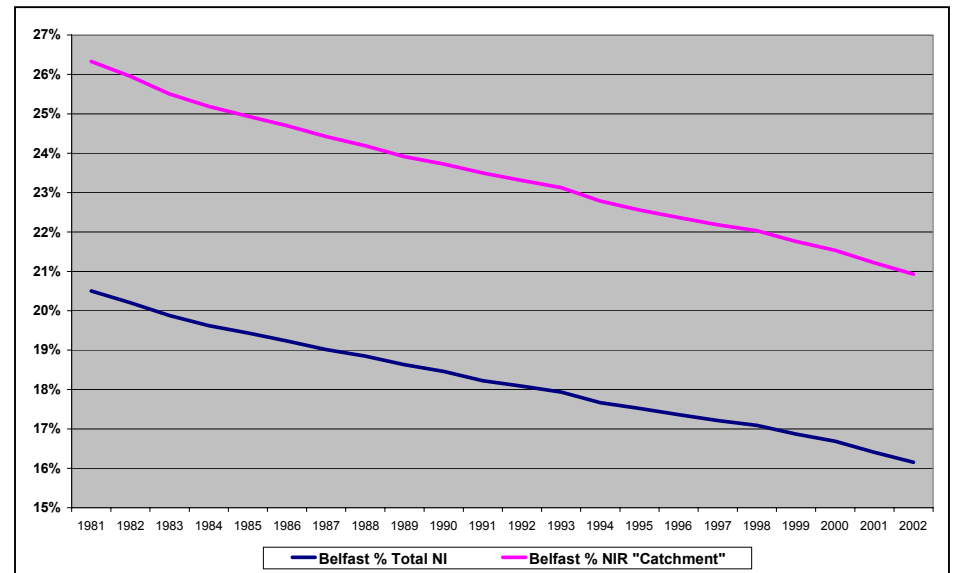


The NIR “catchment” accounts for approximately 75% of the total Northern Ireland population

- The NIR ‘catchment’ population has increased by just below the NI figure since 1981.



- A major factor in both the NI total population and the NIR “catchment” population has been the decline in Belfast population.

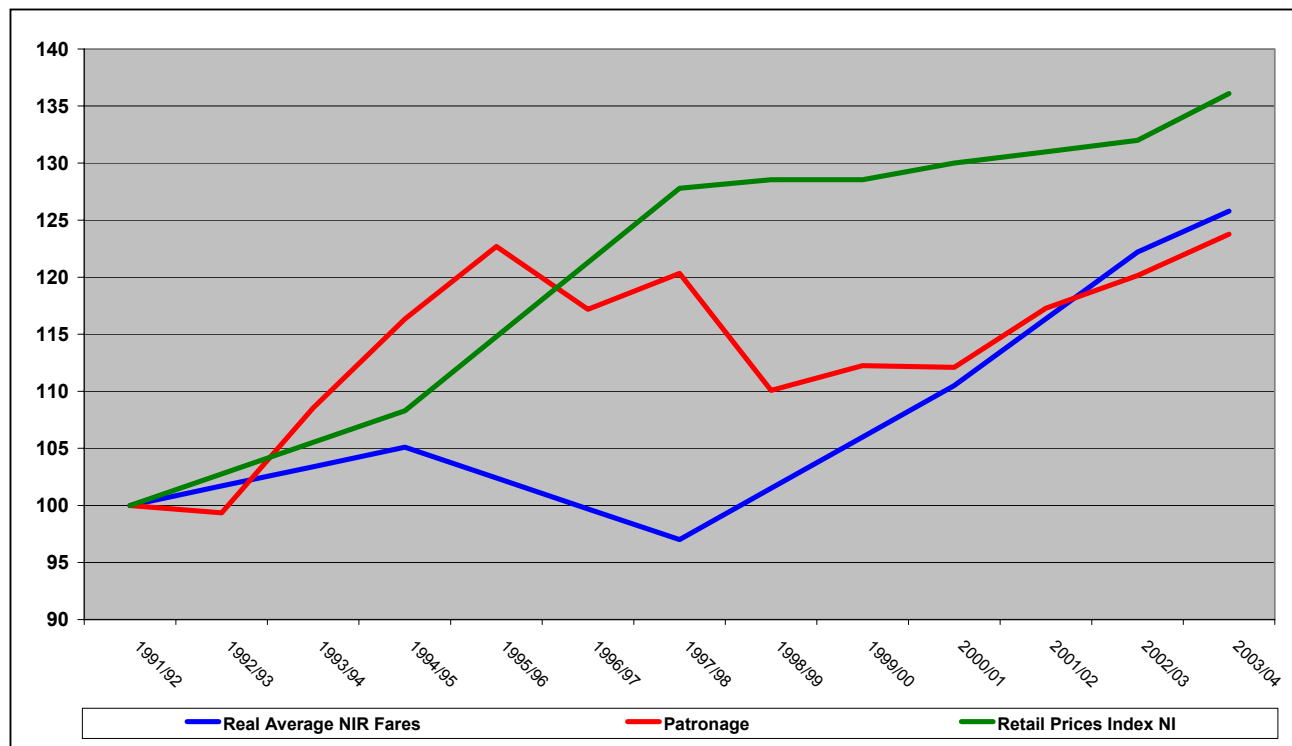


The cities and towns of Northern Ireland are modest by European and international standards

- Belfast ranks as the 22nd largest city in the UK, is the second largest settlement on the island of Ireland (Londonderry is the fourth largest) and accounts for approximately one-fifth of NI’s total population.
- Fortunately for NIR, most of the major cities and towns of Northern Ireland are either on or close to the NIR network (est. 2003 popⁿ).
- Significantly, the cities and major towns below (only those with populations exceeding 20,000 are listed) are all on the NIR network and combined, they alone account for approximately 42% of the total Northern Ireland population:
 - Belfast (243,000)
 - Londonderry (84,000)
 - Newtownabbey (58,000)
 - Bangor (58,000)
 - Lisburn (44,000)
 - Ballymena (29,000)
 - Newtownards (28,000)
 - Carrickfergus (28,000)
 - Newry (27,000)
 - Coleraine (26,000)
 - Lurgan (22,000)
 - Portadown (21,000)
 - Antrim (20,000)
 - Larne (20,000).

Real fares on NIR have not keep pace with the general rate of inflation in the NI economy

- The Retail Price Index has increased over the past decade at a higher rate than that of real average fares charged by NIR.
- A strong relationship between real average fares and patronage on NIR is not obvious – since 2000/01 the two indicators have been growing at a similar rate with more intuitive patterns being observed in the data for 1993/94 to 1999/00.
- The data would imply that other factors other than real average fares are influencing higher usage on NIR.



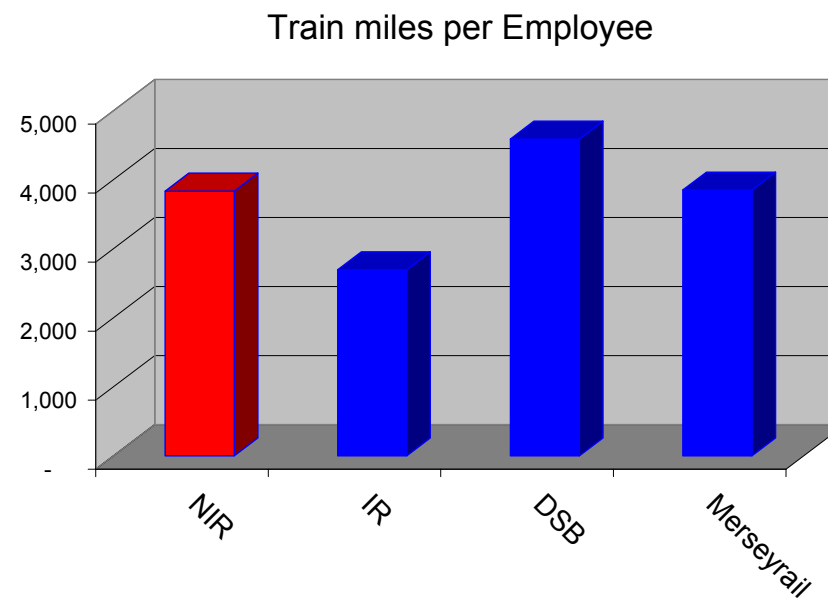


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NIR has modern organisational practices comparing favourably with other operators

- As a member of UK Association of Train Operating Companies (ATOC), NIR has modernised its organisational arrangements including staffing and health and safety practices in line with other UK operators.
- With each driver averaging 29,000 miles per annum, productivity compares favourably with other operators where typical distances and average speeds are higher.
- With a relatively small organisation (circa 700 operational, infrastructure and mechanical staff) and network, there are benefits to the operation from its modest scale such as in the ease of communications and managing change.



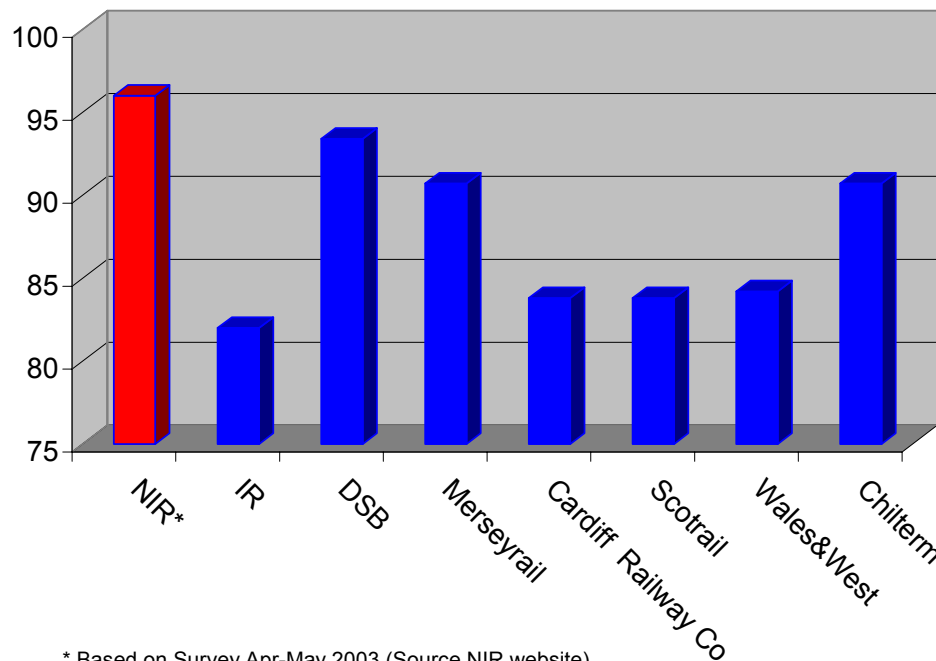
With relatively low load factors, revenue collection can be managed effectively with on-train sales supplemented by a limited number of station sales counters

- The average load factor for NIR is 58 passengers per train, although the relatively high loading on the *Enterprise* service masks much lower loadings on many other services.
- Of the 54 stations operated by NIR, 22 are staffed for some or all of the day. The staffed stations handle parcels as part of the parcels business.
- Across the network as a whole, the passenger revenue collected amounts to just under £300,000 per station.
- Most ticket sales are made at the staffed station counters and on-train by conductors.
- Revenue protection is carried out by conductors, station staff and *ad hoc* checks by Route Coordinators / Inspectors.
- Ticketless travel and fare evasion are believed to be low, although verification of this is hampered by a lack of accurate passenger count data.
- Although crowding occurs on some services during peak periods, there is limited data of passenger loading and travel patterns by time of day and section of route.

With a small and simple network, NIR is able to operate a relatively high level of performance despite the setback of unreliable assets

- NIR does not suffer the problems of larger and more complex systems and is therefore able to achieve relatively high levels of performance despite the setbacks of unreliability in its aged rolling stock and infrastructure and the constraints of a network with significant proportions of single track.
- Half of all delays are due to infrastructure or rolling stock with a further 8% attributed to wheel-slip problems.
- It is noted that NIR is proposing to introduce a delay minute attribution system.

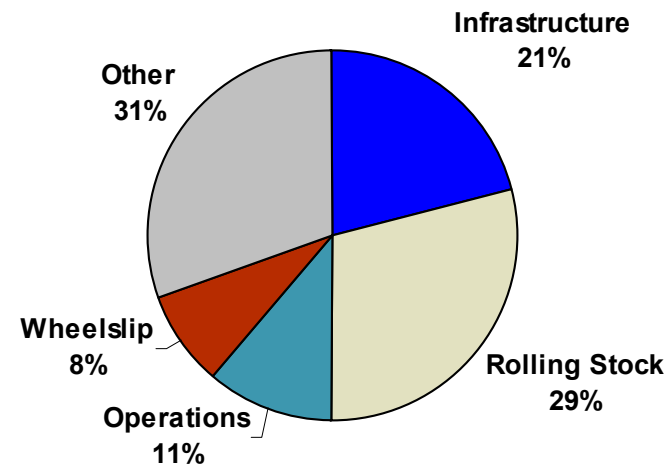
Punctuality (% < 5mins)



* Based on Survey Apr-May 2003 (Source NIR website)

Causes of Delay

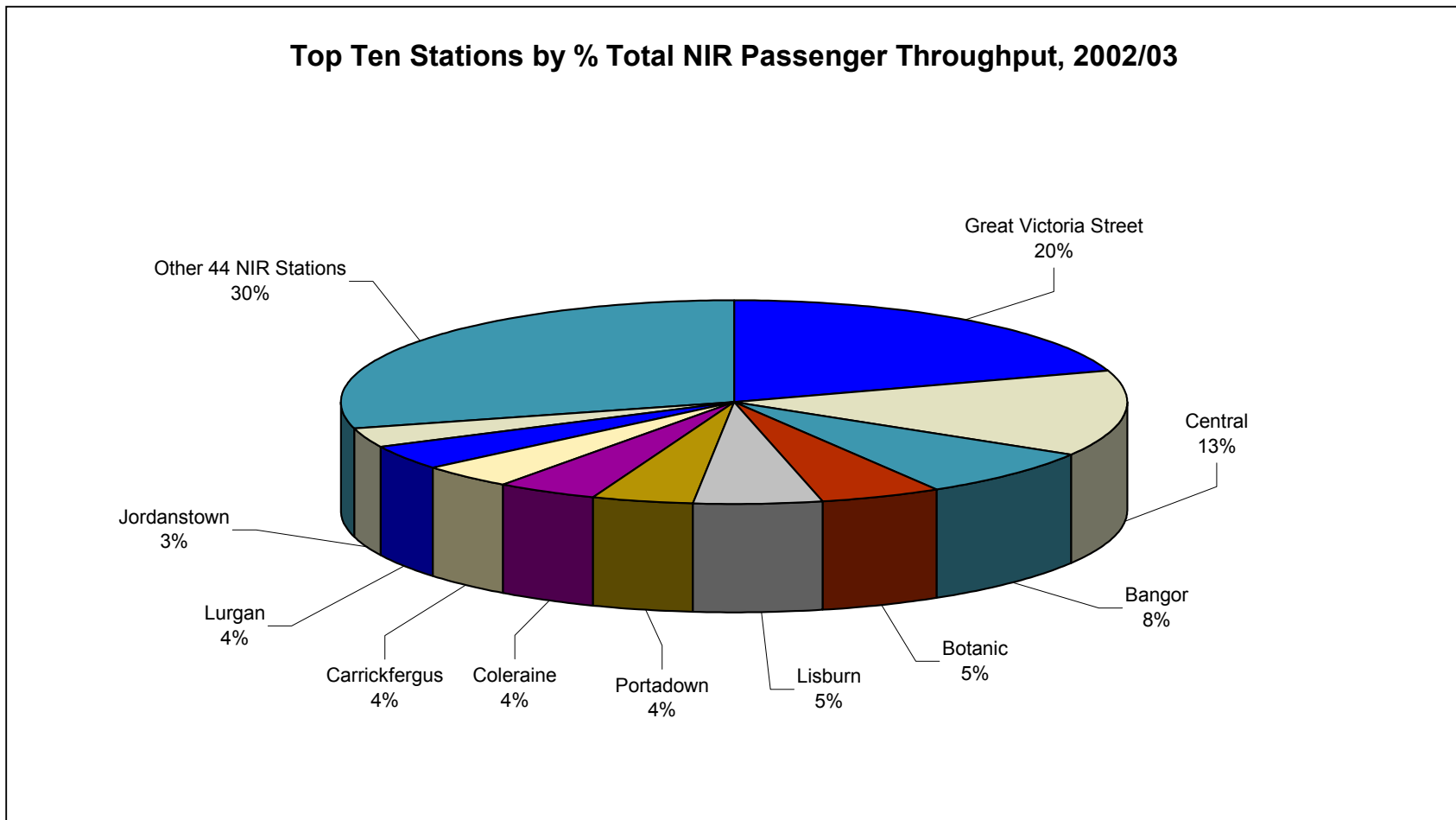
(Dec 2002 - Nov 2003)



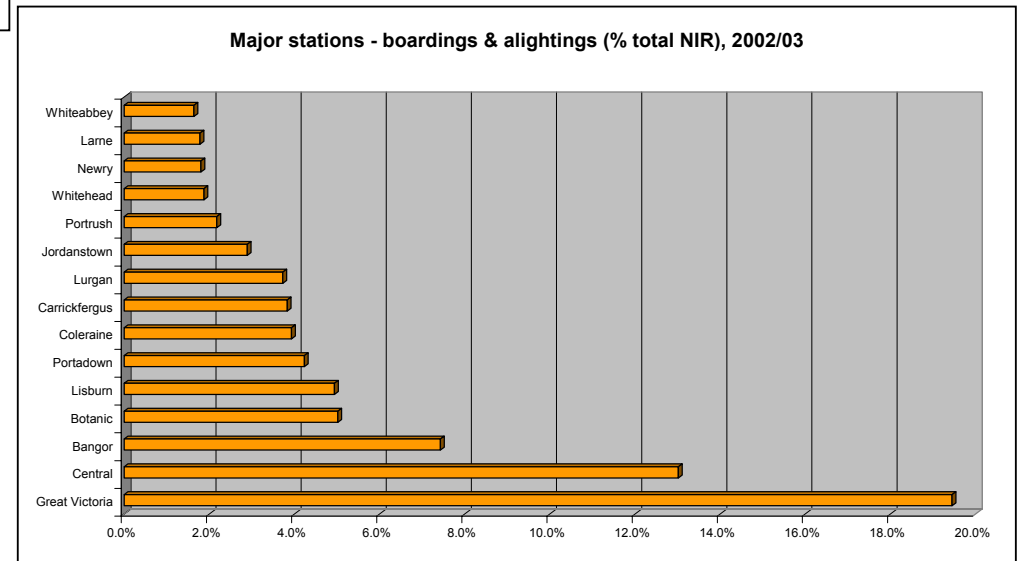
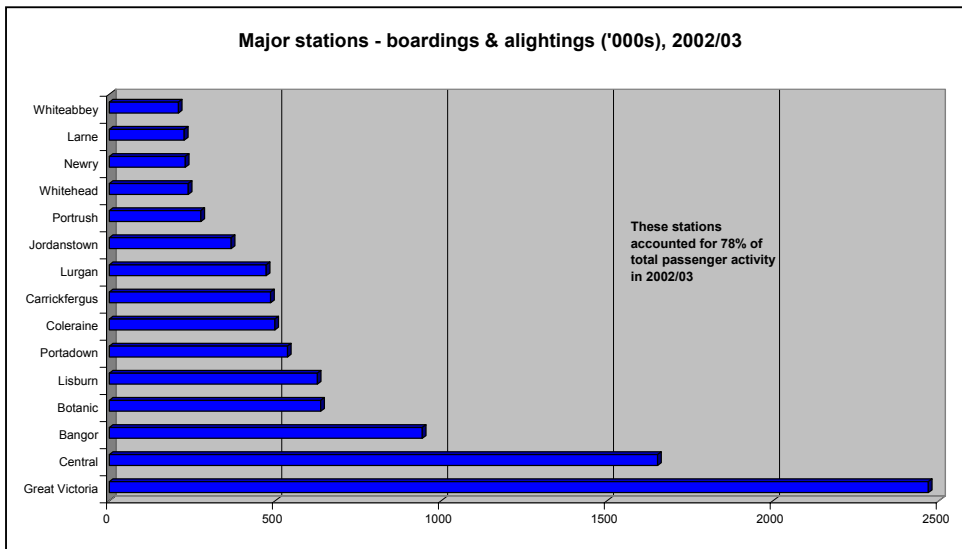
Source: NIR Control Delay Sheets

The ten busiest stations on the NIR network account for approximately 71% of all passenger throughput

- 44 stations and halts on the NIR network (80% of the total) account for only 30% of total passenger activity.

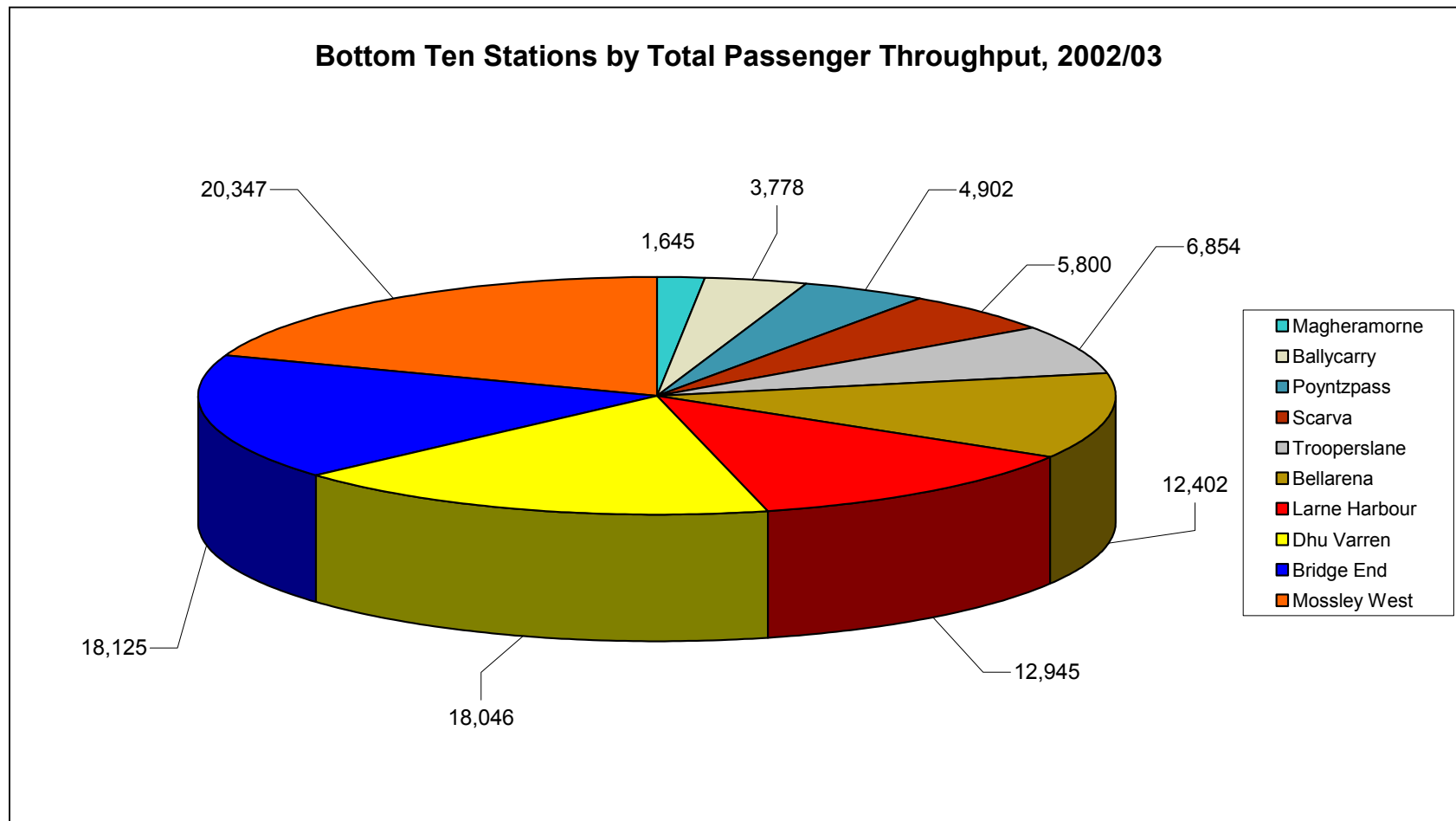


The busiest parts of the NIR network are concentrated on the major stations close to the city centre as well as stations at the ends of lines



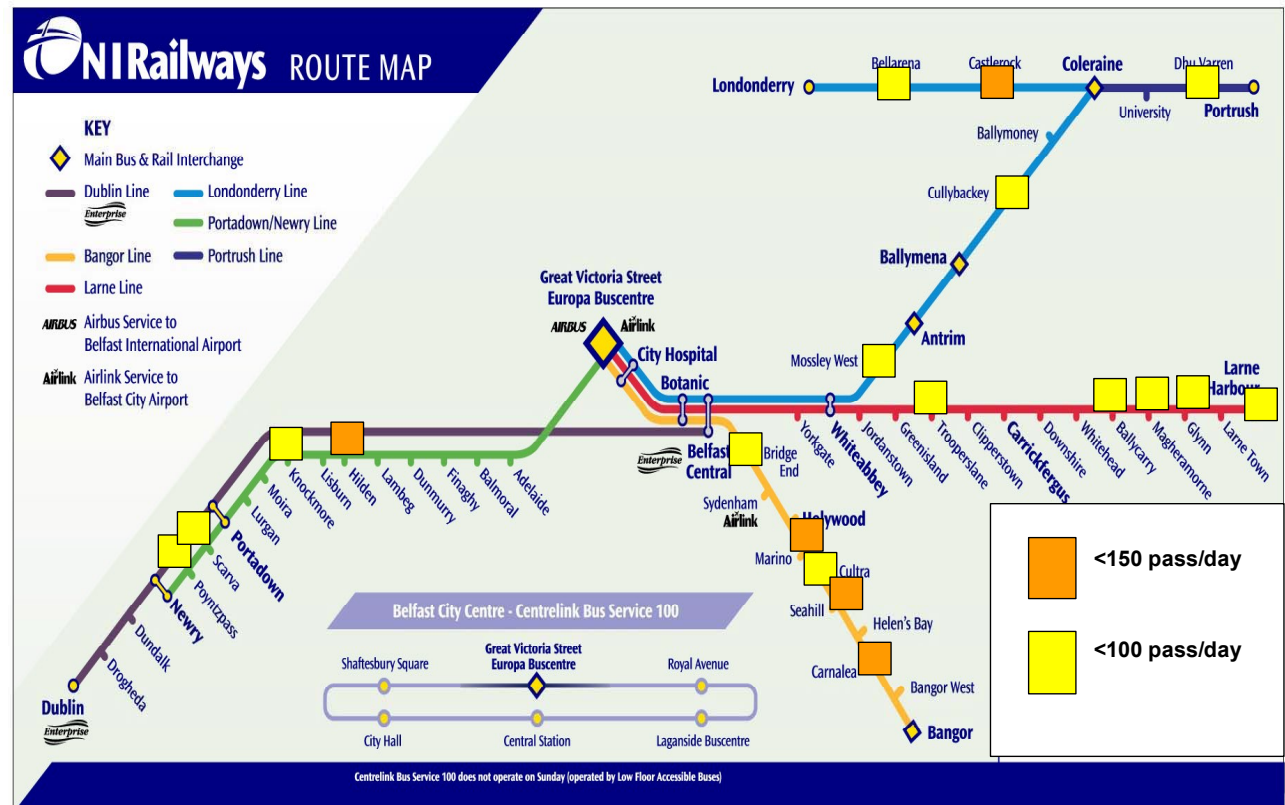
The 10 least used stations and halts on the NIR network combined account for less than 1% of total passenger throughout activity

- Eliminating a number of very lightly used stations and halts may well result in net operational and user benefits associated with better *end-to-end* journey times and lower operational costs.



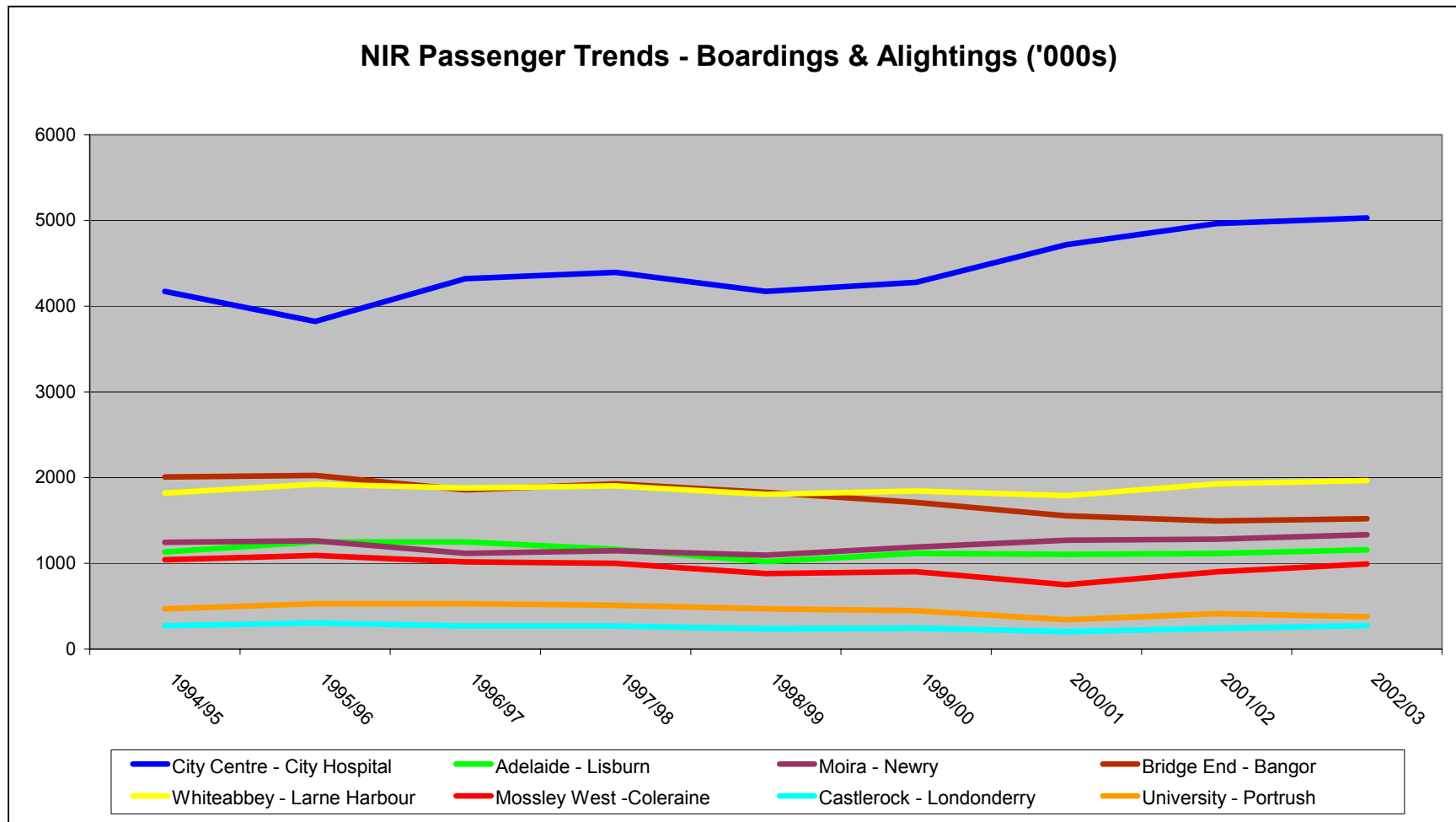
Data obtained from Portis suggests that there are a number of stations used by fewer than 100 passengers per day

- At present most trains stop at all stations but given the low patronage at many stations, under an expanded service offering average journey times could be improved by reducing the number of stops per train, whilst retaining a core service to each station.
- At halts with very low patronage it may be more appropriate to withdraw services or only retain a minimal service.
- Six halts were recorded as having less than one passenger per stopping train:
 - Cultra
 - Bridge End
 - Trooperslane
 - Glynn
 - Magheramorne
 - Knockmore.



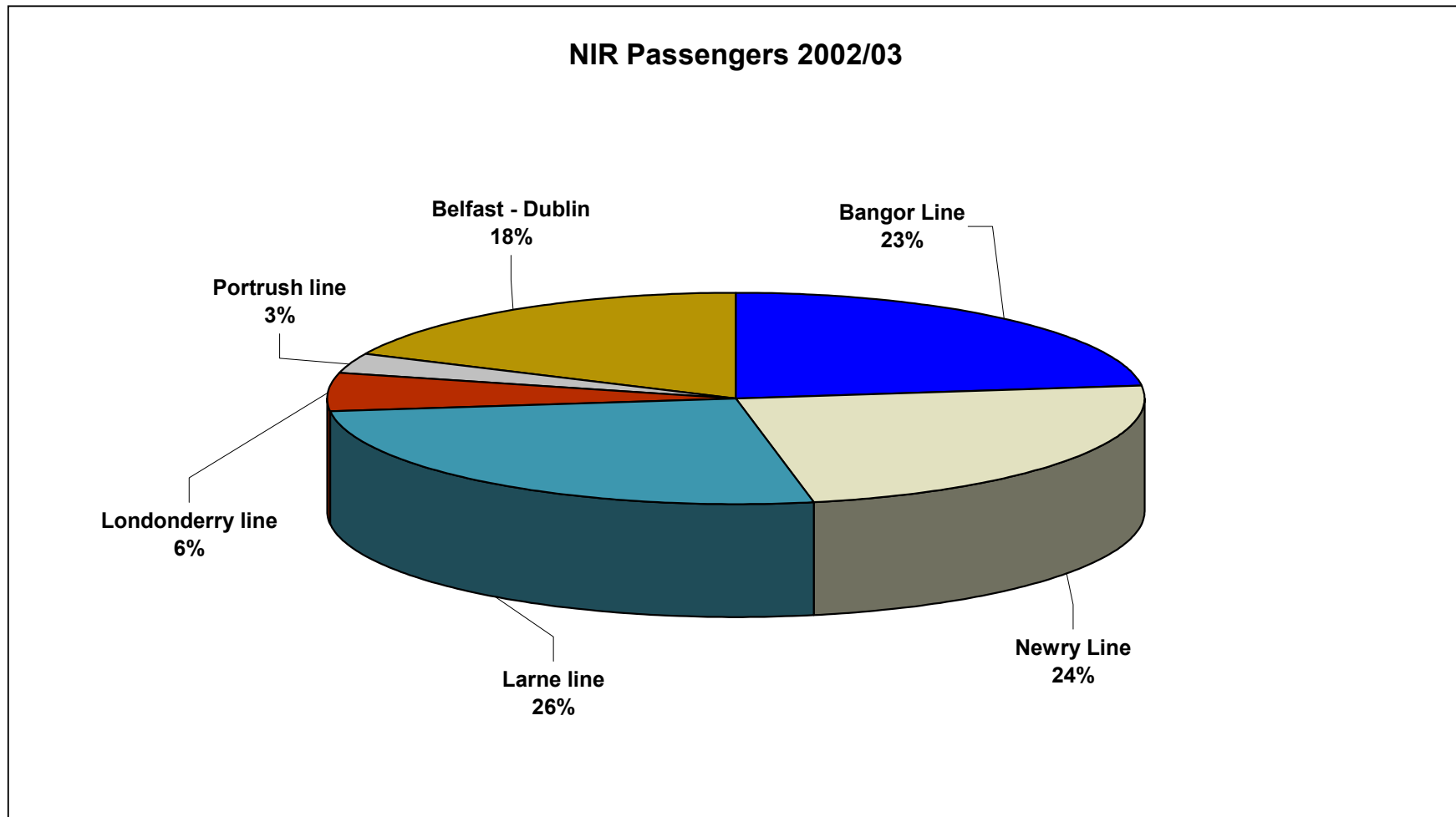
Passenger activity trends indicate variations in performance across different parts of the network – with an overall upward trend in recent years

- The City Centre to City Hospital section accounts for the majority of passenger activity on the network. This is in the main due to the section including the two major Belfast terminals – Great Victoria Street and Central.



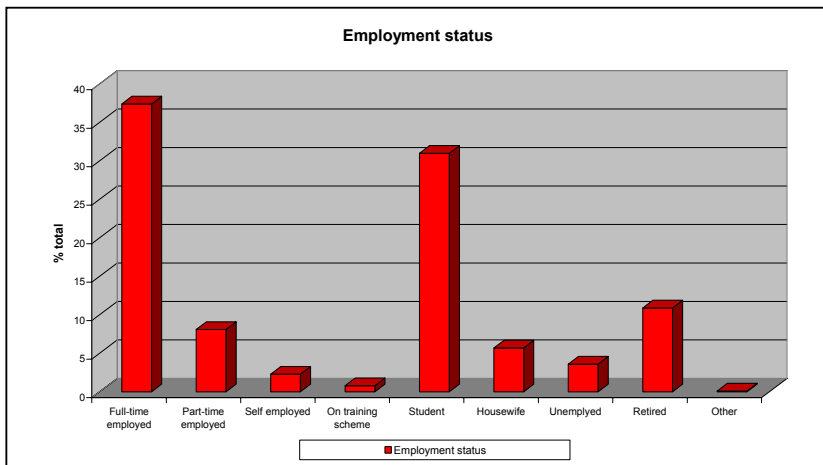
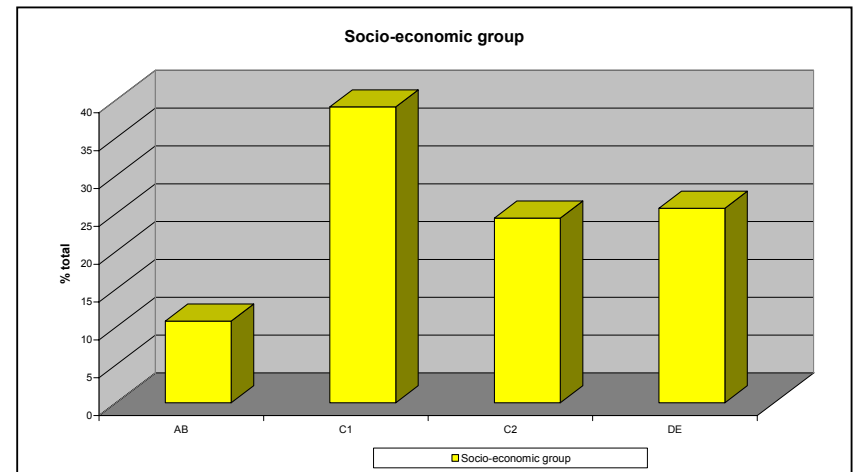
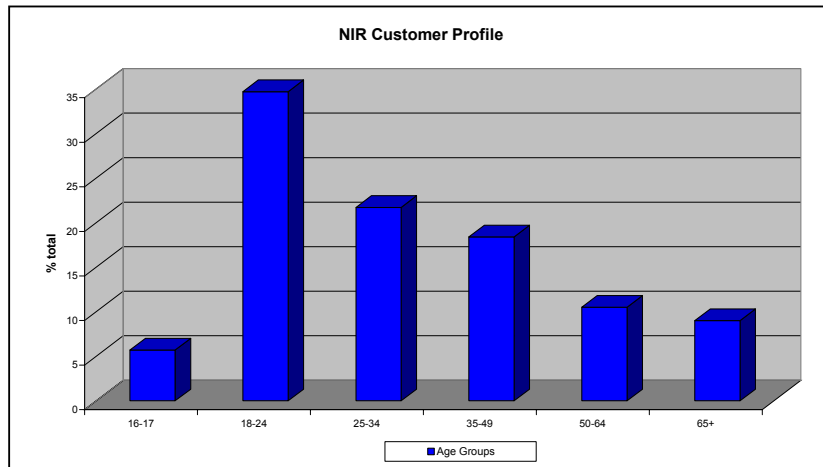
Passenger volumes across each of NIR’s operational routes / lines varies, with approximately 80% associated with ‘local’ NI services

- The cross-border services provided by the *Enterprise* account for almost one-fifth of NIR’s total carryings.



Examination of NIR’s passenger profile information indicates the significant ‘social’ function of the railway

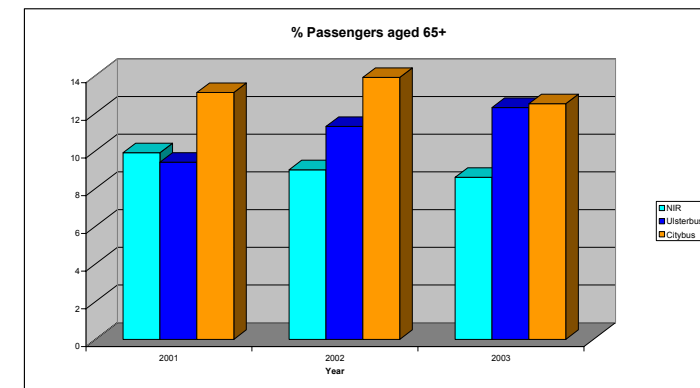
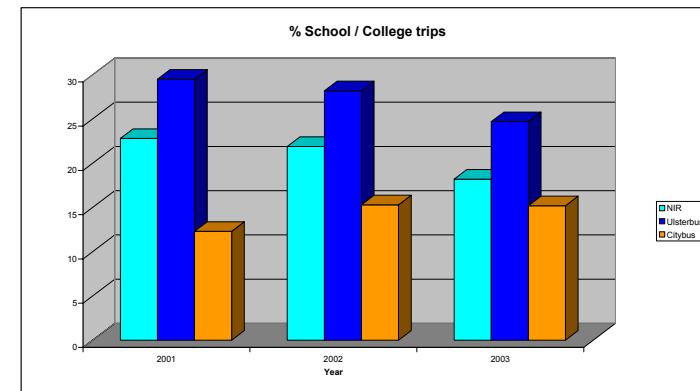
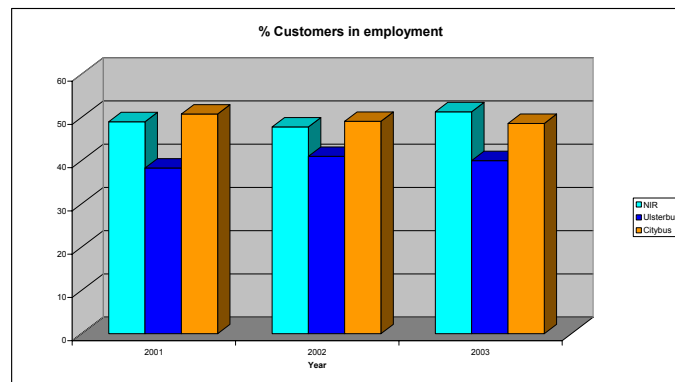
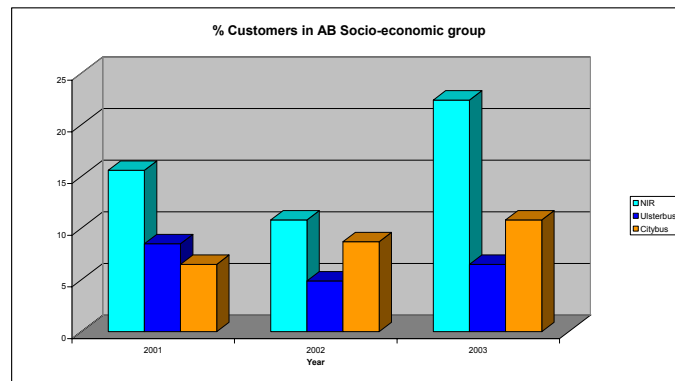
- Over half of all passengers are aged between 16 and 34 years.
- Almost half of all passengers are in employment.
- Over one third of passengers are commuters.
- Half of all passengers fall into the ABC1 socio-economic group – more than either Ulsterbus (36%) and Citybus (43%).



Source:
PricewaterhouseCoopers,
Customer Satisfaction Survey
(Spring & Autumn 2002)

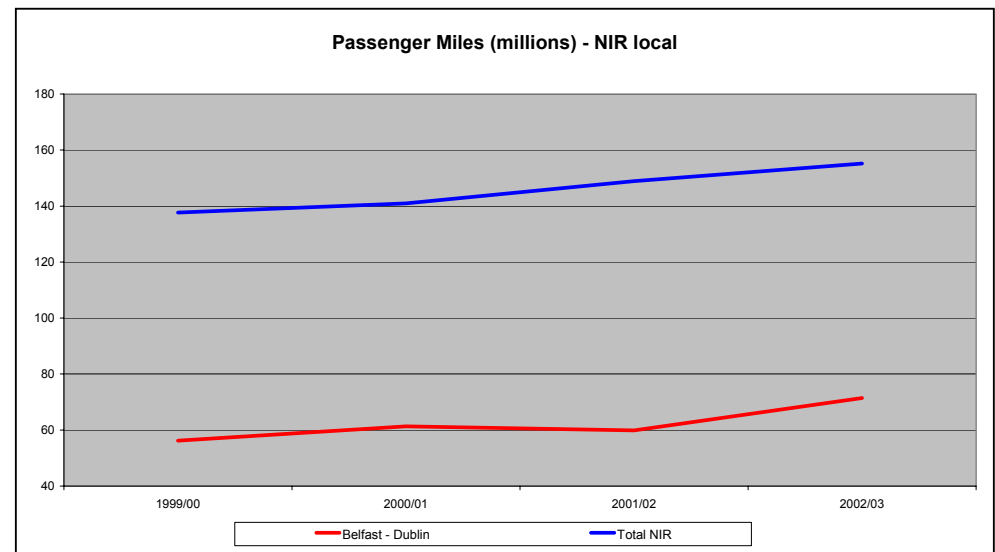
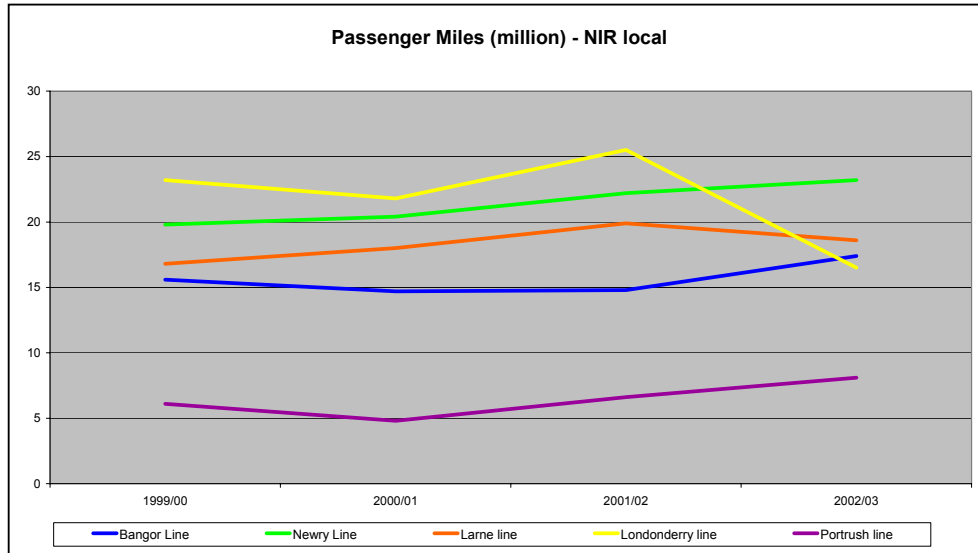
Analysis of survey data collected for the 3 Translink companies – Ulsterbus, Citybus and NIR – reveals important variations in customer profiles across the transport providers

- NIR has a significantly higher proportion of AB socio-economic groups members than either of Ulsterbus or Citybus.
- NIR has a higher proportion of passengers in employment than Ulsterbus and a similar level to Citybus.
- NIR has a substantially higher proportion of School / College passengers than Citybus but a lower level than Ulsterbus (which may in part be explained by the fact that NIR serves the major tertiary education initiations of NI and Ulsterbus has a significant primary and secondary school market)
- NIR has the lowest proportion of passengers in the 65+ age group and the proportion is in decline.



Source:
PricewaterhouseCoopers,
Customer Satisfaction
Surveys – 2001, 2002 and
2003

Growth trends in NIR’s passenger miles indicate an increasing transport task on some lines whilst declines on others

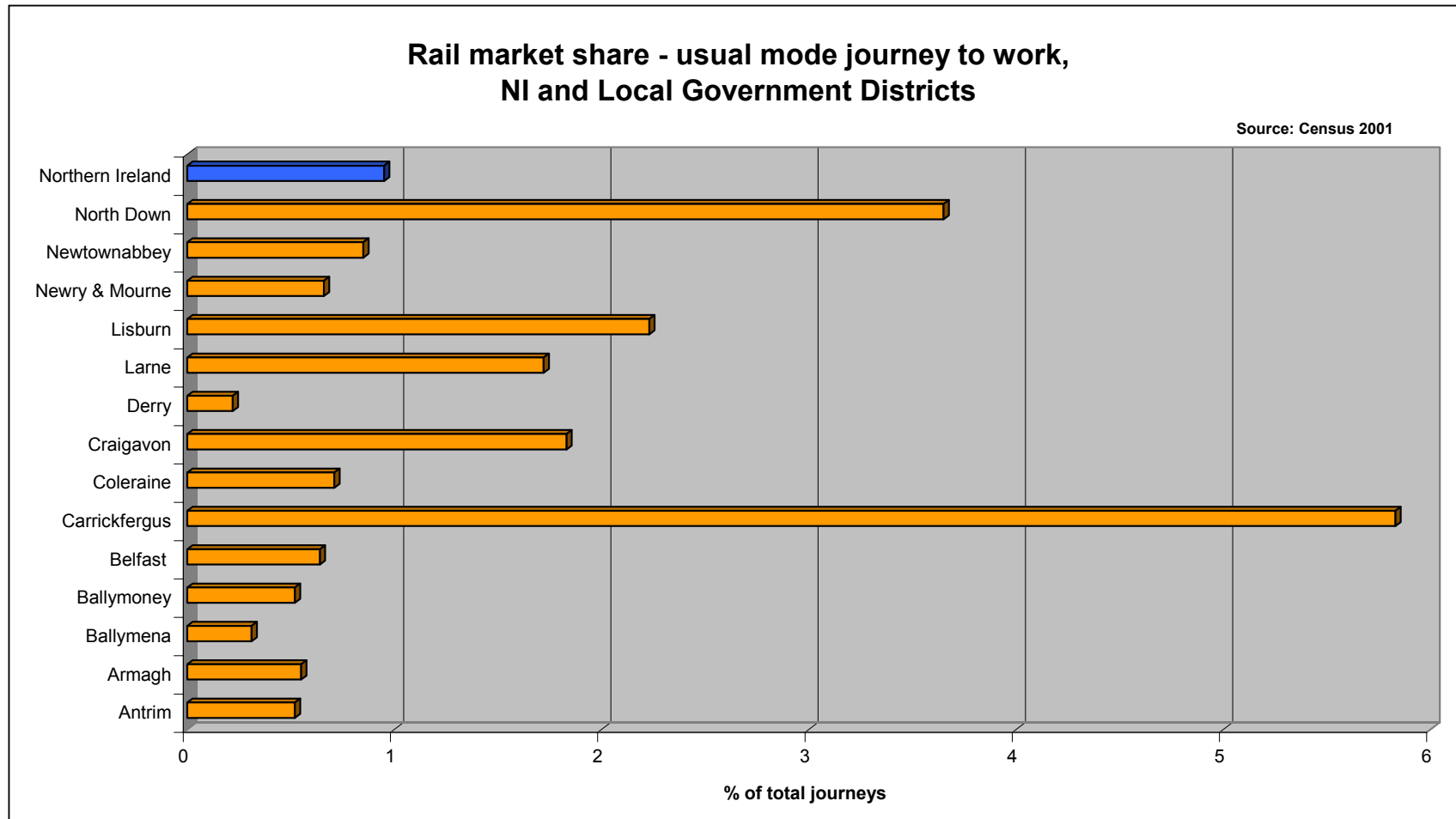


The *Enterprise* represents the premier rail service and serves the two major growth centres on the island of Ireland

- The political situation has been a major impediment to the cross-border rail services realising their full potential over the past 30 years.
- In 1968, carryings were just over 520,000 and this declined to 270,000 in 1972 as political unrest intensified and terrorist activity increased.
- Between 1975 and 1987 the decline in carryings was reversed to some extent with demand reaching 386,000 in 1987 (estimated to have been approximately 25% of total trips between Belfast and Dublin).
- A sustained bombing campaign in 1989/90 seriously disrupted services and severely impacted passenger demand.
- The latent demand in the market is considerable given the potential gravitational pull between the two conurbations and the expanding cities between them.
- Key events over the past 10 years include:
 - 1989/90 – bombing campaign directed at cross-border rail services
 - Feb 1994 – IRA ceasefire declared
 - Oct 1994 – Combined Loyalist Military Command ceasefire declared
 - July 1995 – Introduction of free cross-border social welfare scheme
 - Feb 1996 – Temporary breakdown of IRA ceasefire
 - Aug – Nov 1996 – Severe disruption due to engineering works
 - July 1996 – Civil disturbances in NI post Drumcree
 - Sept 1997 – new *Enterprise* service launched
 - April 1998 – Good Friday Agreement signed.

Rail plays only a minor part in journeys to work in Northern Ireland and performs well below potential in this regard

- The market share figures for areas such as Carrickfergus and North Down clearly indicate the potential for increased rail market share, particularly where increased frequencies are provided, journey times reduced and modernisation of rolling stock and stations undertaken.





