Údarás Náisiúnta Iompair
National Transport Authority

Rail Review 2016

REPORT

August 2016

Údarás Náisiúnta Iompair
National Transport Authority

Iarnród Éireann
Irish Rail

Executive Summary

Ireland has a network of rail lines that have been in place for almost 150 years over which a significant number of public transport rail services are provided. The network supports the economic and social development of the state in providing accessible transport to many key destinations. Approximately 42 million passenger journeys will be completed on the network in 2016, which is returning to the levels achieved at the height of the boom in 2007. The network and services all require significant state funding in order to continue to operate.

During the recent economic downturn, the funding for the operation and maintenance of the rail network was reduced significantly and has not recovered to a sustainable level for the network that currently exists.

This Rail Review examines the network that is operated, the potential of that network to meet both travel demand and environmental objectives. It examines the funding required to operate and maintain the existing network and identifies the funding gap. It then proposes other means of reducing the funding gap if the full state funding is not available.

If the funding gap is not addressed, the consequences are a deteriorating network, increasing safety rules mitigated by slower services or cessation in services, subsequent reduction in passenger numbers resulting in further reduction in revenues to the company, no alternative but to reduce services and a reduction in the benefit to the state of the investment in fleet and track under the Transport 21 programme.

This review is also undertaken in the context of the Department of Transport, Tourism & Sport's document "Investing in Our Transport Future – Strategic Investment Framework for Land Transport" which sets as its first funding priority the achievement of steady state maintenance of the land transport system prior to investing in new assets.

Funding Gap

The company's funding gap between current funding levels and appropriate funding levels for the period 2017 – 2021 is approximately **€103m per annum**. An increased funding of this level per year will bring the spending on the maintenance of the network and the fleet up to an appropriate level and start the investment in refurbished and new fleet to meet future growth.

Additional Funding Required:	2017 €m	2018 €m	2019 €m	2020 €m	2021 €m
Infrastructure Manager					
Steady State Funding (AECOM)	64.2	64.1	64.0	63.7	63.7
Train Operator					
Shortfall from Track Access Charge Increases	7.2	2.7	4.2	3.2	4.7
Fleet Heavy Maintenance	35.0	35.0	35.0	35.0	35.0
Reduced PSO	(3.5)	(10.5)	(17.5)	(24.5)	(31.5)
Train Operator Additional Funding	**38.7**	**27.2**	**21.7**	**13.7**	**8.2**
Unfunded Capital					
Urgent Growth Measures (Fleet)	-	25.4	27.4	16.0	18.7
Total Additional Funding	**102.9**	**116.7**	**113.1**	**93.4**	**90.6**

For the period 2009 to 2015 Iarnród Éireann has incurred accumulated losses of €125.1m despite delivering €76m in cost savings in the same period. The accumulated losses were incurred primarily as a result of reduced exchequer funding and falling passenger numbers. The net result of this practice has been to weaken the balance sheet to the point where it is not possible to incur any losses in the future without risking insolvency. The European Union in setting the principles for the operation of railways has outlined that railways should be operated such that the Infrastructure Manager breaks even and the Railway Undertaking returns a reasonable profit.

The funding required to address the legacy of accumulated losses since 2009 is **an additional investment of €41.7m** in each of the years 2017 to 2019, the remaining term of the current Direct Award Contract between the NTA and Iarnród Éireann. The table below combines the funding gap and solvency issues.

Funding to address solvency/under-compensation in previous years:	2017 €m	2018 €m	2019 €m	2020 €m	2021 €m
Funding Gap	102.9	116.7	113.1	93.4	90.6
Compensation for Underfunding 2010 to 2016	41.7	41.7	41.7	-	-
Total Additional Funding	**144.6**	**158.4**	**154.8**	**93.4**	**90.6**

Potential Solutions to Resolve the Funding Gap and Solvency Concerns

There are three broad possible solutions for resolution of the company's current funding shortfall;

1. Increased exchequer grants
2. Network reduction and line closures
3. A combination of 1 and 2 above with a further proposal to address the under compensation to Iarnród Éireann for the Department of Social Protection's Free Travel Scheme.

These are outlined in full detail within this Rail Review.

Conclusion

Iarnród Éireann has experienced a return to growth in all business areas since 2014. However, despite this, the solvency of the company remains a major concern due to the accumulated losses as a result of the reduced Exchequer funding and the consequent deterioration of shareholder funds.

Both the NTA and Iarnród Eireann want to ensure that there is a resilient rail network in place and an appropriately funded company to manage that network so that rail can contribute to the wider social and economic objectives of the state. The rail network is a valuable asset that the state has invested in over many years. An additional €103m over the next five years will secure the long term sustainability of the rail network, the financial stability of Iarnród Éireann and the development of the railway network for the future. Along with the support of other effective policies to encourage modal shift to integrated public transport, the rail network can contribute to facilitating more sustainable land use development patterns, to providing a viable alternative to congested roads and to achieving the national climate change targets.

1 Introduction

Ireland has a network of rail lines that have been in place for almost 150 years over which a significant number of public transport rail services are provided. The network supports the economic and social development of the state in providing accessible transport to many key destinations. Almost 40 million passenger journeys were completed on the network in 2015. The network and services all require significant state funding in order to continue to operate.

During the recent economic downturn, the funding for the operation and maintenance of the rail network was reduced significantly and has not recovered to a sustainable level for the network that currently exists.

This Rail Review examines the network that is operated, the potential of that network to meet both travel demand and environmental objectives. It examines the funding required to operate and maintain the existing network and identifies the funding gap. It then proposes other means of reducing the funding gap if the state funding is not available.

If the funding gap is not addressed, the consequences are a deteriorating network, increasing safety rules mitigated by slower services or cessation in services, subsequent reduction in passenger numbers resulting in further reduction in revenues to the company and a reduction in the benefit to the state of the investment in fleet and track under the Transport 21 programme.

This review is also undertaken in the context of the Department of Transport, Tourism & Sport's document "Investing in Our Transport Future – Strategic Investment Framework for Land Transport" which sets as its first funding priority the achievement of steady state maintenance of the land transport system prior to investing in new assets.

1.1 Terms of Reference

The National Transport Authority ('NTA', the Authority) and Iarnród Éireann (IÉ) have undertaken a process to review and evaluate possible solutions to the Rail Company's financial requirements under a number of funding scenarios. This report is the outcome of the process.

In light of the envisaged financial envelope for Irish rail PSO subvention and capital spending in respect of the period 2016-2021, the terms of reference for the review are as follows:

1. To identify the implication for Iarnród Éireann (IÉ) finances of the existing financial envelope for PSO and capital works and to consider the funding requirements to avoid losses in Irish Rail;
2. To examine the scope, subject to retention of the existing route network, for (a) changes in PSO rail services (b) other efficiencies and (c) revenue generation;
3. To explore the impact of adjustments to the existing route network in terms of impacts on costs and revenues (including obligations relating to closed lines);

4. As part of the assessment at (3) above, to examine alternative PSO funding of bus services that may be required to meet public transport needs, currently met by rail, and the impacts on passengers in terms of journey times and service frequencies of such adjustments;
5. To illustrate potential scenarios for a sustainable operating and funding model for Irish Rail based on an evaluation of the routes and services that could be retained on a financially viable and efficient basis by Irish Rail;
6. To examine the future investment required for the development of the railway network to meet future demands.

1.2 Funding

The management and operation of the rail network by Iarnród Éireann is divided into two separate business units:

a) Railway Undertaking – operation of rail services under contract with the NTA funded by PSO and fare revenue
b) Infrastructure Manager – maintenance and enhancement of the rail track and stations under contract with the Department of Transport Tourism & Sport (the Multi-annual Contract i.e. the "MAC") funded by grant from Department and Track & Station Access Charges.

Table 1 below contains the various components of this financial envelope for the review period 2016-2021.

Table 1: Current and Capital Funding Estimates 2016 – 2021

	2016	2017	2018	2019	2020	2021
Dept. - MAC Total	**126.0**	**130.17**	**130.17**	**130.17**	**130.17**	**130.17**
NTA - PSO	**110.64**	**110.64**	**110.64**	**110.64**	**110.64**	**110.64**
Dept. & NTA - Capital Enhancement Total	**26.0**	**11.0**	**41.0**	**32.0**	**31.0**	**22.0**

1.3 Current Position Compared to 2014

The last Rail Review was completed in 2014, a time when passenger numbers on the network were only starting to recover from their lowest point in a decade in 2013, and IÉ's funding was at its lowest level for a decade, both effects of the economic downturn and significant underfunding from central government.

Encouragingly, IÉ's position has improved since then in line with the wider economic recovery and the back drop for this Rail Review is more positive. There is growth in passenger numbers, which are set to rise for a third straight year (approaching the pre-recession level of 2007) and the funding situation has stabilised as no additional cuts are being applied.

Furthermore, several of the proposals included in the 2014 Rail Review are being acted upon, with the mobilisation of the Customer First programme, the forthcoming reopening of the Phoenix Park Tunnel and the planned implementation of the 10 minute frequency on DART services in 2017.

However, there are still significant challenges to overcome. The decrease in multi annual contract funding for the Infrastructure Management in recent years has led to a deteriorating asset base. Large and varied parts of the railway's infrastructure are in need of urgent maintenance due to this lack of investment, which is of concern to all stakeholders including the Commission for Railway Regulation.

The aim of this report is to set out how IÉ can maintain a steady state of investment in the years ahead, and build on this to provide an improved and expanded level of service for its customers and to meet the state's objective to grow sustainable transport use.

1.4 Review Participants

The review, which commenced on 3rd March and was concluded on 30th June, was jointly progressed by teams from each of IÉ and the Authority, led by the CEO of each organisation. The process was advanced through regular Steering Group meetings supported by the production of technical notes and position papers.

1.5 Supporting technical resources

The internal technical, transport planning and financial teams of IÉ and NTA supported the review process through the production of position papers and the analysis of various scenarios as requested by the Steering Group.

External technical support was provided by Roland Berger Strategy Consultants Ltd (Roland Berger) and AECOM.

Roland Berger had been appointed 2014 and again in 2016 by Iarnród Éireann to develop a model (Route Profitability Model) for the financial assessment of various rail network and service scenarios.

The basis of the model development was an analysis of route profitability to provide an understanding of the contributions to profit and loss of its constituent operations. The analysis considered performance at an overall system level and separated into the individual business units. The assessment model was used to examine various network and service scenarios and to assess the financial implications of these.

The Roland Berger reports can be found in Appendix 6 and 7 of this document.

AECOM were initially appointed by IÉ in 2010 to undertake a comprehensive review of the infrastructure investment needs of the network up to 2030.

The AECOM review (2030 Rail Network Strategy Review, April 2011) established the infrastructure maintenance and renewal investment requirement for the current network in order to achieve a steady state infrastructure.

This year IÉ re-commissioned AECOM to update its original analysis, with particular reference to the backlog of work that has emerged as a result of underfunding since 2011. AECOM have been tasked with identifying the future funding requirement in this context taking account of efficiencies and other impacts on costs that have arisen both since the original analysis and the last Rail Review.

The AECOM report can be found in Appendix 4 of this document.

2 The Rail Network

The rail network in Ireland comprises approximately 2,400 km of railway track, of which approximately 1,660 km is currently active, and includes 147[1] passenger stations and 372 platforms[2].

It also comprises 5,100 bridges, 1,240 level crossings, over 4,900 cuttings and embankments and 14 tunnels.

The railway is mainly single track, with 886km of double track and 60km of multiple track.

The network includes main lines, Dublin suburban and commuter passenger routes and Cork Suburban routes, together with freight-only routes. The majority of the network is comprised of radial lines focused on Dublin. The network largely provides for inter-urban connections providing strategic transport links at the national level between the six key cities on the island, Dublin, Cork, Galway, Limerick, Waterford and Belfast as well as linking to smaller cities and large towns which have strong regional functions in particular Sligo, Tralee, Wexford (see the Network Map overleaf).

[1] Including Manulla Junction which only operates as a transfer point for services to/from Ballina, and Kishogue the opening of which is pending and Mosney which currently has no service.
[2] See Appendix 1 for breakdown of track lengths and depiction of network configuration


Iarnród Éireann
Irish Rail
Portrush
Coleraine
Derry
Larne
Antrim
Bangor
Belfast
Lisburn
Lurgan
Portadown
Newry
Dundalk
Drogheda
Ballina
Sligo
Collooney
Ballymote
Boyle
Carrick on Shannon
Dromod
Longford
Edgeworthstown
Mullingar
Enfield
Kilcock
Maynooth
Dunboyne/M3
Clonsilla
Foxford
Westport
Castlebar
Manulla Junction
Passenger transfers only
Claremorris
Ballyhaunis
Castlerea
Roscommon
Athlone
Galway
Oranmore
Athenry
Attymon
Woodlawn
Ballinasloe
Clara
Tullamore
Portarlington
Monasterevin
Kildare
Newbridge
Dublin Connolly
Dublin Heuston
Dublin Pearse
Dun Laoghaire
Bray
Greystones
Kilcoole
Wicklow
Rathdrum
Arklow
Gorey
Enniscorthy
Wexford
Rosslare Strand
Rosslare Europort
Craughwell
Ardrahan
Gort
Ennis
Sixmilebridge
Limerick
Castleconnell
Birdhill
Nenagh
Cloughjordan
Roscrea
Ballybrophy
Portlaoise
Athy
Carlow
Muine Bheag
Kilkenny
Thomastown
Templemore
Thurles
Limerick Junction
Charleville
Tipperary
Cahir
Clonmel
Carrick on Suir
Waterford
Tralee
Farranfore
Killarney
Rathmore
Millstreet
Banteer
Mallow
Cork
Glounthaune
Midleton
Cobh
Main Terminal Station
Regional Station
InterCity Rail Network
Translink Network
Passenger transfers only

Intra-urban rail is also extensive within the Dublin area with the provision of DART in 1984 on the main network providing the core high capacity network that is central to the Greater Dublin Area's mass transit system.

Freight terminals at Ballina, Westport, and Waterford, which are operated by Iarnród Éireann, also form part of the rail network. All are intermodal terminals handling the interchange of traffic between road and rail modes. In addition to the Iarnród Éireann depots there are a number of facilities owed by other companies including facilities at Dublin Port, Tara Mines (Navan), and Belview Port (Waterford). A disused rail line linking the Port of Foynes to Limerick is also being considered for future development.

2.1 **Passenger Rail Services**

Various passenger service types operate across the national rail network, in the main they can be broken down into 3 categories – Intercity, Commuter and DART. Different service types share lines (as described above) at various locations across the network and many stations are served by a number of service types, particularly within the Dublin Region.

The range of passenger services currently in operation on the national network is detailed in the tables below (Tables 2&3) - Intercity and Commuter/DART services are set out separately. This provides a high-level indication of service frequency and underlines the variations in service provision which occur across the network at present.

The most frequent services overall are Commuter and DART services, which tend to be shorter journeys. The most frequent InterCity service is between Dublin and Limerick (direct and indirect services), or between Dublin and Cork (direct).

Table 2 Intercity/Inter-Regional Services

Route/Line	Service	No. Services, (2 directional, Weekday)[3]
Dublin Connolly - Border (NI)	Dublin Connolly - Belfast Central	16
Dublin Connolly - Sligo McDiarmada	Dublin Connolly - Sligo	14
Dublin Connolly - Rosslare Europort	Dublin Connolly - Rosslare/Rosslare Europort	8
Dublin Heuston - Portarlington -Galway Ceannt	Dublin Heuston - Galway	18
Dublin Heuston - Cherryville Junction – Waterford Plunkett	Dublin Heuston - Waterford	14
Dublin Heuston - Cork Kent	Dublin Heuston – Cork/Limerick	29
Dublin Heuston - Portarlingon – Ballybrophy – Limerick Colbert	Dublin Heuston - Limerick	7
Dublin Heuston - Portarlington – Athlone – Manulla Jnt –Westport/Ballina	Dublin Heuston - Westport/Ballina	8
Dublin Heuston - Cork Kent – Tralee Casement	Dublin Heuston - Tralee	2
Limerick Colbert - Galway Ceannt	Limerick-Galway	9
Limerick Colbert - Waterford Plunkett	Limerick-Waterford	4
Cork Kent - Tralee Casement	Cork-Tralee	5

[3] As operated on National Rail Census Day 2015

Table 3 Commuter & DART Services

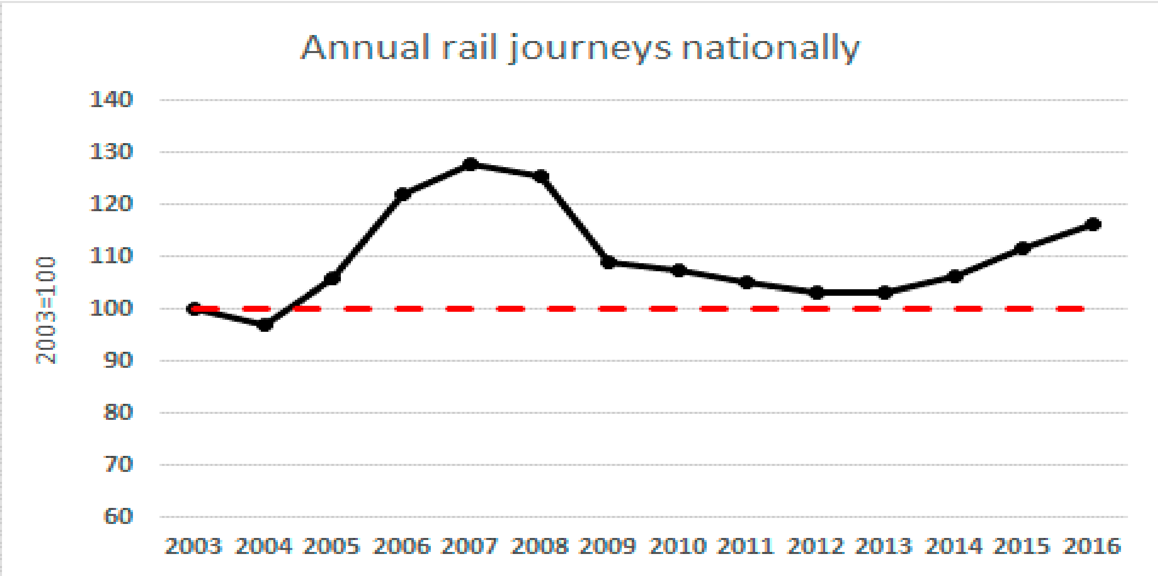
Route/Line	Dublin Commuter	No. Services, (2 directional, Weekday)[4]
Dublin Heuston – Cork Kent/Galway Ceannt	Dubin Heuston - Portlaoise	37
Dublin Heuston – Cork Kent/Galway Ceannt	Dublin Heuston - Newbridge	7
Dublin Heuston – Cork Kent/Galway Ceannt	Dublin Heuston - Kildare	2
Dublin Heuston – Cork Kent/Galway Ceannt	Dublin Heuston - Athlone	3
Dublin Connolly – Sligo McDiarmada	Dublin Connolly/Pearse - Longford	4
Dublin Heuston –Cherryville Junction – Waterford Plunkett	Dublin Heuston - Carlow	3
Portarlington – Galway Ceannt	Galway - Athlone	2
Dublin Connolly – Sligo McDiarmada	Dublin Connolly/Pearse/Bray - Maynooth	62
Dublin Connolly - Docklands Line	Dublin Connolly/Docklands - M3 Parkway	19
Clonsilla - M3 Parkway	Clonsilla - M3 Parkway	22
Dublin Connolly – Border (NI)	Dublin Connolly/Pearse/Bray - Dundalk	14
Dublin Connolly – Border (NI)	Dublin Connolly/Pearse/Bray - Drogheda	36
Dublin Connolly – Border (NI)	Dublin Connolly - Newry	1
	Cork Commuter	
Cork Kent-Cobh (Cork Suburban)	Cork - Cobh	46
Cork Kent-Midleton (Cork Suburban)	Cork-Midleton	44
Dublin Heuston – Cork Kent	Cork-Mallow	14
	Other Suburban/Commuter	
Limerick Colbert – Galway Ceannt	Limerick-Ennis	9
Limerick Colbert – Galway Ceannt	Galway-Ennis	1
Dublin Heuston – Portarlington -Galway Ceannt	Athenry-Galway	4
Ballybrophy – Limerick Colbert	Limerick-Ballybrophy	4
Ballybrophy – Limerick Colbert	Limerick-Nenagh	1
DART	Dublin Connolly/Pearse-Greystones-Malahide/Howth	157

[4] As operated on National Rail Census Day 2015

2.2 **Existing passenger demand**

Total passenger journeys on the national rail network in 2015 were 39.7 million. This represents an annual increase of 5% and is the second year of continuous passenger journey growth. Rail passenger demand peaked in 2007 at 45.5m passengers, before falling back to a low 36.7m in 2012 and a subsequent flattening of volumes in 2013. The first significant increase in passenger volumes was recorded in 2014 (3%).

Figure 2 Annual Rail Journeys Nationally



In 2015 all network segments delivered positive year on year growth with Intercity services at 2.3%, Commuter at 3.6% and DART at 7.5%. DART and Commuter growth can be attributed to the improved employment levels within the Greater Dublin area together with the significant increase in Leap card penetration and usage. Intercity growth was more moderate as disposable incomes remain challenged in areas outside of Dublin. Currently approximately 17.2m passengers use the DART network, 12.1m Commuter network and 10.4m use the Intercity network annually.

Rail usage varies significantly across the national network – the annual National Rail Census provides a snapshot of this. The annual rail census gives an indication of the journey pattern across the network and is a good reference point for previous years' census data. An overview of the 2015 Census is provided within Appendix 1. Some key findings are as follows:

- The total patronage[5] on the rail network on Census day was 141,393, involving around 678 rail services[6].
- Approximately 83% of daily journeys were undertaken in the Greater Dublin Area[7] underlining that the majority of rail demand is associated with this region.

[5] Passengers boarding services, National Heavy Rail Census 2015, NTA/IÉ
[6] Including shuttle services operating Limerick Colbert – Limerick Junction and return
[7] Dublin, Kildare, Meath and Wicklow

- While DART services represented around 23% of total services operated they accounted for approximately 46% of total passenger boarding's on the network - this underlines the focus of demand on this part of the network.
- Almost 1.5 times the proportion of boardings took place on Connolly services as on Heuston services (14,763 boardings versus 9,639 boardings), reflecting the number of Dublin commuter services in Connolly.
- Regional services (i.e. those services that do not terminate in Dublin) combined passenger numbers accounted for only 5% of total passenger demand on Census day underlining the limited usage of these services.
- The busiest station in the country, with just over 29,755 boardings and alightings combined, was Connolly station; the quietest station with a total of 1 boarding and no alighting was Carrick on Suir.
- The top ten stations accounted for approximately 46% of total boardings nationally and 48% of total alightings. With the exception of Cork's Kent Station, all of the top ten stations were located in the Dublin area.

Stations	Sum of Reconciled On	Sum of Reconciled Off	Daily Total
Connolly	14,763	14,992	29,755
Pearse	13,439	13,766	27,205
Heuston	9,639	9,680	19,319
Tara Street	7,802	9,550	17,352
Lansdowne	3,428	4,035	7,463
Cork	3,478	3,512	6,990
Dun Laoghaire	3,308	3,439	6,747
Grand Canal Dock	2,673	3,731	6,404
Bray	2,957	2,837	5,794
Blackrock	2,859	2,844	5,703

The total passenger numbers across the different lines for 2015 is as follows:

Route Description	**Passenger Journeys (millions) in 2015**
Intercity	
Dublin - Cork	2.902
Dublin - Tralee	0.596
Dublin - Limerick	0.828
Dublin – Galway	1.592
Dublin – Westport Ballina	0.539
Dublin - Waterford	1.189
Dublin – Belfast	1.068
Dublin – Sligo	1.259
Dublin – Rosslare	0.316
Limerick Junction – Waterford	0.032
Limerick – Ballybrophy	0.025
Limerick – Galway (Ennis to Athenry)	0.102
Total Intercity	**10.448**

Commuter	
Dublin – Drogheda	4.718
Dublin – Maynooth	3.620
Dublin – Kildare	2.222
Dublin – Wicklow	0.278
Dublin – Navan	0.0119
Cork – Cobh	0.764
Cork – Midleton	0.340
Total Commuter	**12.062**
DART	**17.150**

- 25 stations in the country generated less than 100 journeys on Census day and a further 19 stations generated between 100 and 200 journeys

Stations	Sum of Reconciled On	Sum of Reconciled Off	Daily Total	Services
Carrick-on-Suir	1	0	1	Limerick Jct – Waterford
Roscrea	7	3	10	Ballybrophy – Limerick
Ardrahan	3	8	11	Galway – Limerick
Cahir	9	2	11	Limerick Jct – Waterford
Foxford	5	7	12	Dublin – Ballina
Attymon	7	7	14	Dublin – Galway
Cloughjordan	6	9	15	Ballybrophy – Limerick
Fota	10	9	19	Cork – Cobh
Castleconnell	15	5	20	Ballybrophy – Limerick
Birdhill	11	10	21	Ballybrophy – Limerick
Tipperary	11	10	21	Limerick Jct – Waterford
Craughwell	13	14	27	Galway – Limerick
Gort	19	13	32	Galway – Limerick
Nenagh	17	17	34	Ballybrophy – Limerick
Clonmel	23	17	40	Limerick Jct – Waterford
Newry	49	0	49	Dublin – Belfast
Carrigaloe	37	13	50	Cork – Cobh
Rosslare Europort	20	30	50	Dublin– Rosslare Europort
Farranfore	22	39	61	Tralee – Cork/Dublin
Banteer	42	24	66	Tralee – Cork/Dublin
Rosslare Strand	22	44	66	Dublin– Rosslare Europort
Woodlawn	38	45	83	Dublin – Galway
Thomastown	40	48	88	Dublin – Waterford
Clondalkin/Fonthill	42	48	90	Commuter: Dublin – Kildare
Sixmilebridge	53	37	90	Galway – Limerick

- All five stations between Ballybrophy and Limerick, all four stations between Limerick Junction and Wateford, and three stations between Ennis and Athenry were all among the 15 least used on the network with less than 40 passenger movements.

2.3 Fleet

In 2013, in response to falling passenger demand and with the aim to reducing fuel and energy costs, IÉ implemented its Fleet Strategy Project which saw a reduction in the maximum train sizes of Intercity and off-peak DART services. However, since the recovery of passenger levels from 2014 and with the proposed introduction of new services using the Phoenix Park Tunnel, the previously removed MKIV fleet has now been reintroduced.

This is not sufficient, however, to deal with potential capacity demands as passenger numbers recover to 2007 levels. Already there are a number of Intercity and Commuter routes which are approaching or exceeding capacity. Since 2007, MK2, MK3 and 2700 Class DMU rolling stock have been phased out, and while the new fleet of ICR vehicles was introduced, this will not be adequate to meet demand in the short- to medium-term. For a period around 2007, Iarnród Éireann had more fleet than they currently have, as there was overlap between delivery of new rail fleet and withdrawal of old rail cars.

To adequately meet the future growth objectives of this report, a number of measures need to be taken to enhance IÉ's fleet. This is particularly relevant to Intercity and Commuter services, as DART services have already undergone capacity enhancements in April of this year in preparation for the future DART 10 minute timetable.

Firstly, it is proposed that the Class 2700 DMU fleet, which was withdrawn from service in 2012, be refurbished at a unit cost of €0.3m and reintroduced on a phased basis in 2018/19 thus releasing ICR sets to other services. Furthermore, new ICR centre car vehicles should be purchased at a unit cost of €2.4m to €3.1m depending on procurement, with the lower cost estimate associated with a continuation of the existing Mitsui / Rotem Framework Agreement. It is yet to be determined from a procurement viewpoint whether the Mitsui purchase is possible. An alternative supplier would involve a new tendering process, longer lead in period and likely increased capital, operational and maintenance costs compared to the Mitsui option.

Another option is to purchase a new build fleet however this is more costly, involving a new tendering process, longer lead in period and increased operational and maintenance costs compared to the Mitsui option.

The table overleaf highlights the number of vehicles which will be required based on the various growth levels considered and costs. Iarnród Éireann has chosen the 6% Annual Loading Increase as the appropriate figure for design purposes. Further details on this can be found in Appendix 5. A detailed business case will be required if this fleet purchase was to be progressed.

Annual Loading Increase	No. of services increased	2700 Class Vehicles	Additional ICR Vehicles	Fleet Cost €'M
4%	19	28	31	82.4
6%	23	28	41	106.4
8%	25	28	49	125.6

3 The Role of Rail

3.1 Introduction

Iarnród Éireann carries 39.7[8] million passenger journeys accounting for 15.9% of the 249 million passenger journeys made annually on public transport throughout the State[9]. Currently around 17m passengers use the DART network and 22m passengers use the Intercity and Commuter network annually, accounting for over 1,500m passenger kilometres.

Rail also carries around 1% of freight tonne kilometres.[10]

This demonstrates the attraction that rail has for a very significant section of the travel market and the volume of trips that would be carried out using other modes (predominantly private car and bus) in the absence of rail. As such, rail has a key role to play in contributing to sustainable travel in Ireland now and into the future.

Envisioning the optimal rail network, in terms of national transport needs and value for money, needs to be against the backdrop of both its current role and the role it should serve into the future, given the forecast population and economic growth in Ireland.

3.2 The Benefits of Travel by Rail

This Chapter presents the conclusions in the comprehensive report included as Appendix 2. The report in Appendix 2, entitled 'The Role of Rail – towards a national rail policy', sets out all the factors that need to be weighed up when deciding on the optimal funding model for the rail network. These factors include:

- The current role discharged by rail in Ireland
- Meeting policy goals – European and national
- Supporting the economy – growth, competitiveness, trade and freight, business travel
- Tourism – general, special tourism markets, rail tourism
- The environment and climate change –emissions and air quality
- Social benefits – social inclusion, improved accessibility and travel safety

The report examines the current transport role of rail, its position relative to other modes and how rail contributes to achieving national policy goals in relation to the environment, land use development, regional sustainability and economic development. To give a complete picture the report also sets out the challenges that rail faces in terms of competition from road-based transport.

The report concludes that the current strengths of the rail network in providing for regular travel demand within Ireland's largest urban areas (Dublin and Cork) and strategic inter-urban demand

8 'Rail Statistics for Ireland', Statistical Bulletin Number 02/2016, National Transport Authority, (2016)

9 'Commercial Bus Services in Ireland (2015 statistics), Statistical Bulletin Number 04/2016 (Draft), National Transport Authority, (2016)

10 'Investing in our transport future – A strategic framework for investment in land transport', Department of Transport Tourism and Sport (DTTAS), 2014

between Dublin and the other key cities and regional towns[11] on the island will increase in importance as overall demand for travel increases with economic growth along with the requirement to meet other national policy goals in relation to carbon emissions. The wider social, environmental and economic benefits associated with the rail network are summarised as follows:

- Rail provides the core high capacity element of the public transport network in the Greater Dublin Area (GDA) - approximately 7% of existing commuting demand in the GDA is met by rail. Without rail this demand would have to be met by other modes (car/bus) on a road network that would then suffer increased congestion. Demand for travel to/from and within the Greater Dublin Area is predicted to increase further in future years – maximising the capabilities of the existing rail network will be critical in managing this as the road network becomes more constrained, and will also prolong the economic life of the road network itself. Rail provides an irreplaceable role in providing high volume commuter transport in the Greater Dublin Area serving locations up to 80km from the city centre with high frequency services of approximately one hour travel time, and in providing a mass transit line through the heart of the city with DART.

- Intra-urban rail, as a high capacity transport mode, delivers significant business agglomeration benefits by reducing travel times and/or the cost of travel, thereby reducing the effective distances between firms, as well as between firms and labour markets and raising overall productivity. Between urban centres it allows for reduced transport costs and thus increases commercial links between the centres. Multiple options for travel help support economic activity and encourage investment. The larger city regions in Ireland are now the focal points for internationally mobile investment with a growing number of investments attracted to the capital city and the larger population centres[12]. Strong inter-urban access, at present contributed to by the rail network, and international connectivity are part of what has secured this investment and part of what will continue to secure and maintain investment into the future. Reducing the strategic rail transport network is likely to have a negative impact on the attractiveness of Ireland's larger city regions for foreign investors. Intra-urban rail also offers the facility to work while travelling which is not available to the same extent on other public transport modes.

- A primary focus across national policy documents in the various sectors mentioned above is to increase sustainability and efficiency through more effective alignment of land use and transport and modal shift towards more sustainable forms of transport. Focusing especially on the development of locations within and around the key cities and towns that are served by the rail network is central to achieving these aims.

- Rail currently has a significant market share of interurban travel associated with Dublin and while this was subject to decline from 2007 onwards, due largely to the economic downturn and increased competition for car and bus travel, more recent signs are that this is beginning to stabilise – maintaining and increasing this mode share is critical to preventing future shift

[11] Belfast, Cork, Galway, Limerick, Waterford, Sligo, Tralee/Killarney, Westport, Wexford
[12] 'Policy Statement on Foreign Direct Investment in Ireland', Department of Jobs, Enterprise and Innovation, (2014)

to private car for such journeys and to keeping Ireland's road network moving, particularly in the Dublin area, now and into the future as demand increases.

- The national rail network also plays a central role in sustaining and growing tourism demand and its associated benefits. Approximately 11% of domestic tourists and 5% of out-of-state tourists utilise the intercity rail network. Rail also provides high capacity transport links for high volume tourism and leisure demand created by special events and is regarded as a key part of the package to support and increase the attractiveness of the Port of Cork to the cruise industry. A significant reduction in the ability to travel by rail would be likely to impact negatively on how the country is viewed by international tourism markets and how strongly it can compete with other destinations for tourist travel. The introduction of the Belmond luxury cruise train indicates that the market has the potential to grow further.

- As part of the overall public transport network rail supports social inclusion and social mobility by providing access to services, communities and jobs for those vulnerable to social exclusion including older people and people with disabilities. High levels of accessibility across the rail network facilitate and support universal access. Furthermore, each year more than 780,000 people benefit from rail travel through the Free Travel Scheme. Should the railways be cut back significantly there would be a requirement to find alternative means of enabling these groups to travel.

The rail network contributes not only to meeting transport demands but also to broader social, environmental and economic needs and objectives, all of which need to be taken into consideration in planning for the future of the network.

3.3 Sustainability

Ireland's targets in relation to emissions reductions are already proving challenging and transport is one of the key sectors in which substantial improvements are required. Part of the necessary package of transport actions is maintaining and increasing the mode share of walking, cycling and public transport.

The environmental benefits of rail travel are well known. The International Union of Railways (UIC) reports that travelling by rail is 3-10 times less CO2 intensive compared to road or air transport. During 2010, the average rail passenger km in Ireland created just 60g of greenhouse gases, vs. 210g for road vehicles.[13] If all rail journeys were made by car it would increase greenhouse gas (GHGs) emissions by around 240,000 tonnes, equivalent to 30,000 households[14]. Sustaining and building upon the role of rail in providing for travel demand will support national efforts to reach emissions targets.

[13] 'Energy efficiency and specific CO_2 emissions', European Environment Agency (2013); 'Railway Handbook: Energy Consumption and CO_2 Emissions', International Energy Agency and International Union of Railways, (2013),; The World Bank

[14] Sustainable Energy Authority, Ireland; Central Statistics Office

The government is currently preparing the National Mitigation Plan, in which transport is a key sector (along with electricity generation, built environment and agriculture). The DTTAS will present a series of mitigation measures for the transport sector which will focus on the development of a cost effective policy platform for reducing emissions and increasing energy efficiency across all modes. It is envisaged that matters to be considered will include the role of technology, sustainable land use patterns, modal shift and travel demand. NTA and IÉ will play a key role in meeting these objectives.

The plan will also draw on the recently published Investing in our transport future – A Strategic Framework for Investment in Land Transport, which includes achieving steady state maintenance of rail infrastructure as one of its key priorities and principles for future investment

Already IÉ has made huge inroads in the area of energy efficiency over the past number of years, to the extent that IÉ has already passed the target of 30% improvement, set by Government, to be achieved by 2020. It has also reduced its emissions by 22% since 1996, whilst increasing train kilometres operated.

However, the transport sector as a whole is set to miss the 2020 targets, and more stringent targets of a 40% reduction are required by the EU by 2030, as part of a road map to reduce emissions by over 80% by 2050. In addition, the United Nations Climate Agreement (COP21) binds all governments to work to limit global temperature increase, with the role of transport highlighted.

A move to electrified systems such as envisaged in the DART Expansion Programme will accelerate the use of renewable energy in transport delivery, resulting in up to 75% of all journeys on the Iarnród Éireann network being powered by electricity.

3.4 Rail Freight

The principle of moving freight by rail supports existing Irish and EU requirements relating to sustainability of transport and environmental policies and aligns with the National Ports Policy, Dublin Port Master Plan and the emerging National Low Carbon Roadmap. Both the NTA and Iarnród Éireann welcome the proposed National Freight Review that is being commissioned by the DTTAS to identify the opportunities rail freight can deliver from both a commercial and environmental perspective to the Irish economy in the context of increasing economic growth and road congestion. Iarnród Éireann's key strategy for freight is to organically grow the business by focusing on commercially viable niche point to point markets revenue streams. Rail offers a unique ability to move traffic in larger volumes and relatively higher speeds particularly using existing lines and assets that specifically have direct connectivity between Ports and inland distribution hubs. In this respect, Iarnród Éireann is pursuing new rail freight business opportunities including the drinks, healthcare, building materials, bio-mass, waste and dairy industries. Any rail lines that could support the development of rail freight in the future, where passenger services do not exist, should be protected in the interim while the business case for that investment is developed.

4 Potential For Future Growth

4.1 Introduction

Ireland's economic future appears good – the economy is in recovery following the recent downturn. As the economy grows, demand for transport also increases in tandem. Rail can play a significant role in meeting this growth in demand for travel and movement of goods and can facilitate a switch to more sustainable patterns of mode choice amongst existing travellers and operators in the transport of goods. If investment in infrastructure is made today, and effective appropriate services are provided. There are four key markets where rail can carry out this role:

- Travel within the major conurbations of Dublin and Cork,
- Travel to cities and large and medium-sized towns from their surrounding commuter hinterlands that are served by rail, and
- Interurban travel between the cities and large and medium-sized towns in the State.
- Rail Freight

4.2 Future trends

National trends show:

- The State is increasingly urbanising, i.e. as population grows, a higher proportion of people locate in towns and cities as defined by the CSO. In 2011[15], 62% of the population lived in 'aggregate town areas' i.e. those greater than 1500 population, a rise of 2.2% since 2006;
- The population is living longer, and enjoying a more active and healthy period of retirement. This trend will increase the demand for travel by this cohort of the population;
- The policy of increasing specialisation of healthcare facilities is being followed within the State, leading to an increase in the demand for travel for healthcare purposes;
- Tourism is growing, both in absolute numbers of overseas and domestic visitors and the sector's contribution to the national economy. The characteristics of tourists are also changing, with an increase in the proportion of independent tourists who often visit more than one location during their stay, and have a higher propensity to use public transport while travelling internally in Ireland;
- As trip length increases, the mode share of travel undertaken by public transport increases, perhaps due to worsening road traffic congestion and scarce and costly parking at some types of destinations, in addition to the stress of driving in unfamiliar surroundings;
- An increase in the regionalisation of employment, i.e. the location of new investment by FDI entities in areas outside the GDA to contribute to the achievement of balanced regional development;
- There has been an increase recently in applications from commercial bus operators for licenses to operate services between cities and large towns outside the GDA to meet

[15] 2011 Census data being used as detailed 2016 Census data not yet available

demand for transport between these locations, indicating an increase in the diversity of the pattern of demand for travel nationally.

These trends indicate an increase in the diversity of travel pattern and future need for transport. Rail services need to be revised and updated to stay relevant to these new needs.

4.3 Proposed Measures to Improve Rail Services

The following measures which have significant potential to increase patronage on rail should be progressed where appropriate. Similar measures to those in the domain of service development have been implemented in several bus markets throughout the State over recent years. These have been in the main successful and have significantly increased patronage, particularly in cities and towns.

1. *Improve the frequency of service* so as to increase the utility offered by rail across a diverse range of needs and person-types, thereby increasing the likelihood that people will consider rail when planning a trip. This applies especially when travel during interpeak periods, the evenings, at weekends, in groups / families and in directions counter to traditional peaks is being planned – particularly in towns within the commuter belts of Dublin and other cities. Plans to increase the frequency of DART services to 10 minute headway during the core operating week should be progressed;

2. *Targeted reduced fares* to become more competitive with alternative modes of travel available for the same journey, especially targeting groups / families;

3. *Offer interoperable tickets* to maximise passenger utility from the public transport network;

4. *Increase the length of the core operating day* to better address the needs of discretionary travellers, especially at weekends and during the summertime. This is particularly important when targeting the market for travel to cities from towns within their commuter belts. Timetables for the planned suburban rail services via the Phoenix Park tunnel approach to Dublin City Centre will be assessed to ensure that the principles set out here are incorporated;

5. *Standardise train stopping patterns* to more accurately reflect the importance of large towns and cities as attractions in their regions and nationally, and to develop transport hubs in the network where interchange can be facilitated for those making less popular, indirect journeys. This will make reading the network more intuitive and comprehensible by visitors and those planning less popular trips;

6. *Develop direct train-paths* for less popular trips between larger towns and cities outside the GDA to avoid passengers having to interchange as often and incur long waiting times;

7. *Improve the passenger environment at stations*, in particular at those where interchange is planned to occur and minimise interchange times and penalties;

8. *Enhance rail infrastructure* to better meet operating needs of new improved services, e.g. a targeted approach to the removal of Permanent Speed Restrictions (PSRs), on corridors where the elasticity of demand for travel with respect to speed indicates that an increase in

patronage is likely to accrue as a result of the investment. Further passenger quality and speed benefits will also accrue from investment in electrification of certain intercity corridors[16]. The benefits of providing additional passing points on single track corridors, improved junctions to allow for more train movements, and new stations in urban areas, should be examined. Provide additional infrastructure and services to widen the catchment of rail where appropriate by providing bus access links and operating facilities for buses and taxis at stations, and more car parking facilities;

9. *Re-configure rolling stock* to better meet the accessibility needs of the population travelling on rail;

10. *Market and promote rail* travel in domestic and international markets.

11. *Co-ordinated policy support.* The viability of the railway as a sustainable mode cannot be guaranteed long term by just increased funding and the withdrawal of services from the least well performing sections of the network. The railway needs to be supported by a wide array of policies that facilitates the timely delivery of capacity, mode shift traffic and demand management schemes, effective integration with other modes and the concentration of development adjacent to the railway. It is particularly important in this respect that the role of public transport including the rail network is clearly acknowledged in the National Planning Framework currently under development. It is vital that the trend of dispersed spatial development is arrested in any future planning policy.

4.4 Line Speed and Infrastructure

Passenger demand and elasticity analysis indicates that improving InterCity journey time to at least 2.00 hours on the Cork route and at least 1:30 hours on the Dublin to Belfast, Galway, Limerick and Waterford routes would further strengthen rail as an option for such connections, and will bring a high level of consistency and transparency to the network. Measures to improve journey times on these routes were considered and for a relatively small investment, journey time gains can be delivered in the short term, which go some way towards achieving the targets outlined above. Longer term, given the focus of transport policy on the promotion of sustainable development, electrification of the more highly trafficked routes is a key enabler of achieving the competitive journey times outlined above.

On the IÉ network, each railway route/line is assigned a Maximum Line Speed Limit. Restrictive (i.e. less than line speed) Permanent Speed Restrictions (PSRs) are imposed for specific infrastructural and operational reasons.

A high level Technical Review of the Permanent Speed Restrictions (PSRs) on the IÉ Network has been undertaken with a view to identifying the opportunities for removing these PSRs and also for increasing line speeds beyond their current designation, with a particular focus on 100mph running. The review considers the line speed and restrictions with respect to the complexity associated with their removal, the estimated cost and a realistic timeframe that can be achieved for each.

[16] Appendix 3 – Potential for Future Growth from investment in Rail Infrastructure, IÉ, May 2016.

It also provides details of the journey time improvements that can accrue from undertaking this work. It is then possible to quantify the increased passenger demand resulting from journey time elasticities and determine the associated potential for revenue growth.

The methodology adopted was to undertake a high level review of each main radial route so as identify potential opportunities for line speed improvements with an approximate cost and journey time saving in each case. Assumptions with regard to general track maintenance are that the AECOM funding review incorporates and includes improvements such as ballast cleaning and rail/sleeper renewals. Capital projects are identified separately.

Ultimately this provides a high level review of current restrictions on the network and establishes a time-lined and costed review of each route along with the potential journey time that can be made from eliminating the restriction.

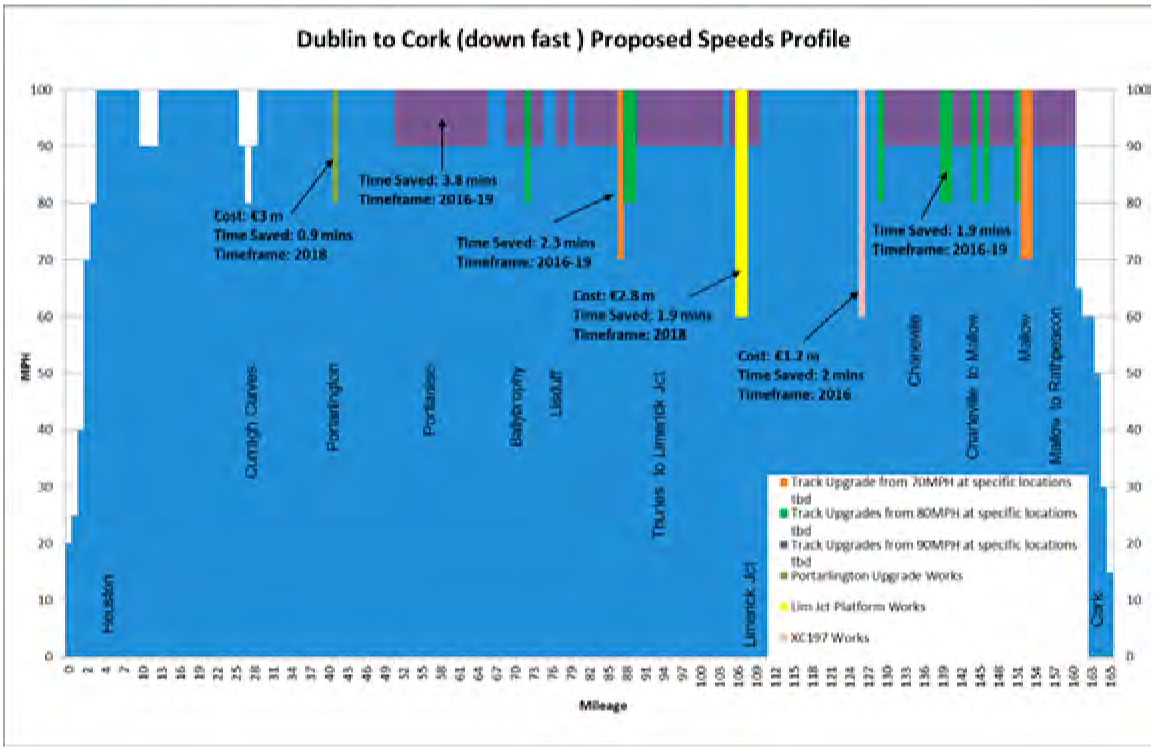
Based on the AECOM demand model, the journey time elasticity improvement can be converted to increased passenger demand and associated growth in revenues.

The scope of the review covers the following routes: Cork, Limerick, Kerry, Belfast and Galway.

A summary by route is outlined below:

Route	**Incremental Capital Cost (€m)**	**Time saving (mins)**	**Annual Revenue (€m) Increment**
Cork	€5.8	14	€2.4
Limerick	-	11	€1.0
Kerry	-	20	€0.8
Belfast	-	10	€0.4
Galway	€8.6	17	€1.8
Totals	€14.4		€6.4

The profile below presents an illustration for the Dublin to Cork route which clearly highlights the speed improvements relative to various initiatives;



In conclusion, short term journey time improvements as a result of steady state investment as per AECOM analysis, together with modest additional capital expenditure of €14.4m, generates an additional €6.4m annual revenue. This capital expenditure includes Limerick Junction platform, Portarlington (PSR) and a number of initiatives on the Galway route. The Belfast journey time improvements result from general track maintenance south of the Border and the impact of ballast cleaning in the North by NIR.

Electrification of Dublin – Cork/Belfast/Galway will deliver significant journey time savings and yield significant returns. The economic return to electrification depends on the timing of the investment. If this investment were to take place in the near future when the current fleet of InterCity carriages are all still within their useful life, the relevant costs of electrification would include the full cost of a new electric fleet (EMUs), and the investment would not be justified. However, if electrification is postponed until the current fleet is being replaced, the relevant capital cost of electrification would be limited to the cost of the civil works needed to the line. This would make electrification an attractive investment at that juncture. This strategy becomes an option from 2025.

4.5 Strategic Network Developments

In the context of emerging economic growth and the importance of the rail network for the greater Dublin area it is essential that the proposed DART expansion programme be pursued as a priority as a key element of the Government's current capital plan. This programme, including the DART Underground 'missing link' connection in the city centre, is a key element of the NTA strategy for the Greater Dublin area. It is recognised as vitally important to improving local, regional and national access to the capital and to contributing to the national climate change targets through significant modal shift from the private car. The scope of the DART Underground is currently under NTA and Iarnród Éireann review to investigate the potential for optimisation and acceleration. The review is scheduled for completion by mid-2017. A further delay in implementing the programme will contribute to unsustainable development patterns in the greater Dublin area in the absence of an early commitment to a network of high capacity public transport connections to the city centre and between key suburbs. The funding for Strategic Rail Investment is not considered in detail in this review.

5 Financial Situation

This Chapter sets out the financial position of Iarnród Éireann as follows:

- Overview;
- Financial history 2007 to 2015;
- Current funding and funding requirements.

5.1 Overview

For the period 2007 to 2015 Iarnród Éireann has incurred accumulated losses of €150m despite delivering €76m in cost savings in the same period. A further €11m loss is forecasted for 2016. The accumulated losses were incurred primarily as a result of reduced exchequer funding and falling passenger numbers. Furthermore, despite the capitalisation of intercompany loans in 2009 and 2010, the solvency of the company remains a major concern due to the accumulated losses and the deterioration of shareholder funds. The company cannot incur further losses as it will become insolvent.

This unsustainable level of funding has resulted in the deterioration of the infrastructure asset, giving rise to increased safety risks and unacceptably high commercial risks to the various revenue streams. Iarnród Éireann has estimated the potential impact in financial terms of a deteriorating asset. It is estimated that each 10-minute deterioration in intercity journey times, could reduce customer satisfaction, leading to a €4.9m reduction in fare revenue.

The continued underfunding of the Infrastructure Manager has resulted in a significant funding gap. The annual steady state funding required to maintain the rail network, continues to increase as a result of delayed maintenance due to a lack of appropriate funding and tender price escalations. The annual steady state funding requirement has increased from €247m in 2011 to €276m in 2016, and will continue to increase as long as the Infrastructure Manager continues to be underfunded.

Iarnród Éireann has experienced a return to growth in all business areas in 2015 including Rosslare Europort which contributes circa €3m p.a. to Iarnród Éireann's operating result. This contribution is used to cross subsidise the activities of the rail network. The purpose of this chapter is to highlight the escalating funding gap and the detrimental impact this unsustainable level of funding is having on the company's financial viability and solvency.

5.2 Financial History 2007 to 2015

Revenue

During the period 2007 to 2015, total revenue of which passenger revenue is the largest proportion, fell from €230.9m (2007) per annum to €185.6m (2011) per annum. Total revenue has increased from 2013 onwards, with marketing activity and sales initiatives contributing significantly. The continued improvement in the macro economic climate has also been a major factor in revenue and passenger growth.

Public Service Obligation (PSO) Subvention and Infrastructure Management Multi Annual Contract (MAC) Funding

Most rail passenger businesses in Europe are supported through PSO, and Iarnród Éireann is no exception. The PSO payments for 2015 have reduced by €96.7m (49.6%) since 2007, this has had a detrimental impact on the company's balance sheet to the point where it is no longer possible to incur losses in the future without crystallising insolvency.

*one time PSO payment of €30.6m received in 2012

The Infrastructure Manager has not received sufficient funding to complete a programme of infrastructure maintenance and renewals in line with the required funding levels as set out in the AECOM report and to adequately provide for the IM's obligations regarding closed and abandoned lines as set out in Appendix 3. As a result, a significant backlog of maintenance and renewal activity has built up. Consequently, the steady state funding required for maintenance of the network has increased from €247m per annum (AECOM, 2011) to €276m per annum (AECOM, 2016) due to growth in the funding gap over the last six years. This unsustainable level of funding has resulted in the ongoing deterioration of the infrastructure asset, giving rise to increased safety risks and unacceptably high commercial risks to the various revenue streams. The focus has been on reactive maintenance as opposed to timely renewals of the asset which results in higher life cycle costs. Essential signalling issues have arisen on the network with the acute issue at Cherryville junction only resolved by supplementary funding being received. Iarnród Éireann's level of spending is below any reasonable benchmark figure, for example Iarnród Éireann's spend is 33% below the levels allowed for in Scotland.

Passenger Journeys

Passenger journeys increased by 32% from 2002 to 2007, however since then they have fallen by 19.3% (8.8m) from 45.5m in 2007 to 36.7m in 2013. The reduced journeys can be attributed to the economic downturn. Passenger journeys bottomed out in 2012/2013 and have increased year on year since then, although still 12.7% below the peak in 2007. The growth in passenger numbers is likely to continue in 2016 and future years as long as the level of rail service matches demand. There are capacity issues which can only be resolved through the provision of additional fleet. The funding required to meet the additional fleet required is approximately €88mfor the period 2017 to 2021. Additional funding will be required beyond 2021 to meet the estimated total cost of €106.4m.

Expenditure

Notwithstanding the increased costs from new lines opened since 2007, new rolling stock and heavy maintenance depreciation, and a carbon tax levy, the operational cost base reduced by €75.7m. Additional supplementary funding provided in 2014 and 2015 resulted in a small increased expenditure on previously deferred asset renewal works.

Shareholder Funds

Despite the reduction achieved in the cost base and the capitalising of intercompany loans the combined effect of reduced revenue and PSO monies have seriously impaired shareholder funds, which at the year-end 2015 represent 22.6% of called up share capital. Critically, Iarnród Éireann can no longer incur any future losses without crystallising insolvency. This situation needs immediate remediation to avoid a financial crisis.

Current Funding

The current level of funding is unsustainable and is the primary cause for the deterioration of the infrastructure asset. The consequence for underfunding is increased safety risks and unacceptably high commercial risks to the various revenue streams, which in turn runs the risk of the company incurring further losses and entering insolvency.

The table below illustrates the expected deterioration in key performance indicators based on the current funding levels.

Key Performance Indicators	2016	2017	2018	2019	2020	2021
Safety Index (equivalent fatalities)	8.1	8.9	9.7	10.5	11.3	11.3
Service Punctuality	92.5%	91.5%	90.5%	89.0%	87.5%	86.0%
Train Reliability	99.0%	98.5%	98.0%	97.5%	97.0%	96.5%
Delay (minutes)	221,000	234,000	255,000	275,000	295,000	315,000
Overall Customer Satisfaction	90.0%	89.0%	88.0%	87.0%	86.0%	85.0%
Service Value for Money	53.0%	52.0%	50.0%	49.0%	48.0%	47.0%

The impact of the deterioration of the infrastructure asset will manifest by way of increased journey times and decreased service reliability including service cancellations and an erosion of customer confidence. Inevitably this will result in reputational damage leading to significant revenue loss and a decline in customer satisfaction. It is not inconceivable that a journey time deterioration of 10 minutes across our intercity network would occur each year due to asset failure arising from this under investment. This is summarised together with the revenue impact in the table below.

	2016	2017	2018	2019	2020	2021
Journey Time Deterioration (mins)	0	10	20	30	40	50
Revenue Loss (€m)	0	4.9	9.9	14.8	19.7	24.6

Operating risks will also increase as equipment reliability decreases, which will result in increased labour and equipment costs. As the KPI's continue to diminish, costs will escalate and the fall in demand will accelerate. This will have a detrimental effect on the profitability of Iarnród Éireann and in a short period of time will lead to insolvency.

5.3 Appropriate Funding Levels

Providing appropriate funding levels over the next few years will bring the railway infrastructure to a steady state condition by 2030. This will place Iarnród Éireann in a strong sustainable competitive position with improvements across a wide array of KPI's including safety, reliability, punctuality, value for money and customer satisfaction. Growth and operational risks would also reduce significantly and the company will be in a position to respond to the growth in demand for sustainable transport.

Additional Funding Requirement (Infrastructure Manager)

Management, maintenance, and renewals of Railway Infrastructure are funded by the Multi Annual Contract (MAC) and by Access Charges to the TOC. AECOM were commissioned by Iarnród Éireann to identify the level of funding required to maintain the railway infrastructure. AECOM identified the steady state funding requirement to be €247m in 2011. A significant backlog of maintenance and renewal activity has built up due to underfunding since 2011. The steady state funding required to maintain the network has increased from €247m in 2011 to €276m in 2015. The funding gap between the current funding level and the appropriate funding level is illustrated below.

IM Funding Requirement	2017 €m	2018 €m	2019 €m	2020 €m	2021 €m
Funding Required	275.8	275.8	275.8	275.8	275.8
Less MAC and Access Charges (AC)	184.9	185.0	185.1	185.4	185.4
Infrastructure Manager Funding Gap	**90.9**	**90.8**	**90.7**	**90.4**	**90.4**
Less Proposed increase in AC	26.7	26.7	26.7	26.7	26.7
Infrastructure Manager Funding Gap incl. AC	**64.2**	**64.1**	**64.0**	**63.7**	**63.7**

The Essentials Function Body has awarded an increase in access charges from 2016; the total increase in access charges is €26.7m per annum. The access charges were set at the median level in terms of access charges in other European jurisdictions. The above table assumes that the increased access charges is funded and transferred to the Infrastructure Manager from the Railway Undertaking. The Infrastructure Manager funding gap will necessitate the deferral of essential asset renewal works and will require an ever increasing emphasis on reactive maintenance and safety mitigations across all asset categories, (track, bridges, signals, etc.). In turn this will require an increase in temporary speed restrictions (TSR's) and likely sporadic equipment failures will result in an increase in journey times/decreasing service reliability. Operating risks will increase due to the increased level of labour intensive interventions and vulnerability to extreme weather conditions. There will also be an increase in commercial risk due to the deterioration in the quality of interface with the customer and the service unreliability associated with the continuing use of obsolete equipment. There will be revenue implications associated with this. Ultimately, in the longer term the funding shortfall will lead to increased asset whole life costs.

Essential Safety Critical Systems

Maintaining and improving on safety standards is of paramount importance for the future of the railway as a viable mode. It is vitally important in this respect that adequate and timely funding provision is made for the upgrading and replacement of safety critical control (NTCC, train protection ATP / CAWS) and communications (GSM-R) systems. It is also important that funding be made available to address on a priority basis the higher risk railway crossing interfaces. While safety will continue to be managed, safety standards will be compromised due to the deferral of investment in these safety critical systems which would require a greater level of human interventions. Adequate provision needs to be made for these in the IM's multi-annual contract. In this respect the closing of the funding gap and certainty of funding for the MAC over a multi annual period is a key EU regulation issue that needs to be addressed if the correct and cost effective balance is to be achieved between timely renewal and reactive maintenance. Heretofore funding is only assured on an annual basis with indicative figures for future years subject to change. Failure to upgrade the control and communication systems could, as has been the case elsewhere, expose Iarnród Éireann to the unacceptable risk of serious collisions on single lines.

Additional Funding Requirement (Train Operator)

While Essential Functions Body has awarded an increase in access charges as outlined above, it has to be paid by the Railway Undertaking (Train Operator). This can be funded by either additional PSO or additional fare revenue generated by volume growth and/or increases in fares or a combination of both.

It is envisaged that the Train Operator will generate additional revenues in the long term to facilitate the increased access charges although this is dependent on an aggressive revenue growth plan. However there is a shortfall for a number of years which will have to be funded through the PSO Contract.

Passenger Revenue is projected to grow from a forecast €190.6m in 2016 to €221.2m in 2021 with passenger journeys growing from 41.4m to 46.1m over the same period. This equates to a compound annual growth rate of +3.2% which exceeds growth projections for economic indicators including domestic demand and levels of employment. Revenue growth comprises of a number of key drivers including improved macro-economic environment, fare increases (CPI), segmental marketing activity and benefits from the Customer First project from 2016.

Risk to Revenue

With an unsustainable level of infrastructure investment, there is a high level of commercial risk associated with achieving the aggressive demand and revenue projections outlined above. This commercial risk arises due to significant deterioration across a number of key performance indicators identified under current funding.

Growth

Volume growth in passenger journeys will require an urgent investment in fleet and services. Passenger journeys are expected to increase by 4.7m (11.4%) from 2016 to 2021. These increases in demand particularly at peak times and coupled with the proposed introduction of new services for the Phoenix Park Tunnel have resulted in the requirement to re-introduce fleet which was previously retired. The operational DART fleet has also increased by 12 vehicles to facilitate the planned increase in frequency to every 10 minutes. There are a significant number of outer Commuter and Intercity services which are currently approaching or exceeding capacity.

The potential for capacity demands to return to 2007 levels is fast becoming a reality; however the fleet currently available to meet this demand is far less than was available in 2007. The fleet requirements are outlined in the Iarnród Éireann Fleet Strategy and the level of investment (€88m out of a total cost of €106.4m) for the next 5 years is illustrated in the table below (Additional Funding).

Reasonable Profit
Under EC Regulation 1370/2007 Iarnród Éireann are entitled to make a reasonable profit. Reasonable profit is currently estimated to be approximately €3.5m per annum by the NTA. This is not included in the funding gap.

Heavy Maintenance
Iarnród Éireann have funded heavy maintenance costs of €35m per annum from own resources or through a Capital grant from the NTA, the cost of depreciation relating to heavy maintenance funded from own resources has been charged to PSO. This remains unfunded and is now included in the funding requirement for the Railway Untertaking.

Total Additional Funding Required
Providing the appropriate level of funding for Iarnród Éireann will deliver a vastly improved rail network and significant improvements in service and safety KPI's. Increased fleet capacity will enable Iarnród Éireann to provide additional services and meet additional capacity requirements, which in turn will contribute to revenue growth.

The table below adds all the funding requirements together for the Infrastructure and Railway Undertaking business within Iarnród Éireann as follows:

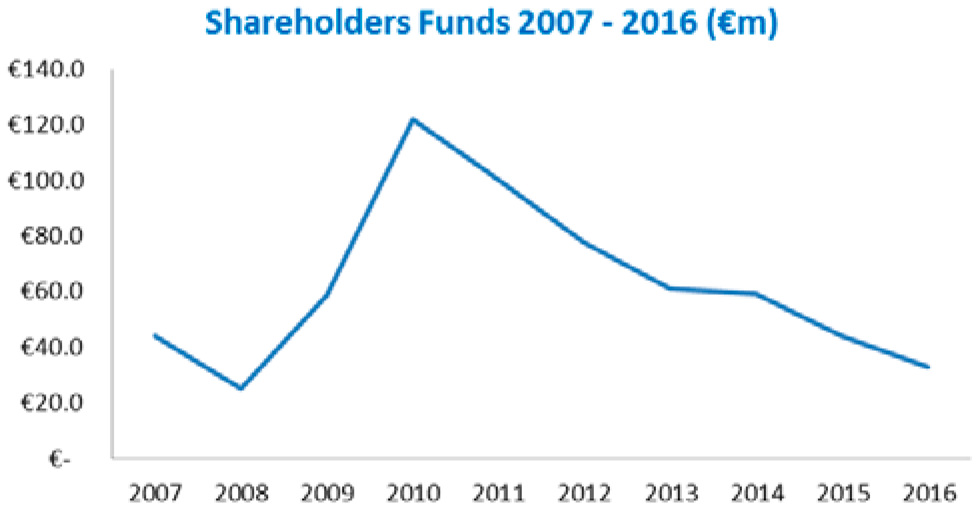
Additional Funding Required:	**2017 €m**	**2018 €m**	**2019 €m**	**2020 €m**	**2021 €m**
Infrastructure Manager					
Steady State Funding (AECOM)	64.2	64.1	64.0	63.7	63.7
Train Operator					
Shortfall from Track Access Charge Increases	7.2	2.7	4.2	3.2	4.7
Fleet Heavy Maintenance	35.0	35.0	35.0	35.0	35.0
Reduced PSO	(3.5)	(10.5)	(17.5)	(24.5)	(31.5)
Train Operator Additional Funding	**38.7**	**27.2**	**21.7**	**13.7**	**8.2**
Unfunded Capital					
Urgent Growth Measures (Fleet)	-	25.4	27.4	16.0	18.7
Total Additional Funding	**102.9**	**116.7**	**113.1**	**93.4**	**90.6**

5.4 Fleet

The Authority has also included a funding requirement to refurbish some fleet to bring back into service and purchase new fleet to meet the expected growth in passenger demand.

5.5 Financial Overview

The company is projected to have retained losses of €161m by the end of 2016. Underfunding of the railway has resulted in spending levels running ahead of revenue for a number of years. This has been facilitated by debt through the parent company. The net result of this practice has been to weaken the balance sheet to the point where it is not possible to incur any losses in the future without risking insolvency. It is not feasible or acceptable to allow Net Assets of the company fall beyond the current level; this view is shared by the Board of Iarnród Éireann. The balance sheet cannot sustain any unexpected financial shock. The table below illustrates the impact of the underfunding on shareholder funds.



The continued under funding of Iarnród Éireann and the weak balance sheet need to be addressed as a matter of urgency. Potential solutions to address these concerns are detailed in the following chapter.

6 Possible Funding Solutions

6.1 Introduction

The two areas of concern identified in Chapter 5 are:

1. The operational funding gap between current funding levels and appropriate funding levels for the Infrastructure Manger (€64.2m in 2017 reducing to €63.7m in 2020) and the Train Operator (€52.6m in 2018 reducing to €26.9m by 2021).
2. Iarnród Éireann's weak balance sheet and critical solvency concerns issue. The additional funding outlined in Chapter 5 excludes the compensation for underfunding 2010 - 2016. The funding required for the restoration of shareholder funds is identified in table 6.3 and outlined in detail in section 6.4.

6.2 Existing Projected Funding Gap

As identified in the previous chapter, the projected funding gap from 2017 to 2021 is illustrated in the table below:

Additional Funding Required:	2017 €m	2018 €m	2019 €m	2020 €m	2021 €m
Infrastructure Manager					
Steady State Funding (AECOM)	64.2	64.1	64.0	63.7	63.7
Train Operator					
Shortfall from Track Access Charge Increases	7.2	2.7	4.2	3.2	4.7
Fleet Heavy Maintenance	35.0	35.0	35.0	35.0	35.0
Reduced PSO	(3.5)	(10.5)	(17.5)	(24.5)	(31.5)
Train Operator Additional Funding	**38.7**	**27.2**	**21.7**	**13.7**	**8.2**
Unfunded Capital					
Urgent Growth Measures (Fleet)	-	25.4	27.4	16.0	18.7
Total Additional Funding	**102.9**	**116.7**	**113.1**	**93.4**	**90.6**

6.3 Potential Solutions to Resolve the Funding Gap and Solvency Concerns

There are three broad possible solutions for resolving the day to day funding gap and the more long-term under-investment in the maintenance of assets.

1. **Increased exchequer grants to eliminate the funding gap and solvency concerns**

This would require the Exchequer to provide all the funds to ensure solvency and adequately maintain the assets resulting in a maximum increase in funding of €116.7m in 2018 reducing to €90.6m by 2021. Compensation for losses incurred over the contract period 2010 to 2016 for the provision of transport services is required to ensure solvency which adds €41.7m for each of the years 2017, 2018 and 2019. The details are outlined in section 6.4 and illustrated below:

Funding to address solvency/under-compensation in previous years:	2017 €m	2018 €m	2019 €m	2020 €m	2021 €m
Funding Gap	102.9	116.7	113.1	93.4	90.6
Compensation for Underfunding 2010 to 2016	41.7	41.7	41.7	-	-
Total Additional Funding	**144.6**	**158.4**	**154.8**	**93.4**	**90.6**

The additional funding required excludes reasonable profit. Under EC Regulation 1370/2007 Iarnród Éireann are entitled to make a reasonable profit which is currently estimated to be approximately €3.5m. Compensation for losses incurred before 2010 are excluded as they were incurred outside the term of the current transport services contract.

2. Network reduction and sufficient line closures to eliminate the funding gap

Assuming no extra Government funding is provided, the operational funding gap would have to be eliminated through large rail network reductions. This will require the closure of the majority of the rail network leaving only the following services:

- **DART** (current underfunding based on AECOM steady state funding is €0.70 per passenger journey);
- **Dublin and Cork commuter services** (current underfunding based on AECOM steady state funding is between €5.10 and €12.20 per passenger journey);
- **InterCity services from Dublin to Cork, Belfast and Limerick** (current underfunding based on AECOM steady state funding is between €8.70 and €26.00 per passenger journey).

Apart from the length of time it would take to implement, such a level of network reduction and line closures would incur substantial additional costs in targeted Voluntary Severance if, indeed, such a large-scale reduction in the organisation could be achieved solely through a Voluntary Severance scheme.

3. Possible median solution to eliminate the funding gap and solvency concerns

A possible solution which integrates some line closures and additional Exchequer funding has been developed during the Rail Review to eliminate the operational funding gap.

There are a number of components to a median solution including:

- Additional Government funding;
- Free Travel Scheme;
- Network reductions.

These potential measures are set out below.

Additional Government Funding

The additional funding required to eliminate the funding gap and to repair the balance sheet ranges between €158.4m in 2018 and €90.6m in 2021. The additional funding requirement can be reduced by implementing the measures detailed below.

Free Travel Scheme

The Department of Social Protection (DSP) pays CIE in respect of the Free Travel Scheme (FTS). CIE in turn allocates this payment to the three group companies. Despite an increase in passenger journeys from 3.9m in 2009 to 4.6m in 2016 IÉ's annual payment from the scheme has remained at €14.6m since 2009. Based on ageing population trends, it is expected that FTS passenger journeys will continue to increase to 5.1m by 2021, based on a conservative annual growth rate of 1.5%,

FTS passenger journeys now represent 11.6% of all passenger journeys, while FTS passenger revenue represents only 7.5% of total passenger revenue. It is no longer viable that Iarnród Éireann continue to subsidise free travel. Prior to the freeze of FTS funding at 2009 levels, funding was matched to general fare increases. It is now proposed that FTS funding is increased by €5.9m to reflect the increased usage of 27% since 2009 and that the relationship to general fare increases is reinstated to close the funding gap.

Network Reductions

Iarnród Éireann has worked with Roland Berger to produce an analysis of 2015 revenue and expenditure performance across the rail network. For this analysis, 17 routes were identified. The analysis provides the cash per journey required to breakeven for each of the 17 routes by identifying the total cash costs less revenue divided by the passenger journeys on the route. For clarity all government subvention, capitalisation, depreciation and exceptional costs were excluded.

In addition to the actual results for 2014 and 2015, the cost per route after applying the cost to maintain the railway infrastructure to an acceptable steady state condition (per AECOM) was included.

While there was an improvement in performance for the majority of the routes in 2015 as a result of strong revenue growth and a positive contribution from cost reductions, four routes performed poorly. The four poorest performing routes were:

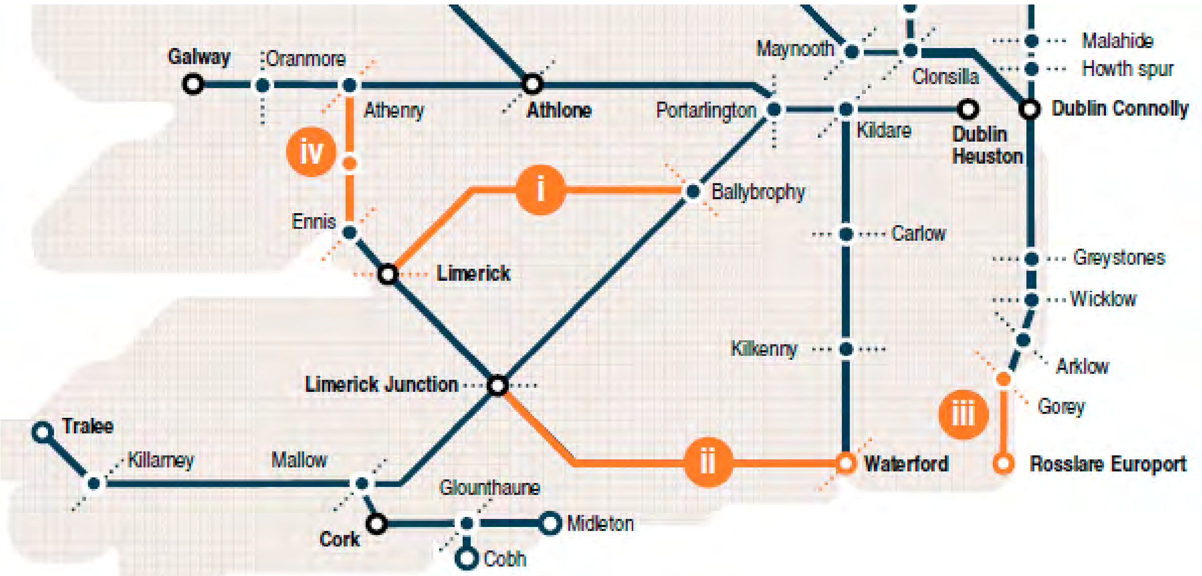
Cash Cost per Passenger Journey to Breakeven:	Actual 2014	Actual 2015	Steady State
Limerick - Ballybrophy	-€417.2	-€551.9	-€761.6
Limerick Junction - Waterford	-€360.2	-€362.4	-€491.5
Limerick - Galway	-€55.0	-€44.0	-€68.1
Dublin - Rosslare	-€30.8	-€29.1	-€39.6

Following on from the overall analysis of the breakeven level of subvention required per route, the four routes/line segments were analysed further to establish the level of revenue and costs that would cease if network changes were made. The criteria adopted for selection of possible route/line segment closures included the following:

- Recognising the need to maintain commuter services to support growth in the Greater Dublin Area and Cork;
- Retaining the Intercity Network, i.e. Dublin to Cork, Galway, Limerick, Waterford and Belfast;
- Focussing on impacting the fewest number of passengers;
- Focussing on those passenger journeys which have the highest net costs deducting fare revenue.

The routes/line segments were examined purely in financial terms and not on their potential to meet travel demands or other policy objectives in the future.

The routes/line segments selected are illustrated in the map below:



These projections are an initial view of the commercial impact of network changes to these four routes/line segments. Costs which are shared with other routes are not assumed saveable nor are any central costs included in these projections. Implementation costs have also been excluded. Therefore the cost saving per passenger journey is lower than the cash cost to break even because some of the central overhead costs remain if a line is closed. The results are illustrated below:

Route/Segment Closure:	Cost Savings per Passenger Journey	Passenger Journeys per Annum	Cash Improvement per Annum €k
Limerick - Ballybrophy	€225.40	22,856	5,151
Limerick Junction - Waterford	€146.30	35,018	5,123
Ennis - Athenry (Limerick - Galway)	€27.90	102,442	2,858
Gorey - Rosslare (Dublin - Rosslare)	€25.20	177,326	4,476
			17,608

The earliest possible date for implementation of route/line segment closures is assumed to be the beginning of 2018. Implementation costs, lost revenues and expenditure savings have been projected out to 2021 and illustrated below:

Projected costs and savings from line closures	2017 €m	2018 €m	2019 €m	2020 €m	2021 €m
Implementation costs	-	11.80	11.80	0.00	0.00
Bus substitution costs	-	0.80	0.80	0.80	0.80
Revenue lost	-	2.50	2.50	2.50	2.50
Expenditure savings	-	(14.20)	(19.80)	(19.80)	(19.80)
Total Cost/(Savings)	**-**	**0.90**	**(4.70)**	**(16.50)**	**(16.50)**

The funding gap will be reduced by a minimum of €16.8m should the option to close these four routes/line segments be considered. Costs which are shared with other routes are not assumed as saveable nor are any central costs included in the above projections.

Exchequer Funding

Implementing the route/line segment closures and the increased FTS funding would reduce the funding gap. The details are illustrated below:

Median Solution	2017 €m	2018 €m	2019 €m	2020 €m	2021 €m
Existing Gap	144.6	158.40	154.80	93.40	90.60
Potential Solutions					
Line Closures	-	0.90	(4.70)	(16.50)	(16.50)
FTS Funding Increase (excl. future fare increases)	(5.90)	(6.00)	(6.10)	(6.20)	(6.30)
Remaining Gap to be funded by the Exchequer	**138.7**	**153.30**	**144.00**	**70.70**	**67.80**

The reduction in the network proposed as a median solution only contributes a small amount to bridging the funding gap. The Ennis to Athenry section of rail line should only be considered for closure after a full review is carried out of the extension of the Western Rail corridor and when the National Planning Framework has been published. Similarly the Gorey to Rosslare line closure would impact on a large number of passengers. The Authority proposes a strategic review with Transport Infrastructure Ireland on how growth in travel demand along the M/N11 corridor can be met in the future. It is recommended that no reduction in service on this section of track be considered at this time.

However the Limerick-Ballybrophy and Limerick Junction-Waterford sections of track should be considered as part of the median strategy.

6.4 Balance Sheet

The company is projected to have retained losses of €161m by the end of 2016. Underfunding of the railway has resulted in spending levels running ahead of revenue for a number of years. This has been facilitated by debt borrowing through the parent company. The net result of this practice has been to weaken the balance sheet to the point where it is not possible to incur losses in the future without crystallising a solvency problem. It is not feasible to allow Net Assets of the company fall beyond their current level. The balance sheet cannot sustain any unexpected financial shock.

Restoration of Shareholder Funds

The options available to repair the balance sheet include:

- **A new issuance of share capital.** Shareholder funds as a percentage of called up share capital will continue to be significantly less than 100% due to accumulated losses.
- **A once off funding payment.** This would represent compensation for losses which were incurred in the period 2010 to 2016, the forecasted accumulated losses for the period 2010 to 2016 are €125.1m. The current contract ends in 2019, payments to reverse the accumulated losses incurred since 2010 could be split over the next 3 years at €41.7m per annum. This would restore shareholders' funds and resolve the solvency issues faced by Irish Rail.

7 Conclusions

This report is the outcome of a review process, undertaken by the NTA and IÉ, to appraise and evaluate possible solutions to Iarnród Éireann's financial requirements under a number of funding scenarios as requested by the Department of Transport, Tourism and Sport (DTTAS, the Department). The purpose of this review is to brief key stakeholders of the critical financial challenges facing Iarnród Éireann today, secure agreement on how best to resolve and thereby to deliver a vastly improved rail network including significant improvements in service level and safety KPI's.

The underfunding of Iarnród Éireann cannot continue indefinitely. The Infrastructure Manager has accumulated a significant backlog of maintenance and renewal activity and the steady state funding required for maintenance of the network has increased from €247m p.a. as calculated in 2011 to €276m p.a. as calculated in 2016. The Infrastructure Manager funding gap necessitates the deferral of asset renewal works and will require an ever increasing emphasis on reactive maintenance across all asset categories, (track, bridges, signals, etc.). In turn this will require an increase in temporary speed restrictions (TSR's), and sporadic equipment failures will result in an increase in journey times/decreasing service reliability. This has significant repercussions for the profitability and viability of Iarnród Éireann.

The Train Operator cannot continue to subsidise PSO through commercial activities, and the fleet heavy maintenance costs must be funded by the Exchequer. The Train Operator is approaching full capacity on its fleet and is close to exhausting all avenues to provide additional capacity. Increased fleet capacity is required to enable Iarnród Éireann to provide additional services and to meet increased customer demand into the future. This in turn will contribute to revenue growth and an increased contribution by the railway to more sustainable development and environmental improvements.

A short window of opportunity to repair the balance sheet exists. Iarnród Éireann can be compensated for losses incurred due to underfunding since 2010. However once a new public services contract is signed in 2019, the legacy losses can no longer be funded through the public service contract. Iarnród Éireann will be restricted to reasonable profit under Regulation 1370/2007. Alternatively it would require in excess of 30 year's reasonable profits to restore shareholder funds to a reasonable level.

The review has focussed on the financial aspects of the operation and maintenance of the rail network. However the rail network plays a key role in the economic and social life of the country. The review also predates the conclusion of the National Planning Framework and the National Mitigation Plan to address the states obligations to meet reductions in carbon emissions.

The long term sustainability of the rail network and the financial health of Iarnród Éireann will require the timely delivery of the DART expansion programme in the greater Dublin area in order to improve local, regional and national access to the capital. This major rail development should in turn be supported by a wide array of effective policies to encourage modal shift to integrated public transport solutions and to concentrate development adjacent to high capacity public transport services.

Appendices

Appendix 1: Overview of the Rail Network – services and patronage

Appendix 2: The Role of Rail – towards a national policy

Appendix 3: Advisory note on abandoned and closed lines

Appendix 4: Meeting the capital investment requirements

Appendix 5: Fleet Strategy

Appendix 6: Route Profitability

Appendix 7: Line Segment Analysis

Appendix 8: Potential Alternative Service Provision

Appendix 9: Financial Reconciliation to Five Year Plan

Údarás Náisiúnta Iompair
National Transport Authority

Rail Review 2016

APPENDICES TO REPORT

August 2016

Údarás Náisiúnta Iompair
National Transport Authority

Iarnród Éireann
Irish Rail

Appendix 1

August 2016

An Overview of the Rail Network, Services and Patronage

Údarás Náisiúnta Iompair National Transport Authority

Iarnród Éireann Irish Rail

Contents

1.0 Introduction

The following provides an overview of the existing rail network in Ireland, the services that operate on it and the function that it provides in meeting current travel demand. This includes a consideration of existing rail patronage as indicated by the National Rail Census 2015.

2.0 The Existing Network and its Services

2.1 Overview of the Rail Network

The rail network in Ireland comprises approximately 2,400 km of railway track, of which approximately 1,660 km is currently active, and includes 147[1] passenger stations and 372 platforms[23]. The population of all of the settlements with a rail station is approximately 233, 8053[4] – representing approximately 50% of the national population.

It also comprises 5,100 bridges, 1,240 level crossings, over 4,900 cuttings and embankments and 14 tunnels.

The railway is mainly single track, with 886km of double track and 60km of multiple track.

The network includes main lines, Dublin suburban and commuter passenger routes, Cork Suburban routes, together with freight-only routes. The majority of the network is comprised of radial lines focused on Dublin. The network largely provides for inter-urban connections providing strategic transport links at the national level between the six key cities on the island Dublin, Cork, Galway, Limerick, Waterford and Belfast as well as linking to smaller cities and large towns which have strong regional functions in particular Sligo, Tralee, Wexford (See Figure 1 overleaf).

Intra-urban rail is also extensive within the Dublin Metropolitan area with the addition of DART to the main network (See Figure 2 overleaf) providing the core high capacity network that is central to the Greater Dublin Area's mass transit system.

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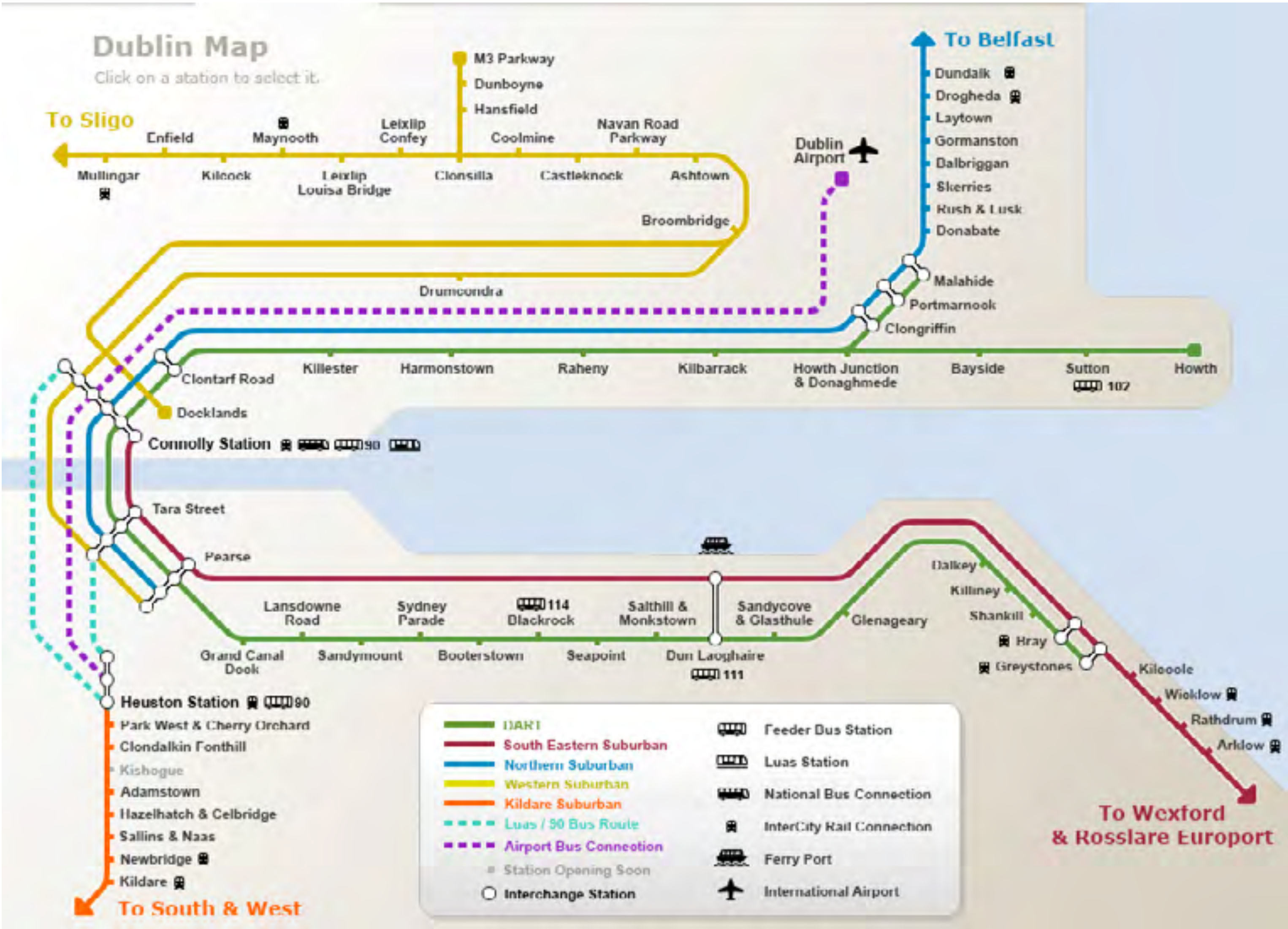
[1] including Manulla Junction which only operates as a transfer point for services to/from Ballina, Hansfield and Kishogue the opening of which is pending and Mosney which currently has no service.
[2] Irish rail Network Statement 2015
[3] see Apendix 1 for breakdown of track lengths and depiction of netowrk configuration
[4] POWSCAR (2011) 'Settlement' populations

Figure 1 Intercity Network

Figure 2 Dublin Network

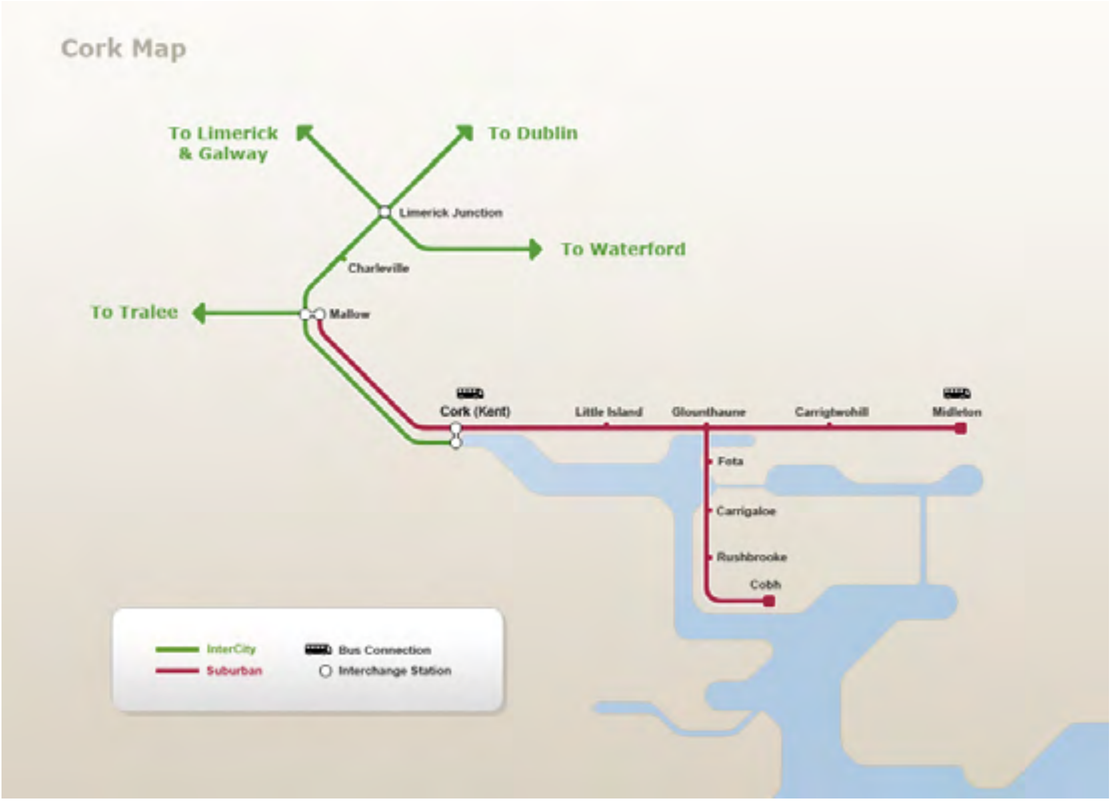


2.2 Description of the Network and Services

The following provides a brief description of the network and its existing services:

- The Northern line - extends from Connolly northwards to Belfast. The line provides an electrified DART service from Malahide and Howth, which is served by a branch spur from Howth Junction, along with diesel commuter services from Drogheda/Dundalk and intercity services linking to Belfast. Including Dublin Connolly there are 8 stations along the mainline as far as the border with Northern Ireland with Dundalk and Drogheda as the main centres of population. The DART serves 13 stations including Connolly along this corridor.
- The South-Eastern Line extends from Dublin City Centre as far as Rosslare Europort providing for electrified DART services as far as Greystones and diesel services further south serving 11 stations outside of Dublin city centre. The main settlements on this line are Wexford, Gorey and Arklow. This line is significantly constrained south of Bray as it is single track with limited passing capacity.
- The Maynooth or Sligo line along operating out of Dublin Connolly provides for intercity services to Sligo with 11 stations enroute. The main intermediate settlements on the line are Mullingar and Maynooth. Diesel commuter services are also provided extending to Maynooth and Longford. A recently constructed branch spur line connects from the main line to Hansfield, Dunboyne and M3 Parkway.
- The Kildare Line runs from Dublin Heuston west as far as Galway. The line provides for intercity services to Galway, Cork, Limerick and Tralee and diesel commuter services operate along this line as far as Portlaoise. Along the Kildare line to Galway there are 12 intermediate stations and the largest settlements served are Newbridge, Athlone and Tullamore.
- The Westport/Ballina line branches off the main Kildare line after Athlone. There are 6 intermediate stations along the line including Manulla Junction which is a transfer point only. The main intermediate settlements served are Roscommon and Claremorris. Ballina is served by a branch spur from Manulla which also serves Foxford.
- The Waterford Line branches off the Kildare Line after Kildare serving 5 additional intermediate stations beyond this point to Waterford City including Kilkenny and Carlow. At Portarlington the Kildare Line also branches and the network expands southwest wards to Cork, Limerick and Tralee.
- Portlaoise line, Westport/Ballina line and the Galway/Limerick line all branch off the Kildare line serving the various regions of the country. The main Portlaoise Line connects to Cork via Limerick Junction. After Portlaoise there are 6 further stations on the line before reaching Cork Kent Station. Portlaoise and Mallow are the main intermediate settlements on this portion of the rail network. After Cork the network extends further with a regional line to Tralee. The Portlaoise line branches further at Ballybrophy into the Nenagh branch line. Including Ballybrophy there are 6 stations along the line before it connects with the Galway-Limerick line between Limerick and Limerick Junction.
- The Galway–Limerick Line runs from Limerick Junction connecting with the main Galway-Dublin line at Athenry. There are 8 stations between Limerick Junction and Galway Ceantt Station including Limerick City and Ennis as the key population centres.
- Limerick Junction is a central interchange point in the network – it is the focal point of the Portlaoise Line (Dublin/Cork/Tralee) and the Galway-Limerick Line, as already described and also of the Limerick Junction-Waterford Line which has 4 intermediate stations. The largest intermediate settlement served is Clonmel.
- The final piece of the national rail network currently in operation is the Cork Suburban Rail Network which consists of line linking from Mallow, through Cork City to Midleton and Cobh, branching at Glouthaune. In total there are 10 stations on the Cork Suburban lines.

Figure 3 Cork Suburban Networks



2.3 Network Developments

The rail network continues to develop and evolve. The table below highlights some of the most recent changes to the infrastructure of the network.

Table 1 Network Changes

Network Changes	Year
Opening of Hansfield Station, Co. Dublin	2013
Opening of Oranmore Station, Co. Galway	2013
New entrance to Pearse Station, Dublin City	2013
Kildare Rail Project, phase 1 (Cherry Orchard-Hazelhatch)	2010
Western Rail Project – Opening Ennis to Athenry	2010
Opening of Cork Commuter Rail	2009

Further work remains to be done and priority issues for tackling, in the context of the Greater Dublin Area have been identified in the National Transport Authority's 'Integrated Implementation Plan 2013-2018'. The Plan underlines constraints on DART and the limited levels of integration between the various rail lines, arising from the nature of historic rail development in Ireland, as central issues. 'For instance, Heuston station, as the key terminal point of several commuter and Intercity services, is remote from the Northern and South-Eastern lines and the overall DART system, requiring, at present, a bus or Luas journey to achieve that connection.'[5]

Further enhancements to the network are envisaged and the objectives set out in the Plan are as follows:

- Develop the Phoenix Park Tunnel Link to bring commuter train services directly from the Kildare line into the heart of Dublin City Centre;
- Eliminate the current train restrictions in the city centre through the completion of the City Centre re-signalling project;
- Protect the safety and reliability of the GDA railway system through investment in upgrading of train control and monitoring systems;
- Continue investment in a level crossing closure programme;
- Enhance customer information systems and ticketing systems;
- Continue the upgrading and enhancement of train stations in the GDA;
- Continue development work on the extension of DART services north of Malahide and westwards to Maynooth; and
- Protect or progress DART Underground in line with the Government's decision on the next national capital plan.

The IÉ Five Year Plan (2016-2021) also includes the establishment of a 10 minute frequency DART service on weekdays as a principal aim. At a national level, the key requirements are a steady state level of infrastructure maintenance and renewal investment, improved journey times between Dublin and the provincial cities and electrification of key elements of the network on a phased basis over the longer term.

2.4 Passenger Rail Services

Various service types operate across the national rail network, in the main they can be broken down into 3 categories – Intercity, Commuter and DART. Different service types share lines (as described above) at various locations across the network and many stations are served by a number of service types, particularly within the GDA.

The range of services currently in operation on the national network is detailed in the tables below - Intercity and Commuter/DART services are set out separately. The line on which each service operates is included as is the number of each service in operation on a typical weekday. This provides a high-level indication of service frequency and underlines the variations in service provision which occur across the network at present.

[5] 'Integrated Implementation Plan 2013-2018', National Transport Authority (2013)

The most frequent services are Commuter and DART services, which tend to be shorter journeys. The most frequent InterCity service is between Dublin and Limerick (direct and indirect services), or between Dublin and Cork (direct).

Table 2 Intercity/Inter-Regional Services

Route/Line	Service	No. Services, (2 directional, Weekday)[6]
Dublin Connolly - Border (NI)	Dublin Connolly - Belfast Central	16
Dublin Connolly - Sligo McDiarmada	Dublin Connolly - Sligo	14
Dublin Connolly - Rosslare Europort	Dublin Connolly - Rosslare/Rosslare Europort	8
Dublin Heuston - Portarlington -Galway Ceannt	Dublin Heuston - Galway	18
Dublin Heuston - Cherryville Junction – Waterford Plunkett	Dublin Heuston - Waterford	14
Dublin Heuston - Cork Kent	Dublin Heuston – Cork/Limerick	29
Dublin Heuston - Portarlingon – Ballybrophy – Limerick Colbert	Dublin Heuston - Limerick	7
Dublin Heuston - Portarlington – Athlone – Manulla Jnt –Westport/Ballina	Dublin Heuston - Westport/Ballina	8
Dublin Heuston - Cork Kent – Tralee Casement	Dublin Heuston - Tralee	2
Limerick Colbert - Galway Ceannt	Limerick-Galway	9
Limerick Colbert - Waterford Plunkett	Limerick-Waterford	4
Cork Kent - Tralee Casement	Cork-Tralee	5

[6] As operated on National Rail Census Day 2015

Table 3 Commuter & DART Services

Route/Line	Dublin Commuter	No. Services, (2 directional, Weekday)[7]
Dublin Heuston – Cork Kent/Galway Ceannt	Dubin Heuston - Portlaoise	37
Dublin Heuston – Cork Kent/Galway Ceannt	Dublin Heuston - Newbridge	7
Dublin Heuston – Cork Kent/Galway Ceannt	Dublin Heuston - Kildare	2
Dublin Heuston – Cork Kent/Galway Ceannt	Dublin Heuston - Athlone	3
Dublin Connolly – Sligo McDiarmada	Dublin Connolly/Pearse - Longford	4
Dublin Heuston –Cherryville Junction – Waterford Plunkett	Dublin Heuston - Carlow	3
Portarlington – Galway Ceannt	Galway - Athlone	2
Dublin Connolly – Sligo McDiarmada	Dublin Connolly/Pearse/Bray - Maynooth	62
Dublin Connolly - Docklands Line	Dublin Connolly/Docklands - M3 Parkway	19
Clonsilla - M3 Parkway	Clonsilla - M3 Parkway	22
Dublin Connolly – Border (NI)	Dublin Connolly/Pearse/Bray - Dundalk	14
Dublin Connolly – Border (NI)	Dublin Connolly/Pearse/Bray - Drogheda	36
Dublin Connolly – Border (NI)	Dublin Connolly - Newry	1
	Cork Commuter	
Cork Kent-Cobh (Cork Suburban)	Cork - Cobh	46
Cork Kent-Midleton (Cork Suburban)	Cork-Midleton	44
Dublin Heuston – Cork Kent	Cork-Mallow	14
	Other Suburban/Commuter	
Limerick Colbert – Galway Ceannt	Limerick-Ennis	9
Limerick Colbert – Galway Ceannt	Galway-Ennis	1
Dublin Heuston – Portarlington -Galway Ceannt	Athenry-Galway	4
Ballybrophy – Limerick Colbert	Limerick-Ballybrophy	4
Ballybrophy – Limerick Colbert	Limerick-Nenagh	1
DART	Dublin Connolly/Pearse-Greystones-Malahide/Howth	157

[7] As operated on National Rail Census Day 2015

2.4 Rail Freight

Freight terminals at Ballina, Westport, and Waterford, which are operated by Iarnród Éireann, also form part of the rail network. All are intermodal terminals handling the interchange of traffic between road and rail modes.

In addition to the Iarnród Éireann depots there are a number of facilities owed by other companies including facilities at Dublin Port, Tara Mines (Navan), and Belview Port (Waterford). A disused rail line linking the Port of Foynes to Limerick is also being considered for future development.

Iarnród Eireann are in discussions with Bord na Móna regarding potential future partnerships in the transportation of biomass.

3.0 An Overview of Rail Patronage

3.1 Existing passenger demand

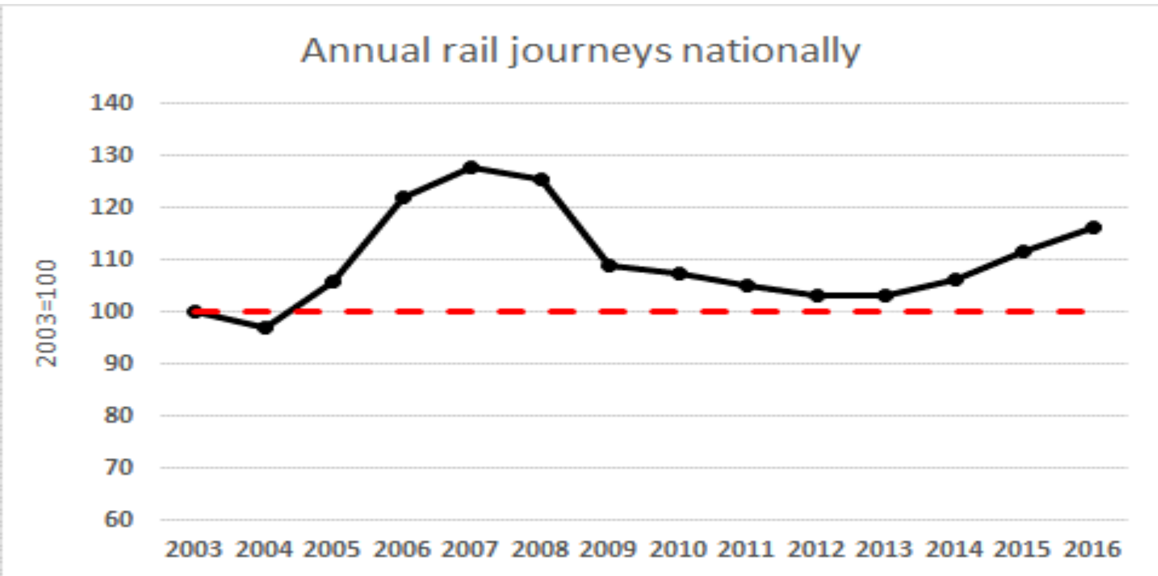
2015 saw total passenger journeys on the national rail network of 39.8 million - a 5% increase on 2014 when total journeys amounted to 37.8 million.

Passenger numbers carried on the rail network had increased significantly in the years up to 2007 when they peaked at 45.5m per annum. A decline in passenger numbers followed over the next six years to 36.7m per annum (-19.3%) in 2013, as the impacts of low economic growth, high unemployment, austerity measures and poor consumer and business sentiment were felt. That period also coincided with the completion of the major inter-urban motorway network linking Dublin with Belfast and the four provincial cities and the upgrading of the M50 motorway around Dublin.

Rail passenger numbers have stabilised in recent years, the decline having bottomed out towards the end of 2013. With improving economic indicators, growing consumer confidence and marketing initiatives, 2014 saw a nearly 3% increase in passenger numbers over 2013 levels and 2015 saw a further 4.9% increase in passenger numbers to 39.7m. The largest growth was in DART, which increased by 7.6% from 15.9m to 17.2m, demonstrating the need for planned service increases. On commuter routes numbers jumped by 3.3% from 11.6m to 12m, with strongest growth on the Cork – Middleton line up almost 9% to 340,000. InterCity grew by 2% to 10.4m. The main factors driving growth in 2015 included:

- The strengthening economy,
- Marketing activity,
- Leap card and other integration methods, and
- Focus on events to bring new business to the railway
- The results to date for 2016 indicate continuing strong levels, particularly in the GDA

Figure 4 Annual Rail Journeys



Rail usage varies significantly across the national network – the National Rail Census provides a snapshot of this and an overview of the 2015 Census is provided below.

3.2 Rail Census 2015 – Overview

The 2015 National Rail Passenger Census, which was conducted on 13th November 2015, recorded boardings and alightings of passengers on every service operated at every train station in the country. This was the fourth annual National Rail Passenger Census therefore facilitating comparison with rail usage across the country in since 2012. Prior to this the Census was carried out for the Greater Dublin Area (GDA) only.

The Rail Census is a snapshot of rail usage on a single day. While it is generally accepted that this survey is broadly representative of a typical weekday it is important to remember that it does not present systematic use or provide information on variations in rail usage by day of week or seasonally. Annual data of rail usage will give a balanced picture offer the course of an entire year. Analysis of the Rail Census should be interpreted in this context.

Table 4 below provides a summary of the number of journeys on the national rail network on Rail Census Day 2015 broken down by area of the network. Table 5 provides a comparison of 2015's Census Day with that of 2014, showing an increase in patronage at all service levels.

Table 4 Rail Usage 2015 (Boardings and Alightings on National Rail Census Day)

Boardings across the network	Direction	Boardings 2015	Proportion of total on network
DART (Greystones - City Centre - Howth / Malahide & v.v.)	Northbound Southbound	32,239 32,666	
	Total	64,905	48%
Connolly Commuter Services (Gorey - City Centre - Drogheda - Dundalk & v.v.)	Northbound Southbound	9,143 10,467	
	Total	19,610	14%
Connolly Commuter Services (Gorey - City Centre - Maynooth - Longford & v.v.)	Westbound Eastbound	11,097 10,903	
	Total	22,000	16%
Heuston Commuter Services (Heuston - Kildare - Carlow/Portlaoise/Athlone & v.v.)	Southbound Northbound	12,255 12,538	
	Total	24,793	18%
Regional Services (Limerick - Galway, Cork- Cobh - Midleton, Limerick - Ballybrophy, Limerick Junction - Waterford, Limerick - Limerick Junction)	**Total**	7,393	5%
TOTAL ALL SERVICES		**138,701**	

Table 5: Change from 2014 to 2015 Census Days

Routes	2014	2015	% increase
Cork - Limerick - Tralee InterCity	8080	8475	5%
DART	54986	64905	18%
Galway/Mayo InterCity	6223	6639	7%
Waterford	3882	4016	3%
Heuston Commuter	5543	5663	2%
Connolly Commuter	39943	44302	11%
Cork Commuter	4228	4890	16%
Regional	2222	2503	13%
Total Passengers boarding services	**125107**	**141393**	**13%**

The following highlights some key outputs from the Census:

- The total patronage[8] on the rail network on Census day was approximately 141,393, involving 669[9] rail services.
- Approximately 83% of daily journeys were undertaken in the Greater Dublin Area[10]
- While DART services represented around 23% of total services operated they accounted for approximately 46% of total passenger boardings on the network - this underlines the focus of demand on this part of the network
- In terms of remaining services almost double the proportion of boardings took place on Connolly services as on Heuston services

Adding the number of boardings and alightings at each station to provide a measurement of daily journeys associated with each station provides an insight into the variation in station usage across the rail network. Boardings, alighting and total journeys for the highest demand stations are set out in Table 6.

Table 6: Highest Demand Stations, Census Day 2015

Top 10 Stations - Boardings			Top 10 Stations- Alightings			Top 10 Stations - Total Movements		
1	Connolly	14763	1	Connolly	14,992	1	Connolly	29,755
2	Pearse	13439	2	Pearse	13,766	2	Pearse	27,205
3	Heuston	9639	3	Heuston	9,680	3	Heuston	19,319
4	Tara Street	7802	4	Tara Street	9,550	4	Tara Street	17,352
5	Cork	3478	5	Lansdowne	4,035	5	Lansdowne	7,463
6	Lansdowne	3428	6	Grand Canal Dock	3,731	6	Cork	6,990
7	Dun Laoghaire	3308	7	Cork	3,512	7	Dun Laoghaire	6,747
8	Bray	2957	8	Dun Laoghaire	3,439	8	Grand Canal Dock	6,404
9	Blackrock	2859	9	Blackrock	2,844	9	Bray	5,794
10	Maynooth	2824	10	Bray	2,837	10	Blackrock	5,703
Total Top 10		**64,497**	**Total Top 10**		**68,386**	**Total Top 10**		**132,732**
Total Network		141,393	Total Network		141,393	Total Network		282,786
% of Total at Top 10 Stations		**45.6**	**% of Total at Top 10 Stations**		**48.4**	**% of Total at Top 10 Stations**		**46.9**

[8] Passengers boarding services
[9] Including services operating Limerick Colbert – Limerick Junction and return
[10] Dublin, Kildare, Meath and Wicklow

Twelve stations generated in excess of 5,000 passenger journeys on Census day (See Table 5). Connolly, Pearse, Heuston and Tara respectively generated the highest number of passenger journeys in 2015, as was also the case in previous years.

Nine out of the ten busiest stations for boardings and alightings in the country were located in the Greater Dublin Area (Table 6). Kent station, in Cork city, was the only station outside of the Dublin area to feature in the top ten in terms of passenger movements – Cork Kent was the 6th busiest station in the country.

In 2015, 25 stations in the country generated less than 100 journeys on Census day (down from 27 stations in 2013) – none of the stations on the Northern line, Sligo line, Cork line or DART lines fell into this category and only one Cork Commuter station was included (Carrigaloe) (See Appendix 2). A further 20 stations generated between 100 and 200 journeys.

Of the low performing stations, 12[11] generated less than 30 passenger movements. 11 of the 12 poorest performing stations were all located on the Waterford-Limerick Junction, Ballybrophy-Limerick Junction and Limerick-Galway lines. Relative to the rest of the network these lines have lower population catchments characterised by small-medium size settlements surrounded by dispersed rural populations. They also exhibit rail journey times that struggle to compete with journey times by road and have the lowest levels of services on the network. This is a similar scenario to that which appeared in 2013.

The above indicates significant variation in station usage across the network and in the volume of movements generated to/from stations. The top ten stations represent a significant proportion of overall daily patronage on the rail network accounting for approximately 46% of total boardings in the country and 48% of total alightings. Effectively this means that, on census day, just over half (47%) of all passenger movements on the network occurred at the stations listed in Table 6 above. This underlines the concentration of rail activity on the Dublin network and also the strong role of Cork in facilitating rail travel demand.

3.3 Rail usage in Dublin

Heavy Rail lost a significant share of travel into Dublin city centre, with a drop of 5% in mode share between 2007 and 2011[12], when it reached its lowest level of a 12.5% mode share. This was followed by a period of stabilisation between 2011 and 2014. More recent trends show a return to growth, with the rail mode share jumping from 12.9% in 2014 to 14.8% in 2015. If this trend continues, the mode share will recover to pre-recession levels by 2017.

The total number of people crossing the Dublin Canal Cordon in the morning peak period (7:00 to 10:00) increased by 4% between 2013 and 2015, from 192,188 person trips in 2013 to 199,943 person trips in 2015. The total number of people travelling by heavy rail was 29,521 in 2015 –

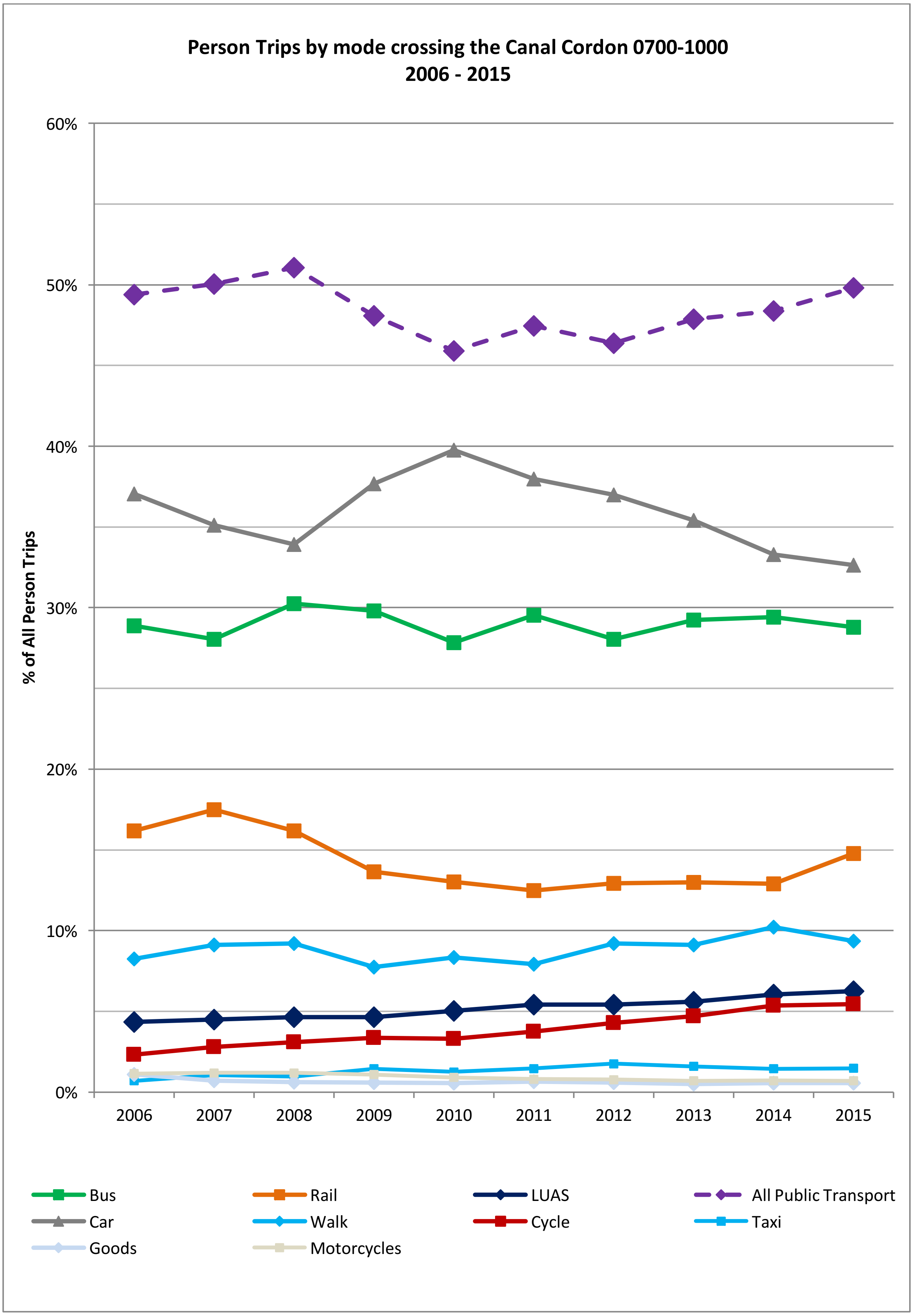
[11] Carrick on Suir, Birdhill, Ardrahan, Tipperary, Castleconnell, Cloughjordan, Craughwell, Cahir, Roscrea, Foxford, Attymon, Fota

[12] 'Report on trends in mode share of vehicles and people crossing the Canal Cordon 2006-2015', NTA, 2016

representing 15% of those travelling and approximately 4,552 more people than in 2013. Figure 5 illustrates trends in mode share for travel into Dublin City Centre 2006-2015.

Overall, the proportion of those crossing the canal cordon by public transport increased by 2% from 2013 to 2015. Bus showed a slight decrease in this period and Luas showed a slight increase, whilst rail showed the most significant increase. Despite the numbers using heavy rail increasing, the number of passengers in 2015 was still over 5,000 less than the 2007 peak when a figure of 35,692 was recorded, equating to a 17.5% mode share.

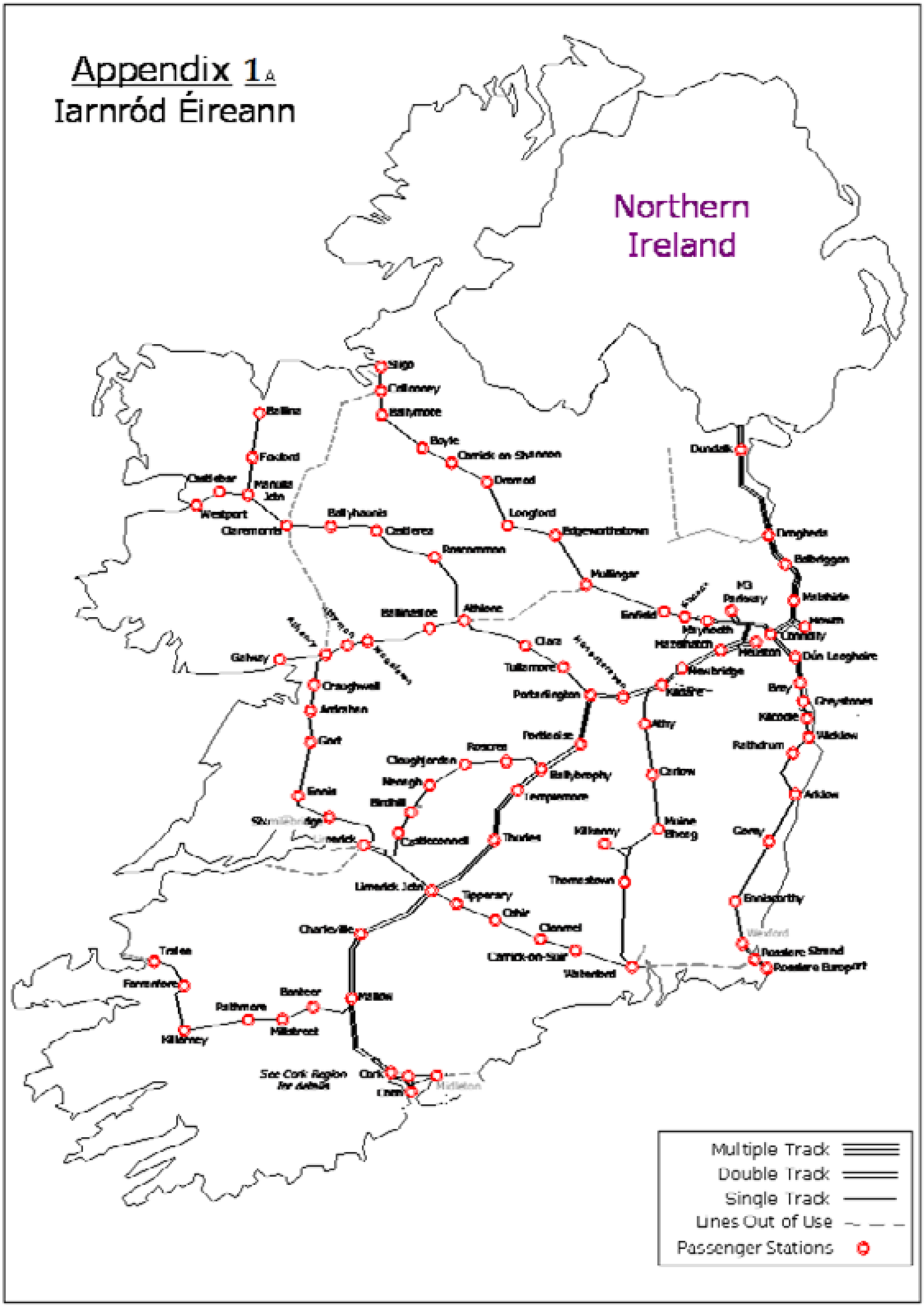
Figure 5 Mode share of people crossing the canal cordon 2006 to 2015



Appendix 1: Track Length and Track Configuration

Active Lines		Track Lengths (kms)
Dublin Heuston	Cork Kent	265.94
Islandbridge Junction	Glasnevin junction	8.38
North Strand Junction	Dublin Connolly	0.85
Liffey Junction	Dublin Docklands	5.02
Cherryville Junction	Waterford Plunkett	124.79
Portarlington	Galway Ceannt	141.65
Athlone West Junction	Westport	133.32
Manulla Junction	Ballina	33.65
Ballybrophy Junction	Killonan Junction	73.00
Limerick Check	Athenry	96.59
Limerick Junction Direct Curve		0.85
Limerick Colbert	Waterford West	123.98
Killarney Junction	Tralee Casement	98.72
Cork Kent	Cobh	18.52
Glounthaune	Midleton	10.03
Dublin Liffey Junction	Sligo McDiarmada	213.70
Clonsilla	M3 Parkway	7.24
Dublin Connolly	Rosslare Europort	168.16
Waterford Plunkett	Belview	6.49
Dublin Connolly	Border (NI)	95.92
Church Road Junction	East Wall Junction	0.80
Howth Junction	Howth	5.63
Drogheda	Navan (Tara Mines)	29.02
Total Active Lines		**1662.25**
Other Lines		**Track Lengths (Kms)**
Athenry	Collooney	126.49
Midleton	Youghal	23.42
Limerick Check	Foynes	43.15
Mullingar	Athlone	44.42
Tara Junction	Kingscourt	31.54
Waterford Abbey Junction	New Ross	21.89
Belview	Rosslare Strand	49.97
Tralee	Fenit	14.31
Sligo	Sligo Goods Yard	0.80
Total Other Lines		**355.99**
Total All		**2018.24**

Appendix 1A
Iarnród Éireann



Appendix 2: Rail Stations with less than 100 passenger movements on Rail Census Day 2015

Clondalkin/Fonthill	90
Sixmilebridge	90
Thomastown	88
Woodlawn	83
Banteer	66
Rosslare Strand	66
Farranfore	61
Carrigaloe	50
Rosslare Europort	50
Newry	49
Clonmel	40
Nenagh	34
Gort	32
Craughwell	27
Birdhill	21
Tipperary	21
Castleconnell	20
Fota	19
Cloughjordan	15
Attymon	14
Foxford	12
Ardrahan	11
Cahir	11
Roscrea	10
Carrick-on-Suir	1

Appendix 2

August 2016

The Role of Rail – towards a national rail policy

Údarás Náisiúnta Iompair
National Transport Authority

Iarnród Éireann
Irish Rail

Contents

1. The Current Role of Rail in Ireland

1.1 Introduction

Iarnród Éireann carries 39.8 million passenger journeys annually, accounting for 18% of the 224 million passenger journeys made annually on Public Service Obligation (PSO) public transport throughout the State[1]. This equates to €174.5m in passenger revenue. Currently c.16m passengers use the DART network and c.21m passengers use the Intercity and Commuter network annually, accounting for over 1500m passenger kilometres.

This demonstrates the attraction that rail has for a very significant section of the travel market and the volume of trips that would be reassigned to other modes (predominantly private car and bus) or suppressed in the absence of rail. As such, rail has a key role to play in contributing to sustainable travel in Ireland now and particularly into the future as the economy grows.

Rail also carries around 1% of freight tonne kilometres.[2]

This note presents a high level overview of the existing role of rail nationally considering not only travel demand but also the wider external impacts of the rail network including economic, social and environmental.

1.2 Population and demand for travel

According to the 2011 Census, 56% of Ireland's population resides in urban areas with a population greater than 5,000 persons. In addition, just under half of the total population of Ireland live within the boundary of a settlement served by rail[3] - this represents the main direct market for regular rail travel for all trip purposes and amounts to approximately 2.3 million people. 38% of the population is dispersed throughout rural Ireland. The majority of the dispersed rural population will have limited access to rail, largely achievable by access modes such as car, bus and rural hackney / taxi.

Demand for travel is also skewed regionally. More than 27% of the country's population lives in Dublin and 39% live in the Greater Dublin Area[4] (GDA). 35% of the jobs are in Dublin and 43% are in the GDA. It follows that some 57% of national employment is located across the rest of the State, clustered in regional cities and large towns. In 2015, 53% of new jobs created by IDA FDI clients in Ireland were located outside the GDA, compared to 49% in 2014. However, Dublin remains the focus of both the intercity and commuter rail network and rail has a critical role to play in providing for radial travel demand to/from Dublin. The population of the GDA grew by 9% during the 2006-2011 inter-Census period, and while Dublin City's population grew by a more modest 4% there was double digit growth recorded in areas that are served to some extent by rail: Fingal, Kildare and Meath. The

1 National Transport Authority, Public Transport Passenger Numbers 2015 (2016)
2 'Investing in our transport future – A strategic framework for investment in land transport', Department of Transport Tourism and Sport (DTTAS), 2014
3 Total population of settlements with rail stations using CSO Settlement boundary definitions
4 Greater Dublin Area comprises the counties of Dublin, Meath, Wicklow and Kildare.

volume and characteristics of travel demand generated in relation to Dublin is unique in comparison with the rest of the country due to the size and strengths of the Dublin city region. These characteristics have set the context for the usage of the rail network. Similar population growth also occurred outside the GDA in Laois, Longford, Louth and Wexford, areas also served by rail.