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The railway infrastructure is characteristic of a ‘legacy’ railway with aging assets, a high proportion of single track, numerous user crossings and variable track geometry

- In theory, network line speeds are 70 mph with the exception of the main double track route to Dublin which is 90 mph. However, there are numerous line speed restrictions (mainly permanent) due to track curvature and level crossings which reduce achievable line speeds.
- Whilst there has been historic under-investment in the network, NIR has completed some significant asset renewal and new projects in more recent years including:
 - Reopening of the Antrim to Bleach Green line and construction of the Cross Harbour Railway bridge;
 - Bangor Line Renewal Project;
 - Track renewals on the Lisburn line section and the upgrade / replacement of old timber bridges across the network with modern equivalents;
 - *Enterprise* Cross Border Rail project; and
 - Station redevelopments including Belfast Central, Great Victoria Street and Bangor Stations.



One of the more common conclusions from previous reviews is that the current poor position of the railway has been caused by years of under-investment

- *“It is a self-evident truth, agreed by all involved with railways in Northern Ireland, that there has been sustained under-investment. DRD witnesses implicitly agreed that, in substantial measure, this was due to switching of resources to fund larger than expected PSO requirements.” Report on Inquiry into the proposed financial provision for 2000-01 into Northern Ireland Affairs Committee of the House of Commons 26 July 2000.*
- *“Many of the shortfalls identified are consistent with those found in other European railways undergoing change and technological renewal. However, a long history of limited availability of funds for renewals and upgrades has contributed significantly to many of the inadequacies identified, particularly those relating to infrastructure and rolling stock condition”. Strategic Safety Review of Northern Ireland Railways, Main Report Overview March 2000, AD Little Ltd.*
- *“The basic conclusion must be that ‘we should not be starting from here’. And that “unless this investment [i.e. the investment identified in the Strategic Safety Review] takes place, progressive closure is inevitable.” Interim Report of the Railways Task Force on the Future of the Railway Network in Northern Ireland. September 2000.*

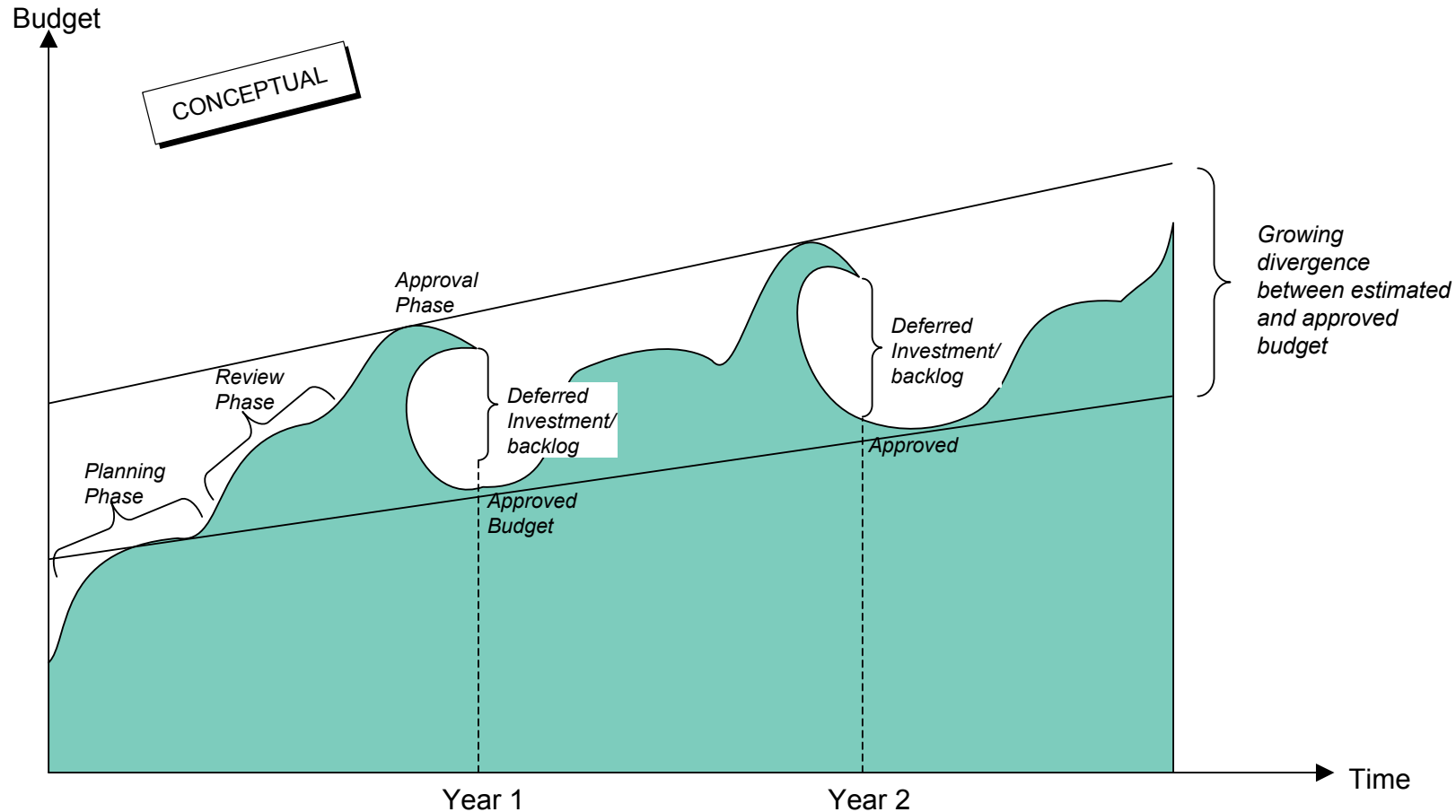
However, over the last decade the railway has received significant funding which has enabled it to begin tackling the problems of aging assets - this will need to continue to put the railway on a firmer footing going forward

While historic under-investment has been recognised the degree of under-investment has never been clearly established

- Railway Task Force provides some useful analyses of the situation in this regard:
 - *“Apart from a 3% increase in the period 1997/98 - 1998/99, real public spending on transport has been decreasing steadily at an average rate of around 4.5% pa”.*
 - *“NI spend per capita is higher than UK spend per capita in every area except transport and other environmental services.”*
 - *“On average, over the period 1991/92 – 1997/98. NI rail funding per passenger mile was approximately two thirds that of GB despite privatisation and despite the fact that GB has a higher proportion of longer and more profitable routes”.*
 - *“Similarly, when compared on a route mile basis, rail investment in NI lags behind that in GB. Despite the fact that in 1995/96 rail investment per route mile in NI was nearly 250% higher than it was 7 years previously, it was still only 85% of that in GB.”*
- In addition, AD Little’s Strategic Safety Review was a valuable source of information for this Review. Although it should be recognised that there are fundamental differences in the scope of the two strategic reviews as the investment and resource needs identified within the Strategic Safety Review *“refer to items required for safety reasons only.”*
- That means that the Strategic Safety Review was not undertaken to determine the long term funding requirement for the railway but was responsible for *“assessing the adequacy of current safety levels and arrangements for NIR’s situation and needs”*. In addition, the timescales of the Safety Review (shown below) were different:
 - Urgent (immediate)
 - Short term (<1 year)
 - Medium-term (1-3 year)
 - Long term (3-10 year).

Note: AD Little’s Strategic Safety Review expenditure estimates are stated as having *“no better than an accuracy of +/- 30%.”*

It is clear that deferred infrastructure investment has created a ‘bow wave’ affect resulting in a significant backlog of renewals



Accurate quantification of this backlog would require historic data on the change in asset age and condition as well as a spend profile by asset type

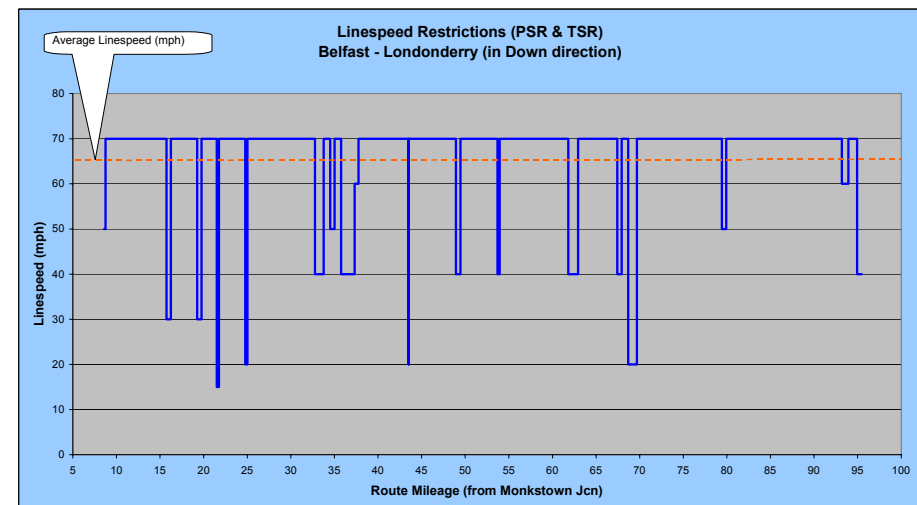
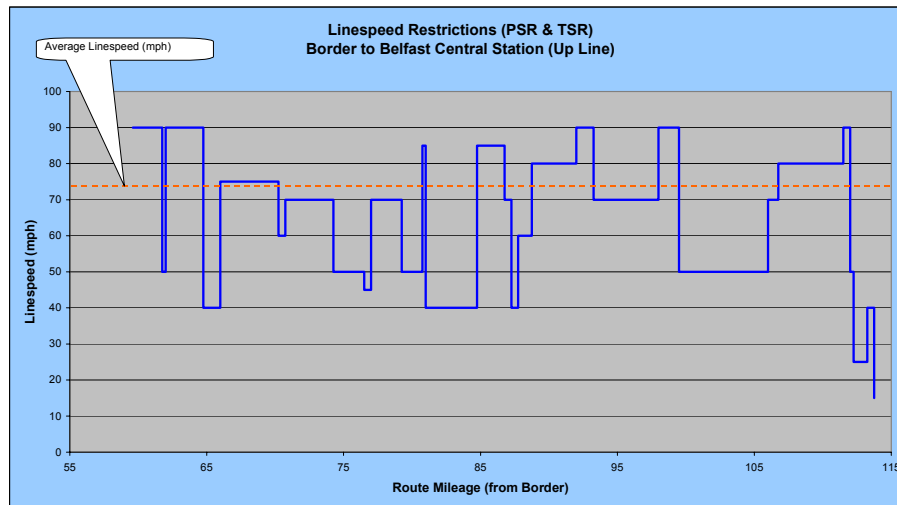
Because of the history of under investment key infrastructure assets are in a poor condition

- This situation in relation to the lack of sufficient asset renewals is common among many railways.
- Ultimately this approach to asset management is more expensive and inefficient than a regime of controlled and planned management of the assets.
- NIR’s Infrastructure Team has recognised that the lack of asset information will hamper the revitalisation of the network and as such a number of recent initiatives to address this should be implemented as soon as practical:
 - Recognition of the need to match the Infrastructure Division’s skills and capacity to the anticipated future maintenance and renewals task;
 - The proposed establishment of an internal programme management capability; and
 - The establishment of an Asset Management Database.
- It is important to understand that in order to gain an efficient and effective programme for maintenance and renewal of assets, the organisation needs a better footing going forward – particularly with respect to task and funding certainty.

.... in addition reliable asset information regarding the age and condition is not readily or centrally available

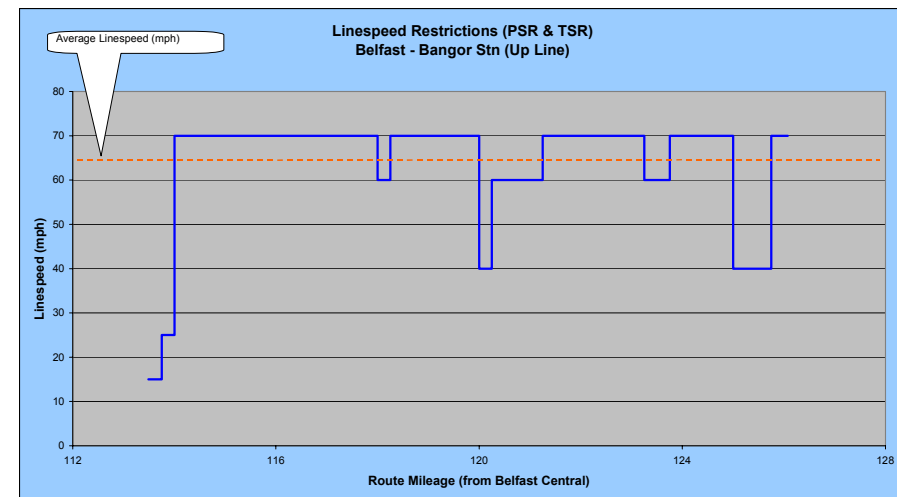
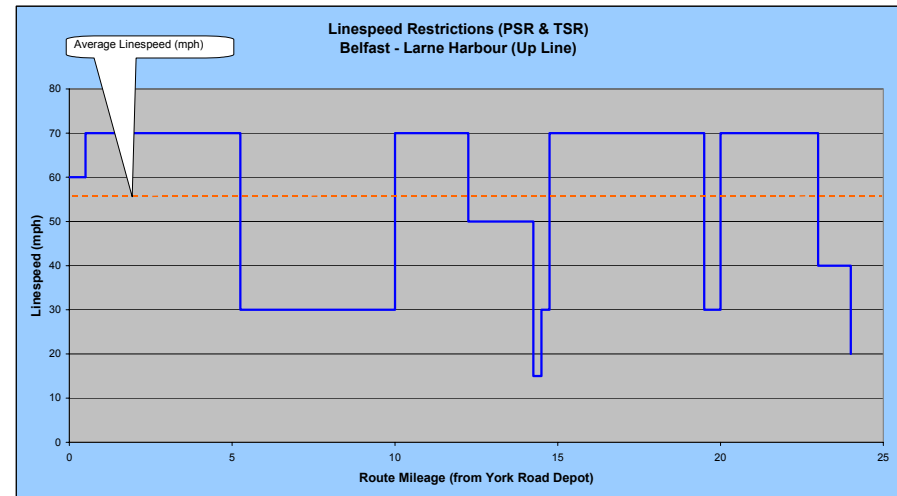
Analysis of current network line speeds further confirms the problems associated with network characteristics (e.g. curves) and condition of the assets

- Both line speed graphs below highlight the actual line speeds of the network as well as the variability of the speeds that the network will allow. When line speeds are considered in conjunction with operating performance of the older rolling stock (with poor acceleration, point to point and deceleration capabilities) the limitations become even more pronounced.
- In particular, the Belfast to the Border line (graph, left below) provides a good example of a railway constrained by its characteristics. While the majority of the line speed restrictions are as a result of curvature and level crossings there are also some sections of poor track condition most notably between Lisburn and Moira.
- It is worth noting that this line was upgraded when the Enterprise Cross Border Rail Project was undertaken between 1992 and 1997 at a total outturn cost of approximately £108 million (€155m) or approximately £1million per route mile.



The line speed graphs also highlight that renewal of track while improving asset condition does not necessarily remove all the speed restrictions

- For example, the average line speed on the recently renewed Bangor line is approximately 10 mph higher than on the Larne Line.
- In theory, this speed differential would equate to a journey time saving of about 3 minutes over a 20 mile journey. However, other factors such as stopping patterns and variability of line speeds will act to erode some of the benefits of the renewal work.
- Simply undertaking renewal of assets without proper route objectives, detailed planning, competent design as required and effective implementation may not provide a step change in asset performance.
- It is important to “*make the most*” of the benefits which are possible through significant investment in an asset renewals programme.





“As Is” Summary

- Network Summary
- NIR’s Operational Environment
- Operational Issues
- Network Infrastructure
- Rolling Stock
- Draft New Timetable

In terms of rolling stock the picture is considerably more positive with the impending arrival of a new fleet of 23 CAF DMU 3-car sets

Type/Make	Year of Entry	Vehicles	Remarks
Hunslet Loco 102	1969	1	For shunting only (Adelaide Freight Depot)
GM Class 110	1980-84	3	
GM Class 201	1995	2	Maintained by IÉ at Inchicore
Mark2 Coaches	2002	9	Originally built in 1973
De Dietrichs	1996	14	Enterprise sets – includes 2 DVTs
Class 80 DMUs	1969-1978	56	BR MK2 body; 20 power cars; 3 car unit
Class 450 DMUs	1985-87	27	35 year old MK1 underframe; Body BR Class 455;
Total Vehicles		110*	
CAF 3000	2004	69	New fleet replace Class 80s
Total Vehicles		123*	Revised Fleet Profile

* Excludes the two Class 201s

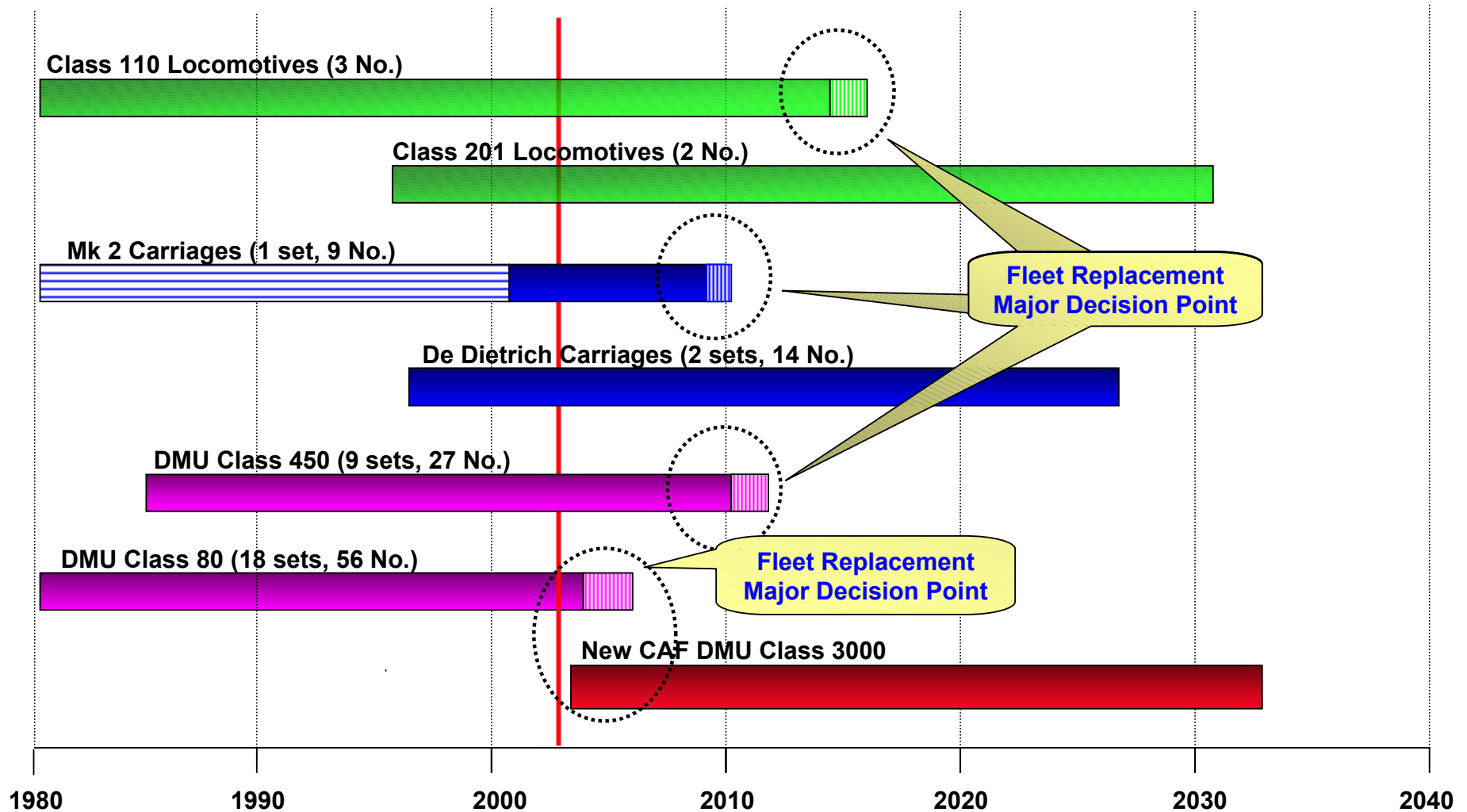
“The new trains mark a further significant step in the renaissance of rail travel in Northern Ireland and indeed for public transport in general”

New Trains Update – Translink.co.uk

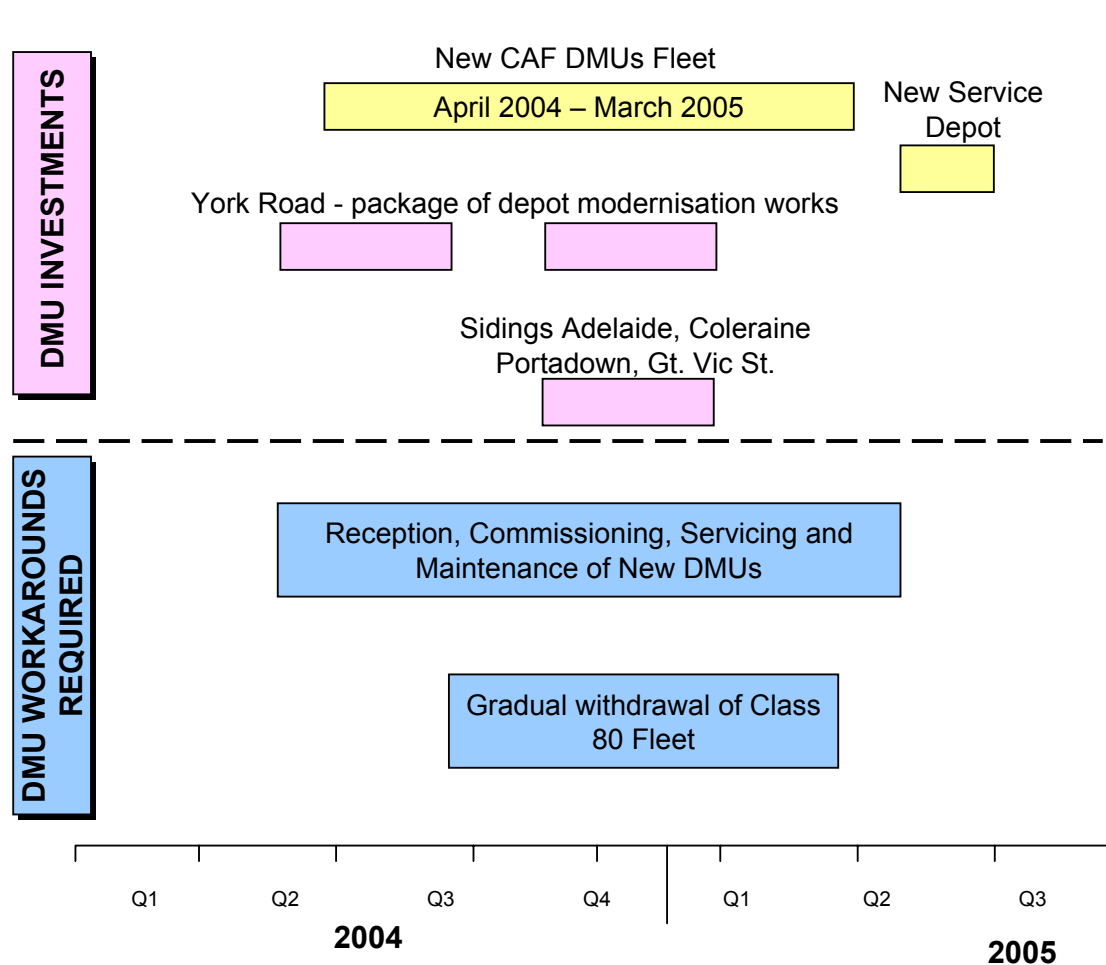
The new CAF DMUs will bring considerable operational benefits

- **Higher asset utilisation** – once the new trains have “bedded in”, considerably improved asset utilisation should be possible due to:
 - greater reliability - reliability targets of 40,000 miles per casualty are planned within 12 months;
 - higher availability - 20 out of 23 units should routinely be available for service;
 - longer range – CAF units can cover 3 times the mileage of class 80/450s between fuelling;
 - improved traction performance – reducing ‘point to point’ timings – potential to save a unit on the Larne route.
- **Improved service punctuality and reliability** – resulting from reduced rolling stock related delays, including incidence of wheel-slip related delays (new trains will be equipped with anti-slip traction control).
- **Improved traction performance** – with a much higher power/weight ratio, reduced journey times will be possible on the Portadown, Bangor and Larne routes (subject to infrastructure improvements). On the Londonderry route, the scope for journey time improvements is constrained by the physical limitations of single line operations, where timings at passing loops are a critical factor. However, reduced running times will assist in improving service reliability on the Londonderry line even if only modest *end-to-end* journey time savings are achieved.
- **Flexibility** - with all vehicles powered, there is the potential to re-configure some units into 2 and 4-car formations.
- **Comfort** – Although the CAF units will have the same seating capacity as the Class 450 fleet, they will offer a step-change improvement in the ambience and quality of the passenger environment.
- **New timetable** – As a result of the improved performance and availability of the new trains, NIR has a draft enhanced timetable providing 28% more train miles and offering improvements in frequency and journey time on a number of routes (this development timetable will be subject to refinement and modification following detailed on-going market research, public consultation and operational analyses).

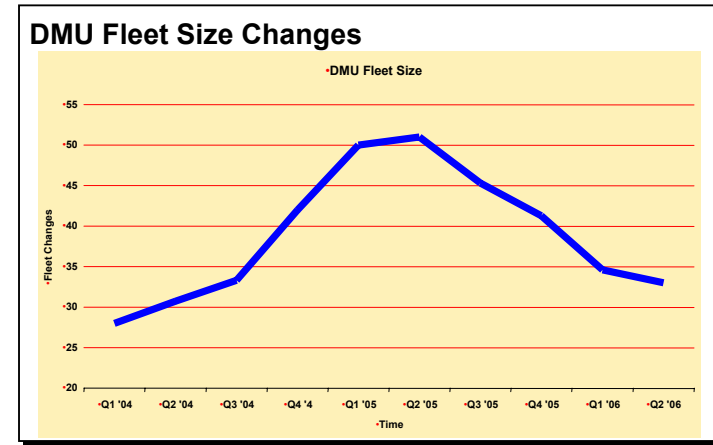
Even following the delivery of the new CAF fleet there are other key decision points which will require evaluation in the short term



The new DMU fleet will arrive before the proposed new depot at Fortwilliam will be ready, therefore ‘workarounds’ need to be planned



Note: Capital costs associated with these proposed investments are detailed on page 87 of this report.



DMU Workaround Issues

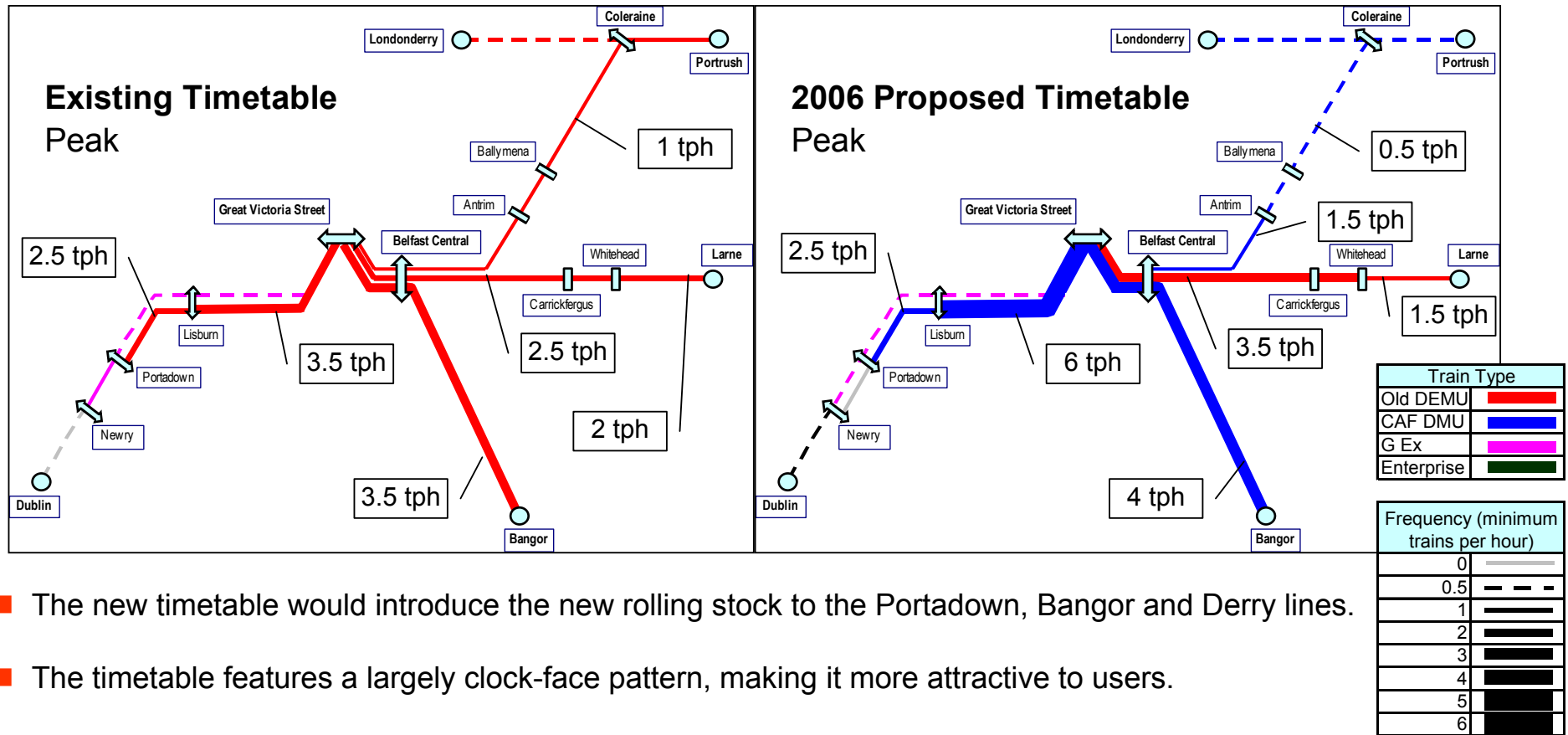
- DMU Fleet changes from 28 in March 2004 to peak of 51 in Feb 2005, before coming back to steady state of 33 in Feb 2006
- This will require increased stabling, fuelling and CET facilities for train preparation
- There will also be ‘pressure’ on maintenance at York road facility as reception, commissioning, testing of new DMUs as well as running of Class 450s & remaining Class 80s.



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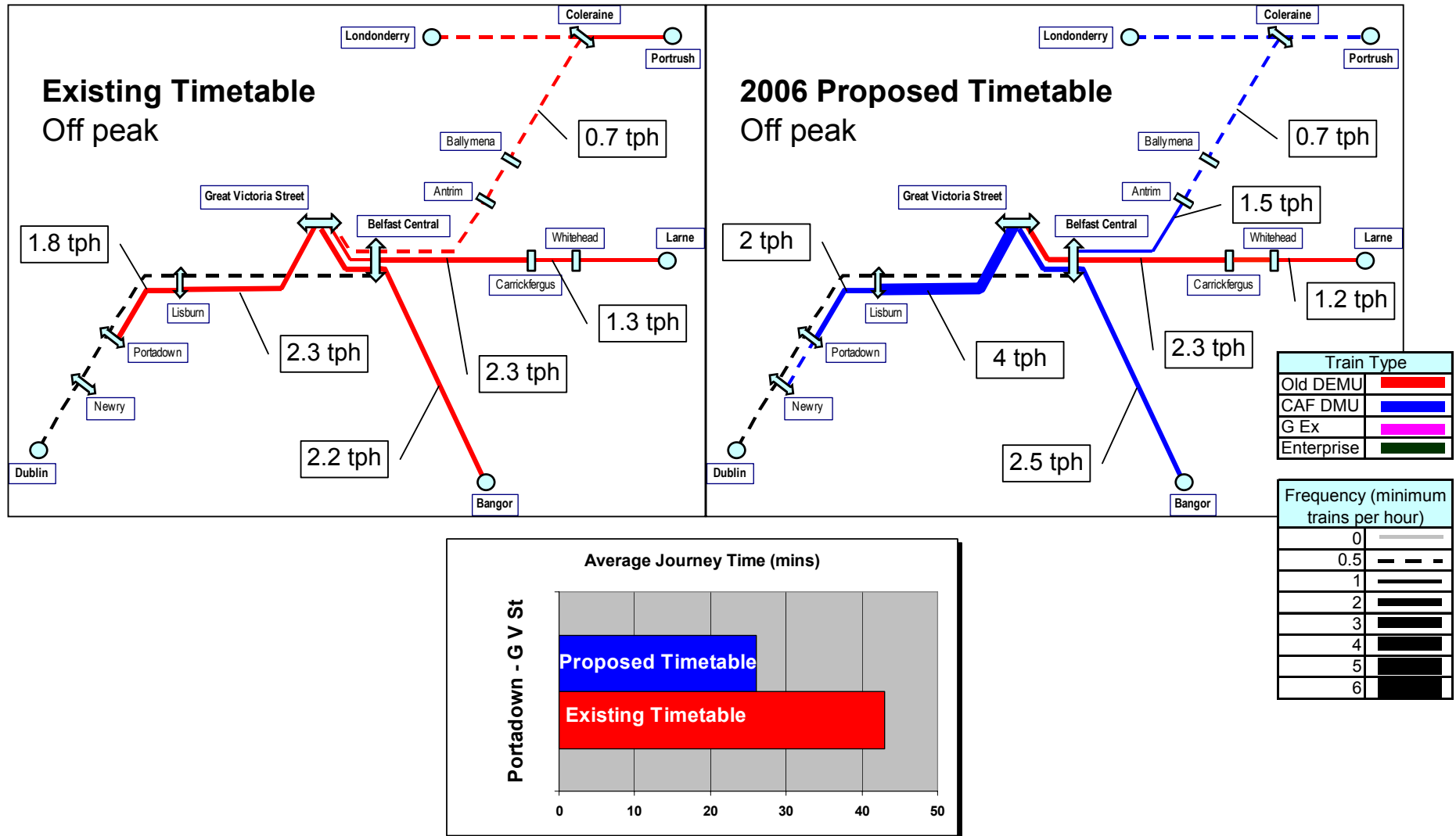
A draft new timetable* has been proposed for introduction following commissioning of the new CAF DMUs



- The new timetable would introduce the new rolling stock to the Portadown, Bangor and Derry lines.
- The timetable features a largely clock-face pattern, making it more attractive to users.
- Increased capacity would be provided between Belfast and Lisburn, Bangor and Whitehead.

* This concept timetable / development timetable involving deployment of new CAF DMUs and Class 450 units will be subject to additional analysis as well as being subject to market research and public consultation that will be undertaken during 2004. **For this strategic review, it was however necessary to have in place a ‘starting position’ in order to estimate the range and magnitude of the likely impacts, costs and benefits associated with the upgraded fleet and new service offering.**

Off peak, the main benefits are additional services to Lisburn and potential journey time reductions on the Portadown line



The scope of benefits offered by a new timetable using the new trains is constrained by the size of the fleet and capability of the infrastructure

- With a fleet of 23 new CAF units, a maximum of 20 units can be reliably deployed for peak service. The residual fleet of 9 Class 450 units would offer up to another 7 units for peak service, although the maintenance needs of these aging vehicles may make even this difficult to achieve.
- NIR propose to deploy the Class 450 units on the Larne line in order to provide higher comfort levels on the Londonderry line. (It is noted that less reliable Class 450s would be a higher performance risk if they were to operate the single track route to Londonderry).
- Some peak services require more than 3-car formations, but incompatibility between the two fleets means that ‘strengthening’ CAF units with Class 450 units in the peak will not be possible.
- The improved performance of the CAF units cannot be fully exploited to offer significant journey time improvements on the Londonderry line because of the absence of passing loops at critical locations on the single line route.
- Capacity and performance in the central section may be further constrained by mixed operation of Class 450 and CAF DMUs between Belfast Central and Great Victoria Street, where the poorer acceleration and braking capacity of the former becomes the limiting factor.

As noted earlier, the new timetable is currently under development. The timetable that will actually be implemented in 2005 will be subject to input from market research, public consultation and operational analysis / modelling.

There is a recognition that the draft timetable does little to exploit the opportunities of improving the service offering on the Ballymena-Belfast corridor

- 3 draft clock-face timetables have been examined*:
 - Option A: Half hourly to Ballymena/ two hourly to Coleraine and Londonderry;
 - Option B: Half hourly to Coleraine and Londonderry;
 - Option C: Half hourly to Ballymena/ hourly to Coleraine and two hourly to Londonderry.

- The analysis included the following steps:
 - mapping the timetables graphically to identify potential conflicts;
 - comparison of point to point timings with existing timings and simulated timings prepared by CAF;
 - analysis of rolling stock set workings, turnaround times and potential recoverability;
 - comparison of options of terminating at Belfast Central or Great Victoria Street;
 - consideration of rolling stock deployment options to achieve the desired service levels with the existing fleet;
 - consideration of priorities for enhanced infrastructure (double tracking/passing loops).

* It is acknowledged that these timetables as presented were at a draft stage and provided as *indicative only*.

Initial conclusions are that it would be possible to schedule half-hourly services to Ballymena and hourly services to Coleraine, but operability would be highly sensitive to service perturbations

- Although conflicting movements on the single line and some very tight turnarounds for the rolling stock workings have been found, Options A and C could, with some relatively minor adjustments, be made to work within the constraints of the existing infrastructure.
- Option B, however, proved more problematic due to the difficulty in aligning services at the passing loops. It was concluded that this option would not be practical without additional double track sections.
- Options A and C would both require 7 CAF units (including one unit to operate the Portrush shuttle) to operate the service either to Belfast Central or to Great Victoria Street. This would require 2 CAF units to be transferred from other routes. These could be obtained without reducing service levels by removing the peak strengthening units from the Bangor line, but there could be an overcrowding problem on that line as a result.
- There would be some slight increase in journey times (up to 5 minutes) as a result of the timing adjustments identified. However, additional recovery time may also need to be built in order to provide some degree of resilience to perturbations.
- Ideally, half hourly services to Ballymena would warrant double tracking the entire route between Monkstown and Ballymena. Priority for double tracking would be between Monkstown and Mossley West and extending south from Ballymena and Coleraine. Whilst additional passing loops would also be useful at the mid points between Ballymena, Killagan and Cullybackey they would be costly in terms of signalling and switch and crossings and may be less cost effective than extending double track over longer sections.

Another variant to Option A was also considered where the service would terminate at Coleraine with separate shuttle services to Portrush and Londonderry operated by retained Class 80s

- This variant to Option A could be achieved with just 5 CAF units, but would require 3 Class 80 units to operate a 2 hourly connecting shuttle to Londonderry and a half hourly shuttle to Portrush.
- With an additional spare unit, 4 Class 80 units would need to be refurbished and life extension works carried out. The cost of this has not been assessed, but is likely to be in excess of an average of £50,000 per vehicle (i.e. 4 x 2-cars = £400,000+).
- There would clearly be disbenefits for Londonderry – Belfast passengers by the forced interchange and a journey time increase of 10 -12 minutes (120 minutes Londonderry – Belfast Central).
- This option would incur marginally higher operating costs than Option A, but would enable 2 CAF DMUs to be retained for Bangor line peak strengthening.



NIR Comparative Performance

Data used in the comparative analysis obtained from various sources:

- Rail Monitor 2003
- Strategic Rail Authority
- Scottish Executive
- Department of Infrastructure, Victoria
- Jane's World Railways 2001-2002
- <http://www.ed-u.com>
- <http://en.wikipedia.org>
- <http://www.nationmaster.com>
- <http://www.abs.gov.au/ausstats>
- <http://www.infoplease.com/countries.html>

Northern Ireland Railways compares generally well against a number of its peer group members in terms of broad performance indicators

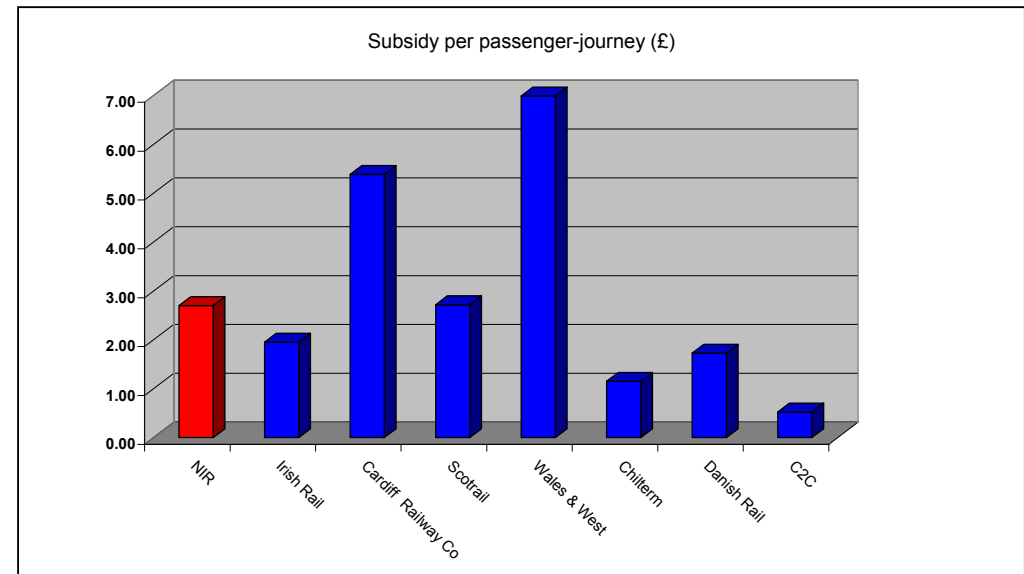
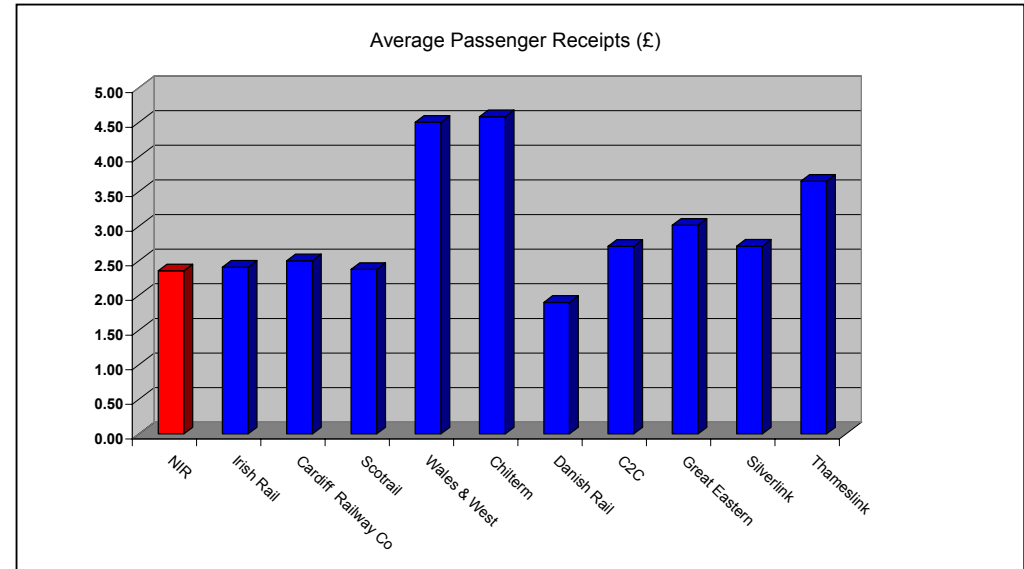
- Average passenger receipts on NIR are low by GB comparator standards.
- Average passenger receipts are similar to those in Rol and Denmark.

Note on Benchmarking

Of these railways, only NIR is a fully vertically integrated railway. Hence to determine a reasonably comparable operating cost base the figures need to be adjusted. Basically, most of the other entities are 'above rail' only service providers (e.g. TOCs in GB) - each is charged an access fee to cover the cost of infrastructure provision and maintenance through track access charges. In addition, they also pay a rolling stock lease charge. Both these charges contain a capital element - hence for the purposes of these 'high-level' comparators, this Review has used NIR "Overhead Costs" which includes depreciation.

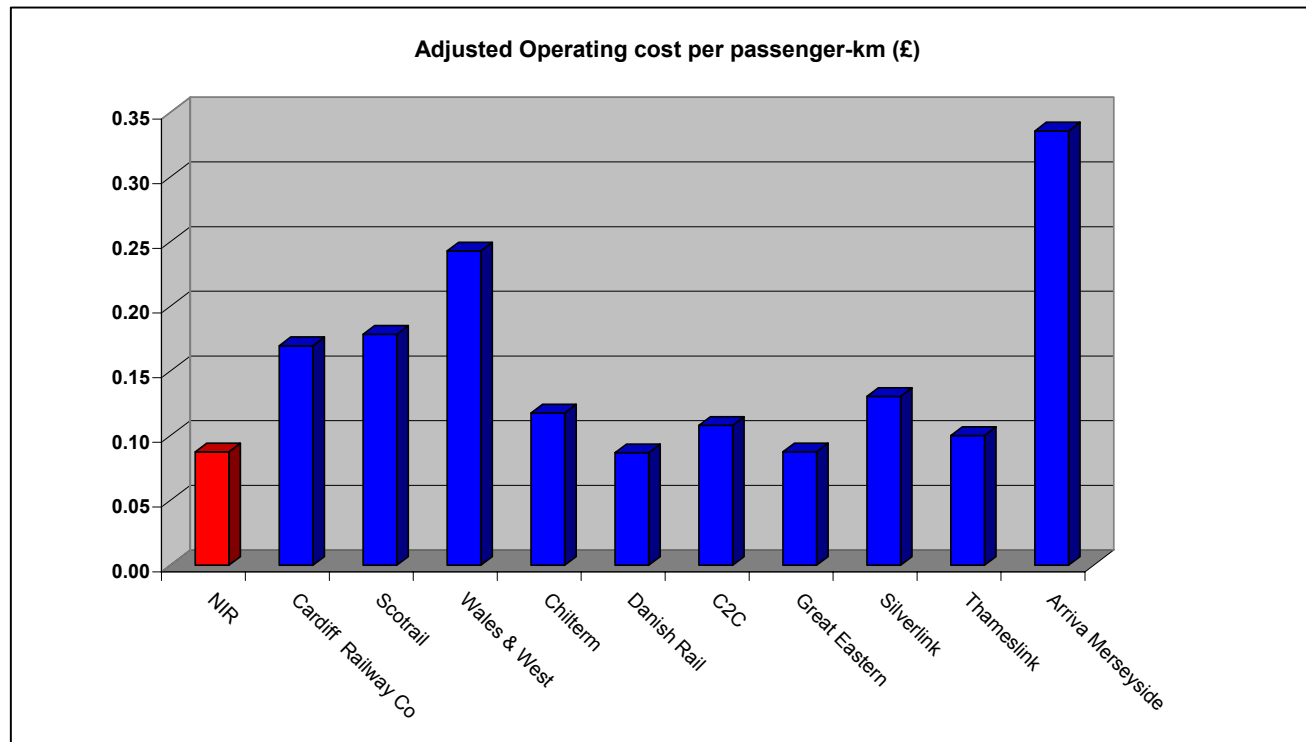
- Average subsidy per passenger is in the 'high' range in its peer group.

Data for NIR and Irish Rail is for 2003. Data for other operators is for 2001/02.



Passenger subsidy compares well with peer group comparators

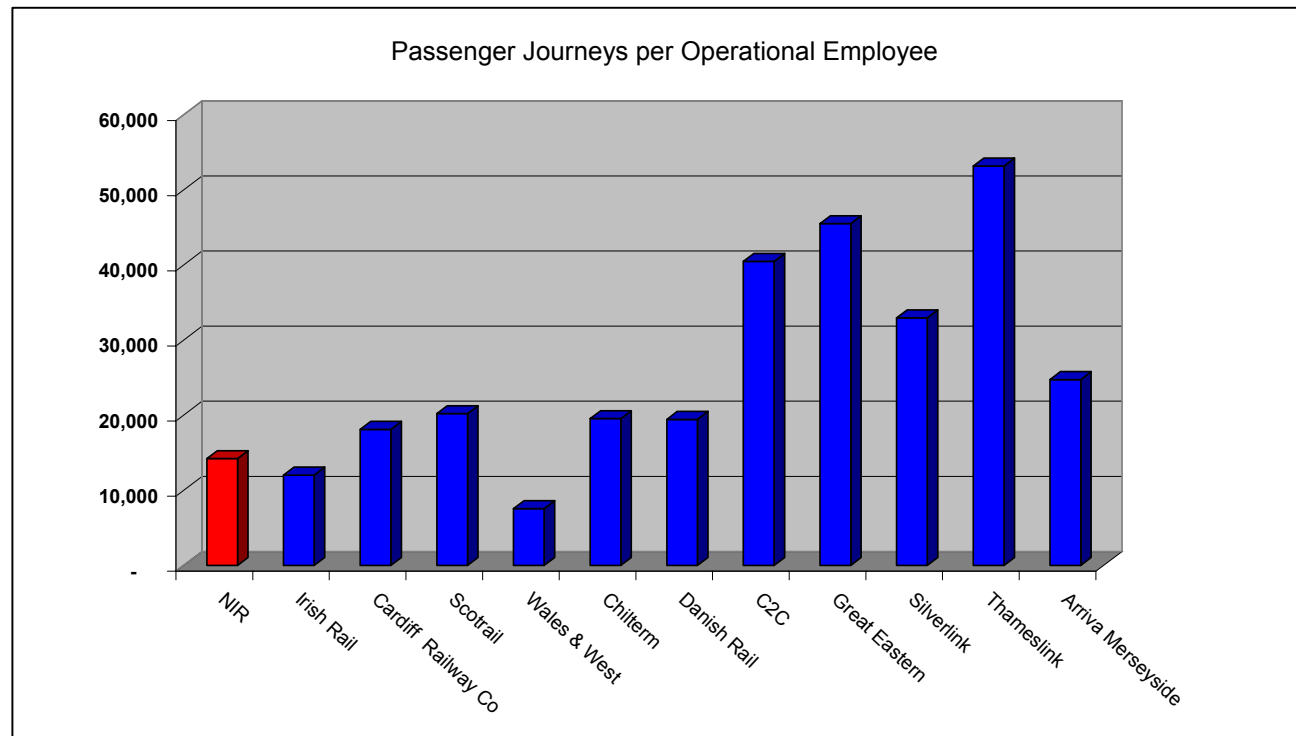
- Operating cost per passenger is lower than those of both Wales and Scotland.



Data for NIR and Irish Rail is for 2003. Data for other operators is for 2001/02.

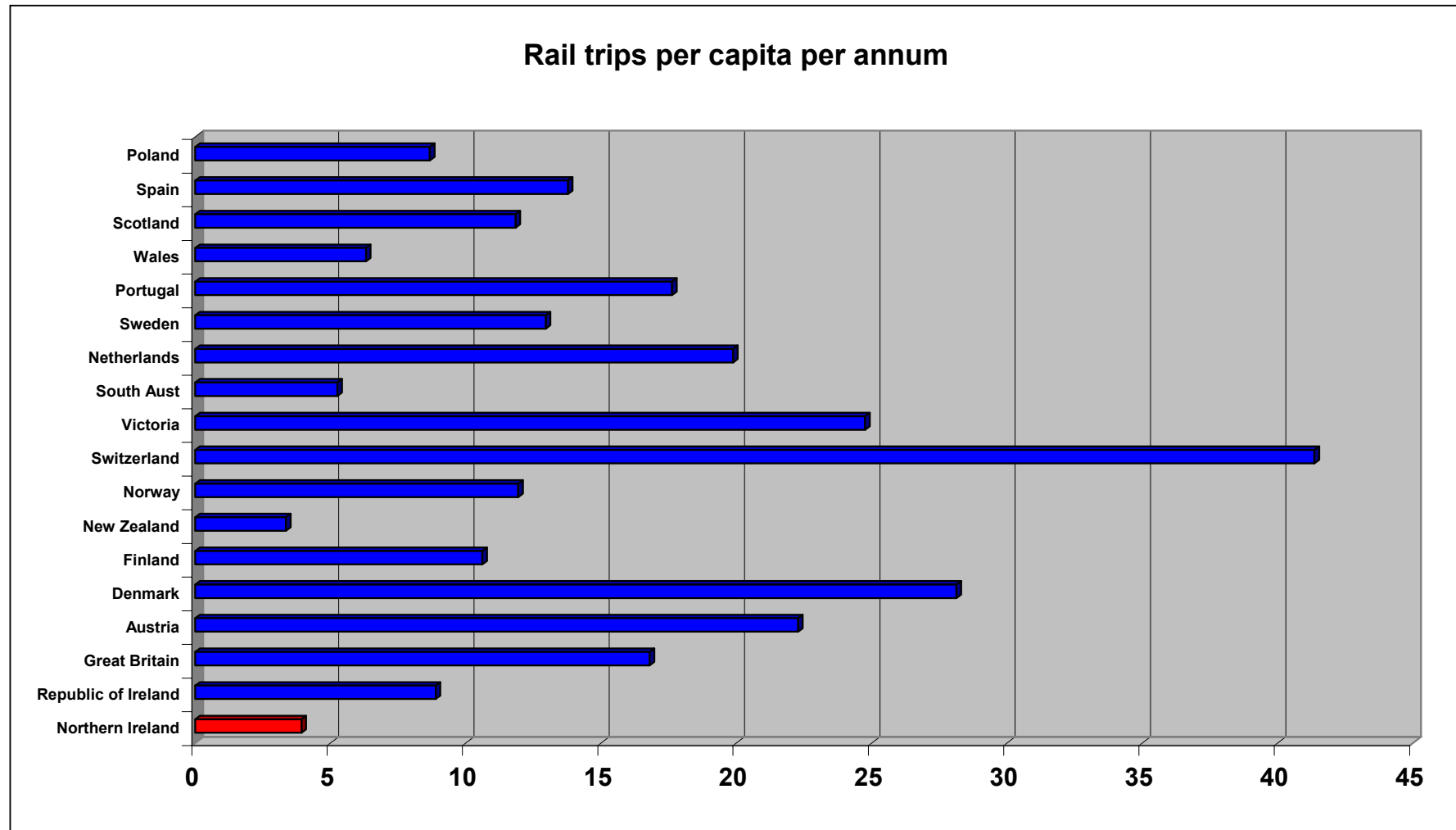
Passenger volumes per employee on NIR are similar to those of a regional / rural railway as opposed to one centred on a major population centre with significant commuter volumes

- Even allowing for scale limitations, passenger journeys per employee appear low on NIR.