1.3 InterCity Travel

The Dublin-Cork corridor remains the most dominant InterCity corridor in the country, with a significant level of inter-city movements, particularly by business travellers. It competes strongly with car for trips between the cities, accounting for approximately 50% of non-bus trips. Dublin-Sligo and Dublin-Limerick also strong performers, performing relatively close to their potential.[5]

Dublin-Belfast, on the other hand, underperforms in its role as an InterCity service, with much of its demand accounted for by outer-commuting trips from Dundalk and Drogheda to Dublin. The low level of business travel is also notable. Dublin-Waterford also underperforms, partly due to the stopping arrangements at Kilkenny, and permanent speed restrictions.[6]

More recent research carried out by the NTA on Dublin to Cork intercity travel suggests that the importance of public transport for inter-urban travel may have been underestimated. The research suggests that the public transport mode share for such trips is around 50% - and that as much as 60% of this is captured by rail.

End-to-end travel demand between Dublin and the 5 other key cities on the network amounted to approximately 5% of total of journeys on the network in 2015. (See Table 1)

Table 1: Intercity Patronage 2015 (annual end to end journeys on Intercity Services)[7]

InterCity	Journeys 2015	% of End to End InterCity	% of Total Journeys on the Network[8]
Dublin/Cork	632,661	27.3%	1.6%
Dublin/Belfast	182,883	7.9%	0.5%
Dublin/Limerick	292,056	12.6%	0.7%
Dublin/Galway	339,917	14.6%	0.9%
Dublin/Waterford	214,561	9.2%	0.5%
Sub Total	**1,662,078**	**71.6%**	**4.2%**
Dublin/Sligo	174,151	7.5%	0.4%
Dublin/Westport	114,475	4.9%	0.3%
Dublin/Tralee	118,569	5.1%	0.3%
Dublin/Ballina	44,122	1.9%	0.1%
Dublin/Wexford[9]	61,753	2.7%	0.2%
Sub Total	**513,070**	**22.1%**	**1.3%**

[5]'2030 Rail Network Strategy Review, Final Report', AECOM and Iarnród Éireann, (2011) p. 219
[6] 2030 Rail Network Strategy Review, Final Report', AECOM and Iarnród Éireann, (2011) p. 220
[7] IÉ Ticketing data, annual patronage (paid + DSP). It should be noted that the above table excludes patronage data for the Belfast to Dublin service was provided by Translink in Northern Ireland.
[8] Total journeys in 2015 amounted to 39.7million (IÉ 2015)
[9] Included as the largest urban settlement on this line and in the region

Limerick/Lim Jnt/Galway	42,198	1.8%	0.1%
Limerick/Lim Jnt/Waterford	2,049	0.1%	0.0%
Limerick/Lim Jnt/Cork	67,937	2.9%	0.2%
Cork/Tralee	33,833	1.5%	0.1%
Sub Total	**146,017**	**6.3%**	**0.4%**
Total	**2,321,165**	**100%**	**5.9%**

The highest intercity demand is for travel between Dublin and Cork, (just over one quarter of the total city to city market) followed by Dublin-Belfast. Belfast and Galway display stronger demand from Dublin than to Dublin. Limerick and Galway have similar levels of demand and Waterford the lowest share of the end-to-end intercity market.

Of the smaller regional cities and large towns, Sligo and Westport exhibit notable levels of patronage to/from Dublin. The majority of travel is to/from Dublin with an extremely low proportion of overall travel occurring *between* the regional cities (i.e Limerick-Galway).

1.4 Commuter and Intra-Urban Travel

The number of people travelling to work almost doubled between 1990 and 2008, and current predictions see a 35% increase in commuter trips from 2011 levels by 2041; this equates to around 650,000 additional trips to work per day annually.[10] The capacity of the railway network enables it to provide essential mobility for growing travel demand. A reduction in commuter services, or a lack of development of the rail service into the future, would limit the ability to meet growing demand sustainably, lead to more commuting by car and a consequential erosion of the level of service on the national and regional road network approaching the main cities and towns.

With regard to local and commuter travel the ability of rail to grasp a significant portion of this market, outside of the Dublin area, has been limited significantly by land-use patterns dominated by low to medium density development in suburban areas, highly dispersed rural populations and the growth in peripheral development of services and employment not served by the railway. In combination, this acknowledged failure in spatial planning policy has now effectively locked-in acute car dependency.[11] This settlement and employment locational context, which dictates travel demand, is difficult to serve by public transport, particularly by rail, as a critical mass of population, employment and education located close to rail stations is required. The provision of free destination car-parking at a quantum is also central in facilitating car use in large settlements and further limits the ability of public transport to compete with the car. The only exception to this is in central Dublin, where parking standards are set out on the basis of centrality and public transport accessibility.

These characteristics have been critical in defining the function of rail nationally, regionally and locally. This is considered in more detail below particularly with regard to the key cities and commuting demand as one of the key generators of travel demand.

[10] 'Investing in our transport future', Department of Transport, Tourism and Sport, (2014)
[11] 'Atlas of Ireland 2015 Report' (AIRO NUI Maynooth and Centre for Cross Border Studies) (2015)

1.5 National Commuting Demand

There are a number of key figures that highlight the position of rail in meeting commuting demand at the national level and in the Greater Dublin Area (GDA) for comparative purposes. They are as follows:

- Nationally approximately 4% of people commuting to work do so by rail amounting to approximately 48,400 people in 2011[12]
- Almost all of this existing rail demand associated with commuting is located in the Greater Dublin Area with less than 1,500 people outside of the GDA commuting to work by rail. (See Table 2 below)
- The existing rail network has a strong mass-commuting function in the Greater Dublin Area.
- Commuting by rail is negligible outside of the Dublin area including into the other cities (Limerick, Galway, Waterford, and Cork)
- The ability of bus to capture commuter travel demand is stronger than that of rail with bus mode exceeding rail for work trips at the national level, inside the GDA and outside of the GDA.

Table 2 – National, GDA, Non GDA Mode Split Work

Travel to Work Mode Split (CSO POWSCAR 2011)									
	Bicycle	**Bus**	**Car Driver**	**Walk**	**Car Passenger**	**Rail**	**Van**	**Other**	**Total**
National Total	35,233	79,583	916,857	144,992	60,311	48,399	54,608	22,759	1,362,742
National Mode %	3	6	67	11	4	4	4	2	100
GDA Total	25,662	66,798	366,490	72,942	22,130	46,935	16,763	10,157	627,877
GDA Mode %	4	11	58	12	4	7	3	2	100
Non-GDA Total	9,571	12,785	550,367	72,050	38,181	1,464	37,845	12,602	734,865
Non-GDA Mode %	1	2	75	10	5	0	5	2	100

This shows the significant differences in commuter rail use nationally which is also reflective of the network and service provision.

1.6 Commuting and the key cities

The following describes what is considered to represent the extent of the potential demand for commuter rail along the existing network into the key cities and summarises the existing role of rail in relation to commuting function[13].

[12] Central Statistics Office, (CSO), POWSCAR (2011)
[13] Summaries are based on an analysis of commuter demand into the key cities from with a 5km radius of each rail station supplemented as appropriate by analysis of commuter demand into key cities at the CSO Settlement level (Source, CSO, POWSCAR 2011)

1.6.1 The Dublin Area

As noted above, the Dublin Area is unique within Ireland – population, employment, economic activity and associated travel demand are all far in excess of that evident elsewhere.

- The public transport network has a critical role to play in keeping Dublin moving and this role is likely to increase into the future.
- Approximately 7% of commuting demand in the Greater Dublin Area is currently met by rail (including Luas).
- Rail provides the core high capacity network that is central to the Greater Dublin Area's mass transit system.
- For travel into the Dublin metropolitan area[14] from elsewhere the strongest demand exists along the east coast of the country from Dublin to the border with Northern Ireland – all settlements on the rail network as far as Dundalk display a significant commuting relationship with Dublin[15].
- Significant numbers commuting to Dublin are also evident as far out as Mullingar on the Sligo Line, Carlow on the Waterford line, Portarlington, on the Galway line, Portlaoise on the Limerick/Cork line and Gorey on the Rosslare line. These locations can be considered as the extent of the Dublin outer commuter area beyond which existing commuter travel demand is at levels that does not justify rail commuter services.
- There are signs that congestion on key radial and orbital roads serving the metropolitan area is likely to become an issue in the near future.
- Demand for travel is likely to increase in future years – maximising the capabilities of rail to capture travel demand will be critical to managing this as the road network becomes more constrained.

1.6.2 Commuting into Cork

- Despite the presence of demand for travel and the increasing issue of limited capacity on the road network, the existing mode share for rail for employment trips is low (approximately 1%).
- Census figures suggest that to the east of the city demand is strong as far out as Midleton including from Carrigtwohill, Cobh, Rushbrooke and Carrigaloe – areas where comuter rail is provided
- There is also significant demand travel into Cork as far as Mallow[16] to the North West, falling dramatically beyond this.
- Similar to Dublin, the local and regional roads are capacity constrained and congestion is a growing issue.
- Residential development at origin is not based on accessibility to the rail stations, and key destinations have developed up away from the rail line or are characterised in many locations by large estates, making access to/from rail stations unattractive. Settlements along the rail line have not been appropriately developed to support it. The latter is a major issue for the city and needs to be addressed.
- There is potential to increase this mode share and recent indications are that patronage on the Cork suburban network is growing.

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[14] As defined by the Regional Planning Guidelines for the Greater Dublin Area 2010-2022, Dublin Regional and Mid-East Regional Authorities, (2010). The Metropolitan Area includes all of Dublin City Council, substantial parts of South Dublin and Dun Laoghaire Rathdown and certain EDs (Electoral Divisions) in Fingal, Kildare, Meath and Wicklow.

[15] Census information does not allow cross border commuting (i.e. Newry-Dublin) to be quantified.

[16] 945 people commuting to work into Cork from within Mallow settlement boundary, 1449 from within a 5km radius of Mallow train station, CSO, (2011)

1.6.3 Commuting into Galway

- Commuting by rail is almost irrelevant for trips to work into Galway at present with less than 1% of work trips taken by rail.
- Oranmore is the main feeder town for the city (1,211 commuters into Galway city), followed by Athenry (597 commuters)[17]. Beyond Athenry demand for commuting into Galway city falls away rapidly.
- The volume of people commuting into Galway from within the boundaries of the settlements on the Galway-Limerick line collectively amounts to less than 400 people[18].
- The central location of Ceannt station provides a strong advantage for Intercity rail and tourism/leisure demand
- Due to the competitiveness of journey times by road, the dispersed nature of the population and the location of large employment destinations dislocated from rail, the rail network does not facilitate significant commuter demand. The scale and density of Galway is unlikely to support a comprehensive commuter rail network even in the long term
- The primary function of rail services along the Limerick-Galway corridor is to serve other types of demand (shopping, leisure, tourism).

1.6.4 Commuting into Waterford

- Along the Waterford-Dublin rail corridor there are extremely low levels of commuting demand into Waterford City (approx. 380[19] people – from within 5km of all stations)
- Along the Waterford-Limerick line approximately 600 people commute into Waterford from within the settlements along the rail line. The most significant demand for travel into Waterford to work is from Carrick on Suir (288[20] people)
- According to the 2011 Census 282[21] people commuted into Waterford by rail. The use of rail for travel to work into Waterford is negligible and is likely to remain so given the populations and scale of demand in the area. The majority of commuters originate from dispersed development in rural areas, there are no critical capacity issues on the road network and the small scale of the city and the dispersed low-density pattern of development limit the potential for commuter rail.

1.6.5 Commuting into Limerick

- At present less than 1% of commuter demand is met by rail.
- Travel demand for trips to work with destinations in Limerick City extends to Ennis, including Sixmilebridge, on the Galway-Limerick line
- Demand for travel to work into Limerick from within the settlements on the Limerick-Ballybrophy rail line is low (approx. 600 people from all settlements along the line).
- As with in Galway, the separation of major employment destinations from Limerick Colbert station has further limited the ability of rail to meet commuter demand and journey times by road are often quicker than by rail.
- As a small city, with a dispersed low-density population, it is likely to remain extremely challenging for rail to play a significant role in Limerick.
- The potential exception to this is for travel from Ennis and surrounds into Limerick by rail.

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[17] 'Profile 10 Door to Door', Central Statistics Office (CSO), 2012

[18] Approximately 1500 people commuting into Galway from within a 5km radius of Craughwell, Gort and Ardrahan rail stations collectively. The majority of these people originate in the rural areas surrounding the settlements

[19] POWSCAR 2011

[20] POWSCAR 2011

[21] POWSCAR 2011

1.7 Competition from other modes

Rail must compete for market share with both car and bus in terms of cost, journey times, flexibility and reliability.

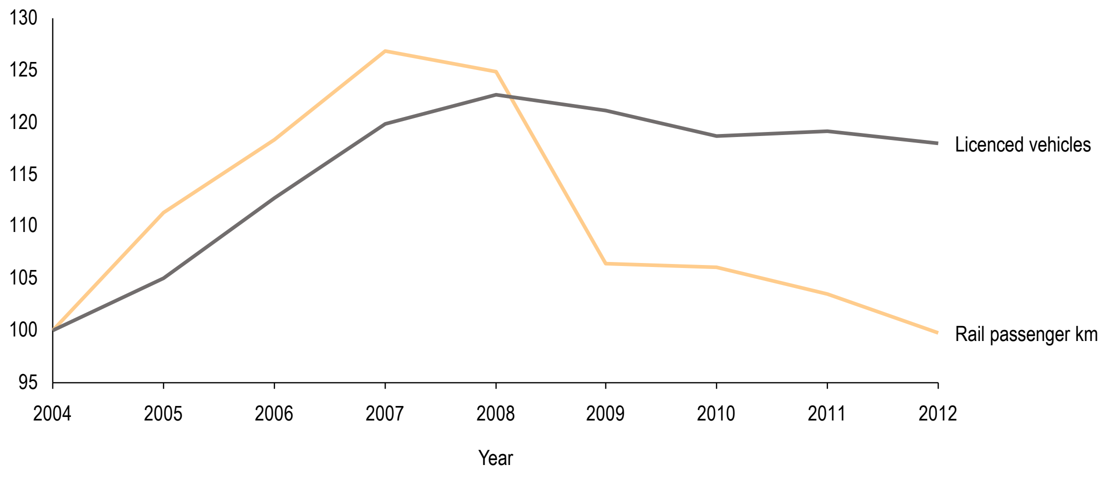
Market research both at EU and national level indicates that rail scores highly across a range of characteristics including comfort, quality of service, on-board information, punctuality and reliability all of which influence mode choice. Studies of the values put on travel time show that the disutility associated with rail travel is low by comparison with other modes. The low disutility derives from the additional comfort afforded by rail travel and the opportunity to be productive'[22].

Despite these general benefits, rail in Ireland has suffered in recent years from competition on road. Major national roads improvements between Dublin and the key cities are now complete and, as a result any gains in terms of improved journey times by car and bus are likely to have peaked. This, coupled with a levelling off in economic conditions offers an opportunity for rail to become more competitive, by improving the range, innovation and price of rail services.

1.7.1 Private Car

Both the car fleet and commercial vehicle fleets have roughly doubled in size compared to their levels in the early 1990s. The net result is that, for example, there were 1.06 million people driving to work in 2011 compared to 440,000 in 1991 – an increase of 140%.'[23] The increase in car ownership had the knock on impact of a decline in use of other modes. The relationship between car ownership and rail passenger kilometres travelled is illustrated in Figure 1 below.

Figure 1 Rail passenger km vs number of licenced vehicles 2004-2012 (index, 2004=100)



In recent years there has also been a dramatic reduction of approximately 40% in journey times by road between Dublin and the other core cities (Belfast, Cork, Limerick, Waterford) as a result of roads investment programmes and the completion of the Major Inter Urban Motorway programme.

[22] '2030 Rail Network Strategy Review, Final Report', AECOM and Iarnród Éireann, (2011)
[23] 'Investing in our transport future', Department of Transport, Tourism and Sport (2014)

This has increased the attractiveness of travel by car and bus for intercity journeys. National roads between Dublin and Cork, Galway, Limerick, Waterford and Belfast have all been significantly improved and all directly compete with the InterCity rail routes.

Table 3 Estimated Core City Centre to Core City Centre Journey Times by Mode (minutes)[24]

Origin	Destination	Rail JT	Bus JT	Car JT
Dublin Heuston	Galway	150-170	160-215	139
Dublin Heuston	Limerick	145-162	176-206	142
Dublin Heuston	Cork	186-201	206-236	179
Dublin Heuston	Waterford	157-172	151-161	118
Dublin Connolly	Belfast	151-161	138-153	131

When estimated end to end journeys are considered car is more competitive than rail on all routes particularly from Dublin to Waterford and to Belfast (the location of the rail stations relative to the city centres contributes to this). Given the additional flexibility provided with car travel and the fact that car can provide door to door accessibility this is likely to make car travel particularly attractive against rail for these routes.

1.7.2 Bus

Bus journey times appear to be significantly more competitive than rail on the Dublin to Waterford and Dublin to Belfast routes while rail can still achieve lower journey times to Cork and Limerick and to some extent Galway.

The attractiveness of bus for such trips has been further bolstered by the development of the private[25] bus market which has increased choice for consumers with a number of operators offering intercity travel options. Service improvements, for example in the provision of free on-board Wi-Fi, competitive fares, the frequency of services across the day and week, and the range of destinations served also increase the attractiveness of travel by bus.

1.8 Urban congestion

Notwithstanding the current attractive journey times by bus, as population grows, along with its related economy activity, journey times on road networks within suburban and inner urban areas of Ireland's cities will increase for road based transport compared to rail.

National policy to better consolidate residential and commercial development will result in many settlement areas being created in close proximity to commuting rail lines. The penetration of rail into city centres, particularly in Dublin and Cork, will become an increasingly important factor in the choice of mode of public transport travel and will ensure mode share growth for rail.

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[24] Estimates use core city centre locations (i.e. O'Connell Street) and include additional time for access to/from train stations/bus drop-off points by fastest mode to estimate overall journey time

[25] Public Transport Regulation Act 2009

2. Future Measures

Arising from the Chapter 4 of the Rail Review – Potential for Future Growth, the below table provides more detail on themes that could be developed to deliver the proposed measures to improve rail services.

2.1 Guiding Principles

Stage 1 – Key Cities	
1) Frequency of service for InterCity Dublin-Cork 1 every hour (minimum) Dublin-Belfast 1 every hour Dublin-Galway 1 every 2 hours Dublin-Limerick 1 every 2 hours Dublin-Waterford 1 every 2 hours (maximum)	Develop revised service proposals
2) No service frequency improvements on Regional City to Regional City corridors (Galway/Cork, Galway/Limerick, Cork/Limerick, Limerick/Waterford, Waterford/Galway) but requirement to examine opportunity for improved connections and opportunities to operate direct services where these are feasible and would generate additional patronage.	Develop revised service proposals
3) It is also proposed that further analysis should be carried out to: - Ascertain the optimal desired arrival time for the business market on weekday mornings along each corridor…., each corridor should provide at least one service that arrives at Dublin before 09.00, each weekday morning, - Develop proposals that will provide - Examine the potential to optimise network connections at points such as Limerick Junction, Mallow, Athlone - Maximise the provision of clockface departure times as appropriate[26]	Develop revised service proposals
Stage 2 – Key Towns (c. 20,000 population)	
4) All InterCity trains travelling through Athlone should stop there.	
5) All InterCity trains travelling through Kilkenny should stop there.	
6) Proportionately more services should operate between Dublin/Sligo and Dublin/Tralee than Dublin/Wexford.	work up detail for 4)-6)
Stage 3 – Intermediate Towns	
7) Further work required to examine potential for reduction in services at stations deemed 'very low' or 'low' priority. Research required examining bus	

[26] During peak hours it is the arrival time at destination that is key – this is likely to result in non-clockface departures from the regional cities to Dublin and vice-versa as a result of differing stopping patterns and journey times

alternatives to/from these locations along existing rail connections and assess costs/benefits of any proposed reduction (journey time implications etc). Stations are as follows: 'Very Low' – Attymon, Banteer, Collooney, Foxford, 'Low' Woodlawn, Clara, Ballybrophy, Farranfore, Rathmore, Rosslare, Ballymote, Dromod, Ballyhaunis, Castlerea, Cahir, Birdhill, Cloughjordan	**Principle Agreed –** further assessment required
Stage 4 – Urban Commuting 8) Consider in further detail the potential for rail to perform a commuter function into the key cities based on the station parameters set out below and the timetable characteristics any such service should have in order to operate effectively. - Into Dublin – from Dundalk to the north (potentially Newry in Northern Ireland), Mullingar to north-west, Portarlington and Portlaoise to the west and Carlow and Gorey to the south. - Into, across and out of Cork Metropolitan Area – from Mallow to the North West, from Midleton to the east and including the Cork Suburban stations particularly Carrigtwohill, Cobh, Rushbrooke and Carrigaloe - Into Galway – from Athenry to the east - Into Limerick – from Ennis on the Western Rail Corridor - Into Waterford – levels of commuting into Waterford from settlements along the rail corridors are not significantly high to justify commuter rail services however, in relative terms, there is significantly more commuting demand (and overall existing passenger demand) from Limerick into Waterford than from Waterford to Limerick - this should be reflected in public transport service provision 9) All InterCity trains should stop at the last 'commuter station' in a commuter belt to facilitate interchange for example Athenry, Dundalk, Portarlington	Develop revised services Develop revised services Further research for Galway, Limerick, and Waterford

2.2 Areas for Consideration

a) Much of current timetable provides the same service levels on Saturday as Monday-Friday. Analysis is required to clarify how demand differs on Saturday (and Sunday) from week day demand. Difference must be reflected in future timetables (Stage 5 of review)

b) Tralee to Dublin services – some are direct while the majority require interchange at Mallow. What is the justification for this? Should all Tralee services interchange at Mallow

c) Recommend all InterCity trains on Dublin/Tralee will connect at Mallow with Dublin/Cork trains. This may be feasible if the adverse impact is mitigated by additional benefits conferred by offering new services. For example, if Tralee – Mallow – Cork – Cobh were offered every hour, it would:

- Dissipate the spike of loading at Mallow onto Cork-Dublin services;

- Generate Cobh- Killarney and Cobh – Tralee leisure traffic
- Generate Tralee /Killarney /Mallow – Fota /Cobh leisure traffic

d) All InterCity trains on Dublin/Cork will operate as through services

e) Limerick to Dublin services – some are direct while majority require interchange at Limerick junction. Should all Limerick services require interchange at Limerick Jnt?

f) Recommend all InterCity trains on Dublin/Limerick will connect at Limerick Junction with Dublin/Cork trains

3. Meeting Policy Goals

3.1 European Policy

Rail is very much at the centre of European transportation policy with regards to sustainable transport. The European Commission's efforts in relation to rail have concentrated on three major areas: (1) opening of the rail transport market to competition, (2) improving the interoperability and safety of national networks and (3) developing rail transport infrastructure.

The European Commission in a recent *'White Paper'*[27] has committed to maintaining a dense railway network in all Member States and, more specifically, to connecting all core network airports to the rail network and to achieving a 50% shift of medium distance intercity passengers and freight journeys from road to rail by 2050. Clearly, at a European level, rail is seen as an integral part of sustainable transport networks going forward. Ireland's ability to meet and contribute to these targets would require an equally strong policy and programme of supporting measures defining and building upon the role of rail nationally.

Crucially from an EU perspective the Cork – Dublin – Belfast rail corridor, linking the three primary urban centres on the island, is an important TEN-T corridor which is part of a wider North Sea – Mediterranean Corridor. The corridor aims to remove barriers to the internal market by offering greater modal choice, safer and less congested travel, smoother and quicker journeys while minimising environmental impact.

3.2 National Policy

Rail travel is supported in various sectors of national policy. The Government's transport policy, *'Smarter Travel'*[28] requires a significant modal shift towards more sustainable forms of transport (public transport, walking and cycling) coupled with a renewed focus on the achievement of more compact settlement patterns within urban and rural areas, which in turn will complement and optimise the use of infrastructure investment.

The *National Spatial Strategy (NSS)* has been the guiding framework for planning and investment since 2002. Notably 16 of the 20 Gateways and Hubs earmarked in the NSS for concentrated growth are served by the InterCity rail network. The key high-level objectives included in the NSS in relation to rail are as follows:

- Building on Ireland's radial transport system of main roads and rail lines connecting Dublin to other regions
- Ensuring that rail continues to offer realistic alternatives to road travel on the key inter-city routes and
- Increasing rail freight

[27] 'White paper: Roadmap to a Single European Transport Area -Towards a competitive and resource efficient transport system ', European Commission, (2011)

[28] 'Smarter Travel': A Sustainable Transport Future – A New Transport Policy for Ireland 2009 – 2020', Department of Transport, (2009)

The NSS is to be replaced by the National Planning Framework in the new Dáil.

3.3 Greater Dublin Area Integrated Implementation Plan

In January 2014 the Minister for Transport, Tourism and Sport approved the National Transport Authority's Integrated Implementation Plan 2013-2018 for the Greater Dublin Area. This plan sets out actions to be taken by the Authority to ensure the effective integration of public transport infrastructure, the effective integration of public passenger transport services and to ensure the most beneficial and efficient use of Exchequer resources.

The need for meaningful integration of transport and land use planning is addressed as part of the plan. In this regard, the need to match high capacity public transport with complementary development patterns that facilitate its use is seen as critical to achieving more sustainable travel patterns going forward.

The prioritisation of *'residential development located proximate to high capacity public transport…over development in less accessible locations in the GDA'* and the location of trip intensive development destinations (retail, employment etc) in areas *'well served by existing or committed high quality public transport'* are identified as two of the key principles for optimising the integration of transport and land-use.

The existence of the rail network, as the highest capacity element of the GDA public transport network, offers strong potential to achieve strong integration between land-use and transport in the GDA.

The Integrated Implementation Plan is now underpinned by the NTA's recently published Transport Strategy for the Greater Dublin Area 2016-2035.

3.4 Sustainable development in urban areas

A primary focus in the policy and plan documents mentioned above is to increase sustainability and efficiency in urban areas through greater alignment of land use and transport. In particular *'Smarter Travel'*[29] underlines the need to increase residential densities in areas proximate to public transport corridors, focusing especially on the development of locations within and around the key cities and towns that are served by the rail network.

In the Dublin area, a number of large and medium scale sustainable residential development areas on rail-based public transport corridors were to be delivered (Adamstown, North Fringe, Clongriffen, Baldoyle, Pelletstown, Clonburris, Cherrywood). However, the downturn in the economy stalled their delivery.

[29] 'Sustainable Residential Development in Urban Areas' (Department of Environment, Communities and Local Government, (2009) and 'Smarter Travel: A Sustainable Transport Future – A New Transport Policy for Ireland 2009 – 2020', Department of Transport

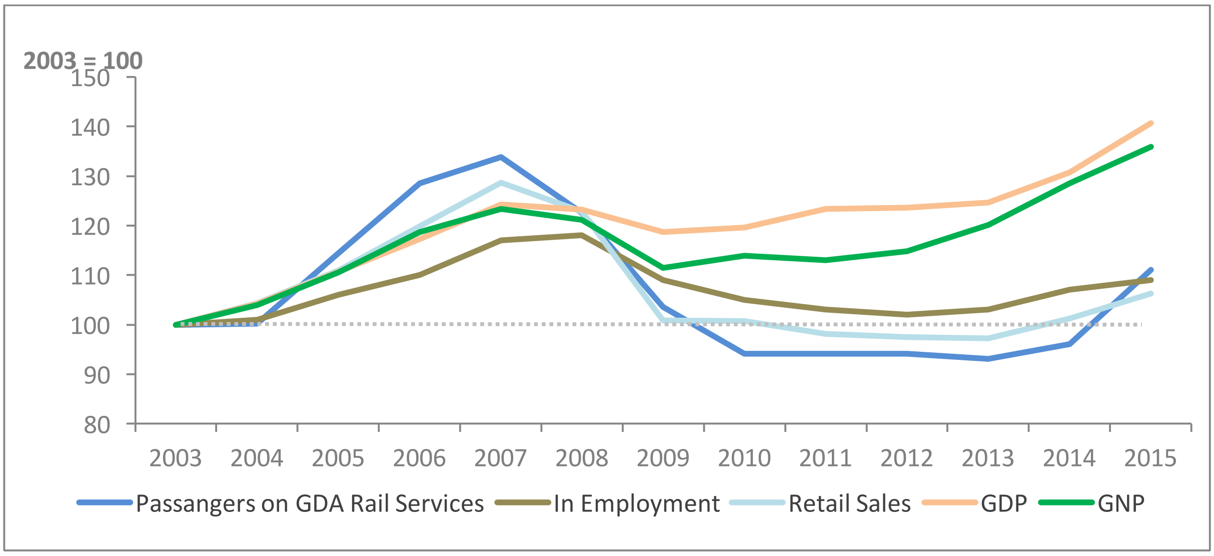
A joint study by the NTA and the Department of Environment, Heritage and Local Government 'Planning and Development of Large-Scale, Rail focused Residential Areas in Dublin' (2013) assessed this issue and concluded that Government policy in relation to sustainable residential density guidelines remains applicable and should be applied and supported. *'It is considered that for Dublin to continue to grow, improve its economic status, and function as economic driver for the country, a coordinated and integrated approach to land use and transport planning must continue to be implemented through national policy.'* The rail network, as the focus for future residential development is central to achieving this.

4. Economy

4.1 Growth and Regeneration

Rail patronage is closely linked to Gross Domestic Product (GDP) and other economic indicators such as employment levels and retail sales, as illustrated by Figure 2 below. As the economy recovers it is anticipated that demand for travel by rail will increase – the presence of capacity within the rail network to meet this demand will support growth.

Figure 2 Rail Patronage in GDA vs national economic indicators



Rail, as a high capacity transport mode, delivers significant benefits to business, particularly in large urban areas, by reducing travel times and/or the cost of travel, thereby reducing the effective distances between firms, as well as between firms and labour markets and raising overall productivity. Recent research by the Economic and Social Research Institute (ESRI) Ireland stated that *'transport infrastructure linking two centres will not generate additional agglomeration economies but will allow for reduced transport costs and thus increased commercial links between the centres'*[30].

Similarly, rail can regenerate and deliver growth in local areas within the vicinity of the rail stations, as increased connectivity provides access to economic opportunities, boosting employment levels, as well as making areas more attractive as business locations. Research from elsewhere[31] suggests that, on average, residential properties within 1/4 - 2 miles from stations sell 4% higher than others and that commercial properties sell for 16% higher. This can contribute to longer term regeneration of areas and wider significant socio-economic benefits.

[30] 'Investing In Our Transport Future: A Strategic Framework for Investment in Land Transport, Background Paper Seven: The Regional Development Impacts of Transport Infrastructure', Department of Transport, Tourism and Sport, (2014)
[31] 'The impact of railway stations on residential and commercial property value', Journal of Real Estate Finance and Economics (2007)

4.2 Competitiveness and Investment

Government policy recognises the need for a modern high quality transport system to ensure Ireland's economic competitiveness and to support enterprise development. Work carried out by Goodbody indicates that the rail network serves the vast majority of the centres of economic activity in the country[32].

Fast, reliable public transport systems, and in particular high quality connections between transport nodes, business, retail, residential, educational and cultural districts are increasingly becoming a pre-requisite for attracting global investment[33]. The 2009 Forfás report *Our Cities: Drivers of National Competitiveness*[34] highlighted the need for sustained investment to improve public transport particularly in the key urban centres.

Recent statistics in relation to foreign direct investment (FDI) in Ireland confirm that the larger city regions are now the focal points for internationally mobile investment with a growing number of investments attracted to the capital city and the larger population centres[35]. Strong inter-urban access, a present partly contributed to by the rail network, and international connectivity are part of what makes and will continue to make these locations a strong proposition for FDI.

4.3 Trade and Freight

Rail freight, particularly for bulky goods, could remove considerable numbers of trucks from the road network which would reduce congestion, in turn leading to environmental benefits such as reductions in noise and air pollution. Road is estimated to be around 30% more expensive than rail per tonne km in the transportation of biomass over 100km and around 45% more expensive over 200km[36] given the economies of scale associated with rail. Furthermore, rail freight has less impact on the environment than road freight: rail is estimated to emit 22.8 grams CO_2 per tonne km vs. 123.1 grams CO_2 per tonne km for road.[37]

A report by the Competition Authority on *'*Competition in the Irish Port Sector' underlined the link between Ireland's future economic success, its ability to trade internationally as an island nation and its heavy dependency on its ports to do so. The existence and quality of road and rail infrastructure linking ports to final on-land destinations influences port selection and the ability of individual ports to compete and expand.

Like road infrastructure, a good rail link can strengthen the competitive position of a port, particularly when handling bulky products like timber, mineral ores, liquid bulk and biomass. While freight options were limited for decades, there has been renewed interest in the use of rail freight in the face of a growing economy – combined with rising road congestion and higher environmental

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[32] ibid
[33] 'Report on Proposed Capital Investment Programme 2012-2016. Transport Capital Investment Programme, Appendix 1', Department of Transport, Tourism and Sport (2011)
[34] 'Our Cities: Drivers of National Competitiveness', National Competitiveness Council and Forfás, (2009)
[35] 'Policy Statement on Foreign Direct Investment in Ireland', Department of Jobs, Enterprise and Innovation, (2014)
[36] 'Biomass: Strategic Issues in Supply Chain Logistics', Limatel
[37] TERM 2003 27 EEA 31, European Environment Agency, (2003)

concerns – and the number of freight services being provided by Iarnród Éireann has grown.[38][39] In the case of Dublin, improvements in the road and rail network such as the Dublin Port Tunnel and the addition of a rail spur have increased the competitive position of Dublin Port.

Also, the introduction of longer freight trains in 2016 supports the competitive positioning of rail freight versus road. The key strategy for freight is to organically grow the business by focusing on commercially viable revenue streams. In this regard, high level discussions are taking place between Iarnród Éireann and corporate importers/exporters to further develop the rail freight business and explore feasible market opportunities.

The principle of moving freight by rail supports existing Irish and European requirements relating to sustainability of transport and environmental policies and aligns with the National Ports Policy, Dublin Port Master Plan and the emerging Department of the Environment National Low Carbon Roadmap. Subject to feasibility, rail could have a role to play in this sector not only contributing to economic benefits but also in assisting Ireland in meeting its 2020 EU Renewable Energy target.

4.4 Business Travel

Iarnród Éireann customer research indicates that approximately 23% of their intercity passengers in 2015 travelled for business purposes compared with the peak in 2007 of 31% and a low of 19% in 2010. As in previous years, the Dublin/Cork route had the highest proportion of passengers travelling for business. As the economy continues to stabilise and improve it is likely that demand for business travel will also increase and there is an opportunity for rail to grasp a larger share of this market.

The rail system also contributes to congestion alleviation which has knock on economic gains in terms of time saved. At present at least 60 per cent of rail users are car-owning. This means that the rail system is contributing significantly to congestion alleviation, where these car owners would have otherwise travelled on congested networks. The congestion alleviation benefits of the rail system are at present focused only on the environs of Dublin where road networks are more congested and the volume of demand, particularly commuting demand, currently met by rail is significant.

Nationally, in 2006, 20% of total travel time by road was classified as 'delayed' due to congestion, falling to 16% in 2013. The figures for major roads in the Greater Dublin Area were 24% in 2006 vs. 20% in 2013. While the road network saw lower levels of traffic during the economic downturn it is expected to become more congested during the economic recovery, particularly in and approaching the largest urban centres. The capacity available in the rail network, as part of the overall public transport network, makes it an important tool for limiting congestion.

As the economy continues to improve it is likely that demand for business travel will continue to grow and there is an opportunity for rail to capture a larger share of this market.

[38] 'Competition in the Irish Ports Sector', The Competition Authority, (2013)
[39] The catalyst for this revival in fortune is the strategy of targeting train load business. Iarnród Éireann operates the train point to point for a customer, and the onus is on the customer to fill or sell the train.

5. Tourism

5.1 General

Tourism is a major sector of the Irish economy, amounting to a €6.6 bn industry annually[40]. This represented some 2.1% of GDP in 2014 (rising to 9% if wider impacts are included e.g. investment activity and other activity in the tourism chain)[41]. The sector accounts for 7.3% of national employment, on a conservative estimate. The sector is forecast to grow by 6% in 2016 relative to last year and this growth is forecast to generally continue in the absence of shocks.

Good public transport enhances the ability of a country, a region or a city to attract visitors, by making tourist destinations and attractions more accessible and by offering legible and frequent services during the interpeak, evenings and weekends when most leisure related travel takes place. National railways have a critical role to play in this and are recognised across the globe as an asset integral to sustaining and growing tourism demand and its associated economic benefits.

The World Economic Forum Travel and Tourism Competitiveness Reports highlight the role of ground transport networks including railroad infrastructure as part of the package of characteristics that influence a country's ability to attract foreign tourists. In 2011 the report by the forum highlighted a disimprovement in Ireland's ability to attract foreign tourists with Ireland's ranking falling from 18th in 2009 to 21st in 2011. In the 2015 Ireland's position had stabilised at 19th. However, transport remained one of the weak areas for Ireland, with the quality of the State's ground transport network ranking 41st out of 141 countries surveyed. The quality of railroad infrastructure was ranked more positively at 30th position – up from 42nd in 2011. A significant reduction in the ability to travel by rail would be likely to impact negatively on how the country is viewed by international tourism markets and on its ability to attract foreign tourism.

There were approximately 7.1 million overseas tourist visits to Ireland in 2014, representing a 13% increase on 2012, and an additional 1.7 million visitors from Northern Ireland, amounting to 8.8m visitors to the State in total.

- The 7.1m overseas visitors travelled internally within the State during their stay, accounting for 11.1m visits to regions, and 11.7m visits to counties within those regions. This means that visitors from out-of-state travel medium distances from place to place whilst in Ireland.
- A significant proportion of overseas holidaymakers arranged their holiday independently. Independent tourists are interested in experiencing everyday life in the countries they visit, and have a propensity to use regular public transport while here, fostered by their use of public transport at home.
- 56% of overseas holidaymakers did not use a car whilst in the country thereby relying on sustainable modes – public transport, walking and cycling – in travelling within the State during their stay here.
- In the region of 40% of overseas tourists visited the Dublin Region.

[40] Tourism Facts 2014, Failte Ireland, October 2015 (Revised February 2016)
[41] Travel & Tourism Economic Impact 2015 Ireland, World Travel & Tourism Council, 2015

- The national rail network has a role in providing for this travel demand. Research by Fáilte Ireland (2010) estimated that around 5%[42] of all out-of-state holidaymakers utilise intercity rail and 6% use local rail.

In addition to out-of-state visitors to the country there were 7.4m domestic (in-state) trips in 2014 (an increase of 5% in trips on 2012).

- In 2014, 10% of domestic tourists relied on intercity rail to make their trips.
- While car is by far the most dominant mode used by domestic holidaymakers the mode share of intercity rail exceeds that of intercity bus despite significant improvements in the intercity bus offering over recent years. This may be due to the perception that a rail trip is part of the overall holiday experience, especially when travelling with children.

The rail network covers many of the main centres for tourism across the country. Fáilte Ireland identified priority development destinations across the country[43]. These priority areas cumulatively account for 70% of Ireland's tourism product - 78% of hotel beds, 80% of attractions with visitor numbers above 20,000 and 60% of all attractions. The rail network serves and links key settlements that are NSS Gateways within these priority areas including Dublin, Cork, Sligo, Westport, Galway, Limerick, Tralee/Killarney and Kilkenny/Waterford.

In particular the Dublin-Westport/Ballina route and the Dublin-Tralee routes show patronage that is relatively strong when compared to their catchment populations – this is mainly as a result of the tourism demand on the lines[44].

5.2 Special Tourist Markets

Cruise Tourism

The Port of Cork hosted 62 cruise liners in 2013, mostly at the Cobh cruise terminal, bringing in approximately 123,000 passengers and crew. Cobh is served by rail, with a well-located station in the heart of the town. Statistics for the cruise season show up to 28% of cruise passengers took the train from Cobh to Cork City during their visit (IÉ). The port authority aim to increase the number of cruise ships entering the port in coming years – onward land travel by rail is regarded as part of the package to do this. The attractiveness of rail for onward travel around the region to tourists entering at Cobh would be improved by offering services to destinations beyond Kent Station in the centre of Cork.

The continued support of rail and the ability to increase and adapt services is recognised by the Port authorities as critical to the continued growth of the cruise tourism industry. There is likely to be potential to further enhance the rail offering and in turn growth tourists use of rail in the wider Cork area in the short, medium and long term through the development of tourist specific rail packages.

Mass transit for large public events

The increase in occurrence of events such as mega-concerts, sports fixtures, and cultural events such as Tall Ships generates date- and location-specific large scale demands for transport for

[42] Approximately 0.4million people
[43] Dunlin and its Doorstep, the South East, Shannon Corridor, Cork City, Connemara, West Cork, Ring of Kerry, Dingle Penninsula, Donegla/Sligo
[44] '2030 Rail Network Strategy Review, Final Report', AECOM and Iarnród Éireann, (2011)

leisure/tourism. Trains are the ideal choice to move large numbers of people safely to and from such events. While this means that venues close to rail stations are the ideal choices to host such events, it also means that improved more comprehensive rail services must be operated to meet the demand for transport that arises, frequently outside of normal service operating hours. Good experience of using rail to special events can introduce people for the first time to the benefits of rail travel, and encourage them to re-examine commuting habits in favour of switching to rail in the future for their regular needs.

Iarnród Éireann currently operates a range of targeted event specific services often supported with corresponding marketing campaigns and fares/ticket offers. Additional opportunities to provide specials to events across the network should also be examined and developed.

Railtours
Railtours Ireland, a private company, has organised rail-specific vacations for almost 350,000 visitors since 1998: approximately 22,000 per year.[45] Furthermore, 80% of these passengers are from the U.S.A. and Canada. As visitors from North America make up 25% of all overseas tourism revenues in Ireland, this represents an important segment of Ireland's tourism industry.[46]

Belmond Ltd., a global collection of luxury hotel and travel adventures, plans to introduce the Grand Hibernian service during 2016.

5.3 Rail Tourism – A potential growth area

The points above demonstrate the existing role of rail in meeting demand for tourism related travel. In this context it is widely accepted that there is potential to further increase the proportion of tourism and leisure related travel demand captured by rail.

A newly published report from the Irish Tourism Industry Confederation suggests that the number of non-car using tourists could potentially grow from 4.7m in 2016 to 5.3m in 2020.[47] It states that public transport usage among visitors is likely to increase above the average tourism growth rate, particularly in the medium to long term, as improvements that are currently in development stages take effect. The gradual decline of car ownership and usage among certain tourists, combined with a nervousness about using a car in an unfamiliar destination where parking may be constrained for others, indicates an increased propensity to use public transport while visiting Ireland. Furthermore, the increasing integration of web-based sales platforms supports ease of travel by consumers - facilitating multi-modal and multi-country travel by public transport. The increasing use of mobile technology for both ticket sales and paperless travel also makes public transport usage more appealing to visitors travelling in unfamiliar locations or facing linguistic barriers.

The report recommends that a full integration of all modes in terms of pricing, ticketing, stops and routes is the best method of achieving this potential growth. Scheduled services should be promoted to tourists as day-trip and short break products, with specific bundles developed for the different tourist groups (business travel, visiting friends/family, international tourists etc). A consistent

[45] 'Railtours Ireland First Class', Rail Tours Ireland, (2014)
[46] 'Tourism Facts 2013', Failte Ireland, (2014)
[47] A Review of Public Transport & Tourism in Ireland, Irish Tourism Industry Confederation Report (2016)

approach in the area of the use of online and mobile technology for ticketing is recommended, to ensure that the potential of web-based sales platforms is maximised.

Initiatives to grow tourist numbers on Iarnród Éireann services are already under way include the launch of a tourist Leap Card on sale at Dublin airport while potential future market development initiatives may include:

- Outside of Dublin, Cork attracts the largest number of overseas visitors to the country and three of the top four tourist destinations in the south-west of Ireland are located in the Greater Cork area (Fota Wildlife Park (railway station at Fota), Blarney Castle (disused railway station at Blarney), the Jameson Experience Midleton (railway station at Midleton)). Improving the coverage of the rail network by reopening stations or providing new ones on the network, the development of a rail tourism package and the development of rail services to facilitate a coherent offer to those visiting these attractions merits further consideration,

- Recent years have seen a growth in active tourism particularly cycling and the development of this niche market in Ireland in an opportunity. There is an opportunity for rail to exploit this market by making rail-cycle simple, particularly on services to key destinations (e.g. Westport, Ennis, Killarney, Tralee, Sligo and Ballina.

6. Rail and Sustainability

6.1 Emissions and Air Quality

Railways are widely recognised as one of the 'greenest' ways there is to provide mobility for goods and people.

- It is a fuel efficient method of transport
    - Fuel usage and emissions per Passenger / Tonne kilometre are low
    - Electric railways are commonplace and these represent the cleanest form of powered transport; emissions relate only to the energy source used for generating power.
- It is eminently suited to moving heavy freight loads overland,
    - It is particularly good for large tonnage and long distances.
- It can move large numbers of people in comfort into and out of cities, and between cities
    - It is fast and generally free from congestion delays.
    - Traveller productivity is enabled, as the traveller does not have to drive and can work while travelling (wi-fi enabled etc.).
- The road footprint per passenger is very low, compared to car transport.
    - This leads to less construction work.
- The vehicles are very durable, returning very long service lives for the materials and energy invested in them.
    - It is not unusual to operate vehicles for 40 years, covering millions of kilometres over their lifetime.
- Noise emissions from railways are less intrusive than road transport.
    - The noise from road tyres is the most significant noise polluter.

The International Union of Railways (UIC) reports that travelling by rail is 3-10 times less CO2 intensive compared to road or air transport. During 2010, the average rail passenger km in Ireland created just 60g of greenhouse gases, vs. 210g for road vehicles.[48] If all rail journeys were made by car it would increase greenhouse gas (GHGs) emissions by around 240,000 tonnes, equivalent to 30,000 households[49].

The following table shows the progress made by railways, in the past decades, compared to alternative means of transport:

[48] 'Energy efficiency and specific CO_2 emissions', European Environment Agency (2013); 'Railway Handbook: Energy Consumption and CO_2 Emissions', International Energy Agency and International Union of Railways, (2013),; The World Bank

[49] Sustainable Energy Authority, Ireland; Central Statistics Office

Mode	Emissions (gCO2/passenger km)	% age change since 1995 / 1996
Passenger rail, diesel	74	-16%
Passenger rail, electric	54	-28%
Passenger rail, overall	61	-22%
Car / Taxi	106	-08%
Domestic air services	231	+06%
Source: ATOC UK Report		

In Ireland transport emissions have decreased by 20% since 2007. The decrease primarily reflects the impact of the economic downturn plus the changes in vehicle registration tax and road tax introduced in mid-2008. Despite this, transport remains the second largest contributor to overall GHG emissions in Ireland (after agriculture) responsible for 21.8% of the total.

'Latest projections indicate that through full implementation of all foreseen mitigation measures, a small reduction in transport emissions is achievable by 2020'[50]. This is dependent on maintaining and improving the current mode share for sustainable modes including rail.

With regard to air emissions, Ireland did not meet the prescribed 2010 ceiling for nitrogen oxides emissions due to sustained emissions from road transport. *'Levels of NOX in traffic-impacted city centre areas will continue to be a problem due to the difficulty in achieving large-scale reductions in road traffic numbers. This should be addressed through policies to reduce car use; increase use of public transport; and reduce emissions from vehicles.'*[51] Sustaining and building upon the role of rail, particularly in the Dublin metropolitan area has a role to play in this.

For Ireland to comply with its international commitments on air quality and air emissions, further improvements in the transport sector are critical. Central to this is the implementation of policies to increase the use of alternatives to road transport for the movement of both people and goods. To do so alternatives in terms of public transport must be made available and must be attractive. Iarnród Éireann's plans to further improve its impact on the environment include the following:-

- Biodiesel and energy reduction measures,
- Plans for expansion of electrification (DART expansion programme)
- Potential electrification of InterCity routes in the longer term
- Explore commercially viable freight opportunities

[50] 'Ireland's Environment, An Assessment', Environmental Protection Agency, (2012)
[51] (ibid)

- Promotion of further mode shift from the private car.

6.2 Energy Efficiency

Iarnród Éireann has made huge inroads in the area of energy efficiency over the past number of years, to the extent that IÉ has already passed the target of 30% improvement, set by Government, to be achieved by 2020.

IÉ is achieving a reduction in total energy consumption of 272 GWh per year, compared to the baseline; this equates to 27 Million litres of Diesel oil per year saved, which represents a 36% reduction.

These reductions have taken place in the context of services being either unaffected or slightly improved, as the below table shows.

	Quantity baseline 2006	**Quantity 2015**	**Change %**
Energy used	**769** G W hr	**497** G W hr	- 35 %
Train kilometres	18.2 M km	18.4 M km	+ 1 %
Energy per Train kilometre	4.14 MWh per 100 Train kilometres	2.7 MWh per 100 Train kilometres	- 35 %
Passenger kilometres	1,872 M km	1,917 M km	+ 2 %
Energy per Passenger kilometre	4.03 MWh per 10,000 Passenger kilometres	2.59 MWh per 10,000 Passenger kilometres	- 36 %

This is an exemplar performance, and it continues with further projects to achieve more savings, but the long term goal must be the electrification of the railway.

6.3 Protection of the Natural Environment

Iarnród Éireann are in the process of achieving ISO Certification, for all operations with a significant impact on energy consumption, or with the potential to cause significant environmental harm.

Three separate Standards are being implemented:

- ISO 9001 Quality Management Standard
- ISO 14001 Environmental Management Standard
- ISO 50001 Energy Management Standard

These standards are being implemented to ensure good practice in its operating procedures, so that it can achieve a measurable consistency in performance and drive continuous improvement. Each of the affected locations implement Review Workshops on both environmental and energy on a regular basis.

The infrastructure and systems relating to the environment are continually updated and improved including fuel management systems, waste management the treatment of brownfield sites.

Iarnród Éireann's rail network traverses a diverse network of natural habitats and landscapes including rivers, coastal areas, peat lands, wetlands, semi natural grasslands and estuaries. The railway network can be an agent of good or harm, as it can provide vital corridors for wildlife within urban and agricultural landscapes but can also act as a vector for the expansion of invasive species infestations.

Iarnród Éireann is a participant in several programmes designed to improve the environment, or at a minimum, ensure that there is no deterioration in the environment. It is an active participant in several areas:

- The "All Ireland Pollinator Plan" initiated by the National Biodiversity Centre; level crossing sites are particularly suitable for bees.
- An ongoing programme for the identification and treatment of invasive species of plant life and animal life.
- An ongoing programme for the safe use of (necessary) pesticides and weed killers.

Great care is taken in planning works, particularly in Special Areas of Conservation, to ensure that biodiversity is sustained, and improved, if such improvement makes sense in the overall context of the works in hand.

In summary, Iarnród Éireann is operating in the most sustainable powered land transport arena, and is operating at an exceptionally high level in terms of its work to reduce specific fuel consumption and guard the environmental assets entrusted to it.

7. Social benefits

7.1 Accessibility

The accessibility of rail enables greater participation in the economy by those with mobility and sensory impairments. In a 2013 National Disability Survey, respondents living in towns and rural areas stated that they were more likely to use intercity trains than intercity buses[52] and reports by the National Disability Authority suggest that disabled users have benefitted significantly from investment in new rolling stock and station facilities.[53]

Since 2000, all new railway stations have generally been designed and constructed in accordance with accessibility standards/best international practice. An accessibility refurbishment programme to make the existing railway stations accessible is underway on a railway line by railway line basis.

A recent European Commission survey on satisfaction with rail services indicated that Ireland, along with the United Kingdom, are the two countries in Europe that consistently have the highest satisfaction with accessibility,[54]

7.2 Social inclusion

The Department of Social Protection Free Travel Scheme enables senior citizens to play a full role in society. Better inclusion also brings with it associated economic benefits.

The wider benefits of the scheme, beyond facilitating travel, of supporting and encouraging recipients to be active and participate in the community and providing access to services and facilities (shopping, health services) are widely recognised.

Around 11% of journeys on the rail network each year are made by passengers under the Free Travel Scheme. The Scheme benefits more than 780,000 people every year, amounting to 4.6m journeys annually, and should the railways be cut back significantly there would be a requirement to find alternative means of enabling these groups to travel.

Further benefit to the economy is derived, through supporting domestic tourism and associated spends in local economics at destinations (through patronage of businesses, restaurants, hotels and other amenities). Rail is currently playing a key role in facilitating this, particularly on lines like the Dublin-Westport and Dublin-Sligo.

7.3 Safety

Rail has a strong safety record, with railway accident and injury statistics much lower than most other modes of transport both in Ireland and across the EU (fatalities per passenger km for trains are

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'Transport and Disability by Geographical Area', [52] National Disability Survey, (2013),

[53] 'Towards Best Practice in Provision of Transport Services for People with Disabilities in Ireland', National Disability Authority, (2004),

[54] 'Europeans' satisfaction with rail services', European Commission, (2013)

30 times lower than for cars across Europe). The Railway Safety Commission has reported that Iarnród Éireann is performing above average in terms of safety performance[55] across a broad range of safety Key Performance Indicators (KPIs) when benchmarked against the EU average, and overall Ireland is in the top five safest European countries for rail travel. From 2008 to 2011 there were 917 road fatalities in Ireland with estimated total costs of EUR 1.8bn-2bn, or around EUR 500m p.a.[56] Since 2008 there were only eight fatalities for rail passengers and employees.[57] The value of casualty prevention resulting from use of the rail network as opposed to private car is a wider benefit.

Usage of the rail network lowers the numbers of people killed or seriously injured on the transport network in Ireland (relative to what would be expected to happen if those journeys were made by other modes).

[55] 'Railway Safety Statistical Report'Railway Safety Commission, (2010)
[56] 'Casualty and Accident Values' Goodbody Economic Consultants for The Road Safety Authority – Ireland, (2002) ; 'A valuation of road accidents and casualties in Great Britain', Department of Transport – UK, (2011),
[57] 'EU transport in figures: Statistical Pocketbook', European Commission, (2013),

8. Conclusions

This report has examined the current role of rail in the national transport network, its position relative to other modes and how rail contributes to achieving national policy goals in relation to the environment, land use development, regional sustainability and economic development. To complete the picture the report also sets out the challenges that rail faces in terms of competition from road-based transport, and identifies opportunities for rail to improve its share of national travel going forward.

Envisioning the optimal rail network, in terms of national transport need and value for money, needs to be against the backdrop of both its current role and the role it should serve into the future, given the forecast population and economic growth in Ireland.

The current strengths of the rail network in providing for intra-urban travel demand within Ireland's largest urban areas (Dublin and Cork) and strategic inter-urban linkages between Dublin and the other key cities and regional towns[58] on the island will increase in importance as overall demand for travel increases with economic growth. In years to come rail will be central to achieving broader national policy goals, so we need to invest now to develop both infrastructure and services to ensure its future success.

The wider social, environmental and economic benefits derived from rail travel can be summarised as follows:

- Rail provides the core high capacity element of the public transport network in the Great Dublin Area (GDA) - approximately 7% of existing commuting to work in the GDA is by rail. Without rail, this traffic would reassign to other road-based modes (car/bus) which would increase traffic congestion and erode the useful life of the national and regional road network approaching the capital. . Demand for travel within the Greater Dublin Area is predicted to increase further in future years – maximising the role of rail will be critical in managing this sustainably as the road network becomes more constrained. Rail provides an irreplaceable role in providing high volume commuter transport in the Greater Dublin Area serving locations up to 80km from the city centre with high frequency services of approximately one hour travel time, and in providing a mass transit line through the heart of the city with DART.

- Inter-urban rail, as a high capacity transport mode, delivers significant business agglomeration benefits by reducing travel times and/or the cost of travel, thereby reducing the effective distances between firms, as well as between firms and labour markets and raising overall productivity. Between urban centres it allows for reduced transport costs and thus increases commercial links between the centres. Multiple options for travel help to support economic activity and encourage investment. The larger city regions in Ireland are now the focal points for internationally mobile investment with a growing number of investments attracted to the capital city and the larger population centres[59]. Strong inter-urban access, at present contributed to by the rail network, and international connectivity are part of what has secured this investment and part of what will continue to secure and maintain investment into the future. Reducing the strategic transport network is likely to

[58] Belfast, Cork, Galway, Limerick, Waterford, Sligo, Tralee/Killarney, Westport
[59] 'Policy Statement on Foreign Direct Investment in Ireland', Department of Jobs, Enterprise and Innovation, (2014)

have a negative impact on the attractiveness of Ireland's larger city regions for foreign investors.

- A primary focus across national policy documents in the various sectors mentioned above is to increase sustainability and efficiency through more effective alignment of land use and transport and modal shift towards more sustainable forms of transport. Focusing especially on the development of locations within and around the key cities and towns that are served by the rail network is central to achieving these aims.

- Rail currently has a significant market share of interurban travel associated with Dublin and while this was subject to decline from 2007 onwards, due largely to increased competition for car and bus travel, this has now stabilised and is beginning to grow - maintaining this mode share is critical to preventing future shift to private car for such journeys and to keeping Ireland's road network moving, particularly in the Dublin area, now and into the future and as demand increases.

- The national rail network also plays a key role in sustaining and growing tourism. Tourism is a key sector in the Irish economy. Approximately 11% of domestic tourists and 5% of out-of-state tourists travelled intercity on rail in 2014. Tourists visiting the major cities and towns also generally use public transport to travel, including by rail. Rail also provides high capacity transport links for high volume tourism and leisure demand created by special events and is regarded as a key part of the package to support and increase the attractiveness of the Port of Cork to the cruise industry. A significant reduction in the ability to travel by rail would be likely to impact negatively on how the country is viewed by international tourism markets and how strongly it can compete with other destinations for tourist travel.

- Ireland's targets in relation to emissions reductions are already proving challenging and transport is one of the key sectors in which substantial improvements are required. Part of the necessary package of transport actions is maintaining and increasing the mode share of walking, cycling and public transport. During 2010, the average rail passenger km in Ireland created just 60g of greenhouse gases, vs. 210g for road vehicles.60 If all rail journeys were made by car it would increase greenhouse gas (GHGs) emissions by around 240,000 tonnes, equivalent to 30,000 households. Sustaining and building upon the role of rail in providing for travel demand will support national efforts to reach emissions targets. Iarnród Éireann has already passed the target of 30% improvement, set by Government, to be achieved by 2020. Since 2006 energy consumption has reduced by 35% whilst services have been maintained and in some cases enhanced.

- As part of the overall public transport network rail supports social inclusion and social mobility by providing access to services, communities and jobs for those vulnerable to social exclusion including older people and people with disabilities. High levels of accessibility across the rail network facilitate and support universal access. Furthermore, each year more than 780,000 people benefit from rail travel through the Social Protection Free Travel Scheme, amounting to 4.6m journeys annually. Should the railways be cut back significantly there would be a requirement to find alternative means of enabling these groups to travel.

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[60] 'Energy efficiency and specific CO_2 emissions', European Environment Agency, (2013),; International Energy Agency and International Union of Railways (2013), 'Railway Handbook: Energy Consumption and CO_2 Emissions'; The World Bank

The rail network contributes not only to meeting transport demands but also to broader social, environmental and economic needs and objectives, all of which must be taken into consideration in planning for the future of the network.

Appendix 3

August 2016

Advisory Note on Abandoned & Closed Rail Lines

Údarás Náisiúnta Iompair
National Transport Authority

Iarnród Éireann
Irish Rail

Contents

1 Introduction

This advisory note sets out a brief overview of the responsibilities that continue to be held by Iarnród Éireann (IE) for maintaining of Abandoned & Closed Rail Lines and for which no funding is currently provided.

2 Definition of Closed and Abandoned Lines

A closed line is one in which the CIÉ/IÉ Board is relieved of its obligation to operate trains, but all other statutory duties remain, including maintenance of accommodation works, drains, fences, bridges level crossings etc. An abandoned line is one which, under section 21 of the 1950 Transport Act, an abandonment order has been made by the Board.

There are 10 Closed Lines on the network with 387 bridges.

There are some 80 Abandoned Lines with 1107 bridges in varying forms serving differing purposes throughout the Network. There are a number of these lines where the actual ownership has not been fully ascertained.

Closed and Abandoned lines represent a significant risk and responsibility to CIÉ.

3 Maintenance of Closed and Abandoned Lines

One of the major concerns around closed and abandoned lines is those assets, in particular bridges, where there is a third party interface. There are 387 bridges on 10 closed lines where responsibilities for these structures remain with IÉ. Structural inspections on closed lines are therefore undertaken in accordance with the technical standards on a risk-prioritised basis with special consideration for structures with public/third party interfaces.

As with all assets, there is a basic requirement for the maintenance of these assets to ensure their functionality and safety. No funding is currently provided for assets on any closed lines or any associated works. Work requirements commonly arise such as for boundary protection or bridge repair and these are carried out as the issues arise.

With regard to abandoned lines, representations from Local Authorities and others are becoming more frequent where requests are being made to carry out works to these assets. For example, following recent representations by the Local Authority, IÉ have had to undertake repairs to a local road bridge where there is no functioning railway at Graigue in Co. Tipperary. The bridge posed a safety risk to road users, including a recent accident where a school bus was involved in a collision at this bridge.