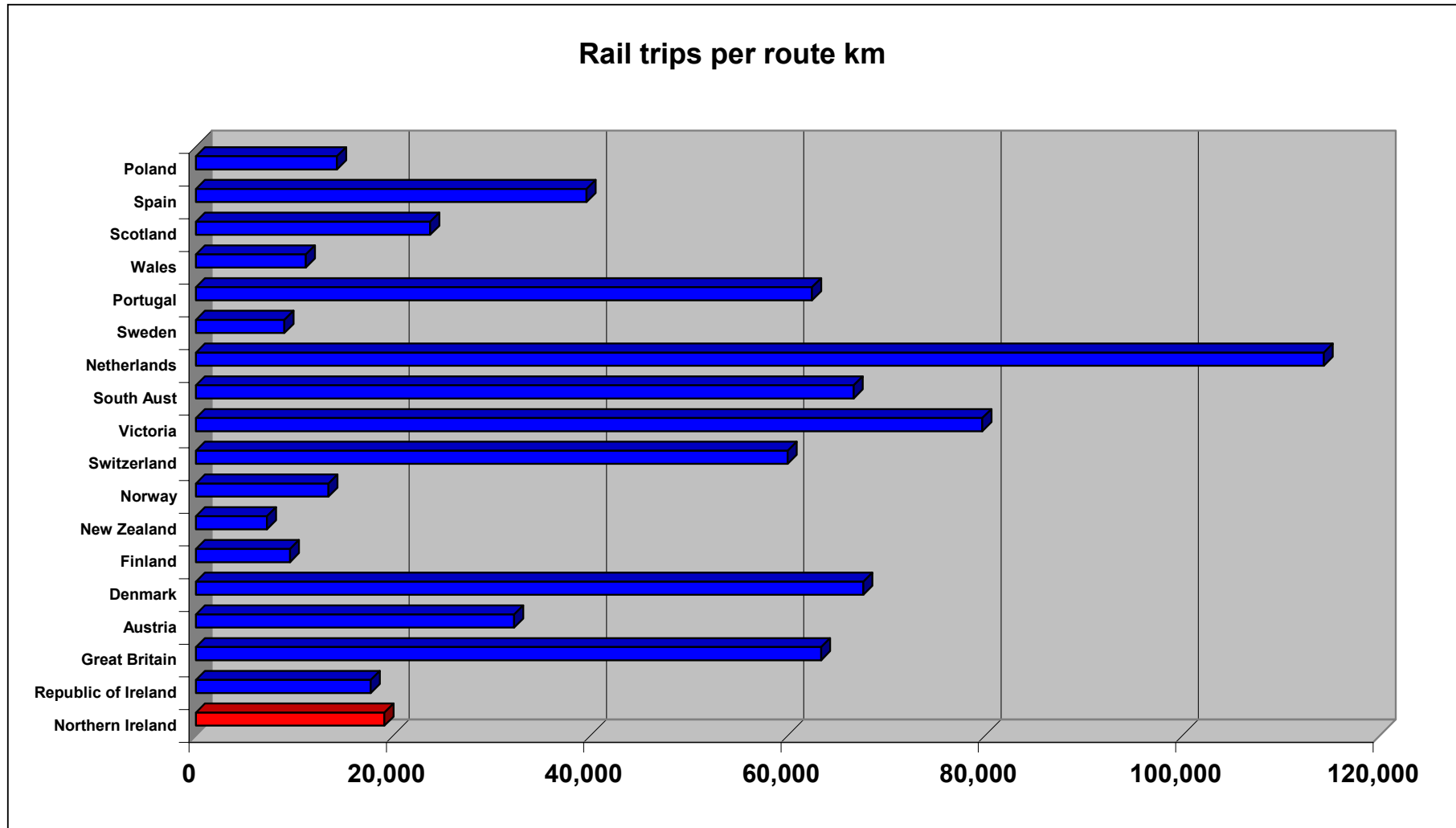
Data for NIR and Irish Rail is for 2003. Data for other operators is for 2001/02.

Aggregate rail usage is low by international standards and compares with small population centres with limited rail networks such as New Zealand and South Australia



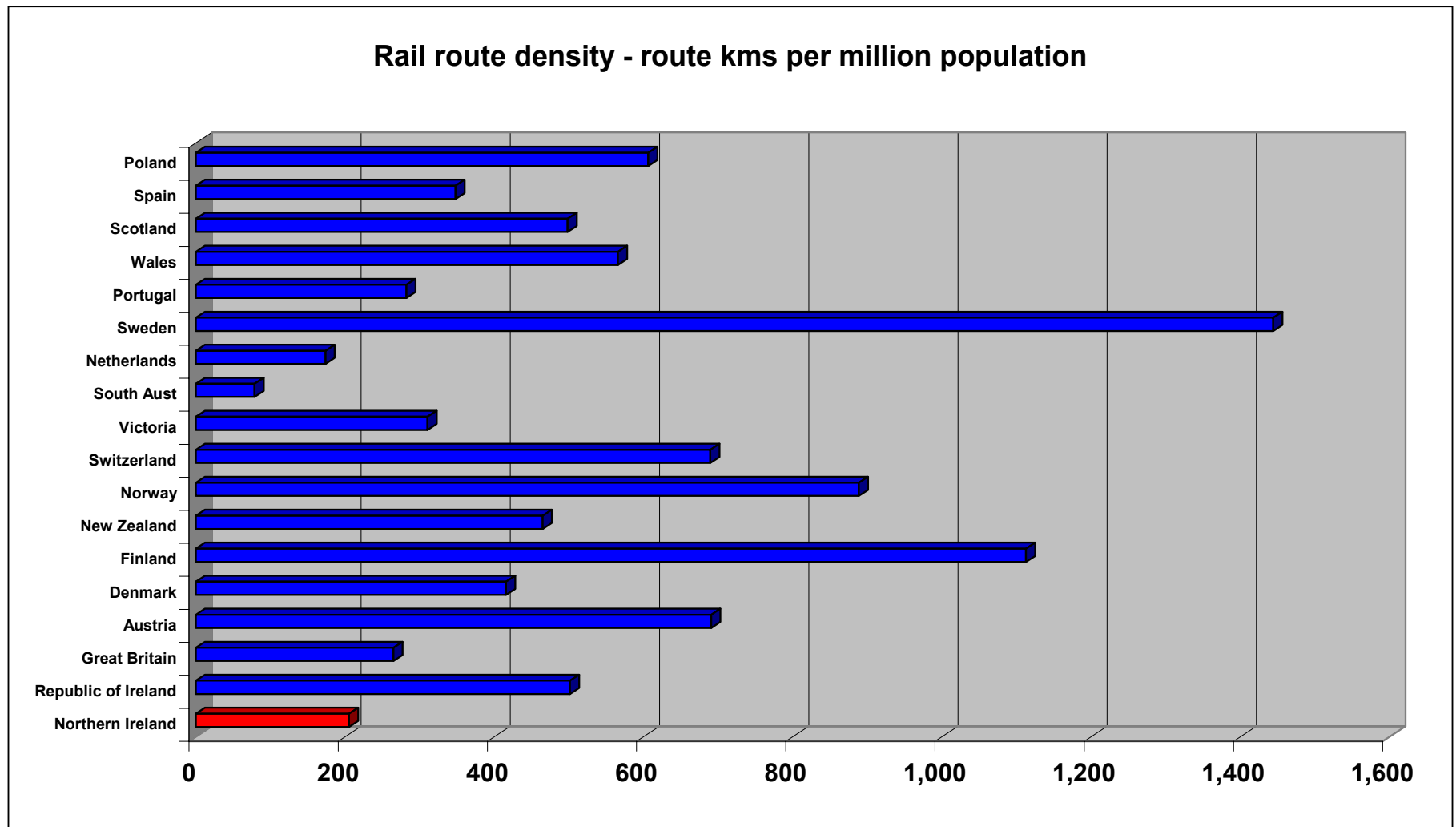
Data for NIR and Irish Rail is for 2003. Data for other operators is for 2001/02.

Rail usage as measured by trips per route kilometre compares well with a number of countries with substantially larger populations and larger rail networks, most notably, Sweden, Finland, Wales and Poland



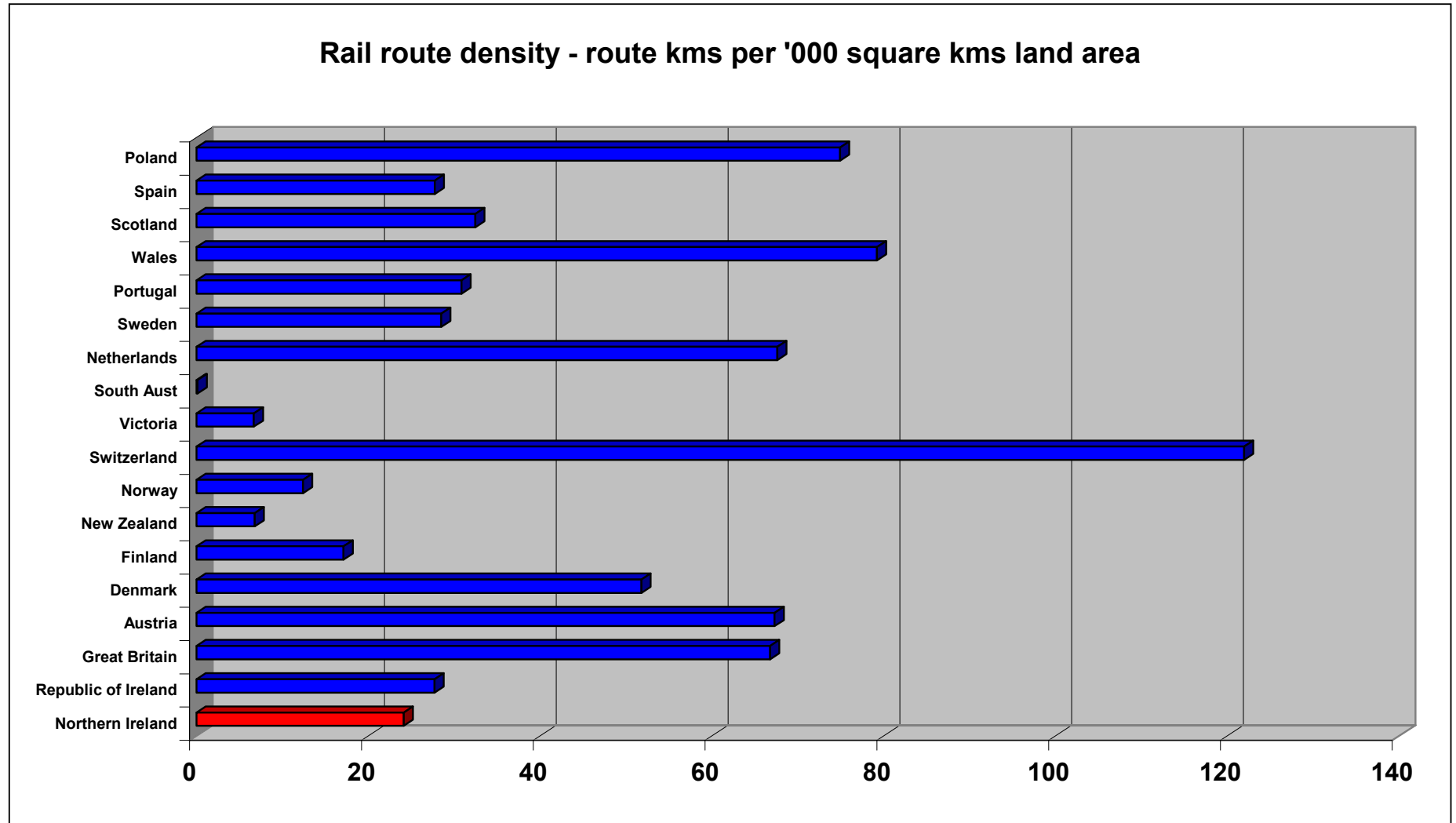
Data for NIR and Irish Rail is for 2003. Data for other operators is for 2001/02.

Northern Ireland has one of the lowest rail network densities in Europe when measured as route kms per million population



Data for NIR and Irish Rail is for 2003. Data for other operators is for 2001/02.

When measured as route kms per thousand km², Northern Ireland's railway is small and thereby limited in terms of scale and density



Data for NIR and Irish Rail is for 2003. Data for other operators is for 2001/02.



Appraisal Framework

- Strategic Context and Need for Expenditure
- Objectives and Constraints
- Options Definition
- Costs and Benefits
- Risk and Optimism Bias
- Appraisal Results

The appraisal framework adopted for this Review is consistent with the HM Treasury *Green Book* ¹ and the *NI Practical Guide* ².

- The key features that have emerged with the new *The Green Book* (2003) include:
 - Use of a 3.5% real discount rate (previously 6%);
 - Increased emphasis on estimating distributional benefits; and
 - Formal incorporation of Optimism Bias estimates for capital and recurrent costs and for benefit streams.
- The NI Practical Guide sets out 10 Steps for appraisal:
 - Strategic Context
 - Need for Expenditure
 - Objectives & Constraints
 - Options Definition
 - Monetary Costs and Benefits
 - Risk & Optimism Bias Adjustment
 - Non-monetary Costs and Benefits
 - Measures of New Economic Worth
 - Ex post Appraisal Activities
 - Results & Conclusions.
- The appraisal for this Review is consistent with the NI Practical Guide ten step approach.
- The appraisal method adopted is **Cost Benefit Analysis** – which quantifies in monetary terms as many of the costs and benefits as feasible, including items for which the market does not provide a satisfactory measure of economic value.
- Supplementary techniques have been used for weighting those costs and benefits that remain unvalued. This is consistent with the GOMMS (Guidance on the Methodology for Multi-modal Studies) in relation to the five objectives for transport – i) environmental impact; ii) safety; iii) economy; iv) accessibility; and v) integration.

1. The Green Book, Appraisal and Evaluation in Central Government, Treasury Guidance, 2003

2. The Northern Ireland Practical Guide to the Green Book, 2003

The strategic context of this Review is the development of a modernised NIR able to increase public transport usage

- Recent patronage growth is a significant improvement on performance in the late-1990s.
- The level of PSO has started to increase significantly in recent years (from £9.3 million in 1999/00 to an estimated £16.4 million for 2003/04).
- Historical under-investment in the network means that NIR's ability to move forward at a significant level is severely constrained unless a 'step change' in capability is implemented.
- New rolling stock is currently being procured at a cost of approximately £80 million which presents an opportunity to increase patronage levels.
- There has emerged in recent years a delineation of the network in terms of "Core" and "Lesser Used Lines" (north of Ballymena and north of Whitehead).
- The A.D. Little review (cited earlier) identified short-comings in infrastructure, *inter alia*, which are being addressed via significant recent and planned capital works.
- Land and transport planning initiatives (e.g. Regional Transport Strategy) place significant emphasis on rail's increased contribution to the NI transport task.

The need for investment arises from the requirement to implement an effective and sustained asset renewals programme, as well as accommodating underlying demand growth and the desire for better ‘value for money’

- The implementation of a long-term assets renewals programme will provide NIR with:
 - An infrastructure functioning consistently at reliable levels of performance;
 - Planning and resourcing certainty; and
 - Life-cycle costing approach to asset management.
- In order to maintain existing levels of passenger service as well as to accommodate increased patronage associated with expanding economic activity, investments will be required in infrastructure, fleet and passenger systems etc.
- Efficiencies will need to be obtained from both the capital and labour employed on the railway if cost per passenger carried is to be lowered. This can be achieved by increasing asset utilisation and achieving productivity gains. The result will be a situation where following appropriate investments, there will be a decline in the difference between marginal cost and marginal ticket revenue; in effect, a reduction in PSO per passenger carried.
- In the absence of investments, the performance of NIR will decline in general and specifically, will not enable opportunities associated with new rolling stock investments to materialise. Declining railway performance will lead to, *inter alia*, decline in patronage growth and increased PSO requirements (in aggregate and on a person passenger carried basis).

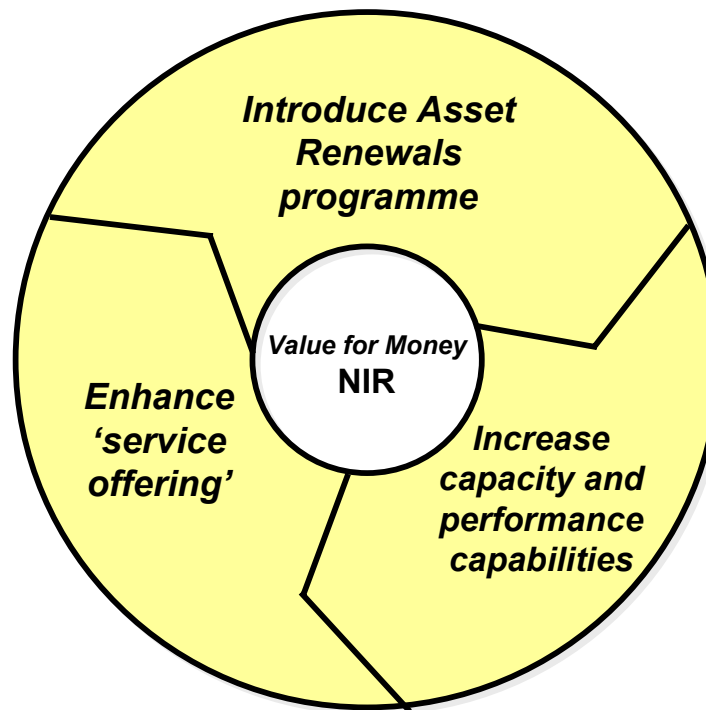


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The overriding objective is an NIR which delivers a better ‘value for money’ service than at present and an NIR that makes a more significant contribution to the NI economy and community in the longer-term

- The specific targets of the investment include: increased patronage growth ‘over and above’ underlying growth, reduced PSO per passenger carried, increased service reliability and improved punctuality.
- The critical path associated with investments on NIR are that benefits will not flow until investments are implemented. Many of the investments involved are ‘lumpy’ investments associated with significant increases in capacity and performance.



Appraisal Framework

- Strategic Context and Need for Expenditure
- Objectives and Constraints
- Options Definition
- Costs and Benefits
- Risk and Optimism Bias
- Appraisal Results

Translink is faced with a number of strategic options for the development of the railway of Northern Ireland

- The ‘status quo’ option (as opposed to the often miss-used term, ‘do nothing’ option) represents the case against which ‘*do something*’ options can be assessed incrementally.
- The ‘status quo’ can also reflect the realistic ‘do minimum’ option.
- In the case of NIR, the ‘do minimum’ option has been defined as:
 - Introduction of timetable and operational modifications associated with new passenger vehicles which will result in changes to service headways and journey times across parts of the NIR network;
 - Introduction of an assets renewals programme for the replacement of life-expired assets with modern equivalent assets. Included within this asset renewals programme are some elements ‘driven’ by legislative commitment such as the introduction of Train Protection Warning System (TPWS)[#] and the provision of enhanced accessibility facilities at stations consistent with the Disability Discrimination Act. Furthermore, the programme includes the removal of accommodation level crossings for safety risk reasons consistent with the recommendations of the AD Little report.
- The ‘do minimum’ option is referred to in this Review as the “**Steady State**”.
- The ‘do something’ option is:
 - Expansion of the service offering of NIR – the “**Expanded Offering**” option (the **Vision Timetable**).^{*}
- An assessment of a “**no NIR**” scenario was also undertaken as was an assessment of closure and mothballing of the “**Lesser Used Lines**”.

[#] Implementation of TPWS is currently under review by Translink / NIR.

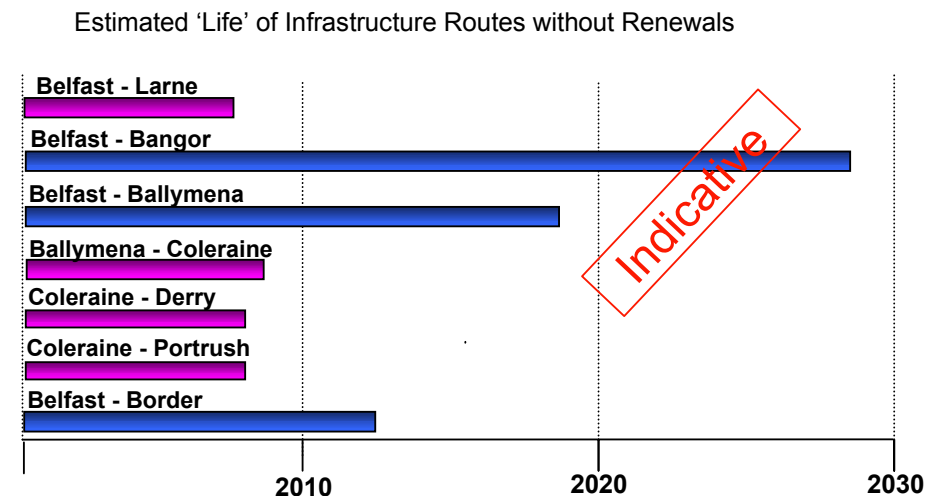
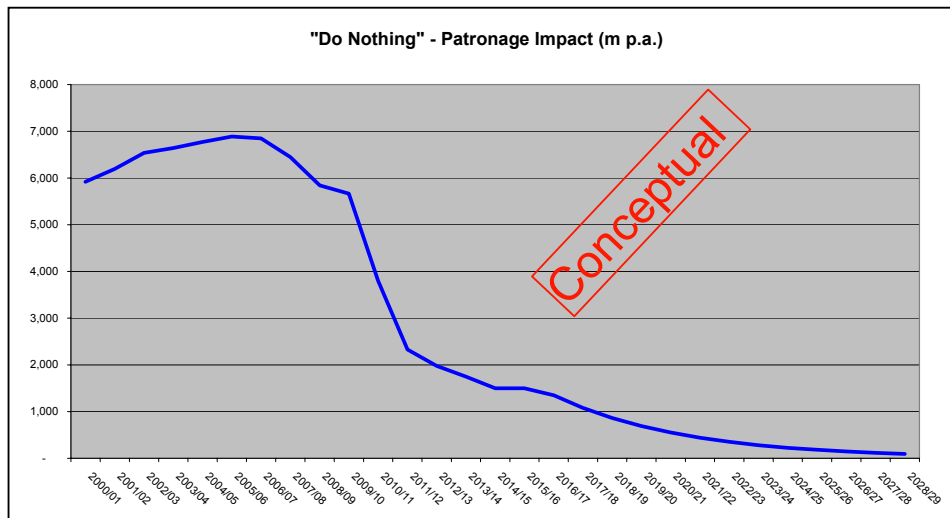
^{*} Assumptions underpinning the “Expanded Offering” are detailed in Appendix C

As part of the Review the so-called “Do Nothing” option was considered

- The *Do Nothing* option can be defined as:
 - Undertaking day-to-day maintenance of the infrastructure and rolling stock; and
 - No investment in renewal of the assets during the twenty five year period of the Review.

- Under the *Do Nothing* option there would be no renewal of assets. In the first instance, targeted maintenance would ensure that the asset can enable satisfactory operational performance. However, as time progresses there will come a point where it becomes more economic to renew the asset than to continue with an ever increasingly high intensity maintenance regime.

- If renewal of the asset is not undertaken at this stage the asset will then pass the “*point of no return*”. This means that maintenance simply cannot address the worsening condition and a major deterioration in reliability and safety is inevitable. When this occurs there will be no option but to close the section of line and / or withdraw the rolling stock units from service.



The ability of the railway to provide reliable services will be severely reduced prior to closing lines or the withdrawal of trains from service

- Prior to closure of a line (or line section) asset performance will suffer. For example, we would anticipate an increase in the number of delays attributable to infrastructure failures across the NI network as well as an increase in train failures. Typical infrastructure failures would include signalling faults, embankment collapses, points failures and deterioration of track quality so that restrictions on line speeds will need to be imposed#. This, in turn, leads to longer journey times, all of which will result in less passengers, reduced revenues as well as a more costly maintenance regime.
- There is a common misperception that the actual rail is the only asset required to be maintained and renewed. Signalling systems, telecommunication networks, earthwork structures and under-bridges supporting the railway and old station roofs all require maintenance and periodic renewal.
- Given the age of the network, it is more likely that a station closure due to the collapse of a station roof could be more disruptive to services than an increase in broken rails or the failure of an embankment such as the failure on the IR Network shown in the picture opposite which closed a section of the Dublin to Sligo line for 6-8 weeks in 2001.



Embankment failure on the Sligo line near Ballymoate 2001.

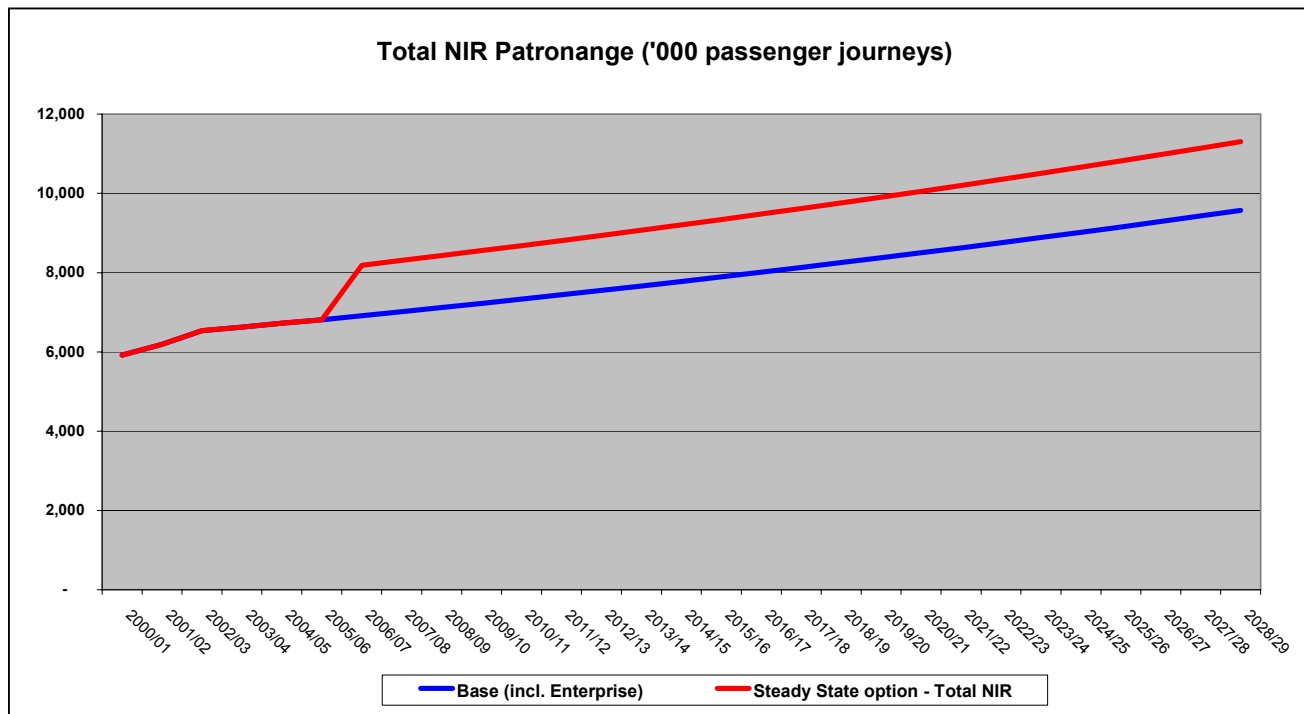
Speed restrictions are imposed as a direct result of the line not being safe to operate at higher speeds (i.e. a risk reduction measure).

The move towards a Railway Safety Case regime driven by the recent Railway Safety Bill will ‘raise the bar’ with respect to the management of the railway’s assets

- The Railway Safety Bill is due to be enacted in 2005. NIR will, in accordance with this legislation, be required to produce a Safety Case.
- According to the Explanatory and Financial Memorandum on the Railway Safety Bill, the safety case will serve two purposes:
 - *“to give confidence that the operator has the ability, commitment and resources to properly assess and effectively control risks to the health and safety of the staff and general public;*
 - *to provide comprehensive working documents to provide evidence that the accepted risk control measures and safety management systems have been properly put into place and continue to operate in the way they were intended”.*
- Safety Cases are now common in many railways throughout the world following adaptation from other “hazardous” industries.
- In addition, the EU Technical Specifications for Interoperability for conventional rail (i.e. not high speed) are also expected to impose requirements on all railways with respect to, for example, dealing with cross border interoperability; the issuing of safety certificates; the recognition of other member states safety certificates; setting down rules for accident investigation and the creation of bodies to investigate accidents.
- Given these changes it is unlikely that a *Do Nothing* option i.e. a plan not to undertake any renewal of assets, would ever gain the appropriate approval.
- It is also highly probable that the new safety case regime would ensure that the railway is scaled down a lot quicker than might have been the case a number of years ago. Railway engineering staff may well have less discretion than in the past and could be forced to take mitigating action if funding is not delivered or risk being in breach of NIR’s Safety Case.

Modest economic activity growth will underpin base passenger demand growth for NIR in the absence of any explicit operator stimulation

- The underlying demand growth (i.e. growth associated with expanding economic activity)¹. indicates an expectation of growth of approx. 48% over the next 25 years (from 6.5 million journeys to 9.6 million in 2028/29) – a rate of 1.48% p.a. compound.
- The introduction of the new CAF trains will add significantly to the underlying growth; with patronage expected to grow from 6.5 million in 2002/03 to 11.2 million (72% increase) – this translates to a 2028/29 patronage level 17% higher than the 2028/29 base.



Base refers to underlying growth associated with expanded economic activity in the absence of any changes to service patterns and operations.

In line with DRD advice, average annual economic growth, as measured by GDP, of 2.0% modelled. Growth was also modelled at 2.25% p.a. to arrive at a BAH Case. Incomes elasticity values sourced from Passenger Demand Forecasting Handbook, 2002 and Iarród Éireann research. Demand elasticities with respect to changes in headways, in-vehicle time and fares obtained from "Translink Demand Elasticities Study", Final Report, Oscar Faber, December 1999.

The slope of the demand curves reflects that no positive 'impacts' associated with the introduction of new trains is incorporated in the forecasts until the first full year of service.

More detail on assumptions used in the appraisal are contained in Appendix A.

Long-term patronage forecasts have been prepared for a number of scenarios

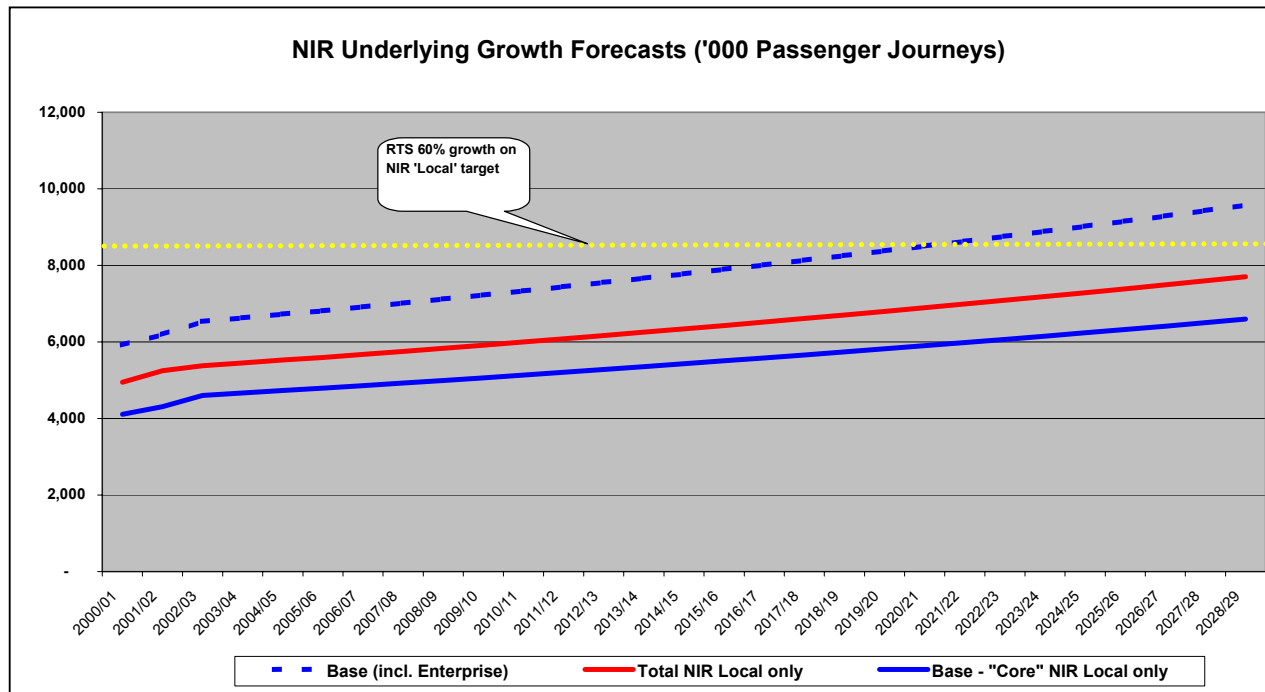
- For demand modelling purposes, and to aid in business decision-making, disaggregated forecasts have been prepared adopting the following definitions:
 - Total NIR
 - NIR “Core” only
 - NIR “Lesser Used Lines”
 - Total NIR less *Enterprise* (NIR Local)
 - NIR “Core” less *Enterprise*.
- The cross-border *Enterprise* service operating between Belfast and Dublin is a very different product and operation from the ‘local’ rail services of Northern Ireland. The market for the *Enterprise* is markedly different from the ‘typical’ customer profile of the NIR ‘local’ services. Over half (53%) of *Enterprise* travellers are on business with the remainder travelling for leisure and other purpose.¹
- The following scenarios have been modelled:
 - Underlying growth for NIR (i.e. growth associated with an expanding economy – increased population and increased NI income) - the “Base” – Total NIR, NIR “Core” only and NIR “Lesser Used Lines”².
 - “Steady State” (i.e. growth associated with the “Do Minimum” option ‘over and above’ the “Base” – the introduction of the new CAF train sets and the subsequent operational and customer benefits that this will bring such as reduced journey times and better frequencies. These have been prepared for Total NIR, NIR “Core” only and NIR “Lesser Used Lines”.
 - “Expanded Offering” – growth associated with a radial change in service offering (high peak and off-peak frequencies, improved operating speeds and extended weekday and Sunday operating hours).

1. Enterprise Service, Customer Satisfaction Monitoring 2002 – Final Report, MORI / MRC, April 2003

2. “Lesser Used Lines” has been defined as per the Railways Review Group, i.e. north of Ballymena and north of Whitehead

The level of long term patronage for NIR associated with underlying growth in economic activity will not be sufficient to meet public policy transport targets

- The “base” growth forecast (i.e. underlying growth only) indicates Total NIR patronage rising from 6.5 million in 2002/03 to 9.6 million in 2028/29 – a rate of 1.48% p.a. compound.
- Total NIR ‘Local’ (i.e. without *Enterprise*) is expected to rise from 5.4 million to 7.5 million – a rate of 1.4% p.a. compound.
- NIR “Core” Local only (i.e. without *Enterprise* and without “Lesser Used Lines” is expected to rise from 4.7 million to 6.4 million – a rate of 1.4% p.a. compound
- The “Lesser Used Lines” account for approximately 12% of the Total NIR market and 17% of the Total NIR “Local” market.



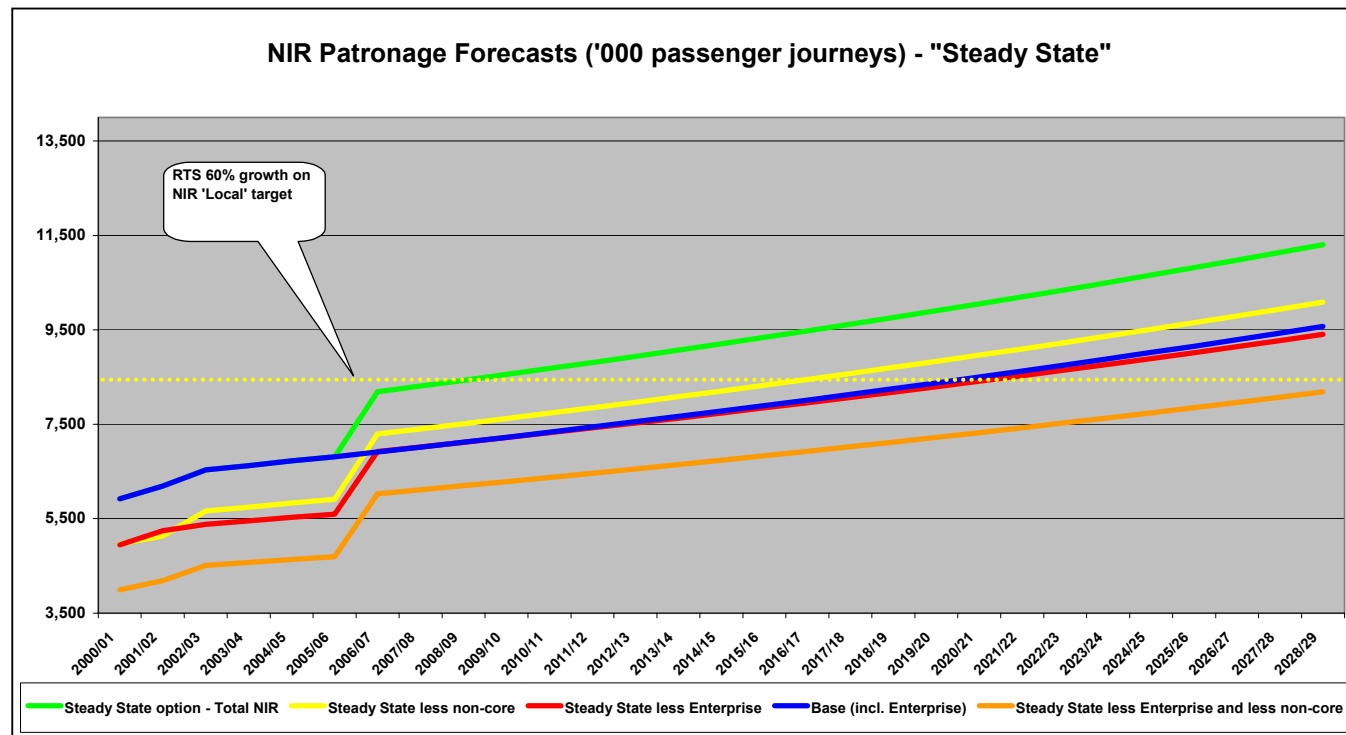
Currently one-in-three users of the NIR network are students. The majority of these will be using stations such as Portrush, Coleraine, Botanic and Jordanstown. Furthermore, some 11% of NIR customers are retirees mostly expected to utilise services into GVS and Belfast Central. These socio-economic profile statistics will be updated in the recently commissioned market research and may provide an indication of those parts of the NIR network that are serving the broader social good.

The “Steady State” option provides a mix of enhancements and reductions in service levels across the NIR network

	Peak Service Headways	Peak Journey times
Bangor Line	12% better	3% better
Newry Line	19% worse <small>(incl. 100% worse to Newry)</small>	18% better
Larne Line	8% better	4% worse
Londonderry Line	8% better	12% better
Portrush Line	200% worse	No change
X-border	No change	No change

The “Steady State” option indicates a substantial uplift in NIR Local patronage ‘over and above’ the “Base” associated purely with an expanded NI economy

- The “Steady State” growth forecast indicates Total NIR patronage rising from 6.5 million in 2002/03 to 11.2 million in 2028/29 – a rate of 2.16% p.a. compound.
- Total NIR ‘Local’ (i.e. without *Enterprise*) is expected to rise from 5.4 million to 9.3 million – a rate of 2.22% p.a. compound.
- NIR “Core” Local only (i.e. without *Enterprise* and without “Lesser Used Lines”) is expected to rise from 4.6 million to 8.2 million – a rate of 2.4% p.a. compound.



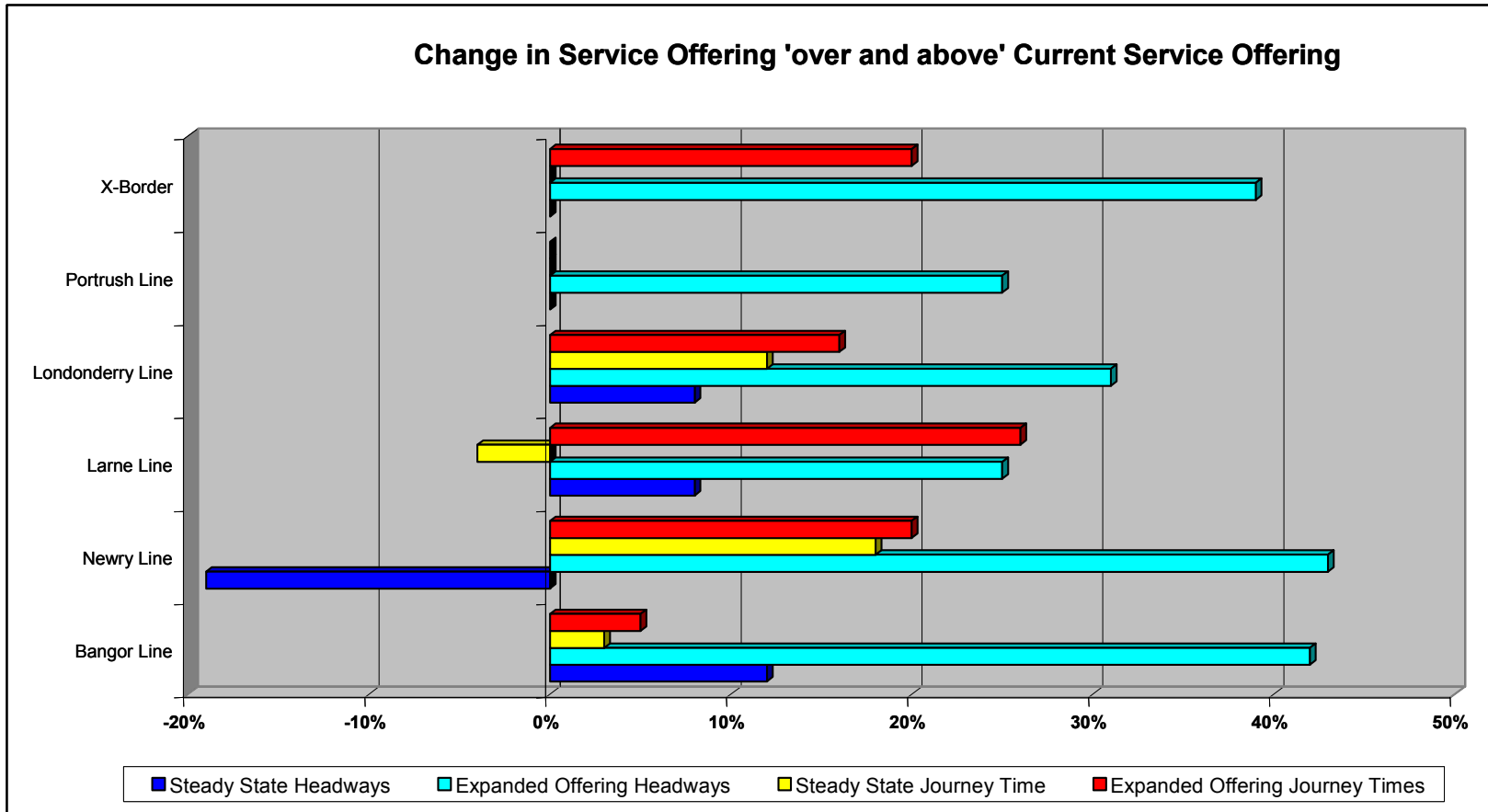
The RTS target of 60% NIR Local rail patronage increase is achieved by 2020/21 – well after the RTS expectation.

The slope of the demand curves reflects that no positive ‘impacts’ associated with the introduction of new trains is incorporated in the forecasts until the first full year of service.

The “Expanded Offering” option provides for a major uplift in service frequencies across the NIR network and for cross-border services as well as significant journey time reductions

	Peak Service Headways	Peak Journey times
Bangor Line	42% better	5% better
Newry Line	43% better	20% better
Larne Line	25% better	26% better
Londonderry Line	31% better	16% better
Portrush Line	25% better	No change
X-border	39% better (hourly all day)	20% better

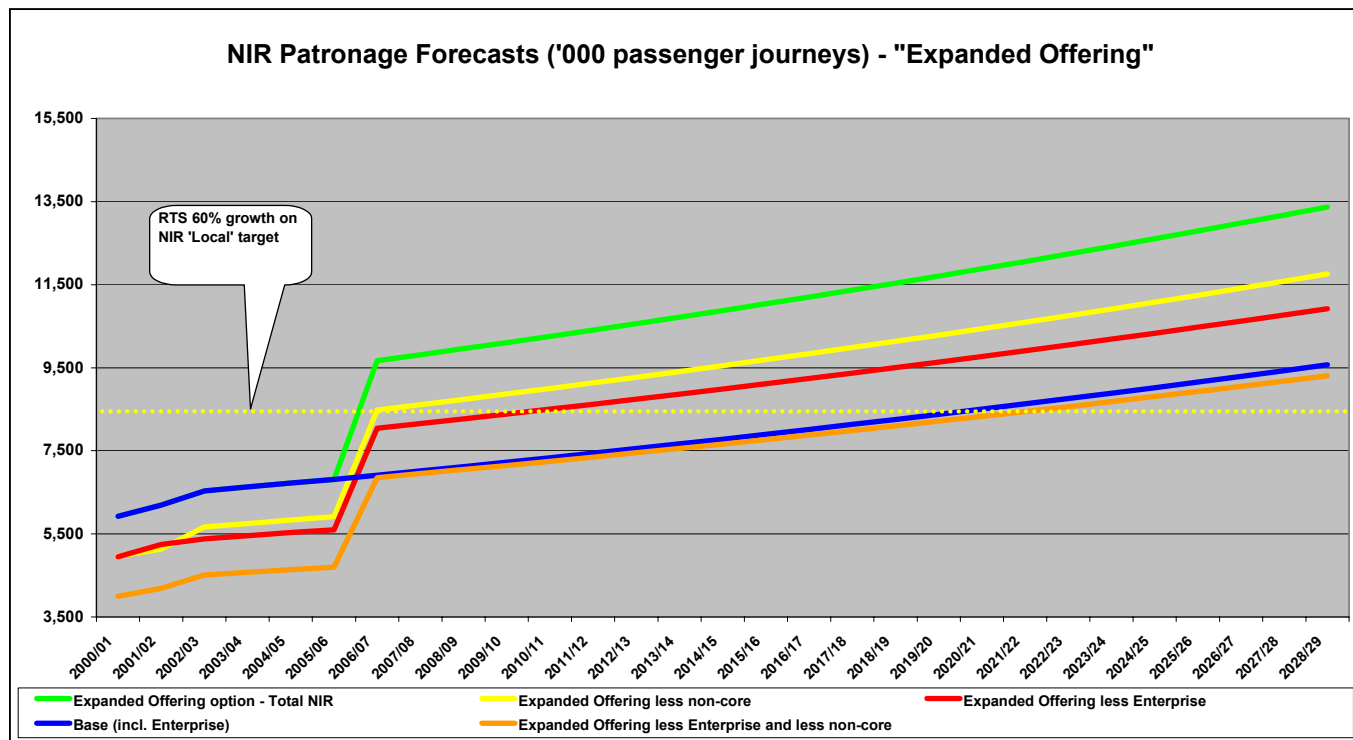
NIR Strategic Review – Appraisal Framework – Options Definition



Under "Steady State" Portrush headways decline by 200% not shown on graph for scale reasons

The “Expanded Offering” option indicates a substantial uplift in rail patronage ‘over and above’ the “Steady State” associated with a radical enhancement in services

- The “Expanded Offering” growth forecast indicates Total NIR patronage rising from 6.5 million in 2002/03 to 13.3 million in 2028/29 – a rate of 3.0% p.a. compound.
- Total NIR ‘Local’ (i.e. without *Enterprise*) is expected to rise from 5.4 million to 10.9 million – a rate of 3.0% p.a. compound.
- NIR “Core” Local only (i.e. without *Enterprise* and without “Lesser Used Lines”) is expected to rise from 4.6 million to 9.3 million – a rate of 3.1% p.a. compound.



The RTS Target of 60% NIR Local rail patronage increase is achieved by 2010/11 – ten years earlier than under the “Steady State” option and ahead of the RTS timeline of 2012.

The slope of the demand curves reflects that no positive ‘impacts’ associated with the introduction of new trains or any of the measures delivering a radically improved service offering are incorporated in the forecasts until the first full year of service.



Appraisal Framework

- Strategic Context and Need for Expenditure
- Objectives and Constraints
- Options Definition
- Costs and Benefits
- Risk and Optimism Bias
- Appraisal Results

The monetary costs and benefits associated with each option have been estimated using standard practice approaches

- Cost categories estimated are:
 - Capital costs, e.g. track / permanent way, structures, earthworks, buildings and level crossings renewals and new capital works;
 - Recurrent costs for train operations, fleet maintenance and infrastructure maintenance;
 - Vehicle operating costs (VoCs) for private cars and buses (resource costs only, i.e. without taxes and duties);
 - Vehicle Accident costs (VaCs) for private vehicles based on changes to car miles on the NI road network and the rate of accidents (by category, e.g. fatality, serious injury, minor / slight injury);¹
 - Environmental costs for private vehicles based on changes to car miles on the NI road network and the rate of emissions (volume by category) and noise costs;² and
 - Increased PSO associated with increased rail passengers.

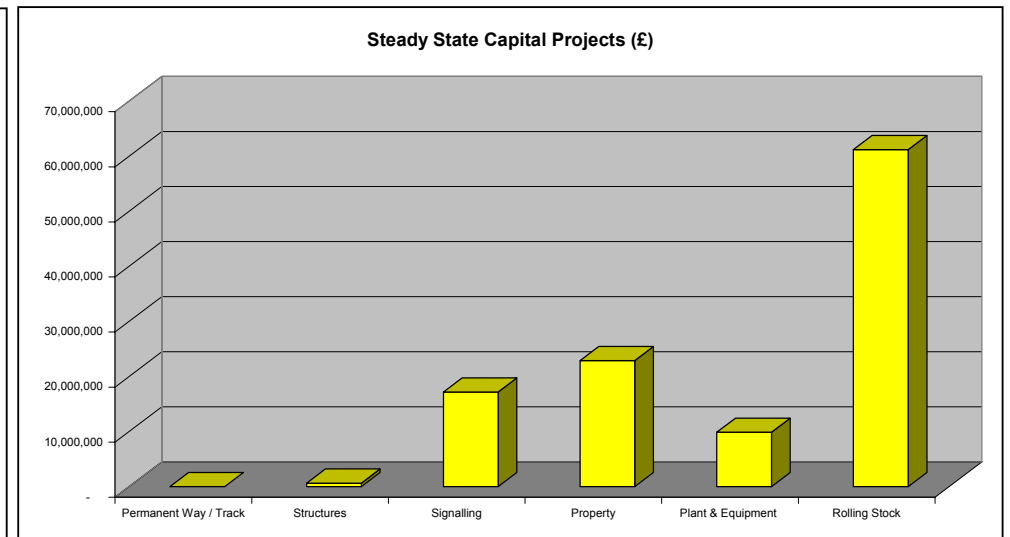
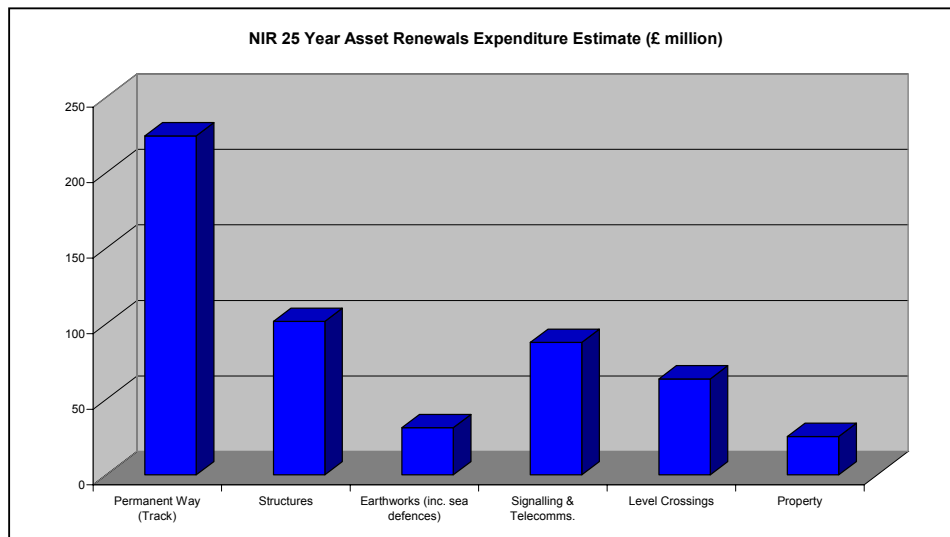
- Benefits that accrue to both existing rail users and others have been estimated. These are:
 - Value of time savings³ (VoTs) based on changes in generalised costs between car and rail;
 - Increased rail revenue;
 - Benefits to existing users in terms of reduced service headways and in-vehicle times;
 - Benefits associated with provision of new passenger rail vehicles, expanded hours of service operation and widespread modernisation of stations;
 - Savings in VoCs, VaCs;
 - Decongestion benefits to road users associated with vehicle miles removed from NI roads; and
 - Residual values for capital assets.