The 80 abandoned lines have an estimated 1107 bridges on them. As with closed lines, no funding has been provided for the inspection, maintenance or general upkeep of these assets.

The estimated funding requirement for maintaining these closed and abandoned lines is €3m per year.

4 Conclusion

Section 21 of the 1950 Transport Act sets out the mechanism for abandoning a railway line. Closure of the line is a pre-requisite. Where an Abandonment Order is made there is a procedure by which the Board may relieve itself of its statutory duties by the service of notices and the payment of compensation.

Iarnród Éireann proposes that the DTTaS facilitates the transfer of all bridges on abandoned lines to the relevant Local Authority (LA) and the abandonment of all closed lines. This proposal will reduce the estimated funding requirement for maintaining closed and abandoned lines by €3m per year.

List of Abandoned or Closed Lines

Abandoned Lines				
Nr	Section	Mileage	Length Miles	Length Km's
1	Sallins - Tullow	0 - 34.75	34.75	31.38
2	Bagnalstown - Pallas East	66 - 90	24.0	38.62
3	Clara - Banagher	0 - 18.75	18.75	30.18
4	Portlaoise - Kilkenny	0 - 28.25	28.25	45.46
5	Birdhill - Killaloe	0 - 4	4.0	6.44
6	Banteer - Newmarket	0 - 9	9.0	14.48
7	Headford - Kenmare	0 - 22	22.0	35.41
8	Gortatlea - Castleisland	0 - 4.25	4.25	6.84
9	Mallow - Waterford	0 - 75.5	75.5	121.51
10	Fermoy - Mitchelstown	0 - 12	12.0	19.31
11	Portlaoise - Mountmellick	0 - 7.5	7.5	12.07
12	Castlecomber Jct - Deerpark	0 - 9.5	9.5	15.29
13	Roscrea - Birr	0 - 11.75	11.75	18.91
14	Charleville Jct - Patrickswell	0 - 17.5	17.5	28.16
15	Farranfore - Valentia Hb	0 - 39.25	39.25	63.17
16	Thurles - Clonmel	0 - 25.75	25.75	41.44
17	Goolds Cross - Cashel	0 - 5.75	5.75	9.25
18	BridesGlen - Shanganagh	8.25 - 12	3.75	6.04
19	Woodenbridge - Shillelagh	44.75 - 61.5	16.75	26.96
20	Macmine Jct - New Ross	83.25 - 102	18.75	30.18
21	Broadstone - Liffey Jct	0 - 1.5	1.5	2.41
22	Streamstown - Clara	61.75 - 69.5	7.75	12.47

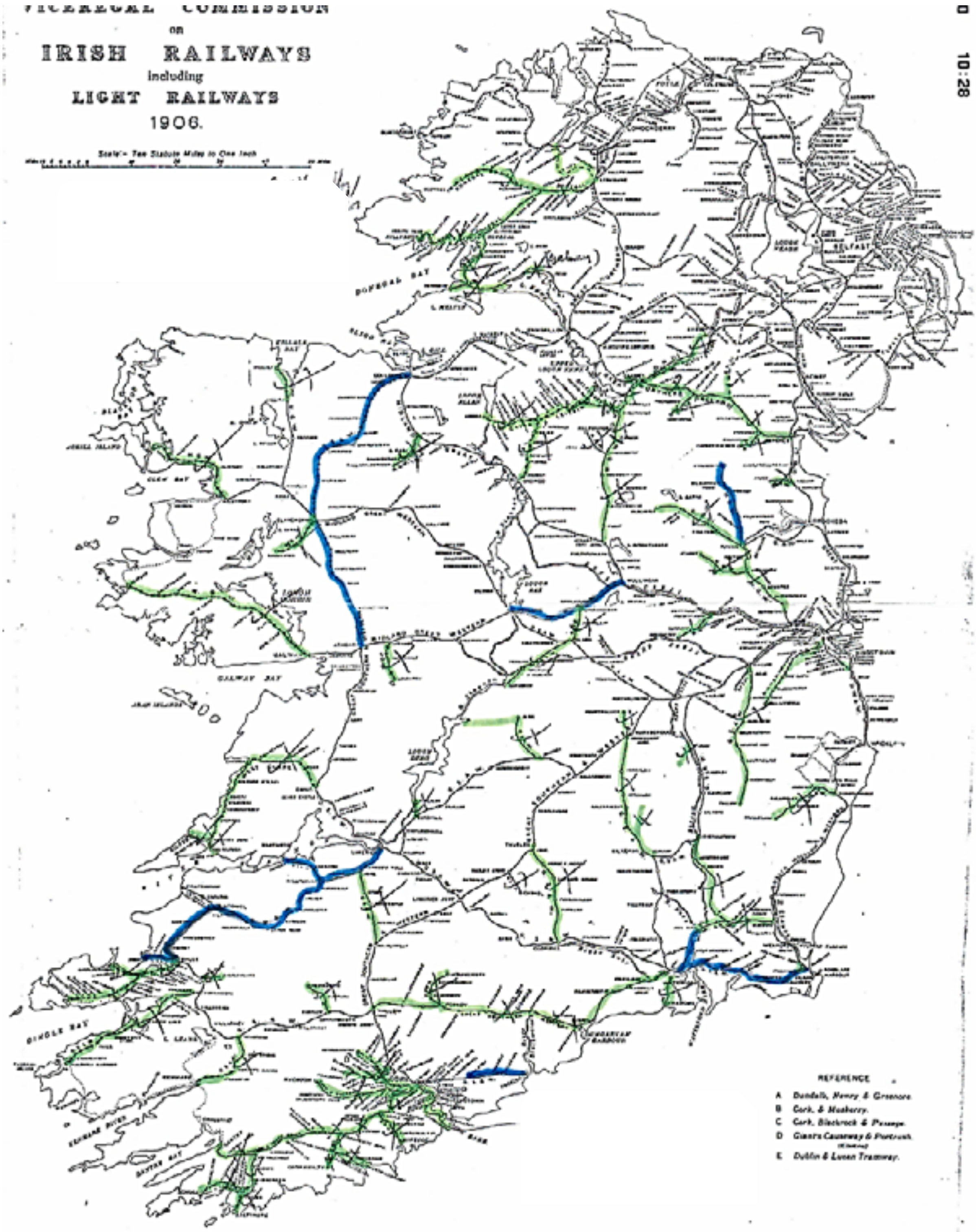
23	Enfield - Edenderry	27.75 - 37.25	9.5	15.29
24	Inny Jct - Cavan	61 - 85.75	24.75	39.83
25	Galway - Clifden	126.75 - 174.5	47.75	76.85
26	Attymon - Loughrea	107.25 - 116.25	9.0	14.48
27	Kilfree - Ballaghadereen	112.5 - 122	9.5	15.29
28	Claremorris - Ballinrobe	135 - 147.5	12.5	20.12
29	Westport - Westport Quay	161.25 - 163	1.75	2.82
30	Ballina - Killala	166.5 - 174.25	7.75	12.47
31	Dunboyne - Navan	10.5 - 30.5	20.0	32.19
32	Kilmessan - Athboy	24.25 - 36.5	12.25	19.71
33	Westport - Achill	160.75 - 187.5	26.75	43.05
34	Dundalk - Derry - border near Clones	0 - 41	41.0	65.98
35	Border Porthall - Border St Johnson	109 - 114	8.25	13.28
36	Dromin - Ardee	0 - 5	5.0	8.05
37	Portadown (Border Glaslough) - Cavan	21 - 54.75	33.75	54.32
38	Armagh (Border Kanes Rock) - Castleblaney	14 - 18.25	4.25	6.84
39	Inniskeen - Carrickmacross	0 - 6.5	6.5	10.46
40	Navan - Oldcastle	18 - 39.5	21.5	34.60
41	Bundoran Jct - Bundoran	Below		0.00
42	Border Pettigo - Border Letter	15 - 17	2.0	3.22
43	Border Belleek - Bundoran	27.75 - 35.25	7.5	12.07
44	Sutton - Howth	0 - 5.25	5.25	8.45

45	Ballyhaise - Belturbet	0 - 4.25	4.25	6.84
46	Shantonagh Jct - Cootehill	0 - 7.5	7.5	12.07
47	Cork - Coachford	0 - 15.5	15.5	24.94
48	Coachford - Donoughmore	6.25 - 15.75	9.5	15.29
49	St. Annes - Blarney	7.25 - 8.5	1.25	2.01
50	Cork - Baltimore	0 - 62	62.0	99.78
51	Kinsale Jct - Kinsale	0 - 11	11.0	17.70
52	Clonakilty Jct - Clonakilty	24 - 33	9.0	14.48
53	Drimoleague - Bantry	45.5 - 58.75	13.25	21.32
54	Cork City Railways	0/25 - 0.75	0.5	0.80
55	Ballinascorthy - Courtmacsherry	0 - 9	9.0	14.48
56	Listowel - Ballybunion	0 - 9.25	9.25	14.89
57	Border Strabane - Killybegs	2 - 50.75	48.8	78.46
58	Stranorlar - Glenties	0 - 24	24	38.62
59	Donegal - Ballyshannon	31.5 - 47	15.5	24.94
60	Border Strabane - Letterkenny	1 - 19.25	18.25	29.37
61	Belturbet - Dromod	33.75 - 0	33.75	54.32
62	Ballinamore - Arigna	0 - 18.75	18.75	30.18
63	Cork - Crosshaven	0 - 16	16.0	25.75
64	Waterford-Tramore	0 - 7.25	7.25	11.67
65	Cork - Macroom	0 - 23.5	23.5	37.82
66	Skibbereen - Schull	0 - 14.5	14.5	23.34
67	Tralee - Dingle	0 - 32.25	32.25	51.90
68	Castlegregory Jct - Castlegregory	0 - 6	6.0	9.66
69	Ennis - Kilkee	0 - 48	48.0	77.25
70	Moyasta - Kilrush	43 - 47.5	4.5	7.24
71	Athy - Wolfhill	0 - 9.5	9.5	15.29

72	Terenure - Poulaphouca	0 - 20.25	20.25	32.59
73	Conygham Road - Leixlip	0 - 9	9.0	14.48
74	Parsonstown - Portumna Bridge	0 - 12.25	12.25	19.71
75	Dundalk - Greenore	0 - 12.5	12.5	20.12
76	Greenore - Border Newry	0 - 13	13.0	20.92
77	Derry - Burtonport	2 - 74.5	72.5	116.68
78	Tooban Jct - Carndonagh	6.25 - 30.5	24.0	38.62
79	Crossdoney - Killeshandra	81.5 - 88.5	7	11.27
80	Summerhill (Cork) lines		0.5	0.80
	Total 80		**1358**	**2161**

Closed Lines				
Nr	***Section***	***Mileage***	***Length Miles***	***Length Km's***
1	Navan Kingscourt	31 - 50.5	19.5	31.38
2	Abbey Junction - New Ross	102 - 115.75	13.75	22.13
3	Belview - Rosslare Strand	79.75 - 110.75	31.0	49.89
4	Mullingar - Athlone	50.25 - 78	27.75	44.66
5	Athenry - Claremorris	60.5 - 76.25+0 - 16.75	32.5	52.30
6	Claremorris - Collooney	0 - 46.25	46.25	74.43
7	Limerick - Foynes	0 - 26.75	26.75	43.05
8	Tralee - Fenit (14 Bridges)	0 - 8.5	8.5	13.68
9	Midleton - Youghal	6.25 - 20.5	14.25	22.93
10	Ballingrane - Tralee (lifted)	14.25 - 46 + 0.75	29.5	47.48
	Total 10		**250**	**402**

Map of Abandoned or Closed Lines



Green indicates abandoned.

Blue indicates closed.

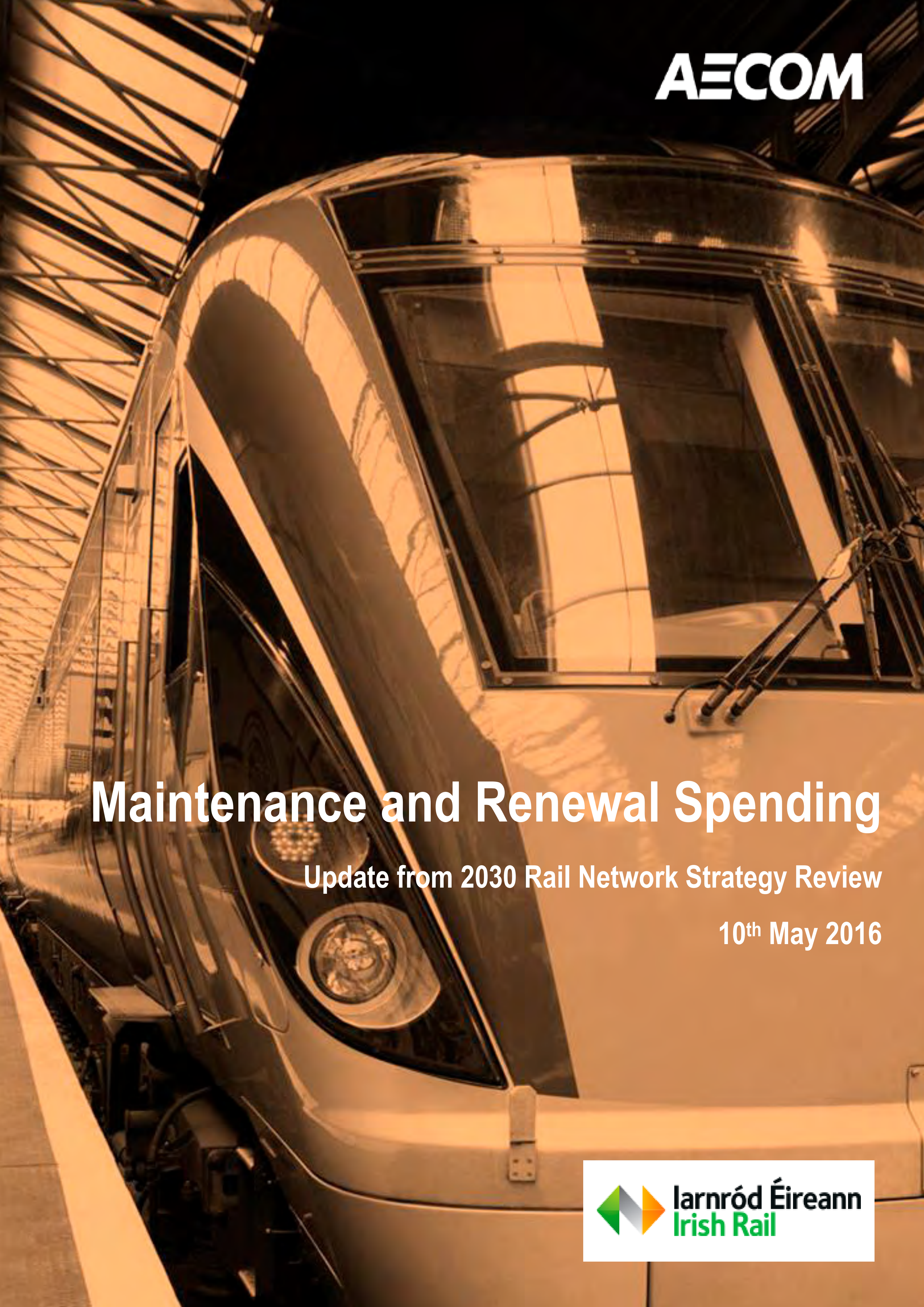
Appendix 4

August 2016

Meeting the capital investment requirements

Údarás Náisiúnta Iompair
National Transport Authority

Iarnród Éireann
Irish Rail



AECOM

Maintenance and Renewal Spending

Update from 2030 Rail Network Strategy Review

10th May 2016

Iarnród Éireann
Irish Rail

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EXECUTIVE SUMMARY

As part of its work on Irish Rail's "2030 Rail Network Strategy Review, 2011"[1] AECOM devised a recommended programme of infrastructure maintenance and renewal activities to be carried out by Irish Rail over the twenty years from 2011 to 2030 inclusive. Based on its work, AECOM recommended that Irish Rail spend the equivalent of €2,896m on the maintenance and renewal of its civil engineering infrastructure over the period, and a further €1,384m on the maintenance and renewal of its Signalling, Electrical and Telecoms infrastructure over the same period.

In the years since 2011, Irish Rail has not had sufficient funding to complete this planned programme of maintenance and renewal spending. A significant backlog of infrastructure maintenance and renewal activity has built up and there is an urgent need to secure funding for an enhanced level of maintenance and renewal activity over the coming years to make up this backlog and to restore the planned level of maintenance and renewal activity.

Irish Rail's planned level of infrastructure maintenance and renewal is actually below any reasonable benchmark figure. It is a full 21% less than the spending allowed in Scotland, which is one of the best comparators in terms of scale and local economic conditions. Irish Rail's actual level of spending is significantly lower than its plans. Its current actual spending is running at a level a full 33% below the levels allowed in Scotland.

Irish Rail has been spending significantly less than a sustainable amount on infrastructure maintenance and renewal since 2011. It has been able to maintain the operational performance of the network by carrying out short term repairs that temporarily restore time expired assets to a workable condition and by managing safety issues. Funds for this extra repair and maintenance work have been secured by postponing planned renewal work. This is reflected in the fact that total planned spending on maintenance and renewal is running €285m behind planned levels by the end of 2016. Spending on maintenance is currently running ahead of planned levels, reflecting short term fixes to keep the network operational

This is strictly a short term approach. As time passes and renewal spending is postponed to pay for short term fixes, more and more of the assets that make up the network will reach the end of their useful life and will cease to be fully functional. In order to keep the rail network operating these assets will require short term repairs. The number of assets requiring this type of repair and the cost of carrying out individual repairs will both increase as time passes. In a relatively short time the annual cost of reactive repairs to keep the network operational will exceed the cost of a well-planned predictive approach based on renewing assets as they reach the end of their normal life.

More seriously as the average age of the network assets continues to increase under the current approach there will be an increasing risk of reductions in service as the operating speed of the lines declines. Ultimately the risk of safety being compromised will emerge.

There is a clear need to increase spending on maintenance and renewal and to return the network to a sustainable state. We have devised a revised estimate of the Irish Rail infrastructure maintenance and renewal annual requirement over the 14 year period 2017 – 2030 assuming track asset lives of 40 years. This takes account of the backlog built up over the last six years, adjusted for a level of avoidable expenditure, and with adjustments for tender price inflation and efficiencies The updated infrastructure annual maintenance and renewal steady state funding requirement is €239.5m over 14 years (2017 prices) compared to the original 2011 funding requirement of €214.0m over 20 years. In addition to infrastructure maintenance and renewal costs, the Irish Rail Infrastructure Manager will have ongoing operating costs. The average of these for the years 2014 to 2016 has been: €23.0m per

[1] 2030 Rail Network Strategy Review, Final Report, AECOM October 2011,

annum signalling and control operating costs and €9.2m per annum safety management costs. Funding for €37.3m of operating and safety management costs per annum is required for the future including an increased provision (internal transfer cost) for the Infrastructure Manager EU compliance (4b/c). The minimum funding requirement of the Infrastructure Manager to meet operating, safety management and steady state infrastructure maintenance and renewal costs is therefore €276.8m per annum over the 14 year period to 2030. This compares to the original requirement of €244m per annum over 20 years derived in the original 2011 AECOM analysis.

It should be noted that this does not include any provision for works and responsibilities that may be associated with closed and abandoned lines which has been estimated at €3m per annum.

1. INTRODUCTION AND METHODOLOGY

As part of its work on Irish Rail's "2030 Rail Network Strategy Review" AECOM (2011) devised a recommended programme of infrastructure maintenance and renewal activities to be carried out by Irish Rail over the twenty years from 2011 to 2030 inclusive. Based on its work, AECOM recommended that Irish Rail spend the equivalent of €2,896m on the maintenance and renewal of its civil engineering infrastructure over the period, and a further €1,384m on the maintenance and renewal of its Signalling, Electrical and Telecoms infrastructure over the same period. This equated to an average annual spend of €214m over 20 years. It was recommended that this spending be slightly front loaded into the period to 2019 to prioritise completing the renewal of the Dublin-Cork rail line. Key details of the programme are summarised in the next section of this report.

This recommended programme of infrastructure maintenance and renewal spending was devised when a major programme of inspection and renewal of rail infrastructure was coming to an end. Between 1999 and 2013 three five year phases of a "Railway Safety Programme" were completed. As a result the infrastructure managed by Irish Rail was in a relatively good physical condition, and there was a high level of knowledge as to its likely future state and future needs for maintenance and renewal.

In the years since 2011, Irish Rail has not had sufficient funding to complete its planned programme of infrastructure maintenance and renewal spending. Accordingly a significant backlog of maintenance and renewal activity has built up and there is an urgent need to secure funding for an enhanced level of maintenance and renewal activity over the coming years to make up this backlog and to restore the planned level of maintenance and renewal activity.

Irish Rail commissioned AECOM to update the work it had done on infrastructure maintenance and renewal during the preparation of the "2030 Rail Network Strategy Review", and to gauge the effect of this backlog of spending. Specifically AECOM was asked to consider:

- The impact of the shortfall in infrastructure maintenance and renewal on the current state of the Irish Rail network;
- The future deterioration of the network if the backlog in infrastructure maintenance and renewal is not made up; and,
- The level of infrastructure maintenance and renewal needed to manage the Irish Rail network on a sustainable and efficient basis given the backlog that has been allowed to develop.

This report sets out the results of the work carried out by AECOM. The following sections of this report set out:

- A summary of the maintenance and renewal programme originally planned for Irish Rail;
- The results of a benchmarking exercise on the planned level of spending carried out by AECOM, together with a summary of the results of other independent reviews of Irish Rail's original spending plans for maintenance and renewals;
- Details of the emerging shortfall in maintenance and renewal spending;
- AECOM's assessment of the effect of this shortfall on Irish Rail's CCE assets;
- AECOM's assessment of the effect of this shortfall on Irish Rail's SET assets;
- The potential risks that will arise if the emerging backlog is not addressed in a timely manner; and,
- An overview of the level of spending needed over the 14 year period 2017 – 2030 bearing in mind the backlog over the last six years, cost escalations and efficiencies.

2. PLANNED SPENDING

The 2030 Rail Network Strategy Review (AECOM 2011) described a programme of infrastructure maintenance and renewal spending for the 20 years from 2011 to 2030 which would maintain Irish Rail's infrastructure assets in a safe, usable "steady state" in the most cost effective manner possible. The average annual civil engineering (CCE) maintenance and renewals requirement was established at €144.8m per annum, and the requirement for maintenance and renewal of signalling, electrical and telecommunications (SET) assets was set at €69.2m per annum. A further annual spend of €21m was required to cover the Infrastructure Manager's operational costs (signalling and control) and €9.0m for a safety management system. Irish Rail's planned levels of spending based on this review are summarised in Table 1 below:

Table 1: Irish Rail/AECOM Maintenance and Renewal programme 2011-2030

Description	*Average Spend 2011-2030 (€m)*	*Total Spend 2011-2030 (€m)*
CCE Maintenance and Renewal		
Track Renewal	48.0	960.0
Track Maintenance	34.8	696.0
Bridge Renewals	17.6	351.2
Points and Crossings	9.5	189.0
Fencing	4.1	81.0
Level Crossings	10.8	216.2
Cuttings, Embankments and Other Structures	10.1	202.6
Facilities and Buildings	10.0	200.0
	144.8	**2,896.0**
SET Maintenance and Renewal		
Signalling *	26.0	520.0
Telecoms **	8.4	168.0
Electrification	4.4	88.0
Maintenance	30.4	608.0
	69.2	**1,384.0**
Total Maintenance and Renewal	**214.0**	**4,280.0**
Signalling and Control Operating Costs	21.0	
Safety Management System Operating Costs	9.0	
Total Costs of Irish Rail Infrastructure Manager	**244.0**	

* including provision for train protection systems (CAWS / ATP) but excluding NTCC

** including provision for train protection systems (CAWS / ATP) and GSMR.

3. REVIEWS AND BENCHMARKING OF PLANNED SPENDING

The €244m programme outlined in the 2030 Rail Network Strategy Review (AECOM 2011) and summarised in the previous section has been subject to a high degree of independent scrutiny, all of which have confirmed that it represented an essential level of spending if the network is to be used in a safe and effective way for the long term. For this report, AECOM carried out a benchmarking exercise to compare Irish Rail's spending on infrastructure Maintenance and Renewal with the levels of spending in England and Wales, and Scotland. This benchmarking exercise also referenced the wider international statistics produced by UIC.

Independent Scrutiny of Irish Rail Maintenance and Renewal Programme

As noted above Irish Rail's original infrastructure maintenance and renewal programme was devised in 2011 as part of its 2030 Rail Network Strategy Review. This review was carried out with the assistance of AECOM and Goodbody Economic Consultants and at the request of the Department of Transport, Tourism and Sport. It was published in October 2011.

Subsequently, in late 2012, Risk Solutions completed a mid-term review of the Third Railway Safety Programme (2009 – 2013)[2]. The steering group for this review included the Department of Transport Tourism and Sport, the Department of Public Expenditure and Reform and the Railway Safety Commission. Amongst other things, this review endorsed Irish Rail's planned levels of steady state infrastructure maintenance and renewal spending.

In 2014 the Department of Transport Tourism and Sport working group on the Railway Infrastructure Manager Multi-Annual Contract produced its report on the funding needed for the Irish Rail Infrastructure Manager for the period from 2014 to 2018[3]. The working group was advised by Jacobs/Leigh Fisher during its work. The working group broadly endorsed Irish Rail's planned level of steady state spending of €244m per annum but noted that funding would not be available for this level of spending in 2014. The working group acknowledged that reducing maintenance and renewal spending below the steady state levels planned by Irish Rail is not sustainable in the long term and will lead to a reduction in operational performance.

The then Railway Safety Commission (now incorporated into the Commission For Railway Regulation) requested a review of the safety implications of Irish Rail not receiving enough funding to complete its planned level of maintenance and renewal activity. Irish rail, engaged Risk Solutions to carry out this review and they reported in April 2015[4]. Risk Solutions were able to report that the shortfall in funding would not lead to an immediate safety or operational risk. However, they were very explicit that continued shortfalls would eventually lead to an unsustainable situation.

Benchmarking

For this review, AECOM has benchmarked Irish Rail's maintenance and renewal spending against a range of international benchmarks. Rail infrastructure in England and Wales is owned and operated by Network Rail. Network Rail is subject to economic regulation by the Office of the Rail Regulator (ORR). The ORR reviews and approves Network Rail's five year plans for maintaining and regulating its assets. These reviews are publicly available and provide a detailed benchmark of the maintenance and renewal activity of a rail Infrastructure Manager operating in line with best practices and subject to

[2] Mid-term review of Iarnród Éireann's Third Railway Safety Programme, A report for Department of Transport, Tourism and Sport, Risk Solutions, October 2012

[3] Funding for the Railway Infrastructure manager Multi- Annual Contract 2014 – 2018, Working Group report, Final Report, Department of Transport, Tourism and Sport, 31st January 2014.

[4] A review of the safety risk implications of agreed funding levels for the Infrastructure Manager Multi-Annual Contract, A report for Iarnród Éireann, Risk Solutions, April 2015

independent regulation designed to impost cost efficiency. Similar levels of detail are available on the maintenance and renewal activities of Scottish Railways. Finally, the Union International des Chemins de Fer (UIC) carries out regular benchmarking exercises on the maintenance and renewal spending of its member railways. AECOM has compared Irish Rails maintenance and renewal programme against these benchmarks.

The results of this benchmarking exercise are set out in Table 2 overleaf.

Country comparison shows an average annual infrastructure maintenance and renewal spend per track-km of €140k for England and Wales, €113k for Scotland, compared to €89k for Ireland. Irish Rail's spending is significantly lower than that in England and Wales and Scotland, particularly for Bridges and Signalling renewals. The percentage spend on SET maintenance is also much higher for Ireland, showing a disproportionate focus on maintenance rather than renewal. However the level of SET maintenance in Ireland (€ / track-Km) is much lower than that of Network Rail, notwithstanding the significantly higher levels of renewal spend (€ / track-km) carried out by Network Rail in its SET assets.

It should also be noted that these benchmark figures are all net of VAT. Irish Rail is not in a position to recover VAT which adds approximately 9 to 10% to its cost base compared to that of Network Rail or Scottish Rail.

Based on Electrification % data (Figure 29 in LICB report – see Annex) and with reference to an older ORR/BSL benchmarking study (also attached), we made a reasonable assumption that UK is 'N' and Ireland is 'Q' in the list of anonymised countries. If this assumption is correct, Ireland would be the 11th of 15 countries in terms of expenditure on renewals and maintenance per track-km (note: this is normalised by purchasing power) until 2010. Figures 21 and 22 in the LICB report also show the fluctuations in annual expenditures, where Ireland's renewal shows a marked decrease in spend from 2010, which aligns with information Irish rail has provided.

Even though this data pre-dates the period we are looking at from 2011, it presents valuable information on trends and the positioning of Ireland in comparison with other countries. In terms of annual spend per asset from 2011; we drew a comparison with the data provided for Civils against the UK CP5 data shown below. The data for signalling and SET was not provided. This shows again a disproportionate spend in maintenance for Ireland in comparison to renewals for all Civils. It may be possible that some small renewal are classified as maintenance. The LICB report indicated that maintenance accounts for approx. half of that spend with several countries clearly increasing the renewals over maintenance to help clear backlogs.

In comparison in the UK, the Network Rail in CP5 is expecting to employ a strategy to have greater proportion of track renewals on main lines, with greater use of heavy maintenance / life extension elsewhere.

Table 2: Benchmarking of Irish Rail against Network Rail, Scotland and rest of Europe

	Ireland (2011-30) 2400 km track				Average spend per annum Network Rail (2013-19) 32190 km track			Scotland (2015-19) 4430 km track		
	Planned		Actual 2011-16							
	€m	€k/ km track	€m	€k/ km track	£m	€m	€k/ km track	£m	€m	€k/ km track
Track &Points and Crossing	55	23	44	18	690	890	28	90	117	26
Civils (Incl. Bridges, Cuttings,etc)	27	11	30	13	461	595	18	81	105	24
Facilities and Buildings	10	4	10	4	224	289	9	19	25	6
Civil Maintenance	35	15	48	20	469	604	19	78	101	23
Other Renewals (incl. Plant and Mac	18	7	0	0	205	264	8	35	45	10
Signalling	18	8	8	3	616	795	25	59	76	17
Telecomms (incl. IT)	8	4	6	3	177	228	7	9	12	3
Electrification	4	2	2	1	196	253	8	5	7	1
SET Maintenance	30	13	31	13	468	604	19	12	16	4
SET Refurbishment/Planned Jobs	8	3	0	0						
	214	**89**	**180**	**75**	**3505**	**4522**	**140**	**389**	**502**	**113**

Conclusions on Benchmarking

The infrastructure maintenance and renewal plan described in the 2030 Rail Network Strategy Review called for average annual infrastructure maintenance and renewal spending of €214m per annum in 2011 prices over 20 years. This is equivalent to €89,000 per track kilometre on main running lines. In contrast the latest determination from the Office of Rail Regulation in the UK allows Network Rail to spend the equivalent of €140,000 per track kilometre on maintenance and renewals (2012/2013 prices). In Scotland the equivalent of €113,000 per track kilometre is allowed for maintenance and renewals (2012/2013 prices). Irish Rails planned level of maintenance and renewal is actually below any reasonable benchmark figure. It is a full 21% less than the spending allowed in Scotland, which is one of the best comparators in terms of scale and local economic conditions. Irish Rail's actual level of spending is significantly lower than its plans. Its current actual spending is running at a level a full 33% below the levels allowed in Scotland.

There is significant outside support from benchmarks and the work of outside experts for Irish Rail's concern that its current levels of maintenance and renewal spending are unsustainably low.

Asset Management and Efficiencies.

Irish Rail continues to seek and deliver efficiencies insofar as is possible to offset the funding shortfall currently being experienced.

One of the key developments in recent years has been investment in and development of the Infrastructure Manager's asset management systems through the introduction of a suite of Decision Support Tools for each of the main asset bases in CCE. This has been a critical component in Irish Rail's on-going ability to withstand the cumulative under-funding as they provide means of asset knowledge, risk management and prioritisation and therefore cost optimisation. This has contributed to the achievement of a number of efficiencies over the last number of years and which are reflected in the overall updated steady-state requirement outlined in this report.

Examples of efficiencies achieved in the area of track to withstand the less than steady state funding include:

- Undertaking works with longer track possession timeframes (where possible and with a minimisation on service disruption) have been achieved in some areas such as the major ballast cleaning project on the Dublin/Cork Line. This has resulted in a higher output rate of ballast cleaning (and thus will generate a lower unit rate cost)
- Despite less than steady-state funding, some limited line speed increases have been achieved by changes to track geometry standards and some of the tolerances within which allows better optimisation of the track asset.
- The introduction of track measurement and monitoring technologies, for example, the introduction of the 'Sperry' rail flaw detection system provides greater visibility of rail defects at an early stage allowing better risk management and subsequently therefore cost management. This will be further enhanced and supplemented in 2016 with the introduction of rail grinding/milling services which will allow greater serviceability of the rail asset, thus reducing the requirement for otherwise earlier replacement of rails.

Other examples of efficiencies include:

- Rationalisation of little used assets.
- More competitive tendering in some areas generated through the construct of various contracts

- Improvements to technical specifications, for (a recent) example fencing, are helping to achieve efficiency and productivity and therefore cost but overall, a review of all standards has helped to optimise in terms of maintenance and renewal requirements
- An extensive project of low-value level crossing closures have been achieved through land buyouts, transfers and so on. Despite the lack of investment available, over 60 level crossings have been closed in the last 3 years as a result of this low cost project.
- Updated maintenance interventions are being achieved across the asset bases – as a simple example, the introduction of a teflon based lubricant for points and crossings has generated savings on more traditional methodologies which were previously in place for lubrication of these critical assets
- A general change in asset inspections methodologies from a simple condition based to more rounded risk based methodologies has generated efficiency, not only in resources, but also in terms of determining and prioritising works, so as to provide optimisation of investment.
- Investment in infrastructure around the leaf fall season which causes considerable disruption to services during the autumn period has seen significant benefits. In particular, the introduction of Traction Gel Applicators (TGA's), rail scrubbers and sandite / waterjetting technologies have significantly reduced the adverse service impact during this period.

4. EMERGING SHORTFALL

Emerging Backlog in Spending

Since 2011 financial constraints have prevented Irish Rail from achieving planned levels of steady state spending on infrastructure maintenance and renewal in line with the AECOM 2011 recommendation. In the years from 2014-2018 Irish Rails' funding for the maintenance and repair of infrastructure is the subject of an Infrastructure Manager Multi-Annual Contract (IMMAC) between the DTTAS and Irish Rail, as required by S.I. No. 249 of 2015. The nature of the IMMAC, which is essentially an annual contract, does not provide the Infrastructure Manager with certainty of funding over the five years as required under EU directives. The contract sets out the actual level of funding available for the current year (including exchequer funds, access charges and own funds) and only states an indicative level of exchequer funding for subsequent years which has been subject to change. The level of exchequer grants set out in Schedule A of the contract falls well short of that required to support the required level of steady state infrastructure maintenance and renewal investment bearing in mind the funds available from access charges and Irish Rail own funding.

Despite a clear consensus amongst policy makers and their professional advisors that Irish Rail's planned level of spending on infrastructure maintenance and renewal represents the steady state level of spending needed to preserve the network in a fully operational condition over the long term, a significant backlog in spending and activity is emerging. By the end of 2016 this backlog will reach €285m. The speed at which this backlog is accumulating is set out in Tables 2 and 3 below.

An analysis of this shortfall has been conducted to identify works that have been deferred over the six year period (2011 – 2016) due to funding constraints and that may now no longer be required e.g. a missed station painting cycle. It should be noted however that it may not be possible to exclude the full cost of a missed cycle of works as the cost of a subsequent cycle is likely to be more expensive as the asset may be in a more deteriorated state, Following an analysis of the backlog of each asset category a possible cost saving of €12m was estimated. This reduced the unavoidable deferred spend at the end of 2016 from €285m to €273m as set out in Table 4.

It should be noted from Table 3 and 4 that the SET maintenance spend has been higher than planned due to underspend in renewals while the points and crossing spend has been higher than originally planned due to a required acceleration of works. Significant backlogs of works have emerged across all other asset categories and particularly in the areas of track renewal, bridges, level crossings and signalling renewal / upgrade including train protection (ATP/ CAWS) and GSMR.

Table 3: Planned and Actual Maintenance and Renewal Spending 2011-2018 (€m)

	Planned Spending	2011	2012	2013	2014	2015	2016 forecast	Average 2011-2016	Total Annual Average Shortfall
CCE									
Track									
Renewal	48.0	50.9	31.8	36.5	22.0	32.9	29.6	34.0	
Maintenance	34.8	27.1	27.3	24.3	47.9	40.6	42.7	35.0	
TOTAL	**82.8**	**78.0**	**59.1**	**60.8**	**69.9**	**73.5**	**72.3**	**68.9**	**-13.9**
Bridges									
Renewal		16.3	18.1	12.7	5.6	7.7	7.0	11.2	
Maintenance		0.0	0.0	0.0	4.0	5.2	4.4	2.3	
TOTAL	**17.6**	**16.3**	**18.1**	**12.7**	**9.6**	**12.9**	**11.4**	**13.5**	**-4.1**
Points and Crossings									
Renewal		5.1	8.9	12.9	9.2	5.9	4.3	7.7	
Maintenance		0.0	0.0	0.0	4.4	6.0	5.7	2.7	
TOTAL	**9.5**	**5.1**	**8.9**	**12.9**	**13.6**	**11.9**	**10.0**	**10.4**	**0.9**
Fencing									
Renewal		3.0	1.8	3.2	3.1	1.5	2.6	2.5	
Maintenance		1.3	1.0	0.8	0.8	1.1	0.7	1.0	
TOTAL	**4.1**	**4.3**	**2.8**	**4.0**	**3.9**	**2.6**	**3.3**	**3.5**	**-0.6**
Level Crossings									
Renewal		2.1	2.6	3.5	2.3	1.4	1.5	2.2	
Maintenance		1.7	1.5	1.2	1.7	2.5	2.3	1.8	
TOTAL	**10.8**	**3.8**	**4.1**	**4.7**	**4.0**	**3.9**	**3.8**	**4.1**	**-6.8**
Cuttings, Embankments etc.									
Renewal		5.5	4.0	4.4	3.9	2.1	2.3	3.7	

Maintenance		4.0	4.3	3.2	6.2	7.8	7.3	5.5	
TOTAL	**10.1**	**9.5**	**8.3**	**7.6**	**10.1**	**9.9**	**9.6**	**9.2**	**-1.0**
Facilities and Buildings	10.0	11.1	8.0	10.8	9.5	9.9	8.3	9.6	-0.4
Subtotal CCE	**144.8**	**128.1**	**109.3**	**113.5**	**120.6**	**124.6**	**118.7**	**119.1**	**-25.7**
TOTAL CCE Renewal		82.9	67.2	73.2	46.1	51.5	47.3	61.4	
TOTAL CCE Maintenance		45.2	42.1	40.3	74.5	73.1	71.4	57.8	
SET									
Signalling	26.0	12.7	3.1	6.2	8.4	11.1	7.8	8.2	-17.8
Telecoms	8.4	5.7	8.5	5.3	6.2	5.4	5.7	6.1	-2.3
Electrification	4.4	1.2	2.4	1.9	1.6	1.3	1.8	1.7	-2.7
Maintenance	30.4	30.1	29.7	31.1	32.1	31.5	33.8	31.4	1.0
Subtotal SET	**69.2**	**49.7**	**43.7**	**44.5**	**48.2**	**49.3**	**49.0**	**47.4**	**-21.8**
TOTAL IM	**214.0**	**177.8**	**153.0**	**158.0**	**168.8**	**173.9**	**167.7**	**166.5**	**-47.5**
IM Operational Costs & SMS	30.0								
Total	**244.0**								

Source: AECOM

Table 4: Cumulative Backlog in Maintenance and Renewal Spending 2011-2016 (€m)

	2011	2012	2013	2014	2015	2016 forecast	Unavoidable deferred spend
CCE							
Track	-4.8	-28.5	-50.5	-63.4	-72.7	-83.2	-80.8
Bridges	-1.3	-0.7	-5.6	-13.6	-18.3	-24.5	-23.7
Points and Crossings	-4.3	-4.8	-1.4	2.7	5.1	5.7	5.4
Fencing	0.2	-1.1	-1.1	-1.3	-2.7	-3.5	-3.2
Level Crossings	-7.0	-13.7	-19.9	-26.7	-33.7	-40.7	-38.6
Cuttings, Embankments and other Structures	-0.7	-2.5	-5.1	-5.1	-5.3	-5.9	-5.6
Facilities and Buildings	1.1	-0.9	-0.1	-0.6	-0.7	-2.4	2.3
Subtotal CCE	**-16.8**	**-52.3**	**-83.8**	**-108.1**	**-128.3**	**-154.5**	**-148.8**
SET							
Signalling	-13.3	-36.2	-56.0	-73.6	-88.6	-106.8	-101.4
Telecoms	-2.7	-2.6	-5.7	-7.9	-10.9	-13.7	-13.0
Electrification	-3.2	-5.2	-7.7	-10.5	-13.6	-16.2	-15.4
Maintenance	-0.3	-1.0	-0.3	1.4	2.5	5.9	5.9
Subtotal SET	**-19.5**	**-45.0**	**-69.7**	**-90.7**	**-110.6**	**-130.8**	**-123.9**
TOTAL IM	**-36.3**	**-97.3**	**-153.5**	**-198.8**	**-238.9**	**-285.3**	**-272.7**

Source: AECOM

5. EFFECT OF SHORTFALL ON CCE

The effect of this emerging backlog in steady state infrastructure maintenance and renewal spending will be serious. Based on our review of the data available, and discussions with Irish Rail management, the effects on each area of CCE infrastructure will be as outlined below:

Track Renewals and Maintenance

The AECOM 2030 Rail Network Strategy Review recommended a track renewal spend of €2,088m on track renewal and maintenance over the 20 year period 2011-2030. Actual spend for the first 5 years has been €413.5m euros - leaving a backlog of €81m when account is taken of deferred works that are now avoidable. Design life expectancy is critical to determination of a steady state renewal level and this is widely acknowledged as critical by the UIC.

The 2030 Rail Network Strategy Review recommended that 485km of track be renewed over the 20 year planning period on the core Dublin-Cork and Dublin-Belfast lines and the DART system, all of which were at or near their design life in 2011. This renewal programme has not been implemented and as such these lines are closer to the end of their design life

Irish Rail's actual spend on track renewals has been running at an average of €34m per annum 2011-2016 against the 2011 plan of €48m per annum.

Spend on track maintenance has been running at an average of €35m per annum 2011-2016 which is in line with the original plan of €34.8m per annum. However, over the last three years there has been a significant escalation in maintenance spend - which averages as €43.7m per annum. This reflects the increased maintenance needed to keep an increasing amount of track infrastructure that has reached the end of its design life in an operable condition.

If track renewals remain at the current very low levels we would anticipate that maintenance spend will increase further as average track age increases. At the same time the number of track condition related speed restrictions will increase.

We would also anticipate that the number of track related incidents will increase with asset age – e.g. number of rough ride reports, number of wet beds and number of rail breaks will all increase. We would also anticipate an escalating deterioration in track quality with consequential rapid deterioration in track components and underlying formation failure.

The risk of derailment is also likely to increase for assets at the end of their design life due to track geometry defects materialising between maintenance visits and rail breaks (not all rail defects are detectable). To stabilise the railway at the current level the volume of track renewals would need to be returned to the a minimum of 60 km per annum

Even at this level of spending we would anticipate that maintenance would need to be continue at the current enhanced spend of approximately €45m per annum.

Between 2011 and 2016 44km of track has been renewed compared to a steady state requirement of 360km. This gives a renewal shortfall of 316km. As a result the average age of the track infrastructure has increased by more than 4 years over the period 2011 – 2016. To catch up this shortfall over the next 14 years will require an additional 23km of track to be renewed each year and increase the renewal volume from 60 to 83km per annum. In the event that a renewal catch up programme is implemented we would anticipate a gradual reduction in maintenance spend requirement from €45m per annum to the 2011 level of €27m per annum.

Bridges

The 2030 Network Rail Strategy Review recommended a total spend of €438m on Bridge, cutting and embankment renewal and maintenance over 20 year period 2011-2030. This equates to an annual average of €21.9m per annum (inclusive of cuttings and embankments). The Bridge element of this planned spending was €17.6m per annum. Average spend over first 6 years has been €13.5m per annum which gives a shortfall of €4.1m per annum.

The life expectancy of bridges and other structures is more difficult to determine than other infrastructure types. For example, many are brick arches and are already more than 100 years old. It is quite possible that many of these will have a lifespan of 200 years or more. However ongoing renewal and maintenance is required to avoid failure of bridges in service and large expenditure spikes in the future. To implement a catch up programme for the shortfall in work over the last 6 years would require the annual bridge spend to be increased to €19.3m per annum until 2030.

Point and Crossing Renewals

Average spends for 2011-2016 was some €10.4m per annum which was broadly in line with the planned level of €9.45m per annum.

Fencing

Average spend for 2011-2016 was some €3.5m per annum was broadly in line with the planned level of €4.05m per annum plan

Level Crossings

Irish Rail's original programme of maintenance and renewal called for a total spend of €180m on Level Crossing removal/renewal and maintenance over 20 years. This was planned to be at a level of €12m per annum over the 10 year period 2011-2020 and €6m per annum thereafter. Actual spend for the first 6 years has been €4m per annum.

Level Crossings represent a very significant safety risk to Irish Rail - this safety risk will continue at the current level unless ongoing investment to remove the 1,000 or so crossings is maintained. To catch up with its original plan Irish Rail Plan would need to increase its spend to €21m per annum between 2017 and 2020. Alternatively this catch up could be planned over an extended period to 2030 with a reduced budget of €10.3m per annum.

Cuttings Embankments and other structures

Average spend 2011-2016 of €9.2m per annum is in line with the planned level of €10.1m per annum.

Facilities and Buildings

Average spends for 2011-2016 of €9.6m per annum is in line with planned levels of €10m per annum. A notable element of underspend has been a reduction in the station painting programme with consequences for the future balance between maintenance and renewals.

6. EFFECT OF SHORTFALL ON SET

Based on our review of the data available, and discussions with Irish Rail management, the effects on each area of SET infrastructure will be as outlined below:

Signalling Renewal and Maintenance

The maintenance and renewal programme set out in the 2030 Rail Network Strategy Review recommended an average annual spend, over the 20 year period 2011-2020 €26m per annum. The majority of the Signalling Renewal expenditure was proposed for the Dublin–Cork line, the Dublin–Belfast line and the DART network, all of which will reach the end of their design life in the period.

The actual average spend on renewals between 2011 and 2016 has been €8.2m per annum. Much of this spending has been on the DART network. This represents an average shortfall of €17.8m per annum As a result of this shortfall, the signalling system is ageing. The average age (mileage weighted) has increased from 16 to 21 years in the 6 years between 2011 and 2016. Ageing signalling infrastructure increases the risk of signalling failure and associated operational consequences.

As a possible consequence of this aging asset base, the SET maintenance spend is running slightly over plan at an average of €31.4m per annum compared to €30.4m per annum in the original plan.

To re-establish a steady state at the current average age of signalling equipment, signalling renewals need to be increased. This will require spending at the original planned level of €26m (or ideally €32.5m as advised in the original Network Strategy). To catch up the shortfall and return the signalling asset to an average age equal to its half-life, an increased spend will needed. If this catch up is spread over the next 14 years then the spend will be increased to €34.9m per annum and with the average maintenance budget running at €30.3m per annum.

Telecom

The 2030 Network Rail Strategy Review originally proposed a spend of €8.4m per annum over the 20 year period. Actual average spends during the 2011-2016 period is running at an average of €6.1m per annum, representing a shortfall of €2.3m per annum. The consequences of this 25% shortfall need to be reviewed and if necessary the expenditure increased to ensure that the roll out of GSM-R and replacement of CAWS and ATP equipment is not being unduly delayed. These are safety critical systems. The transmission network is due for renewal from 2017 and if necessary the expenditure may need to be increased to accommodate this as it is needed to support all communication on the entire rail network.

Electrification

Irish Rail's planned spending in this area was an average of €4.4m per annum. Outturn spending has been running at an average rate of €1.7m per annum. The consequences of this 52% shortfall need to be reviewed and if necessary the expenditure increased. In particular the contact wire was due for renewal from 2015 along with a number of road rail vehicles.

Asset Condition Assessments.

Arising from a recommendation of the 2014 DTTaS Working Group report referred to earlier Irish Rail commissioned Network Rail to undertake separate asset condition assessments of its signalling, electrical and telecommunication assets. These assessments confirmed the need for urgent wide ranging asset replacement throughout the network. Progress on addressing the priority issues identified, with the limited funding currently available through the IMMAC, is reported to the DTTAS at the IMMAC monitoring committee meetings.

More recently the Commission for Railway Regulation has expressed concerns regarding the urgent safety need to replace / upgrade inadequate and obsolete train control and communication systems.

7. POTENTIAL RISKS

As described above there is a clear consensus that the levels of spending originally proposed for Irish Rail in the 2030 Rail Network Strategy Review represent the appropriate average annual spending on infrastructure maintenance and renewal over the medium to long term. If levels of spending on maintenance and renewal are reduced below these levels now they will have to be increased in future so that total spending over the longer term can “catch up” with the total amount originally intended. The levels of spending between 2011 and 2013, and the levels of spending included in the IMMAC for the period 2014-2018 merely represent a postponement of essential spending. The cuts in spending involved do not represent a net saving in cost. Irish Rail and DTTAS could be described as borrowing money that will have to be repaid in the form of greater infrastructure maintenance and renewal spending in the future.

It is important to understand the effects that this decision to postpone infrastructure maintenance and renewal spending will have. The three most significant effects are:

- Significant reductions in the level of service offered to Irish Rail passengers until the backlog is made up;
- Potential increases in the total cost of maintenance and renewal over the lifecycle of the infrastructure.
- Greater exposure to safety risks.

Reduced Service

The rail infrastructure managed by Irish Rail consists of an enormous number of individual civil, electronic and telecoms assets. These all generally have a life of more than one year. In normal operating conditions their physical condition will deteriorate over time. The normal “useful life” of an asset is the period over which it can be used to operate rail services safely at Irish Rail’s normal operating speeds and frequencies of service.

When a civil engineering asset goes beyond this “useful life” it does not necessarily immediately become non-functional. Its physical state continues to deteriorate steadily over time. If a component of the railway infrastructure has gone beyond its useful life it is still possible to operate rail services over that part of the network. However in order to ensure safe operation it will be necessary to reduce operating speeds of the rail services. Ultimately it may be necessary to reduce the frequency of rail services over the section of track in question.

A growing back log of overdue renewals in the signalling, electrical and telecom (SET) systems, identified in a series of asset condition assessments by Network Rail, could have particularly severe consequences. Unlike civil engineering type assets that may deteriorate slowly and the consequences of this deterioration can be mitigated against (e.g. imposing TSR’s and bridge weight restrictions), SET assets nearing their useful life may suddenly fail resulting in a total loss of service for a prolonged period e.g. the loss of an interlocking such as Limerick could take up to a year to replace and the loss of a DART substation would put the DART business under serious risk with severely limited services. It is prudent practice both from a safety and commercial viewpoint to systematically address these issues.

The best approach to renewal is to carry out a systematic programme of replacing or renewing all of the components of the rail network before they reach the end of their useful life. This can be planned in such a way that the amount of renewal activity is constant from year to year. This is referred to as a steady state renewal programme. The maintenance and renewal programme proposed by Irish Rail for 2011-2030 consisted of such a steady state renewal programme plus the ongoing inspection, maintenance and repair work that is needed to ensure safe operation of the network.

In any given year or years it is possible to reduce renewal activity to less than what is called for by a steady state programme. However if safety is to be preserved this must mean postponing some renewal activity in favour of an increased level of maintenance. The individual assets whose renewal has been postponed will continue to deteriorate. Eventually assets that have not been renewed will reach a physical state where the speed, or even frequency, of rails services will have to be reduced to preserve safety. The rail network is a complex, integrated system so it is obvious that the deterioration of a relatively small, cheap to renew, asset could have a disproportionate effect on a significant number of rail services and so on a very large number of rail passengers.

Inevitably the deteriorating infrastructure assets will increase the commercial risk for the Train Operator whose business plan is critically dependant on achieving aggressive revenue growth. Funding the IM work programme is in turn critically dependant on the Train Operator meeting its revenue targets given the limitations in exchequer funding.

In summary, if spending on infrastructure maintenance and renewals is reduced below the steady state level, then train speeds and frequencies will inevitably have to be reduced. These reductions will become larger as the cumulative amount of spending avoided increases. These speed and frequency reductions will lead to increased journey times being forced on all rail users. To put this in context, by the end of 2013 Irish Rail had managed to postpone €119m in spending on track renewals. This risked imposing increased journey times on all of the journeys taken on Irish Rail services. These increased journey times could easily have a cost of the order of €17m[5] per annum until such time as the backlog in renewal work is made up. This represents a very high price to pay for effectively borrowing €119m.

Increased Cost

So far we have assumed that reducing maintenance and renewal spending below the steady state level represents a postponing of spending. In other words, we have assumed that normal operating conditions can be restored by making additional spending in the future such that the total amount spent over the full term of the programme is preserved.

In reality, reducing spending below the steady state level may actually increase the total amount of spending needed over the life of the maintenance and renewal programme. If individual components of the railway network are kept in use beyond their normal useful life, the eventual cost of renewing them can clearly be greater than it would have been if they had been renewed on a timely basis. As the rail system continues to use the time expired component, the rate at which it deteriorates can clearly increase. In addition other parts of the system that depend on the component in question may start to suffer additional damage. All this means that when the postponed renewal work eventually takes place, it may cost much more than was originally expected.

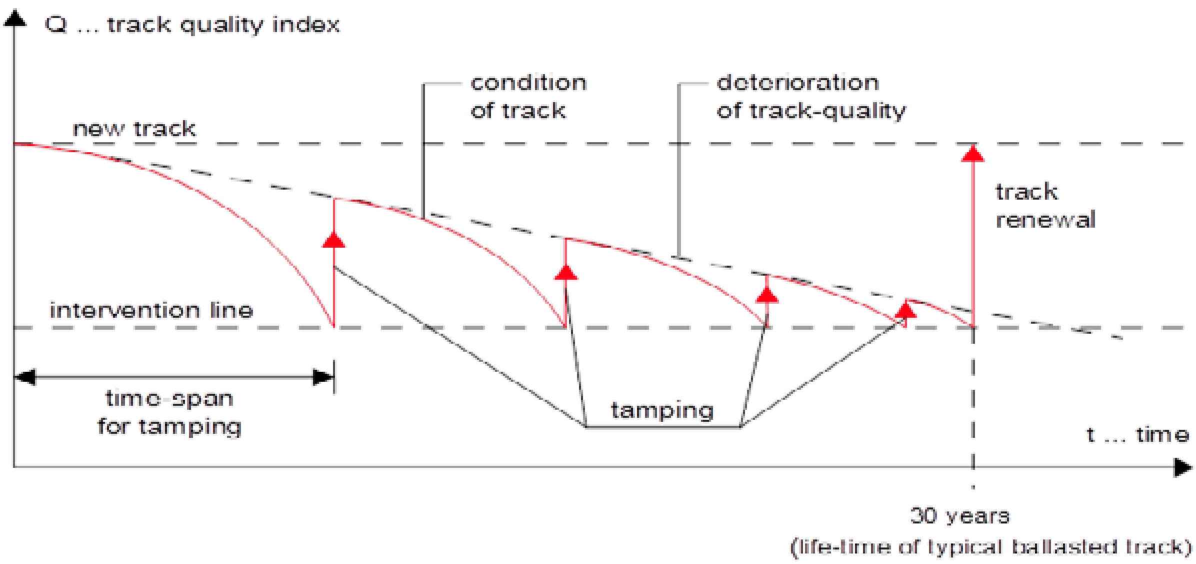
The DTTaS Working Group Report (January 2014) on the funding of the IMMAC 2014 - 2018 gives a useful, costed, example of this type of effect. Section 4.23 of the report presents an estimate that is costs approximately €1.1m to renew a mile of track. Once such a renewal has taken place the track should be fully usable for 30 years before a further renewal is needed. If the track is not renewed at the end of 30 years, then €400,000 - €500,000 worth of "maintenance" work will be needed to restore it to a condition where it can be used safely at normal levels of operational performance.

The graph below illustrates the lifecycle of a typical track asset and how continual maintenance interventions result in a return of track quality to a lesser quality than previous after each successive

[5] In 2013 Irish Passengers completed 1,568m passenger/kilometres. For illustrative purposes we can assume that this travel had an average speed of 100kmh. This implies a total travel time of 15.7m hours. If operating speeds are reduced by 10 per cent, travel time will increase to 17.4m hours. This increase of 1.74m hours represents a cost of €17.4m at an average value of time €10/hour.

intervention. This is a well acknowledged representation of the behaviour of track and demonstrates clearly the progressive deterioration of track over time, thus introducing performance and safety challenges as various declining thresholds are reached, but also demonstrates the lack of value in continuous maintenance interventions as the return in track quality is continually declining for the same investment. It shows these interventions becoming more frequent, until such time is reached that ultimately the impact of the maintenance itself is negligible and the renewal requirement can no longer be offset.

The graphic also demonstrates the overall higher cost of multiple maintenance interventions when the renewal cost is still ultimately required and thus attracting a much higher whole life cycle cost to the asset. This representation is typical of a less than steady-state funding scenario and of the cycle within which IÉ is currently confined with respect to its management of the track asset.



Increased safety Risks.

While Irish rail has withstood the underfunding of its infrastructure maintenance and renewal programme, this has not been without incident.

While safety has been broadly maintained during the period of underfunding to date, there are a number of occurrences that have given cause for concern. One of the primary examples of this since 2011 is in the area of embankment failures. The high risk asset category of Cuttings and Embankments has seen a number of serious land slip events over the last number of years, including train collision events. These include major rock fall event at Waterford Station, serious incidents at Leggan in Kilkenny, as well as multiple slip events on the Cobh and Tralee lines.

Another area of concern is around level crossings and with a significant number of user worked crossings on the network this remains one of the key risks. The period of underfunding has coincided with a number of serous collisions at user worked crossings such as at XM250 and XX24 in County Mayo. A number of planned level crossing elimination projects had to be deferred as a result of lack of funding and while the Infrastructure Manager is looking to introduce improved technology to reduce the risk overall, elimination remains the primary preferred method of dealing with these high risk assets.

Other areas of concern include boundary issues in urban and rural areas and an increasing trend in bridge strikes which present specific safety and operational risks to the railway.

The deferment of SET works has resulted in several areas where Irish Rail had to impose restrictions on operational services due to degradation of the signalling systems. Two notable area were Cherryville Junction where a 25mph restriction had to be imposed for over 12 months until the area was re-signalled in October 2015 and a 5mph restriction currently in pace in Limerick. Operating under degraded working poses a considerable safety risk. The renewals are continuing at a reduced pace in signalling, electrification and telecoms. The reduced funding levels manifest themselves in continued deferment of works that is likely to result in further restriction in other areas. It should be noted that signalling systems can completely collapse with immediate consequential affects on services for prolonged periods.

Summary implications of underfunding.

The programme of infrastructure maintenance and renewal for the period 2001-2030 presented by Irish Rail in its 2030 Rail Network Strategy Review (AECOM 2011) is an efficient approach to maintaining and renewing the rail network. Due to funding constraints Irish Rail has not been able to keep to this programme up to the end of 2016. There is a risk that the multiannual funding available from DTTAS will not allow it to fulfil the programme in the years up to 2018. The backlog of spending up to the end of 2016 based on the current IMMAC amounts to €285m. There is a risk that based on current trends the backlog will accumulate to over €370 by the end of 2018.

Three points need to be made about this backlog and the consequences of not addressing the unacceptable funding shortfall:

- This is, at best, a postponement of spending and sub-optimal use of funding. Irish Rail has received less funding than anticipated, but this will have to be repaid in the form of more spending than anticipated in the future. Postponing spending will actually lead to net additional costs and call into question value for money due to:.
    - an ongoing uneconomic emphasis on reactive maintenance and deferral of timely asset renewal works exacerbating the current backlog.
    - the short term shortfall in funding will lead to increased asset whole life costs over the longer term of an order of magnitude greater than any possible saving in financing costs currently being realised.

- Postponing spending in this way will ultimately impose large travel time costs on passengers, and possibly service cancellations, which are completely out of proportion to any possible saving in financing costs. Performance standards will deteriorate to unacceptable standards as inadequate investment in the infrastructure will see additional operational restrictions (e.g. TSRs for level crossings, weight restrictions at some bridges) imposed as the lives of the degraded assets continue to be extended through maintenance rather than renewal.:-
    - additional TSRs and delay minutes will contribute to declining punctuality levels.
    - there will be greater potential for SET system failures contributing to declining reliability standards and possibly prolonged service cancellations.
    - there will be greater vulnerability to extreme weather conditions.

- there will be reduced permanent way lineside programmes including vegetation clearance and weed spraying
- there will be a reduction in planned electrification, telecoms level crossings, transmission system and station service renewals.
- mandatory technical standards and regulatory supervision may ultimately require certain assets to be withdrawn altogether.

- While safety will continue to be managed, safety standards may be compromised due to:-
    - the deferral of investment on critical signalling, communication (GSMR) and train protection systems (ATP / CAWS) and level crossing technical solutions.
    - delayed replacement of life expired signalling at key locations including Limerick, Kilkenny, Waterford and Cork
    - increased reliance on human interventions.
    - greater vulnerability to severe weather conditions.
    - reductions in key safety critical programmes including level crossings and fencing.