1.2.3. Guidance on methods and values for use have been sourced from: Passenger Demand Forecasting Handbook, August 2002; Transport Economics Note (TEN), Highways Economics Note, No.1, 2002, EU COPERT III environmental data for RoI. Data used in VoC, VaC and environmental estimation has been sourced from PSNI, DfT, NI Statistics & Research Agency and AA.

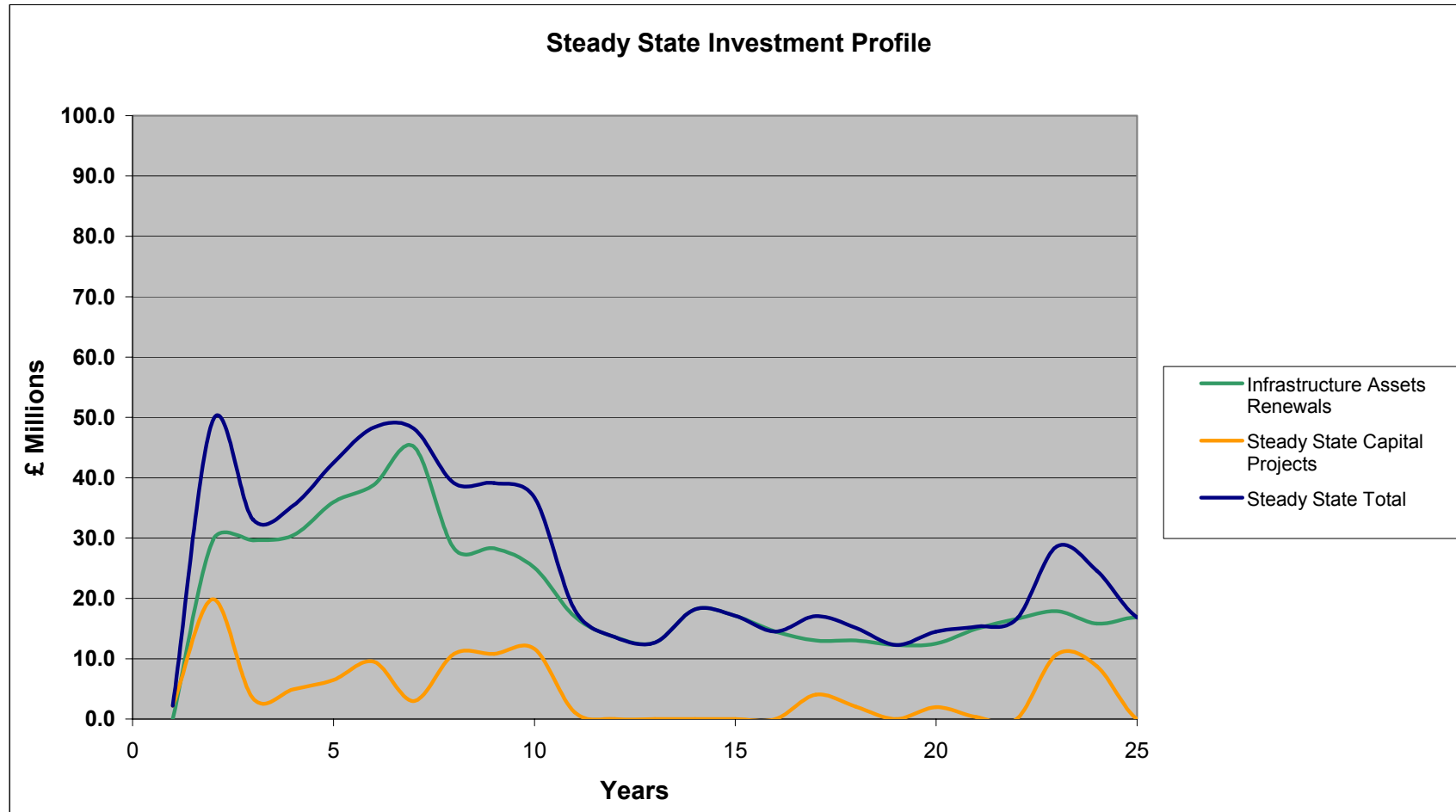
More detail on assumptions used in the appraisal are contained in Appendix B.

The major cost elements of the ‘Do minimum’ option (the “Steady State”) are those associated with putting in place an effective asset renewals programme

- The 25 year total cost (including Optimism Bias factors) for the NIR “Steady State” asset renewals programme is £533 million; an average of £21m per annum ‘over and above’ maintenance.
- New capital items associated with the “Steady State” option are approximately one fifth of the amount associated with a 25 year asset renewals programme for track / permanent way, structures, S&T, earthworks, level crossings and buildings.
- Additional (‘over and above’ current allocations) operating and maintenance costs (O&Ms) over the evaluation period amount to £156 million.



Under the “Steady State” option it is anticipated that the earlier years of the Review period will require the most significant investment ...



..and the quantum of investment required is anticipated to reduce considerably during the second half of the twenty five year period

In order to gain reasonable certainty of resources required for the railway over the 25 year period of this Review, a life cycle cost approach has been adopted

- In essence, this means that costs are determined for the main infrastructure assets on the basis that the assets will have to be renewed in accordance with their individual life cycles.
- Hence, the infrastructure costing model will estimate the cost of renewal / replacement of permanent way every twenty five years. It will not provide an estimate for the cost of complete rebuilding of an earthwork embankment.

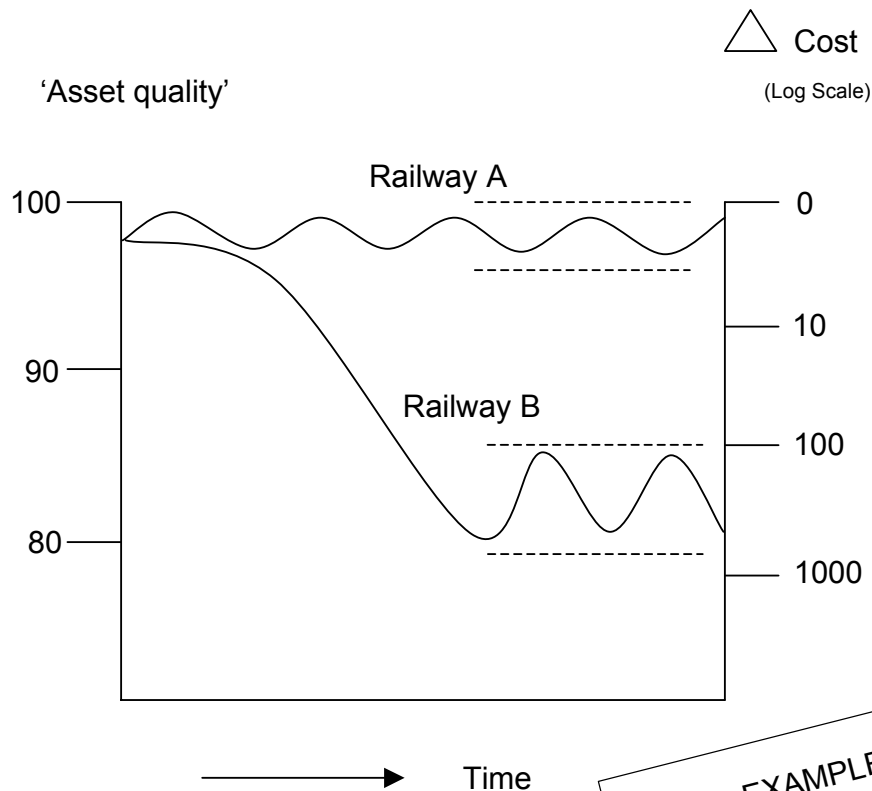
The screenshot shows an Excel spreadsheet titled 'Microsoft Excel - 220104_V1_NIR Review_Infrastructure Renewals Model.xls'. The spreadsheet is organized into columns for years from 2003/04 to 2011/12. It details costs for three stations: Border to Belfast Central Stn, Belfast Central Stn - Bangor Stn, and Belfast (Lagan Jon) - Whitehead Stn. For each station, it lists various infrastructure components like Pwag (Track), Structures, Earthworks, Signalling, Level Crossings, and Property, along with their annual maintenance costs and total renewal costs. The 'Annual Maintenance Costs' row is highlighted in yellow. The 'Life Cycle Cost (Maintenance & Renewals)' row is also highlighted. The spreadsheet includes a '5 year totals' column and a 'Year 0' column for 2003/04. The bottom of the spreadsheet shows a navigation bar with tabs for 'Network Summary', 'Inputs for Demand Model', 'Estimated Budget & Programme', 'Unit Costs Backing Sheet', 'Pwag Cost', and 'Structures'.

	LCC Renewals Cost (£'000s)	Annual Maintenance Cost	Track Miles	Year 0 2003/04	2004/05	2005/06	2006/07	2007/08	2008/09	5 year totals	2009/10	2010/11	2011/12
Border to Belfast Central Stn (inc Spur to Great Victoria Street)			109.78										
Pwag (Track)	£30,564	£1,114	£825	£0	£3,623	£3,623	£3,623	£3,623	£3,623	£18,113	£3,623	£3,623	£3,623
Structures	£30,885	£75	£281	£0	£1,235	£1,235	£1,235	£1,235	£1,235	£6,177	£1,235	£1,235	£1,235
Earthworks (inc. sea defences)	£6,675	£80	£61	£0	£267	£267	£267	£267	£267	£1,335	£267	£267	£267
Signalling	£36,303	£376	£331	£0	£1,452	£1,452	£1,452	£1,452	£1,452	£7,261	£1,452	£1,452	£1,452
Level Crossings	£11,328	£43	£103	£0	£453	£453	£453	£453	£453	£2,266	£453	£453	£453
Property	£22,500	£276	£205	£0	£300	£300	£300	£300	£300	£1,500	£300	£300	£300
Total Renewals Costs	£198,255	£1,965	£1,906		£7,330	£7,330	£7,330	£7,330	£7,330	£36,651	£7,330	£7,330	£7,330
Annual Maintenance Costs					£1,365	£1,365	£1,365	£1,365	£1,365	£6,824	£1,365	£1,365	£1,365
Life Cycle Cost (Maintenance & Renewals)					£9,895	£9,895	£9,895	£9,895	£9,895	£49,475	£9,895	£9,895	£9,895
Belfast Central Stn - Bangor Stn			25.18										
Pwag (Track)	£0	£295	£0	£0	£0	£0	£0	£0	£0	£0	£0	£0	£0
Structures	£4,695	£17	£186	£0	£188	£188	£188	£188	£188	£939	£188	£188	£188
Earthworks (inc. sea defences)	£2,625	£30	£104	£0	£105	£105	£105	£105	£105	£525	£105	£105	£105
Signalling	£3,776	£86	£150	£0	£151	£151	£151	£151	£151	£755	£151	£151	£151
Level Crossings	£4,692	£10	£96	£0	£188	£188	£188	£188	£188	£939	£188	£188	£188
Property	£12,375	£128	£492	£0	£495	£495	£495	£495	£495	£2,475	£495	£495	£495
Total Renewals Costs	£28,163	£526	£1,119		£1,127	£1,127	£1,127	£1,127	£1,127	£5,633	£1,127	£1,127	£1,127
Annual Maintenance Costs					£526	£526	£526	£526	£526	£2,631	£526	£526	£526
Life Cycle Cost (Maintenance & Renewals)					£1,653	£1,653	£1,653	£1,653	£1,653	£8,264	£1,653	£1,653	£1,653
Belfast (Lagan Jon) - Whitehead Stn			31.88										
Pwag (Track)	£28,698	£323	£900	£0	£1,148	£1,148	£1,148	£1,148	£1,148	£5,738	£1,148	£1,148	£1,148
Structures	£25,830	£22	£910	£0	£1,033	£1,033	£1,033	£1,033	£1,033	£5,166	£1,033	£1,033	£1,033
Earthworks (inc. sea defences)	£3,525	£38	£111	£0	£141	£141	£141	£141	£141	£705	£141	£141	£141

Going forward a life cycle cost approach should deliver significant cost savings but it requires a detailed knowledge of asset condition, degradation rate and delivery unit costs

Annual budget driven approach	Life cycle cost (LCC) approach
<ul style="list-style-type: none">■ Maintenance<ul style="list-style-type: none">– Time based intervention– Workload driven by resource availability and annual maintenance budget cap■ Renewal drivers<ul style="list-style-type: none">– Annual expenditure cap– Age, tonnage / work done by component– Resource availability– Availability of access■ Maintenance and renewal interventions based on periodicity and/ or usage criteria■ Higher long term cost; although short-term costs may be lower	<ul style="list-style-type: none">■ Maintenance<ul style="list-style-type: none">– Fluctuating expenditure and resource requirements– Prioritised by location– Workload driven by asset condition/ performance, rate of degradation and cost of renewal■ Renewal drivers<ul style="list-style-type: none">– Asset condition and performance– Maintenance costs– Scope for acceleration and/or deferral of work to gain volume efficiencies■ Interventions based upon measured risk rather than time/ age/ usage criteria■ Fluctuating expenditure and resource requirements■ Lower whole life cost

Getting the balance right in terms of short term and long term costs and volumes of work is essential as the potential recovery costs are very significant – as this Review is clearly identifying is the case for NIR



- Railway A has maintained its assets at steady state whilst managing periodic budget fluctuations;
- Railway A continues to operate within a 'high quality zone';
- Railway B has let asset quality degrade and is now operating within a 'low quality zone';
- Railway B's operating costs are now much greater than before and greater than Railway A; and
- The costs and resources required to enable Railway B to move back to the high quality zone are disproportionately high.

The renewals programme will have an impact on the maintenance spending for the network

- Typically, it would be expected that the maintenance spend would reduce when complemented by a steady LCC renewals programme – it would be expected that it would take a number of years for these benefits to materialise until the average age and condition of the assets has improved sufficiently across the network (lower and higher, respectively). This could take at least five to ten years depending on the rate of investment.
- However, for NIR, it is necessary to examine the specific cost drivers for maintenance such as:
 - Type of maintenance undertaken in the past (preventative and / or corrective); and
 - Labour resources.
- For NIR, it is expected that unit labour costs rates will rise because of the EU Working Time Directive.
- Discussions with NIR engineering staff indicate that a high proportion of historic maintenance has been corrective or reactive as opposed to preventative. For example, the Structures Division has only recently begun to undertake a programme of preventative maintenance for bridges and structures.

.... however, it is not apparent that NIR will achieve any significant short term maintenance gains as a result of increasing renewals spend

Infrastructure asset renewal costs for the “core” are set out in the table below and have been adjusted for Optimism Bias

Line	P.way (track)	Structures	Earthworks (inc. Sea defences)	Signalling & Telecomms	Level Crossings	Property	Totals
Belfast Central Stn – Border	£96.1 m	£33.8m	£8.7m	£36.3m	£11.9m	£9.0m	£195.8m
Belfast Central Stn - Bangor Stn	-	£9.9m	£1.5m	£3.8m	£2.7m	£5.0m	£22.9m
Belfast (Lagan Jcn) - Whitehead Stn	£27.9m	£18.7m	£5.3m	£10.5m	£5.2m	£4.1m	£71.7m
Belfast (Bleach Green) – Ballymena Stn	£27.0m	£10.7m	£1.7m	£11.4m	£10.1m	£0.9m	£61.8m
Total Core	£151.0	£73.1	£17.2m	£62.0	£29.9m	£19.0m	£352.2m

The concept and application of Optimism Bias (OB) is discussed in more detail later in this chapter.

Note: More detailed breakdown of costs are contained in Appendix D.

Infrastructure asset renewal costs for the “Lesser Used Lines” part for the network are also set out for principal assets and for 5 year periods (OB-adjusted)

Line	P.way (track)	Structures	Earthworks (inc. Sea defences)	Signalling & Telecomms	Level Crossings	Property	Totals
Whitehead Stn – Larne Harbour	£9.1m	£2.5m	£3.4m	£3.1m	£1.7m	£2.3m	£22.1m
Ballymena Stn – Derry Stn (inc. Portrush branch)	£64.2m	£25.9m	£10.6m	£22.5m	£31.9m	£4.1m	£159.2m

	5 Year Period 2004/05 - 2008/09	5 Year Period 2009/10 - 2013/14	5 Year Period 2014/15 - 2018/19	5 Year Period 2019/20 - 2023/24	5 Year Period 2024/25 - 2028/29	5 Year Period 25 Year Totals
Whitehead Stn – Larne Harbour	£0.9m	£17.3m	£1.8m	£0	£2.2m	£22.1m
Ballymena Stn – Derry Stn (inc. Portrush branch)	£21.8m	£64.8m	£28.8m	£19.0m	£24.9m	£159.2m
Total Lesser Used Lines	£22.7m	£82.1m	£30.6m	£19.0m	£27.1m	£181.3m

The infrastructure renewals costs quoted include for certain renewal projects within the ‘pipeline’ as well as some safety related and legislative driven projects

- 1. Larne Line renewal - next major project in the pipeline. Estimate of £26.5 million planned for year 2005/06.#
- 2. Property: DDA Accessibility Programme - £4.5 million (inc. OB factor of 50%) - was applied evenly across the stations on the network over the full timescale of the review. Not yet committed but will be required by DDA legislation.
- 3. Level Crossings: Upgrading / removal / elimination of 60 of the highest risk accommodation crossings - £32.3 million (inc. OB factor of 50%) over the full timescale of the Review. Not yet committed but driven by safety requirements.*

Note:

The Review estimate is slightly higher than the total NIR figure of £26.3 million contained within the Economic Appraisal submitted to DRD. Note: the NIR figure includes both a contingency sum of £5.4 million and an additional OB factor of 25.8%.

* Infrastructure Division are due to undertake a re-evaluation of the risks posed by the level crossings – this exercise may result in a change in the number of crossings which require to be addressed.

Cost estimates outlined within the Railways Review Group position report# and the Strategic Safety Review (A.D.Little, 2000) are both estimated over shorter time periods than this Review has taken

Railway Review Group	RRG Report Appendix C 5-year Investment Options “Lesser Used Lines” (capital only)	Note	RRG Report Appendix E 5-year ‘Complete’ Renewal Costs “Lesser Used Lines” (capital only)	Note	Strategic Safety Review (AD Little) – 10-year Costs (in 2004 prices) – Full Network
Minimum Cost Option	£11.1m	Note: No OB Factor applied. This option would <i>de facto</i> renew 5% of the “Lesser Used Lines” track			
Managed Cost Option	£17.3m	Note: No OB factor applied. This option would <i>de facto</i> renew 10% of the “Lesser Used Lines” track			circa £203m
Preferred Cost Option	£34.2m	Note: No OB factor applied. This option would <i>de facto</i> renew 20% of the “Lesser Used Lines” track	£85.6m	Complete renewal costs – No OB factor and No professional fees included – current prices	upper-bound estimate of £268m

- In terms of comparing the RRG figures with this Review, the Managed Cost option for the “Lesser Used Lines” is the most comparable option over the initial five year period of the Review, i.e. the renewal costs for the “Lesser Used Lines” is estimated at £23 million (including OB factors) as against the RRG figure of £17.3 million (excluding OB factors).
- Also for comparison, the capital costs set out within the Railway Task Force for “Partial enhancement of the network” (Scenario 1) were estimated as £94 million over 3 years 2001/02 – 2003/04 (2000 prices and excludes rolling stock costs).

#: A Position Report on the Future Investment Needs of the Northern Ireland Railway Network, Railways Review Group, May 2004

The most significant cost element of the assets renewals programme is Track / Permanent Way

- All routes, with the exception of the Belfast to Bangor line (which has recently been re-laid) will require the renewal of permanent way within the 25 year period of this Review.
- In general, each line has problems / issues specific to that particular line. This means that the scope of work for each track renewal project will vary. For example, while rail wear is not as significant a factor on the network (due to relatively light loading and the absence of locomotives on most of the network), track drainage will vary on certain lines due to the geography of the line – e.g. the Bangor line which has been ‘cut’ through much of the surrounding landscape will require improved track drainage.
- The significant elements of the permanent way programme are:
 - **Belfast to Whitehead** renewal project which at the time of writing is going through the approval process. This project is similar to the recent Belfast to Bangor Line renewal project which although technically satisfactory has resulted in significant cost over-runs due, mainly, to contractual issues. The Belfast to Whitehead project will be managed by experienced rail project managers (outsourced);
 - **Belfast to Border line** – this line has problems associated with poor ballast (degrading) as well as three sites with weakened formation through bog areas. In addition, this route has the added complication of having the cabling ploughed into the ‘six foot’ (between the two tracks) which further complicates the proposed renewal of the ballast;
 - Renewal of **crossing units** and **network switches** and **crossings** across the network; and
 - Renewal of the lines **North of Ballymena** and **North of Whitehead**.

The renewal (refurbishment) of structures and earthworks including coastal defences is also a key element of the asset renewal programme for which significant expenditure has been included in the estimates

- Many of the structures and earthworks on the network are up to 150 years old, therefore the approach to the management of these assets will necessarily involve more emphasis on monitoring of the problem / high risk sites.
- Structures include: rail over-bridges, under-bridges (including viaducts), station footbridges, platforms, culverts, retaining walls and tunnels (at Whitehead and Castlerock).
- One of the main risks identified (and costed for at approximately £36 million over the period of the Review) is associated with critical structures – that is, structures which could lead to the railway being closed for a significant period of time and where replacement costs would be measured in tens of millions of pounds (£). These critical structures include:
 - Bridge spanning the Bann River, west of Coleraine (No. 190);
 - Craigmore Viaduct (north of Newry Station) (No. 193);
 - Bleach Green Viaduct; and
 - Lagan Bridge (No. 315A) and Dargan Bridge.
- The network earthworks (cuttings and embankments), including the coastal defences also represent a significant risk to the operational railway. For example, it has been estimated that the coastal defence works on the Larne line cost circa £1.5 million over the last 5–10 years. In addition as discussed on the previous page the Belfast to Border line has a number of embankments on boggy ground showing signs of distress.
- There are approximately 25 Category 1 (highest risk) earthwork structures on the network – these will be reassessed in the near future in line with revised CIRIA guidelines*.

* Infrastructure embankments - condition appraisal and remedial treatment. 2nd edition CIRIA

The renewal of signalling and telecommunications (S&T) assets as well as the renewal and replacement of many of the network level crossings also accounts for a major proportion of the renewals expenditure estimate

- The **signalling system** (route relay interlocking) varies in condition and age throughout the network. The options for the future renewal of the signalling assets (and telecomms) should be developed in the next couple of years by NIR. The current system is adequate but there would be concerns as to the ability to maintain it on a 'piecemeal' basis (as opposed to a planned / scheduled and coordinated approach) over the long term. There is also an issue regarding the installation of Train Protection Warning System (TPWS) across the network which is estimated to cost between £7m and £8m.
- Decisions on the **telecomms network** should also be determined in line with NIR's communications strategy as the laying of fibre optic cabling will support the operation of level crossings, passenger information displays, internal company communications as well as enabling the flexibility to incorporate additional functions in the future.
 - The laying of a ducted route should continue to be 'rolled out' across the network in line with the proposed signalling and telecomms strategy.
- Renewals costs for the level crossings include:
 - **Level Crossings** – renewal of the road crossings with Automatic Half barriers; and
 - **Accommodation Crossings** - The removal or elimination of accommodation crossings remains a significant issue for NIR mainly due to the costs involved. Infrastructure Division are now trialling technology solutions (such as warning lights etc.) which would reduce the risk to both the users and the operational railway. Obviously, the most effective way to reduce the risk is to remove the crossings but the costs may well be prohibitive particularly on the line north of Ballymena.

The management of the railway's property assets will present challenges in the long term

- The property portfolio includes:
 - station buildings (integrated with bus stations in some cases);
 - rolling stock maintenance and servicing facilities; and
 - staff facilities and buildings.

- Station Accessibility Programme (associated with DDA legislation) – improving the accessibility of the railway by improving station environments. Railways of the member States of the EU are now addressing these issues (as are other public transport operators).

- It is worth noting that there are benefits to all passengers as a result of improvements in accessibility. It is recognised that the future profile of the NI population will contain increasing numbers of mobility impaired persons therefore this issue has become increasingly a business issue than originally intended in the DDA legislation.

Capital projects under the “Steady State” option amount to £112m over the period of the Review and include a variety of projects for both infrastructure and rolling stock

■ Structures:

- New Trains Vision Structures - £2.2 million - (including OB factor of 25%) – in year 2004/05 to be ready for the introduction of new trains. Capital applied equally across all stations and involves structural clearance work to cater for the new trains (platform lengthening etc.);
- Modifications to rail-over bridges (post Selby rail crash) mainly associated with improving crash barriers on approaching roads (total of 10 bridges) at a cost of £0.6 million (including OB factor of 25%) - year 2005/06.

■ Signalling and Telecommunications (S&T):

- Train Protection Warning System Project - £11.2 million (including OB factor of 50%) - year 2006/07. Driven by safety legislation.
- Train Radio project* - £6 million (including OB factor of 50%) – year 2007/08.

■ Infrastructure Plant and Equipment – £9.9 million (including OB factor of 25%) includes:

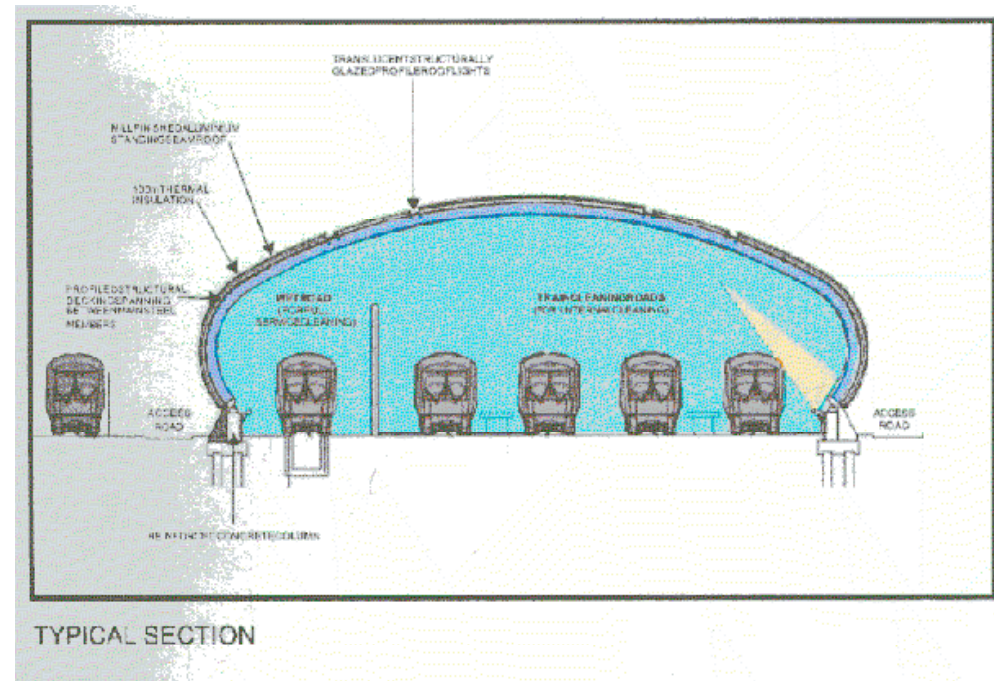
- New tamping machine and new regulator (ballast);
- Other new plant including, vans (Permanent way and S&T gangs), road rail equipment, small plant;
- New spoil wagons and refurbishment of ballast wagons;
- An Infrastructure Asset Management System.

* Note: Advances in new reliable technology for radio systems may mean that there will be additional options for replacement of the existing radio system.

The “Steady State” capital works projects are mainly driven by the arrival of the new CAF trains, safety and legislative requirements

■ Rolling Stock Facilities:

- New train cleaning and stabling facility at Fortwilliam; - £12.8 million (this includes OB factor of 10%) - year 2004/05.
- Works at York Road package of depot modernisation works including: running shed extension, wash plant refurbishment, fuelling point extension and refurbishment, workshop and staff facilities refurbishment and environmental clean up of site; York Road Depot - £2.9 million (this includes OB Factor of 50%) – year 2004/05.
- Permanent way staff facilities (depots) at Ballymena, Adelaide and other minor depots; - £4.5 million (this includes OB factor of 50%).
- Other rolling stock related facilities that have been estimated include: Coleraine Fuelling and CET facility, Adelaide yard stabling and the train simulator project; £0.5 million (this includes OB factor of 50%).



Fortwilliam Cleaning and Stabling Facility; Source Translink Stage D Report

Rolling stock investments take account of replacement of life-expired stock and major ‘mid-life’ renewals which would not be covered under routine maintenance

- Replacement Rolling Stock
 - Class 450 replacements (9 units / train sets);
 - Mark 2 ‘Gatwick’ coaches replacement (1 unit); and
 - De Dietrich ‘Enterprise’ coaches (14 vehicles owned by NIR).

- Rolling Stock – major ‘mid-life’ renewals
 - Class 3000 DMUs;
 - Mark 2 ‘Gatwick’ coaches;
 - De Dietrich ‘Enterprise’ coaches; and
 - Some non routine maintenance for the Class 450s and the NIR locomotives (both GM110s and 201s).



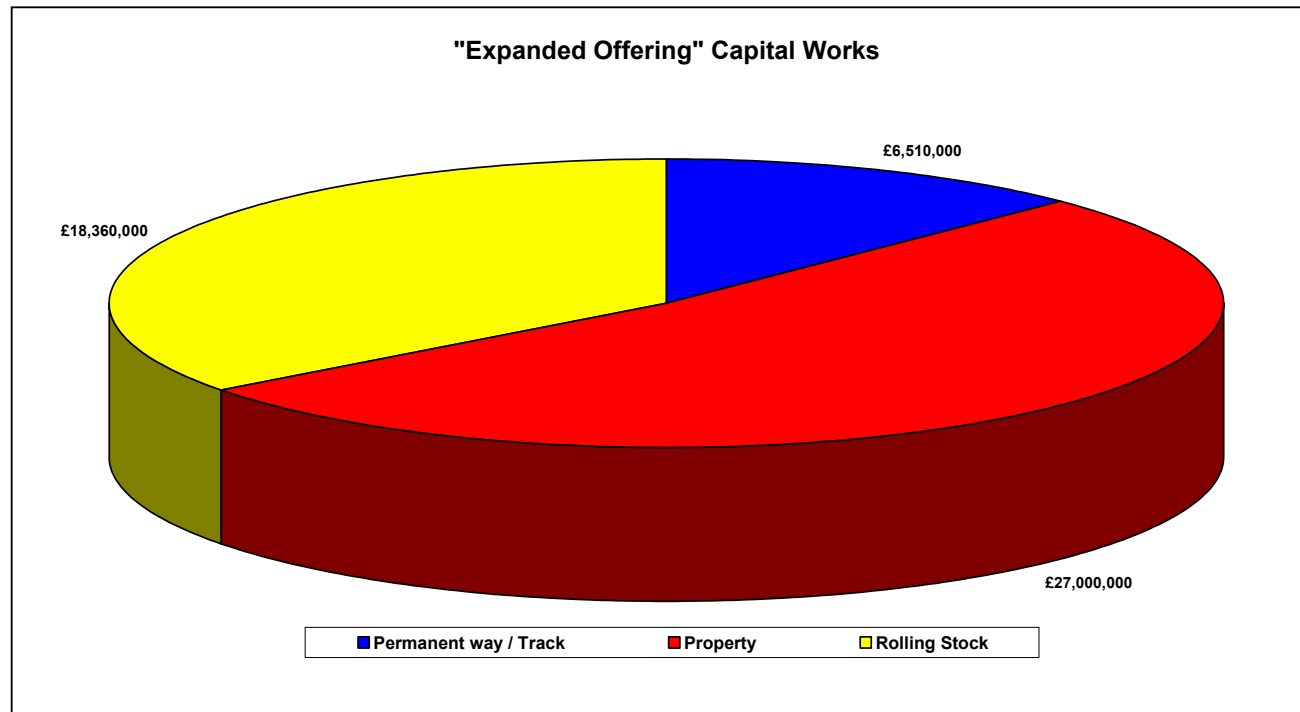
The key benefits associated with the ‘Do minimum’ option (the “Steady State”) are those associated with improved train services across the NIR network

- Under the “Steady State” option the introduction of new CAF DMUs enables a significant improvement in some of the key primary service attributes of rail, namely: service headways (frequencies) and in-vehicle time (speeds).
- Furthermore, under the “Steady State” option, improvements to the travel experience are derived from the operation of new *state-of-the-art* modern DMUs.
- Monetary benefits in terms of additional railway revenue, reduced car VoCs, reductions in ‘externalities’ (associated with road traffic accidents, emissions and noise pollution) and savings in travel time and other elements of generalised cost (GC) of travel (including frequency and in-vehicle time) have been estimated.#

Consistent with current NI practice, the monetary costs and / or benefits associated with noise and air quality impacts have not been explicitly included in the discounted cashflow analysis used to derive values of net economic worth.

The “Expanded Offering” option builds on from the “Steady State” in that it involves an estimated £52 million in additional capital expenditure

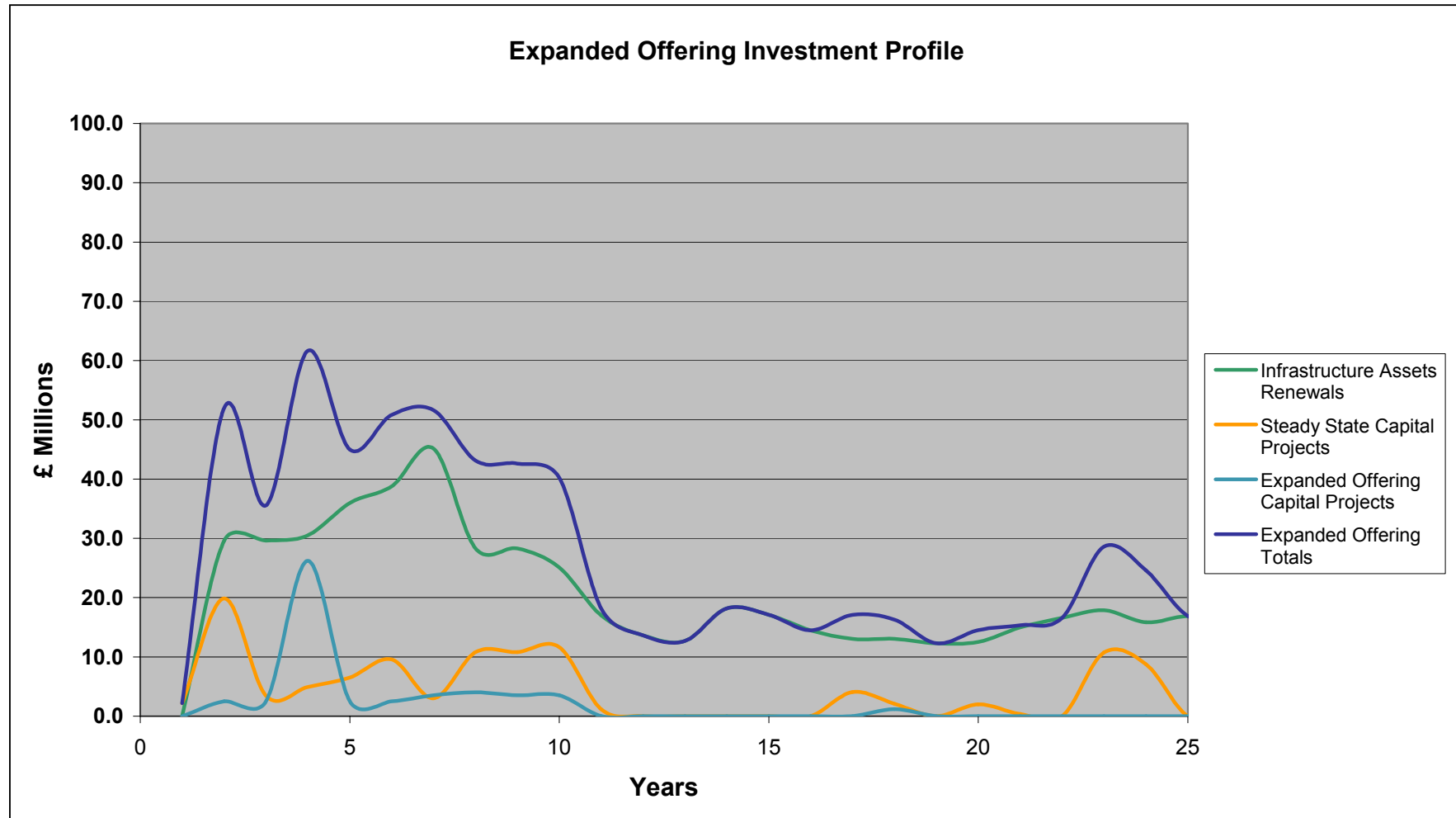
- This expenditure is associated with additional rolling stock and modernisation of key stations across the network and construction of passing loops between Belfast and Antrim and Coleraine and Londonderry line.



Note: X-border rolling stock costs have been halved on basis of 50:50 'split' with Irish Rail

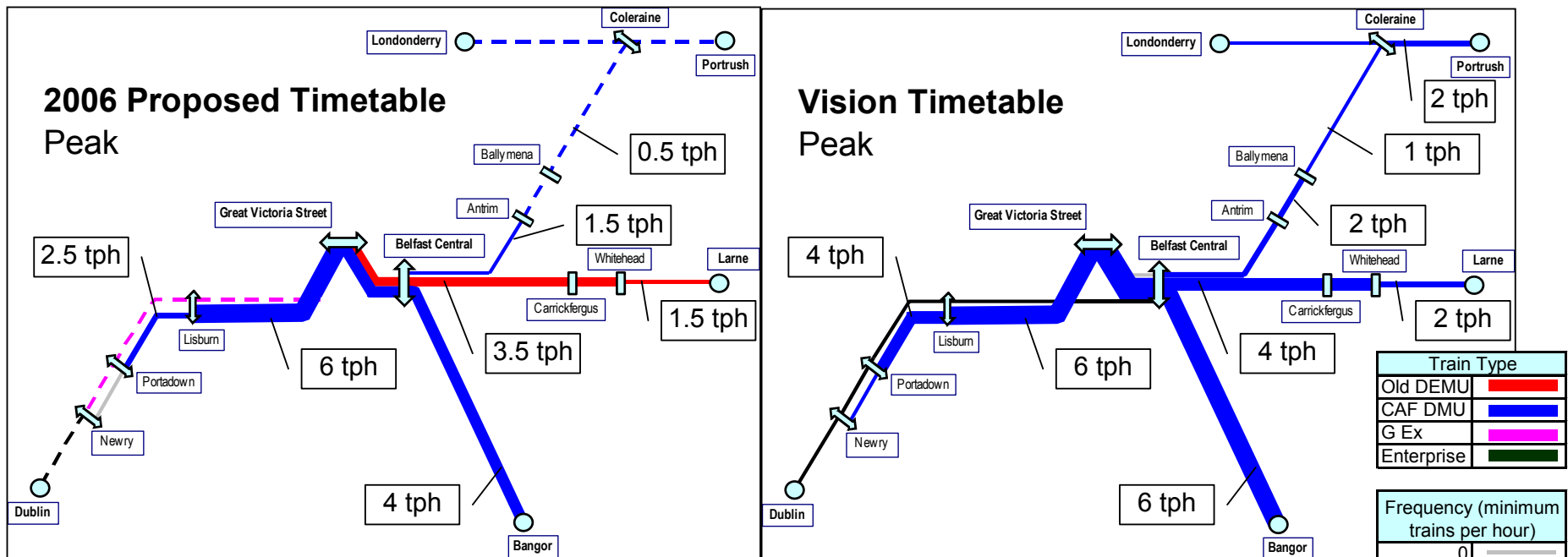
- Additional O&M costs associated with the “Expanded Offering” option over the evaluation period amount to £231 million (or an average of £11 million per annum additional NIR operations costs ‘over and above’ current from 2006/07).

The additional expenditure proposed under the “Expanded Offering” is also incurred within the first half of the Review period and...



... it relates mainly to the provision of additional rolling stock and upgrading of station facilities

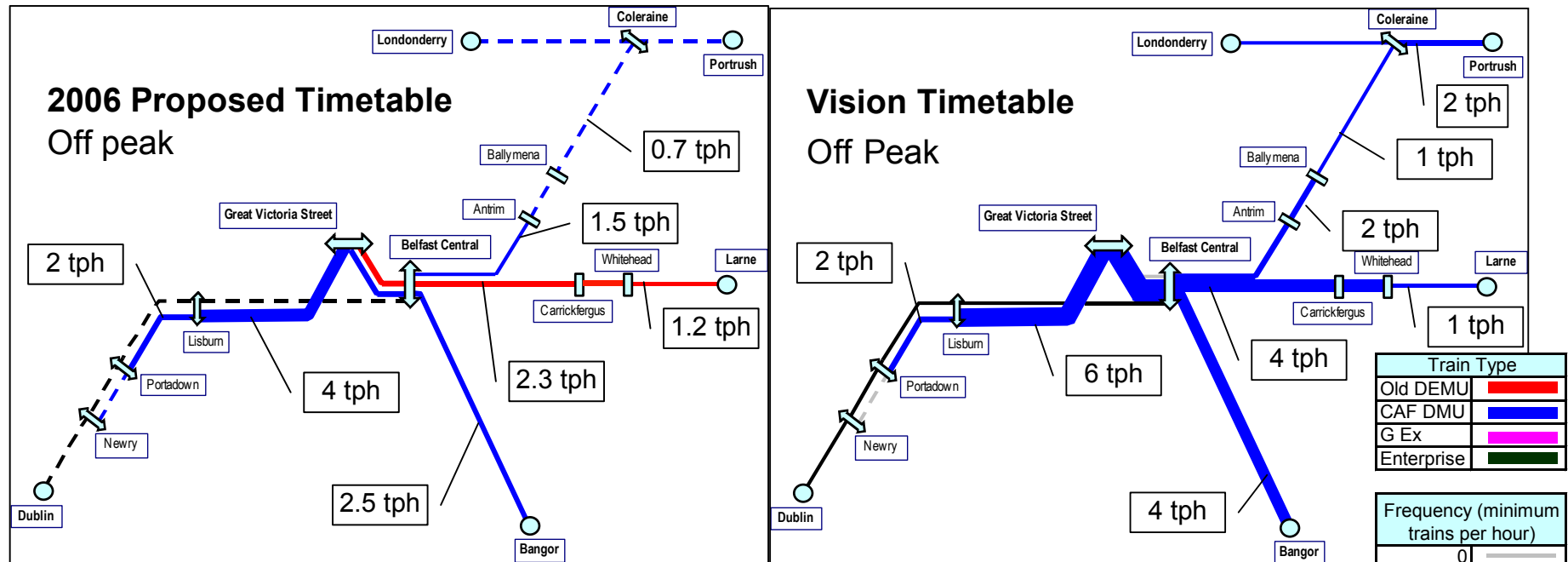
The ‘Vision’ timetable shows how services could be improved and therefore why user and non-user benefits will be generated under the “Expanded Offering” scenario



- Improved services with a clock-face pattern could be provided on all routes with peak capacity of 6 tph operating from Lisburn and Bangor and 4 tph from Whitehead and 2 tph from Ballymena.
- All routes would benefit from modern CAF DMUs with the CAF DMU fleet expanded by 13 units* and withdrawal of 9 Class 450 units.

* It is assumed that the higher frequency would obviate the need to operate double units during the peak period. If this is not the case additional units would be required for peak strengthening.

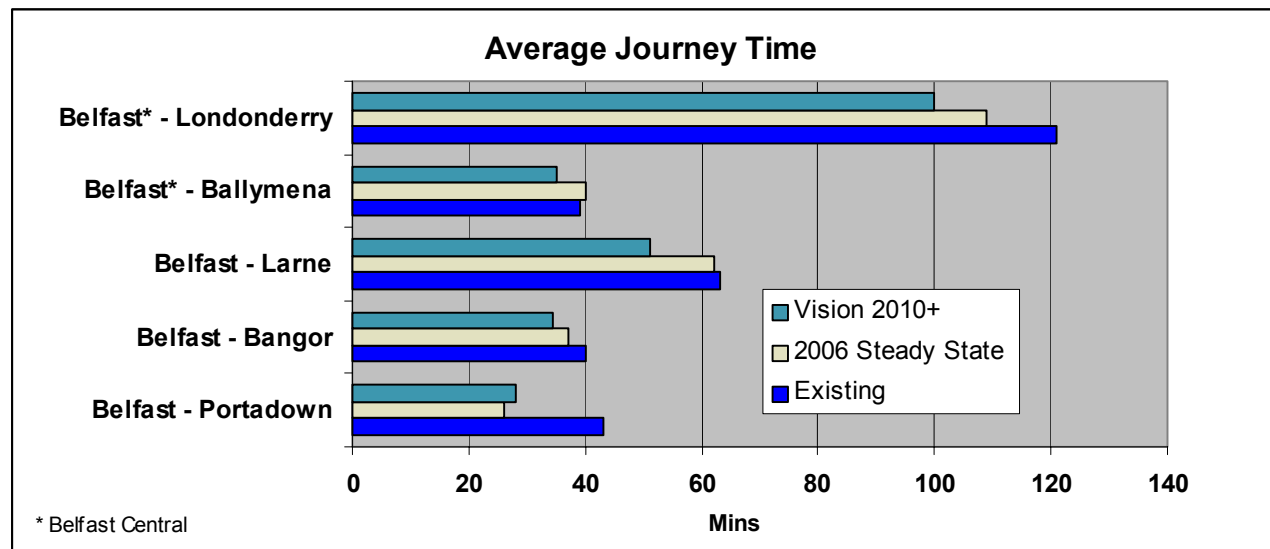
Off peak, the effect of a considerably enhanced service achieved by increasing the utilisation of the fleet has been examined



- To encourage off peak demand, peak frequencies are maintained on the Lisburn, Whitehead and Derry routes.
- Subject to pathing constraints on the single line, a half hourly service to Ballymena and an hourly service to Coleraine and Londonderry could be operated.
- To operate the 'Vision Timetable' infrastructure enhancement including additional passing loops will be required on the Londonderry line.

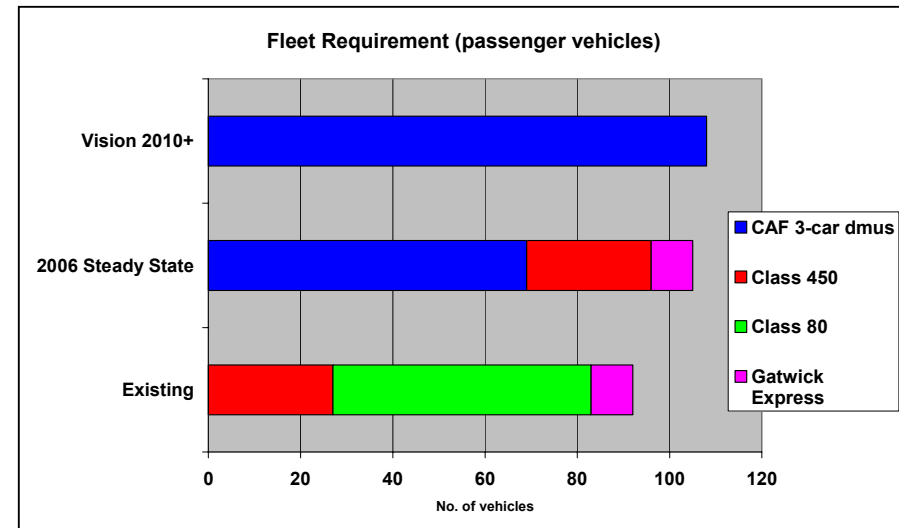
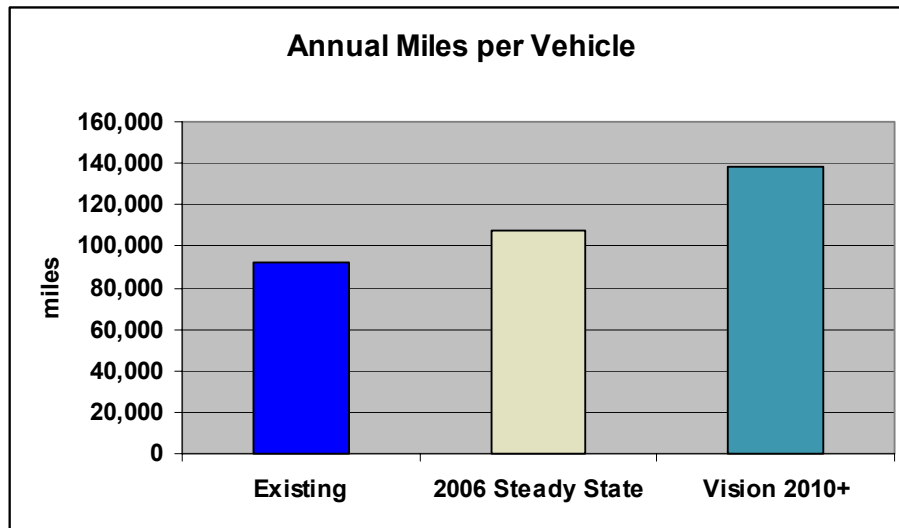
The ‘Vision Timetable’ includes realistic opportunities for journey time reductions for NIR Local services

- Journey time reductions are also achieved by some line speed improvements following track renewals and by reducing the number of intermediate stops.
- With higher frequency services it is possible to offer a choice of faster journeys for the busier stations, whilst retaining at least an hourly service to the more lightly used stations.
- Lower use stations on the Bangor, Larne and Portadown routes would be served by alternate services, and Londonderry line services would no longer call at Whiteabbey or Yorkgate. Up to six of the most lightly used halts would be closed or a minimal service retained.



The 'Vision Timetable' provides scope for improved rolling stock utilisation with a homogenous fleet

- With a more intensive timetable and higher average speeds it is possible to improve utilisation of the rolling stock by as much as 50%.
- The benefits of more frequent services and shorter journey times are achieved under the Vision timetable with only a 17% increase in the number of passenger vehicles.
- There are also benefits in terms of maintenance and operating efficiencies to be gained from a homogenous fleet.