8. CONCLUSIONS AND CATCH UP NEEDED

Irish Rail has been spending significantly less than a sustainable amount on infrastructure maintenance and renewal since 2011. It has been able to maintain the operational performance of the network by carrying out short term repairs that temporarily restore time expired assets to a workable condition. Funds for this extra repair and maintenance work have been secured by postponing planned renewal works. This is reflected in the fact that total planned spending on maintenance and renewal is running €285m behind planned levels at the end of 2016. Spending on maintenance is currently running ahead of planned levels, reflecting short term fixes to keep the network operational

This is strictly a short term, and ultimately an expensive, approach. As time passes and renewal spending is postponed to pay for short term fixes, more and more of the assets that make up the network will reach the end of their useful life and will cease to be fully functional. In order to keep the rail network operating these assets will require short term repairs. The number of assets requiring this type of repair and the cost of carrying out individual repairs will both increase as time passes. In a relatively short time the annual cost of reactive repairs to keep the network operational will exceed the cost of a well-planned predictive approach based on renewing assets as they reach the end of their normal life.

More seriously as the average age of the network assets continues to increase under the current approach there will be an increasing risk of reductions in service as the operating speed of the lines declines and service disruptions / cancellations possibly over prolonged periods in the case of failures associated with SET asset failures. Ultimately the risk of safety being compromised will emerge due to deteriorating assets and the greater need for human interventions.

There is a clear need to increase spending on maintenance and renewal and to return the network to a sustainable state. We have devised a revised estimate of the Irish Rail infrastructure maintenance and renewal annual requirement over the 14 year period 2017 – 2030 assuming track asset lives of 40 years. This takes account of the backlog built up over the last six years, adjusted for a level of avoidable expenditure, and with adjustments for tender price inflation and efficiencies The updated infrastructure annual maintenance and renewal steady state funding requirement is €239.5m over 14 years (2017 prices) compared to the original 2011 funding requirement of €214.0m over 20 years. In order to deliver this increased level of investment across the wide range of infrastructure assets and systems it will be necessary for Iarnród Éireann to address a number of resource constraints.

In addition to infrastructure maintenance and renewal costs, the Irish Rail Infrastructure Manager will have ongoing operating costs. The average of these for the years 2014 to 2016 has been: €23.0m per annum signalling and control operating costs and €9.2m per annum safety management costs. Funding for €37.3m of operating and safety management costs per annum is required for the future including an increased provision (internal transfer cost) for the infrastructure manager EU compliance (4b/c).

The minimum funding requirement of the Infrastructure Manager to meet operating, safety management and steady state maintenance and renewal costs is therefore €276.8m per annum over the 14 year period to 2030. This compares to the original requirement of €244m per annum over 20 years derived in the original 2011 AECOM analysis.

It should be noted that this does not include any provision for works and responsibilities that may be associated with closed and abandoned lines which has been estimated at €3m per annum.

Table 5 below sets out a comparison of the revised steady state annual funding requirement with the original 2011 AECOM annual steady state funding requirement and the annual average spend that was achieved over the six year period 2011 – 2016.

Table 5: Renewal, Maintenance and Operational Expenditure Total €m

	AECOM Annual Steady State 2011 – 2030 (2011 prices)	Actual Average Annual spend 2011- 2016	Revised Steady State Annual spend 2017 – 2030 (2017 prices)
Track	82.8	68.9	88.6
Bridges	17.6	13.5	19.6
Points and Crossing	9.5	10.4	9.5
Fencing	4.1	3.5	4.5
Level Crossings	10.8	4.0	14.2
Cuttings, Embankments and other Structures	10.1	9.2	11.1
Facilities and Buildings	10.0	9.6	11.2
Total CCE	**144.8**	**119.1**	**158.7**
Signalling	26.0	8.2	34.9
Telecomms	8.4	6.1	9.8
Electrification	4.4	1.7	5.8
SET Maintenance	30.4	31.4	30.3
Total SET	**69.2**	**47.4**	**80.8**
CCE + SET	214.0	166.5	239.5
IM Operations	21.0	23.0	28.3
Safety Management Systems	9.0	9.2	9.0
Total IM	**244.0**	**198.7**	**276.8**

The revised steady state infrastructure maintenance and renewal funding requirement is based on the assumption that key signalling projects will be funded through the IM multi annual contract (IMMAC). These key projects include the completion of the final phase of the GSMR project (€30m) and the roll out of a train protection system (€134m). These two projects, were included in the original AECOM analysis and was based on an estimate of €80m for the train protection system which was derived well in advance of the development of a detailed specification for the project. These projects. cannot be delivered with the annual level of funding that has been available in recent years through the IMMAC. It is assumed that the new NTCC will be funded with an entirely separate source of capital funds.

The key drivers of the cost increase between the 2011 AECOM steady state annual funding requirement (€244m) and the Revised Steady State annual requirement (€276.8m) is summarised in Table 6 below.

Table 6: Variance analysis between original and revised steady state average annual funding requirement excluding the closed and abandoned lines c.€3m per annum funding requirement.

	With Backlog
Base annual requirement (AECOM 2011 prices)	244.0
Address unavoidable backlog (€272.7m over 14 yrs)	19.5
Subtotal	**263.5**
IM Operating Costs (additional EU compliance 4b/c) – internal transfer costs	7.3

Cost escalations – tender inflation	22.1
Efficiencies	-16.2
Average Requirement over 14 years (2017 prices)	**276.8**

When account is taken of the requirement to address issues that may arise along the closed and abandoned lines the revised annual steady state funding requirement is €279.8m (€280m)

In the context of the theme throughout this report it should be noted that deferral of renewal works will not alone add to the backlog of works but will also contribute to cost escalations through more expensive works at a future date. Deferral will also undermine the potential for greater efficiencies in the delivery of the investment programme and particularly in the context of optimally timed renewal works being replaced by an increased maintenance requirement.

Appendix 5

August 2016

Fleet Strategy

Údarás Náisiúnta Iompair
National Transport Authority

Iarnród Éireann
Irish Rail

Author: Chris McMorrow / Brian O'Meara	**ADVISORY NOTE – Fleet requirements for planned growth 2016-2020**	Reviewed by:
Submitted by: Peter Smyth		Approved by: Director TO

1. SUMMARY

The Board is advised that a review has been carried out to determine future capacity requirements based on varied projected growth figures to 2020. The review has identified that capacity issues are currently being experienced on Intercity & Commuter services, these issues are expected to further impact on existing capacity levels in the short term in line with Ireland's economic improvement.

2. Background

In 2013 Iarnród Éireann commenced a Fleet Strategy Project aimed at reducing Fuel & Energy costs by way of reducing train sizes to more economically meet train capacity with falling passenger demand. This strategy addressed the Intercity & DART fleets, no alterations to the Diesel Commuter Fleet was considered for this strategy.

The implementation of the Fleet Strategy resulted in the reduction in maximum train sizes of the Intercity Railcar Fleet and Off Peak DART services, this also allowed for the removal from service of half of the MKIV Diesel hauled fleet.

Since 2013 there has been steady growth in passenger numbers across all 3 business categories of Intercity, DART & Commuter services. Overall passenger growth levels since 2013 to the end of 2015 are 6% for Intercity & 8.5% for DART & Commuter services. These overall growth figures are substantial & are primarily achieved during the morning & evening peak hours. Taking into account the relatively narrow AM & PM peak periods it is safe to assume that passenger growth levels during these periods are substantially higher than the overall growth levels highlighted.

3. Current Position

A sharp upturn in Ireland's economic conditions since mid-2014 has resulted in significant increases in passenger numbers. These increases in demand particularly at peak times coupled with the proposed introduction of new services for the Phoenix Park Tunnel have resulted in the requirement to re-introduce the previously removed MKIV train fleet. The operational DART fleet has also been increased by a further 12 vehicles in advance of an increased 10 Minute DART frequency timetable planned for 2017.

3.1 Capacity Issues

There are a significant number of outer Commuter and Intercity services which are currently approaching or exceeding capacity. Following the service developments outlined above all available rollingstock is now in operation and there are no immediate options available to increase capacity on heavily loaded services.

The potential for capacity demands to return to 2007 levels is fast becoming a reality however the fleet currently available to meet this demand is far less than was available in 2007. In 2007 MK2, MK3 & 2700 Class DMU rollingstock were still in operation and were gradually phased out of service between 2007 & 2009 following the introduction of the ICR Fleet.

This fleet cascade overlap provided substantial capacity in this interim period and the initial order of 183 ICR vehicles and subsequent order of 51 ICR vehicles (ordered in 2008) adequately coped in a period of falling passenger demand from 2009 onwards. It must also be noted that between 2008 & 2009 Midleton, The Western Rail Corridor, Docklands & increased Sligo Line services were also introduced and account for the use of 9 train sets which would have been utilised on other services during the peak demand years between 2005 & 2007.

Increased capacity applied to existing DART services in April 2016 and further increases associated with the future DART 10 minute timetable is expected to adequately cope with increased DART capacity demands up to 2020 and DART expansion project to cater for demand beyond this. In order to ascertain capacity requirements for Intercity, Outer Commuter & Commuter demands over the same period sensitivity analysis has been carried out to the 2015 National Census data by assuming annual growth levels of 4%, 6% & 8% per annum up to 2020.

A significant capacity issues arise and currently exist in each scenario based on existing capacity available. The proposals outlined in this paper will allow for higher capacity commuter vehicles to operate on Phoenix Park Tunnel services & in turn create a cascade of ICR & DMU vehicles to some Intercity & Commuter services. Finally an order of individual intermediate ICR (22000 class) vehicles will be required to further increase capacity on existing Outer Commuter & Intercity services. Also considered is an option to purchase a new build fleet to cater for this demand.

Table 1. 2016 Fleet Disposition

Current Fleet Disposition			
Fleet Type	Total Fleet	Operational Fleet	Fleet Availability
MKIV	8 Sets	7 Sets	87%
ICR	231	212	92%
DMU	148	136	92%
DART	138	128	93%

Table 2. Below highlights the number of vehicles which will be required based on the various growth levels considered.

Table 2.

Annual Loading Increase	No. of Services Increased	2700 Class vehicles	ICR Vehicles Required	New Build	ICR & 2700 Cost €M	New Build Cost €M
4%	19	28	31	59	€ 82.4	€ 200.6
6%	23	28	41	69	€ 106.4	€ 234.6
8%	25	28	49	77	€ 125.6	€ 261.8
* ICR costs assumed at €2.4.m per vehicle Incl. of VAT. 2700 Class Refurbishment costs assume €285k per vehicle Incl. of VAT. New Build assumed at €3.1 Incl. of VAT						

4. Capacity Options

There are a number of options open to IE to increase additional capacity up to 2020. It is to be noted that none of these are available within 24 months:

4.1 Class 2700 DMU reintroduction

14 x 2 car DMU class 2700 fleet were withdrawn from service in 2012 as part of the fleet strategy project to optimise capacity and reduce costs. It is proposed to re-introduce this fleet into service on a phased basis during 2018/ 2019 and release ICR sets to other services. Each vehicle requires interior and exterior refurbishment, as well as modifications and heavy maintenance across a range of systems to bring them to a condition suitable for service. Initial estimates suggest the cost of the works will be in the region of €200,000-€300,000 per vehicle depending on the scope chosen.

The most expedient option would be for the work to be offered as a turnkey to a major contractor. In this scenario, it is envisaged that the procurement timeline for contract award and critical path material supply would take up to 12 months, followed by an additional 24 months for the refurbishment program

4.2 ICR new center car vehicles

Analysis by IÉ has shown that existing consists will struggle to respond to peaks in passenger demand from 2016. It is therefore proposed to purchase additional intermediate B cars and reconfigure train sizes to address capacity issues. These vehicles could be handled by the existing Portlaoise Depot with a small number of additional staff. This option provides an efficient solution by increasing capacity on existing units and therefore do not incur additional manpower cost associated with implementing additional services.

The complexity in achieving systems compatibility would mean the only feasible option to lengthen existing trains is to procure intermediate cars from Mitsui/ Rotem. It is expected that an order would be placed under the existing 2004 Mitsui Framework Agreement (subject to legal confirmation on the validity of the contract term) or alternatively via a direct order procurement derogation. It should be noted that there is no current provision in the capital plans for the purchase of additional vehicles.

Exploratory discussions with Mitsui has confirmed that the vehicles could be manufactured and delivered in 2 years from order at a provisional cost of €1.895m per vehicle assuming similar specification to 2008 when a similar vehicle cost €1.646m. Note that costs exclude VAT, excise duty and other project costs which is estimated would result in a cost per vehicle of €2.4m (not inclusive of project management cost). CRR approval would be needed however should be relatively straightforward.

As a means of maximising seating capacity, IE could also review options with Mitsui for these intermediate vehicles to be fitted with air-line seating. Initial estimates show that this may increase capacity in these vehicles from 72 to 80 seats while also providing the capacity for additional bike storage which is becoming an increasing requirement from our customers. This design change, however would necessitate a revisit of the APIS (CRR Approvals) process from a crash-worthiness, passenger load, and evacuation perspective.

4.3 New build fleet

One possible capacity option is to procure a new build fleet. The procurement process for a new vehicle build from tender commencement, contract award and entry into service following delivery, commissioning & further CRR safety validation approvals would extend this period to 5 years. IE would then retain all of the associated operational and maintenance costs for operating a new variant fleet in service. The estimated purchase cost of a new build fleet per vehicle inclusive of VAT & Excise cost is €3.1m per vehicle (not inclusive of project management cost).

5. Discussion

- The options for adding additional fleet capacity are as follows:

1. The re-introduction of the currently stored 2700 class DMU Fleet coupled with the purchase of Intermediate ICR (22000 class) vehicles in order to increase capacity on existing services.

2. The purchase of a new build fleet.

- The re-introduction of the 14 x 2 Class 2700 DMU fleet, (11 sets for service and 3 retained for maintenance holdings) would assist in providing additional and a more suitable Commuter Rolling Stock to Phoenix Park services and would allow the reallocation of 4 ICR sets to other services.

- The 2700 DMU and additional ICR fleet can be maintained by existing depots with a small number of additional staff. CME would review its DMU maintenance strategy taking into account the re-introduction of the 2700 DMU, and allocation of DMU's to Phoenix Park services.

- The purchase of Intermediate vehicles from Mitsui would provide the quickest and most cost effective solution for adding additional capacity. It is yet to be determined from a procurement viewpoint whether this is possible. It would not be recommended from a mechanical viewpoint that the addition of intermediate ICR vehicles from another manufacturer be considered due to high complexity in achieving integration and compatibility with existing ICR systems. This would create a high likelihood of mechanical interface issues and subsequent performance & customer impacts.

- The Purchase of a new build fleet is more costly and has a longer lead in period for introduction into service. Further operational & maintenance costs will be associated with this option as it would be a new fleet variant.

6. Next Steps

It is recommended to proceed with the option of 2700 class railcar re-introduction and the purchase of 41 intermediate ICR (22000 Cass) vehicles. This option is substantially more cost effective than proceeding with a new build and would absorb growth levels of 6% year on year up to 2020.

Based on funding confirmation in Q4 2016, the anticipated timescales associated with the preferred option of 2700 Class re-introduction and Intermediate ICR vehicles are as follows:

2700 Class Re-introduction

Subject to IE Procurement process commencing in January 2017 and critical path material availability, the best possible timeline indicated by the market would be for delivery to take place in stages from Q2 2018 to Q2 2019, with entry into service from Q4 2018. These timeframes will be confirmed following tender process and contract award

New Intermediate ICR vehicles

Subject to contract award in Q1 2017, Mitsui have indicated delivery could take place in phases from Q1 2019 to Q3 2019, with entry into service from Q2 2019. These will be confirmed on contract award

Appendix 6

August 2016

Route Profitability
(Roland Berger Report)

Údarás **Náisiúnta** Iompair
National **Transport** Authority

Iarnród Éireann
Irish Rail

Explanatory Note

Outlining the Approach for the Development of the Route Profitability Model

The analysis of Route Profitability was undertaken by Roland Berger and Iarnród Éireann. The analysis considers performance at an overall system level and at individual business unit levels (the Train Operator and the Infrastructure Manager).

The Route Profitability Analysis:

- Defined the routes;
- Collated the information from all of Iarnród Éireanns systems;
- Allocated revenues and expenditures to routes, which is not possible under current Iarnród Éireann systems;
- Validated all assumptions, methodologies and results with Iarnród Éireann;
- Developed a route profitability model.

The following four terms are used to define different aspects of the railway: Route, Service, Line and Segment

- A Route has an **origin** and a **destination**, on which a train service operates. A Route can consist of one or more services.
- A Service is a train with a particular set of departure and arrival times.
- A Line is a physical track that a given route utilises.
- A Segment is a section of a Line.

Routes

17 Routes were identified for the Route Profitability Analysis:

1. Dublin – Cork;
2. Dublin - Galway;
3. Dublin – Tralee;
4. Dublin - Limerick;
5. Dublin – Westport/Ballina;
6. Dublin - Waterford;
7. Dublin - Sligo;
8. Dublin – Belfast;
9. Dublin – Rosslare;
10. Limerick Junction – Waterford;
11. Limerick – Ballybrophy;
12. Cork Commuter;
13. Limerick – Galway;
14. Kildare Suburban;
15. Northern Suburban;
16. Western Suburban;
17. DART.

Revenue

Iarnród Éireann captures passenger information on a number of systems and has three main revenue types:

1. Origin/Destination reporting, which captures the bulk of revenue from regular ticket sales.
2. Annual & Monthly Tax Saver Revenue.
3. Free Travel Scheme Revenue.

Revenue is, as far as possible, determined on a station to station basis (Origin – Destination). Rolland Berger and Iarnród Éireann developed a complete Origin – Destination matrix for passenger journey patterns and corresponding revenue.

Revenue Allocation

The Origin – Destination revenue is allocated to routes sharing common infrastructure (Line) using particular allocation algorithms.

The methodology, where the Origin and Destination are known has three allocation possibilities:

A. No Interchange – revenue is allocated to routes that operate between the Origin and Destination;
B. Interchange to DART – revenue is allocated to intercity routes;
C. Interchange to other intercity service – revenue is allocated proportionate to the distance of the two journey Segments.

The methodology, where the Origin and/or Destination is not known has two allocation possibilities:

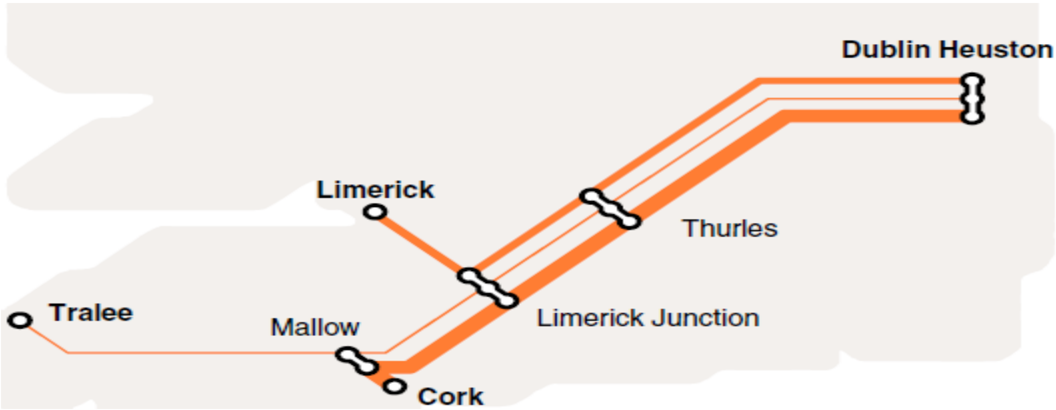
D. Either Origin or Destination is known – revenue is allocated to the route of the known station;
E. Origin and Destination is not known – revenue is split between Suburban and DART routes (proportionate to the distance of each of the routes).

Examples of how the revenue is allocated based on the first four scenarios above is detailed in the following illustration:

A No interchange		B Interchange to DART	C Interchange to other IC	D Either O or D not known
OD-pair				
Cork – Heuston	Thurles – Heuston	Cork – Lansdowne Road	Mallow – Waterford	Cork – Unknown
Allocated to routes				
Cork – Heuston	Cork – Heuston Tralee – Heuston Limerick – Heuston	Cork – Heuston	Mallow – Limerick Junction: > Cork – Heuston > Tralee – Heuston Limerick Junction – Waterford: > Limerick Junction – Waterford	Cork – Heuston Cork – Cobh Cork – Midleton Cork – Mallow

Revenue is allocated based on the frequency of services operating on each route, where the Origin and Destination can be attributed to multiple routes. As per the Thurles – Heuston example above, passengers have three route options Heuston to Cork, Tralee or Limerick. Revenue is allocated based on the frequency of service on each route attributable to the Origin – Destination pairing (Thurles – Heuston).

There are 36 services available for the Thurles – Dublin journey. The Cork – Dublin route has 27 services per day, therefore 75% of the revenue is allocated to the Cork – Dublin Route. The Tralee – Dublin route has 2 services per day, therefore 7% of the revenue is allocated to the Tralee – Dublin route. The Limerick – Dublin route has 7 services per day, therefore 19% of the revenue is allocated to the Limerick – Dublin route.



Approximately 80% of Iarnród Éireann revenue is generated through passenger transport. The non-passenger revenue relates to Car Parking, Advertising, Property, Telecoms and Third Party Revenue. Revenue is assigned to a particular station for Car Parking, Advertising and Property. The revenue assigned to a station is allocated to the routes serving the station based on the frequency of services operating on each route. Telecoms are allocated to all passenger routes based on service frequency. Third Party Revenue (Annual Tax Saver, Free Travel Scheme, Schools and Other) typically have an Origin – Destination and are assigned to the routes accordingly.

Expenditure

Train Operation expenditure is recorded as a cost element in an individual cost centre on the Iarnród Éireann financial system. The cost elements and cost centres have no reference to a particular route.

All Train Operator cost centres and cost elements were reviewed and expenditure was allocated on the following basis:

- Directly to individual routes where possible (e.g. guards who are responsible for a particular route); or
- To track segments (e.g. clerical and station operations) and then to routes using the track segment based on the frequency of route usage.

Expenditure relating to the Infrastructure Manager is recorded under four cost categories:

- Chief Civil Engineer;
- Signalling, Electrification, Communications;

- Infrastructure Manager Operations;
- Buildings and Facilities.

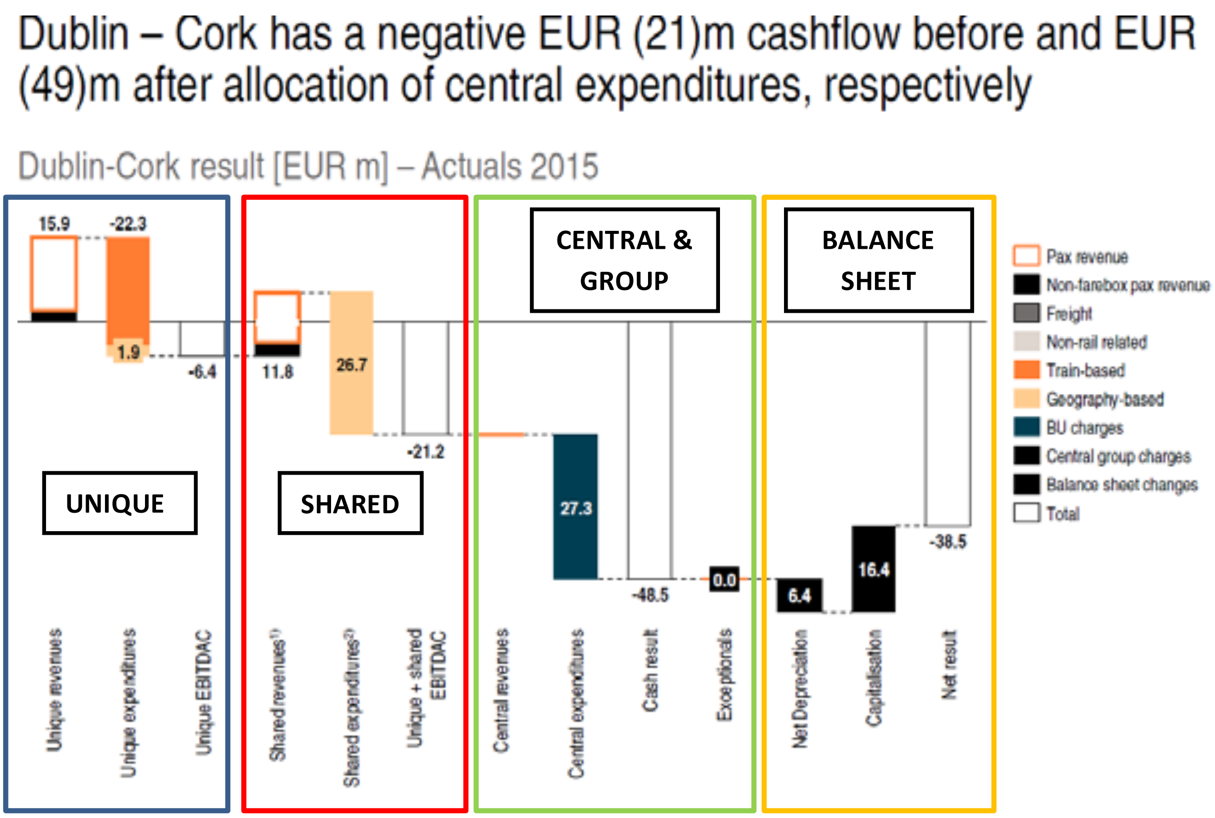
For each of the cost categories, intermediary cost categories were defined on the basis of subdivisions, regional, or track segments. The cost elements in the intermediary cost categories were allocated to track segments based on allocation keys agreed with the Infrastructure Manager Operation. The basis for allocation from a track segment to an individual route is based on the routes' usage of a particular track segment and the track segments expenditure per main track km. Similarly to the Train Operator, there is a distinction between unique and shared expenditures for track segments which are used by one versus several routes.

Once all revenues and expenditures were appropriately allocated the route profitability model was developed.

The route profitability model can be broken down into four categories:

- Unique revenue and expenditure;
- Shared revenue and expenditure;
- Central and Group revenue and expenditure;
- Balance Sheet charges.

Dublin – Cork route profitability analysis per the Route Profitability Report:



Legend descriptions:

Pax Revenue (Passenger Revenue) – relates to ticket purchases and can be unique and shared (detailed under the revenue section).

Non farebox pax revenue (Non Ticket Revenue relating to passengers) – relates to Tax Saver Tickets, the Free Travel Scheme and Penalties. This revenue can be unique and shared.

Freight – relates to freight revenue and expenditure and is allocated to freight routes only.

Non-rail related – relates car parking, property, CAN, Telecoms and third party revenues and can be unique and shared.

Train based – relates to Train Operator expenditure.

Geography based – relates to Infrastructure Manager expenditure.

BU charges (Business unit) – relates to central charges not directly incurred by the route, they include all support areas such as head office, marketing, accounts, payroll, IT, other support functions and CIE costs.

Balance Sheet Charges – relate to depreciation and capitalisation of expenditure.

Iarnród Éireann
Irish Rail

Roland Berger

Route Profitability

Main Report – Final (DRAFT)

Commercially sensitive document Iarnród Éireann will, if necessary, request the application of Section 27(1) of the Freedom of Information Act. Not to be given to ANY OTHER PARTY without the prior written permission of Iarnród Éireann

9 May 2016

Iarnród Éireann Irish Rail Roland Berger

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Contents

A. Introduction

Contents of this section

Background – Route Profitability

- Roland Berger Ltd. ("Roland Berger") has been asked by Iarnród Éireann ("IÉ", "Irish Rail") to undertake an analysis of route profitabilities (the "Route Profitability Analysis", the "Project") to provide an understanding of the contributions to profit and loss of its constituent operations
- The Route Profitability analysis considers performance at an overall system level and separated into the individual business units (the Train Operations, "TO") and Infrastructure Manager ("IM"))
- Roland Berger has during this project, together with Irish Rail
  - Defined the routes which for which individual P&Ls need to be developed,
  - Collated the relevant data from IÉ's systems,
  - Distributed expenditures and revenues to routes where the original data from IÉ did not lend itself to direct allocation to routes (based on methodologies agreed with IÉ),
  - Validated all assumptions, methodologies and results with IÉ and
  - Developed a Route Profitability Model (the "Model"), consisting of separate revenue and cost models, to calculate the P&Ls of each route
- All work has been undertaken in close interactions with IÉ's project manager. Stakeholders (NTA and DTTaS) were kept informed and have provided input through Steering Committee Meetings
- This presentation summarises Roland Berger's findings and represents the completed deliverable against IÉ's commission

Background – Segment analyses

> In addition to the Route Profitability Analysis, Roland Berger has also undertaken a number of analyses in order to understand the financial impact of changes in IÉ's service provision and infrastructure network
  - These analyses are collectively referred to as Segment Analyses or individually as Segment Analysis
  - In total, 4 Segment Analyses have been undertaken

> It should be noted that the definitions of these Segment Analyses has led to a significant increase in complexity of the originally envisaged revenue and cost models since these had to be sub-divided and allocated to segments of the IÉ rail network rather than complete lines
  - While this increases the flexibility of the Route Profitability Model, it has also increased complexity and reduced the ease of handling

> The results of the Segment Analyses will be provided in a separate report

Iarnród Éireann Irish Rail
Roland Berger

The Route Profitability Project provides the basis to develop business cases to ultimately improve IÉ's financial performance

Context of route profitability project

Current situation
> Revenues and expenditures by business unit

Route profitability
> Profit by route by:
– Contribution level
– Business unit

Segment analysis impact on IÉ operations
> Direct revenue impact
> Escapable unique expenditures impact

Business case for scenarios
> Capex required
> Organisational change
> Exceptionals
> Alternative usage of assets
> Indirect revenue impact
> Timing of savings quantified

Wider issues
> Wider economic impact
> Stakeholder views
> Environmental impact
> …

Core Route Profitability Project

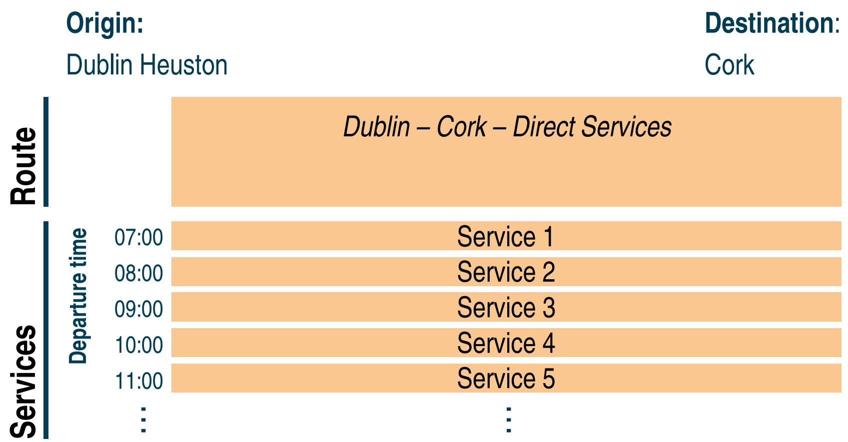
Segment Analyses

Source: Roland Berger

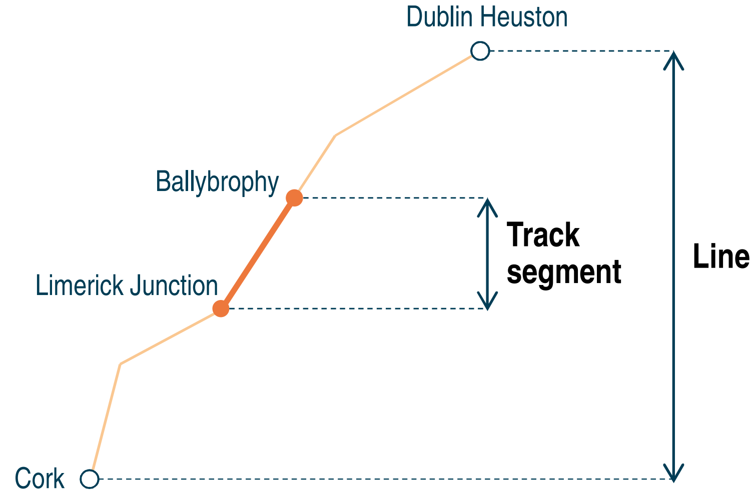
We have defined a set of terms which we will use consistently in our documents

Definitions of route, service, line and track segment

Service view



Geographical view

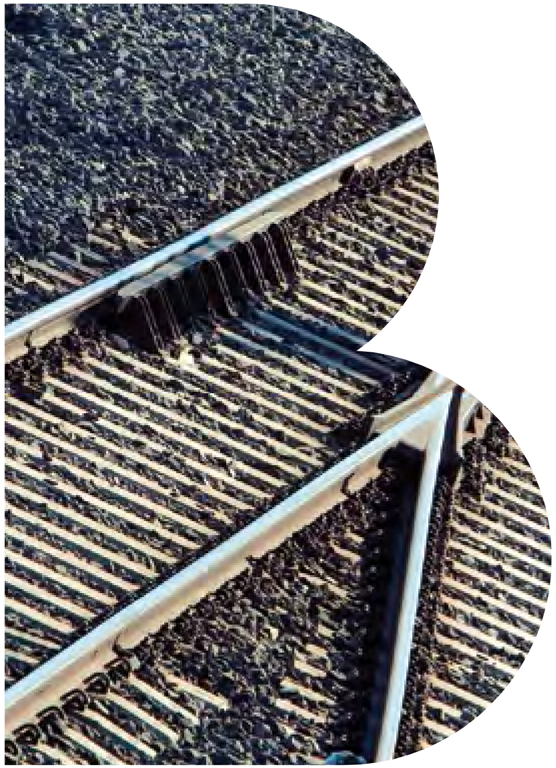


We have defined four terms to describe different aspects of the railway: route, service, line and track segment

> A **route** is a given OD pair, on which services are operated. A route consists of one or more services
> A **service** is a train with a particular set of departure and arrival times
> A **line** is the physical track that a given route utilises
> A **track segment** is a section of a line

Source: Iarnród Éireann, Roland Berger

B. Approach



A multi-step approach has been followed to derive individual cash flows and P&Ls for each of IÉ's routes

Approach to derive at route level financial statements

1 Route definition

Definition of routes for profitability analysis

2 Revenue allocation

Allocated revenue currently collected as OD pairs onto routes

OD pair revenues have been allocated to routes based on service frequency of those routes passing through the OD pair stations

3 TO expenditures allocation

Re-structured current cost centre logic to enable cost allocation to routes

Differentiated between expenditures which can be unequivocally allocated to a route vs. expenditures which can be allocated to multiple routes, "unique" and "shared" expenditures, respectively

4 IM expenditures allocation

Re-allocated from mainly regionally captured data to routes

5 Validation

Process to validate inputs, adjustments and findings with IÉ

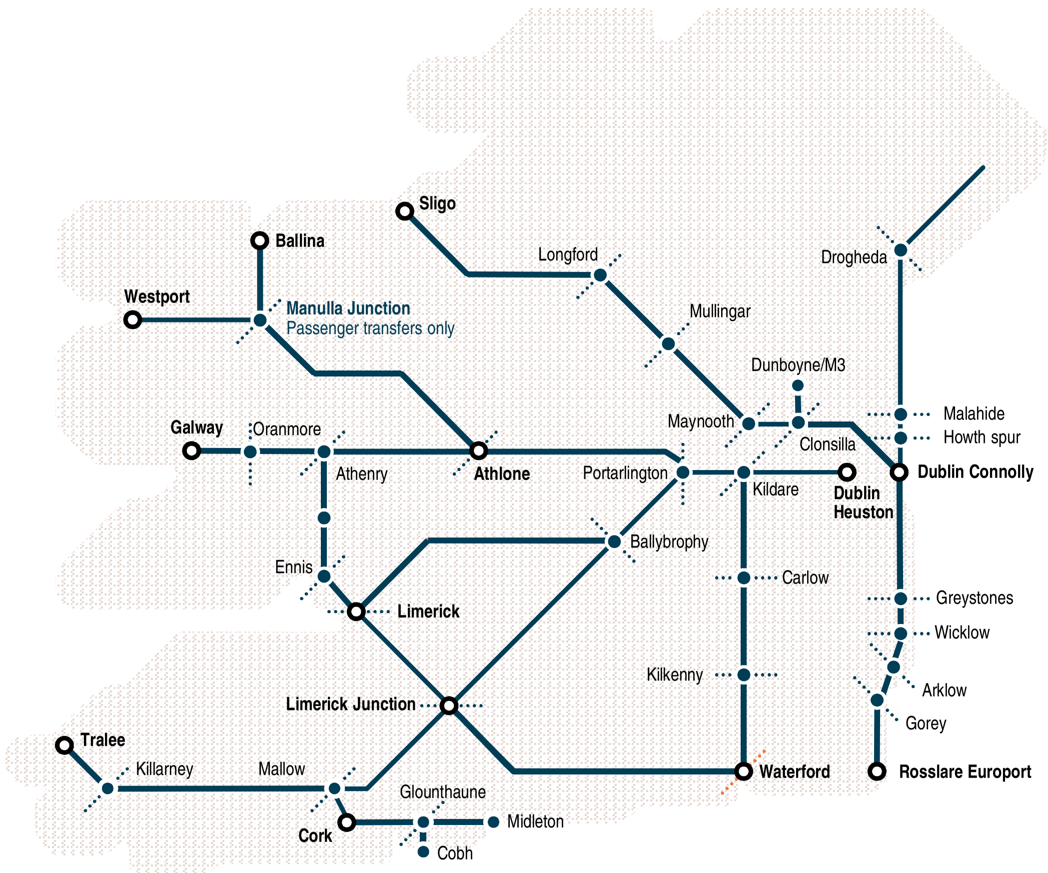
6 Interpretation of results

Caveats around interpretation of findings

Source: Iarnród Éireann, Roland Berger

17 routes have been defined for the route profitability analysis

IÉ route definitions for route profitability analysis



a	Cork
b	Galway
c	Tralee
d	Limerick
e	Westport/Ballina
f	Waterford
g	Sligo
h	Belfast
i	Rosslare
j	Lim. Jct – Waterford
k	Limerick – Ballybrophy
l	Cork commuter
m	Limerick – Galway
n	Kildare Suburban
o	Northern Suburban
p	Western Suburban
q	DART

Source: Iarnród Éireann, Roland Berger

Revenue has been allocated to routes to reflect actual travel patterns

Approach to revenue allocation to routes

> Ticket revenue at IÉ is currently captured by route but allocated to a 'main route' in each corridor. Revenue does, however, need to be allocated to routes to reflect actual usage patterns
  – This has been done through analysis of revenue on individual OD pairs and allocation to individual routes or shared between routes where there are multiple journey opportunities

> IÉ has a range of systems which capture passenger information, including OD information, ticket types and revenue. This information is registered at point of sale and captured in a number of databases before consolidated in SAP. There is a distinction between three main revenue types:
  – OD reporting: capturing the bulk of revenue from regular ticket sales
  – Annual Tax Saver (ATS) and Monthly Tax Saver (MTS): capturing revenue from ticket sales supported through the tax saver scheme
  – Free Travel Scheme (FTS): capturing revenue from ticket sales supported through the free travel scheme

> Roland Berger has used an approach developed together with IÉ which allocates revenue for which OD information is known to individual routes or groups of routes where multiple opportunities exist. This takes into account stopping patterns at stations
  – Separate approaches have been developed for revenue for which OD information is not known, e.g., some of the ATS and the FTS revenue

> Following development of a virtually complete OD matrix for IÉ's journey patterns and commensurate revenue, an allocation to routes has been undertaken. Where there are multiple route possibilities for an OD pair, revenue has been allocated to those routes based on service frequencies ("shared" revenue as opposed to "unique" revenue)

Source: Iarnród Éireann, Roland Berger

The allocation of TO expenditures to routes required significant re-definition of cost centres and cost elements

Approach to allocating TO expenditures to routes

> TO expenditures are currently held as cost elements in individual SAP cost centres (and in some cases in individual SAP internal orders). These cost centres and cost elements have no reference to the routes operated on the IÉ network

> Roland Berger has therefore, together with IÉ, reviewed all cost centres and cost elements in TO's operations and developed an approach to allocate expenditures
  – Either directly to individual routes where this was possible (e.g., guards who are responsible for a specific route), or
  – To track segments (e.g. clerical and stations operations) and then allocated to routes using this track segment based on frequency of route usage

> The level of required disaggregation and allocation keys differ between routes and all assumptions have been validated throughout the process of developing the approach

> In addition, there is a small amount of central revenue which is allocated to all routes

Source: Iarnród Éireann, Roland Berger

A multi-step approach was required to allocate IM expenditures from current cost centre collation to individual routes

Approach to allocating IM expenditures to routes

> IM expenditures are currently collected in four 'buckets':
- CCE Chief Civil Engineer
- SET Signalling, Electrification, Communications
- IMO Infrastructure Management Operations
- B&F Buildings & Facilities

> As a first step in the allocation of those expenditures to routes, intermediary cost buckets have been defined on a subdivision-, regional- or track-segment level

> The cost elements in those intermediary cost buckets have then been allocated to track segments based on a level's dis-aggregation and allocation keys agreed with IM

> The basis for the allocation of IM expenditures from track segment to individual routes is routes' usage of the respective track segments and the track segment's expenditure per main track-km
- Similarly to TO, there is a distinction between unique and shared expenditures for track segments which are used by one vs. multiple routes

Source: Iarnród Éireann, Roland Berger

There has been intensive validation of data, assumptions and findings throughout the development of route level P&Ls

Approach to validation throughout process

> The complexity of the route profitability analysis, conceptually, as it represents a dramatic change in commercial approach, and in the detail, with large amounts of data allocated in multi-step approaches to routes, required a thorough approach to validation throughout the development of route level cash flow statements and P&Ls

> The key element of the approach to the conceptual validation was Steering Committee meetings with participation by the IÉ Executive Group and the main stakeholders, NTA and the Department of Transport

> Validation of data, allocation methodologies and results was achieved through close interaction with multiple management layers within IÉ. The key steps in the validation process were:
  - Early agreement of the type of data to be collected from and through IÉ
  - Review of the data for consistency and comprehensiveness
  - Joint development of approaches to adjust or complement data where required
  - Review of the results from data adjusted through those processes for consistency and 'realism' and amendment of the approach if required
  - Regular presentation of assumptions and findings in the Steering Committee for critical review, explaining differences between perceived and modelled reality and, where required, making adjustments

> The successful running of segment analyses (see separate report) supports that valid assumptions have been made in the various analyses

Source: Iarnród Éireann, Roland Berger

The model informs the development of but does not calculate a business case for organisational or train-service changes

Caveats regarding interpretation of results

> The route profitability model has been developed to understand route-level commercial reality for all routes at IÉ. A number of assumptions on the allocation of revenue and expenditures to routes have been made throughout this development process:

> Revenues have, as far as possible, been determined on a station-to-station OD basis, however,
  - The true geographical OD, i.e., including their station access and egress trips, is not known,
  - OD revenues have been attributed to routes on the basis of service frequency, thereby neglecting other factors influencing passengers' route choices (e.g., available capacity, quality of trains, speed of connection)

> Expenditure allocations have been made on the basis of regional, operational and a range of other assumptions

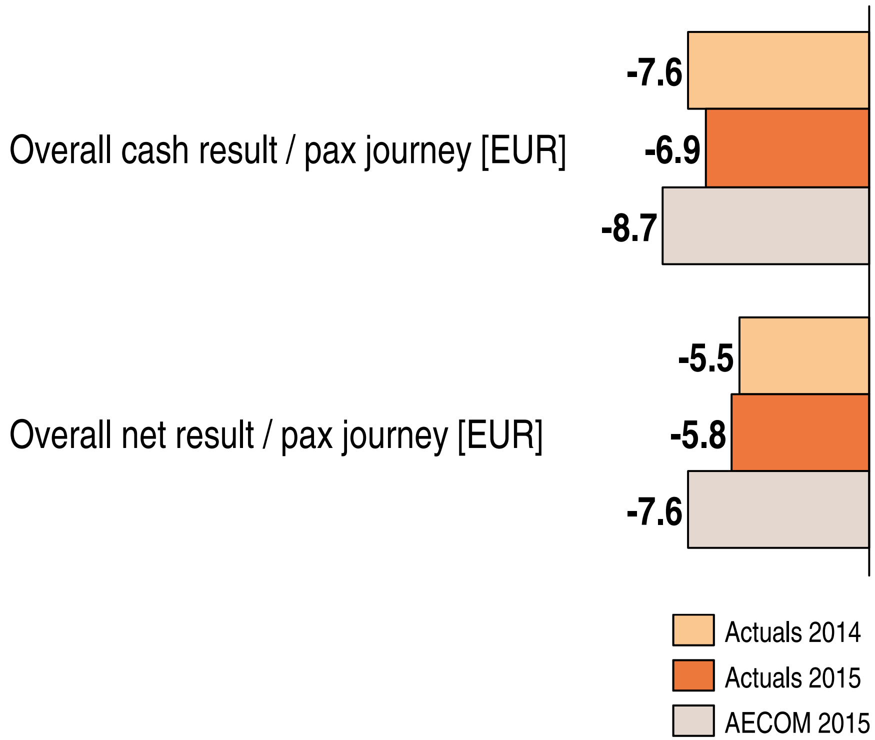
> While the route level P&Ls thus developed represent a fair reflection of reality for comparison and prioritisation purposes, an analysis of changes to services and the network would require a much more bespoke approach to specific routes to derive commercial implications

Source: Iarnród Éireann, Roland Berger

C. Summary results

Overall cash result per pax journey and net result per pax journey are in line with last year's route profitability exercise

Actuals 2014 vs Actuals 2015 vs AECOM 2015 results[1)] / pax journey



> The overall cash result per passenger journey improved from EUR -7.6 to EUR -6.9 from 2014 to 2015 arising primarily from a strong revenue performance and a full year effect of the pay deal[2)]

> The overall net result per passenger journey decreased from EUR -5.5 to EUR -5.8 from 2014 to 2015 arising from a reduced level of capitalisation of costs from one year to the next

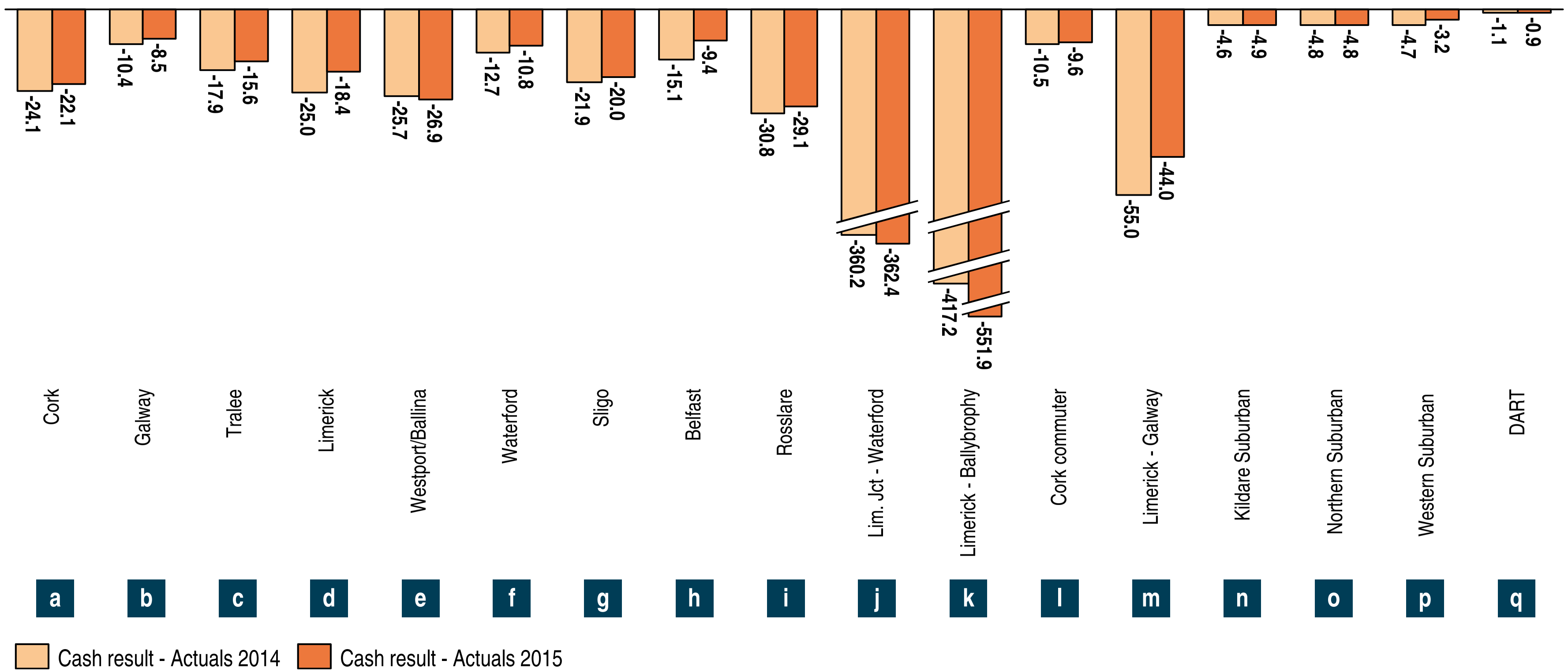
> The impact of the required level of IM spend to retain the infrastructure in a steady-state (AECOM) adds c. EUR 2 per pax journey to the Actuals 2015 results – an increase of 25-30%

1) Passenger route total excluding any government subsidies (e.g. Public Service Obligation (PSO), Multi-Annual Contract (MAC)); 2) Reduction in gross pay

Source: Iarnród Éireann, Roland Berger

Some of IÉ's route require very high levels of cash per passenger journey to breakeven at current maintenance levels

Cash result per passenger journey by route [EUR / pax journey]



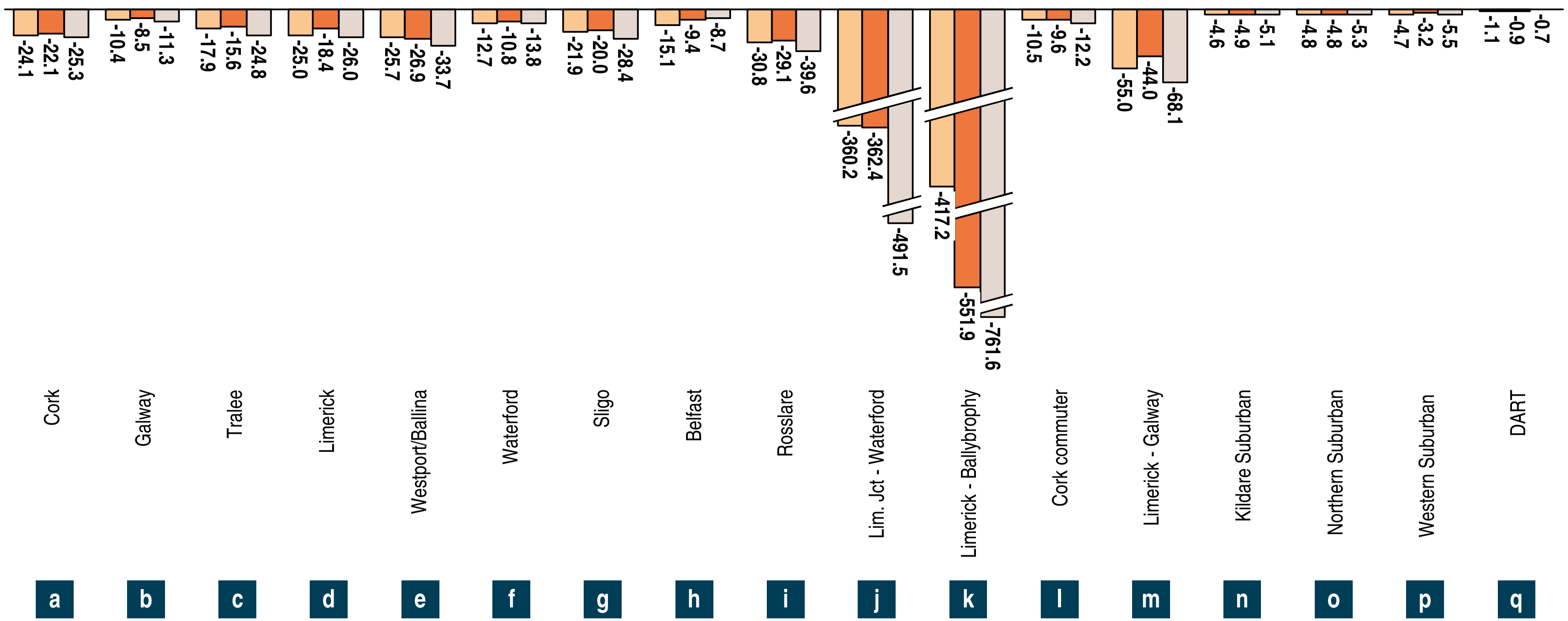
NB:The level of actual expenditure incurred in 2015 does not reflect the AECOM spend required for steady-state operation

1) Cash result is after farebox and before exceptional items, depreciation, amortisation and capitalisation; 2) All results exclude any government funding (e.g. PSO, MAC)

Source: Iarnród Éireann, Roland Berger

Some of IÉ's route require very high levels of cash per passenger journey to breakeven at current maintenance levels

Cash result per passenger journey by route [EUR / pax journey]



1) Cash result is after farebox and before exceptional items, depreciation, amortisation and capitalisation; 2) All results exclude any government funding (e.g. PSO, MAC)

Source: Iarnród Éireann, Roland Berger

Iarnród Éireann Irish Rail | Roland Berger

Compared to Actuals 2014, route performance has been consistent in terms of net result / pax journey

Net result / pax journey (ascending order) comparison A2015 vs A2014 vs AECOM2015

Band	Actuals 2015	Actuals 2014	AECOM 2015
≤ EUR -1	> DART	> DART	> DART
EUR -1 to -5	> Western suburban > Kildare suburban > Northern suburban	> Northern suburban > Western suburban > Kildare suburban	> Kildare suburban > Northern suburban > Western suburban
EUR -6 to -10	> Dublin – Galway > Cork commuter > Dublin – Waterford	> Dublin – Galway > Dublin – Waterford > Cork commuter	> Dublin – Belfast
EUR -11 to -20	> Dublin – Belfast > Dublin – Tralee > Dublin – Limerick > Dublin – Cork > Dublin – Sligo	> Dublin – Tralee > Dublin – Sligo > Dublin – Belfast > Dublin – Limerick > Dublin – Westport/Ballina > Dublin – Cork	> Dublin – Galway > Cork commuter > Dublin – Waterford
EUR -21 to -70	> Dublin – Westport/Ballina > Dublin – Rosslare > Limerick – Galway	> Dublin – Rosslare > Limerick – Galway	> Dublin – Tralee > Dublin – Sligo > Dublin – Limerick > Dublin – Cork > Dublin – Westport/Ballina > Dublin – Rosslare > Limerick - Galway
EUR -200 to -300		> Limerick Junction – Waterford	
EUR -301 to -500	> Limerick Junction – Waterford	> Limerick – Ballybrophy	> Limerick Junction – Waterford
EUR -501 to -800	> Limerick – Ballybrophy		> Limerick – Ballybrophy

Source: Iarnród Éireann, Roland Berger

Roland Berger

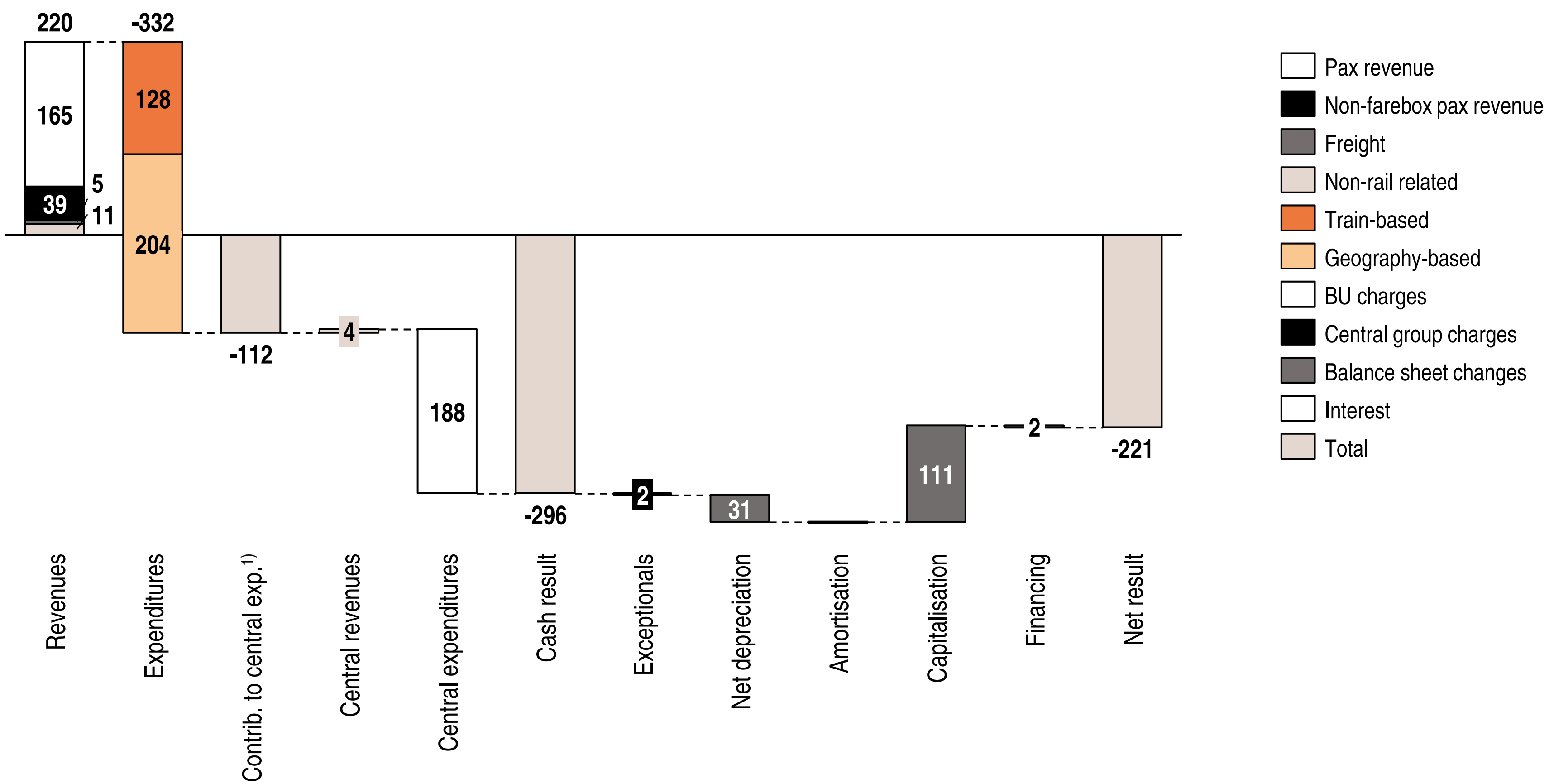
D. Route profitability results Actuals 2015

Iarnród Éireann
Irish Rail

Contents of this section

IÉ shows a contribution to central expenditures of EUR (112)m and cash result of EUR (296)m after attribution of central expenditures

Overall Iarnród Éireann result [EUR m] – Actuals 2015, timetable 2015

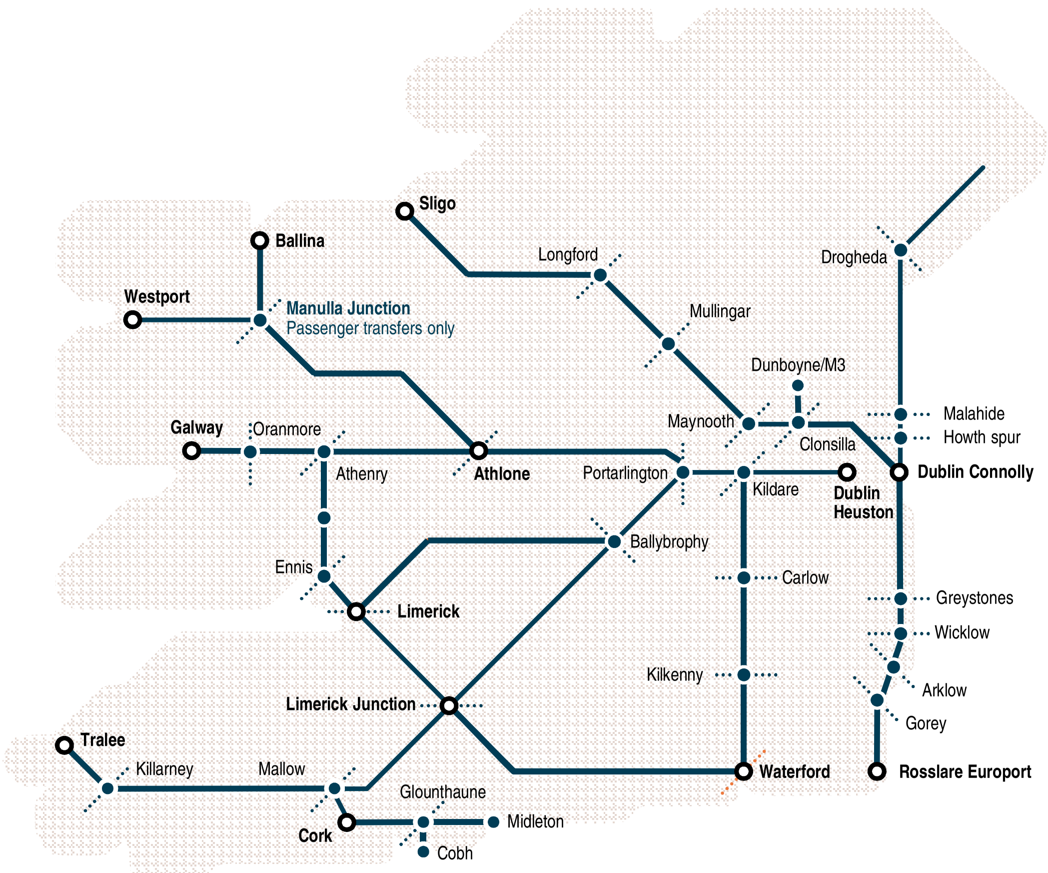


1) Contribution to central expenditures

Source: Iarnród Éireann, Roland Berger

17 routes have been defined for the route profitability analysis

IÉ route definitions for route profitability analysis



a	Cork	j	Lim. Jct – Waterford
b	Galway	k	Limerick – Ballybrophy
c	Tralee	l	Cork commuter
d	Limerick	m	Limerick – Galway
e	Westport/Ballina	n	Kildare Suburban
f	Waterford	o	Northern Suburban
g	Sligo	p	Western Suburban
h	Belfast	q	DART
i	Rosslare		