Given the success of the *Enterprise* service, further improvements are likely to yield high benefits, however, a strategy will need to be agreed with Irish Rail

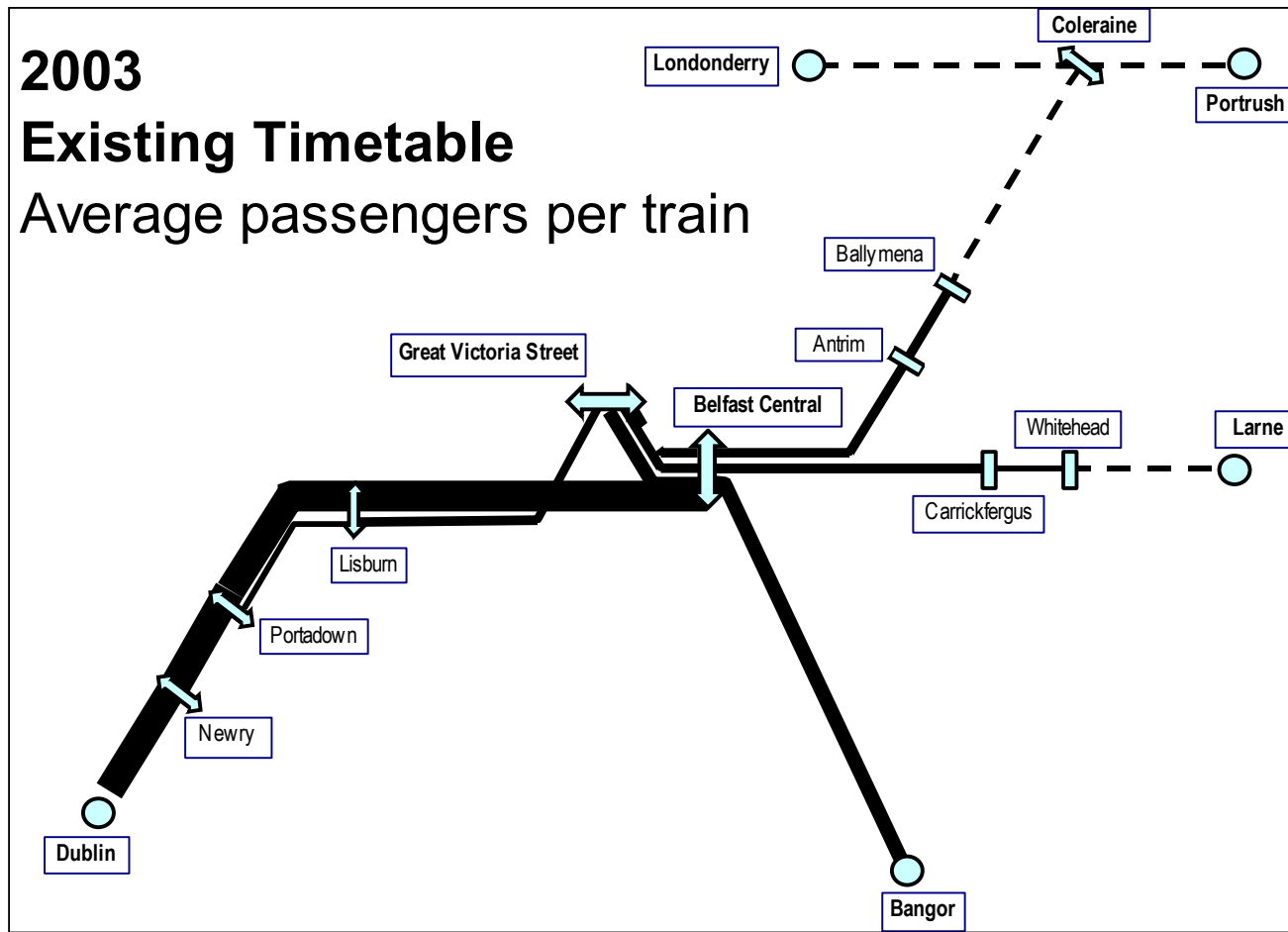
- A clock-face hourly service must be a high priority objective, since this would considerably increase the attractiveness of the service to business and leisure travellers. This could be scheduled relatively easily between the border and Belfast Central and would integrate well into a fully clock-face NI Railways timetable. However, the capacity constraints within the Dublin area are likely to be more problematic in the a.m. and p.m. peak periods (as opposed to the significantly less congested off-peak and shoulder periods) and may be conditional on some major infrastructure works in that area.
- Further journey time reductions could be achieved by infrastructure renewal and upgrading, where removal of the lower speed restrictions would have the greatest impact. Fewer intermediate stops would also enable journey times to be shortened. For example, with improved domestic services to Portadown, this stop could be removed from some or all *Enterprise* services. A standard journey time of 100 - 110 minutes should be a realistic objective.
- With a fleet of just 4 sets of De Dietrich coaches available, an hourly service will require at least two additional sets of rolling stock. The diseconomies of purchasing just 2 high specification trains and the disadvantages of a mixed fleet mean that a replacement fleet of at least 6 sets would be desirable. A shorter term solution could be provided by refurbishing and redeploying 2 rakes of push pull Mark 3 coaches from either Irish Rail or from Great Britain. The fleet strategy will need to be developed in co-operation with Irish Rail.
- Whilst upgrading the route to a maximum speed higher than the existing 90mph limit could yield journey time savings, priority should be to address the lower speed restrictions, many which exist south of Portadown and south of the border.

The concept ‘Vision timetable’ is based on a number assumptions

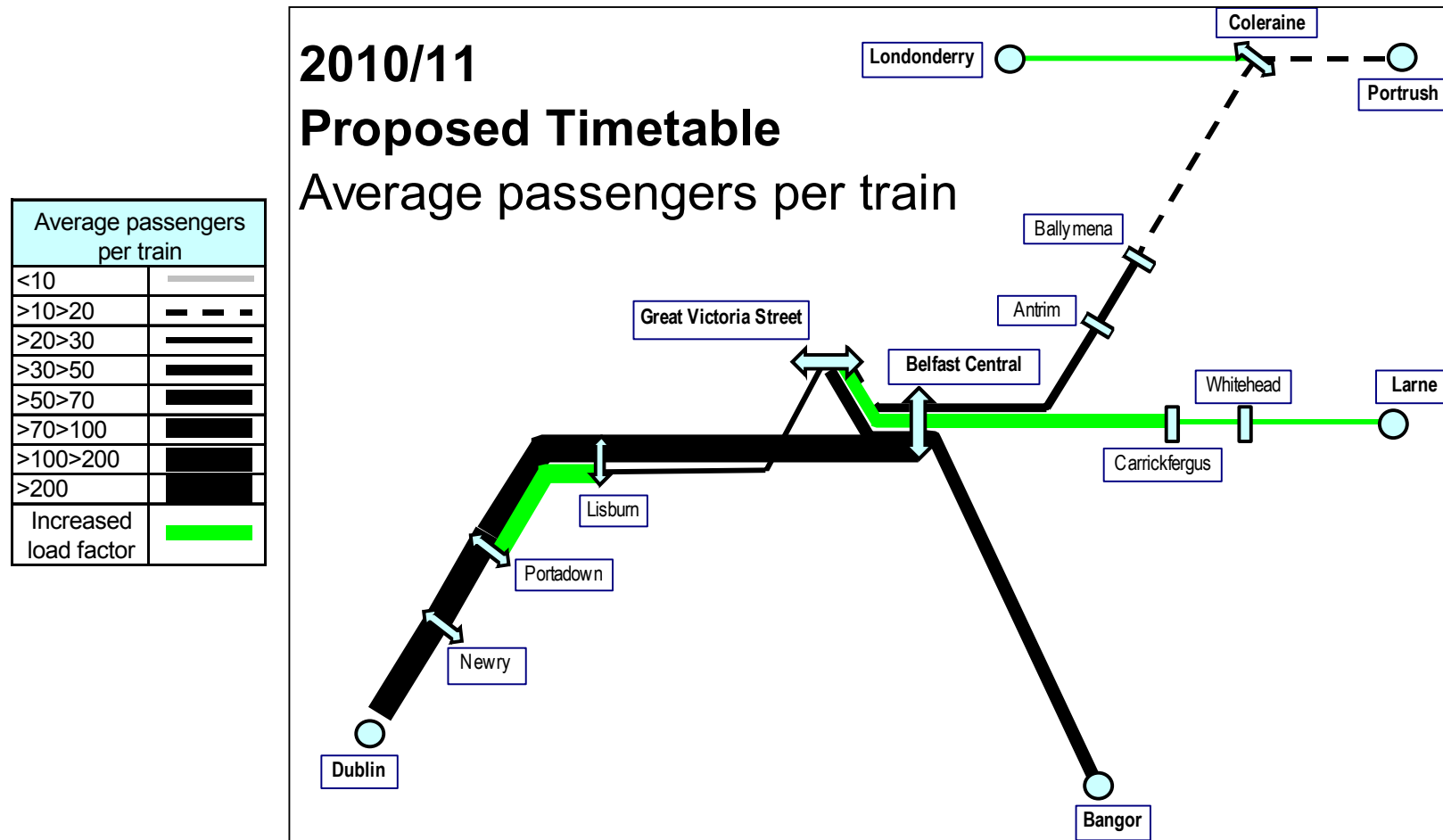
- No infrastructure upgrading is required to operate the proposed services to Portadown, Lisburn and Bangor, subject to the signalling capacity being adequate. At Newry, this is subject to the practicality of timing peak train reversals in the ‘down’ platform – otherwise, a new head shunt may be required.
- On the Larne and Derry routes, line speed improvements targeting the lower speed restrictions are assumed as part of the track renewals programme. Also, double tracking some or all south of the routes south of Ballymena will be required to ensure reliability and timetabling flexibility. A new passing loop in the region of Ballykelly will also be required to enable an hourly service to reach Londonderry.
- The Vision timetable requires 32 units available for daily service, thus a fleet of 32 + 4 spare 3-car CAF DMUs is envisaged. All older vintage vehicles would be withdrawn. One pair of units in 6-car operation would operate on the Newry-Portadown commuter corridor, but no other peak strengthening is envisaged as it is assumed that the higher frequencies will be sufficient to accommodate peak demand without excessive crowding. Otherwise more units would be required.
- Intermediate stations between Belfast and Lisburn (5 stations), Bangor (5 stations) and Larne (4 stations) would receive reduced service with alternating stopping pattern to reduce the number of stops per train and thereby improving journey times.
- 6 halts (Knockmore, Glynn, Magheramorne, Bellarena, Cullybackey and Mossley West) have very low patronage and in order to improve journey times these stations are assumed to be closed or retain only a minimal service.
- Further details describing the ‘Vision’ concept timetable and the underlying assumptions are contained in Appendix C.

With the exception of the *Enterprise* service, existing patronage on NIR services falls well short of capacity, especially on the “Lesser Used Lines”

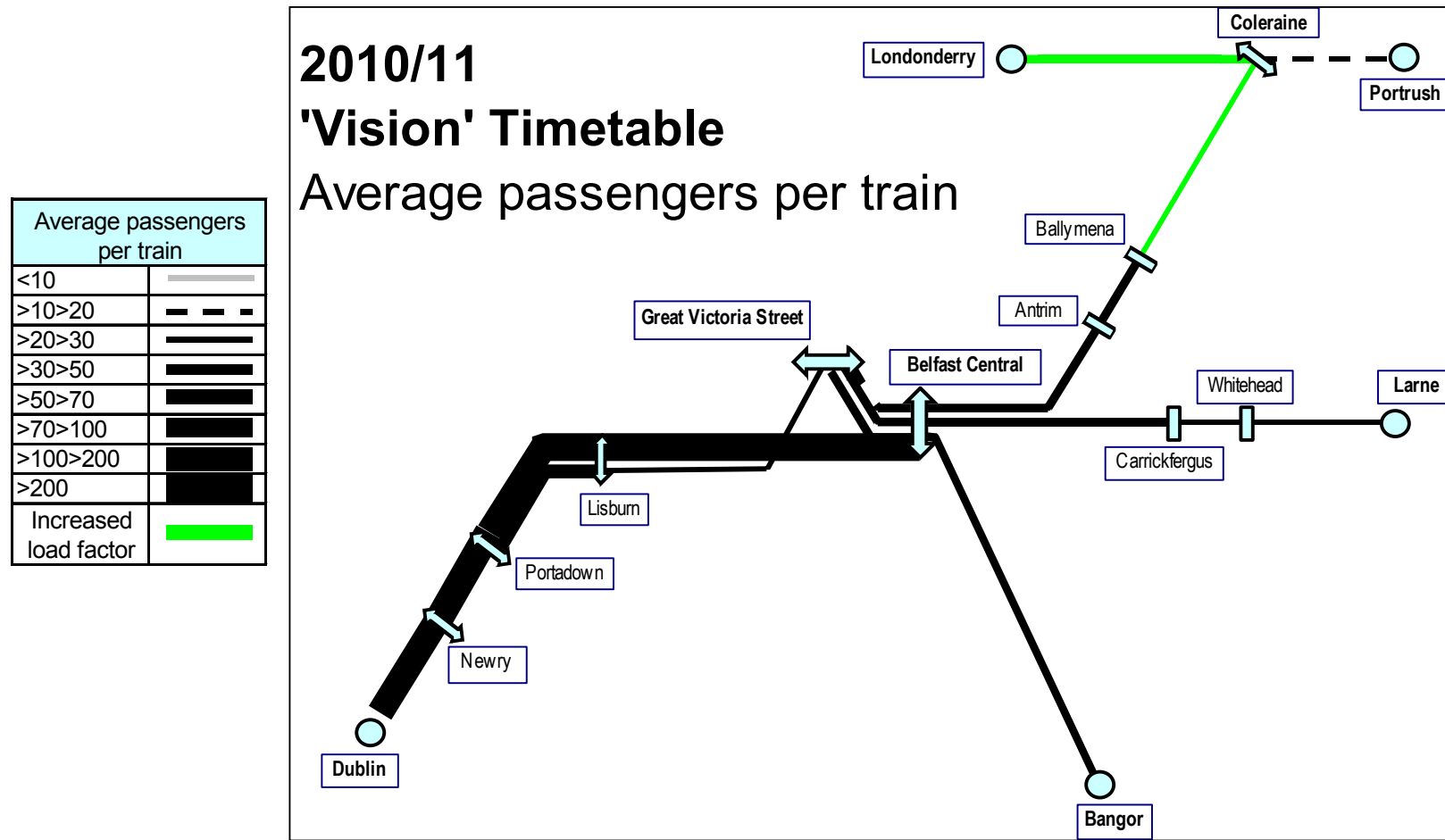
Average passengers per train	
<10	—
>10>20	- - -
>20>30	— — —
>30>50	— — — —
>50>70	— — — — —
>70>100	— — — — — —
>100>200	— — — — — — —
>200	— — — — — — — —



With the new CAF trains and proposed draft new timetable, train loading increases by 2010 largely result from underlying demand growth, occurring mostly on routes receiving little service improvement



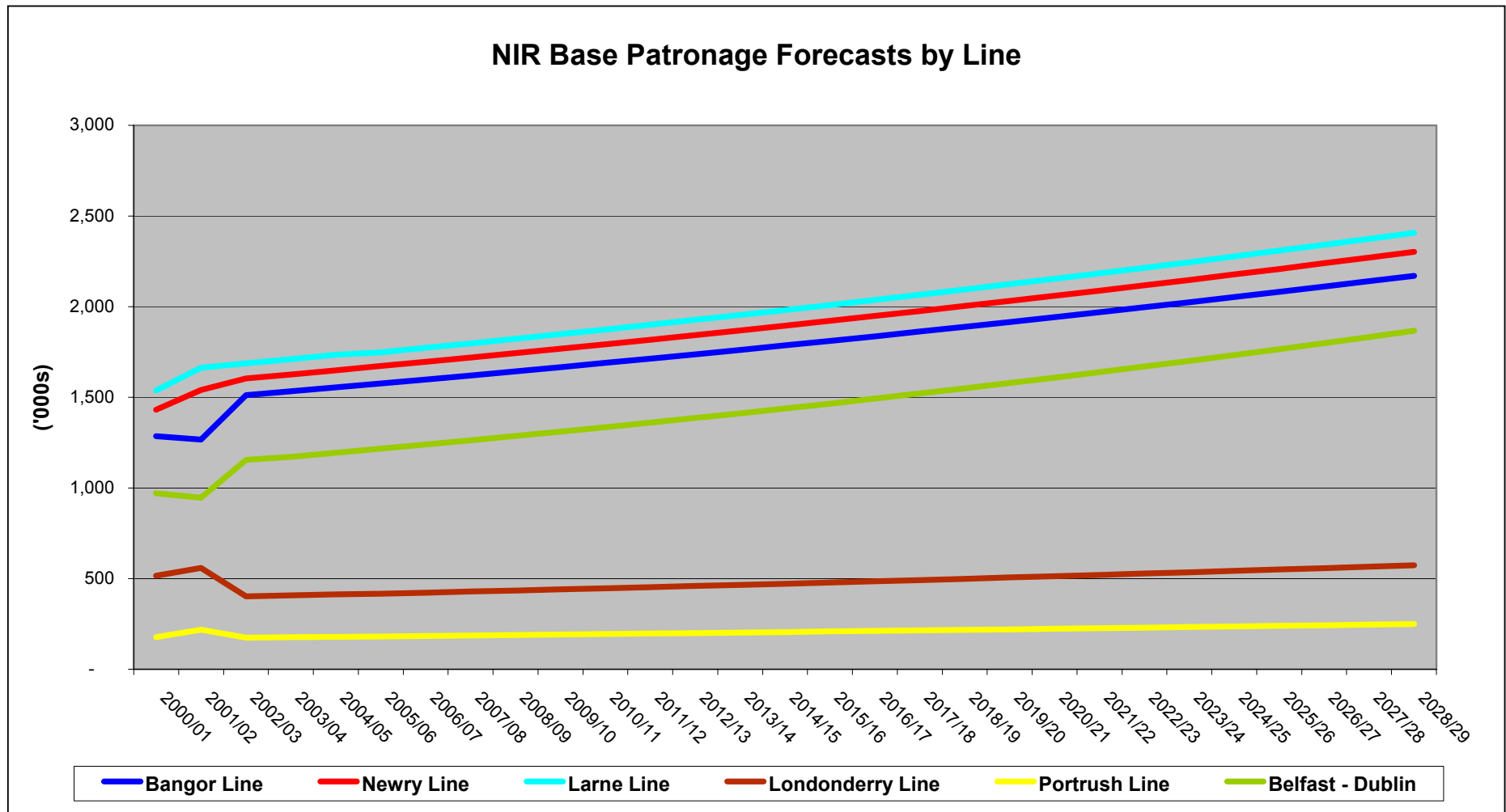
The increased level of service under the ‘Vision’ timetable results in a maintenance of load factors but on a higher number of services, except on the Coleraine - Londonderry line where slightly fewer services operate



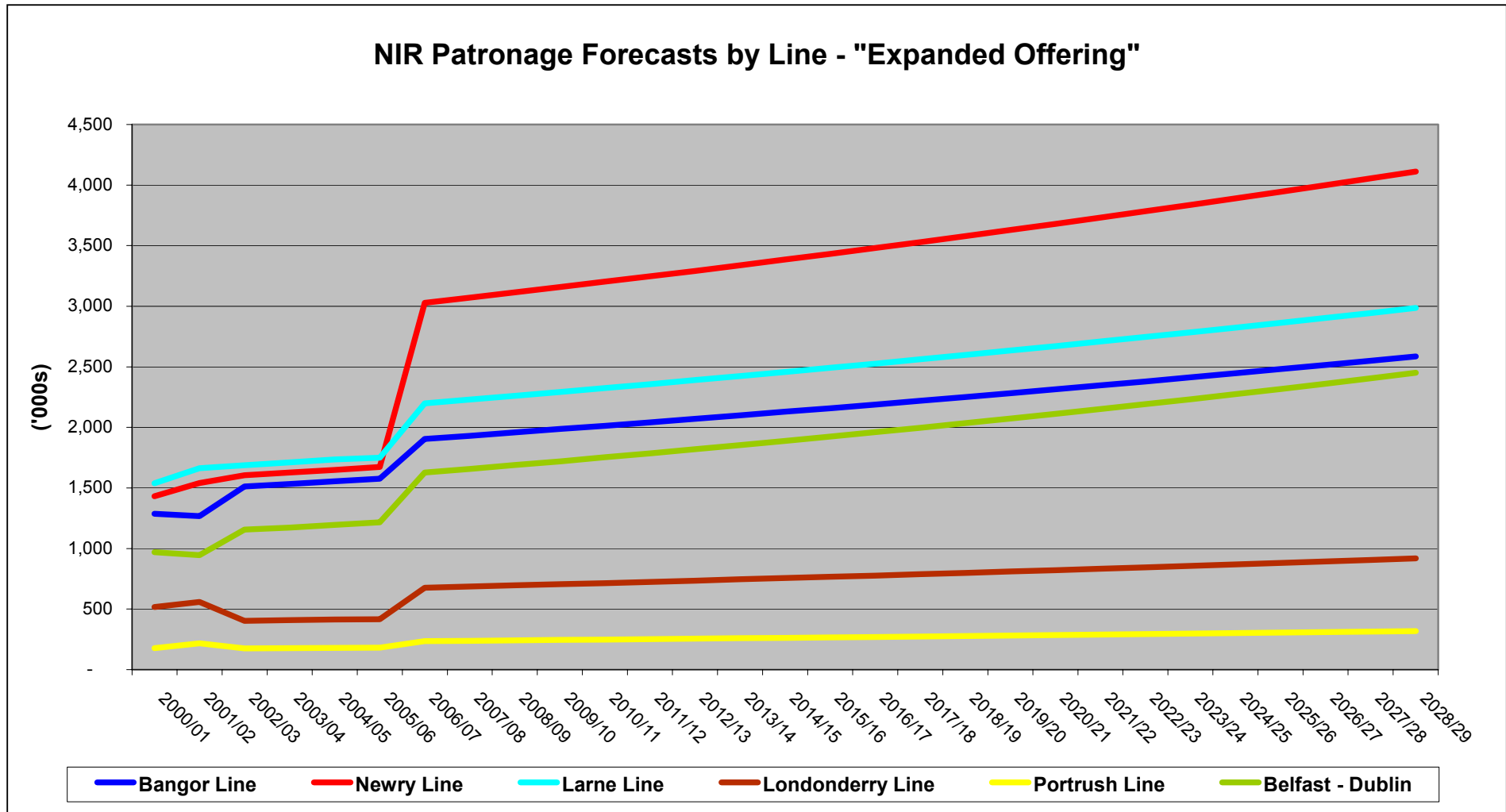
The “Expanded Offering” option delivers a significantly more attractive railway for Northern Ireland

- Demand for passenger rail services in NI under the “Expanded Growth” option is expected to be 39% greater than that under the base (underlying growth) scenario.
- Growth is also expected to be 19% greater than under the “Steady State” option.
- Excluding the *Enterprise* to show NIR Local, the values are 45% and 24% respectively.

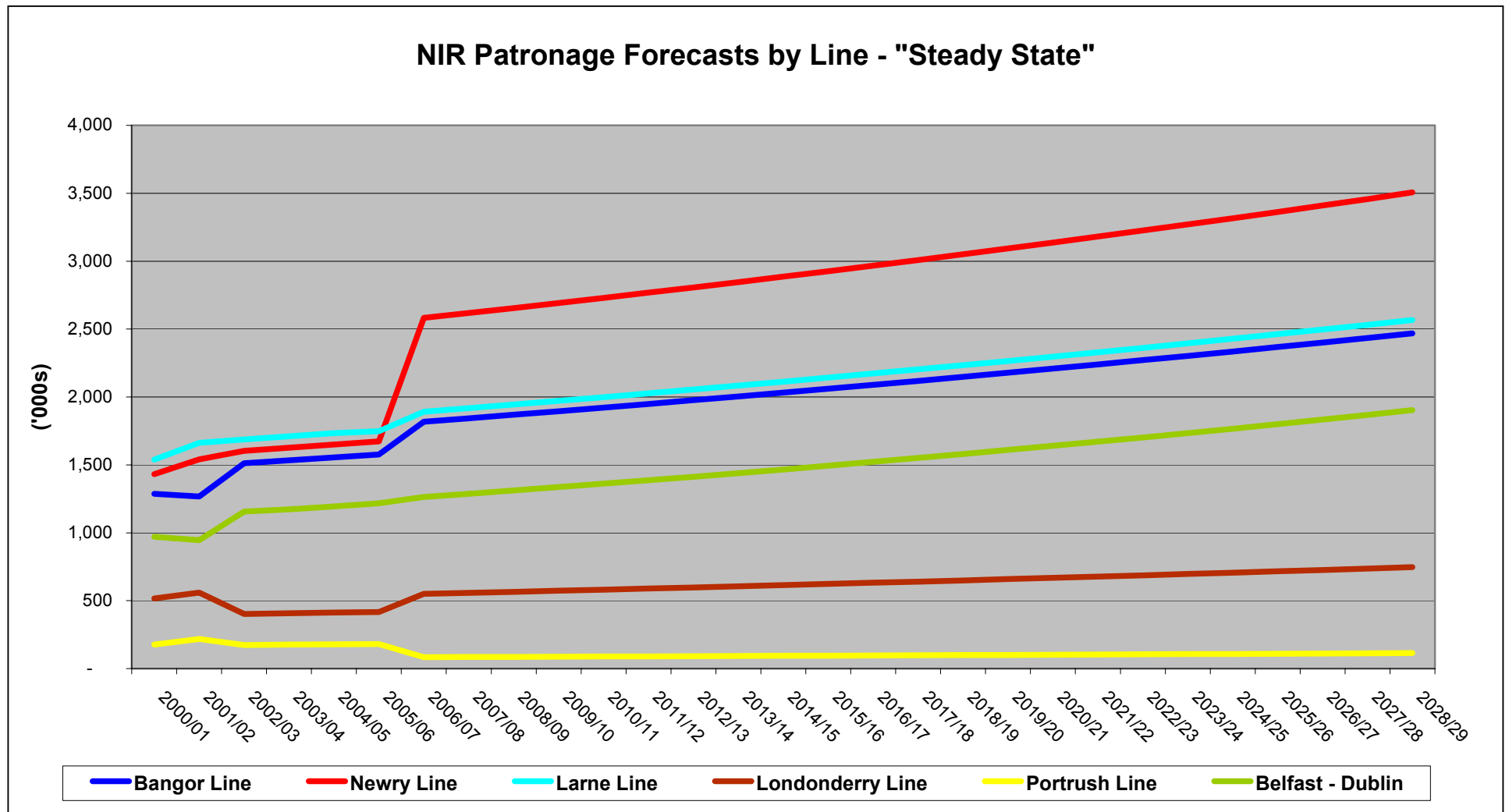
Growth expectations will vary across the network as levels of service are different and rail’s relative attractiveness will vary between locations



The “Expanded Offering” indicates strong growth on all routes across the NIR network, in particular on the Newry Line where services are dramatically improved

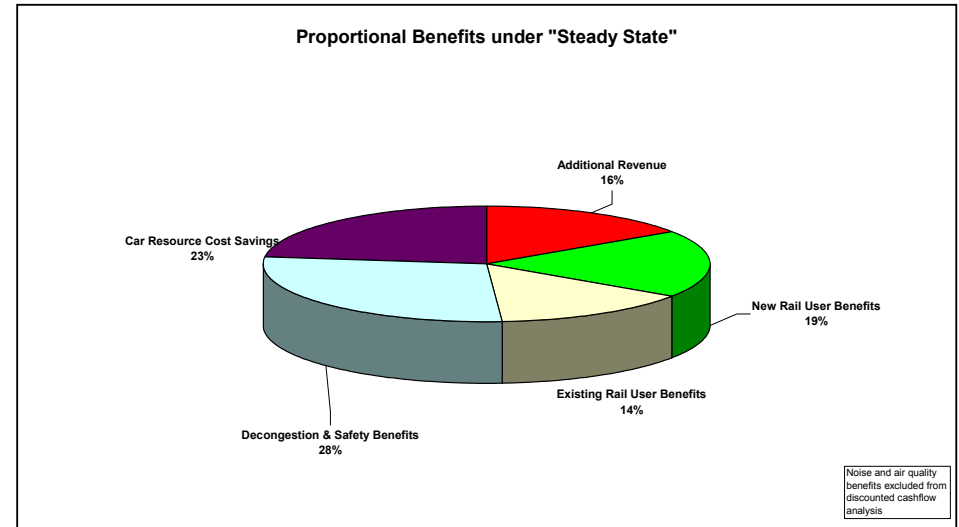
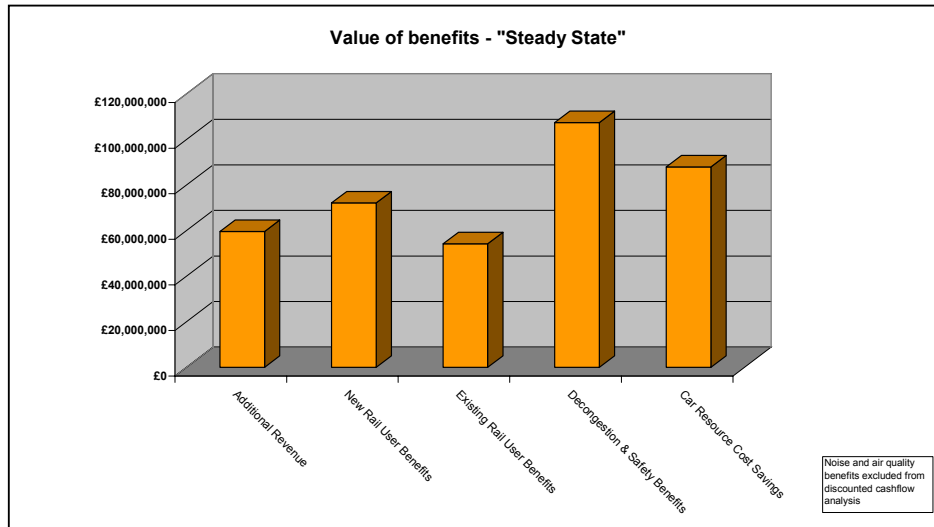


The “Steady State” indicates some declines on those lines where the service offering diminishes in particular on the Portrush Line



The “Steady State” option delivers a range of benefits to both existing rail users and non-users who switch from other modes

- One-quarter of benefits associated with the “Steady State” will accrue from savings in private vehicle operating costs.



Significant benefits associated with the “Expanded Offering” option will accrue to both user and non-users of the railway

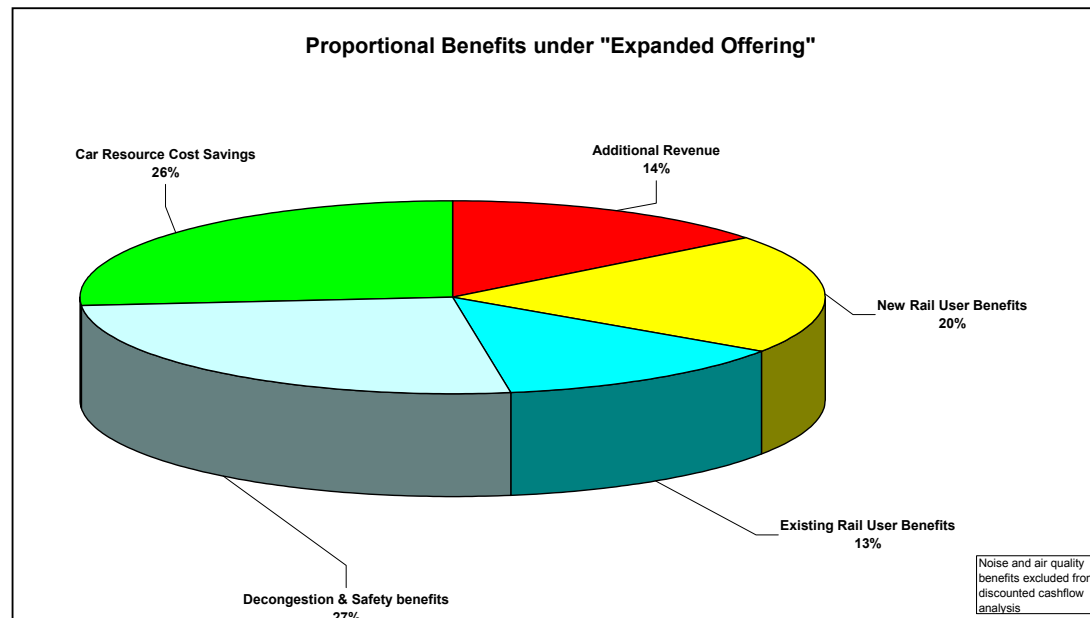
- Existing users will benefit from dramatic improvement in service headways and journey times.
- Decongestion benefits will flow to road users from reduced car miles associated with a diversion of some trips to rail.
- The reduction in car miles will result in reductions in emissions and road traffic accidents.
- Existing rail users will also benefit from new vehicles, modernised stations and enhancement of public transport integration.

- 65 million car kilometres removed from the NI road network
- 9 fatal or serious injury road traffic accidents avoided annually
- 55 minor injury road traffic accidents avoided annually
- a reduction by 21,000 tonnes of the main pollutants associated with fuel combustion removed from the air

The “Expanded Offering” option will result in a significant extraction of car miles off the NI road network delivering benefits to the community

- Almost half the total benefits associated with the “Expanded Offering” option are derived from car operating cost savings, traffic decongestion benefits and road safety gains.

Total Undiscounted Benefits - "Expanded Offering"					
Additional Revenue	New Rail User Benefits	Existing Rail User Benefits	Decongestion & Safety benefits	Car Resource Cost Savings	Total
175,447,312	242,077,696	161,424,449	318,335,271	319,718,531	1,217,003,260
14%	20%	13%	26%	26%	



The merits of operating services over the “Lesser Used Lines” part of the NIR network is subject to on-going deliberations

- 23% of the direct O&Ms for the NIR network (less the *Enterprise*) are associated with the “Lesser Used Lines”.
- 29% of the infrastructure maintenance costs of the total NIR Local are associated with the “Lesser Used Lines”.
- The “Lesser Used Lines” accounts for approximately 16% of the total NIR Local services revenue and approximately 10% of total NIR revenue when the *Enterprise* is included.
- The costs and benefits associated with ‘closure and mothballing’ of the “Lesser Used Lines” include:
 - An additional 23 million passenger miles on NI roads (via cars and buses) resulting in an additional 2.8 million car miles and 0.46 million bus miles on NI roads resulting in net ‘externality’ costs from accidents and emissions of £0.4 million (less trains will result in a reduction of rail transport generated emissions);
 - Approximately 2 additional fatal or serious injury accidents annually;
 - A requirement for an additional 13 buses for the Translink fleet at a capital cost of £1.8 million;
 - An increase in annual vehicle operating costs (cars and buses) of approximately £1.4 million;
 - Lost NIR ticket revenue of approximately £1.6 million;
 - A reduction in NIR direct O&Ms of £2.3 million;
 - Costs associated with mothballing the lines, systems and stations of approximately £9.3 million over 5 years (however it is understood that under NI legislation that after a period of 6 months lines could be abandoned whilst the land / alignments would need to be retained);
 - Additional bus revenues of approximately £1.3 million annually;
 - Reduction in annual railway PSO of approximately £1.8 million; and
 - Staff redundancy costs of £1.2 million.

In the section on appraisal results, disaggregated information for the Larne line (north of Whitehead and the Londonderry Line (north of Ballymena) are provided.

In order to provide an indication of the ‘value’ of NIR to the community an assessment of a ‘no railway’ scenario was undertaken

- In the absence of rail services in Northern Ireland, the following costs to the community would accrue:
 - Additional car miles on the road network (circa. 36 million per annum) associated with an estimated 36% of former rail users shifting to car resulting in: additional VoCs (£4 million per annum) and additional externality costs (approx. £10.4 million per annum);
 - Lost NIR ticketing revenue (circa. £15.4 million annually) – growing at at least the rate of underlying demand growth;
 - Redundancy costs of approximately £11.5 million (based on an average cost of £17,500 per employee);
 - Additional bus miles (circa. 5 million per annum) associated with 64% of former rail users shifting to bus resulting: in a need to purchase additional bus capacity at a cost of approximately £18.6 million (135 new buses); additional bus VoCs of £7 million annually;
 - Costs associated with additional bus maintenance and maintenance facilities.

- Benefits would accrue in the form of:
 - Additional revenues from additional bus passengers of approximately £7.6 million per annum;
 - Savings on NIR PSO funding of approximately £16.4 million per annum; and
 - Savings on NIR direct operating costs of approximately £14.8 million per annum.

- Undertaking a discounted cashflow analysis indicates that the net economic impact of ‘No NIR’ would be negative: -£68 million, i.e. in the absence of NIR, the NI community would be worse off.

The focus of the appraisal has been on the identification and quantification of costs and benefits as well as identification on non-monetary costs and benefits

- The non-monetary costs and benefits that have been identified are set out in the Appraisal Summary Table (AST) later in this report.
- The AST is based on the five objectives for transport as identified earlier in line with the DfT's principles as set out in the *New Approach to Transport Appraisal* (NATA).
- It is recognised that non-monetary costs and benefits may also be important in the decision-making process particularly in terms of demonstrating social, environmental and wider economic effects.

Investment or divestment in the NIR network could give rise to distributional effects

- Section 75 of the Northern Ireland Act 1998 and the New Targeting Social Need (New TSN) are important elements in the consideration of distributional effects of public project appraisal in NI:
 - Section 75 relates to consideration of any differential impacts or direct or indirect discrimination;
 - New TSN is complementary to Section 75, however the focus is on targeting resources more effectively to the most deprived areas and groups in order to reduce disadvantage and erode inter-community differentials.

- At present NIR provides a service to a broad range of groups within NI society:
 - 40% of passengers are under 24 years of age;
 - 31% of passengers are students;
 - Only 34% of journeys are to / from work;
 - 11% of customers are retirees; and
 - Half of all passengers in the lower socio-economic groups (e.g. C2 and DE).

- Improved public transport services should, *cet par*, reduce disadvantage and erode inter-community differentials by providing those without access to a car with the ability to travel readily.

- Closure of parts of the network would clearly result in a negative differential impact in NI as access to public transport services will diminish for some groups.

- The distributional effects of options will vary considerably because of the countervailing nature of options if closure of the “Lesser Used Lines” is considered: expanded capacity and capabilities as opposed to reduced services and access.



Appraisal Framework

- Strategic Context and Need for Expenditure
- Objectives and Constraints
- Options Definition
- Costs and Benefits
- Risk and Optimism Bias
- Appraisal Results

Consistent with emerging practice, cost estimates were adjusted to counter appraisal optimism (Optimism Bias)

- It is important to note that the Guidance* detailing how to apply an adjustment factor for optimism bias (OB) stresses that *“In general, the allowances for optimism bias should be largest in a high level business case (for instance a Strategic Outline Case).”*
- In addition, the adjustment factors for optimism bias should be refined over time where *“ideally the optimism bias for a project should be reduced to its lower bound optimism bias before contract award”*.
- The methodology applied to calculate optimism bias involved answering the following questions in relation to capital cost estimation for the NIR renewals programme and capital works projects:
 - What is the appropriate upper bound value to use for rail renewal programme in NIR?
 - What risk management measures can be built into the network renewal programme at this early stage?
 - ▶ The main strategies listed in the Guidance* for reducing optimism bias are:
 - Full identification of stakeholder requirements;
 - Accurate costing; and
 - Project and risk management.
- Consistent with the guidance the OB factors were not applied ‘blindly’ and all factors applied were upper bound levels (e.g. within the range of 40% - 60% across specific work elements).

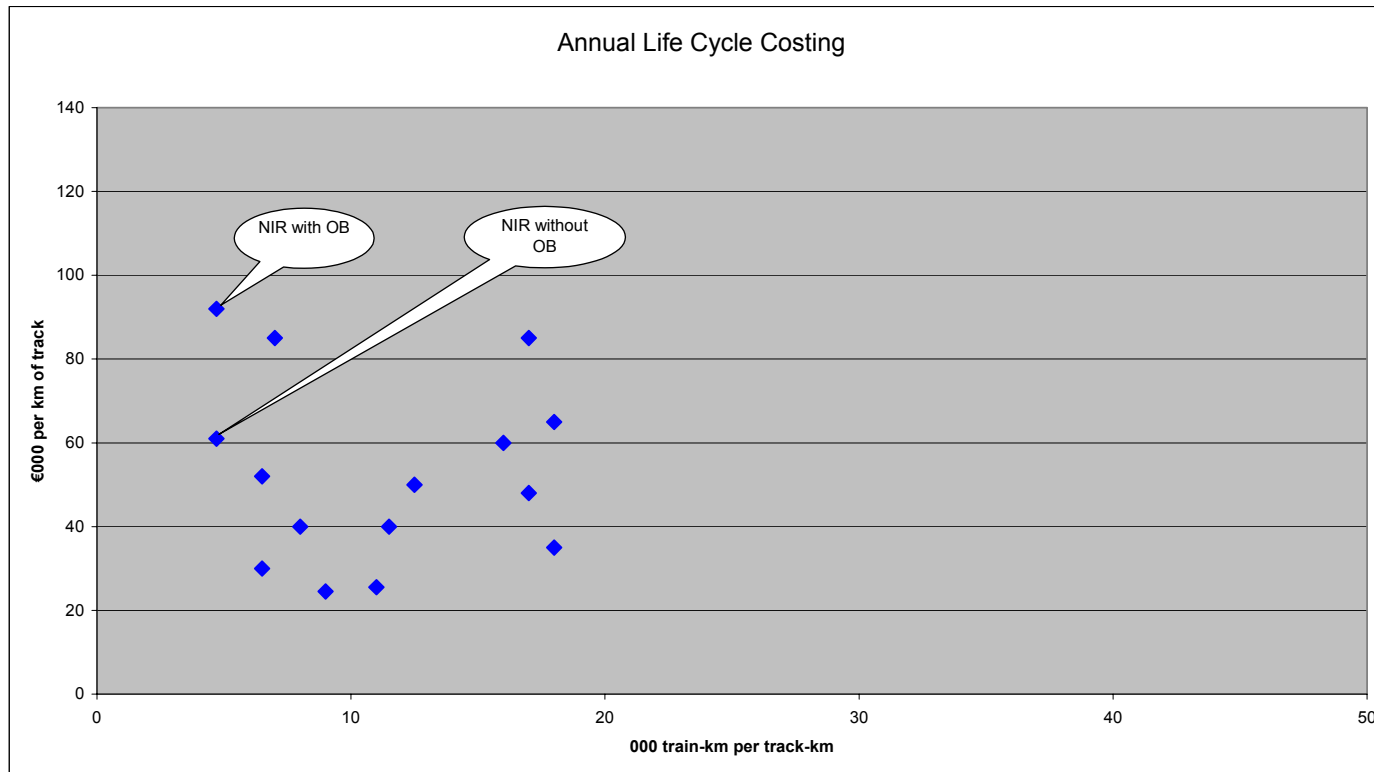
*Supplementary Green Book Guidance, Optimism Bias (HM Treasury)

The application of the OB factors was on a *line-by-line* basis and also considered asset type and previous project delivery experience in NI

- When applying the optimism bias adjustment factor for each line, consideration was given to the lines in question and the type of asset being renewed. However, in line with the appropriate guidance, there were insufficient grounds in most instances for any significant reduction of the higher level factors (circa 50% - 60%) which were applied.
- Consideration was also given to the recent experience of asset renewals projects in particular the Bangor Line renewal project as well as the Antrim Bleach Green re-opening project and the *Enterprise* Cross Border Project.
- It is worth noting that the recent out-turn cost on the Bangor line renewal project was significantly above the project budget (out-turn of approximately £28 million as opposed to approved budget of £14 million). However, this could not be classed as a typical cost underestimation problem. It appears that the majority of the cost over-run was caused by letting the construction contract prior to having a workable design which in turn lead to a number of contractual issues relating to delays and variations of scope. Hence, it was mainly these contractual issues combined with a lack of project management expertise that led to such a significant cost over-run.

Line Section	Permanent Way	Structures	Earthworks	S&T	Level Crossings	Property (inc. stations)
All lines	30% - 40%	50%	60%	50%	50%	50%

The cost estimates both ‘with’ and ‘without’ Optimism Bias are in the upper range of annual costs for infrastructure maintenance and renewal per kilometre of track in comparison with other European railways



Source: Railway Gazette International; Vol 160 January 2004

Note: Comparable renewals only figure for Irish Rail network was estimated as €87,000 per track km. SRR Feb 2003.

- The relatively high annual costs reflect the significant infrastructure renewals backlog which NIR will need to address going forward – hence, it would be anticipated that NIR’s position would improve over time as the railway gets closer to a “Steady State” position – i.e. where the condition and age of the assets on the whole are not worsening year on year.
- In addition, the relatively high costs also relate to the size and characteristics of NIR which is a small railway with only limited opportunities to unlock economies of scale.



Appraisal Framework

- Strategic Context and Need for Expenditure
- Objectives and Constraints
- Options Definition
- Costs and Benefits
- Risk and Optimism Bias
- Appraisal Results

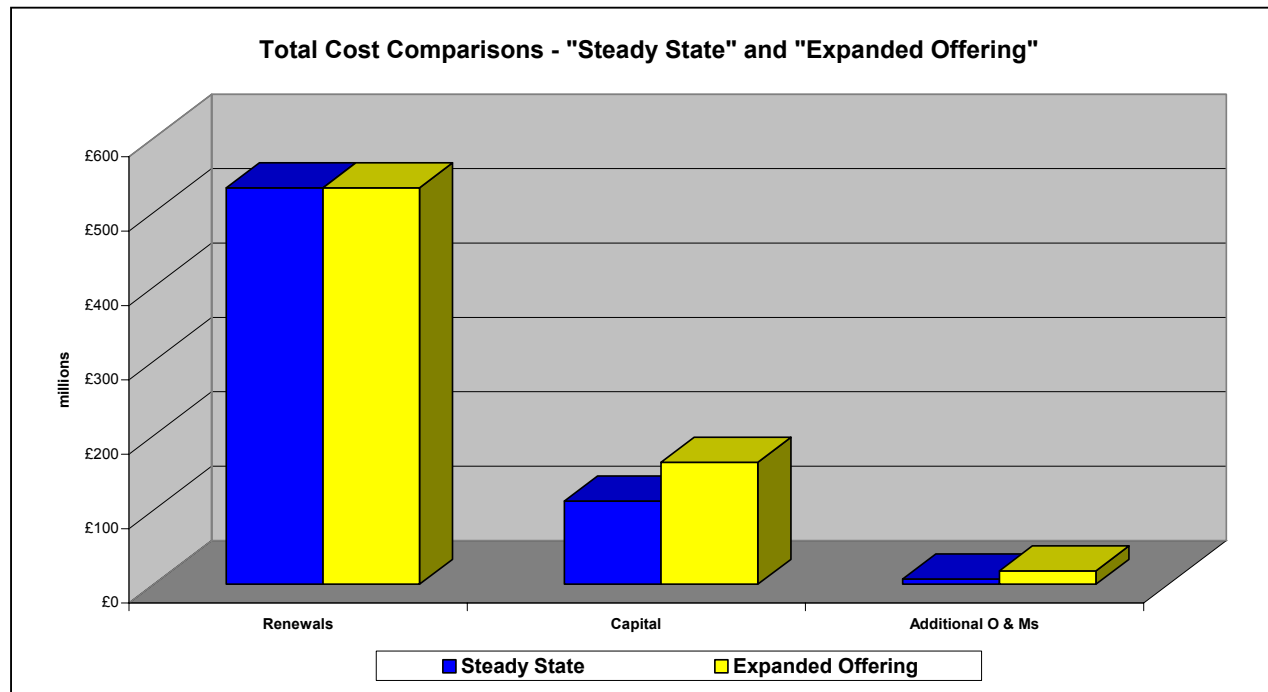
A discount rate of 3.5% in real terms has been adopted in the discounted cash flow analysis to derive measures of net economic worth

- A twenty-five year evaluation period has been adopted, with Year 0 = 2003/04.
- All costs and benefits has been calculated or estimated in 2003/04 prices.
- The following cost and benefit items have been included in Discounted Cash Flow (DCF) analysis:
 - Capital costs: track / permanent way, structures, S&T, buildings / property, level-crossings, rolling stock, depots, earthworks;
 - Recurrent costs: railway O&Ms;
 - Additional railway revenue;
 - New rail user benefits associated with changes in primary service attributes making up generalised cost;
 - Existing user benefits associated with changes in primary service attributes making up generalised cost;
 - New rail user benefits associated with changes in secondary service attributes such as quality of rolling stock, station facilities and expanded hours of rail service availability;
 - VoC savings (resource costs); and
 - Externality benefits associated with VaC savings and road traffic decongestion.

As noted earlier, consistent with current NI practice, the estimated benefits associated with noise and air quality have been excluded from the discounted cashflow analysis.

The low levels of patronage, the need to recover the ‘back-log’ in asset renewals and the limited scope for major economies of scale means that investing in the railway will be difficult to justify by economic measurement only

- It is clear from the analyses undertaken that increased efficiencies are achievable and some scale economies are also attainable.
- The key cost stream associated with both the “Steady State” and “Expanded Offering” options is the 25 year asset renewals programme designed to bring the assets of the railway to a better average standard of condition which will deliver improved operational performance. The average life of the major ‘below rail’ assets (rail, sleepers, ballast, formation etc) under such a programme will, at any point in time, be near the mean economic life, and the condition of these assets should not on average be worsening on a yearly basis.



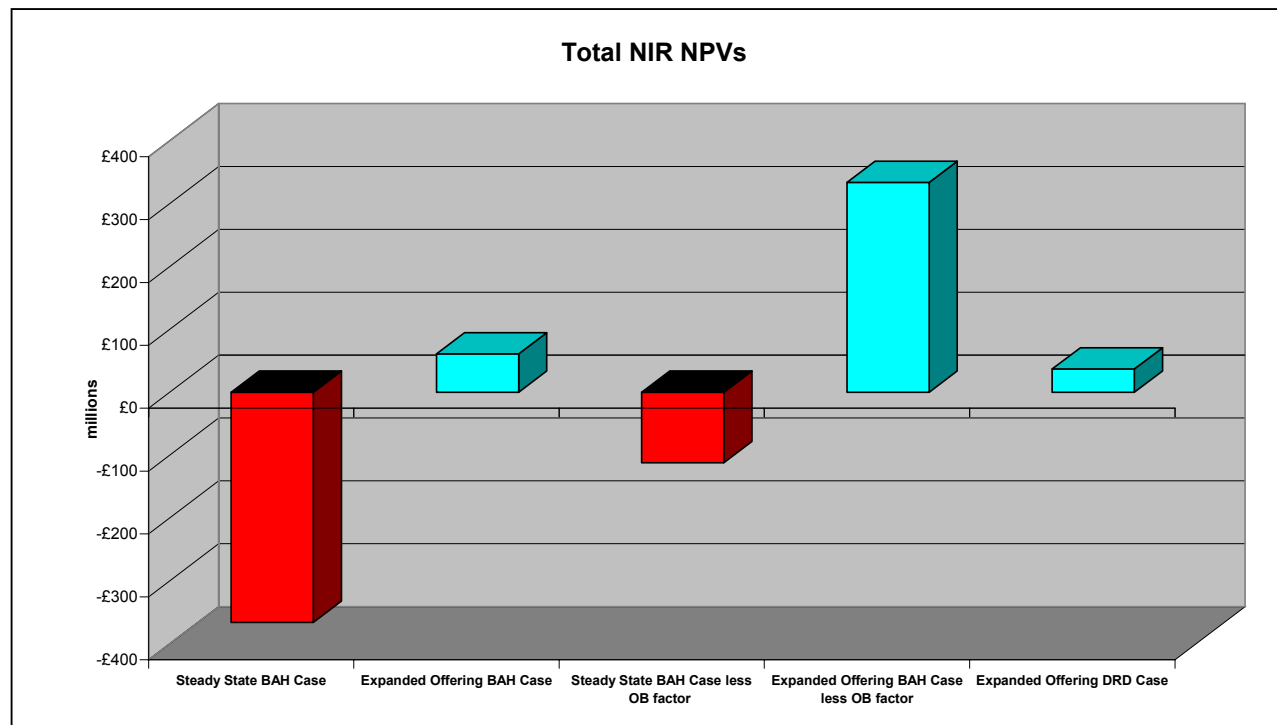
The estimation of long term costs and benefits is by its very nature an imprecise exercise

- During the course of this Review, the Department of Regional Development provided informed inputs into the framing of underlying assumptions used to estimate costs and benefits.
- In some cases the assumptions proffered differed from those deemed ‘best estimate’ / ‘middle scenario’ of the consultants. Therefore, the NPV calculations for the “Expanded Offering” are presented under two scenarios: DRD Case and BAH Case.
- This situation should not be viewed as unusual nor controversial. Put simply, where long term projections are involved the degree of debate and views on aspects of uncertainty will vary. Furthermore, the use of sensitivity testing has been incorporated to illustrate the impacts of results from changes in key underlying assumptions.
- The initial BAH position for the “Steady State” and “Expanded Offering” options was as follows: “Steady State” NPV -£326 million and “Expanded Offering” £80 million. Following additional discussions with DRD it was agreed to incorporate the opportunity costs of the new CAF units into the appraisal and exclude the monetary benefits associated with noise and air quality. This resulted in an NPV for the “Expanded Offering” option of £50.4 million. Furthermore, to arrive at the DRD Case, the assumed split for new rail users associated with the significantly enhanced service offering was adopted as 67% coming from car users and 33% coming from bus users. This had the effect of producing an NPV for the “Expanded Offering” DRD Case of £37.3 million.
- The BAH Case differs from the DRD Case as follows: a 2.25% GDP annual growth factor as apposed to 2% - all other assumptions are the same. The NPV for the BAH Case for the “Expanded Offering” option is £60.8 million.

It is worth noting the following vis-à-vis NI economic growth. NI's GDP had the largest increase between 1990 and 1999 of all the UK regions – around 1% per annum greater than the UK during this period. It grew by 2.5% in 2003 and is expected to grow at 3% in 2004. (Invest Northern Ireland). Medium-term forecasts, May 2004 for the UK “Independent Average” are as follows: 2004 (3.0%), 2005 (2.7%), 2006 (2.4%), 2007 (2.4%) and 2008 (2.5%) – HM Treasury. Short-term GDP forecasts for Rol are 2004 (3.4%) and 2005 (4.6%) – OECD.

The analysis indicates that only the “Expanded Offering” option is likely to deliver significant net economic benefits to NI

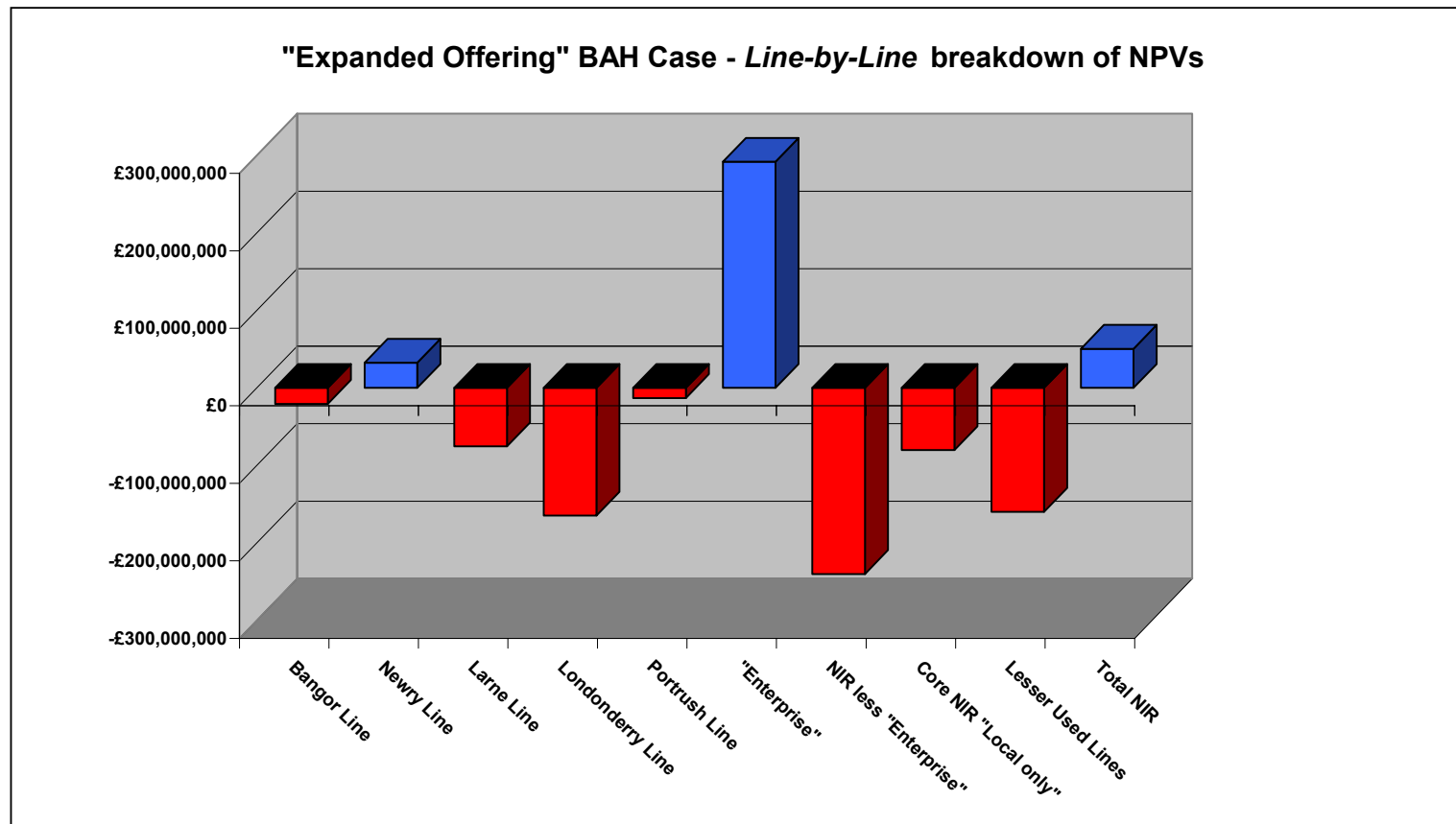
- The following NPV values (with costs adjusted for Optimism Bias) have been calculated:
 - “Steady State” BAH Case, -£366 million;
 - “Expanded Offering” BAH Case, £61 million;
 - “Steady State” BAH Case with 50% OB factor removed, -£112 million; and
 - “Expanded Offering” BAH Case with 50% OB factor removed, £334 million.
- The “Expanded Offering” BAH Case delivers an improved NPV than the “Do Minimum” Option (“Steady State” BAH Case) by almost £427 million over the 25 year evaluation period.



The cost of capital works required in the RoI to achieve Enterprise gains have not been included as these fall outside the NI / UK jurisdiction. However achieving increased frequency off-peak would not be expected to present significant difficulties as sufficient ‘slots’ are currently available. Increasing a.m. and p.m. peak ‘slots’ to / from Dublin Connolly will invariably require capital investment. It is however worth noting that Irish Rail’s plan to open up Spencer Dock offers potential expanded capacity for either *Enterprise* or Irish Rail services, e.g. those on the Maynooth line.

Not all sections of the NIR network would be expected to deliver net economic benefits as a result of the “Expanded Offering”

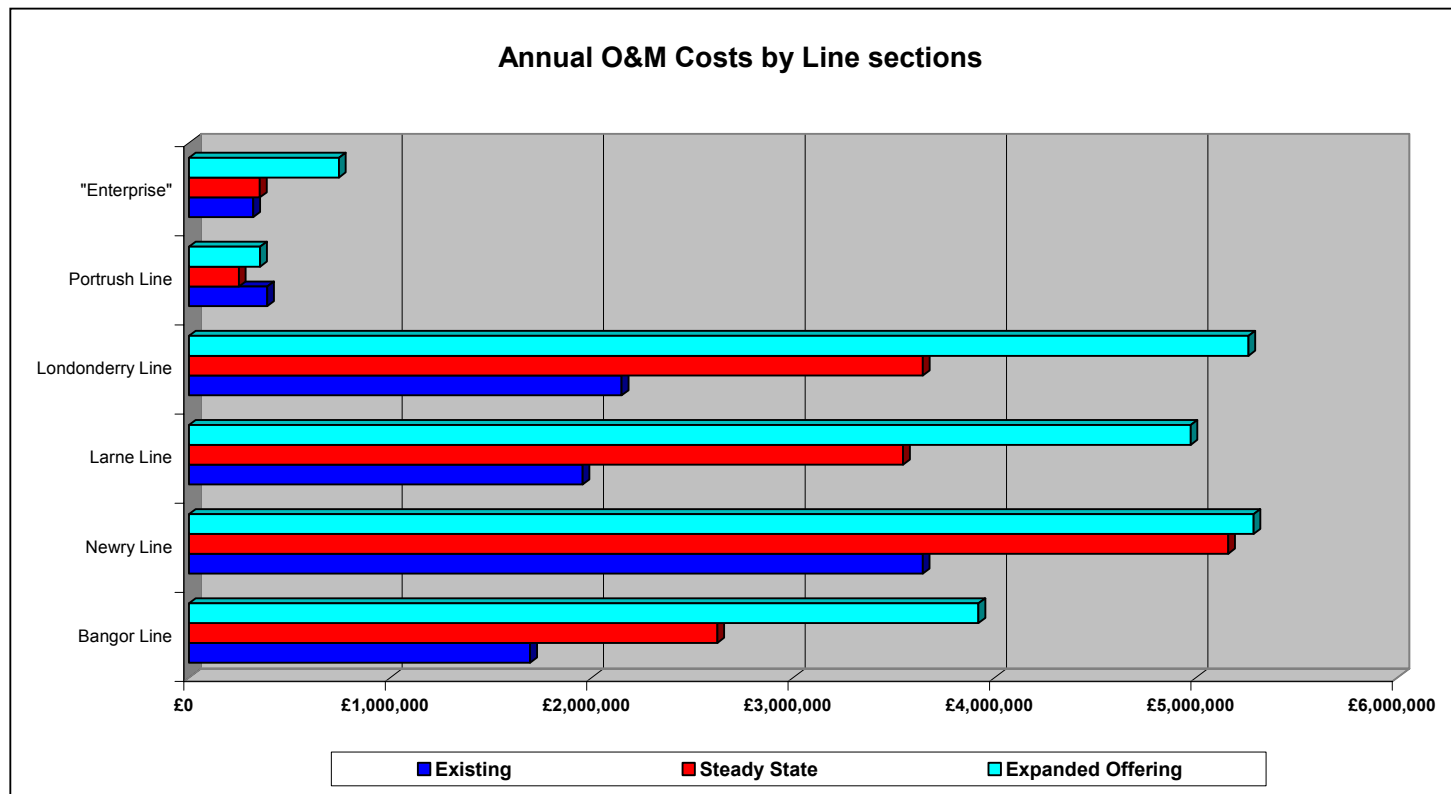
- The overall positive net economic benefit is ‘driven’ by the exceptional gains associated with the Belfast – Dublin service (i.e. hourly service with reduced journey times) as well as those on the Newry Line.
- The importance of the Belfast-Dublin route is further emphasised as it is contingent on investments and decisions undertaken in the RoI to fully exploit the potential of this corridor.



The cost of capital works required in the RoI to achieve *Enterprise* gains have not been included as these fall outside the NI / UK jurisdiction

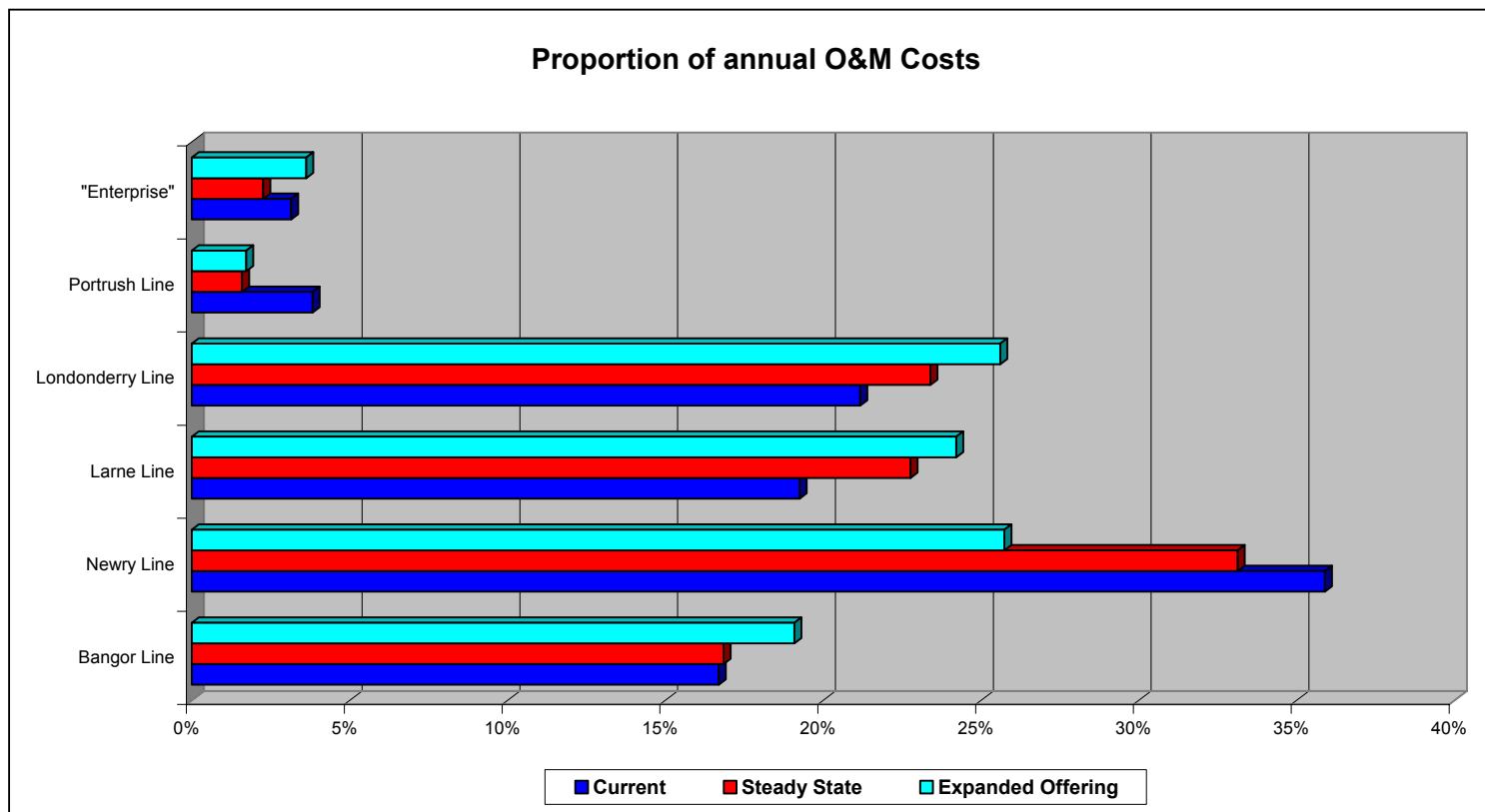
Whilst the cost to Government per passenger journey under the two investment options will decline, the total annual expenditure on NIR will increase

- Under the “Steady State” option, annual operations and maintenance costs (O&Ms) will increase by £5.4 million (approximately 53% greater than current direct O&Ms).
- Under the “Expanded Offering” option, annual operations and maintenance costs (O&Ms) will more than double; increasing by almost £10.4 million (£9.6 million for NIR ‘Local’ and £0.74 million associated with the *Enterprise*).



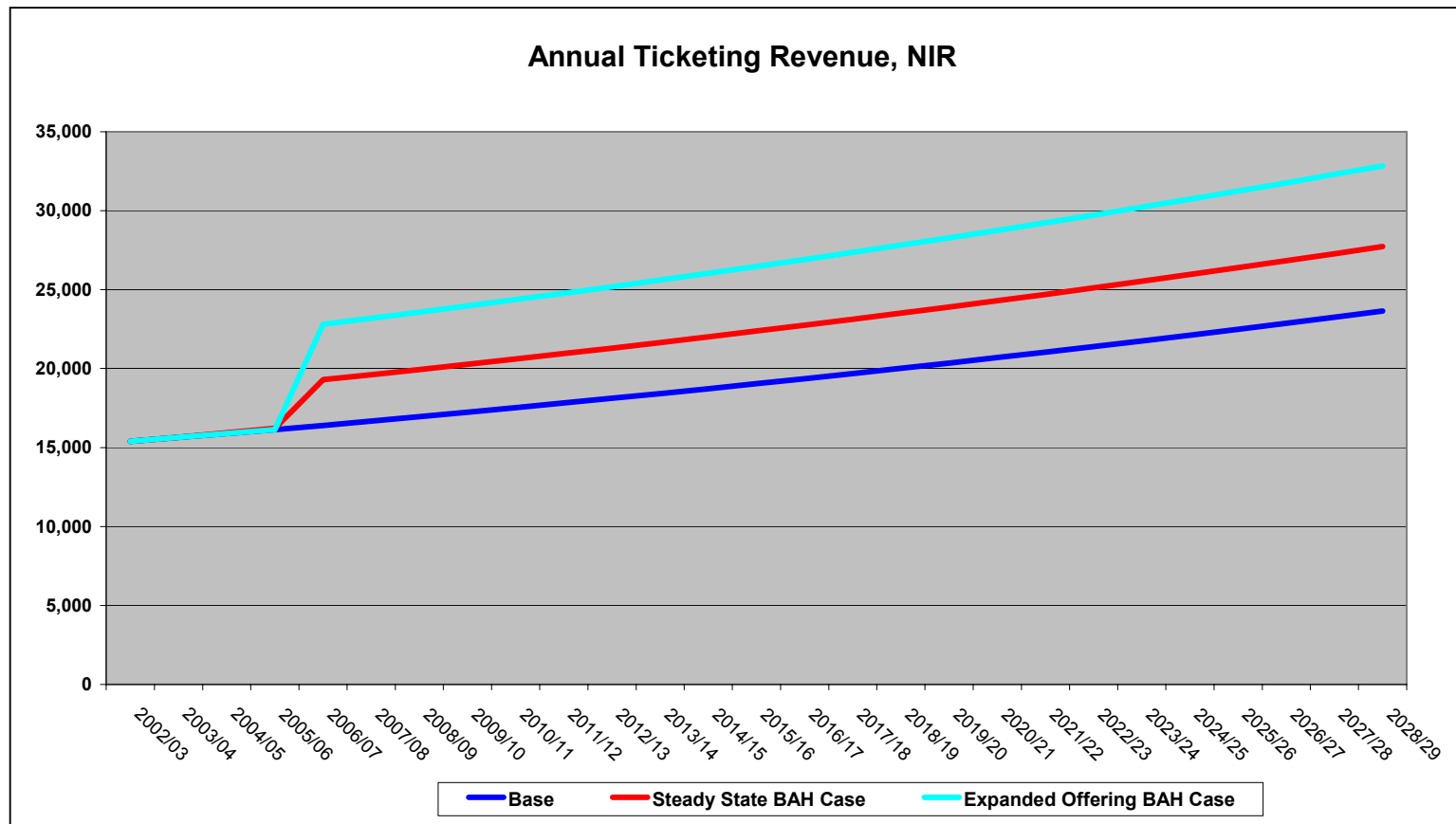
The proportion of direct O&M costs associated with different parts of the NIR network will vary under the two expansion options

- The major 'movements' from “Current” to “Expanded Offering” include:
 - Newry Line down from 36% to 26%;
 - Larne Line up from 19% to 24%; and
 - Londonderry Line up from 21% to 26%.



Revenue from ticket sales will increase significantly ‘over and above’ the base under the two investment options

- Under the base option, annual ticket revenue rises from approximately £17 million to just under £24 million.
- Under the “Steady State” BAH Case option, annual ticket revenue rises to just under £28 million and to just under £33 million under the “Expanded Offering” BAH Case option.



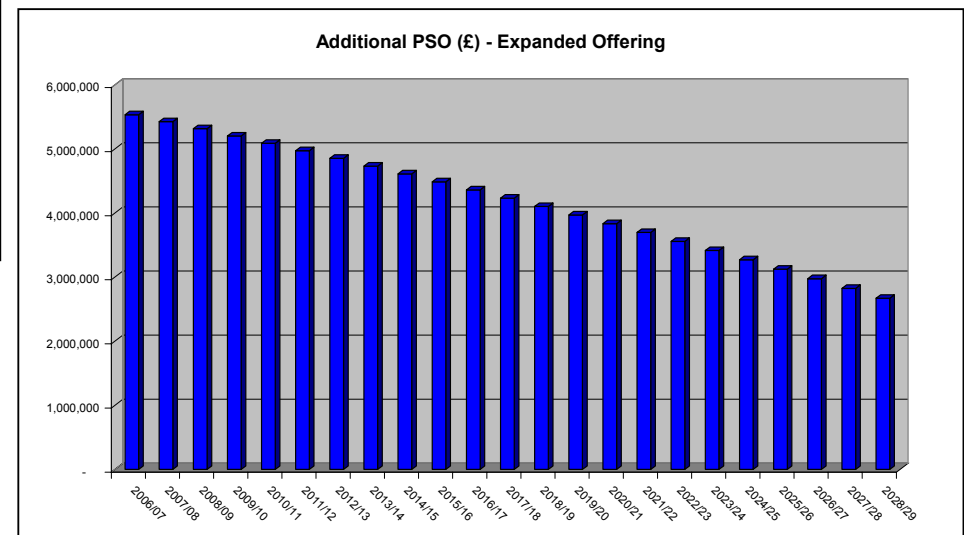
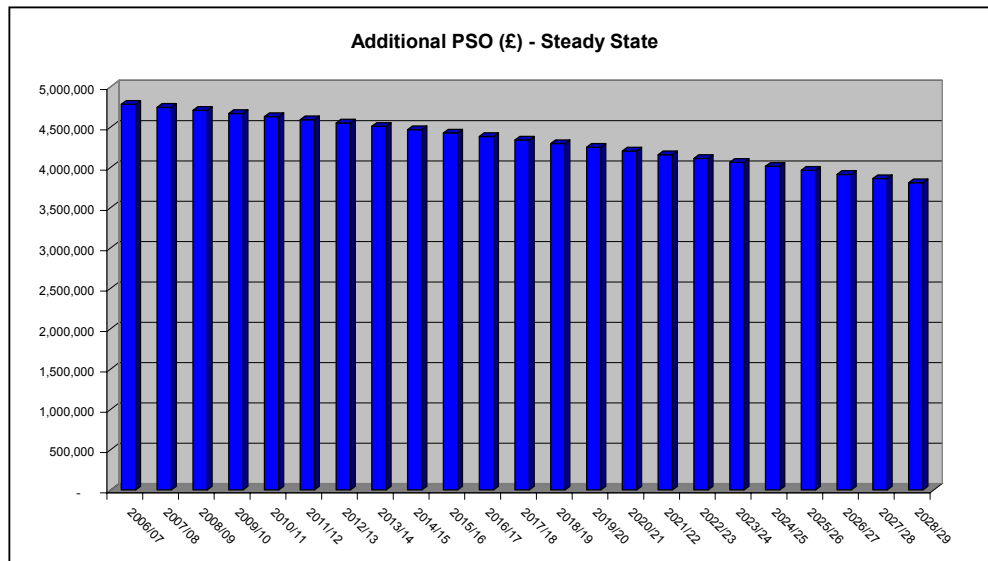
Real fares have been held constant in this analysis – a “sensitivity test” has been undertaken with a real fares increase of 5% in 2006 when all new CAF units are in service.

Increasing rail's market share can be achieved whilst at the same time reducing the level of PSO per passenger carried

- The marginal costs of providing additional rail services and operating trains at higher frequencies and for longer periods are those associated with:
 - Train operations crew – drivers, conductors, train crew supervisors; and
 - Vehicle costs – fuel, cleaning and maintenance.
- Under the “Steady State” option, total direct Operating and Maintenance costs (O&Ms) of NIR are expected to rise by 53% ‘over and above’ the current situation – an annual increase of £5.4 million.
- Under the “Expanded Offering” option total direct Operating and Maintenance costs (O&Ms) of NIR are expected to rise by 95% ‘over and above’ the current situation – an annual increase of £9.6 million.
- Under the “Steady State” BAH Case option total NIR ticketing revenue of NIR are expected to rise by 15% ‘over and above’ the current situation – an annual increase of £2.9 million.
- Under the “Expanded Offering” BAH Case option total NIR ticketing revenue of NIR are expected to rise by 34% ‘over and above’ the current situation – an annual increase of £6.6 million.

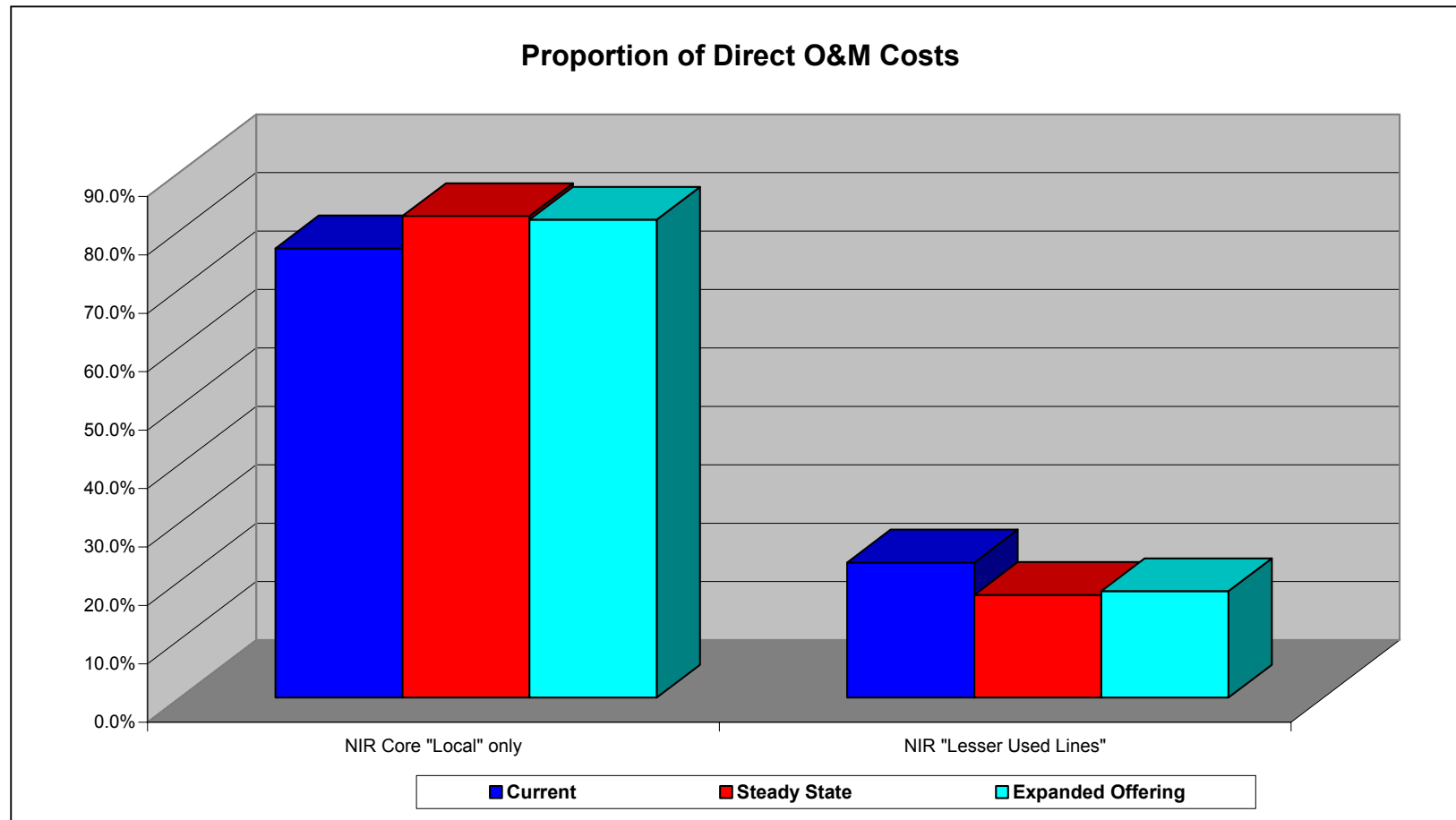
Under the two investment options the level of additional PSO required from 2006/07 declines over the evaluation period

- Under the “Steady State” BAH Case option the additional PSO required would decline from £4.8 million in 2006/07 to £3.8 million by 2028/29.
- Under the “Expanded Offering” BAH Case option the additional PSO required would decline from £5.5 million in 2006/07 to £2.7 million by 2028/29.



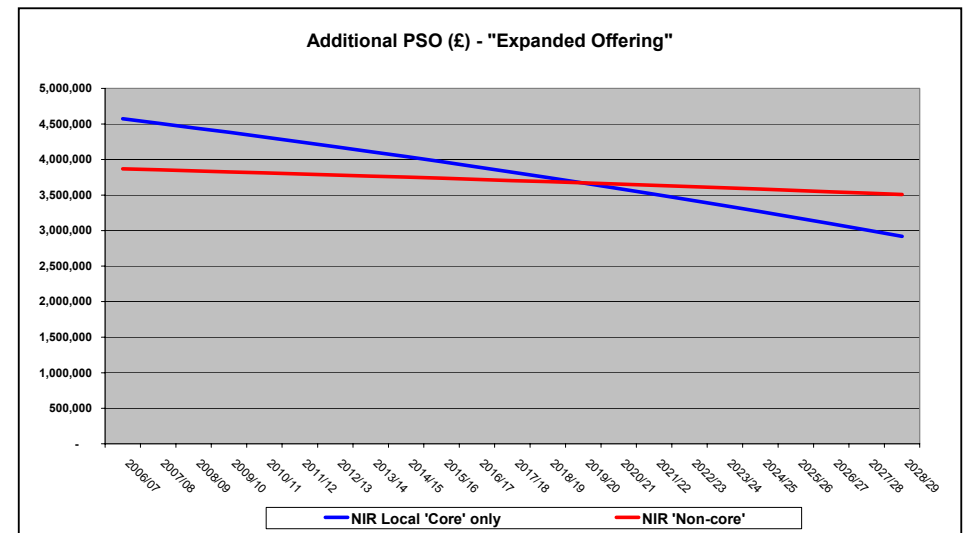
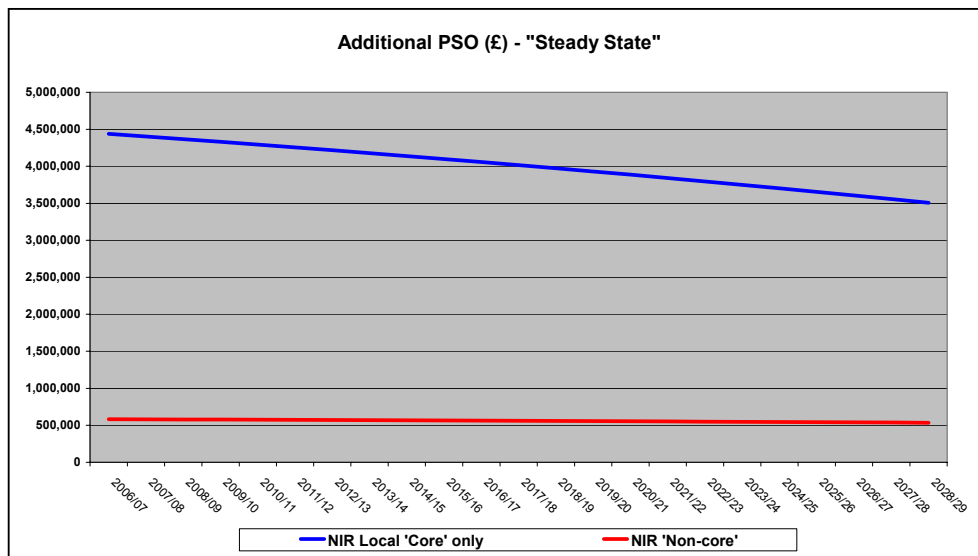
The ‘economics’ of the “Lesser Used Lines” part of the NIR Local railway means that it will continue to perform less well even with a significant increase in patronage associated with the “Expanded Offering” option

- The scale economies associated with the additional services flow best to the Local “Core” part of the NIR network than they do to the “Lesser Used Lines”, however, ‘economics’ are evidenced in the “Lesser Used Lines” parts of the network.



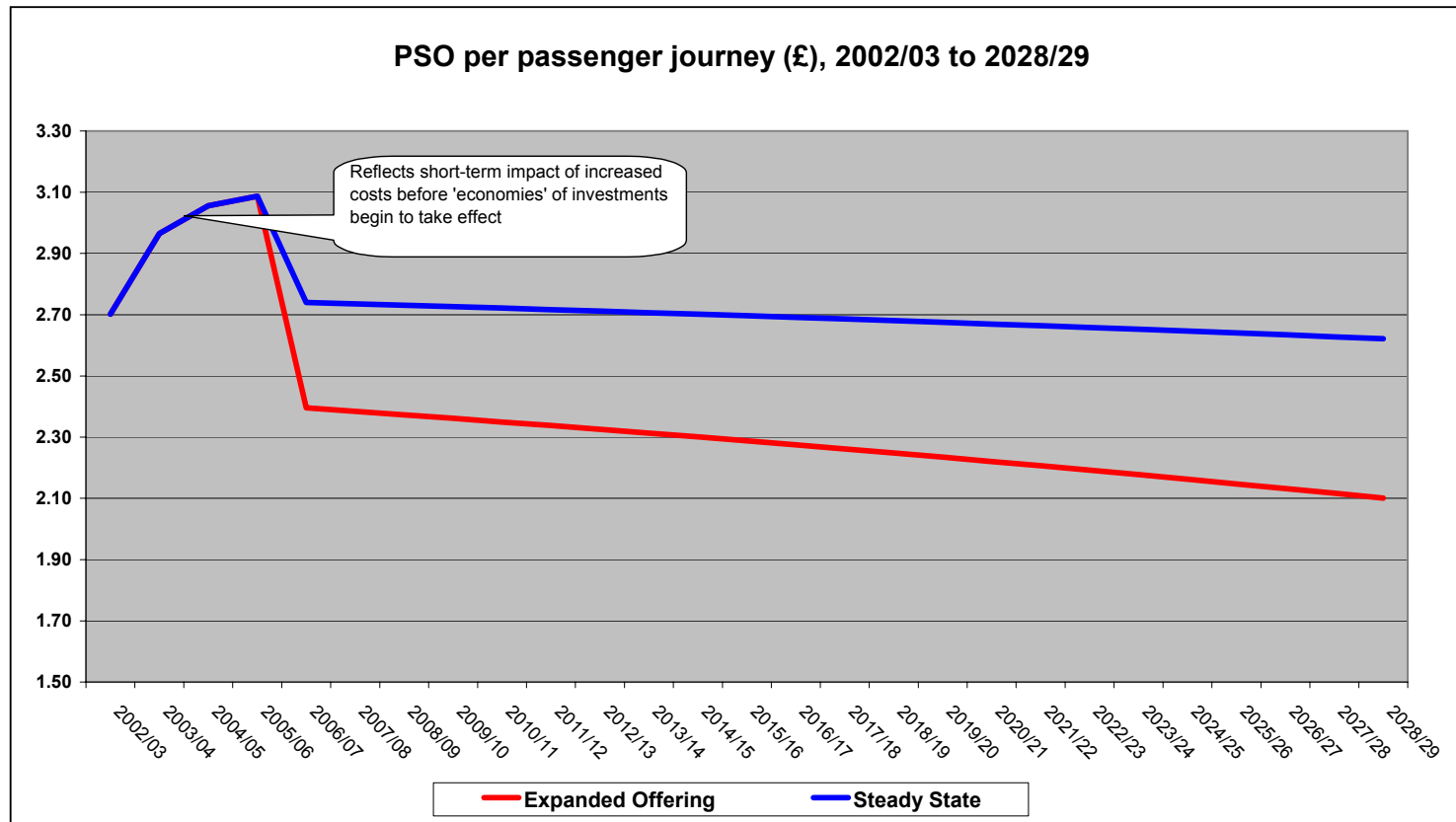
The scale of the “Core” Local NIR network is such that net economies are to be achieved under the investment options

- Under both the “Steady State” and “Expanded Offering” options, additional “Lesser Used Lines” PSO remains relatively stable but the additional PSO for the Core “Local” network is anticipated to decline significantly.



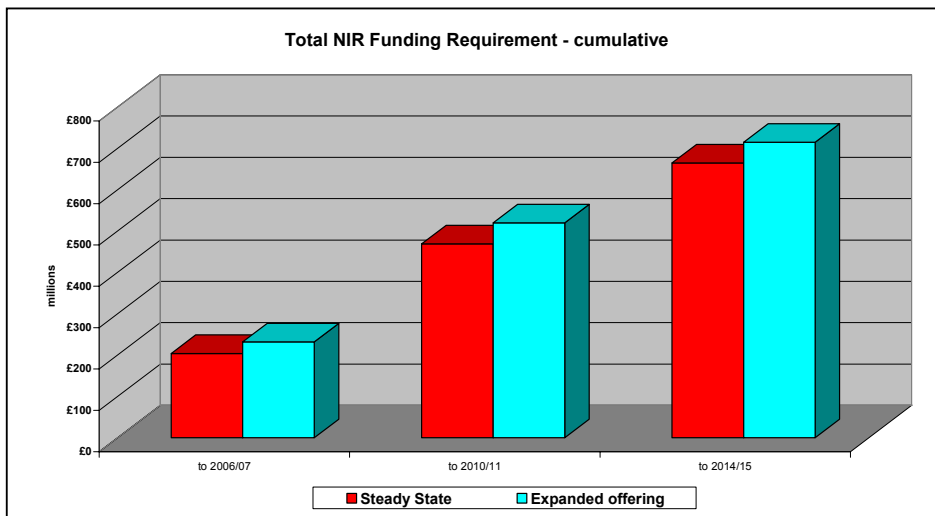
The two investment options result in a decline in the PSO per passenger – particularly the “Expanded Offering” which indicates a substantial efficiency gain

- Under the “Steady State” BAH Case option, the average PSO per passenger journey declines by only 3% from an estimated £2.70 to £2.62.
- Under the “Expanded Offering” BAH Case option, the average PSO per passenger journey declines by 22% from an estimated £2.70 to £2.10.

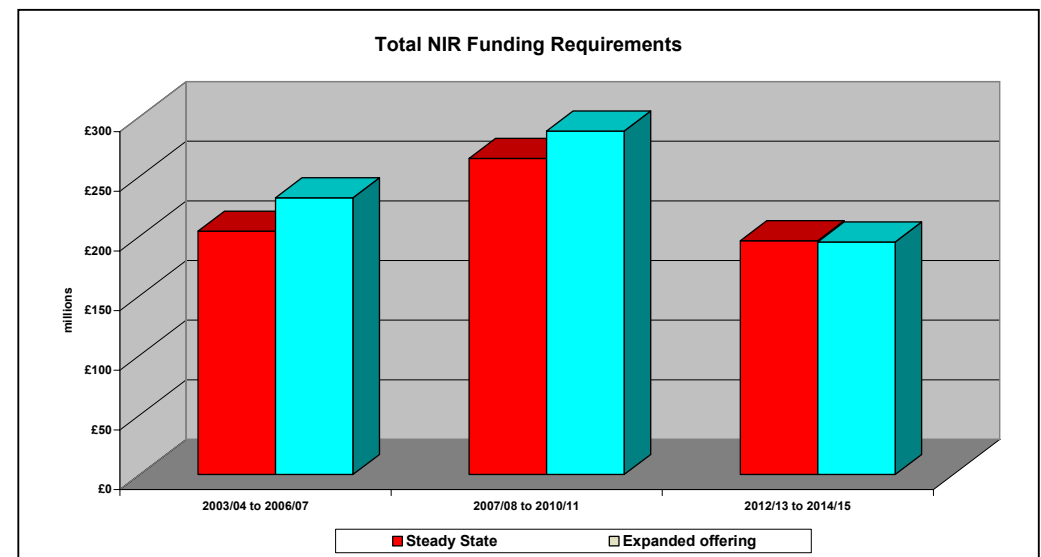


The two investment options would require a similar level of funding over the short, medium and longer terms

- Under the “Steady State” option, total funding requirement to 2014/15 is £576 million.
- Under the “Expanded Offering” option, total funding requirement to 2014/15 is £627 million.



Detailed cashflow summaries on next page



NIR Strategic Review – Appraisal Framework – Appraisal Results

Public Expenditure Allocation Estimates - Total NIR "Steady State"													
	2004/05	2005/06	2006/07	2007/08	Sub-Total	2008/09	2009/10	2010/11	2011/12	2012/13	2013/14	2014/15	TOTAL
		SPENDING REVIEW											
Public Service Obligation (PSO)	£20,624,000	£21,139,600	£22,441,530	£22,404,537	£65,985,667	£22,366,973	£22,328,784	£22,289,959	£22,250,489	£22,210,361	£22,169,566	£22,128,092	£221,729,891
Capital Items													
Renewals	£29,626,767	£29,626,767	£30,498,420	£35,967,649	£96,092,836	£38,785,120	£45,122,203	£28,300,115	£28,300,115	£25,067,692	£16,986,634	£13,611,183	£292,265,899
Infrastructure Capital	£19,870,000	£3,425,000	£3,725,000	£5,700,000	£12,850,000	£6,725,000	£3,000,000	£0	£0	£0	£0	£0	£22,575,000
Rolling Stock	£0	£0	£1,210,000	£810,000	£2,020,000	£2,820,000	£0	£10,800,000	£10,800,000	£11,640,000	£1,120,000	£0	£39,200,000
TOTAL	£70,120,767	£54,191,367	£57,874,950	£64,882,186	£176,948,503	£70,697,093	£70,450,987	£61,390,074	£61,350,604	£58,918,053	£40,276,200	£35,739,275	£575,770,790

Note: Base year 2004/05 not included in funding totals. Funding has been secured for 2004/05

Inflation has not be allowed for in these estimates

Public Expenditure Allocation Estimates - Total NIR "Expanded Offering"													
	2004/05	2005/06	2006/07	2007/08	Sub-Total	2008/09	2009/10	2010/11	2011/12	2012/13	2013/14	2014/15	TOTAL
		SPENDING REVIEW											
Public Service Obligation (PSO)	£20,624,000	£21,139,600	£23,194,797	£23,085,916	£67,420,312	£22,975,223	£22,862,688	£22,748,281	£22,631,970	£22,513,724	£22,393,510	£22,271,296	£225,817,004
Capital Items													
Renewals	£29,626,767	£29,626,767	£30,498,420	£35,967,649	£96,092,836	£38,785,120	£45,122,203	£28,300,115	£28,300,115	£25,067,692	£16,986,634	£13,611,183	£292,265,899
Infrastructure Capital	£22,370,000	£5,925,000	£12,735,000	£8,200,000	£26,860,000	£9,225,000	£6,500,000	£4,000,000	£3,500,000	£3,500,000	£0	£0	£53,585,000
Rolling Stock	£0	£0	£18,410,000	£2,820,000	£21,230,000	£0	£10,800,000	£10,800,000	£11,640,000	£1,120,000	£0	£0	£55,590,000
TOTAL	£72,620,767	£56,691,367	£84,838,217	£70,073,565	£211,603,148	£70,985,343	£85,284,891	£65,848,396	£66,072,085	£52,201,416	£39,380,144	£35,882,479	£627,257,903

Note: Base year 2004/05 not included in funding totals. Funding has been secured for 2004/05

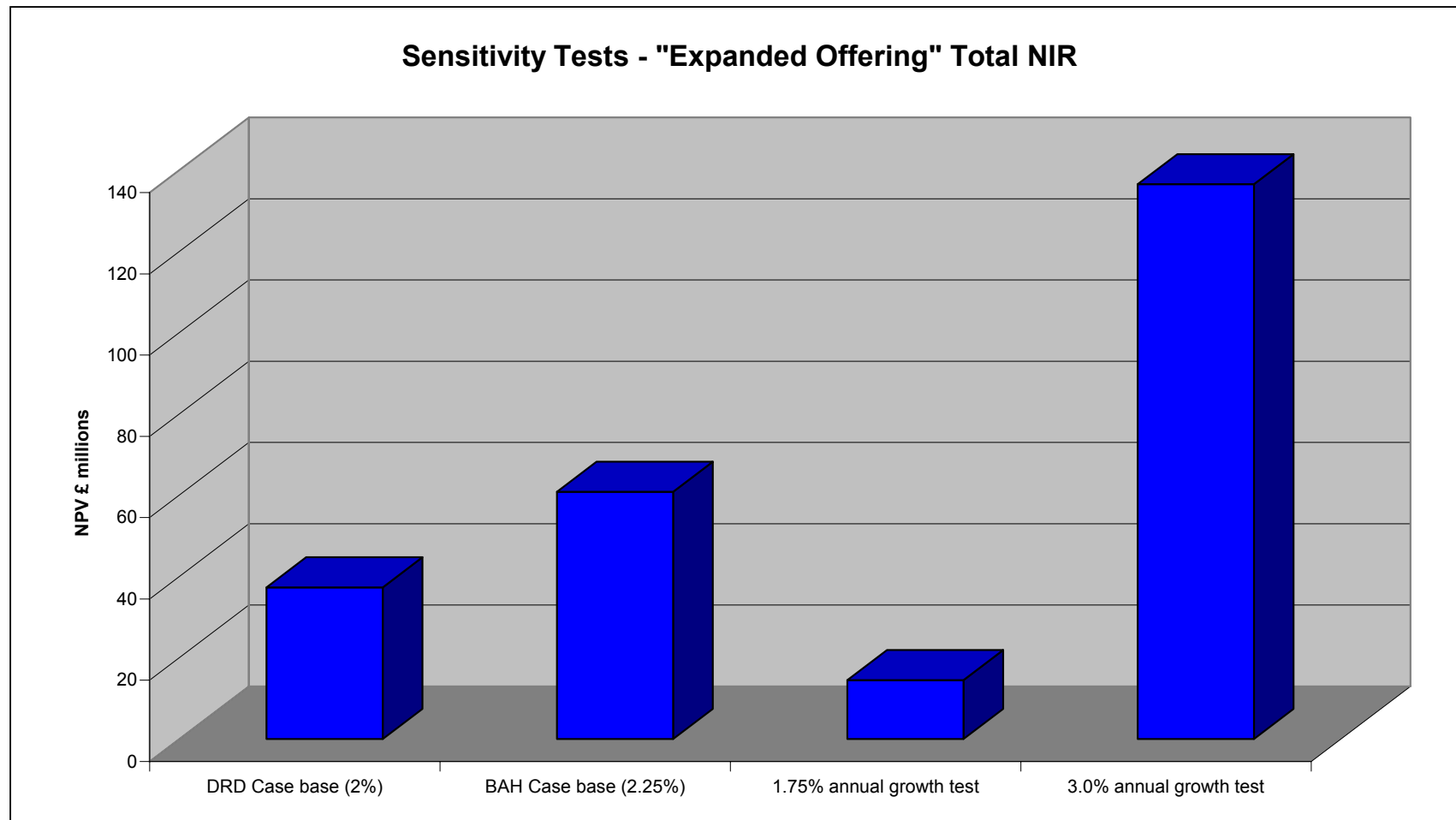
Inflation has not be allowed for in these estimates

Sensitivity analysis involves examining how the balance of advantage among options is affected by reasonable variations in key assumptions

- The following assumptions have been subject to sensitivity analysis:
 - Those related to factors effecting aggregate demand such as rate of economic growth, the elasticity value with respect to incomes, impacts associated with the introduction of new rolling stock and the modernisation of stations; and
 - Real fares.

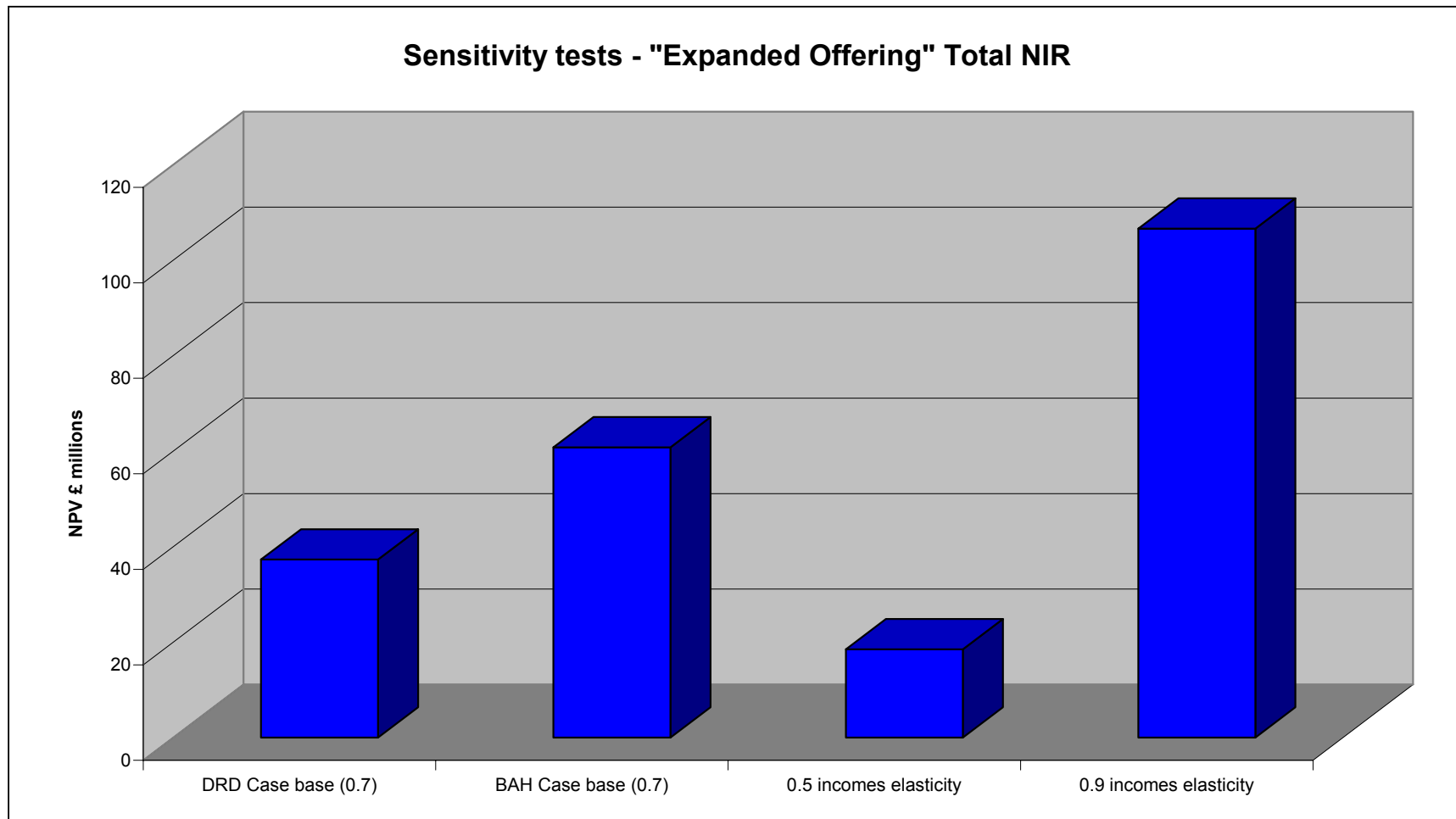
A key ‘influence’ on the cost and benefit streams is the underlying rate of growth

- The level of annual average economic growth within the demand models has been adjusted from 2.0% (DRD Case) and 2.25% (BAH Case) to 3% and 1.75% as part of the sensitivity analysis.



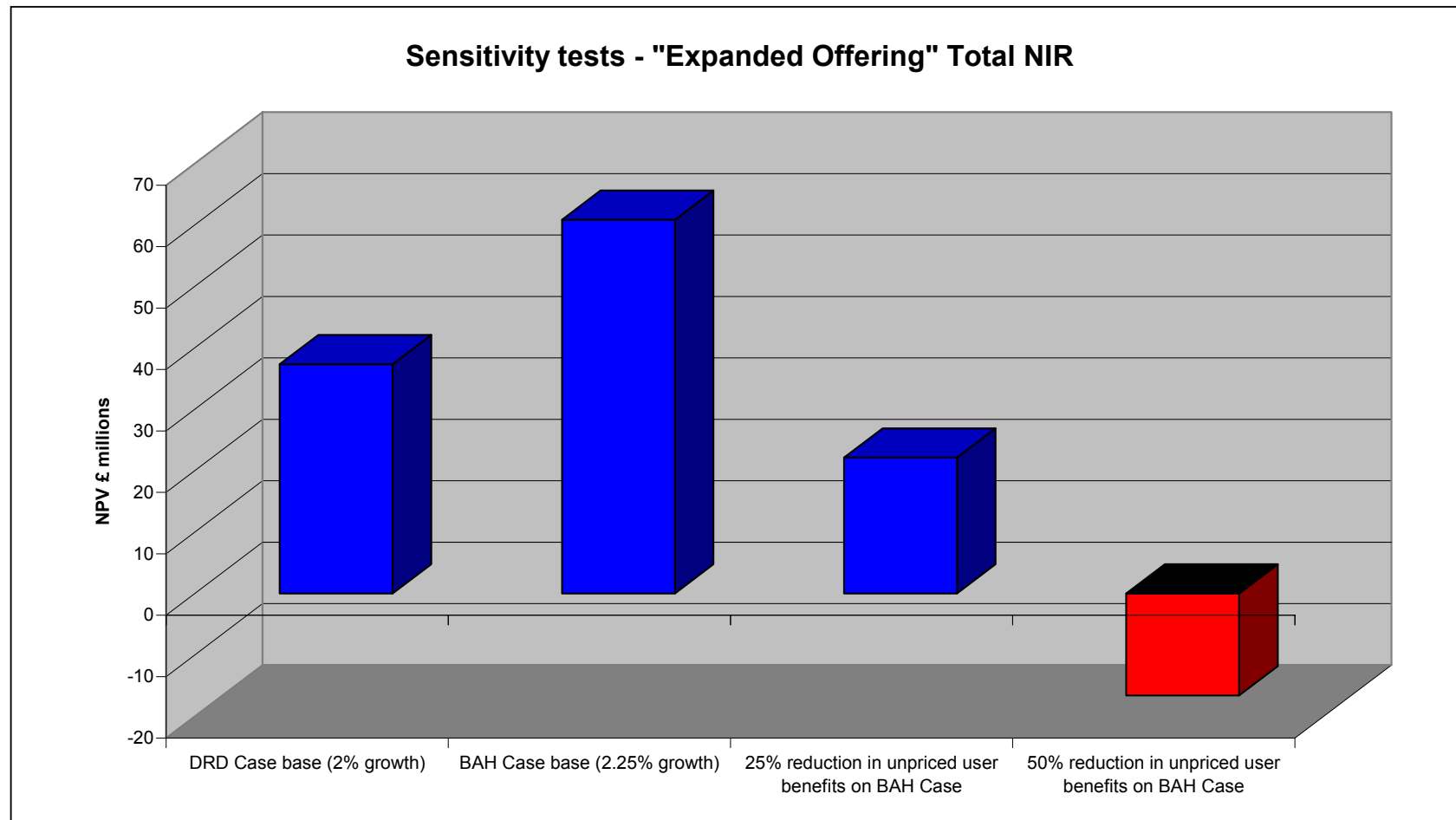
The choice of a point estimate for the value of elasticity with respect to incomes will impact on the rate of underlying growth

- The elasticity value with respect to incomes that has been adopted is 0.7 – this level has been adjusted to 0.5 and 0.9 within the demand models to indicate the impact on underlying growth rates and therefore the options under review.