Source: Iarnród Éireann, Roland Berger

Summary route level P&Ls – 2015 actuals

Route level P&L (Actuals 2015) [EUR '000]

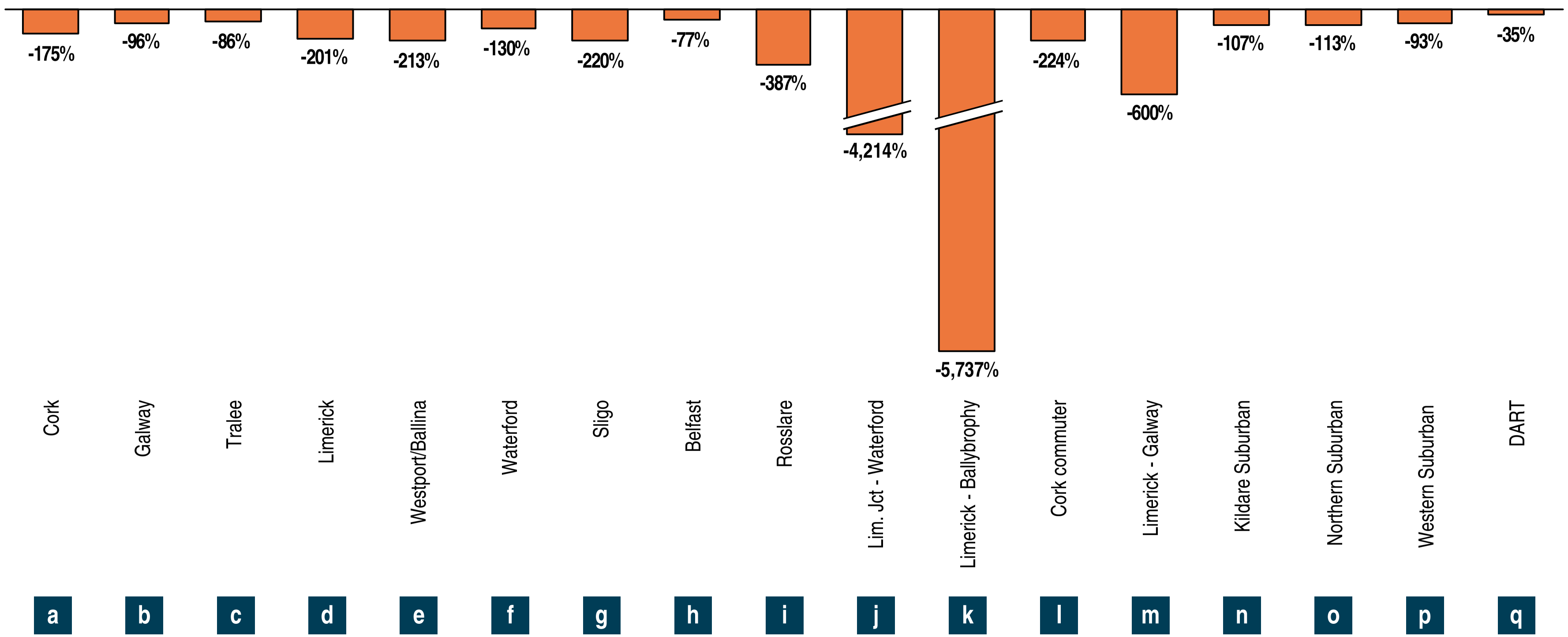
	Unique			Shared			Profitability		
	Revenue	Cost	Net result	Revenue	Cost	Net result	EBITDAC[1]	Cash result	Net result
Cork	15,897	-22,061	-6,164	11,849	-26,712	-14,863	-21,027	-48,512	-38,547
Galway	8,793	-9,472	-679	8,053	-12,757	-4,705	-5,384	-16,143	-11,981
Tralee	8,247	-4,536	3,711	2,825	-8,556	-5,731	-2,020	-9,563	-8,082
Limerick	5,074	-6,383	-1,308	3,760	-12,020	-8,260	-9,569	-17,742	-14,810
Westport/Ballina	5,748	-7,658	-1,910	4,112	-12,531	-8,419	-10,329	-21,001	-17,845
Waterford	6,443	-6,549	-106	5,063	-11,945	-6,882	-6,988	-14,940	-11,344
Sligo	6,054	-12,274	-6,219	4,155	-7,643	-3,488	-9,707	-22,438	-20,531
Belfast	9,162	-6,073	3,088	1,314	-4,129	-2,815	274	-8,037	-9,418
Rosslare	1,523	-7,871	-6,348	2,867	-6,497	-3,630	-9,978	-16,986	-15,901
Lim. Jct – Waterford	106	-5,084	-4,978	112	-781	-669	-5,647	-9,164	-9,047
Limerick – Ballybrophy	38	-4,988	-4,950	109	-913	-804	-5,754	-8,456	-7,880
Cork commuter	2,598	-7,653	-5,054	2,722	-6,508	-3,786	-8,840	-11,922	-9,480
Limerick – Galway	505	-3,112	-2,607	925	-3,980	-3,055	-5,661	-8,574	-8,516
Kildare Suburban	77	-6,231	-6,154	10,166	-10,407	-241	-6,395	-10,967	-6,768
Northern Suburban	5,647	-16,147	-10,500	12,764	-10,269	2,495	-8,004	-20,879	-15,609
Western Suburban	989	-9,446	-8,458	12,323	-9,490	2,833	-5,625	-12,337	-10,080
DART	16,007	-33,155	-17,148	26,685	-11,637	15,049	-2,099	-15,124	-12,309
Passenger route total[2]	92,909	-168,692	-75,783	109,804	-156,774	-46,969	-122,752	-272,784	-228,147

1) EBITDAC = Earnings Before Interest, Tax, Depreciation, Amortisation and Capitalisation; which is the result before central expenditures; 2) Passenger route total only (i.e. excluding freight results and non-rail related results)

Source: Iarnród Éireann, Roland Berger

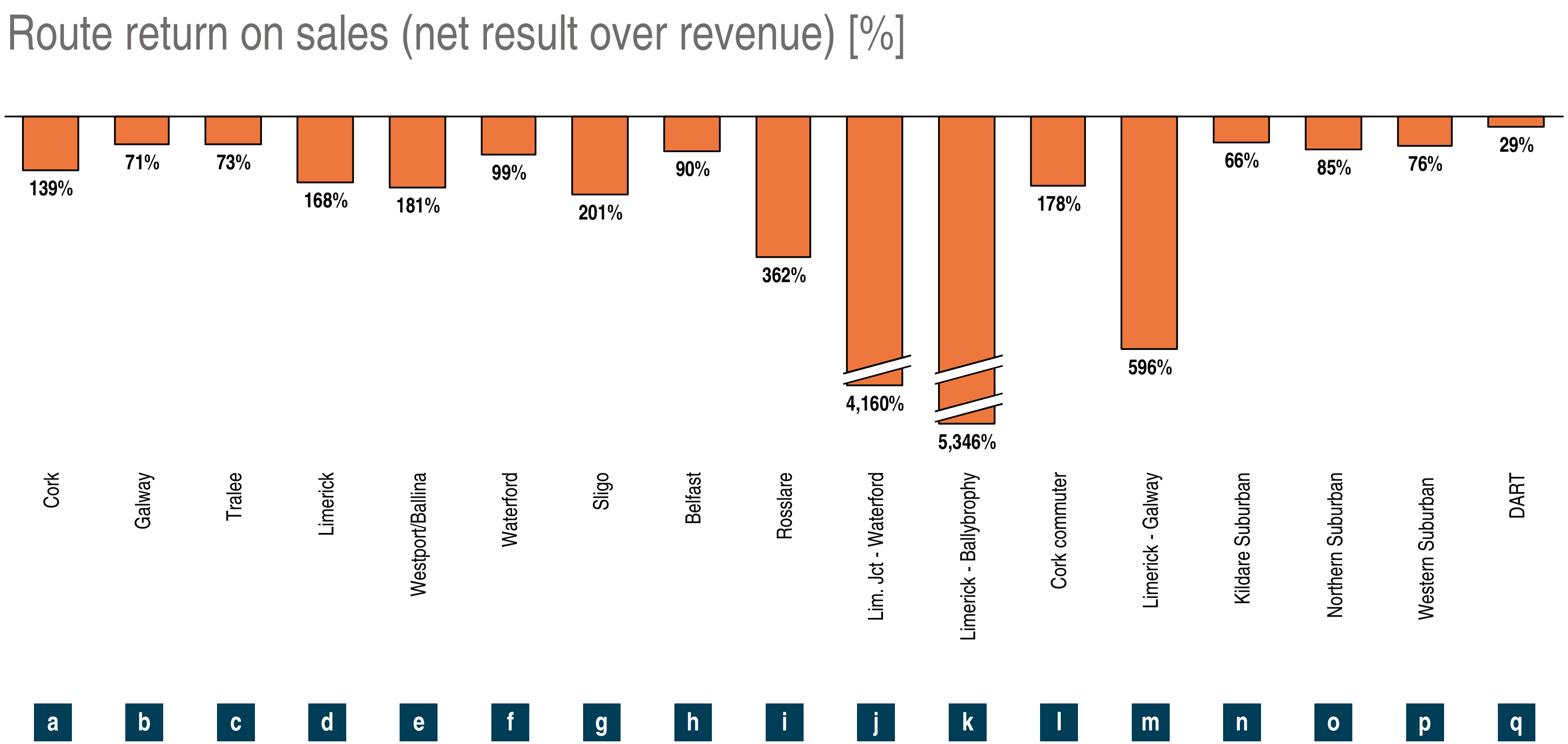
Route cash return on sales varies widely with some routes experiencing very significant negative cashflow

Route return on sales (cash result over revenue) [%]



Source: Iarnród Éireann, Roland Berger

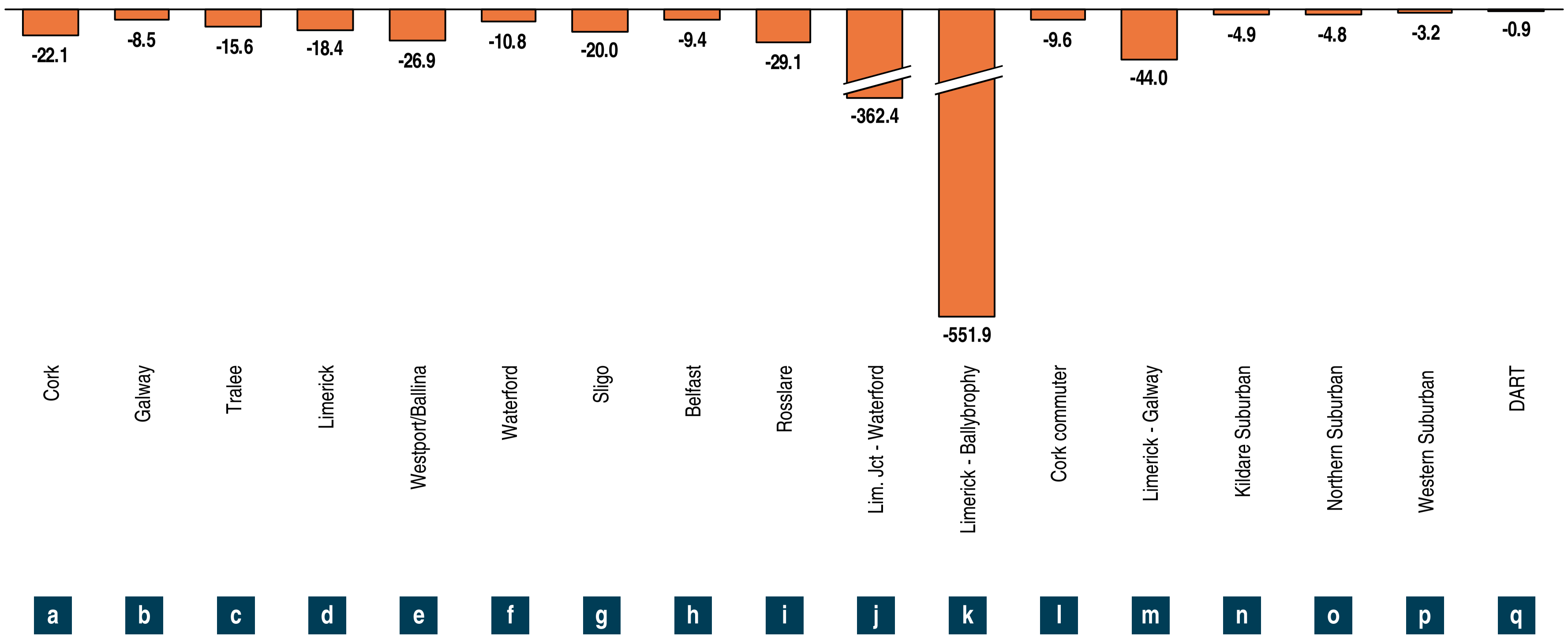
Route net return on sales differs widely with some routes experiencing very significant losses



Source: Iarnród Éireann, Roland Berger

Some of IÉ's routes experience very high levels of negative cashflow per passenger journey

Cash result per passenger journey by route [EUR / pax journey]



Source: Iarnród Éireann, Roland Berger

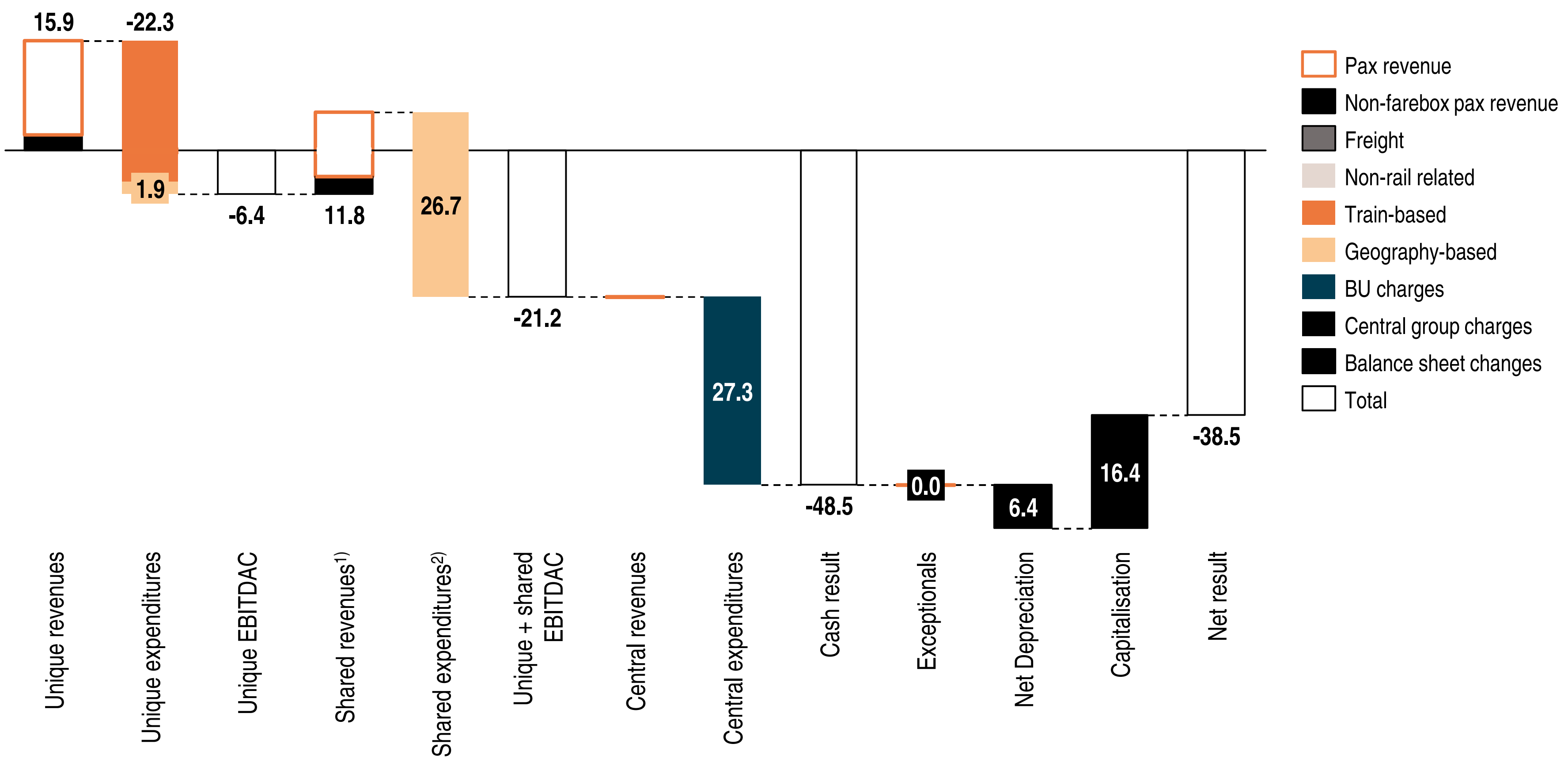
Some of IÉ's routes experience very high levels of net losses per passenger journey

Net result per passenger journey by route [EUR / pax journey]

Source: Iarnród Éireann, Roland Berger

Dublin – Cork has a negative EUR (21)m cashflow before and EUR (49)m after allocation of central expenditures, respectively

Dublin-Cork result [EUR m] – Actuals 2015

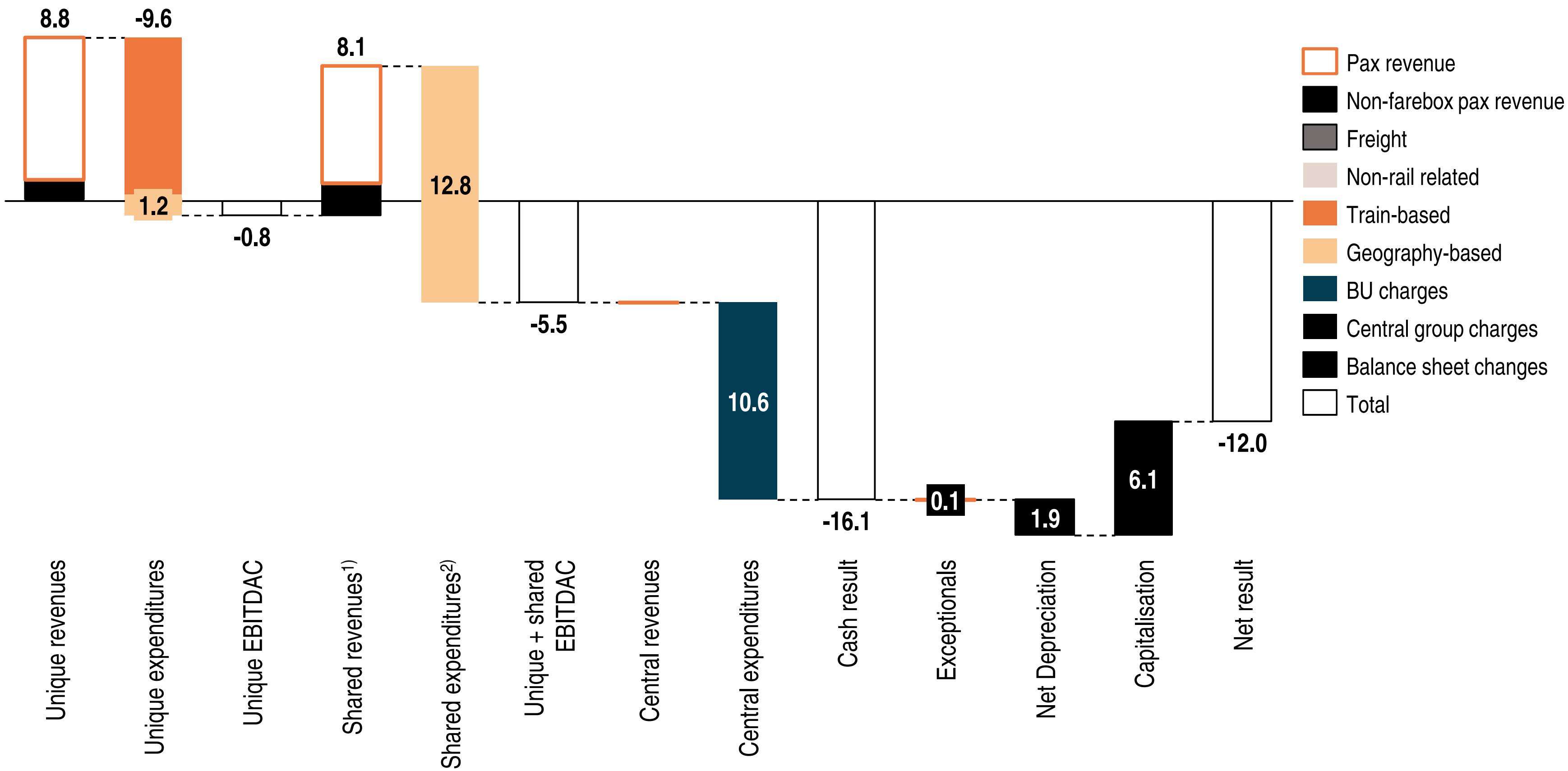


1) Shared revenues include OD-pair revenues for Heuston - Cork, car park and property & retail revenues; 2) Shared expenditures include shared station expenditures and shared IM expenditures for the track segments between Heuston and Cork

Source: Iarnród Éireann, Roland Berger

Dublin – Galway has a negative EUR (6)m cashflow before and EUR (16)m after allocation of central expenditures, respectively

Dublin-Galway result [EUR m] – Actuals 2015

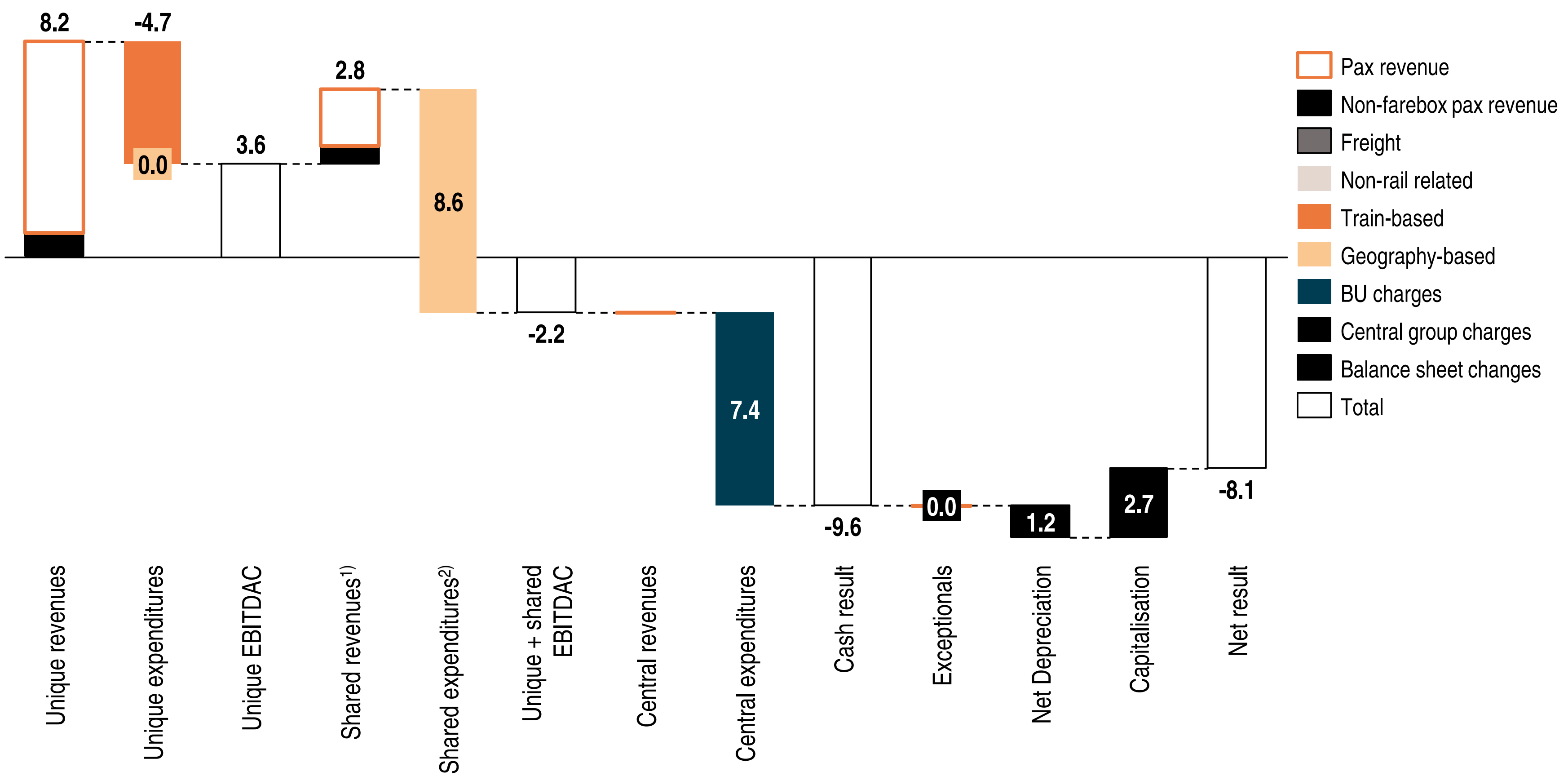


1) Shared revenues include OD-pair revenues for Heuston - Galway, car park and property & retail revenues; 2) Shared expenditures include shared station expenditures and shared IM expenditures for the track segments between Heuston and Galway

Source: Iarnród Éireann, Roland Berger

Dublin – Tralee has a negative EUR (2)m cashflow before and EUR (10)m after allocation of central expenditures, respectively

Dublin-Tralee result [EUR m] – Actuals 2015

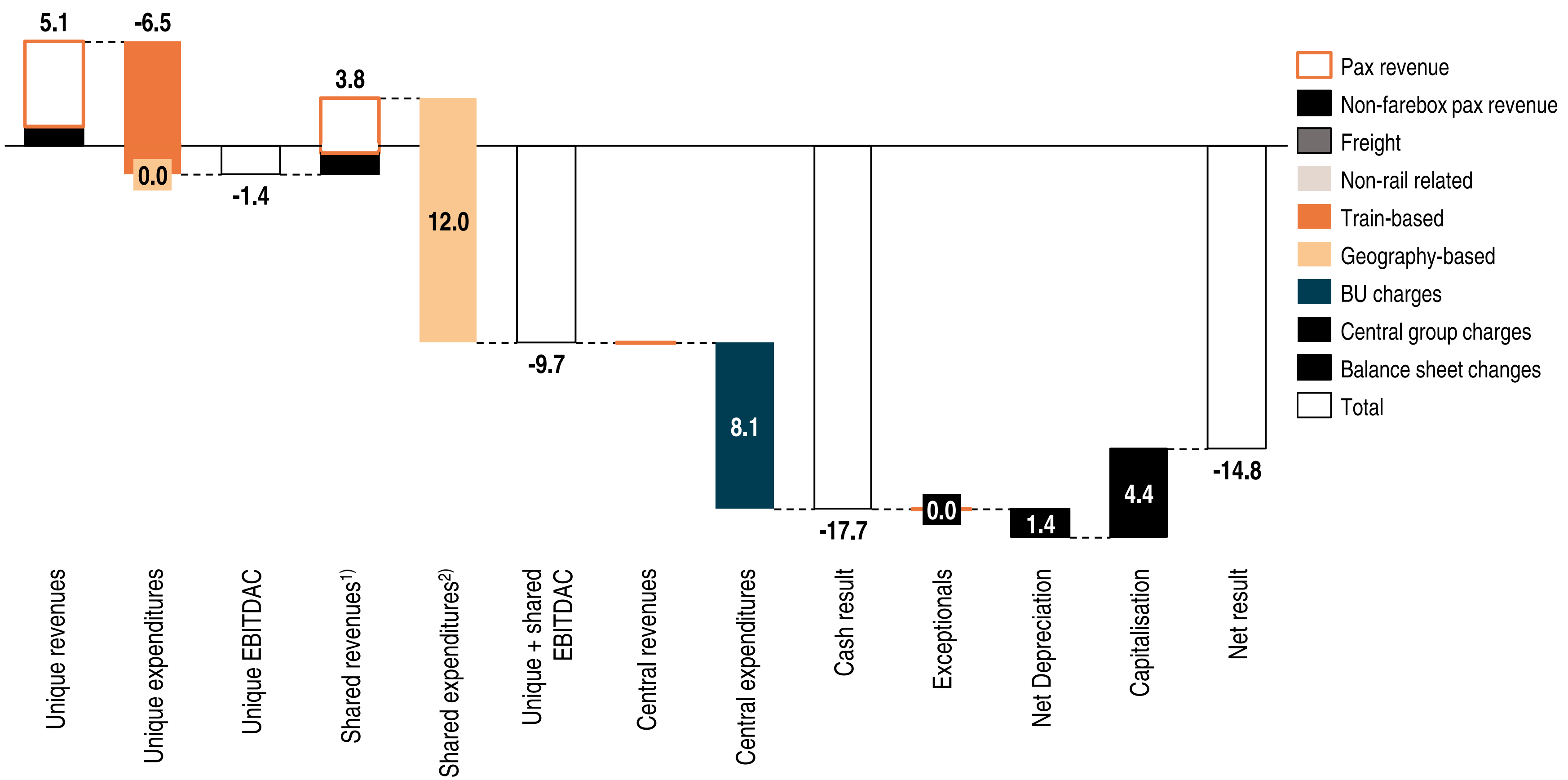


1) Shared revenues include OD-pair revenues for Heuston - Tralee, car park and property & retail revenues; 2) Shared expenditures include shared station expenditures and shared IM expenditures for the track segments between Heuston and Tralee

Source: Iarnród Éireann, Roland Berger

Dublin – Limerick has a negative EUR (10)m cashflow before and EUR (18)m after allocation of central expenditures, respectively

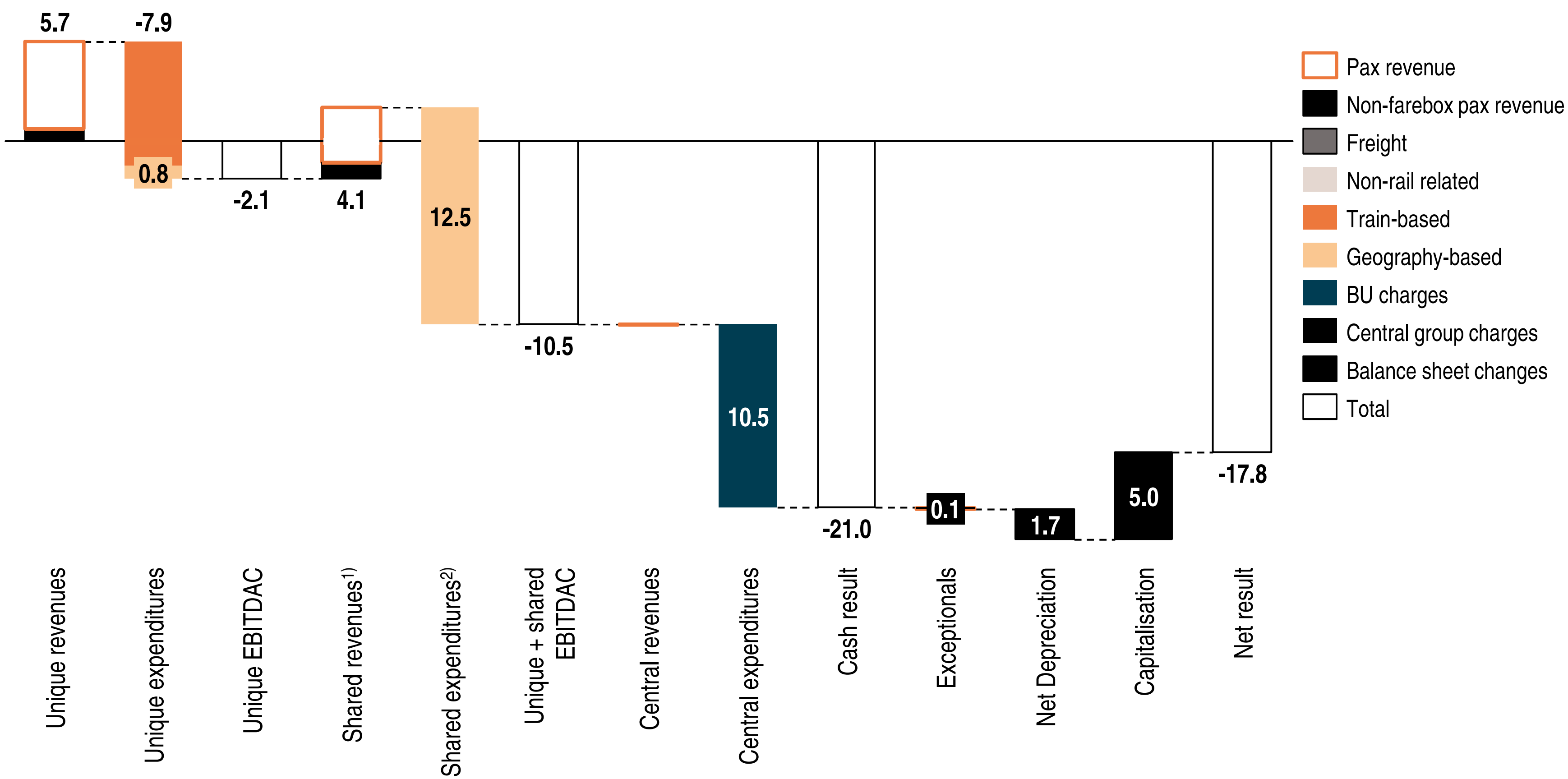
Dublin-Limerick result [EUR m] – Actuals 2015



1) Shared revenues include OD-pair revenues for Heuston - Limerick, car park and property & retail revenues; 2) Shared expenditures include shared station expenditures and shared IM expenditures for the track segments between Heuston and Limerick
Source: Iarnród Éireann, Roland Berger

Dublin – Westport/Ballina has a negative EUR (11)m cashflow before and EUR (21)m after allocation of central expenditures

Dublin-Westport/Ballina result [EUR m] – Actuals 2015

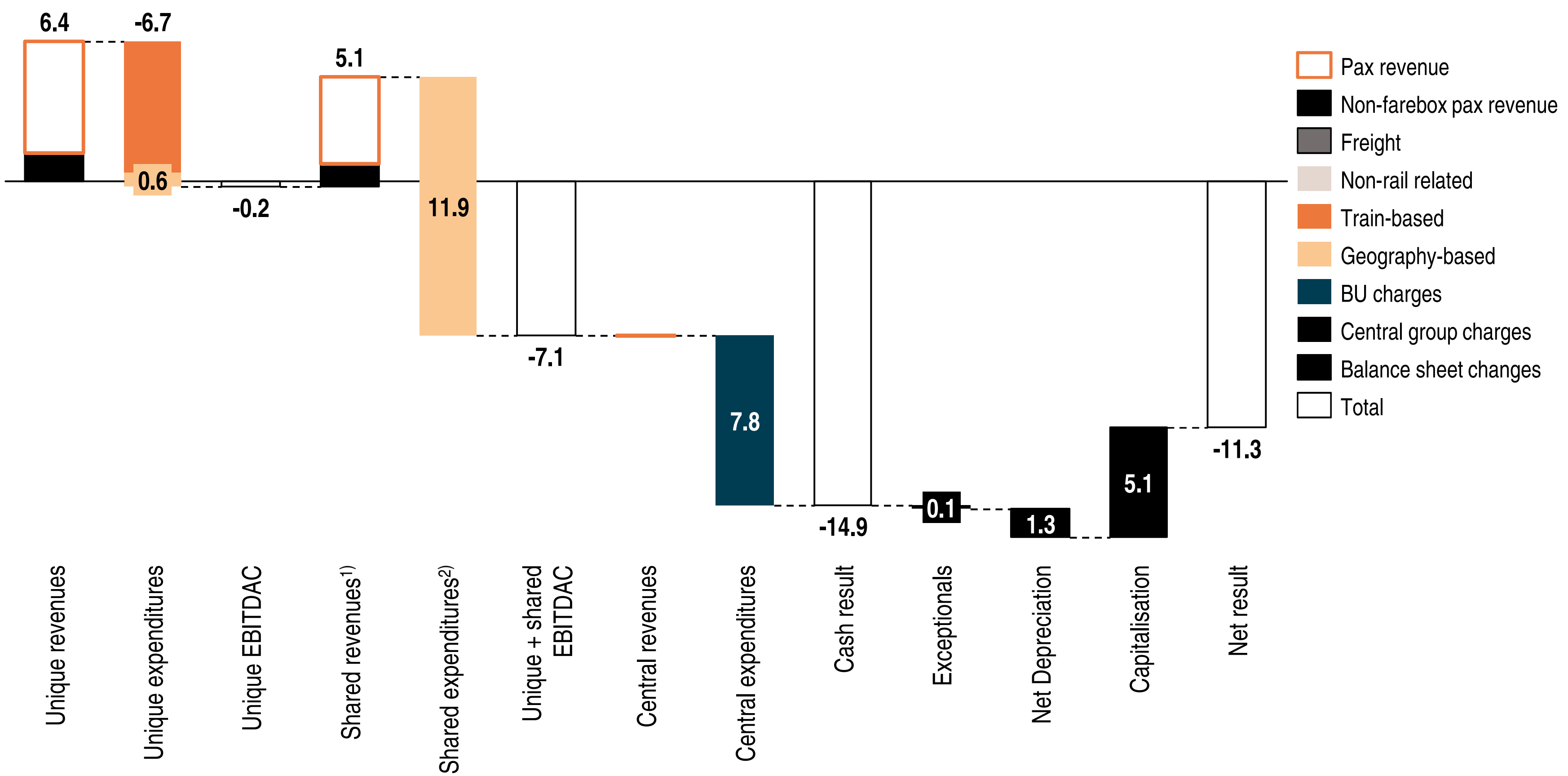


1) Shared revenues include OD-pair revenues for Heuston – Westport/Ballina, car park and property & retail revenues; 2) Shared expenditures include shared station expenditures and shared IM expenditures for the track segments between Heuston and Westport/Ballina

Source: Iarnród Éireann, Roland Berger

Dublin – Waterford has a negative EUR (7)m cashflow before and EUR (15)m after allocation of central expenditures, respectively

Dublin-Waterford result [EUR m] – Actuals 2015

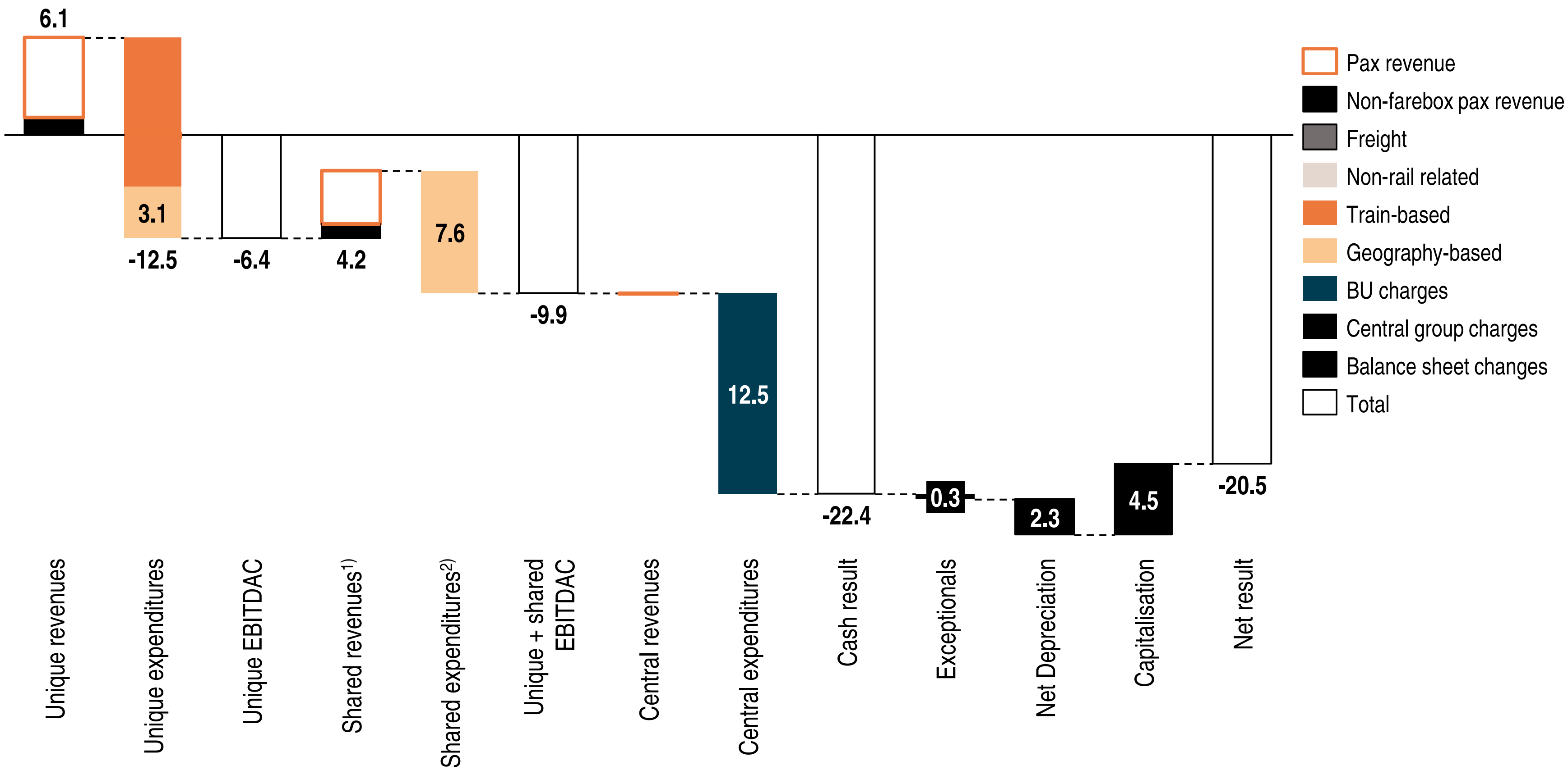


1) Shared revenues include OD-pair revenues for Heuston – Waterford, car park and property & retail revenues; 2) Shared expenditures include shared station expenditures and shared IM expenditures for the track segments between Heuston and Waterford

Source: Iarnród Éireann, Roland Berger

Dublin – Sligo has a negative EUR (10)m cashflow before and EUR (22)m after allocation of central expenditures, respectively

Dublin-Sligo result [EUR m] – Actuals 2015

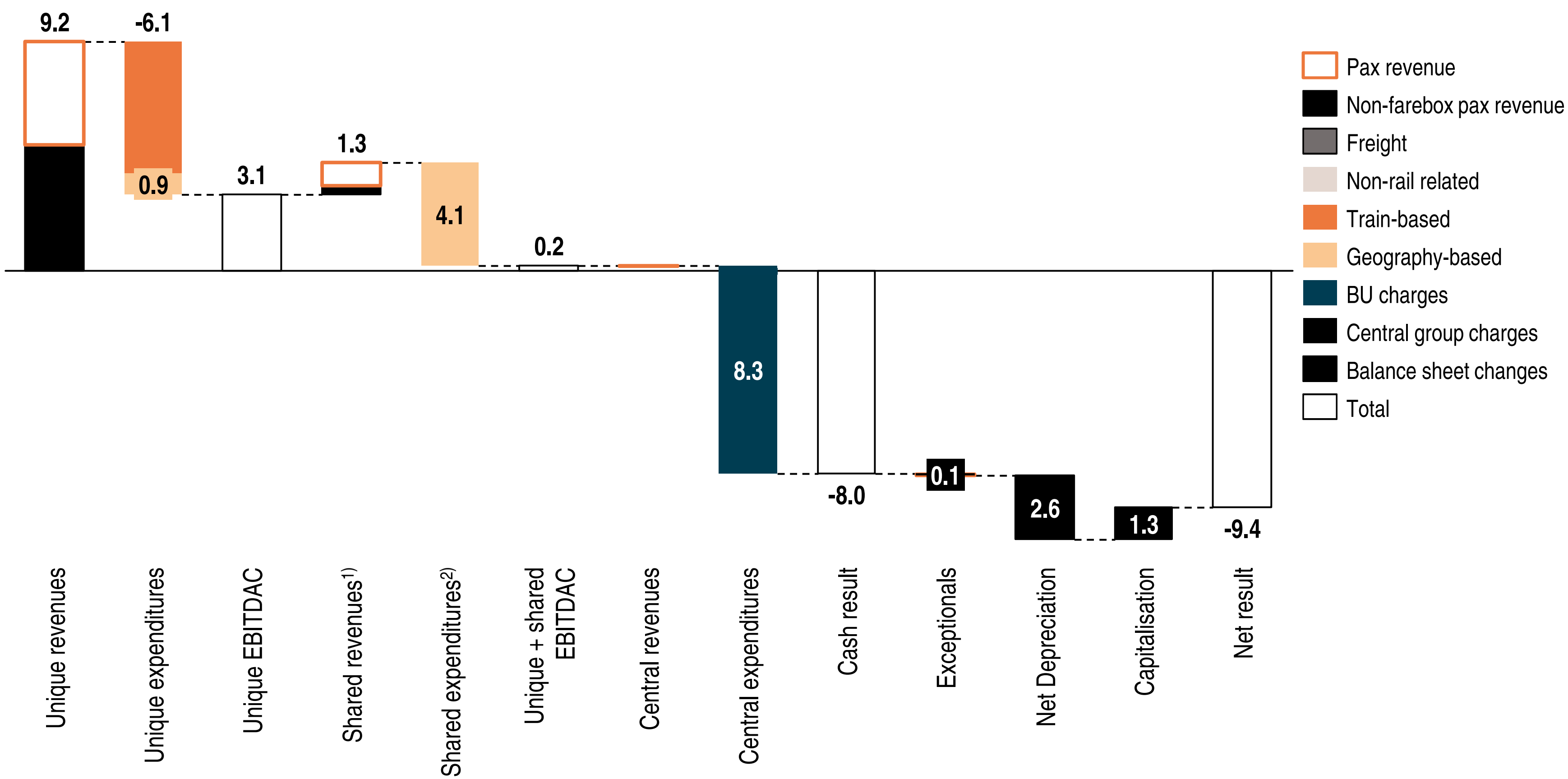


1) Shared revenues include OD-pair revenues for Connolly – Sligo, car park and property & retail revenues; 2) Shared expenditures include shared station expenditures and shared IM expenditures for the track segments between Connolly and Sligo

Source: Iarnród Éireann, Roland Berger

Dublin – Belfast has a positive EUR 0.2m cashflow before and negative EUR (8)m cashflow after allocation of central expenditures

Dublin-Belfast result [EUR m] – Actuals 2015

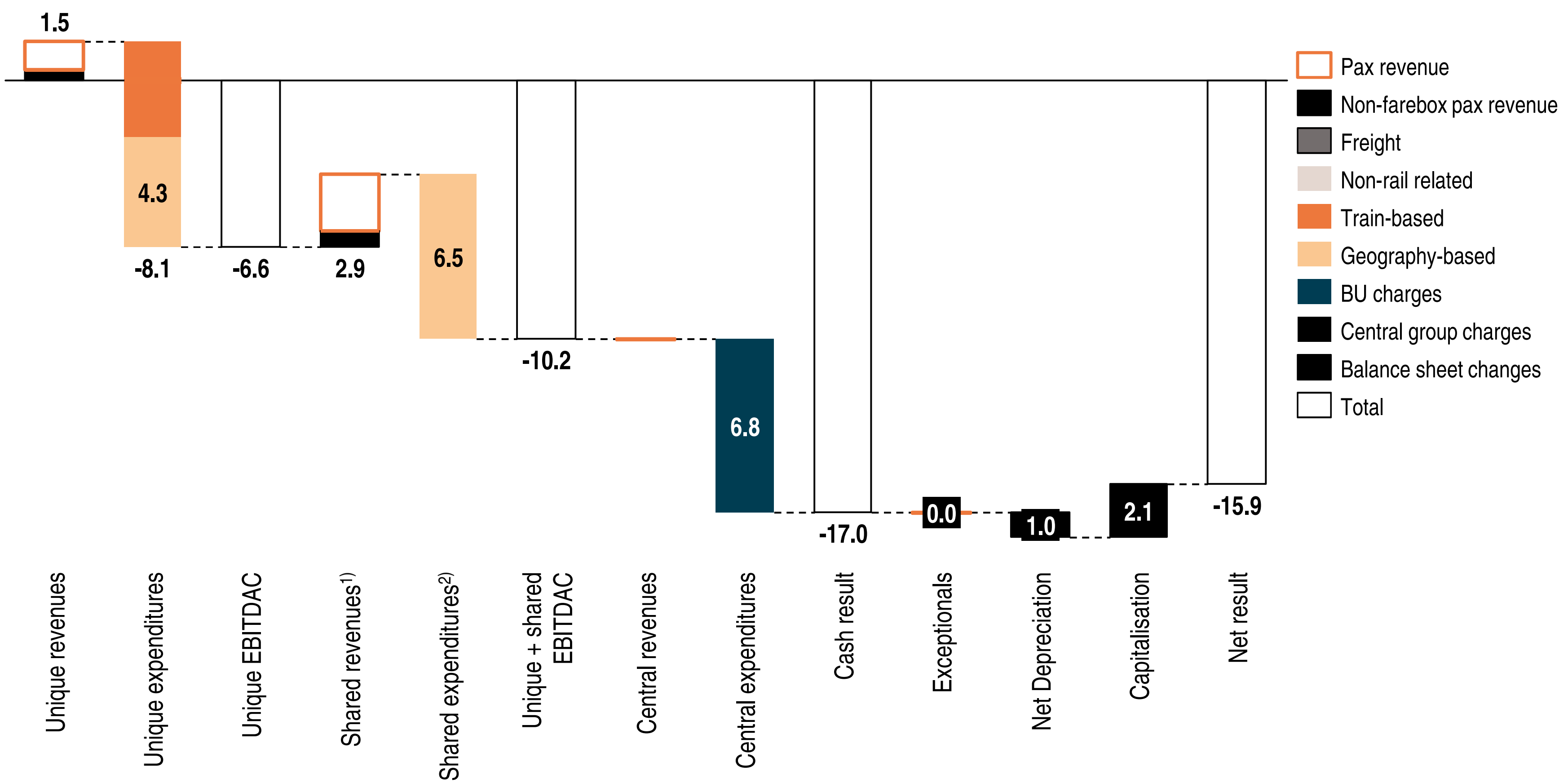


1) Shared revenues include OD-pair revenues for Connolly – Belfast, car park and property & retail revenues; 2) Shared expenditures include shared station expenditures and shared IM expenditures for the track segments between Connolly and Belfast

Source: Iarnród Éireann, Roland Berger

Dublin – Rosslare has a negative EUR (10)m cashflow before and EUR (17)m after allocation of central expenditures, respectively

Dublin-Rosslare result [EUR m] – Actuals 2015

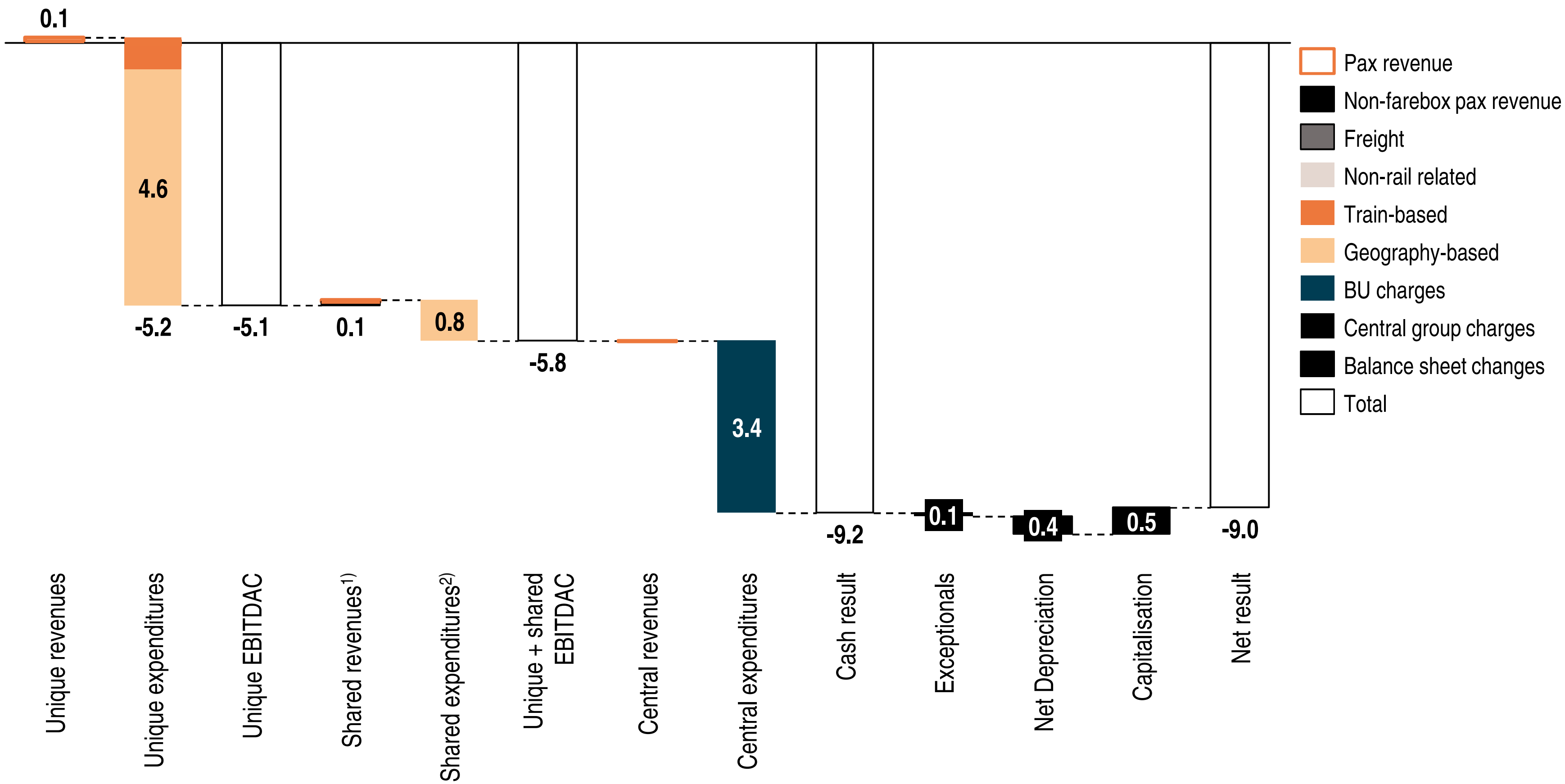


1) Shared revenues include OD-pair revenues for Connolly - Rosslare, car park and property & retail revenues; 2) Shared expenditures include shared station expenditures and shared IM expenditures for the track segments between Connolly and Rosslare

Source: Iarnród Éireann, Roland Berger

Limerick Jct – Waterford has a negative EUR (6)m cashflow before and EUR (9)m after allocation of central expenditures, respectively

Limerick Junction-Waterford result [EUR m] – Actuals 2015

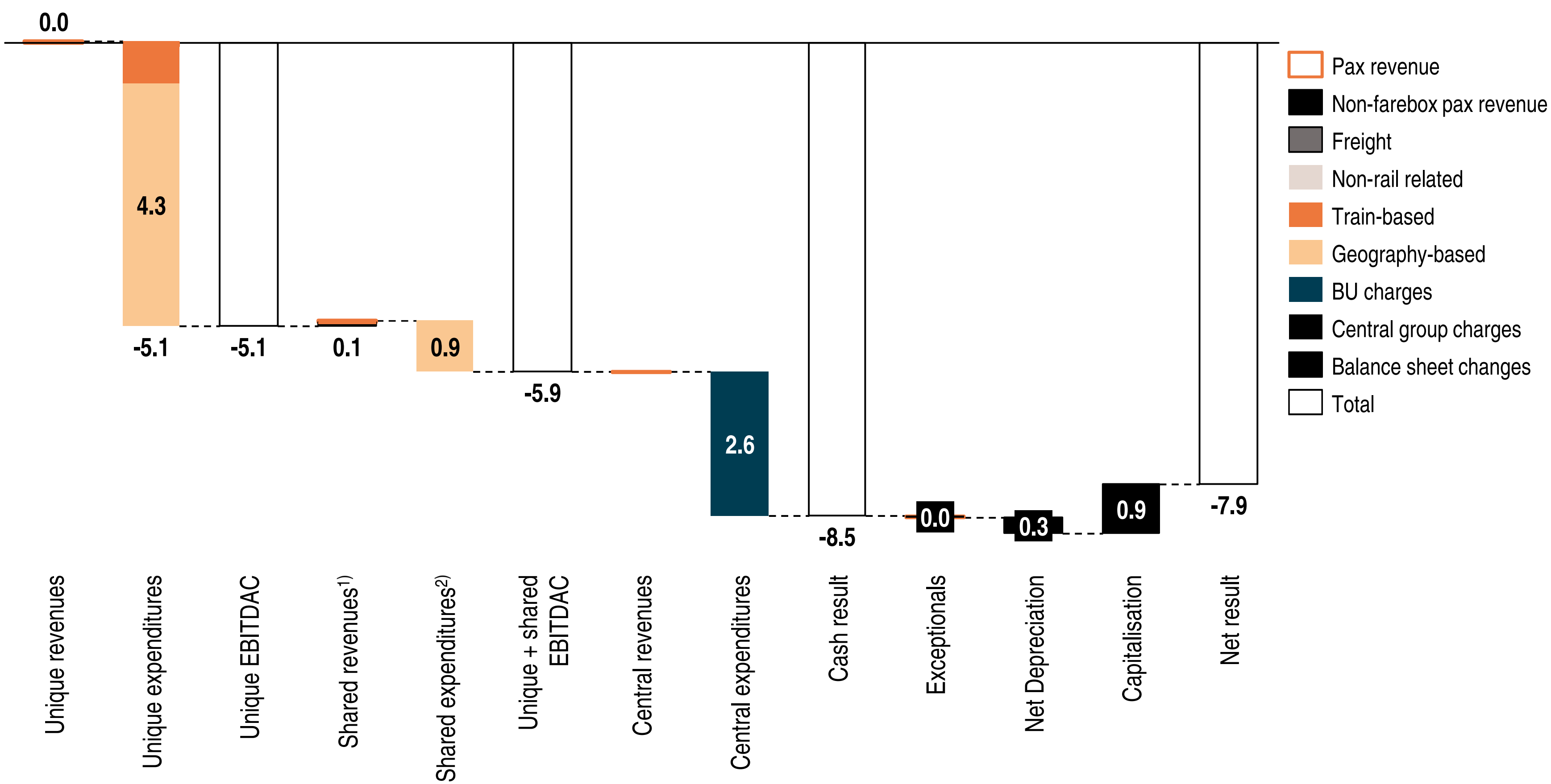


1) Shared revenues include car park and property & retail revenues for stations Limerick Junction and Waterford; 2) Shared expenditures include station expenditures for Limerick Junction and Waterford

Source: Iarnród Éireann, Roland Berger

Limerick – Ballybrophy has a negative EUR (6)m cashflow before and EUR (9)m after allocation of central expenditures, respectively

Limerick-Ballybrophy result [EUR m] – Actuals 2015

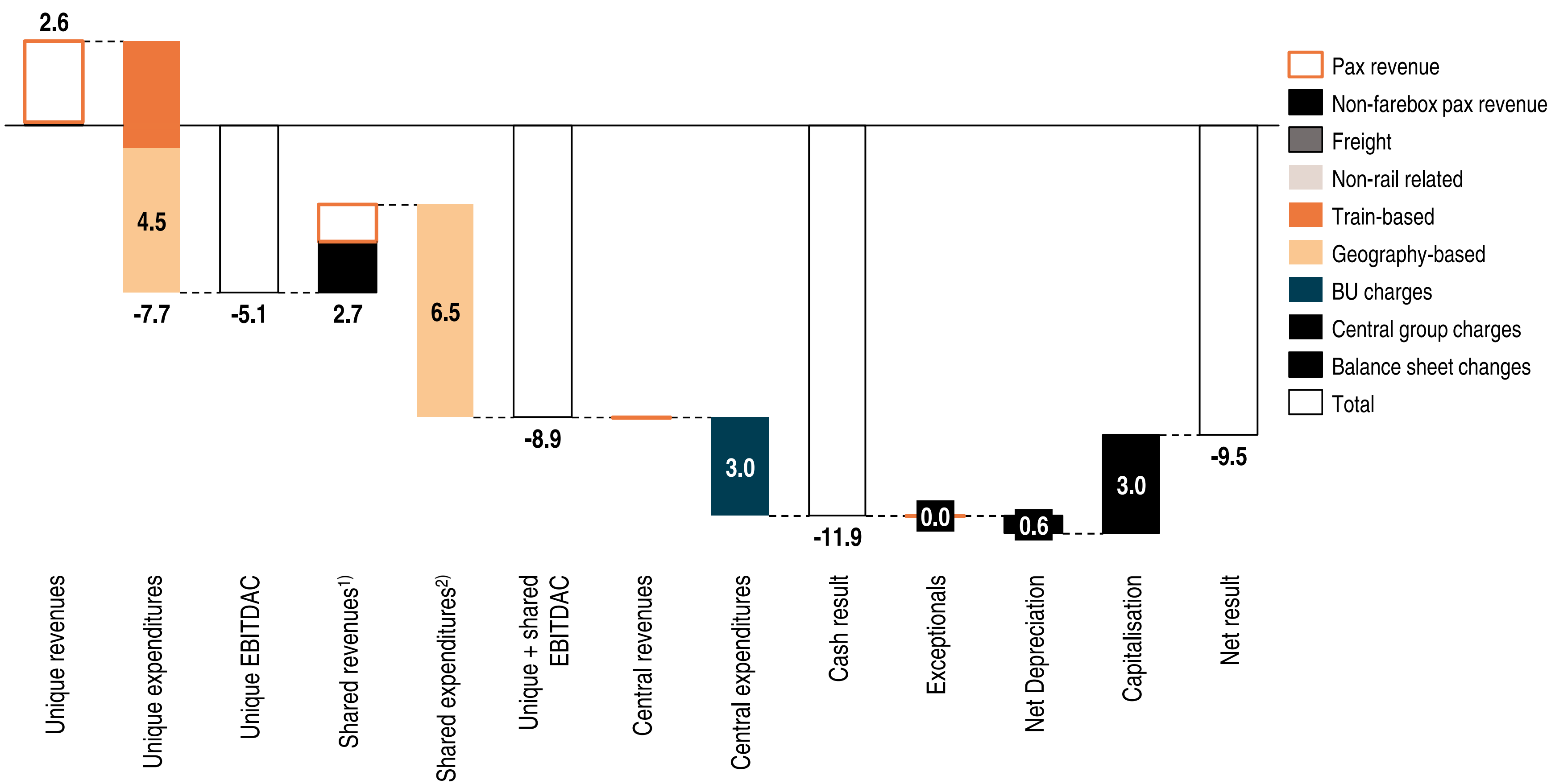


1) Shared revenues include OD-pair revenues Limerick – Ballybrophy and car park and property & retail revenues for stations Limerick and Ballybrophy; 2) Shared expenditures include station expenditures for Limerick and Ballybrophy and IM expenditures for the track segment Kilonan Junction - Limerick

Source: Iarnród Éireann, Roland Berger

Cork commuter has a negative EUR (9)m cashflow before and EUR (12)m after allocation of central expenditures, respectively

Cork commuter result [EUR m] – Actuals 2015

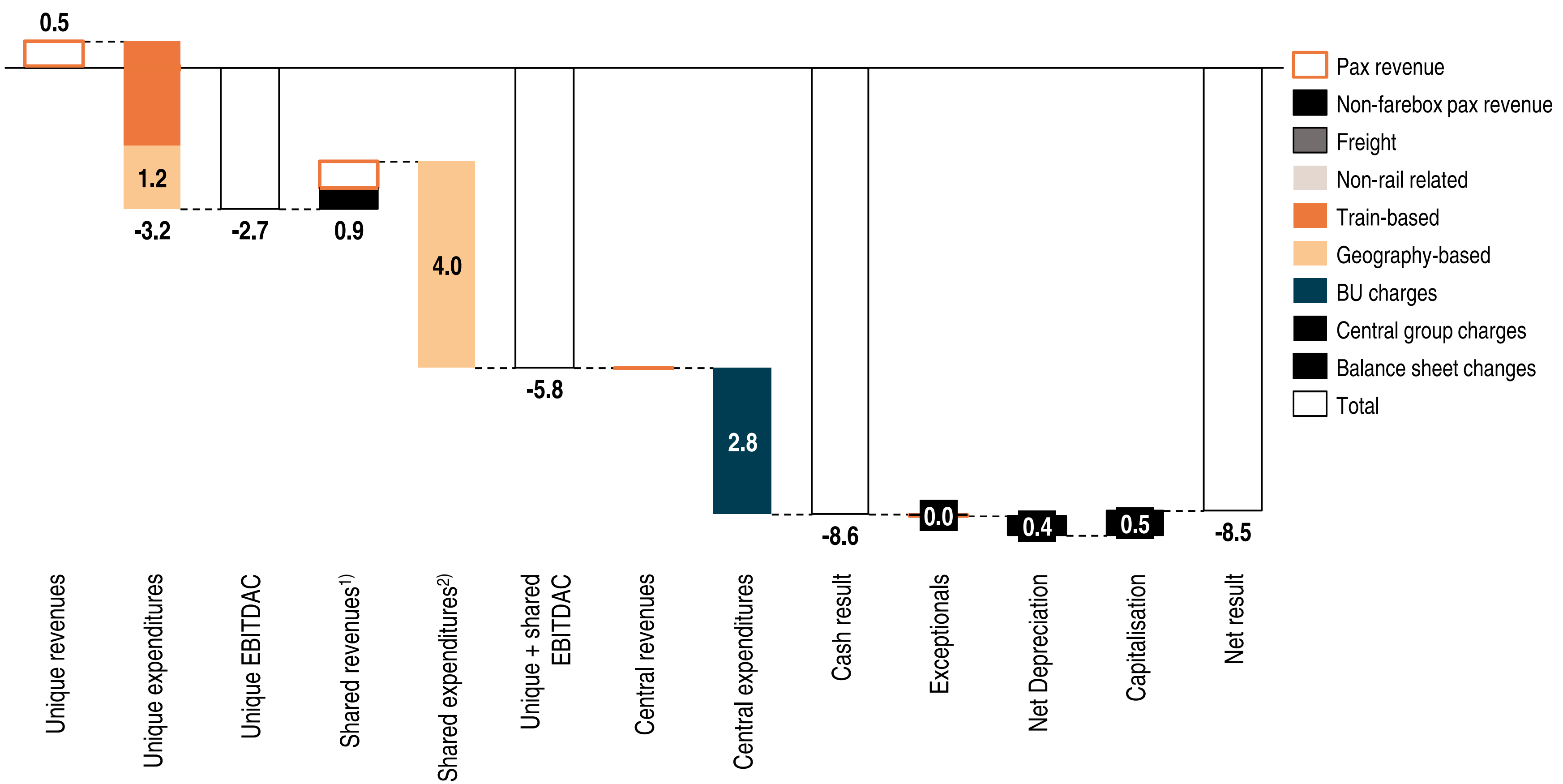


1) Shared revenues include OD-pair revenues for Cork commuter, car park and property & retail revenues; 2) Shared expenditures include shared station expenditures and shared IM expenditures for the track segments used by Cork Commuter

Source: Iarnród Éireann, Roland Berger

Limerick – Galway has a negative EUR (6)m cashflow before and EUR (9)m after allocation of central expenditures, respectively

Limerick-Galway result [EUR m] – Actuals 2015

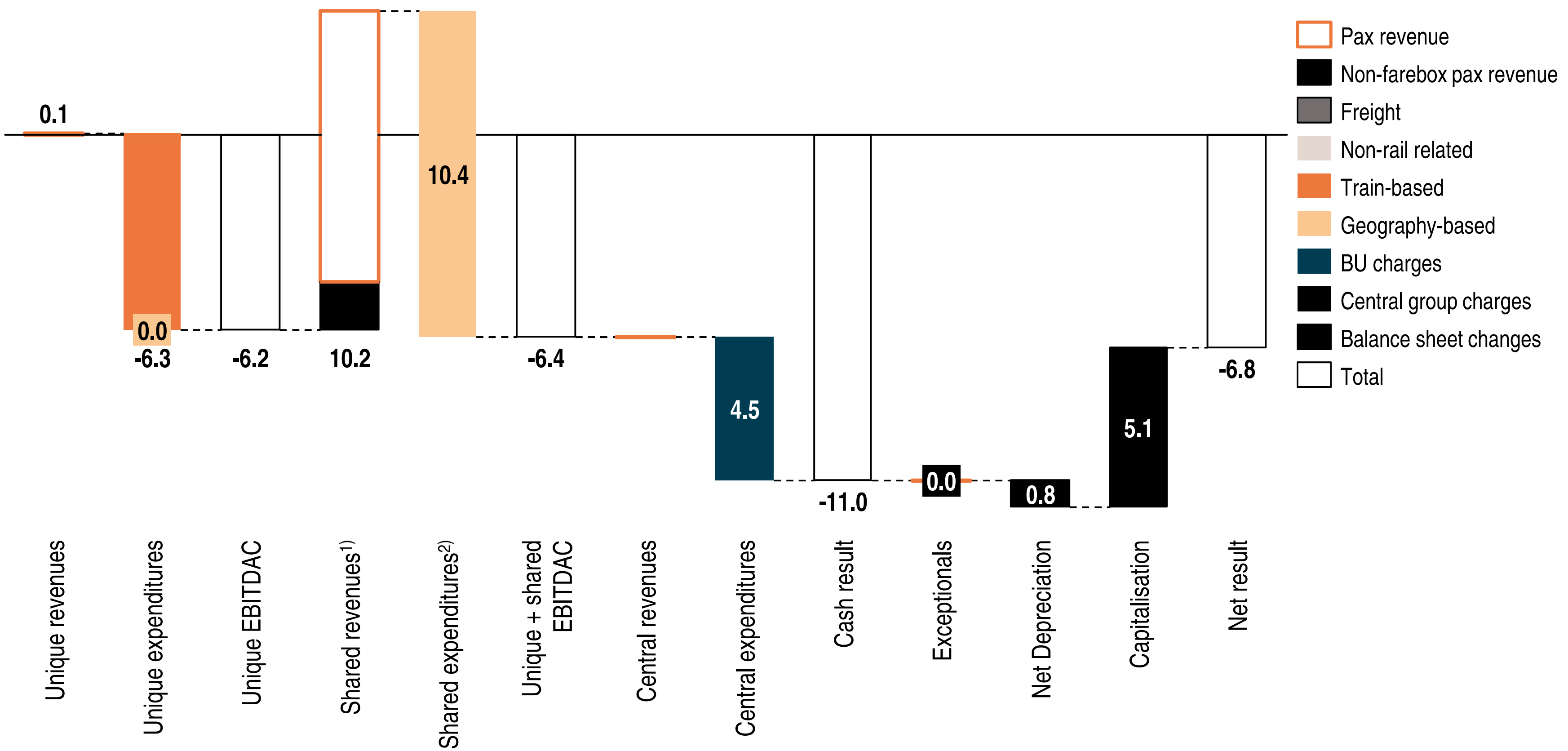


1) Shared revenues include OD-pair revenues for Limerick – Ennis and Athenry – Galway, car park and property & retail revenues; 2) Shared expenditures include shared station expenditures and shared IM expenditures for the track segments Limerick – Ennis and Athenry – Galway

Source: Iarnród Éireann, Roland Berger

Kildare suburban has a negative EUR (6)m cashflow before and EUR (11)m after allocation of central expenditures, respectively

Kildare Suburban result [EUR m] – Actuals 2015

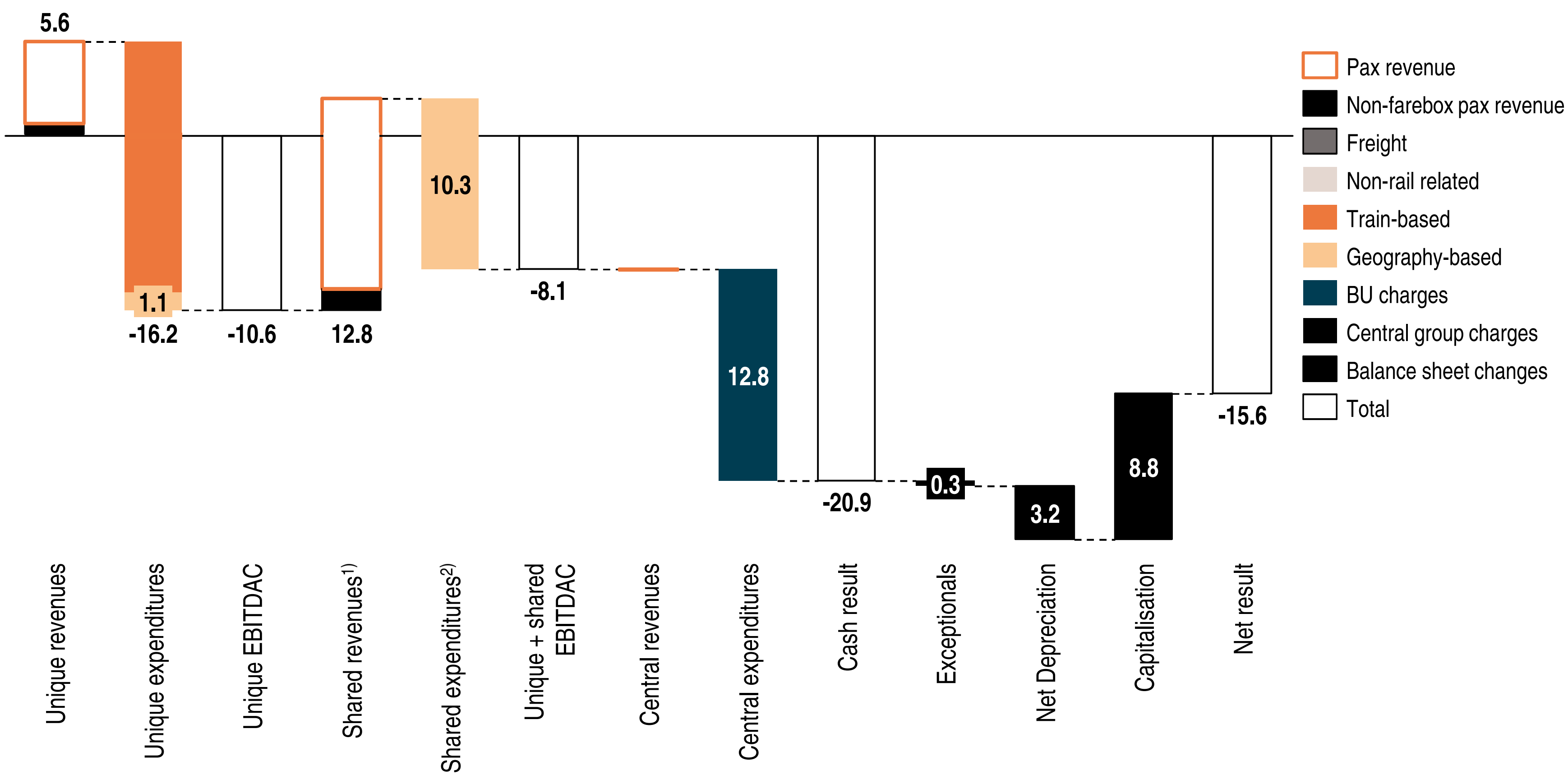


1) Shared revenues include OD-pair revenues for Connolly - Kildare, car park and property & retail revenues; 2) Shared expenditures include shared station expenditures and shared IM expenditures for the track segments between Connolly and Kildare

Source: Iarnród Éireann, Roland Berger

Northern suburban has a negative EUR (8)m cashflow before and EUR (21)m after allocation of central expenditures, respectively

Northern Suburban result [EUR m] – Actuals 2015

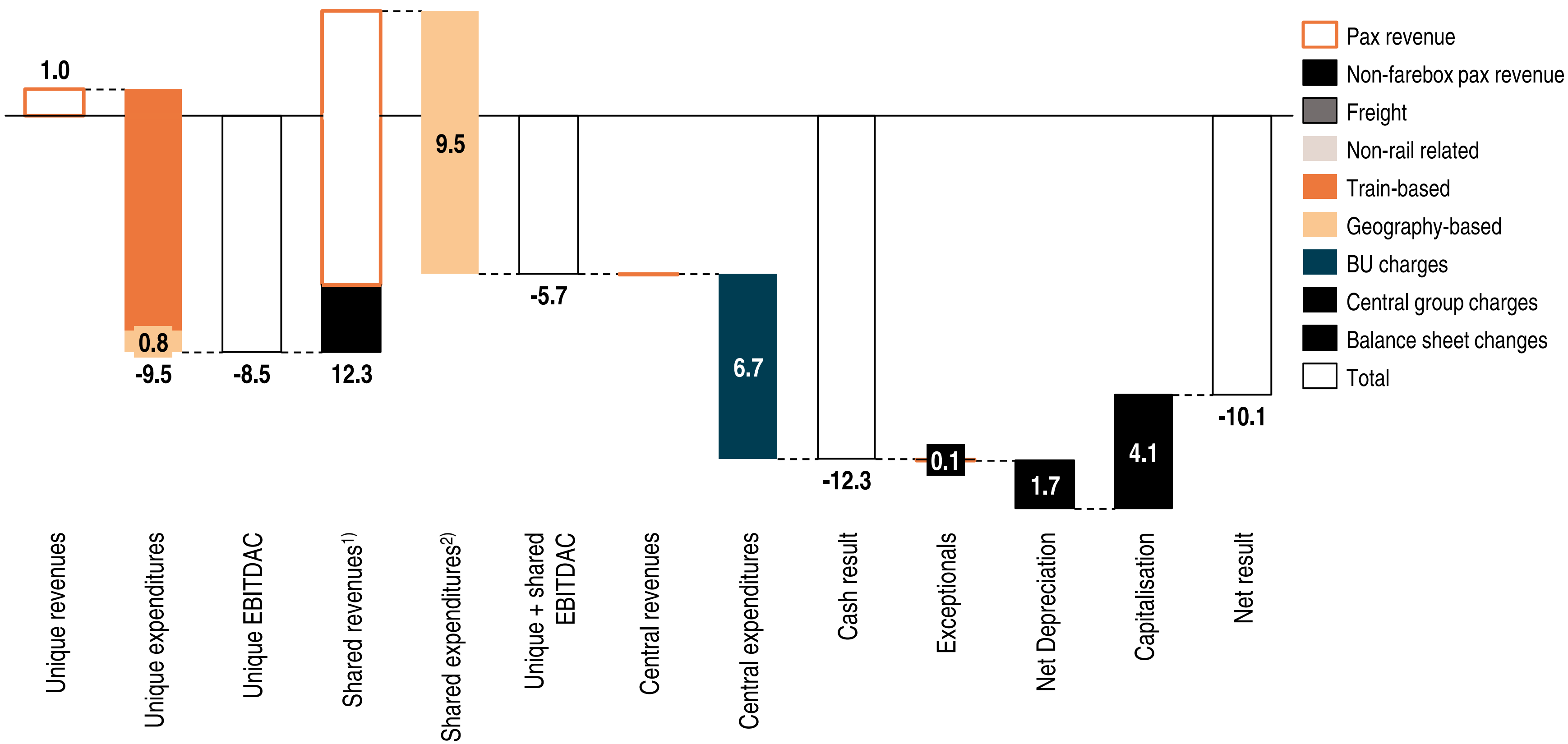


1) Shared revenues include OD-pair revenues for Connolly - Dundalk, car park and property & retail revenues; 2) Shared expenditures include shared station expenditures and shared IM expenditures for the track segments between Connolly and Dundalk

Source: Iarnród Éireann, Roland Berger

Western suburban has a negative EUR (6)m cashflow before and EUR (12)m after allocation of central expenditures, respectively

Western Suburban result [EUR m] – Actuals 2015

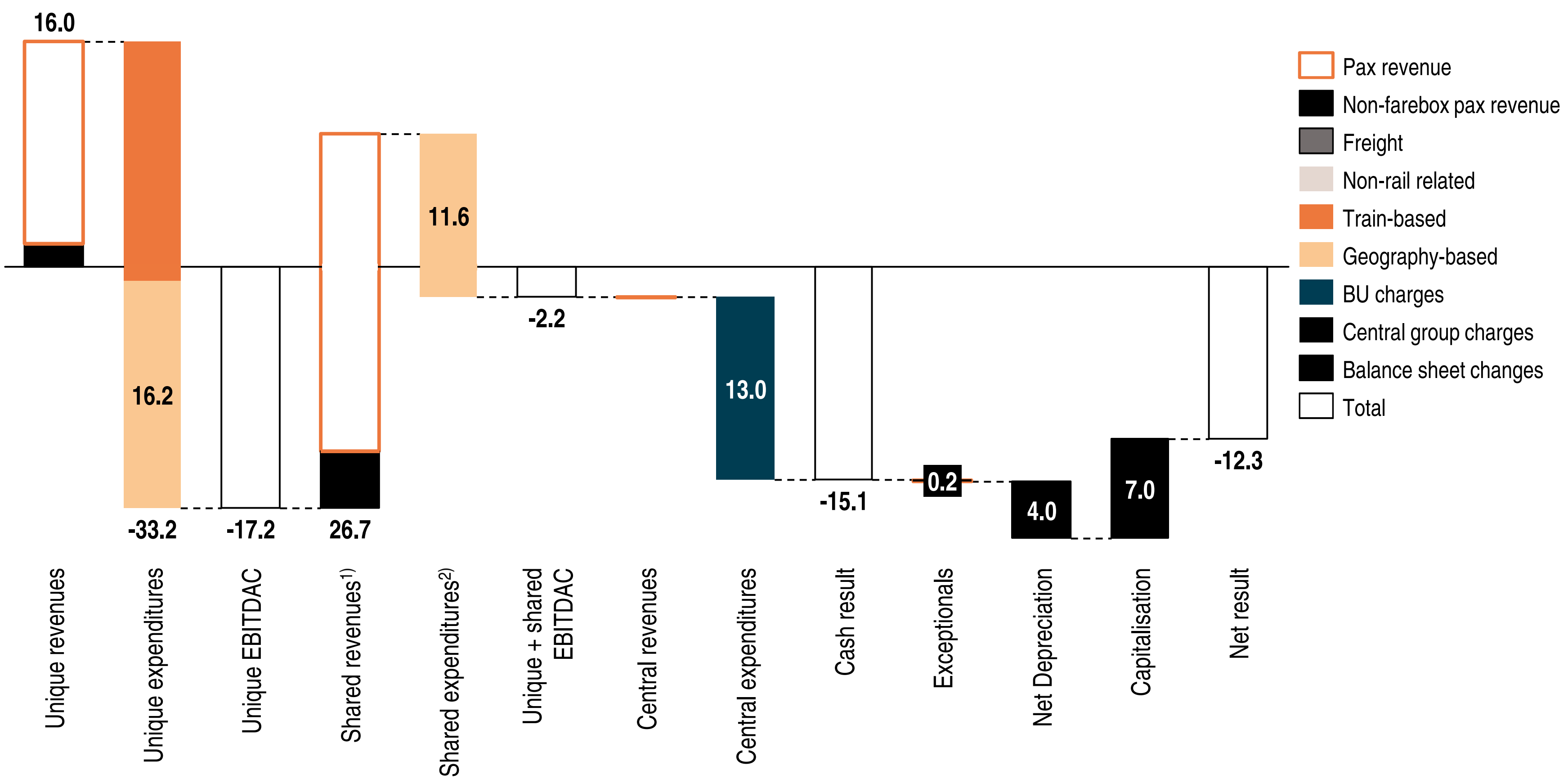


1) Shared revenues include OD-pair revenues for Connolly - Longford, car park and property & retail revenues; 2) Shared expenditures include shared station expenditures and shared IM expenditures for the track segments between Connolly and Longford

Source: Iarnród Éireann, Roland Berger

DART has a negative EUR (2)m cashflow before central expenditures and EUR (15)m after allocation of central expenditures

DART result [EUR m] – Actuals 2015

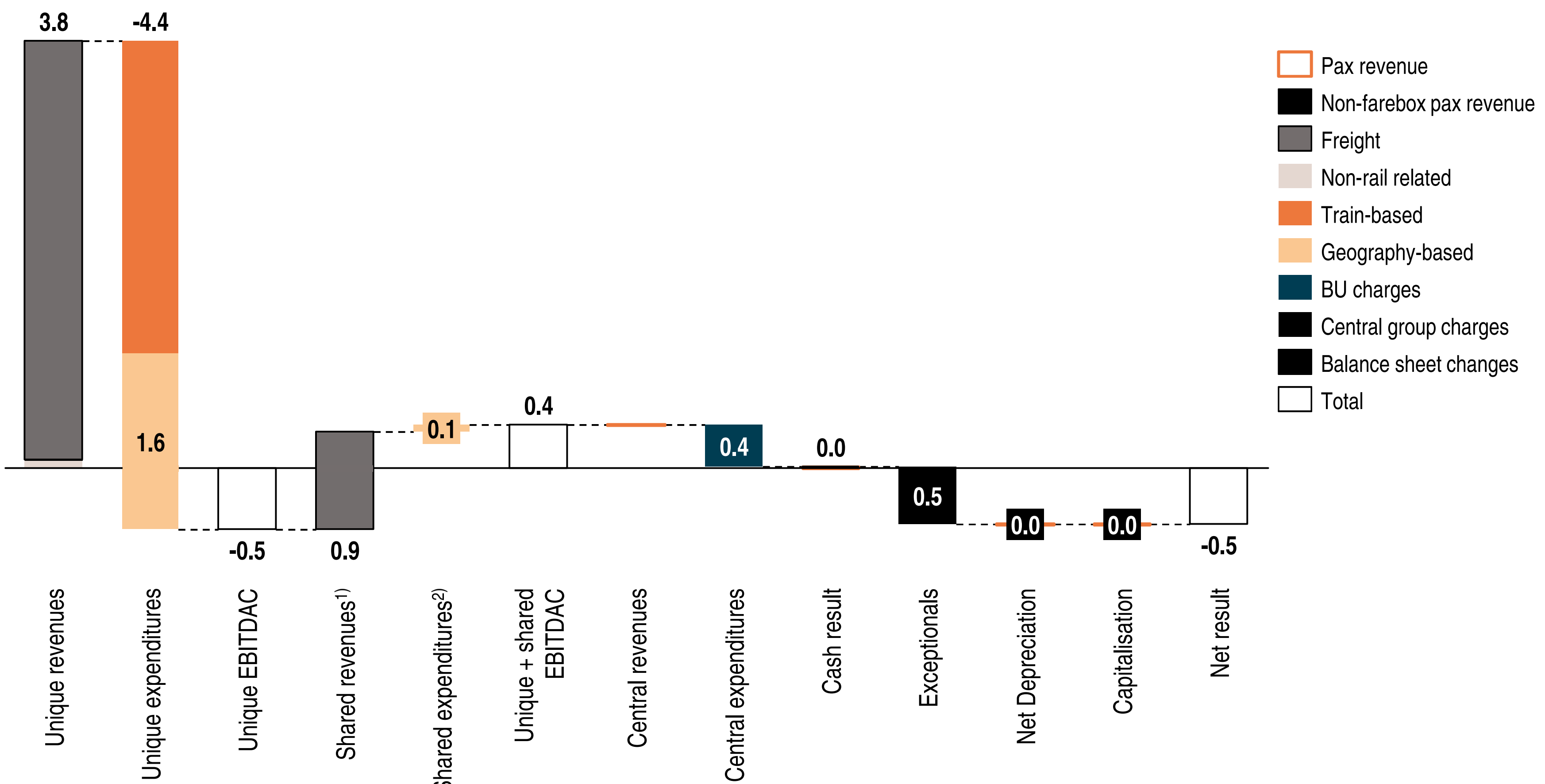


1) Shared revenues include OD-pair revenues for DART, car park and property & retail revenues; 2) Shared expenditures include shared station expenditures and shared IM expenditures for the track segments used by DART

Source: Iarnród Éireann, Roland Berger

When allocating marginal expenditures only, Freight has a positive EUR 0.4m cashflow before central expenditures and EUR 0m after

Freight result – marginal expenditure approach [EUR m] – Actuals 2015



1) Shared expenditures include shared station expenditures and shared IM expenditures for the track segments used by freight routes: Tara mines – Dublin Port, Westport – Waterford, Ballina – Waterford, Ballina - Dublin

Source: Iarnród Éireann, Roland Berger

Roland Berger

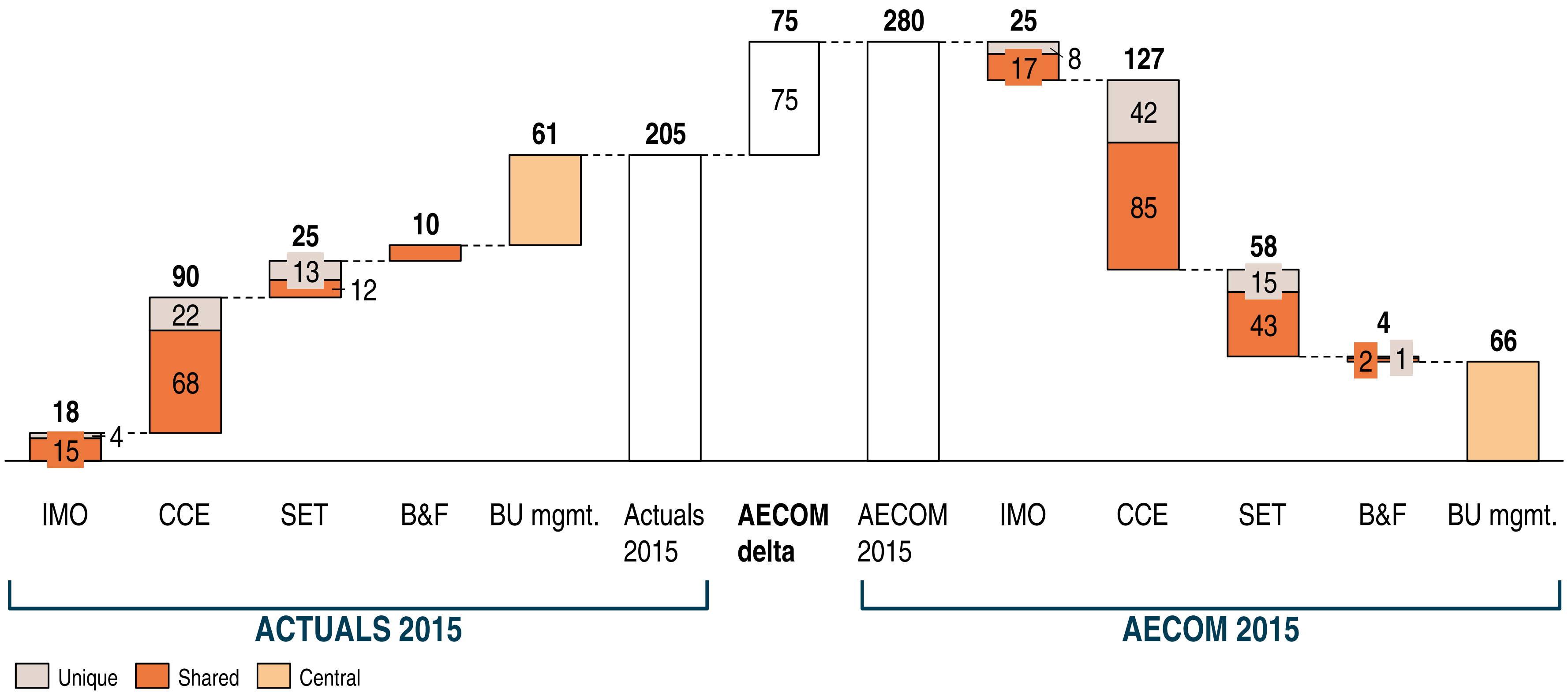
E. Route profitability results AECOM 2015

Iarnród Éireann
Irish Rail

Contents of this section

According to the AECOM 2015 report, IÉIM should have spent EUR 75 m more in 2015 to sustain a steady-state infrastructure

Infrastructure Management expenditures[1] – Actuals 2015 vs AECOM 2015 [EUR m]

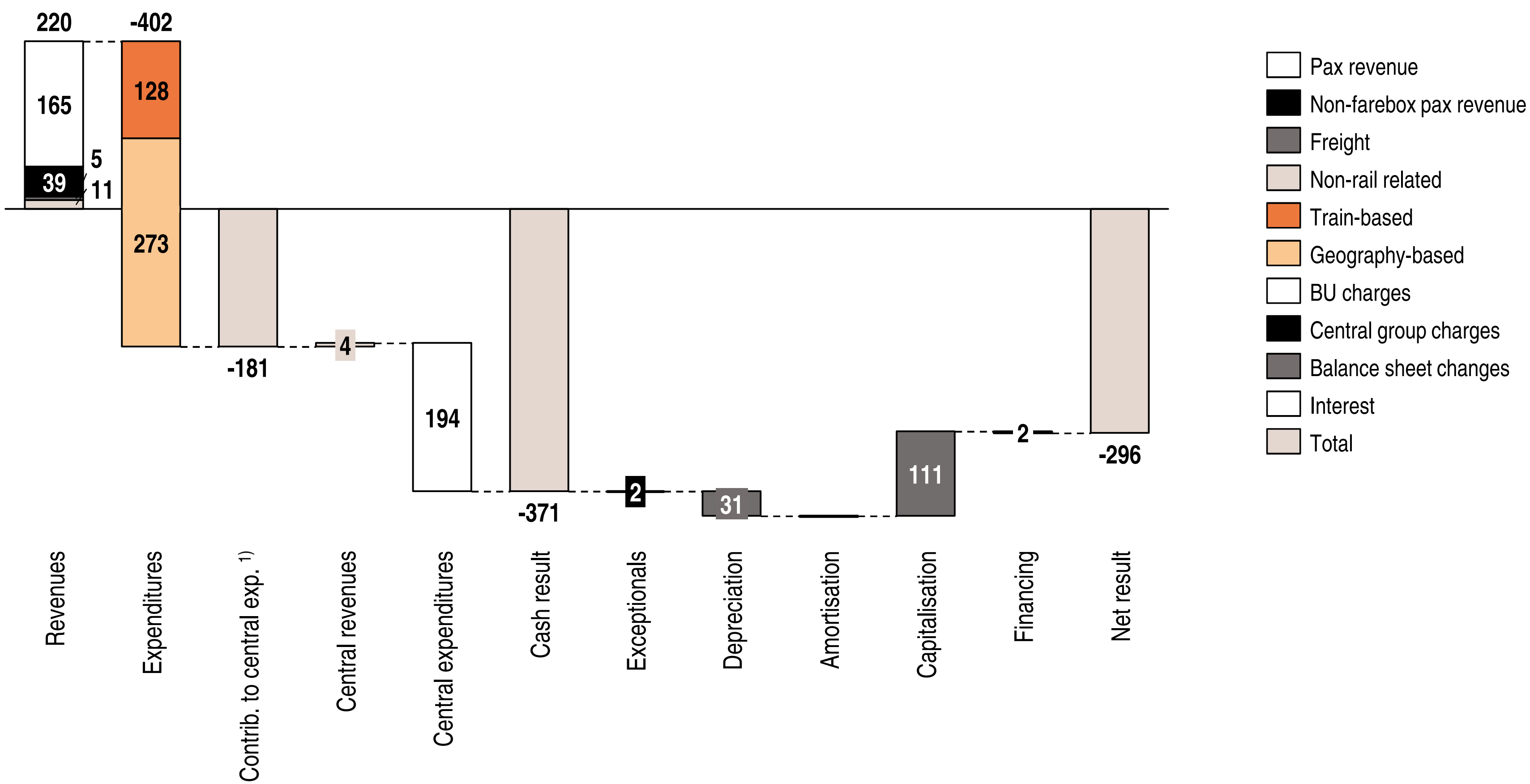


1) Excluding New Works

Source: Iarnród Éireann, Roland Berger

IÉ shows a contribution to central expenditures of EUR (181)m and cash result of EUR (371)m after attribution of central expenditures

Overall Iarnród Éireann result [EUR m] – AECOM 2015, timetable 2015

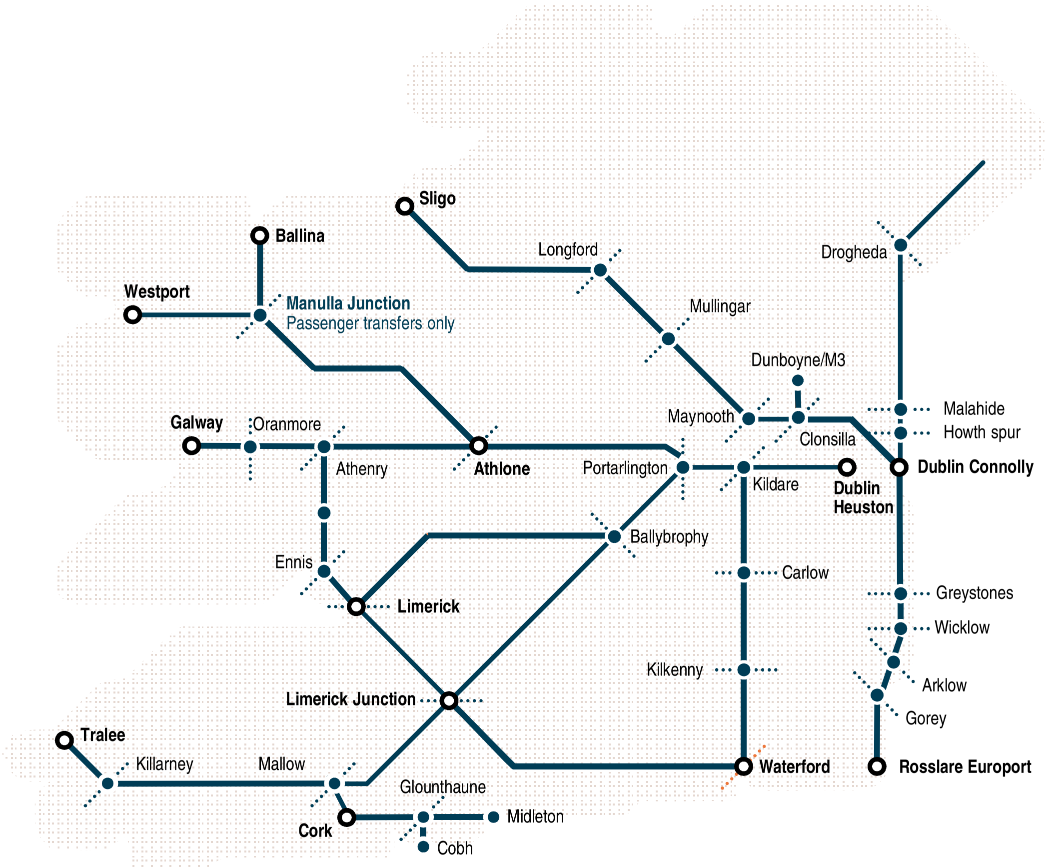


1) Contribution to central expenditures

Source: Iarnród Éireann, Roland Berger

The AECOM 2015 spend has been distributed over the 17 routes defined for the route profitability analysis

IÉ route definitions for route profitability analysis



a	Cork	j	Lim. Jct – Waterford
b	Galway	k	Limerick – Ballybrophy
c	Tralee	l	Cork commuter
d	Limerick	m	Limerick – Galway
e	Westport/Ballina	n	Kildare Suburban
f	Waterford	o	Northern Suburban
g	Sligo	p	Western Suburban
h	Belfast	q	DART
i	Rosslare		

Source: Iarnród Éireann, Roland Berger

Summary route level P&Ls – 2015 AECOM

Route level P&L (AECOM 2015) [EUR '000]

	Unique			Shared			Profitability		
	Revenue	Cost	Net result	Revenue	Cost	Net result	EBITDAC[1]	Cash result	Net result
Cork	15,897	-23,758	-7,861	11,849	-31,774	-19,924	-27,786	-55,575	-45,610
Galway	8,793	-11,374	-2,582	8,053	-15,842	-7,789	-10,371	-21,394	-17,232
Tralee	8,247	-4,583	3,664	2,825	-13,996	-11,172	-7,508	-15,198	-13,717
Limerick	5,074	-6,432	-1,357	3,760	-18,090	-14,331	-15,688	-25,032	-22,100
Westport/Ballina	5,748	-7,700	-1,952	4,112	-17,690	-13,578	-15,530	-26,339	-23,183
Waterford	6,443	-6,582	-139	5,063	-15,740	-10,677	-10,816	-19,156	-15,560
Sligo	6,054	-16,180	-10,126	4,155	-12,947	-8,792	-18,918	-31,847	-29,941
Belfast	9,162	-7,046	2,116	1,314	-3,882	-2,568	-452	-7,497	-8,878
Rosslare	1,523	-10,887	-9,364	2,867	-9,121	-6,254	-15,617	-23,107	-22,022
Lim. Jct – Waterford	106	-8,739	-8,633	112	-355	-244	-8,876	-12,431	-12,314
Limerick – Ballybrophy	38	-8,257	-8,219	109	-833	-724	-8,943	-11,669	-11,093
Cork commuter	2,598	-10,862	-8,263	2,722	-6,141	-3,419	-11,682	-15,158	-12,715
Limerick – Galway	505	-6,565	-6,060	925	-4,700	-3,775	-9,835	-13,266	-13,209
Kildare Suburban	77	-5,709	-5,632	10,166	-11,244	-1,078	-6,710	-11,458	-7,259
Northern Suburban	5,647	-16,151	-10,504	12,764	-11,990	775	-9,729	-22,965	-17,695
Western Suburban	989	-10,187	-9,198	12,323	-16,851	-4,528	-13,726	-20,983	-18,727
DART	16,007	-33,177	-17,170	26,685	-7,768	18,917	1,747	-12,189	-9,374
Passenger route total[2]	92,909	-194,188	-101,280	109,804	-198,965	-89,161	-190,440	-345,266	-300,629

1) EBITDAC = Earnings Before Interest, Tax, Depreciation, Amortisation and Capitalisation; which is the result before central expenditures; 2) Passenger route total only (i.e. excluding freight results and non-rail related results)

Source: Iarnród Éireann, Roland Berger

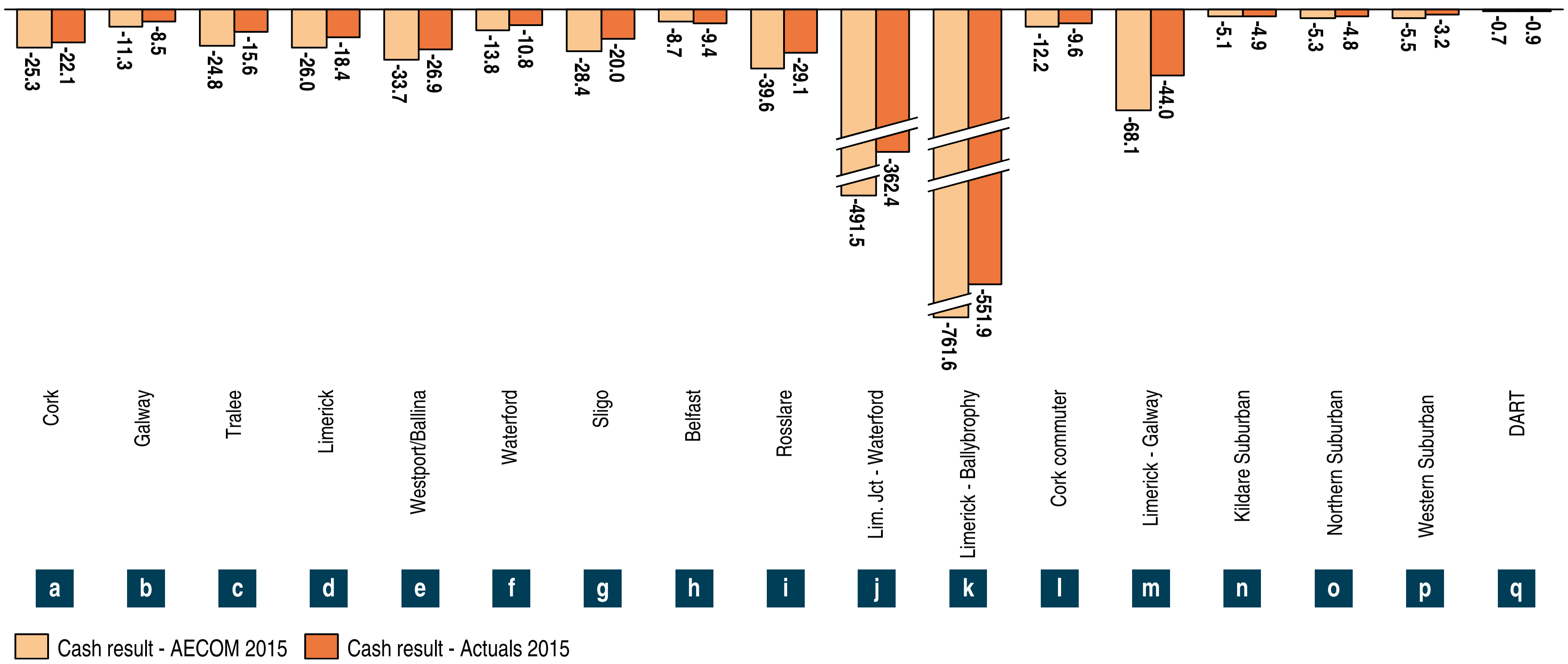
Some of IÉ's routes experience high levels of negative cashflow per passenger journey

AECOM scenario cash result per passenger journey by route [EUR / pax journey]

Source: Iarnród Éireann, Roland Berger

Cash requirements per passenger journey are increased in the AECOM scenario

AECOM scenario cash result per passenger journey by route [EUR / pax journey]

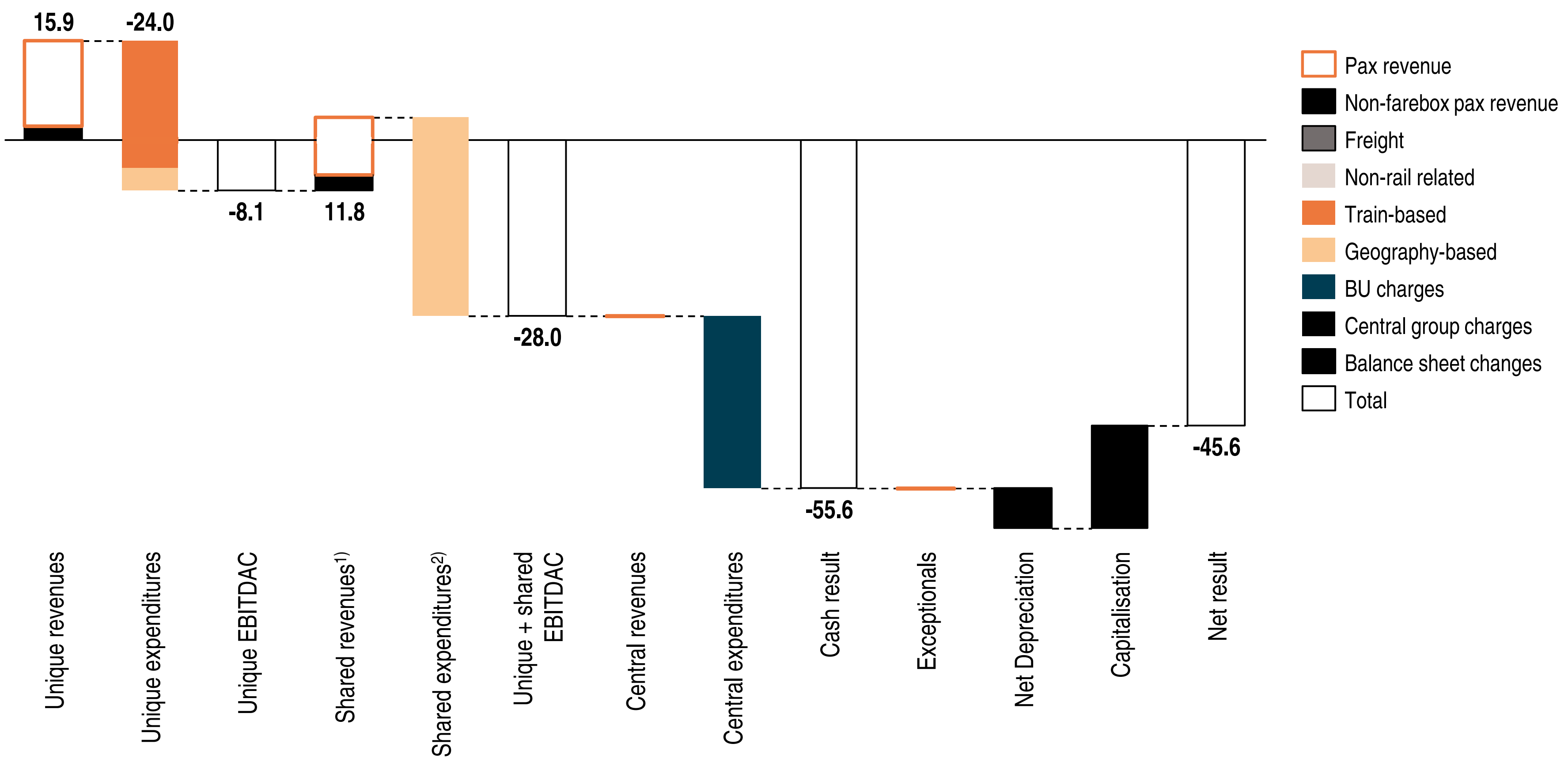


1) Cash result is after farebox and before exceptional items, depreciation, amortisation and capitalisation; 2) All results exclude any government funding (e.g. PSO, MAC)

Source: Iarnród Éireann, Roland Berger

Dublin – Cork has a negative EUR (28)m cashflow before and EUR (56)m after allocation of central expenditures, respectively

Dublin-Cork result [EUR m] – AECOM 2015

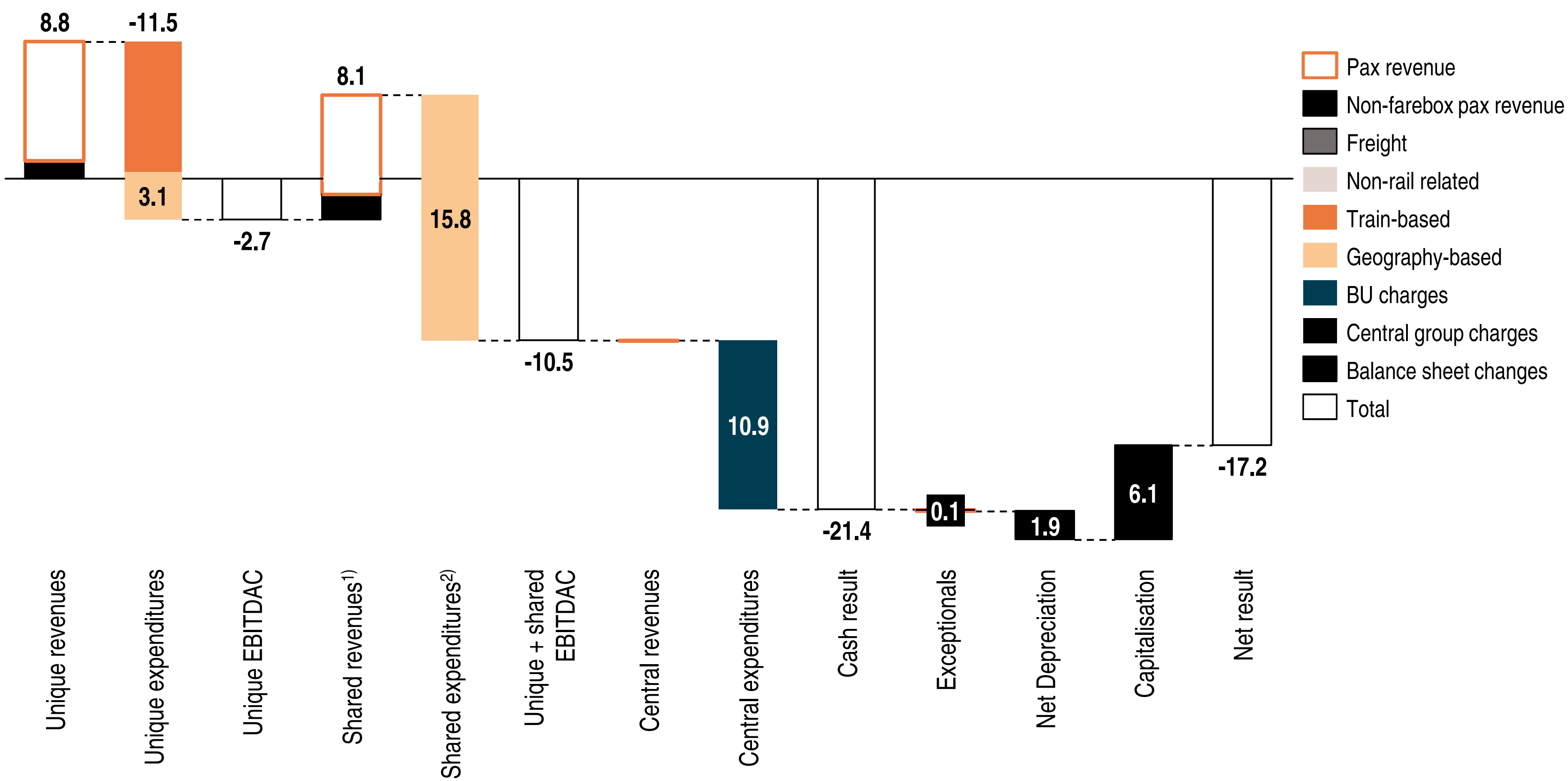


1) Shared revenues include OD-pair revenues for Heuston - Cork, car park and property & retail revenues; 2) Shared expenditures include shared station expenditures and shared IM expenditures for the track segments between Heuston and Cork

Source: Iarnród Éireann, Roland Berger

Dublin – Galway has a negative EUR (11)m cashflow before and EUR (21)m after allocation of central expenditures, respectively

Dublin-Galway result [EUR m] – AECOM 2015

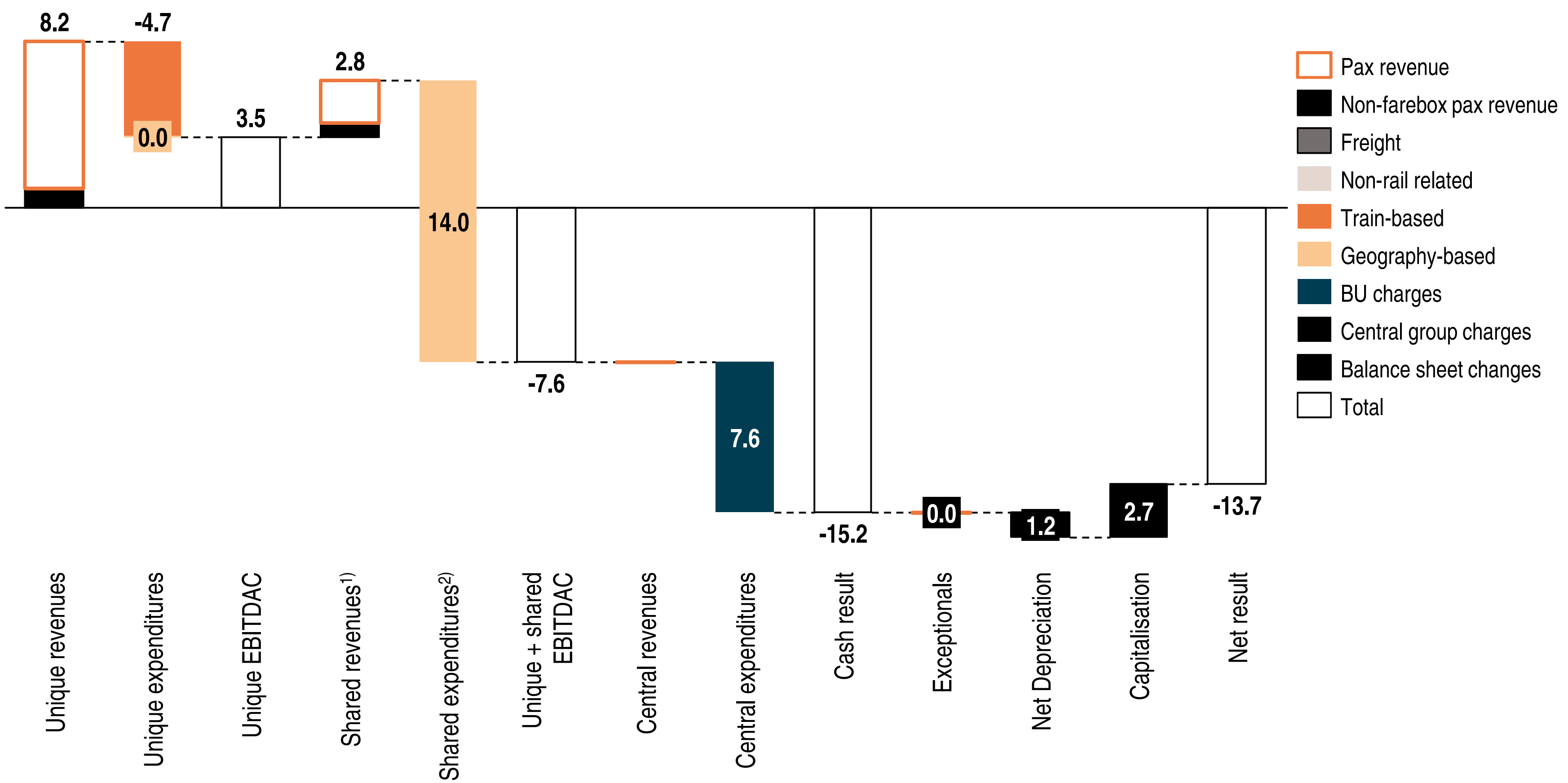


1) Shared revenues include OD-pair revenues for Heuston - Galway, car park and property & retail revenues; 2) Shared expenditures include shared station expenditures and shared IM expenditures for the track segments between Heuston and Galway

Source: Iarnród Éireann, Roland Berger

Dublin – Tralee has a negative EUR (8)m cashflow before and EUR (15)m after allocation of central expenditures, respectively

Dublin-Tralee result [EUR m] – AECOM 2015

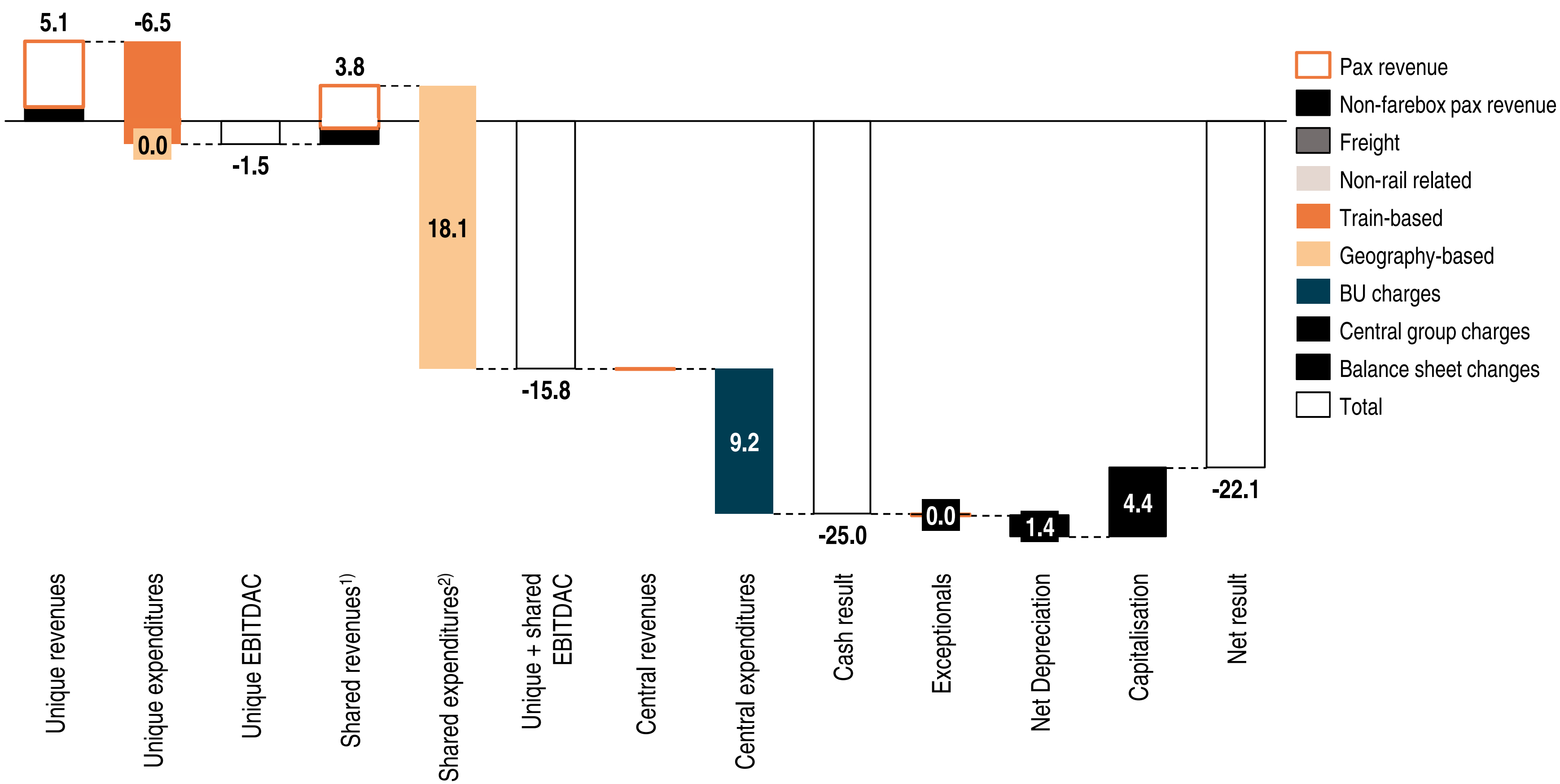


1) Shared revenues include OD-pair revenues for Heuston - Tralee, car park and property & retail revenues; 2) Shared expenditures include shared station expenditures and shared IM expenditures for the track segments between Heuston and Tralee

Source: Iarnród Éireann, Roland Berger

Dublin – Limerick has a negative EUR (16)m cashflow before and EUR (25)m after allocation of central expenditures, respectively