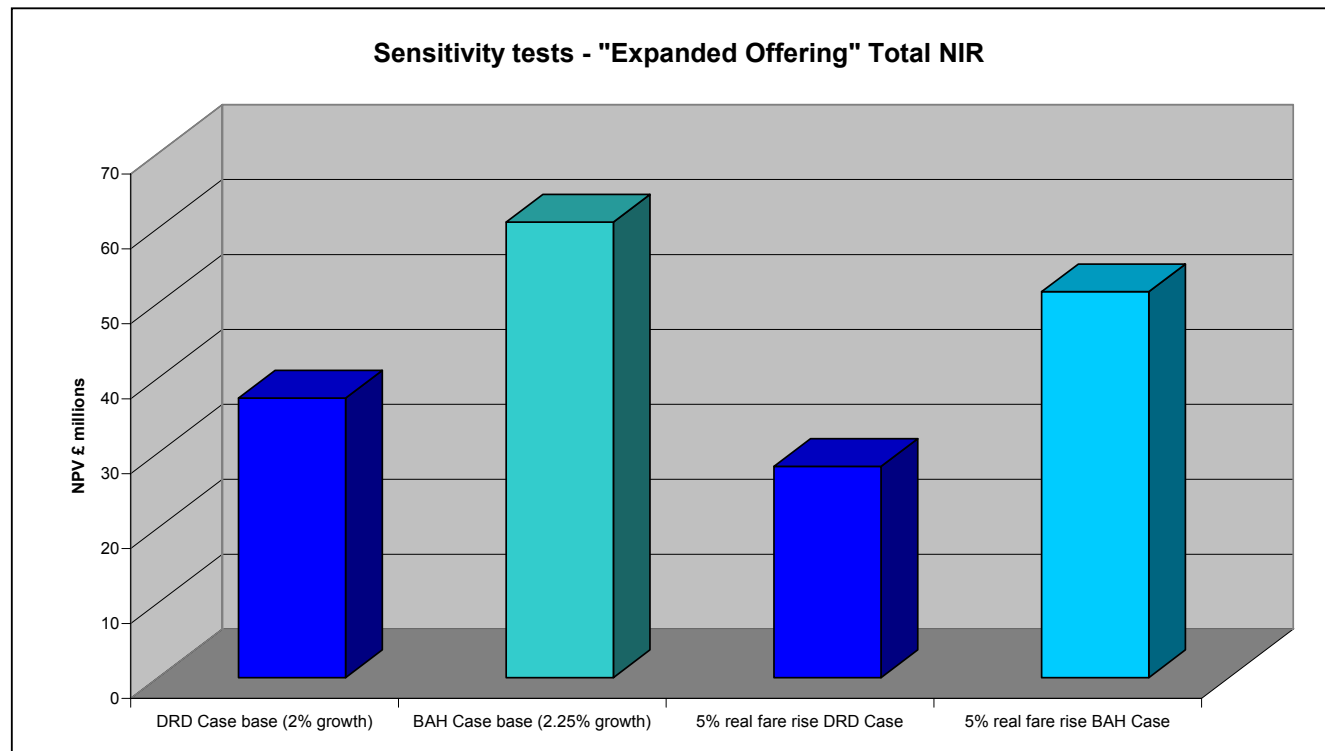
Many of the unpriced user benefits associated with the “Expanded Offering” accrue due to the introduction of new services, station modernisation and other major enhancements to the NIR “Product”

- Reducing (by 25% and 50%) the quantum of unpriced user benefits results in the reduction on the NPV calculated for the “Expanded Offering” for Total NIR.



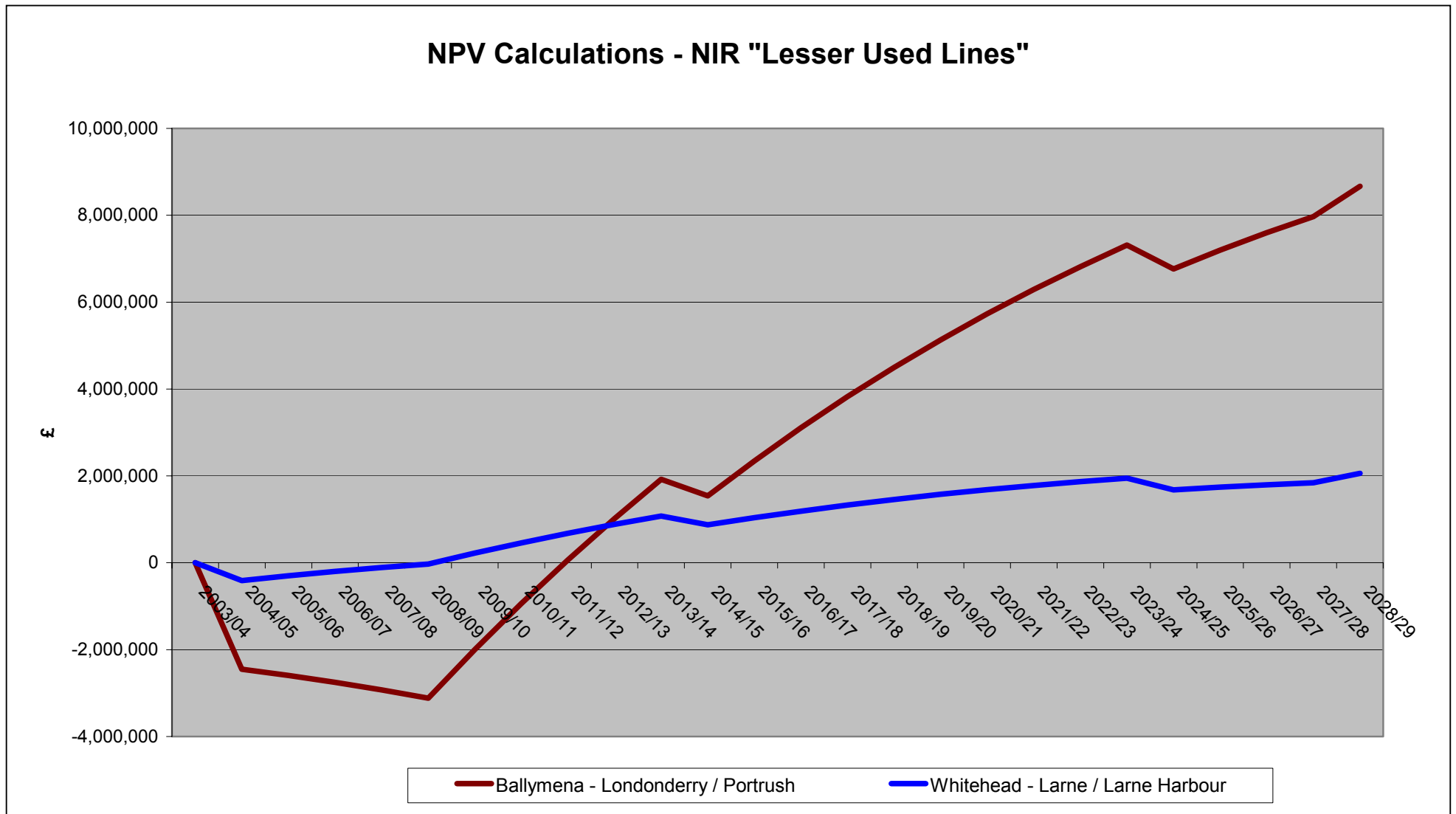
The introduction of the new CAF units may well present NIR with a time at which to seek a real increase in fares

- The introduction of a real fares increase is expected to two ‘impacts’ (because the elasticity of fares for NIR are generally less than -1.0): i) a reduction of demand due to higher fares, and ii) an increase total revenue (and therefore a reduction in PSO). However, for NIR the positive revenue impact is expected to be modest at best as the demand elasticity for fare values estimated by Oscar Faber in 1999 are in some cases ≥ -1.0 thus a 5% increase in real average fares will result in a reduction in patronage greater than 5% (and thereby a greater than 5% reduction in revenue). For example, the fare elasticity for the Bangor line was found to be -0.652 , whilst that for the more price sensitive Portrush line was -1.673 , with a “Total Rail” market value of -0.821 .



The Net Present Values of ‘closure’ of the “Lesser Used Lines” lines indicates a marginally positive case for doing so


- The NPV associated with closure of the “Lesser Used Lines” of the NIR network has been calculated as £10.7 million over a 25 year evaluation period.
- The payback period (i.e. the year in which cumulative NPV starts to be positive) is estimated to be in Year 8 (2011/12) as shown on the chart on the next page.
- This analysis has been undertaken assuming that no additional capital or renewal expenditures over and above those currently undertaken annually would be allocated to the “Lesser Used Lines”.
- If a full life-cycle cost renewals programme were to be implemented on the “Lesser Used Lines” the outcomes would worsen significantly as the additional costs would far outweigh the gains in additional revenues, reduced road transport costs:
 - Approximately £190 million in renewals expenditure (approximately a third of the total required for the whole NIR network) will be required over the next 25 years on the “Lesser Used Lines” parts of the network (£25 million between Whitehead and Larne, £64 million between Ballymena and Coleraine, £87 million between Coleraine and Londonderry and £14 million between Coleraine and Portrush). On the Whitehead – Larne section only approximately £1 million in renewals in required by 2009/10 with approximately £23 million required on the sections north of Ballymena to 2009/10.



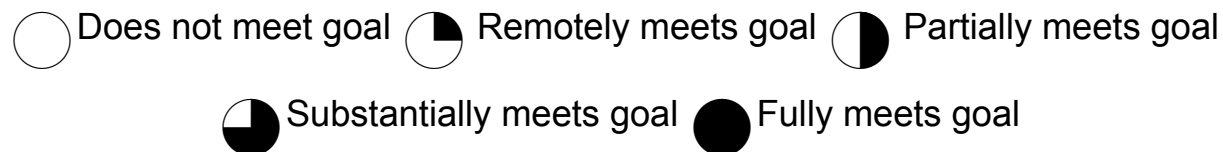
Closure on the “Lesser Used Lines” whilst potentially delivering financial and some economic net gains may involve broader impacts and considerations

- Assessing the ‘closure’ option against a range of social and broader public policy objectives could be a useful input into the longer term future deliberations for the “Lesser Used Lines”.
- The Regional Transportation Strategy (RTS) sets out to make a significant contribution towards achieving the longer-term vision for transportation contained within the Regional Development Strategy:
“to have a modern, sustainable, safe transportation system which benefits society, the economy, and the environment and which actively contributes to social inclusion and everyone’s quality of life”.
- The rail ‘targets’ set out in the RTS include:
 - Retain services north of Whitehead and north and north-west of Ballymena – subject to successful results from the introduction of new trains and improved infrastructure on the rest of the network early in the period to 2012.
 - Patronage increase of 60% over 2001 – total annual figure excluding the *Enterprise* (i.e. 60% on NIR Local services).
- In terms of meeting these ‘targets’ closure of the “Lesser Used Lines” has been assessed as:

Retention of services 

60% increase on NIR Local over 2001 

Where:



Closure on the “Lesser Used Lines” of the NIR network may have significant limiting impacts on future transport use of the alignments

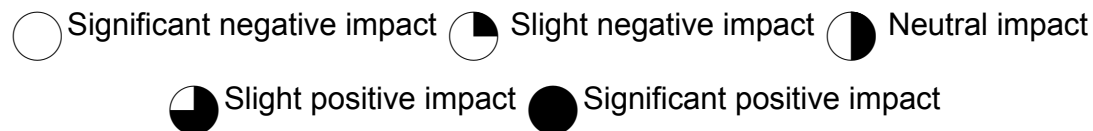
- Reinstatement of railway lines comes at significant cost as is evidenced in numerous projects across the UK and the Republic of Ireland.
- There are numerous cases worldwide of communities and cities reinstating railways (heavy and / or light) on former rail alignments.
- The decisions on alternative uses of railway assets (in particular, land and alignments) need to be taken with long time horizons considered.

A range of impacts will need to be considered in the deliberations as to the case for and against closure of the “Lesser Used Lines” of the NIR Network

Considerations:

Potential to exploit fully past investments	
Impacts on environmental externalities	
Conservation / heritage value	
Biodiversity	
Quality of transport experience	
Safety (personal and transport operations)	
Public acceptability	
Perception of local economy and inward investment opportunities	
Financial affordability	
Accessibility	
Public transport integration	
Social inclusion promotion	
Value for money (short term perspective)	

Where:

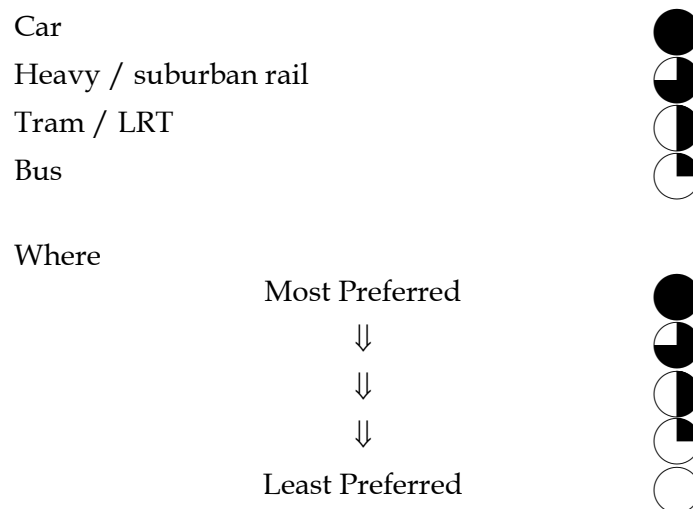


A number of social and economic indicators for Northern Ireland indicate the range of ‘conditions’ across the province

- 28% of the residents of NI are economically inactive – the highest economic inactivity rate across the 12 UK regions.
- The highest rates of claimant counts (unemployment benefits etc) in Northern Ireland are in the following District Councils: Derry (5.6%), Strabane (5.2% and Belfast (4.7%) – the NI average rate of claimant count is 4.1% (December 2003).
- The number of people living in low income households in which at least one adult has a long-standing illness / disability has increased from 46% in 1990/94 period to 54% for the 1999/02 period (OFMDFM Sept. 2003)
- Low income households are most prevalent throughout the West and South of Northern Ireland, with 40% of people in this area living in households experiencing low income (OFMDFM Sept 2003).

With respect to the development of NIR, a key consideration could be the extraction of bus passengers to the enhanced railway

- It is an assumption of the aggregate demand model that new patronage for NIR is gained from 3 sources: market growth, generated trips and diverted trips. The latter category of additional patronage involves the extraction of passengers from other modes (in particular, private car).
- In NI, the bus network is very extensive whilst rail is significantly less so – although due to the geography and spatial distribution of settlements, rail does provide reasonable access to approximately 75% of the NI population.
- A key premise of the Strategic Review has been the need for rail and bus services to operate in an integrated manner.
- It is well held in transport planning that a reasonably clear hierarchy of modal preference exists (*cet par*, subject to other factors such as car availability). This hierarchy supported by many years of research and empirical evidence that indicates a hierarchy as follows:



The development of a substantially improved railway in NI will mean the accruing of option value to those able to avail of the railway's enhanced service offering

- Consistent with the guidance of the DfT's Transport Analysis Guidance (TAG), option values reflect benefits to people who will not use the substantially enhanced NIR regularly (those who will, be they existing or new users, have their 'benefits' captured by the demand modelling) who will benefit from the option to use it at some particular time. In this respect, the benefits of the enhanced NIR ("Expanded Offering") may well extend much wider than to those who use the service regularly, and include all those who might at some point choose to use rail for a specific journey or purpose.

- The implementation of the major upgrade to the rail service offering associated with the "Expanded Offering" option will dramatically increase the attractiveness of rail. Furthermore, the increased service frequencies will significantly increase the convenience and accessibility attributes of rail (particularly where good feeder bus services are provided incorporating integrated ticketing and real time passenger information systems).

- Rail's current market share for journey-to-work trips as evidenced by Census 2001 data is low (mostly under 3%) and even allowing for a significant increase in ridership will continue to remain low. This indicates that the significant proportion of the population (some three-quarters of the NI population would be within 10-15 minutes motorised access time of a railway station) within the rail catchment (e.g. within 800 metres walk time or 10 minutes by car or feeder bus) could be potential beneficiaries in terms of option value.

No attempt has been made to assess the willingness-to-pay of local residents for the ‘option’ of using the enhanced railway with respect to the development

- For this Strategic Review, no attempt has been made to assess the willingness-to-pay of local residents for the ‘option’ of using the enhanced railway as it has been shown that option values are more pertinent to the removal of an existing service or station rather than the provision of a new scheme or upgraded services.
- The scale of options value will differ by proximity to the upgraded NIR network with those closer to a station (e.g. within 800m walk distance) benefiting more than those, for example, 10 minutes away by a feeder bus service.
- The quantification of those residents benefiting by way of ‘option value’ would necessitate a survey (physical count / inventory as well as attitudinal) of households within the railway catchment and would be more appropriate to the consideration of railway closure proposals. To this extent it is reasonable to argue that the economic case for the “Expanded Offering” has been under estimated / is conservative and the costs to the community of closure options, underestimated.
- Most of the major cities and towns of Northern Ireland are either on or close to the NIR network (est. 2003 population). Significantly, the majority of cities and major towns of NI – 14 of 17 - (only those with populations exceeding 20,000) are all on, or have good access to, the NIR network and combined, they alone account for approximately 42% of the total Northern Ireland population.

In order to meet the funding requirements, there are a range of mechanisms which could be explored

- Mechanisms which could be explored, which have not, at this time, been taken into account include:
 - Increases in standard fares at rates in excess of RPI;
 - Restructuring of fare schedules to improve yields;
 - Introduction of pricing strategies to exploit potential latent off-peak demand;
 - Increased exploitation of revenues from advertising and related activities (e.g. at stations, on vehicles etc); and
 - Proceeds secured from property disposal and / or development.

- With respect to surplus land holdings, invariably such sites associated with either disused railway operations or current operations are not ones characterised by good access, significant size and free from remedial needs (many railway sites will have environmental issues associated with chemical use, heavy metals and other contaminants). However, where such sites are available, the potential to transfer these to alternative uses should be investigated subject to the caveat that transfer is such that it does not negatively impact upon the effective operations of the railway nor does it limit the realistic foreseeable development of the railway.

The potential involvement of the private sector in the delivery of services and/or infrastructure maintenance and renewals is only a viable option if the role envisaged can demonstrate that it provides better value for money for the Exchequer than other feasible alternatives

- The concept of “value for money” represents a measure of whether taxpayers’ funds are being spent economically, efficiently and effectively. The assessment of the value for money offered by any proposal will need to take account of cost as well as other material factors such as affordability, safety considerations and wider economic costs / benefits. This test will obviously need to be examined on a *case-by-case* basis.
- Involvement of private partners in the process of delivering rail projects and / or services may be realised through various contractual structures. The contractual form adopted should be determined by the nature of the involvement required and the degree to which benefits might be realised, for example, in terms of:
 - Accelerated delivery of improvement;
 - Risk transfer;
 - Efficient delivery;
 - Economies of scale;
 - Increased market competition;
 - Delivery of whole life asset performance; and
 - Overall value for money.

Options for the involvement of private partners in the NI rail sector are varied

Nature of Private Partner Role	Nature of Contractual Relationship	Role of Translink / NIR	Structural Change
Rolling Stock	Typically, a lease or train service provision contract that includes maintenance of the rolling stock. The train service provision could also include the provision of depot facilities.	Purchaser - sets the specifications. The trains could be paid for on an annual basis with abatements in payments for any failure to deliver.	Outsourcing a significant part of the design, maintenance and overhaul of rolling stock.
Property / Station Maintenance	Options include: a) The outsourcing of property maintenance through a facilities maintenance (FM) contract. b) DBFO contract for the maintenance and upgrade of stations and/or property.	Purchaser - sets the specifications for the required station maintenance. Typically in option (a) contracts would be let for 5 years. Under option (b) private sector funding is required and the contract would typically be for 20-30 years with periodic reviews to benchmark the service.	Transfer of significant activity to the private sector. It may also require the transfer of staff under the Acquired Rights Directive.
Ticketing and Revenue Management	The provision of infrastructure and back office functions in relation to revenue collection. This could be provided on a DBFO basis.	NIR would be one of the operators using the provided infrastructure services.	Separation of ticketing systems and back office administration from train operations.
Maintenance of Infrastructure	Long term maintenance contract. Overall control of the infrastructure would remain with NIR who would determine the levels and type of maintenance. The contract could be an “alliance” type contract where NIR and the private sector share joint objectives in terms of quality, safety and cost efficiencies etc.	NIR would outsource a significant element of maintenance activities and would focus more on contract management, standard setting and procurement of maintenance services.	Transfer of a significant element of current physical maintenance to the private sector. Requires development of procurement and contract management teams to implement and monitor the infrastructure maintenance contracts.
Provision of Funding, Maintenance, Renewal and Upgrade of track and / or Major Projects	This could be provided under a DBFO or DBFT.	NIR procures services rather than assets.	Significant involvement of private partners in physical delivery and maintenance of infrastructure. Increased emphasis on procurement and contract management activity.
Major Enhancement Projects	Delivery of new projects ring-fenced from NIR e.g. DBFO or DBFT.	Interface management.	Private parties with responsibility for delivery of infrastructure.
Passenger/Freight Operations	Operating contracts for train services.	Infrastructure provider and / or train operator.	Separation of infrastructure from operations.

There is clearly a need for the railways of Northern Ireland to be considered in the context of wider community participation, particularly those parts of the network that are lightly-used

- On February 26 this year, the SRA launched a consultation paper on a revitalisation strategy for community/rural lines in Great Britain. As the SRA Chairman notes:

“...branch lines are important for social, economic and financial reasons. ...

...these lines can and do fulfil a key role in the local economy, furthering tourism initiatives or as the main provider of school transport....

...the task is to find ways to increase earnings and reduce costs to provide a sustainable future for these lines.

....” Chairman’s foreword. Community Rail Development - A Consultation paper on a strategy for Community Railways, SRA, February 2004

- The SRA has identified around 60 routes in England and Wales which would benefit from greater local involvement in their marketing, management, and operation. This would in effect involve the redesignation of the status of almost 1,300 route miles, which equates to 12% of the existing network and currently benefits from almost £200m franchise subsidy per annum.
- It is believed that this approach will remove the uncertainty over the future of these lines, award greater community ownership and reduce costs. Furthermore, and potentially more importantly, the approach being mooted could provide the basis for exemptions to some Great Britain Group Standards and all European Interoperability Standards (areas of considerable cost impact for NIR).
- In the Anglia railways case cited in Appendix A, increased community participation has had a significant positive implication for the sustainability of rail lines.

The appraisal framework also includes an objectives achievement assessment, in line with the principles of DfT’s “New Approach to Transport Appraisal” (NATA)

Five Objectives for Transport

Environmental impact – to protect the built and natural environment

Safety – to promote safety

Economy – to support sustainable activity and get good value for money

Accessibility – to improve access to facilities for those without a car and to reduce severance

Integration – to ensure that all decisions are taken in the context of the Government’s integrated transport policy

Supporting Analyses

Distribution and equity

Value for money and financial sustainability

Practicality and public acceptance

Reasons for an objectives achievement assessment

- To demonstrate social, environmental and wider economic effects
- To summarise outcomes against objectives without weighting or summation, so that individual effects can be clearly understood by decision-makers

Note: The AST that follows sets the results of the appraisal and the underlying analysis using discounted cashflow techniques.

“Steady State” – objectives achievement assessment

Environment	<ul style="list-style-type: none"> ■ Generally a positive, if small, achievement of objectives relating to noise and air quality arising from transfer from road to rail ■ The new DMU rolling stock will produce lower greenhouse gas emissions than the existing ■ The new DMU rolling stock will be quieter than the existing and therefore have less noise impact ■ Investment will have a positive effect on conservation of the railway heritage and no significant changes to landscape or townscape ■ Impacts on biodiversity and/or water quality as a result of work on the Derry and Larne lines could occur but would not be significant. ■ Improved toilet facilities on new rolling stock will reduce possible negative effects on the environment. ■ Persons transferring to rail from car (and bus) should achieve health benefits through longer walk distances. ■ Rail passengers will experience improved journey ambience due to new rolling stock.
Safety	<ul style="list-style-type: none"> ■ Significant benefit will accrue as a result of the reduction in road traffic accidents due to passengers transferring from road to rail ■ Improved lighting and CCTV at stations will improve personal safety and security
Economy	<ul style="list-style-type: none"> ■ Increased benefits are less than the increased capital costs, operating costs and other costs resulting in a Negative Net Present Value -£366 million ■ Average PSO per passenger carried will decline under the “Steady State” by only 3% over the longer-term ■ Service reliability will improve due to asset renewal ■ As the “Steady State” does not offer a significant change in service offering, there would be few wider economic benefits as a result of improved rail services e.g. more mobile labour market, better connections between economic centres, improved inward investment opportunities, strengthened perception of local economy, positive impact on tourism
Accessibility	<ul style="list-style-type: none"> ■ Increased service frequency on the Lisburn, Newry, Bangor and Whitehead lines will improve access to the transport system whereas reduced service frequency to Coleraine and Portrush line will reduce access to the transport system in that area ■ The new rolling stock on the Derry, Portrush, Lisburn and Bangor Lines will be more accessible for people with disabilities ■ Station upgrade programme will improve access for people with mobility impairments
Integration	<ul style="list-style-type: none"> ■ Station upgrade programme will make interchange physically easier ■ Improved timetable and better co-ordination with services will improve transport integration ■ Does not meet the Regional Transportation Strategy (RTS) targets for passenger growth ■ Does not fully deliver the RTS proposals for the Enterprise service ■ Conflict with the RTS implies conflict with the Draft Regional Development Strategy (DRDS) with consequent negative implications for other policies that stem from the DRDS

“Steady State” – supplementary analyses

Distribution and equity	<ul style="list-style-type: none"> ■ Slight improvement as most parts of the network will have some benefit from new rolling stock and/or increased services, with the exception of the Coleraine-Portrush Line and the Portadown-Newry Line ■ These benefits would mainly accrue to: <ul style="list-style-type: none"> – Young people (40% of passengers are under 24, 31% are students) – Retired people (11% of customers are retirees) – Lower socio-economic groups (half of all passengers are in groups C2 and DE)
Value for money and financial sustainability	<ul style="list-style-type: none"> ■ Strongly negative net economic worth of -£366 million indicates poor value for money ■ On-going capital expenditure and revenue support of an average £55 m per annum through to 2014/15 required, indicating poor financial sustainability
Practicality and public acceptance	<ul style="list-style-type: none"> ■ Maintaining the status quo would not be expected to raise any problems of practicality. Public expectation of the new railway as a result of investment is likely to be high, so the steady state may be considered less than acceptable/poor value for money.

“Expanded offering” – objectives achievement assessment

Environment	<ul style="list-style-type: none"> ■ Greater achievement of objectives relating to noise and air quality arising from transfer from road to rail as the enhanced offering attracts more passengers from road than the steady state option ■ The new DMU rolling stock will produce lower greenhouse gas emissions than the existing; however, this benefit will be offset by the increased frequency and longer hours of operation ■ The new DMU rolling stock will be quieter than the existing and therefore have less noise impact; however, this benefit will be offset by the increased frequency and longer hours of operation ■ Investment will have positive effect on conservation of the railway heritage and no significant changes to landscape or townscape. Investment in Newry, Coleraine, Derry and Ballymena stations will be particularly beneficial ■ Impacts on biodiversity and/or water quality as a result of work on the Derry and Larne lines could occur but would not be significant ■ Improved toilet facilities on new rolling stock will reduce possible negative effects on the environment ■ Persons transferring to rail from car (and bus) should achieve health benefits through longer walk distances. ■ Rail passengers will experience improved journey ambience due to new rolling stock.
Safety	<ul style="list-style-type: none"> ■ Significant benefit will accrue as a result of the reduction in road traffic accidents due to passengers transferring from road to rail ■ Improved lighting and CCTV at stations will improve personal safety and security. The key stations of Newry, Coleraine, Derry and Ballymena will have additional improvement.
Economy	<ul style="list-style-type: none"> ■ Additional benefits are greater than the increased capital costs, operating costs and other costs resulting in a positive Net Present Value of £61 million – BAH Case. The DRD Case resulted in a positive NPV of £37 million. ■ Average PSO per passenger carried will decline under the “Steady State” by 22% over the longer-term ■ Service reliability will improve due to asset renewal ■ Wider economic benefits will arise as a result of improved rail services e.g. more mobile labour market, better connections between economic centres, improved inward investment opportunities, strengthened perception of local economy, positive impact on tourism
Accessibility	<ul style="list-style-type: none"> ■ Increased service frequency in all area will improve access to the transport system ■ The new rolling stock on the Derry, Portrush, Lisburn and Bangor Lines will be more accessible for people with disabilities ■ Station upgrade programme will improve access for people with mobility impairments. ■ Major station and interchange improvements at Newry, Coleraine, Derry and Ballymena will substantially accessibility
Integration	<ul style="list-style-type: none"> ■ Station upgrade programme will make interchange physically easier ■ Major station and interchange improvements at Newry, Coleraine, Derry and Ballymena will substantially accessibility ■ Improved timetable and better co-ordination with services will improve transport integration ■ Meets the Regional Transportation Strategy (RTS) targets for passenger growth ■ Fully delivers the RTS proposals for the railway

“Expanded Offering” – supplementary analyses

Distribution and equity	<ul style="list-style-type: none"> ■ Most parts of the network will have some benefit from new rolling stock and/or increased services ■ Increased services to Derry, Portrush, Larne and Newry will provide additional benefit in these areas ■ These benefits would mainly accrue to: <ul style="list-style-type: none"> – Young people (40% of passengers are under 24, 31% are students) – Retired people (11% of customers are retirees) – Lower socio-economic groups (half of all passengers are in groups C2 and DE)
Value for money and financial sustainability	<ul style="list-style-type: none"> ■ The positive net economic worth of £61 million indicates good value for money in the absolute sense as the enhanced offering represents significantly better value for money than the “Steady State” option ■ The “Expanded Offering” meets the RTS NIR Local patronage growth target for 2012 (60% increase) by 2008/09 – some ten years before “Steady State” ■ On-going capital expenditure and revenue support of an average of £60 million per annum is required, which is slightly more than the “Steady State” option but delivers a sustainable railway for the NI community
Practicality and public acceptance	<ul style="list-style-type: none"> ■ There may be some practical hurdles to be overcome in implementing the enhanced offering as it represents a significant challenge needing organisational change. The public would be expected to welcome the enhanced offering.

Closure of “Lesser Used Lines” railway – objectives achievement assessment

Environment	<ul style="list-style-type: none"> ■ Where services ceased, transfer of rail passengers and freight to road would have a negative effect on objectives relating to noise and air quality. Elsewhere, a positive achievement of objectives relating to noise and air quality arising from transfer from road to rail would occur. The new rolling stock would produce lower levels of greenhouse gas emissions and noise than the existing, although the overall impact would depend on the timetable operated on the core network ■ Where services ceased, conservation of the railway heritage would be difficult to achieve, but on the core railway investment will have positive effect on conservation of the railway heritage and no significant changes to landscape or townscape ■ No effects on biodiversity and/or water quality would be expected ■ Walk distances, and therefore associated health benefits, will reduce as a result of transfer from rail to bus and car where rail services ceased. Elsewhere, persons transferring to rail from car (and bus) should achieve health benefits through longer walk distances. ■ Where rail services cease, buses may or may not offer comparable journey ambiance to rail. Elsewhere, rail passengers will experience improved journey ambiance due to new rolling stock.
Safety	<ul style="list-style-type: none"> ■ Where services cease, road accidents will increase as a result of transfer of passengers and freight to road. Elsewhere, benefits will accrue as a result of the reduction in road traffic accidents due to passengers transferring from road to rail. ■ Improved lighting and CCTV at stations on the core network will improve personal safety and security.
Economy	<ul style="list-style-type: none"> ■ Net Present Value of £11 million ■ Where services cease, buses are unlikely to be as reliable as rail. On the core railway, service reliability will improve due to asset renewal ■ A smaller railway is less likely to deliver wider economic benefits e.g. more mobile labour market and , better connections between economic centres. It may weaken the perception of local economy and inward investment opportunities, and have a negative impact on tourism.
Accessibility	<ul style="list-style-type: none"> ■ Where services cease accessible bus services would be introduced which could potentially provide a greater level of access than the rail system in terms of bringing people closer to their origins and destinations, greater route flexibility, higher frequency service and more accessible vehicles. ■ On the core railway, new rolling stock will be more accessible for people with disabilities and the station upgrade programme will improve access for people with mobility impairments.
Integration	<ul style="list-style-type: none"> ■ Where rail services cease, the introduction of buses may result in a more integrated transport system than existing. On the core railway, the station upgrade programme will make interchange physically easier ■ On the core railway, improved timetable and better co-ordination with services will improve transport integration ■ Does not meet the Regional Transportation Strategy (RTS) targets for rail passenger growth ■ Does not deliver the RTS proposals for the railway ■ Failure to deliver the RTS implies conflict with the Draft Regional Development Strategy(DRDS) with consequent negative implications for other policies that stem from the DRDS

“Lesser Used Lines” closure – supplementary analyses

Distribution and equity	<ul style="list-style-type: none"> ■ Absence of rail services is likely to be perceived as a disbenefit, regardless of the quality of the bus system offered in its place ■ Cessation of services on parts of the network will have a negative differential impact as access to the railway will diminish only people living or working or studying in areas served by the “Lesser Used Lines” ■ In the areas affected, the impact will mainly affect <ul style="list-style-type: none"> – Young people (40% of passengers are under 24, 31% are students) – Retired people (11% of customers are retirees) – Lower socio-economic groups (half of all passengers are in groups C2 and DE)
Value for money and financial sustainability	<ul style="list-style-type: none"> ■ “Lesser Used Lines” closure and investment in bus services may represent better value for money than options to retain the entire network in its present state
Practicality and public acceptance	<ul style="list-style-type: none"> ■ The Railways Task Force reported that truncation of the rail network was considered as unacceptable by 99% of those who expressed a view during the public consultation

“No railway” – objectives achievement assessment

Environment	<ul style="list-style-type: none"> ■ Transfer of rail passengers to road would have a negative effect on objectives relating to noise and air quality. ■ Conservation of the railway heritage would be difficult to achieve which may have a negative effect on landscape or townscape ■ No effects on biodiversity and/or water quality would be expected ■ Walk distances, and therefore associated health benefits, will reduce as a result of transfer from rail to bus and car where rail services ceased. ■ Bus services may or may not offer an improved journey ambiance.
Safety	<ul style="list-style-type: none"> ■ Road accidents will increase as a result of transfer of passengers to road.
Economy	<ul style="list-style-type: none"> ■ Net Present Value -£57 million ■ An improved bus system is unlikely to be as reliable as rail. ■ The “No Railway” option will weaken the perception of local economy and inward investment opportunities, and may have a negative impact on tourism.
Accessibility	<ul style="list-style-type: none"> ■ Accessible bus services would be introduced which could potentially provide a greater level of access than the rail system in terms of bringing people closer to their origins and destinations, greater route flexibility, higher frequency service and more accessible vehicles.
Integration	<ul style="list-style-type: none"> ■ Cessation of rail services and replacement with bus services may result in poorer integration ■ Cessation of rail services does not accord with the Regional Transportation Strategy (RTS), and therefore conflicts with the Draft Regional Development Strategy(DRDS) with consequent negative implications for other policies that stem from the DRDS

“No railway” – supplementary analyses

Distribution and equity	<ul style="list-style-type: none"> ■ The “no railway” option is likely to be perceived as a disbenefit, regardless of the quality of the bus system offered in its place ■ The absence of rail services in NI would affect substantially more people than if services ceased on the “Lesser Used Lines” only ■ Cessation of rail services would have a negative differential impact on certain groups: <ul style="list-style-type: none"> – Young people (40% of passengers are under 24, 31% are students) – Retired people (11% of customers are retirees) – Lower socio-economic groups (half of all passengers are in groups C2 and DE)
Value for money and financial sustainability	<ul style="list-style-type: none"> ■ Closure of the railway and investment in bus services does not represent better value for money than options to retain the entire network, particularly where the service offering is radically improved
Practicality and public acceptance	<ul style="list-style-type: none"> ■ The Railways Task Force reported that the no railway scenario was unanimously regarded as unacceptable by the public and elected representatives that contributed to the debate

The “Expanded Offering” option is clearly the preferred option

		Steady State	Expanded offering	“Lesser Used Lines” closure	No railway
Environment					
Safety					
Economy	Economic efficiency				
	Wider economic impact				
Accessibility					
Integration	Transport interchange				
	Regional Transportation Strategy and other government policies				
Supplementary analysis	Distribution and equity				
	Affordability and financial sustainability				
	Practicality and public acceptability				
KEY					



Findings

■ Findings

In the absence of an effective and efficient NIR, the community of Northern Ireland would be worse off

NIR provides services to a diverse range of customers across Northern Ireland and into the Republic of Ireland

Limited scale economies and restrictions associated with substantial single track sections strongly influences the potential of the NIR network

Even allowing for obvious limitations, NIR performs well for various indicators against members of its peer group

In order to realise the full potential of the railway, it will be necessary to put in place an investment programme that incorporates a ‘life cycle’ approach to asset renewal and stewardship

Recent investment initiatives (commenced in the late 1990s) have not yet fully redressed the historical infrastructure deficits

Capital investment alone will not deliver the railway necessary for Northern Ireland's future. A better performing railway will require enhanced management practices, improved marketing and improved service quality across all aspects of the business

A well planned and executed asset renewals programme combined with improved fleet utilisation will provide NIR with the sound basis from which to build on in order to successfully deliver significant benefits to customers and the wider NI community

The benefits of investing in NIR will flow to both users and non-users of railway services in Northern Ireland and will include elements such as travel time savings, reduced traffic accident costs and environmental benefits

The draft new timetable (“Steady State” option) does not represent a level of service offering sufficient to radically alter NIR’s future and deliver net economic benefits from the substantial investment involved

The “Expanded Offering” option delivers a net economic benefit to the NI community and includes an expectation of increased rail market share and a lower average PSO per passenger journey. The “Expanded Offering” represents good ‘value for money’ albeit with a risk and uncertainly profile that will require management and monitoring

The move from “Steady State” to the “Expanded Offering” option delivers a quantum uplift in total benefits for a relatively modest total cost increase. In essence, the majority of investment (in particular, the twenty-five year asset renewals programme) is required under the “Steady State” option and the renewals requirement common to both options

The case of the “Lesser Used Lines” parts of the network is not clear cut when broader social, environmental and economic factors are considered. The financial case for retention of services is not strong as the sections involved will require an estimated £181 million in asset renewals over the next twenty-five years. However, under the “Expanded Offering” option long term PSO per passenger on the “Lesser Used Lines” is forecast to decline slightly

The “Expanded Offering” includes the “non-core” sections of the network and clearly represents the preferred investment strategy

The network of NIR represents an important strategic asset for future generations and should be subject to appropriate safeguards. This includes the lightly-used parts of the network. Furthermore, there may in the longer term emerge a case for development of parts of the existing network to serve NI’s major airports – both of which are contiguous to the existing NIR network

in this context the possible development of links to NI’s key airports should also be considered. A discussion of airport rail links is provided in Appendix E.

The ideas currently emerging in Great Britain with respect to the future of rural lines whereby they would benefit from greater local involvement in their marketing, management, and operation needs consideration in the Northern Ireland context

Adoption of the “Expanded Offering” will necessitate implementation of a wide range of supporting practices and management initiatives to ensure that delivery risks are managed effectively and that the full benefits of the investments are captured for the wider NI community

Issues for implementation of future investments are presented in Appendix F

Booz | Allen | Hamilton

Final Report - Appendices



Northern Ireland Railways Strategic Review

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90 years delivering results that endure



Appendices

- A – Demand Assumptions
- B – Appraisal Assumptions
- C – “Expanded Offering” Assumptions
- D – Detailed Infrastructure Cost Estimates
- E – Airport Rail Links
- F – Issues for Implementation of Future Investments

Demand models for NIR rail services have been developed using elasticity values with respect to economic growth and primary services attributes

- Based on patronage data supplied by NIR (PORTIS data, time series station boarding / alighting data, line total passenger flows) line by line section and sub-section disaggregation has been undertaken for the following:
 - Bangor Line: Belfast – Bangor;
 - Newry Line: Belfast – Lisburn, Lisburn – Portadown, Portadown – Newry;
 - Larne Line: Belfast – Carrickfergus, Carrickfergus – Whitehead, Whitehead – Larne / Larne Harbour;
 - Londonderry Line: Belfast – Antrim, Antrim – Ballymena, Ballymena – Coleraine, Coleraine – Londonderry;
 - Portrush Line: Coleraine – Portrush; and
 - Belfast – Dublin.
- Peak and off-peak models have been developed. The ‘peak’ factor adopted is 0.65, i.e. 65% of all NIR journeys commence within the following weekday periods: 0730-0930 and 1630-1830.
- Two economic growth values have been adopted - 2.0% per annum for DRD Case and 2.25% per annum for BAH Case - over the 25 year evaluation period – this is consistent with the Regional Transportation Strategy for NI and the DfT’s TEN. It is noted that GDP (in real terms) has averaged 2.9% p.a. for the period 1990-2002 in NI and GDP per capita, 2.4% p.a. over the same period. (Source: OFMDFM)
- Elasticity values with respect to GDP have been adopted – these have been sourced from the Passenger Demand Forecasting Handbook (PDFH), August 2002 (Passenger Demand Forecasting Council, Association of Train Operating Companies in the UK) and for the Belfast – Dublin corridor from regression analysis time series research undertaken by Iarnród Éireann for the period 1996 to 2001.
- A “Base” forecast was produced assuming no change in service attributes to provide an estimate of ‘underlying’ demand growth in the absence of any initiatives to stimulate demand ‘over and above’ what might be derived from an expanding NI economy.

Where practical NI and line specific elasticity values for primary service attributes have been incorporated into the demand models

- Elasticity values with respect to fares, service headway and in-vehicle time have been sourced from the Oscar Faber study for Translink on demand elasticities for rail and bus services in Northern Ireland (Dec. 1999).
- Real average fares have been held constant in the demand models – with a sensitivity test to show the impact of a 5% real increase in fares associated with the introduction of the new CAF train sets in 2006.
- The primary service elasticity values utilised are set out in the table below:

Primary Service Attributes - Elasticity Values							
	Bangor Line	Newry Line	Larne Line	Londonderry Line	Portrush Line	Other Rail	Total Rail
In-vehicle time	-0.381	-0.798	-0.334	-0.983	-0.983	-0.897	-0.494
Headways / Service Frequency	-0.226	-0.769	-0.271	-0.989	-0.989	-0.293	-0.366
Average fares	-0.652	-1.46	-0.686	-0.686	-1.673	-1.102	-0.821

Choice of incomes elasticity values has been based on either NI specific research or reasonable comparators

- The following elasticity values for GDP / economic growth elasticity have been incorporated in to the models: NIR 'local' services 0.7, *Enterprise* services 0.94.
- The 0.7 value for economic growth elasticity NIR local services has been sourced from the Passenger Demand Forecasting Handbook (August 2002). This value is the recommended value for “non-London inter-urban flows” over distances in the range of 20 to 100 miles where first and full fare tickets account for less than 10% of the volume of ticket sales. NIR is a significant proportion of concession and less-than-full fare travel as evidenced by the customer profile data cited earlier. As a comparison, the PDFH recommends values in the range of 1.0 to 1.7 for South East England trips to / from London or within SE England but excluding to / from London. Research concluded by Iarnród Éireann – econometric time series analysis on quarter data for the period 1996 to 2001 inclusive - has produced the following line-by-line point estimates of demand elasticity with respect to economic growth:
 - Cork line 0.98
 - Limerick line 0.45
 - Tralee branch 0.10
 - Galway line 0.74
 - Sligo line 0.33
 - Westport branch 0.14
 - Waterford line 0.72
 - Rosslare branch 0.30
 - Dublin DART 0.78 (data 1994 to 1999).

Reference to UK research indicates that significant improvements to ‘secondary attributes’ of a rail service can stimulate demand

- Additional demand for rail services will be stimulated by:
 - The introduction of a fleet of modern DMU vehicles;
 - Network wide station modernisation including CCTV, Real Time Passenger Information (RTPI) systems, improved signage, enhanced waiting areas / shelters, improved lightning / illumination;
 - Increasing the hours of weekday train operations;
 - Introduction of additional services on Sundays; and
 - Improved public transport integration, e.g. more trains to / from QVS and Belfast Central as well as better ‘through running’.
- In order to estimate the demand stimulation effects of these initiatives under the “Steady State” and “Expanded Offering” options reference to the PDFH was undertaken. The following values (arguably conservative) have been incorporated in to the demand model based on ‘low end of the range’ values from UK research and experience:
 - New DMUs: value equivalent to 2.7% of average fare;
 - Station modernisation: value equivalent to 3% of average fare; and
 - Increased hours of weekday operation, expanded services on a Sunday and better integration with other PT modes: value equivalent to 0.67% of average fare.
- Elasticity values of fares were used to convert value equivalents into ‘once off’ growth factors using the following formula:
 - $\text{Exp} [\ln (F_2 / F_1) \times E_f]$, where F_1 = old fare, F_2 = new fare, E_f = fare elasticity.
- For all service enhancements under the “Steady State” and “Expanded Offering”, the first full year of benefit is assumed to be 2006/07. No benefits associated with service changes are assumed to accrue prior to 2006/07.

The key source of additional patronage on NIR associated with enhanced services is assumed to come from diverted / extracted private car trips

- Demand growth is anticipated to come from three sources: underlying growth, trip generation (i.e. new demand associated with the availability of new travel opportunities) and stimulated / diverted demand (trips extracted from other modes).
- Underlying demand growth is a function of economic activity.
- For this Review no trip generation has been assumed, as the rail network is not extended into new areas previously not served. This is arguably a conservative approach as the substantial increase in frequencies, for example, may well act to generate trips not previously undertaken but are now much more attractive due to the new frequencies, *inter alia*.
- It has been assumed that the extraction / diversion of trips from other modes is split 67% from private car and 33% from bus. Furthermore, an underlying assumption is that the bus service is modified as appropriate to reflect the enhanced rail offering and to offer a better fully integrated rail / bus public transport network across NI.

Passenger rail transport in many countries is beginning to make a 'come back' in terms of annual growth rate trends

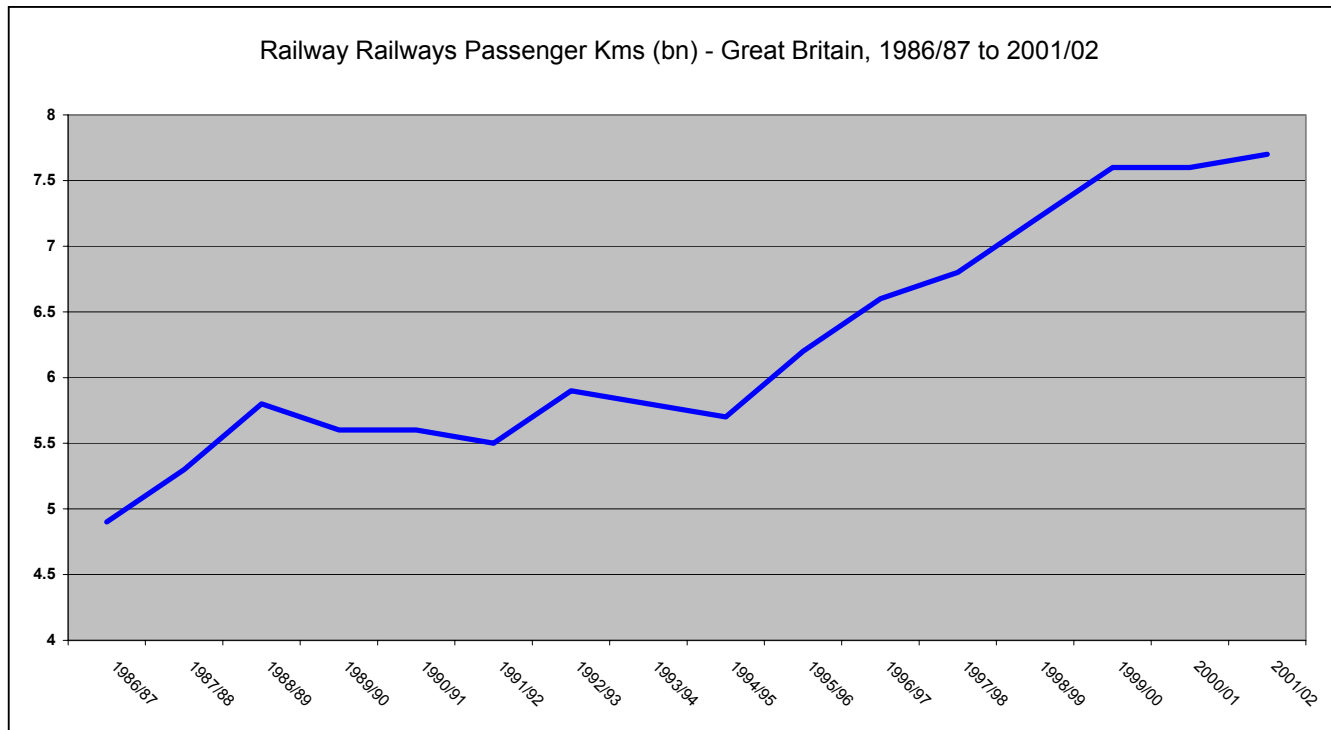
- For example, in Great Britain total passenger rail journeys have increased dramatically in the late 1990s and early this century – albeit to levels 10-15% below the record levels of the 1950s (passenger kms are higher today than they have ever been in GB). Average annual growth of 2.2% p.a. has been experienced between 1985/86 and 2001/02 – a rate of 4.6% p.a. has occurred since 1994/95.



Source: Rail Industry Monitor 2003

Regional railways in Great Britain have also experienced a period of significant growth in recent years

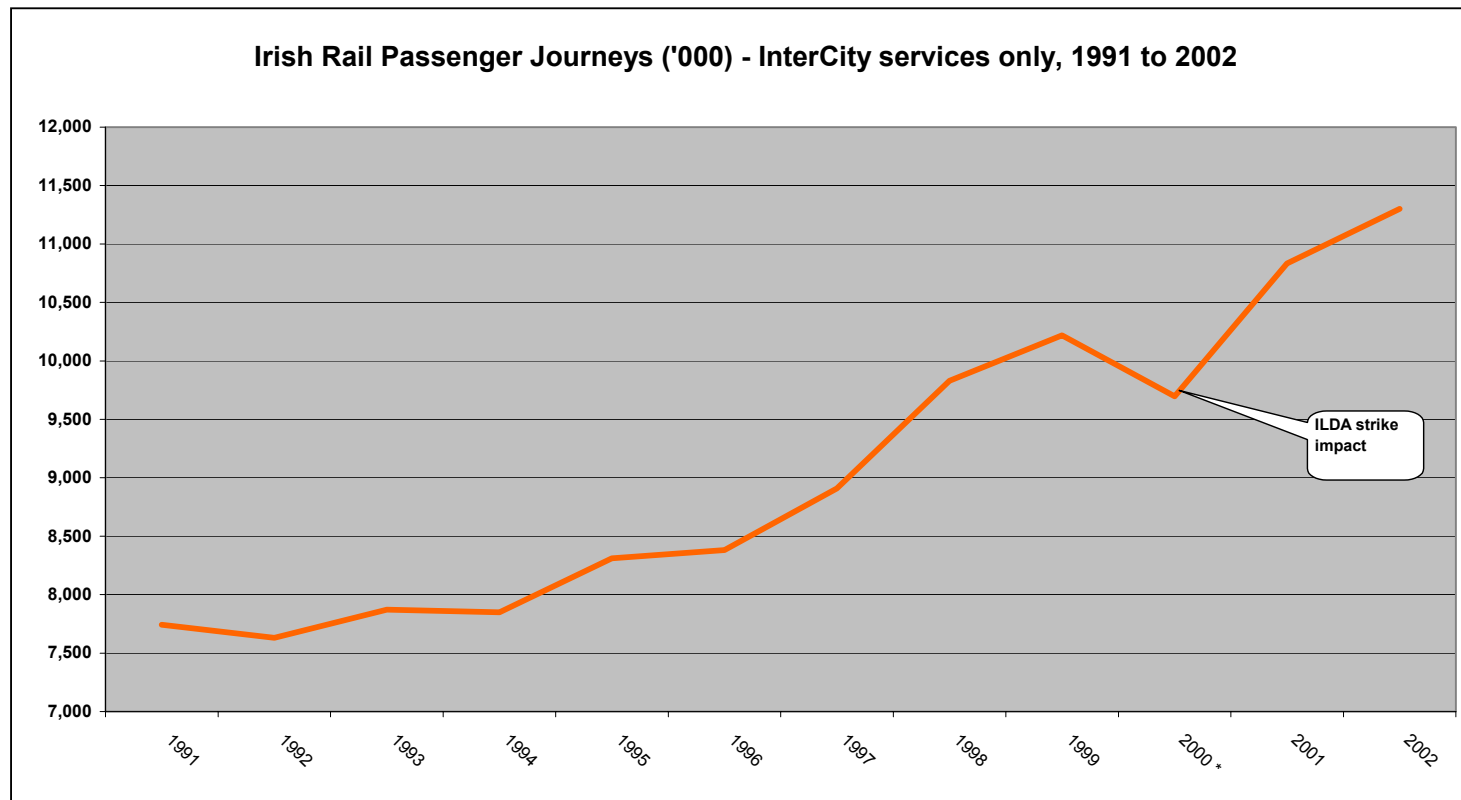
- The volume of passenger kms on Great Britain's Regional railways has increased by an average of 3.1% between 1986/87 and 2001/02 and at an even faster rate – 4.4% p.a. – between 1994/95 and 2001/02.



Source: Rail Industry Monitor 2003

Services operated by Irish Rail's InterCity business have attracted a significant increase in patronage over the past decade

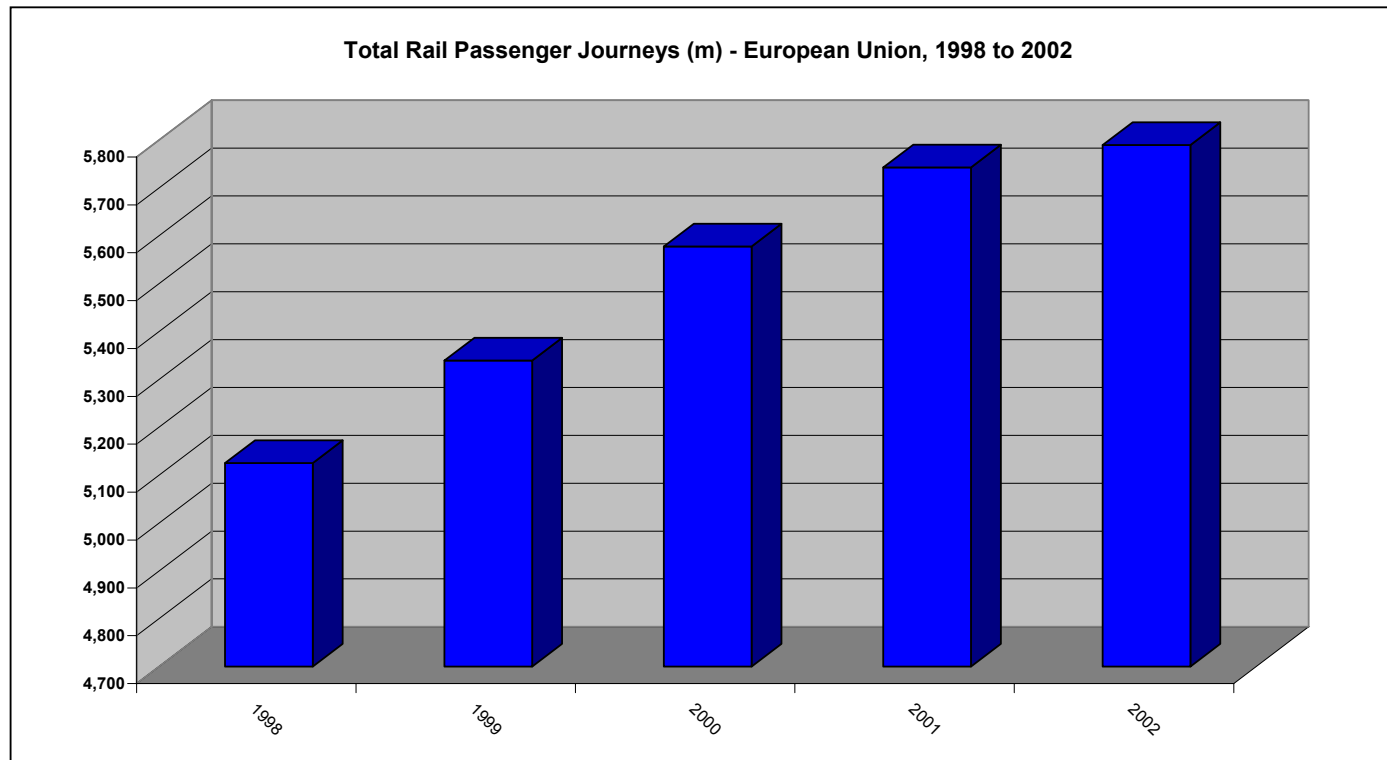
- Passenger journeys on InterCity services operated by Iarnród Éireann (which includes an increasingly significant element of longer distance commuting) have risen on average by 3.6% p.a. between 1991 and 2002.



Source: CIÉ Annual Reports and Iarnród Éireann

Passenger rail journeys in the European Union have also exhibited steady growth in recent years

- Passenger journeys on rail services within the EU have increased from just over 5 billion in 1998 to almost 6 billion in 2002.



Source: UIC

Major success can be achieved in small city and non-urban rail services when the service offering is significantly enhanced

- The information on the Anglia region in England in the 'box' below provides a good indication of what can be achieved in small city and non-urban rail services when the service offering is significantly enhanced.

Anglia branch patronage performance – since 1997

➤ Norwich – Sheringham	+137%
➤ Ipswich – Felixstowe	+107%
➤ Norwich – Lowestoft	+ 77%
➤ Ipswich – Lowestoft	+49%
➤ Norwich – Great Yarmouth	+37%

- ⊕ Based on a policy of improving service frequencies and marketing routes.
- ⊕ Overall, 40% more trains running on the five lines.
- ⊕ Effectively, an hourly service 0500-2300 across the five lines.
- ⊕ Targeting of tourism potential.
- ⊕ Involvement of local councils and community groups.

Source: Local Transport Today, March 2004

The way that rail services are managed and provided can be the stimulus for a significant gain in patronage

“... . Alongside the national upward trend in rail use, there is some evidence that local rail initiatives may deliver additional passenger growth, even on rail corridors which initially have stagnant or declining passenger numbers. So far, the evidence in the UK is limited to a few lines, but there are examples from Europe which demonstrate local small-scale rail initiatives may have untapped potential. ...

In Britain, local initiatives to increase rail use have been spearheaded by community rail partnerships, involving train operators, local authorities and voluntary organisations. There are now more than 30 community rail partnerships affiliated to the national Association of Community Rail Partnerships (for example, the Settle-Carlisle Line, and the Penistone Line). These partnerships have sought to improve rail services through small-scale initiatives such as marketing; increasing service frequency or changing to a regular “clock-face” timetable; refurbishing stations; introducing feeder bus services; and offering special ticket deals.

An example of the increase in patronage that may be achieved through such small-scale local improvements is the Britten Line, the rail line between Norwich and Sheringham in Norfolk. After a period of steady decline, a community rail partnership was established for the line in 1996. A combination of effective marketing, upgrading and repair of stations, new signalling, a more frequent (hourly) service, a bus / rail link and other improvements has turned the line around, and led to year-on-year growth of over seven per cent a year, totalling over 40 per cent over five years (Meades 2002). Critical to the success of the line has been the active involvement of the local community, the county council, and the train operator. The success of the Britten Line has prompted other community rail partnerships to be established in the region, including the Wherry Lines between Norwich, Great Yarmouth and Lowestoft, where a partnership established in 2000 is starting to generate growth of between five and seven per cent a year.

Elsewhere in Europe, there are examples of far more dramatic rail passenger growth as a result of local initiatives. In Nordrhein-Westfalen, the Regiobahn network which serves towns and villages around Dusseldorf has seen passenger numbers grow from 500 per day in 1998 to 12,000 people per day two years later (Salveson 2002). Under Deutsche Bahn the line had only five trains per day. The line was taken over by a local-authority owned enterprise, Regiobahn, financially supported by the regional passenger transport authority, which purchased new trains and began operating services every 20 minutes. Refurbished stations and integration with bus services helped attract more passengers. ...”

Less Traffic Where People Live: How local transport schemes can help cut traffic – by Lynn Sloman of Transport for Quality of Life with support from the University of Westminster Transport Studies Group and Transport 2000 Trust



Appendices

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- B – Appraisal Assumptions
- C – “Expanded Offering” Assumptions
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- E – Airport Rail Links
- F – Issues for Implementation of Future Investments

The appraisal framework adopted for the Review incorporates a number of parameter values used in the derivation of cost and benefit streams

- The following base parameters have been adopted:
 - Evaluation Year 0 = 2004
 - Price year = 2004
 - Evaluation period = 25 years
 - Discount rate = 3.5% real
 - Residual values at straight line of economic-life on capital items only as follows: Structures 40 years; S&T systems 30 years; Property / Buildings 40 years; Rolling Stock 30 years. No residual values have been applied to plant and equipment.
- A range of 'value' parameters have been used in the analysis as follows:
 - Value of time (non-working time): £5.20 per hour (based on Transport Economics Note – TEN - £4.52 in 1998 prices);
 - GDP value of 2% p.a. to adjust VoT value against population change over time (using 0.33% p.a. average population growth for NI – sourced from Government's Actuary Department estimation for 2001-2026) – giving a VoT adjustment factor of 1.67%;
 - Average underlying patronage growth (long-term) estimate of 1.48% p.a (2004/05 to 2028/29).
 - Vehicle operating costs of £0.1576 per passenger mile derived from estimation of current vehicle fleet, annual car mileage, fuel costs and other other operating costs provided by RAC and AA and based on method for estimating average fuel consumption as per DfT's TEN on values of time and vehicle operating costs;
 - Average car load factor of 1.54 (sourced from TEN table 2/2) with an 'adjuster' value of –0.524% p.a. (sourced from TEN table 2/4).

Generalised cost modelling has been used to estimate benefits and costs to existing rail users and new users associated with changes to services patterns and operations

- Estimating the benefits to current NIR users associated with changes in in-vehicle times and service headways has involved a generalised cost approach which involves the calculation of the generalised journey cost as:
 - Access time + waiting time + in-vehicle + egress time (where all values are converted to minutes). Access, waiting and egress time are all valued at twice in-vehicle time in estimating total generalised time;
 - Average journey times were derived from an analysis of passenger mileage data and timetable information for NIR on a line-by-line basis is used for determining in-vehicle and wait time for peak and off-peak rail users;
 - The change in generalised journey time is then valued using VoT to estimate the value benefit to existing users on a line-by-line basis; and
 - The ‘rule of half’ is applied to benefits to new rail users associated with rail investments (calculated as half of the generalised cost savings).
- Unpriced user benefits have also been estimated associated with the introduction of new modern DMUs, station modernisation, enhanced PT integration – the values as a percentage of average fare mentioned in the section on demand modelling have been used consistent with the methods detailed in the PDFH.
- Estimation of benefits to new rail users is based on a comparison of *like-for-like* rail and car journeys in terms of costs (vehicle operating costs, fares and generalised time all converted to monetary values using VoT) applied to new users associated with initiatives to the rail service (i.e. over and above ‘underlying growth’).

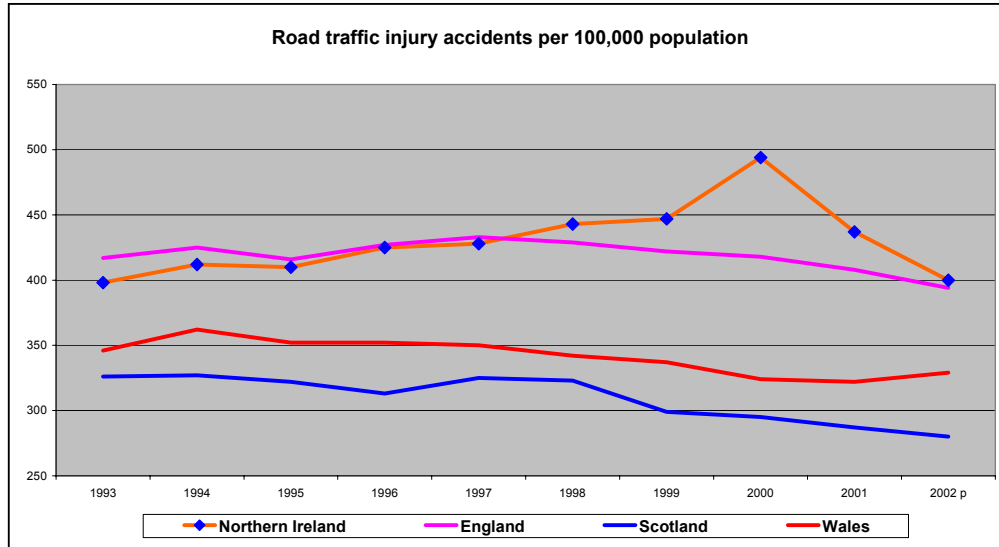
Increased rail usage associated with a diversion of car users to rail will deliver a range of externality benefits to the NI community

- Reduced road vehicle miles performed on NI's road network will result in, *inter alia*, a reduction in road traffic accidents.
- Data for road traffic accident rates for NI indicate of rate of 0.5 to 0.6 injury collisions per million vehicle kms based on a 1998 estimate of total passenger kms (RTS) and PSNI road traffic collision and casualty data for 2002. The break down of injury collisions for 2002 was: 150 fatalities, 1,526 seriously injured and 10,238 slightly injured persons from 6,784 injury collisions.
- Based on information in the Highways Economics Note No. 1, 2002 the following valuation for benefits of prevented road accidents and casualties have been adopted:

Fatal	£1,297,053;	Serious injury	£145,750;	Slight injury	£11,239
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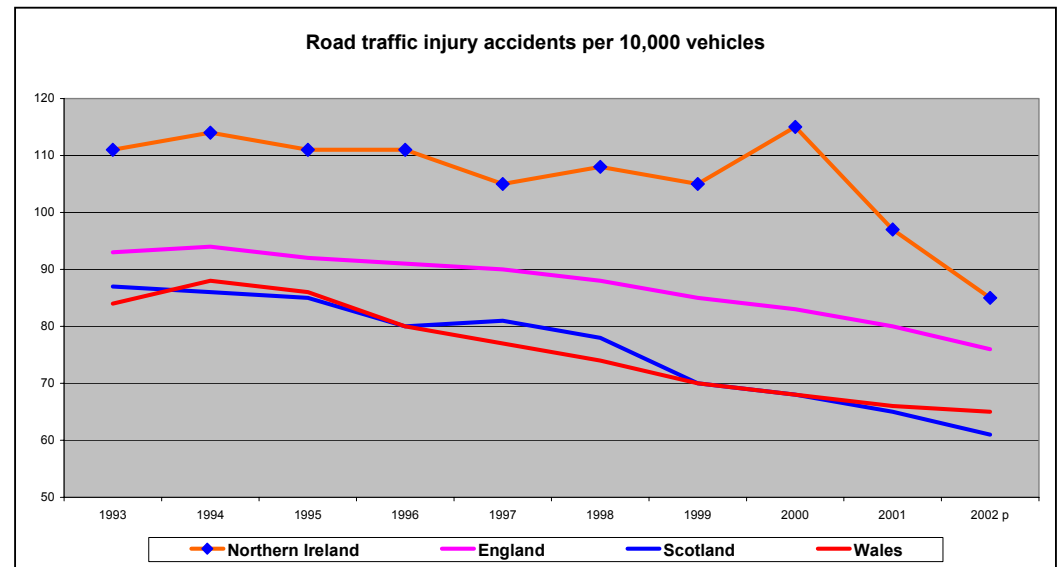
- Reduced vehicle miles on the NI road network will also result in a reduction of emissions and noise pollution
- Decongestion benefits to remaining peak road users was reduced over time at a rate of 1.5% p.a. to reflect increasing underlying road usage / car traffic
- Data sourced from the SRA (based on "Surface Transport Costs and Charges, Leeds ITS 2001 for DfT which utilised the ExternE Transport study of 1999 undertaken for the EC) and the European Environmental Agency has been used to estimate the volume and value of emissions and noise per million vehicle kms. The values adopted for the Review are as follows:
 - For local air quality pollutants (particulates – PM₁₀, carbon monoxide – CO, Nitrogen oxide – NO_x, Sulphur dioxide – SO₂ and volatile organic compounds – VOC): cars - 0.35 pence / vehicle km (2002); buses - 6.5 pence / vehicle km and 2.4 pence / dmu car km;
 - For greenhouse gases (CO₂): cars - 176g / vehicle km; buses – 1,147g / vehicle km; 1,352g / dmu car;
 - Noise – 1.52 pence per vehicle km.

Northern Ireland has the highest road accident rates of all the UK regions



■ Preliminary data for 2002 indicates that in NI there were 400 road traffic injury accidents per 100,000 population compared with 394 for England, 329 for Wales and 280 for Scotland

■ The same data indicates that NI also has the highest rate of injury accidents per 10,000 vehicles with 85 compared with 76 for England, 65 for Wales and 61 for Scotland.



Estimation of unpriced user benefits to new rail customers is an important element of the appraisal method

- Benefits to new rail users (i.e. those diverted to rail as a result of the investments made) have been calculated as half of the generalised cost savings occurring. Change in generalised time is estimated as follows:
 - Convert all time and costs into ‘minutes’ where:
 - rail costs equal:*
 - rail minutes (access time x 2) + (wait time x 2) + in-vehicle time + (access time x 2),
where for short trips / high frequency services, wait time = ½ headway
 - add average rail fare and then convert all to £ value using value of time (£5.20 per hour non-working time)
 - car costs equal:*
 - car journey time (distance / speed function) = x minutes
 - add in car costs (operating costs) to calculate car value for the equivalent trip / journey
 - The difference provides an estimate of **generalised time benefits to new rail users.**
 - This was done on a line-by-line basis for each NIR line
 - The following supporting data was used:

	Average revenue by line (2002/03)	Average journey distance
Bangor Line	£1.60	11.5 miles
Newry Line	£1.94	14.4 miles
Larne Line	£1.36	11.0 miles
Londonderry Line	£2.49}	42.7 miles
Portrush Line	£1.50}	
Belfast – Dublin	£5.46	61.8 miles (adjusted back to NI section only)

Benefits to existing users are also an important element of rail investment appraisal

- The number of new rail users equates to a number of former car users and this enables an estimate of the number of passenger car miles taken from the NI road network. This is used to estimate savings in VoCs (passenger car miles divided by car occupancy) to determine car miles. This estimate of car miles can then be used to estimate accident savings, environmental benefits and decongestion which are applied as a rate / factor per million vehicle miles based on DfTs TEN and the Strategic Rail Authority's Appraisal Guidance (Sept 2002).
- Benefits to existing rail users are valued as a proportion of average fare as recommended in the PDFH and are estimated for reduced service headway; reduced journey time; new rolling stock and station modernisation.
- These benefits are estimated as follows:

- Change service headway:

Choose service frequency penalty (SFP) value (minutes) from PDFH which recommends the following values:

SI = 5, SFP = 5; SI = 10, SFP = 10; SI = 15, SFP = 15; SI = 20, SFP = 19; SI = 30, SFP = 26;

SI = 40, SFP = 31; SI = 60, SFP = 39; SI = 90, SFP = 51; SI = 120, SFP = 63.

Estimate impact using following formula:

$I_j = \{GJT_{new} / GJT_{base}\}^{GJT\ elasticity}$, where GJT = generalised journey time, which equals in-vehicle time + SFP and the GJT elasticity is -0.9 (the default value recommended by the PDFH).

The proportional change is applied to VoT to estimation of value to existing users.

There is currently a significant resource base used to deliver the services of NIR

- These are, in summary: land, buildings, rolling stock, permanent way infrastructure and supporting systems. Current cost valuations for assets employed by NIR by category are as follows (as at 31st March 2003):

Land & Buildings	£65 million
Permanent way	£123 million
Signalling	£28 million
Rolling stock (incl. allocation for new CAF units)	£85 million
Bridges	£15 million
Motor vehicles	£1 million
Plant & Machinery	£14 million
Fixtures & Fittings	£4 million
TOTAL	£335 million

- In assessing the future investment / divestment options for NIR, it is important to consider the opportunity cost of assets currently being utilised, where opportunity cost relates to the value of the next best alternative. It is usually reasonable to assume that where assets are employed in economic activity that, *cet par*, this represents the most appropriate use of those assets, and *prime facie* the opportunity cost is zero. In the case of NIR (and railways generally), the alternative uses of many assets / resources involved are indeed limited. With respect to the stations and related buildings of NIR, some of these may well offer alternative uses as storage facilities, residential and / or office accommodation. However, in the NI context, some of the most significant buildings, in particular stations at Great Victoria Street, Bangor and Coleraine would be required, in the absence of rail services, for on-going (and presumably expanded) bus operations.

The opportunity costs associated with much of the NIR network / assets are modest

- Railway alignments present limited alternative uses. In the NI context, for much of the network there may only be one realistic potential 'interested third party', namely the adjoining land-holder. Uses for railway alignments could realistically range from cycle and walk ways through to conversion to agricultural land or residential / commercial development. Prior to any development there would be a need to render the land in a 'fit for purpose'. This could require environmental (e.g. site decontamination) and other works (e.g. demolition and stabilisation).
- During the Railway Review Group's on-going investigations, a valuation of NIR land (including railway alignments) on an open market basis, net of demolition costs, derived a value of approximately £40 million (with eight significant properties accounting for over half the total valuation). This value has been used as the opportunity cost of land and related assets not 'captured' by the renewals costs.
- It is important to note the following from the Draft Planning Policy Statement PPS13 - Transportation and Land Use (*It is understood that the draft PPS 13 should now be considered as a material consideration in all planning applications. Furthermore, it is expected that the document will be published in its final version during the second quarter of 2004.*)

"The development plan will contain policies to safeguard potential future transport routes, such as disused railway track beds, abandoned railway station sites and the canal network. Such routes and sites must be assessed at a local level and those, which are realistic, will be protected. In such cases priority will be given to their re-use for transport related development. However, these routes may also have potential for recreational, leisure and tourism related use. The plan may identify additional land for the provision of development to facilitate the re-use of these routes and sites."
- Therefore, it is reasonable to expect that in the future raft of development plans, if there is the likelihood of an abandoned railway being re-used as a transport route, e.g. a road bypass, heavy rail line, a guided busway or as part of the national cycle route, it will be protected for the life of the development plan (which are usually 15 years). The likelihood of a disused railway alignment / track bed or station being used as a transport route in the future will be determined by a transport plan / study that supports the development plan.

The opportunity costs associated with the new CAF units has also been incorporated in to the appraisal

- As noted in the NI Practical Guide at section 2.5.22, there might be a case for including an opportunity cost for the new CAF units in the appraisal (another view might be that these are in fact 'sunk costs' and should be excluded from the appraisal). Where there may be a case for estimation of opportunity costs the current market value approach should be adopted. This we have done. In this instance it needs to borne in mind that NIR is a broad (5'3") gauge railway (not that common globally, e.g. Portugal, Republic of Ireland, Spain, the State of Victoria in Australia etc). Furthermore, Iarnród Éireann are currently well into a fleet replacement and expansion programme with committed orders for new suburban / commuter stock as well as intercity units. CP, the operator in Portugal, are also currently in a major fleet renewal and expansion phase associated with the major renewals and upgrade programme for track (which includes electrification) being undertaken by REFER (the railway infrastructure company).
- If the stock was held by a ROSCO (rolling stock leasing company) i.e. an entity with substantial financial resources, a significant inventory of stock, a large number of established clients etc the units may well attract in the open market a price within +10-20% of the cost to Translink / NIR – subject to the costs of transport / delivery, possible need to re-bogie units for standard gauge operation and some re-configuration to meet a new operators specific needs etc.
- However, Translink / NIR will be seen as a captive seller, i.e. buyers will know that Translink does not have much 'leverage' and must sell. In this situation, the reasonable expectation would be closer to the 50%-60% range, with an immediate sale likely to prove difficult. If it were somehow possible to 'generate' two (or more) buyers, i.e. Translink would find themselves in a contestable market for the units, then the situation would be more interesting and they could in effect seek to play one off against the other and thus potentially recover nearer to 70% of cost. For purposes of the appraisal, we have adopted an opportunity cost (current realistic / realisable market value) of 50% of cost to Translink / NIR. This value has been added to the £40 million opportunity cost for land and buildings and allocated across the routes / lines on the network.



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NIR Strategic Review - Vision Timetable Assumptions

	General Description	Infrastructure	Rolling Stock	Other Assumptions
X-Border Belfast C-Dublin	An hourly service with 13 weekday trains each way each day. Accelerated journey time (10-15 min reduction) achieved by fewer station stops and some line speed improvements.	Line speed improvements targeting the removal of lower speed restrictions - no need to go above 90mph.	Requires 5 sets in service (ie 6 in fleet) with 50 min turnarounds (or 4 with 20 min turnarounds). 4 options: a) Low cost - refurb 2 x 8 coach Irish Rail push-pull Mk 3 sets and equip 2 more class 201 locos with head end power; b) Higher cost - 2 x 8 new rakes of coaches and equip 2 more class 201 locos with head end power; c) High costs - replace De D coaches and class 201s with new 6 x 8-car IC dmu fleet and build new maintenance facility; d) High cost - replace De D coaches with 6 x 8 new rakes of coaches and required traction.	Joint project with Irish Rail (so that costs associated with rolling stock etc. would be shared). Assumes capacity is made available into Dublin Connolly; infrastructure improvements south of border; rolling stock exchange with other IR routes.
Belfast C - Newry	Service to be provided by hourly Enterprise service with peak service supplemented by 2x3-car CAF dmus making 2 return trips each peak, calling only at Portadown and Lisburn.	None, subject to practicality of timing peak train reversals in down platform - otherwise may require new headshunt.	Requires 2 additional CAF dmus to replace Gatwick Express set and associated GM loco.	
Belfast GVSt - Portadown	Peak service provides 4 tph, alternating fast (stopping only at Lisburn) and slow (6 stops), with 1 train each peak being provided by Newry service; Off peak service provides 2 tph semifast (3 stops, fast from Lisburn). Journey time improvements derived from better rolling stock performance	None, subject to signalling capacity being sufficient	Peak service requires 5 x CAF dmus	Assume no additional strengthening to 3 car sets during peak, given 6 car Newry service calls at Portadown
Belfast GVSt - Lisburn	Peak and off peak service delivers 6 tph, with 4tph coming from Portadown during peak and 2 tph (4tph off peak) starting at Lisburn. Intermediate stations each get 2 tph in peak and off peak, with 2 tph making 3 stops, 2tph making 2 stops and 2 tph fast. Journey time improvements derived from better rolling stock performance and fewer station stops.	None, subject to signalling capacity being sufficient	Peak service requires 2 x CAF dmus in addition to Portadown service	Knockmore station closed or minimal service. Assume no additional strengthening to 3 car sets during peak.
Belfast GVSt - Bangor	Off peak service provides 4 tph, with 5 of the 9 intermediate stations served by 1 in 4 trains, resulting in alternate trains making 6 and 7 stops between Bangor and Belfast Central. Peak service provides 6tph with 2 additional fast trains per hour stopping only at Bangor W and Holywood. Journey time improvements derived from better rolling stock performance and fewer station stops.	None, subject to signalling capacity being sufficient	Peak service requires 8 x CAF dmus	Reduced service (hourly) at lightly used stations: Camalea, Seahill, Cultra, Marino, Bridge End. If City Airport station opened, Sydenham would also reduce to hourly service, with Airport Station getting 4tph all day. Assume no additional strengthening to 3 car sets during peak
Belfast GVSt - Larne	4tph service Belfast - Whitehead maintained peak and off-peak, with alternate trains running non-stop between Carrickfergus and Belfast Central. 4 intermediate stations between Carrickfergus and Belfast Central get one train in 4, such that alternate trains each make 3 intermediate stops. All fast trains in peak and alternate off peak start at Larne, providing Larne with 2 tph peak and 1 tph off peak. Larne Harbour to be served by Larne trains subject to no impact on service pattern or resource requirements. Journey time improvements derived from better rolling stock performance	Line speed improvements targeting the lower speed restrictions. No other works subject to signalling capacity being sufficient	Peak service requires 7 x CAF dmus	Reduced service (hourly) at lightly used stations: Clipperstown, Trooperslane, Greenisland and Jordanstown. Glynn and Magheramorne closed or minimal service. Assume no additional strengthening to 3 car sets during peak
Belfast C - Londonderry	1 tph service Belfast Central - Londonderry and 1 tph Belfast Central - Ballymena runs peak and off-peak; Journey time improvements derived from better rolling stock performance and fewer station stops.	Line speed improvements targeting the lower speed restrictions. Double track some or all south of Ballymena to enable reliability/flexibility. New passing loop in the region of Ballykelly (consider station near Derry Airport?).	Service requires 7 x CAF dmus (5 for Derry services, 2 for Ballymena services)	Journey times assume timing at passing points is practical for a robust timetable. Bellarena, Cullybackey and Mossley West closed or minimal service. No trains to stop at Whiteabbey or Yorkgate (served by Larne line). Assume no additional strengthening to 3 car sets during peak
Coleraine - Portrush	Operate as an hourly shuttle to connect with Belfast/Londonderry services	None	Service requires 1 x CAF dmu	
OTHER			4 x CAF dmu required as spare cover to deliver 32 units for daily service	No other units required for peak strengthening



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- B – Appraisal Assumptions
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NIR Strategic Review – Infrastructure Renewals Cost Estimates per Line

Border to Newry Stn	Cost (£'000s)
Pway (Track)	£16,888
Structures	£4,735
Earthworks (inc. sea defences)	£1,767
Signalling	£6,383
Level Crossings	£1,413
Property	£305
Total Renewals Costs	£31,490

Newry Stn to Portadown Stn	Cost (£'000s)
Pway (Track)	£31,588
Structures	£12,182
Earthworks (inc. sea defences)	£3,306
Signalling	£11,938
Level Crossings	£2,076
Property	£1,373
Total Renewals Costs	£62,462

Portadown Stn to Lisburn Stn	Cost (£'000s)
Pway (Track)	£31,063
Structures	£10,295
Earthworks (inc. sea defences)	£2,469
Signalling	£11,740
Level Crossings	£7,026
Property	£1,830
Total Renewals Costs	£64,422

Lisburn Stn to Belfast Central Stn (inc. spur to Great Victoria St)	Cost (£'000s)
Pway (Track)	£16,516
Structures	£6,538
Earthworks (inc. sea defences)	£1,132
Signalling	£6,242
Level Crossings	£1,413
Property	£5,490
Total Renewals Costs	£37,331

NIR Strategic Review – Infrastructure Renewals Cost Estimates per Line

Belfast Central Stn - Bangor Stn	Cost (£'000s)
Pway (Track)	£0
Structures	£9,890
Earthworks (inc. sea defences)	£1,510
Signalling	£3,776
Level Crossings	£2,728
Property	£5,033
Total Renewals Costs	£22,938

Belfast (Lagan Jcn) - Carrickfergus Stn	Cost (£'000s)
Pway (Track)	£18,922
Structures	£11,152
Earthworks (inc. sea defences)	£2,979
Signalling	£7,151
Level Crossings	£4,179
Property	£3,203
Total Renewals Costs	£47,586

Carrickfergus Stn - Whitehead Stn	Cost (£'000s)
Pway (Track)	£8,969
Structures	£7,540
Earthworks (inc. sea defences)	£2,343
Signalling	£3,390
Level Crossings	£993
Property	£915
Total Renewals Costs	£24,149

Whitehead Stn to Larne Harbour Stn	Cost (£'000s)
Pway (Track)	£9,126
Structures	£2,477
Earthworks (inc. sea defences)	£3,403
Signalling	£3,080
Level Crossings	£1,748
Property	£2,288
Total Renewals Costs	£22,121

NIR Strategic Review – Infrastructure Renewals Cost Estimates per Line

Belfast Bleach Green Jcn to Antrim Stn	Cost (£'000s)
Pway (Track)	£15,576
Structures	£9,730
Earthworks (inc. sea defences)	£973
Signalling	£7,530
Level Crossings	£4,149
Property	£458
Total Renewals Costs	£38,416

Antrim Stn - Ballymena Stn	Cost (£'000s)
Pway (Track)	£11,454
Structures	£921
Earthworks (inc. sea defences)	£701
Signalling	£3,865
Level Crossings	£5,975
Property	£458
Total Renewals Costs	£23,373

Ballymena Stn - Coleraine Stn	Cost (£'000s)
Pway (Track)	£25,639
Structures	£10,581
Earthworks (inc. sea defences)	£1,690
Signalling	£9,317
Level Crossings	£12,954
Property	£1,373
Total Renewals Costs	£61,555

Coleraine Stn to Londonderry Stn	Cost (£'000s)
Pway (Track)	£33,051
Structures	£14,579
Earthworks (inc. sea defences)	£8,492
Signalling	£11,153
Level Crossings	£16,664
Property	£1,373
Total Renewals Costs	£85,311

NIR Strategic Review – Infrastructure Renewals Cost Estimates per Line

Coleraine Stn to Portrush Stn	Cost (£'000s)
Pway (Track)	£5,528
Structures	£735
Earthworks (inc. sea defences)	£364
Signalling	£2,009
Level Crossings	£2,285
Property	£1,373
Total Renewals Costs	£12,294



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Airport rail links are recognised around the world as an important element of an integrated transport system in many situations

- Of the three major airports of Northern Ireland, the two located within the Greater Belfast Area – Belfast International and Belfast City - are in the “top 15” of UK airports in terms of passenger movements in 2002 (9th and 15th respectively).
- A combined passenger throughput of approximately 5.5 million passengers made “Belfast” the 9th largest airport in the UK.
- UK airports with smaller annual passenger throughput are linked to mainline rail networks, including Newcastle and Prestwick (Glasgow). Furthermore, investigations of airport rail links across the UK are underway, including: Glasgow, Edinburgh and Cardiff.
- The three major NI airports at Belfast and Londonderry are all contiguous to the NIR network:
 - The key question is the extent to which use of rail as an access / egress mode to the airports is limited by the local extent of the airports’ catchment areas and whether relatively short journeys for which rail is not ideally suited dominate; and
 - Some users, especially those on longer access / egress journeys could find rail attractive as part of their overall access / egress journey.

The appropriateness and effectiveness of an airport rail will be contingent on numerous factors and local characteristics will also be important

- The SRA references a framework for public transport provision at airports developed by the DfT.

Passenger Throughput				
	Very Low < 100,000 pax	Low <1 mppa	Medium <3 mppa	High 7.5+ mppa
Forecast by 2030	<1.5 mppa	< 5 mppa	5 - 15 mppa	15 + mppa
Generic Infrastructure Options				
Road Network	Local road network (possibly dual carriageway access reqd.)	Junction access to dual carriageway essential	Dual carriageway access / Motorway access needed	Motorway access via key junctions
Public Transport	Hopper bus to City Centre	Bus network to city centre and wider network for minibus pickup.	Guided bus / LRT role	Heavy rail link accessing wider network or largest local centre for network services
	Minibus		Extensive bus access reqd. to suburbs and outlying areas	Bus and LRT
	Shared taxi	Role for tour operator coaches		Remote check-in
Possible long term mode split for Public Transport	5-10%	10-15%	15-25%	25-40%

Source: The Future Development of Air Transport in the United Kingdom, Rail access to airports of Scotland, Wales and in England outside the South East, Statement by SRA, June 2003

- Based on this framework it is likely that Belfast International would remain within the Medium category in the period to 2030 unless annual growth of an average of 6% 'year on year' was to materialise. In an aviation White Paper detailing plans for airports across the UK over the next three decades, the Government ruled that BIA should retain and expand its position as NI's largest airport, whilst operating hours at Belfast City Airport should be reviewed. This could mean that passenger numbers could increase to more than 10 million in 2030.

- It is difficult to envisage Belfast City moving beyond the Medium category under this framework within the next 25 years.

- The existence of an established rail network within close proximity to the airport facilities and other characteristics of the specific airport(s) may alter the 'rules of thumb' of this guiding framework.

To understand the market for an airport rail link it is necessary to understand the competing needs of different market segments

- There is a need to recognise that the airline passenger market is not the same as the normal commuter rail or urban transit market:
 - there is not the same level of ‘public transport captive’ users; it is a much more contestable market.
- Many airline passengers and potential users are infrequent, first time or ‘once off’ visitors to the airport or the city.
- There can be conflicting needs between air travellers, airport employees (who may be closer to the traditional commuter market) and commuters.
- The role of final destination customers and intermediate customers may be important in particular circumstances.
- The customer mix can greatly influence the service specification:
 - Express service;
 - Stopping service, or
 - Mixed service operation.

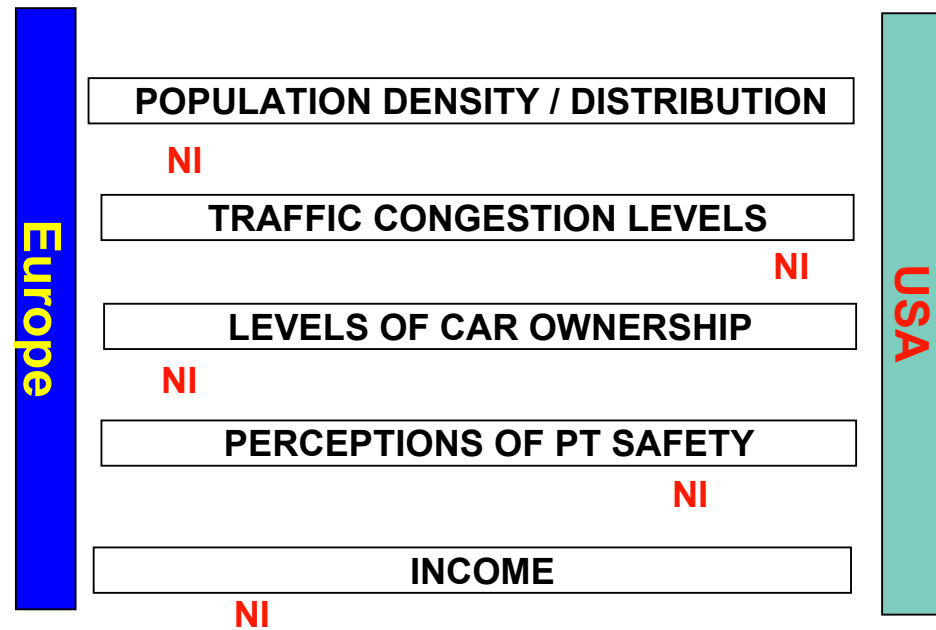
Each situation is different but ‘successful’ airport rail links tend to have a number of characteristics in common

- ‘Successful’ airport rail links in terms of market share and revenue streams typically have the following characteristics:
 - The airport serves a major conurbation (2-3+ million);
 - The airport is large by international standards (10-15+ mppa) with domestic and international services;
 - There is a significant distance between the airport and the City Centre (generally, >20-30 kms);
 - The taxi fares between the city centre and the airport are high in relatively terms of other modes;
 - Car parking at the airport is relatively expensive, or restricted and / or inconvenient; and
 - Travel time between City Centre and airport is significant, often highly variable due to traffic congestion.

- International experience suggests that the success of an airport rail link is dependent on a number of operational and customer service features:
 - A regular interval (“turn-up-and-go”) service frequency;
 - 4 or more trains per hour operating on a ‘clock-face’ timetable;
 - A fast and reliable service;
 - No, or only a limited number of stops *en route* avoiding conflict with non-airport passengers;
 - Dedicated branding of the rail link, and positive marketing of the new service to the key target audiences;
 - Straightforward fares, with domestic and international distribution channels established (premium fares can be justified if speed, reliability, rolling stock, service etc are readily differentiated from normal operations);
 - A range of airline-related services at ‘down town’ terminal station(s), possibly including airline ticket sales, airline check-in and baggage handling facilities.

The ‘capture rates’ for airport rail links varies considerably

- European and Asian airport rail links tend to obtain higher market shares than those in the USA and Australia.
- Wide differences exist in the market share of rail links can exist within the same country:
 - USA data indicates a ‘capture rate’ in the range of 4% to 17%;
 - European and Asian data indicates a ‘capture rate’ in the range of 6% to 35%; and
 - Australia’s two airport rail links (Sydney and Brisbane) have ‘capture rates’ of only 6% and 2% respectively (with the private sector elements of each scheme subsequently reverting to the public sector within 3 years of opening).
- Some possible explanations for the differing market shares may include:
 - Differences in population densities and distributions;
 - Levels of road traffic congestion;
 - Levels of car ownership;
 - Perceptions of public transport personal safety; and
 - Income levels.



The Antrim to Lisburn line has been retained for diversionary purposes, but its value in the short term has to be brought into question..

- The line has been retained for diversionary purposes and currently one train per day is operated over the route to maintain its functionality.
- Since June 2003, there have been 3 occasions where it has been utilised as a diversionary route due to infrastructure failures on the Antrim to Bleach Green Junction line. A total of 12 passenger trains were diverted.
- Provided the infrastructure of the Antrim to Bleach Green Junction line can be maintained in good order, it is difficult to see how a case for retaining the Antrim to Lisburn line as a diversionary route in the longer term can be made.
- It's use as a regular passenger route is hampered by its geography in not proving links between population centres that could not be served more effectively by other modes.
- There may be a case for mothballing the line and safeguarding the route in case it may have a use as a strategic corridor associated with other development in the long term.

...however, it may well provide an opportunity to develop a rail link to Belfast International Airport

Linking Belfast International Airport into the NIR network may deliver significant benefits to both the railway and the NI community

- A preliminary assessment of development of a spur off the Lisburn – Antrim line into the airport has been undertaken incorporating the following assumptions:
 - 2 mile spur into airport off Lisburn – Antrim line;
 - GVS station capacity enhancement;
 - 2 passing loops on Antrim – Bleach Green section;
 - 19 miles route renewal on Lisburn – Antrim;
 - Capital works costs of £44.7 million (including new station at airport);
 - 2 3-car DMU train sets to operate 24 services daily in a circular pattern (Belfast – Antrim – Airport – Lisburn – Belfast) costing £9.2 million;
 - Average load factor of 40% (equivalent to current NIR average);
 - 53 route miles in total;
 - Annual direct O&Ms of £5.85 million;
 - Annual track / infrastructure maintenance costs of £1.3 million;
 - Annual revenue of £2.7 million (based on NIR average per passenger mile – no ‘premium’ fare assumed);
- A ‘cost recovery’ level of 46% on direct O&Ms has been estimated – lower than existing NIR performance – and resulting in an additional annual PSO of £3.1 million.
- Increasing load factors to 60% results in a ‘cost recovery’ level of 70%.

A range of socio-economic benefits will be generated by developing a rail link to Belfast International Airport

- The annual number of private car miles on the NI road network would be reduced by 5.2 million miles resulting in savings as follows:
 - Vehicle operating costs of £1.4 million;
 - Environmental cost savings of £0.27 million;
 - Safety benefits of £0.64 million.
- Based on the analysis detailed above an NPV of -£67 million has been calculated.
- However, an NPV of £0 was achieved when average load factor was increased to 70% - equating to an average of 211 passengers per train and a total of 1.14 million passengers using the Circle Line / Airport service.
- If 'real' fares on the airport service were to be set at a level 20% above the NIR average – a load factor of 63% would be required to achieve an NPV of £0 – equating to an average of 190 passengers per service and 1.03 million annually.



Appendices

- A – Demand Assumptions
- B – Appraisal Assumptions
- C – “Expanded Offering” Assumptions
- D – Detailed Infrastructure Cost Estimates
- E – Airport Rail Links
- F – Issues for Implementation of Future Investments

All areas of the future NIR business will need to focus on continuous improvement if the benefits of investments are to materialise

- Infrastructure issues relate to:
 - Asset management and stewardship;
 - Route-by-Route Performance Strategy;
 - In particular the development of a NIR Signalling and Telecommunications strategy which takes account of the needs of the business and exploits the opportunities provided by the ownership of a fixed network;
 - Optimisation of maintenance and renewals programmes; and
 - Opportunities for enhancement of routes.
- Rolling Stock;
 - Focus on the continuation of current initiatives to reorganise the maintenance organisation in line with best practice elsewhere while recognising NIRs relatively isolated position.
- Management Information Systems; and
- Operations and customer services.

Both asset knowledge and a route-by-route performance strategy will be required to aid decisions regarding the maintenance and renewal of NIR's infrastructure assets

- **Asset knowledge is the first step** in ensuring that NIR will get the best from what they have got. It will also enable NIR to invest wisely to achieve the level of performance and reliability to provide safe, comfortable and reliable services.
- Historically, NIR in common with many railways would have relied heavily on the **intellectual capital of senior engineering staff and railway workers** as well as an intimate knowledge of local assets and situations.
- Unfortunately this informal asset knowledge base may not always be available in the future, hence the establishment (and use) of a **company Asset Management (AM) System is a necessity**. NIR Infrastructure Division has recognised this and is in the process of scoping out the type of AM system which would be best suited to NIR.
- The development of an Asset Management System is only one side of the equation – NIR should also focus on developing a **strategic route-by-route performance strategy**. This should set out what is and what will be required from each route on the network over the longer term.
- This will enable the Infrastructure Division to **optimise the asset maintenance and renewals programme** which should in turn lead to better works planning and a more efficient use of resources.

“decent modern and well maintained transport infrastructure is more efficient to run, costs less to maintain, cuts pollution, is safer and reduces delays” New Civil Engineer 8 January 2004

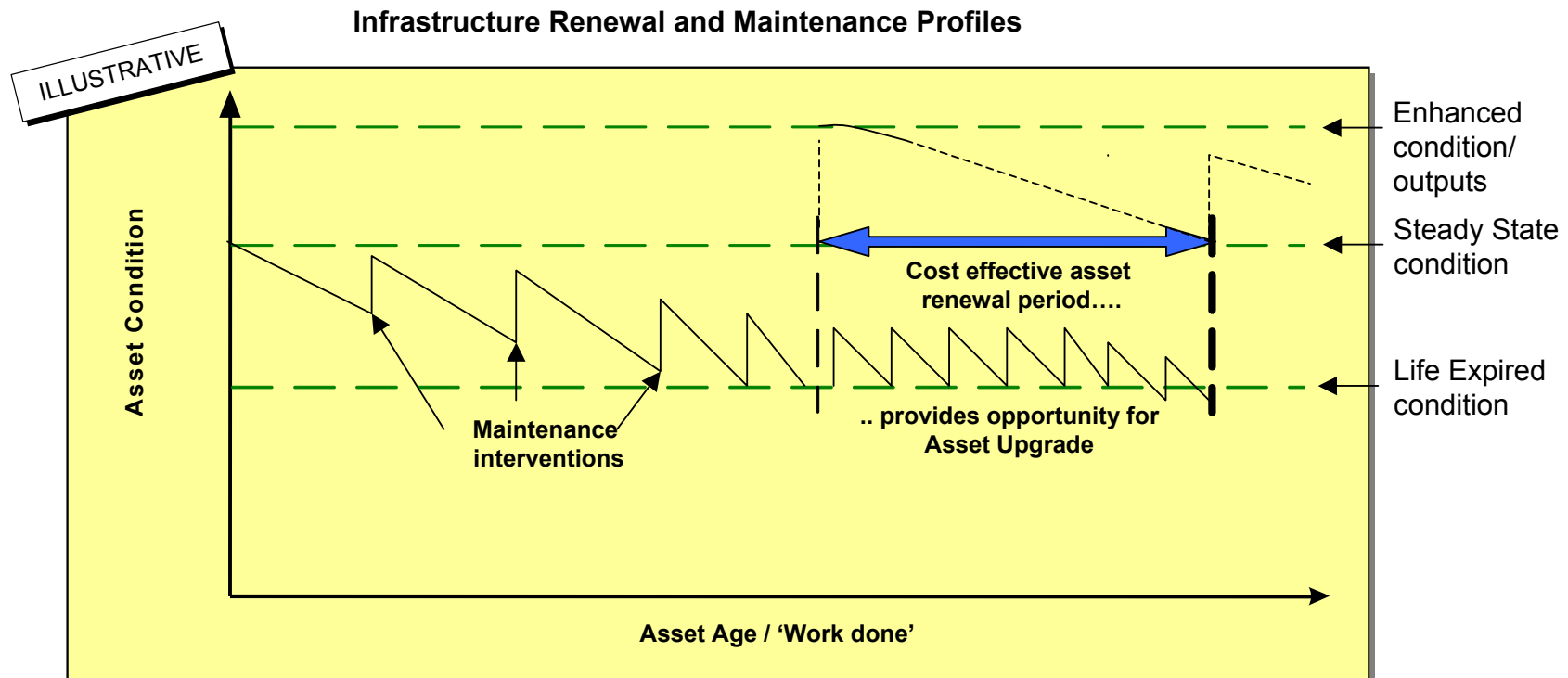
The optimisation of the NIR asset renewals programme and budget will require an understanding of a variety of inter-related issues including the key cost drivers for infrastructure spending

- Accessible asset knowledge should provide information for asset management decisions.
- An awareness of the cost / performance / condition constraints in which asset management decisions are made will also be necessary.
- Familiarity with the input / output relationships between cost/ work done and asset performance and degradation.
- Awareness of delivery efficiency issues with respect to control of scope, planning and possessions.
- Ability to model and carry out ‘what if’ scenario analysis and to view the changes to the bottom line figures as a result of any changes made.
- The planning of infrastructure investment requires flexibility, periodic review to ensure co-ordination with related investment and recognition of the over optimistic estimation of investment timescales.

Key Cost Drivers	Examples
RAMs Levels*	In essence higher levels of availability and reliability targets for the network directly imposes higher performance requirements on the infrastructure.
Stakeholder and Management	Ability of management to analyse, model and manage work and improvements.
Purchasing Power	Reflected in lower material costs, lower costs for outsourced renewal projects etc.
Network Complexity	Relating to issues such as complex depot and stabling operations, complex traffic control, more complex signalling, more level crossings, and a mix of single and double track.
Conditions	Factors could include, site access, requirement for night work, inability to take long possessions reflected in less productivity.

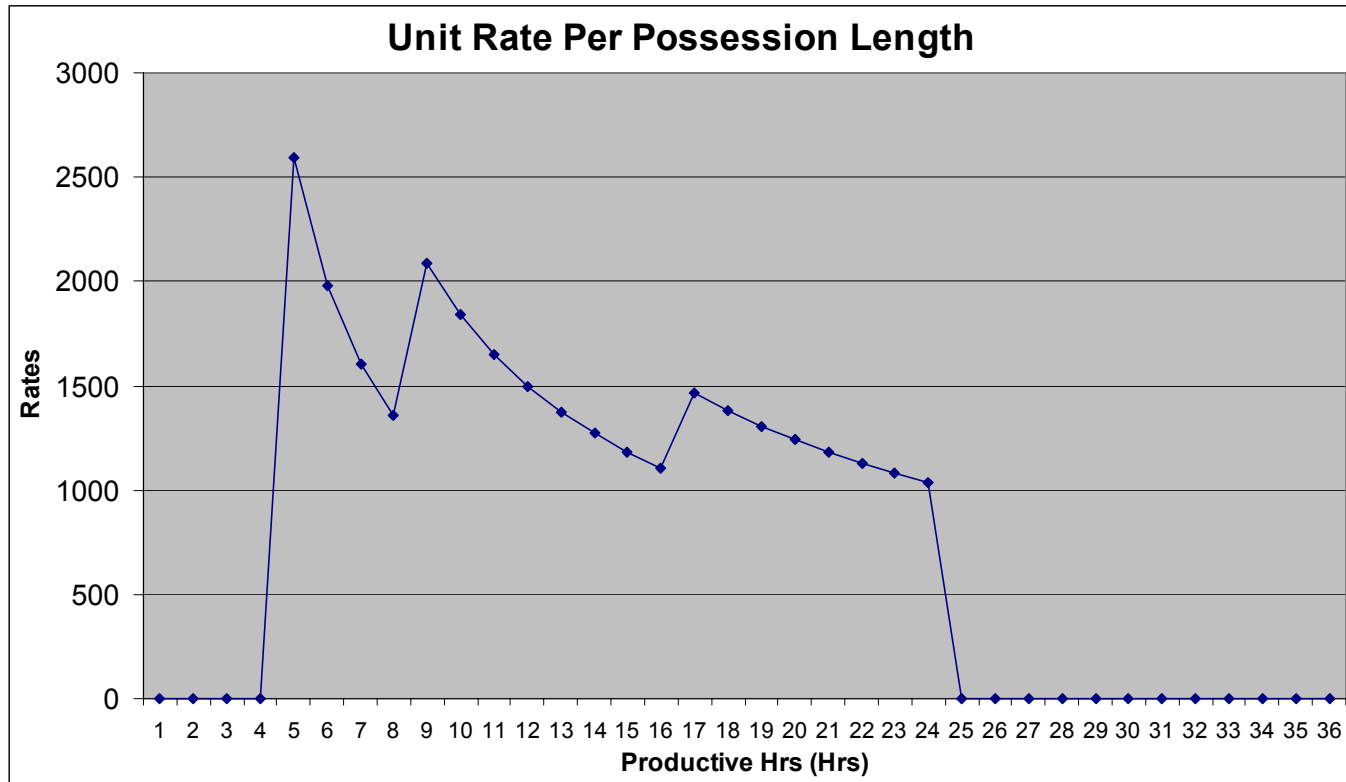
*Reliability, availability and maintainability levels.

A well planned asset renewals programme will also present NIR with opportunities to upgrade or enhancement certain routes as required



- Whilst the Review team would not envisage a significant requirement for enhancement or upgrading schemes it is important to recognise that enhancement rather than renewal of life-expired assets can save costs and increase revenue by providing additional functionality as opposed to like-for-like asset replacement in certain cases. For example, the use of new technologies for level crossings or rolling stock cleaning etc.

How the work is undertaken will have an important influence of the costs, for example output unit rates are heavily driven by duration of any possessions



Note: Direct blockade efficiencies from the UK stated to be 40% of Rules of the Route comparator.
Rates in £Stg.

The development of an ‘In-house’ track renewal resource may well provide NIR with efficiency gains if the planned volumes of work can justify it

Looking forward with NIR maintaining a modern fleet of DMUs, experience of modern maintenance facilities and best practice elsewhere would indicate that such a transition could yield significant savings

- Continue to build on the recent staff culture changes and maintenance step change by further improvements to maintenance depot fabric and facilities. This may require some additional investment, but should then deliver greater fleet maintenance cost efficiencies.
- Continuation of current efforts to bring improvements by managing the depot on a modern 'Traincare' facility approach for the new DMUs maintenance.
- Continuation to assess recent re-organisation of depot operations in relation to staff skills and numbers to support this transition to new trains and their modern kit. This should also enable better use of CAF's support and expertise as per the maintenance contract.
- In the longer term there are gains to be had by reviewing, reducing or getting rid of the 'old facilities' like machine shop, engine repair, bogie repair, etc. Any such decisions should consider NIRs position with respect to availability, suitability and competitiveness of other options.
- Possible rationale for savings are listed below:
 - Maintenance regime should be more balanced;
 - Relevant safety assessments carried out and no need to examine trains;
 - Fleet performance should be better and maintenance costs lower; and
 - Staff deployment would be lower and skill sets different (e.g. no train examiners, correct balance of skilled and semi-skilled, etc.).

There are some immediate actions which NIR should undertake to enable the longer term strategy for the railway to be properly developed

- **Delay attribution system** – collation of data on delay incidents by duration (delay minutes), location and cause should be developed to enable better analysis of the occurrence and impact of failures and more effective performance management. This will, in turn, enable the value of performance enhancing measures to be properly appraised.
- **Routine passenger counts** – the absence of comprehensive and accurate travel data is an inhibiting factor to conducting economic appraisals of strategic options. Furthermore, accurate station footfall and train loading data would enable better optimisation of service patterns and resource utilisation. This should eventually be achieved with the implementation of smart card. An immediate solution could be passenger counts which would assist further in the assessment of optimisation of service delivery (service patterns, resource utilisation etc.).