Dublin-Limerick result [EUR m] – AECOM 2015

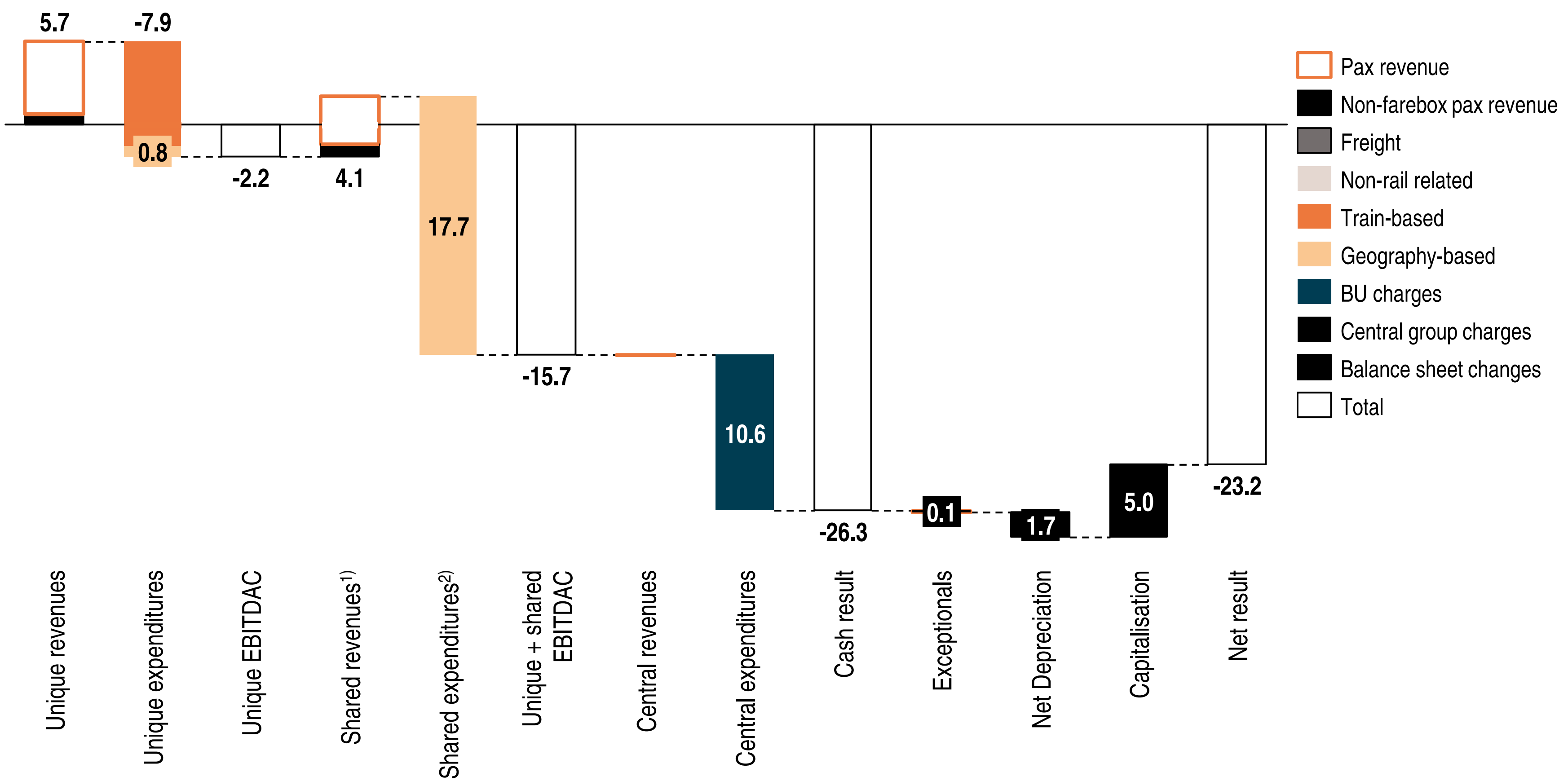


1) Shared revenues include OD-pair revenues for Heuston - Limerick, car park and property & retail revenues; 2) Shared expenditures include shared station expenditures and shared IM expenditures for the track segments between Heuston and Limerick

Source: Iarnród Éireann, Roland Berger

Dublin – Westport/Ballina has a negative EUR (16)m cashflow before and EUR (26)m after allocation of central expenditures

Dublin-Westport/Ballina result [EUR m] – AECOM 2015

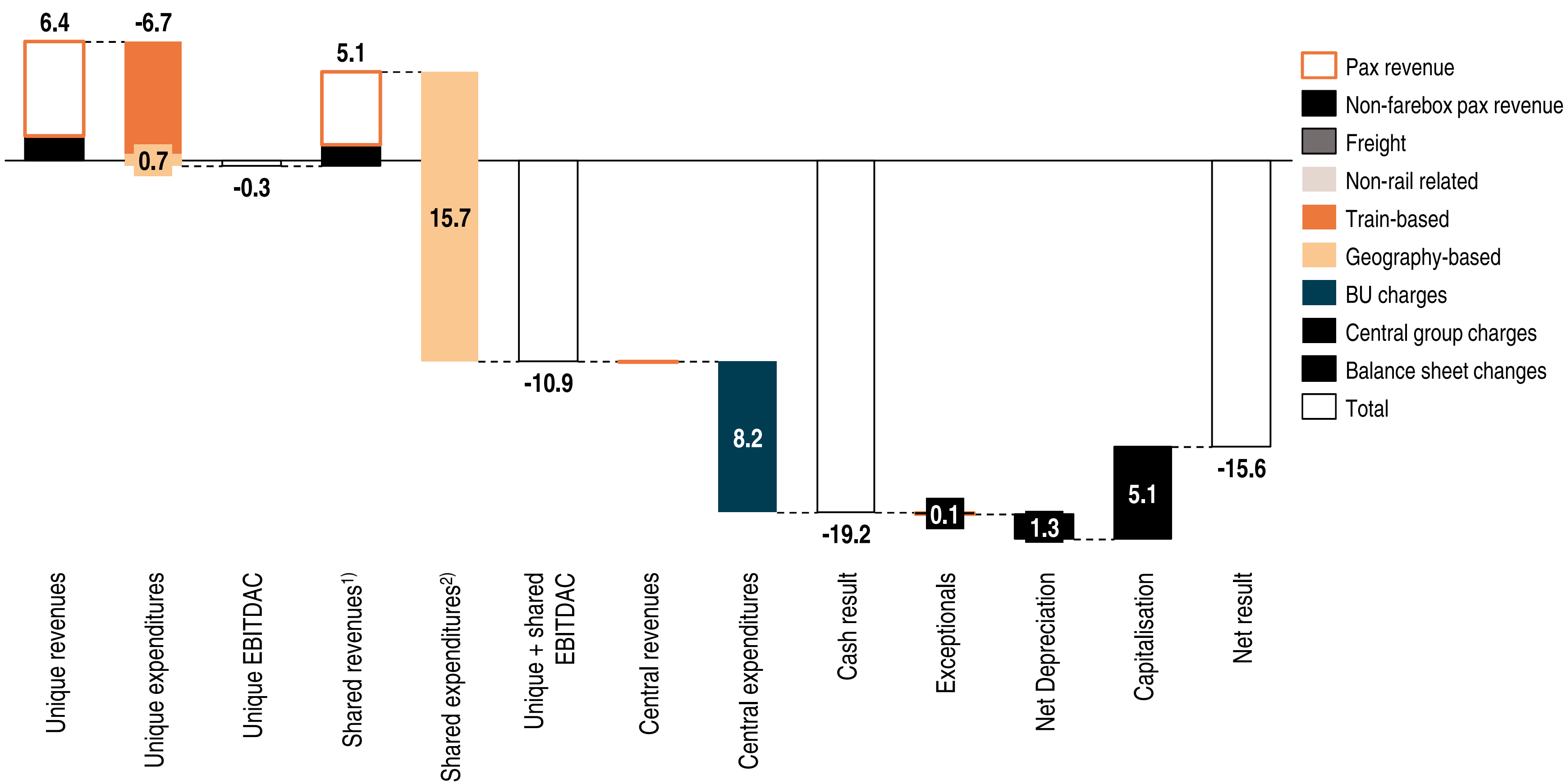


1) Shared revenues include OD-pair revenues for Heuston – Westport/Ballina, car park and property & retail revenues; 2) Shared expenditures include shared station expenditures and shared IM expenditures for the track segments between Heuston and Westport/Ballina

Source: Iarnród Éireann, Roland Berger

Dublin – Waterford has a negative EUR (11)m cashflow before and EUR (19)m after allocation of central expenditures, respectively

Dublin-Waterford result [EUR m] – AECOM 2015

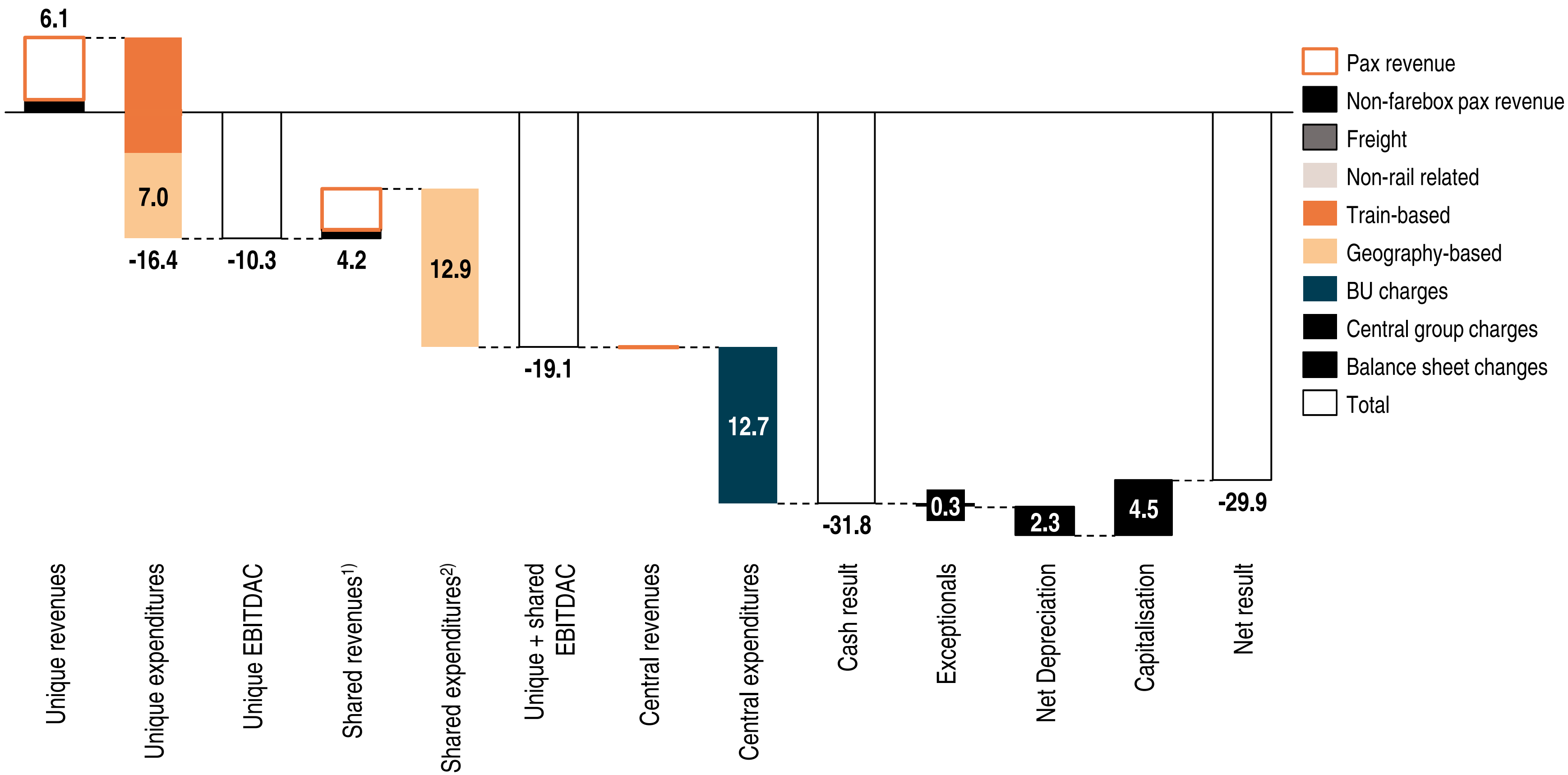


1) Shared revenues include OD-pair revenues for Heuston – Waterford, car park and property & retail revenues; 2) Shared expenditures include shared station expenditures and shared IM expenditures for the track segments between Heuston and Waterford

Source: Iarnród Éireann, Roland Berger

Dublin – Sligo has a negative EUR (19)m cashflow before and EUR (32)m after allocation of central expenditures, respectively

Dublin-Sligo result [EUR m] – AECOM 2015

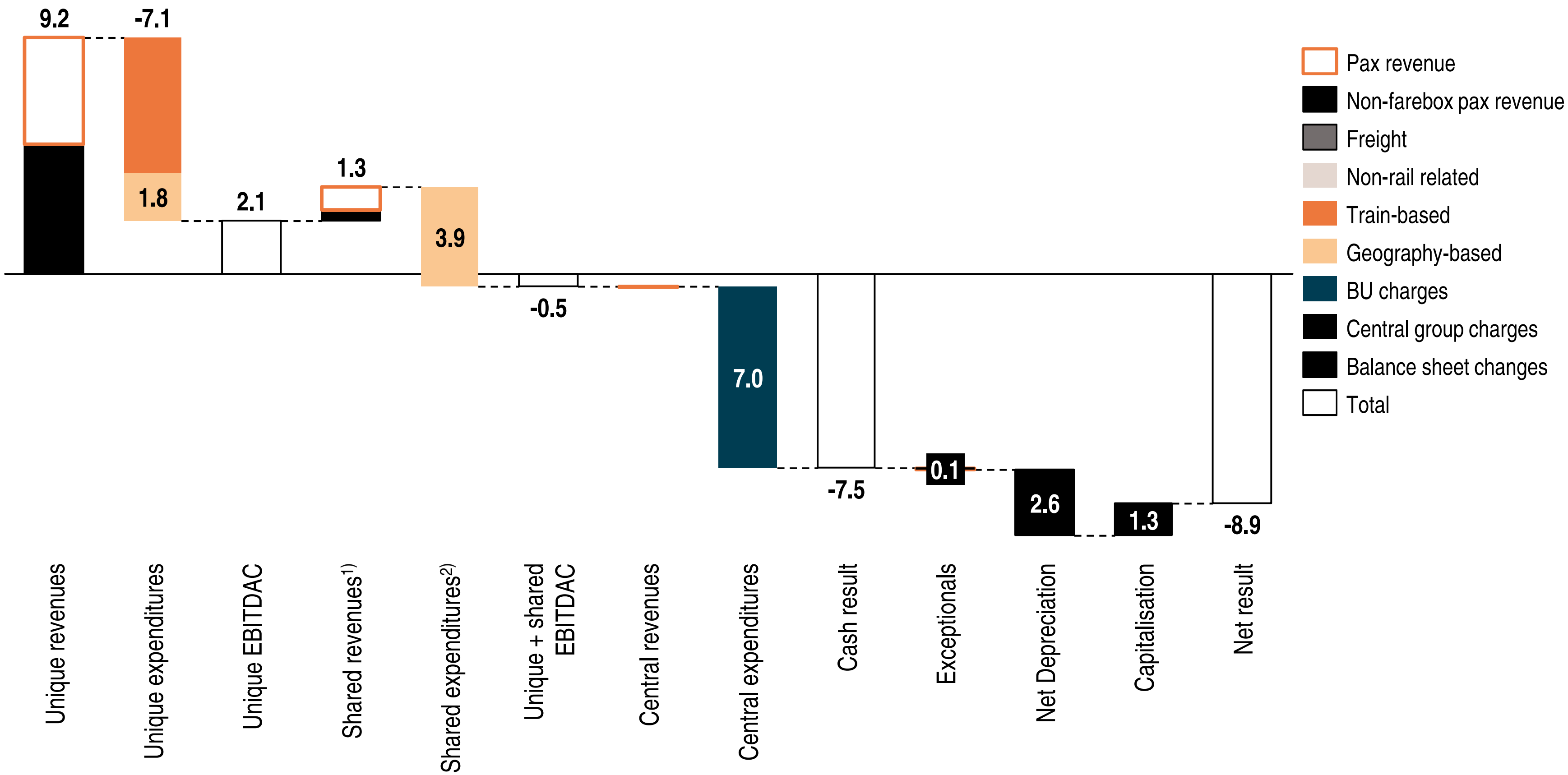


1) Shared revenues include OD-pair revenues for Connolly – Sligo, car park and property & retail revenues; 2) Shared expenditures include shared station expenditures and shared IM expenditures for the track segments between Connolly and Sligo

Source: Iarnród Éireann, Roland Berger

Dublin – Belfast has a negative EUR (1)m cashflow before and negative EUR (8)m cashflow after allocation of central expenditures

Dublin-Belfast result [EUR m] – AECOM 2015

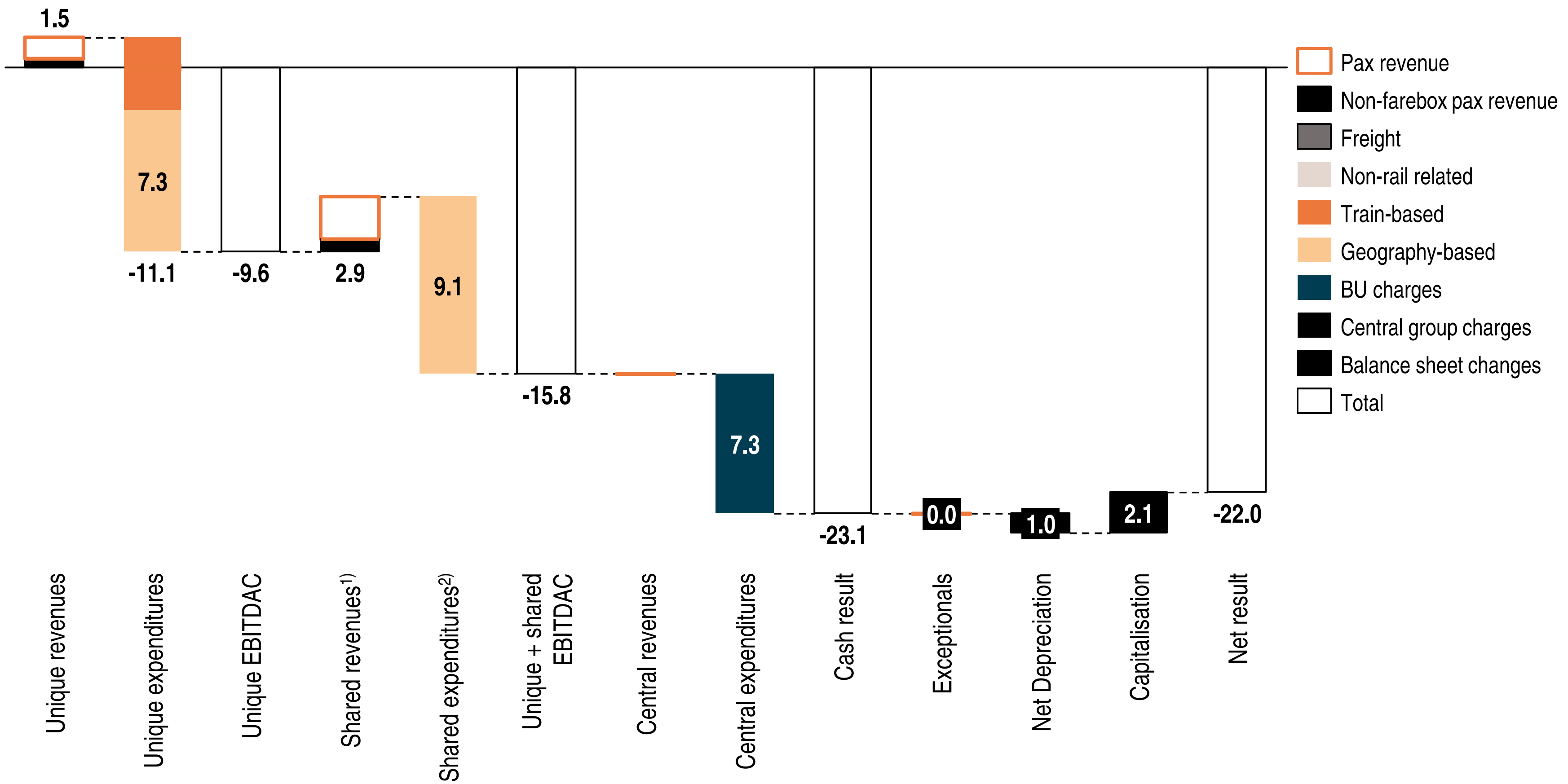


1) Shared revenues include OD-pair revenues for Connolly – Belfast, car park and property & retail revenues; 2) Shared expenditures include shared station expenditures and shared IM expenditures for the track segments between Connolly and Belfast

Source: Iarnród Éireann, Roland Berger

Dublin – Rosslare has a negative EUR (16)m cashflow before and EUR (23)m after allocation of central expenditures, respectively

Dublin-Rosslare result [EUR m] – AECOM 2015

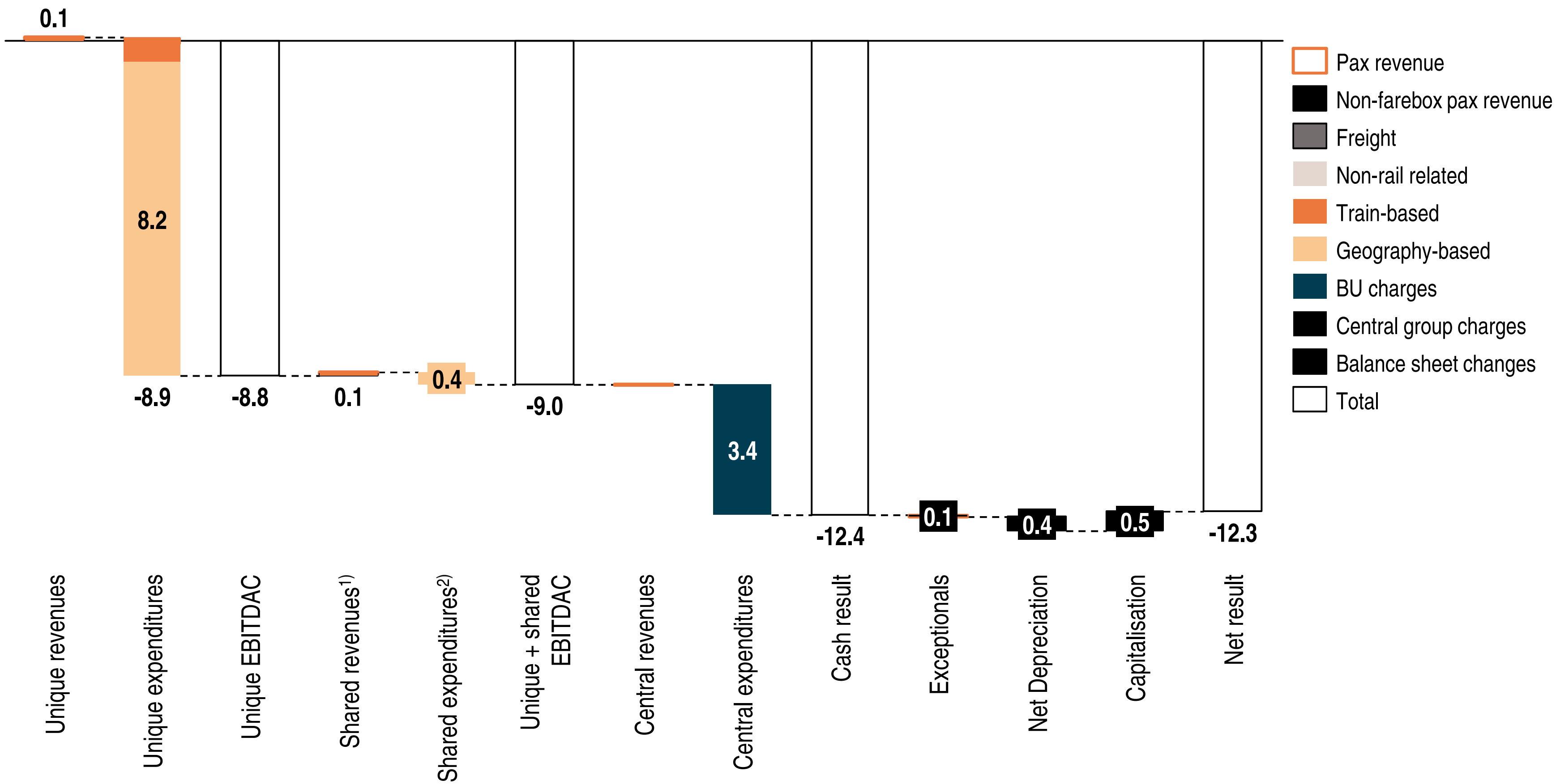


1) Shared revenues include OD-pair revenues for Connolly - Rosslare, car park and property & retail revenues; 2) Shared expenditures include shared station expenditures and shared IM expenditures for the track segments between Connolly and Rosslare

Source: Iarnród Éireann, Roland Berger

Limerick Jct – Waterford has a negative EUR (9)m cashflow before and EUR (12)m after allocation of central expenditures, respectively

Limerick Junction-Waterford result [EUR m] – AECOM 2015

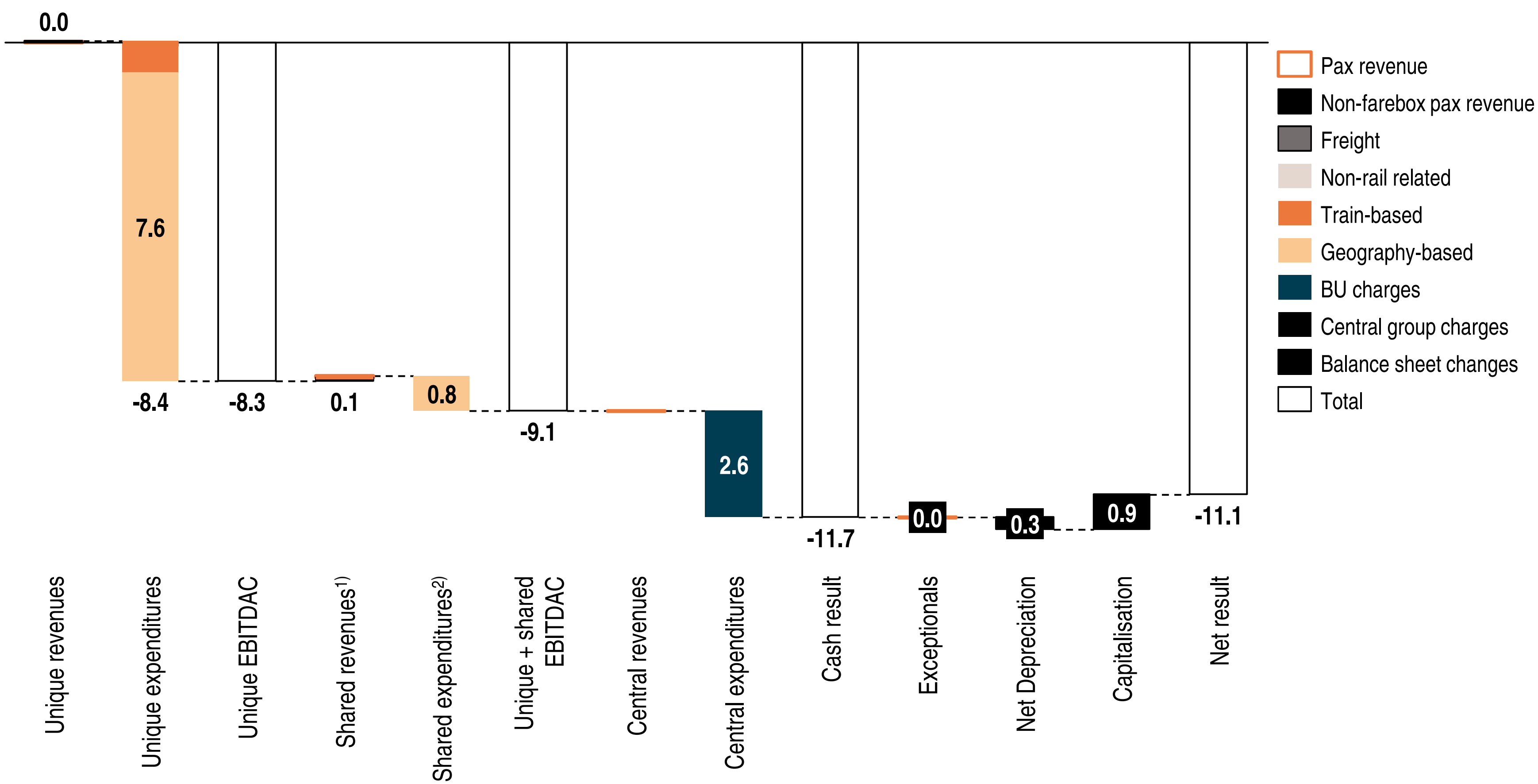


1) Shared revenues include car park and property & retail revenues for stations Limerick Junction and Waterford; 2) Shared expenditures include station expenditures for Limerick Junction and Waterford

Source: Iarnród Éireann, Roland Berger

Limerick – Ballybrophy has a negative EUR (9)m cashflow before and EUR (12)m after allocation of central expenditures, respectively

Limerick-Ballybrophy result [EUR m] – AECOM 2015

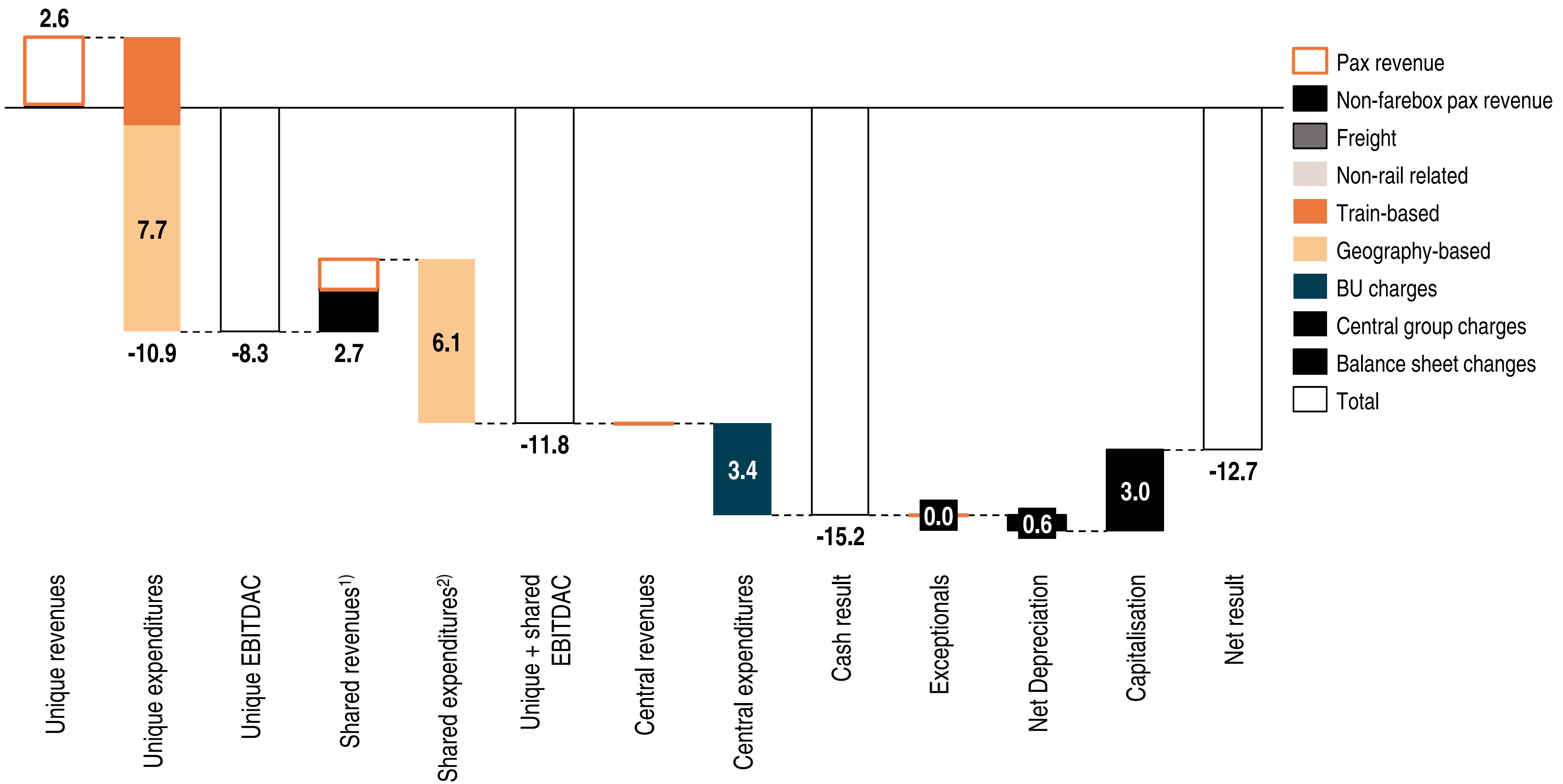


1) Shared revenues include OD-pair revenues Limerick – Ballybrophy and car park and property & retail revenues for stations Limerick and Ballybrophy; 2) Shared expenditures include station expenditures for Limerick and Ballybrophy and IM expenditures for the track segment Kilonan Junction - Limerick

Source: Iarnród Éireann, Roland Berger

Cork commuter has a negative EUR (12)m cashflow before and EUR (15)m after allocation of central expenditures, respectively

Cork commuter result [EUR m] – AECOM 2015

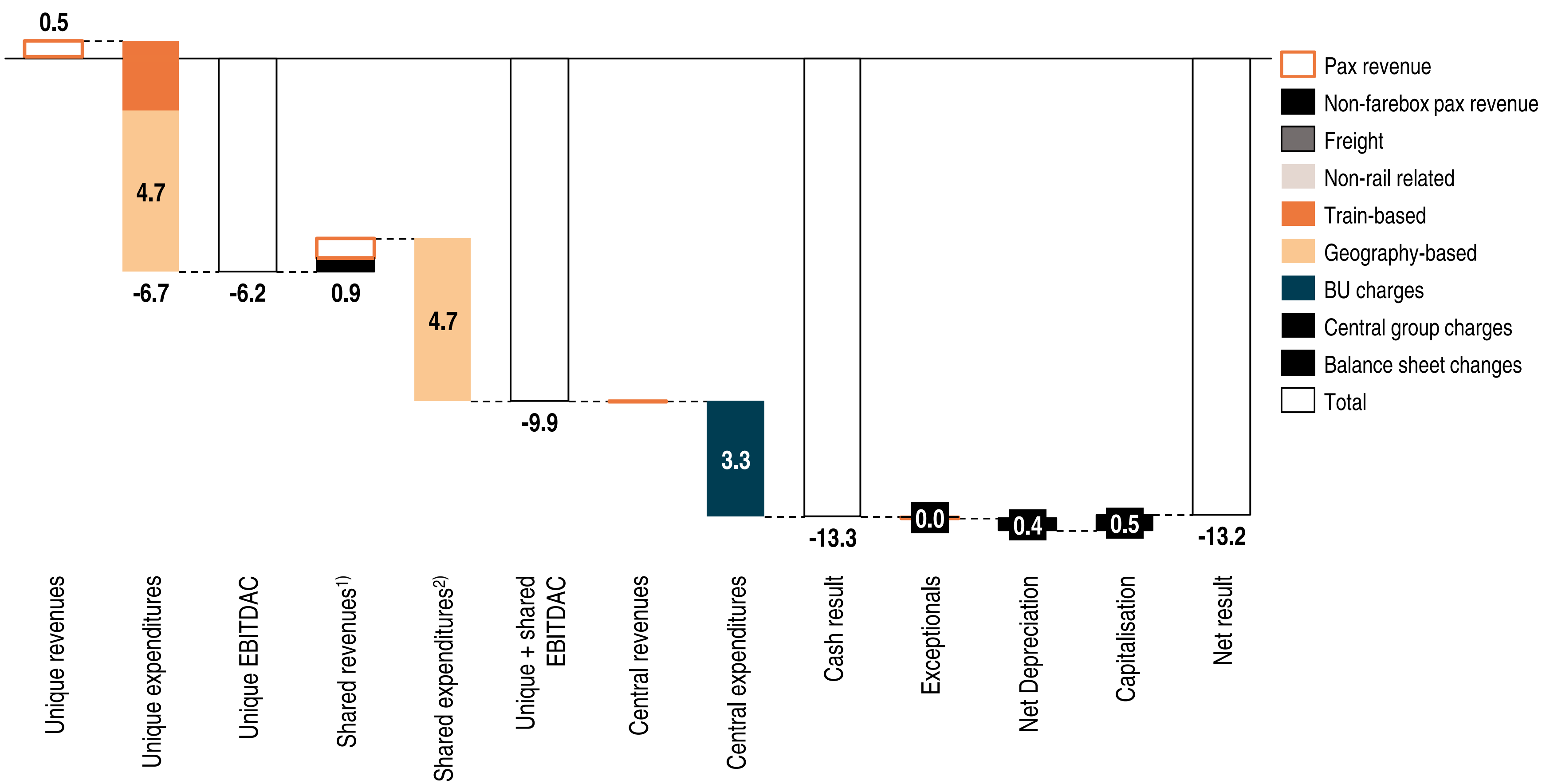


1) Shared revenues include OD-pair revenues for Cork commuter, car park and property & retail revenues; 2) Shared expenditures include shared station expenditures and shared IM expenditures for the track segments used by Cork Commuter

Source: Iarnród Éireann, Roland Berger

Limerick – Galway has a negative EUR (10)m cashflow before and EUR (13)m after allocation of central expenditures, respectively

Limerick-Galway result [EUR m] – AECOM 2015

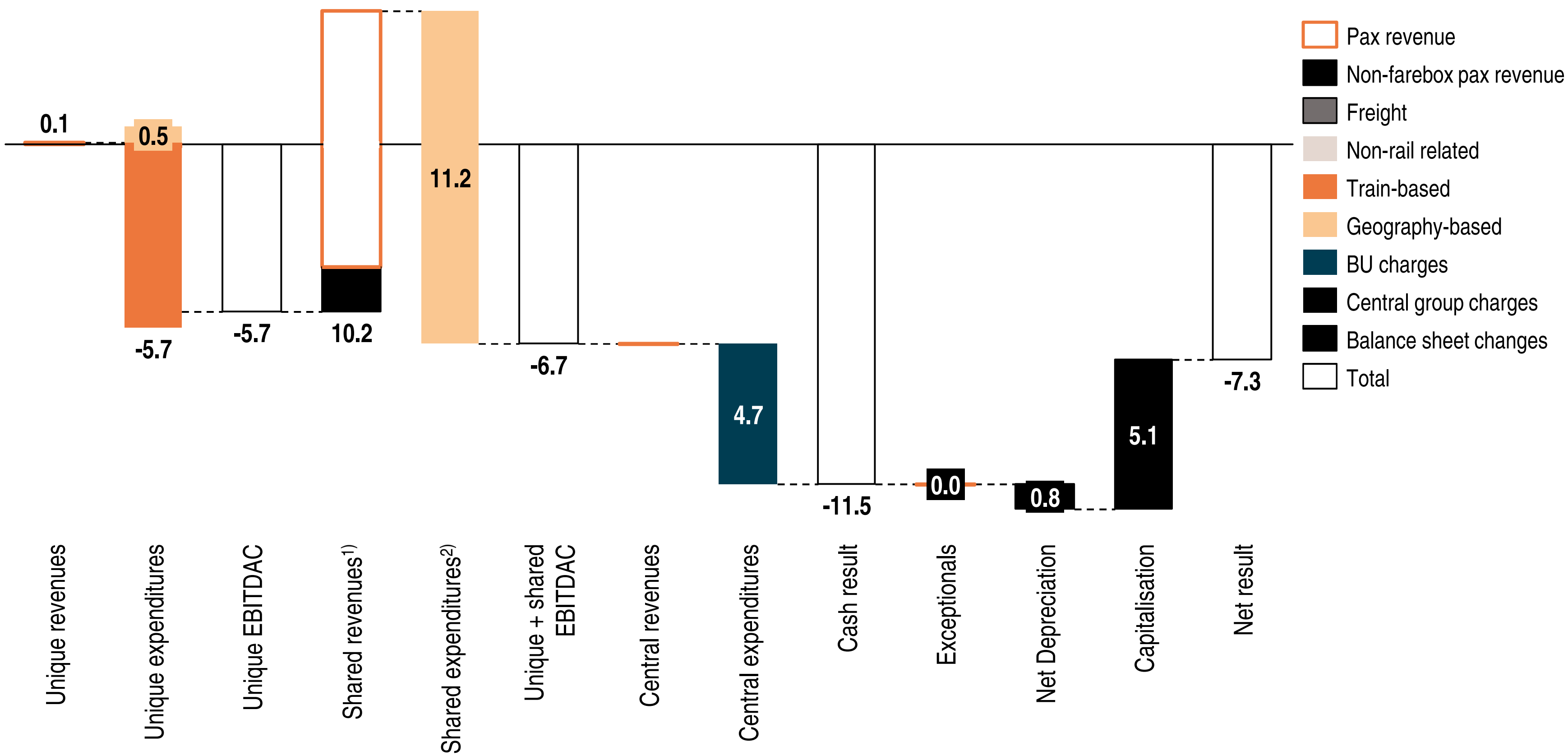


1) Shared revenues include OD-pair revenues for Limerick – Ennis and Athenry – Galway, car park and property & retail revenues; 2) Shared expenditures include shared station expenditures and shared IM expenditures for the track segments Limerick – Ennis and Athenry – Galway

Source: Iarnród Éireann, Roland Berger

Kildare suburban has a negative EUR (7)m cashflow before and EUR (12)m after allocation of central expenditures, respectively

Kildare Suburban result [EUR m] – AECOM 2015

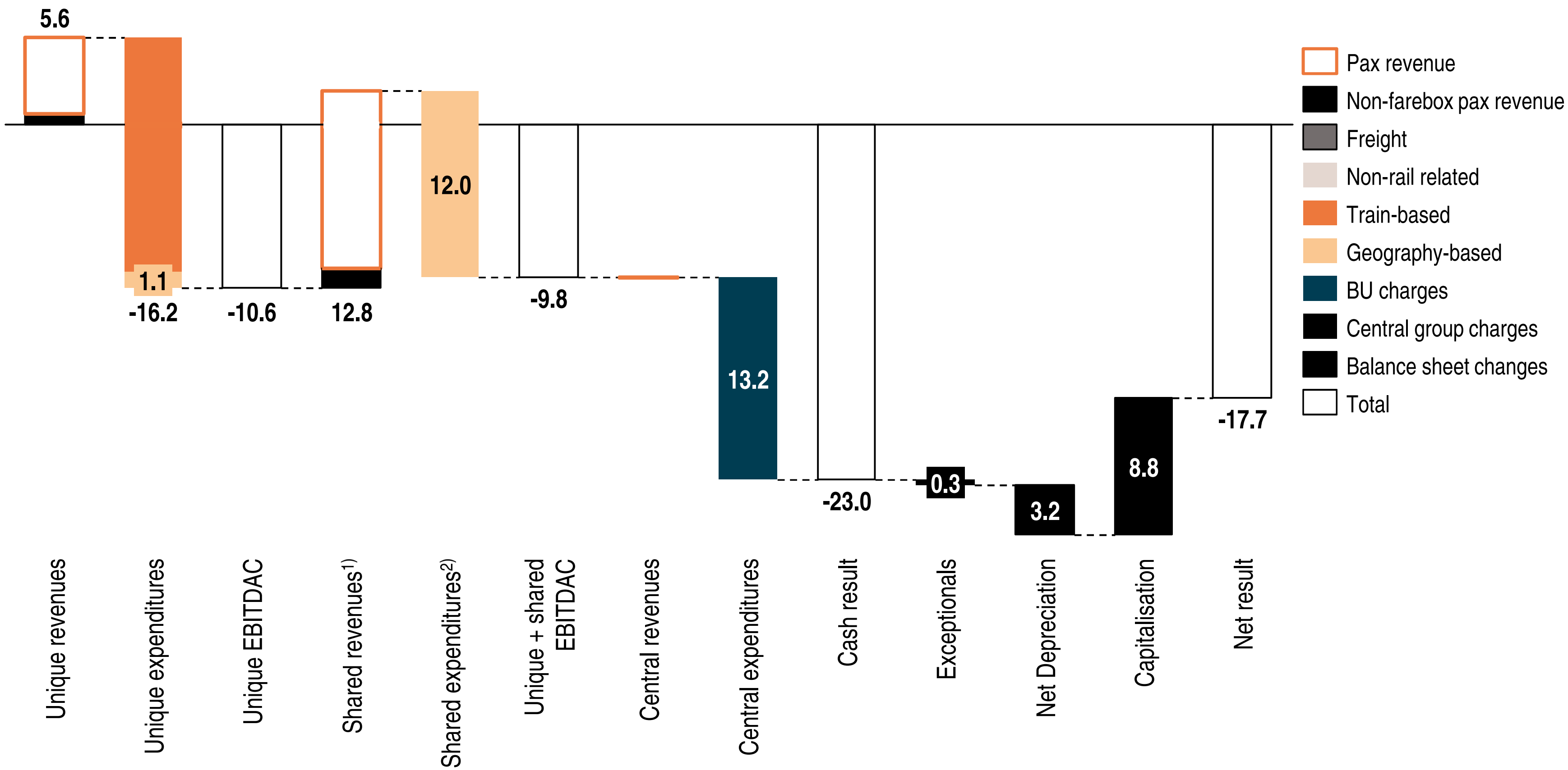


1) Shared revenues include OD-pair revenues for Connolly - Kildare, car park and property & retail revenues; 2) Shared expenditures include shared station expenditures and shared IM expenditures for the track segments between Connolly and Kildare

Source: Iarnród Éireann, Roland Berger

Northern suburban has a negative EUR (10)m cashflow before and EUR (23)m after allocation of central expenditures, respectively

Northern Suburban result [EUR m] – AECOM 2015

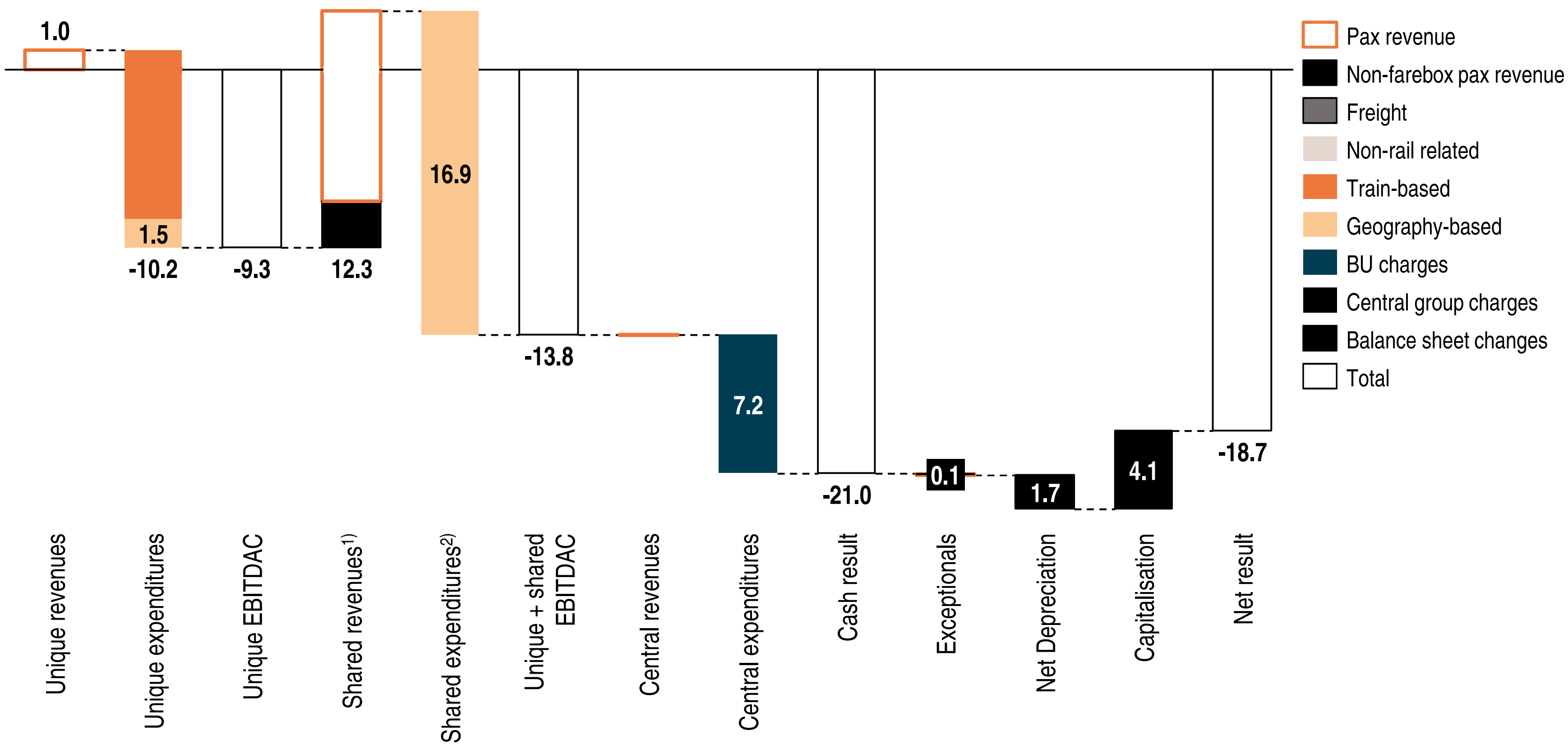


1) Shared revenues include OD-pair revenues for Connolly - Dundalk, car park and property & retail revenues; 2) Shared expenditures include shared station expenditures and shared IM expenditures for the track segments between Connolly and Dundalk

Source: Iarnród Éireann, Roland Berger

Western suburban has a negative EUR (14)m cashflow before and EUR (21)m after allocation of central expenditures, respectively

Western Suburban result [EUR m] – AECOM 2015

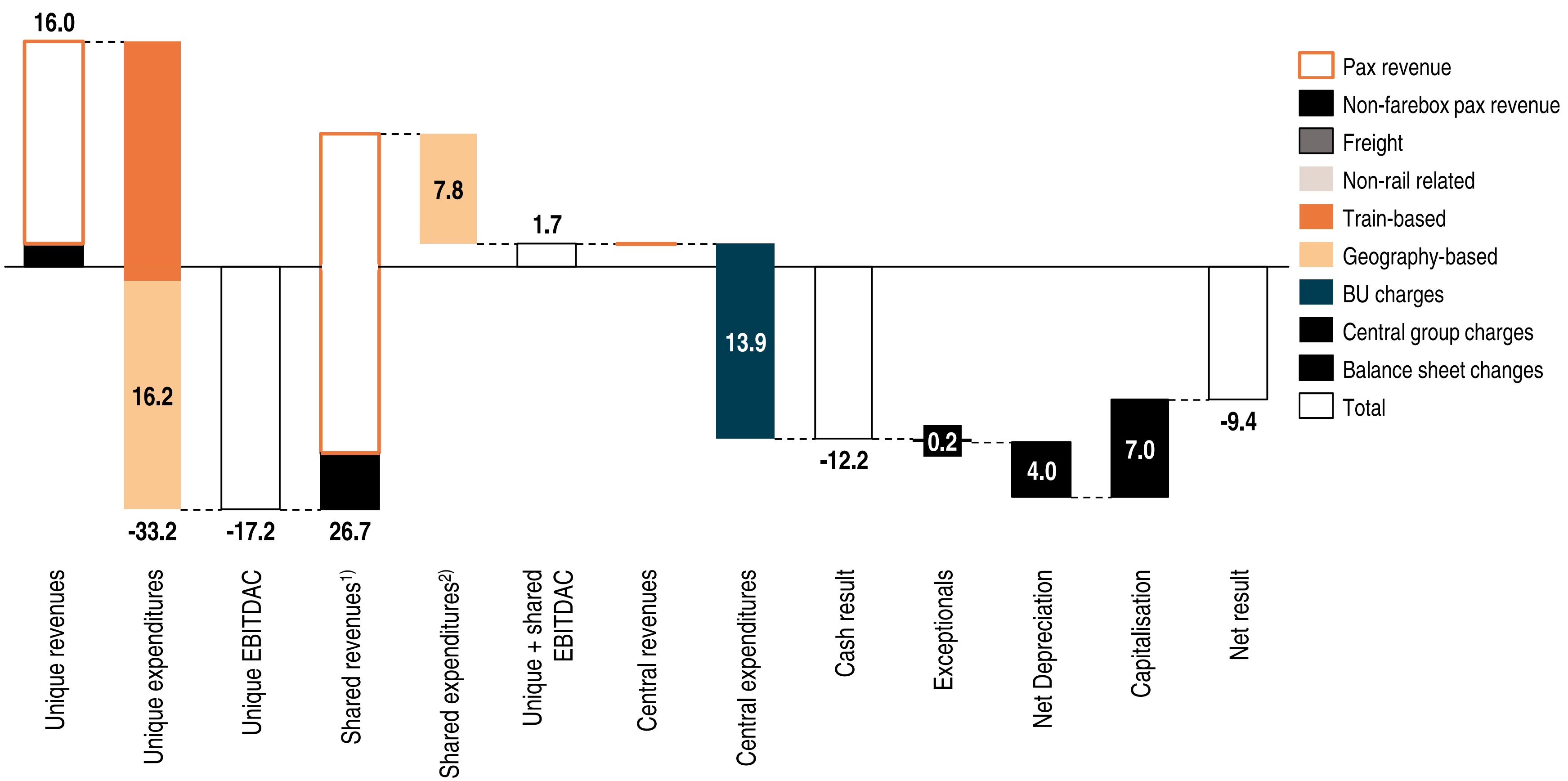


1) Shared revenues include OD-pair revenues for Connolly - Longford, car park and property & retail revenues; 2) Shared expenditures include shared station expenditures and shared IM expenditures for the track segments between Connolly and Longford

Source: Iarnród Éireann, Roland Berger

DART has a positive EUR 2m cashflow before central expenditures and EUR (12)m after allocation of central expenditures

DART result [EUR m] – AECOM 2015



1) Shared revenues include OD-pair revenues for DART, car park and property & retail revenues; 2) Shared expenditures include shared station expenditures and shared IM expenditures for the track segments used by DART

Source: Iarnród Éireann, Roland Berger

When allocating marginal expenditures only, Freight has a negative EUR (2)m cashflow before central expenditures and EUR (2)m after

Freight result – marginal expenditure approach [EUR m] – AECOM 2015

1) Shared expenditures include shared station expenditures and shared IM expenditures for the track segments used by freight routes: Tara mines – Dublin Port, Westport – Waterford, Ballina – Waterford, Ballina - Dublin

Source: Iarnród Éireann, Roland Berger

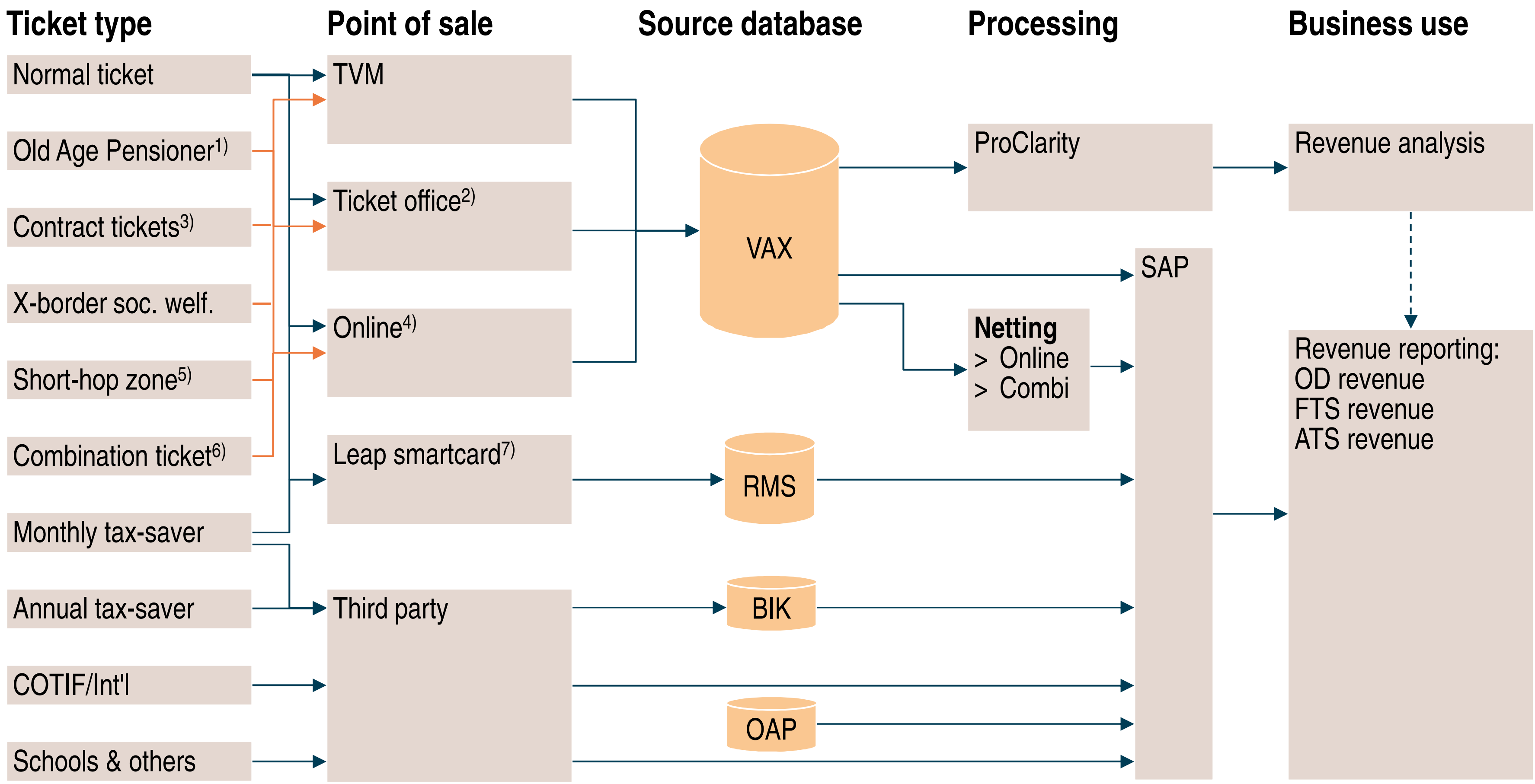
F. Appendix: Details on approach

Roland Berger

Iarnród Éireann
Irish Rail

F.1 Revenue allocation

IÉ has a range of systems from which data for the revenue analysis has been sourced

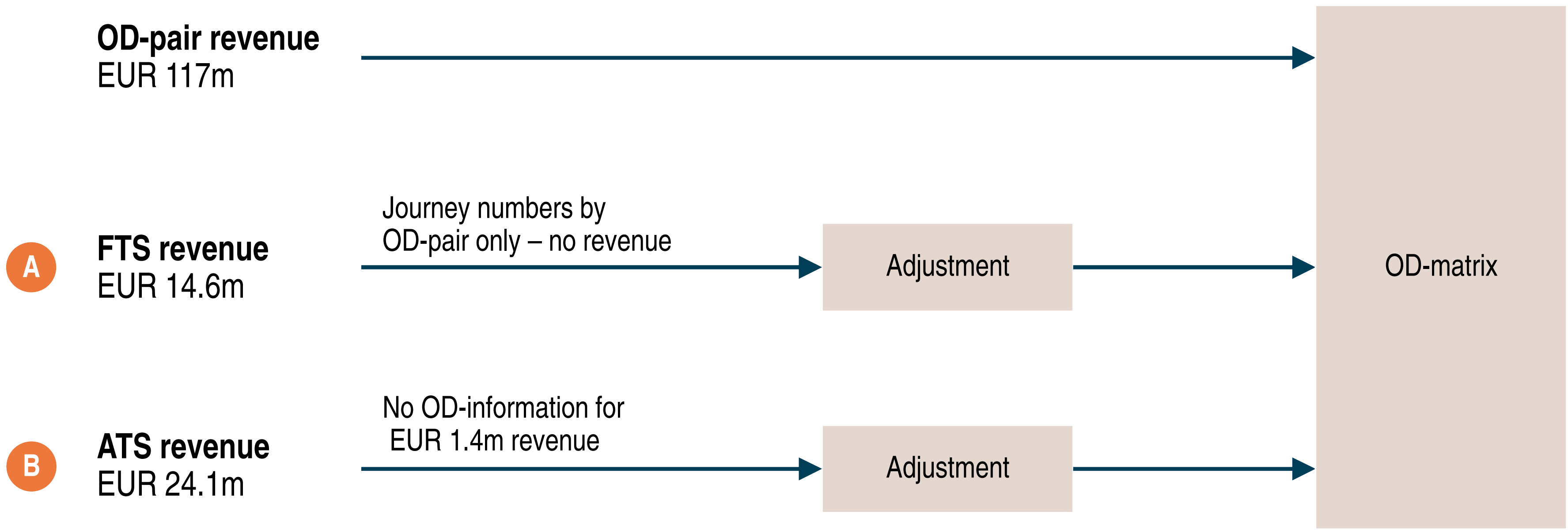


1) Recorded at zero fare (only pax journeys are recorded); revenues are lump sum from Ministry; 2) Using Crouzet booking system; 3) OD-pairs unknown; 4) Transaction fee registered in VAX, not in SAP; 5) OD-pairs unknown (VAX routes 0 and 99); 6) full fare in VAX, revenue capped in SAP; 7) E-purse revenue + fulfillment of monthly tax-saver tickets

Source: Iarnród Éireann, Roland Berger

Building the OD-matrix requires adjustment of FTS and ATS data where IÉ's data is incomplete

Revenue allocation methodology – 2014 example



Source: Iarnród Éireann, Roland Berger

ATS and FTS OD-revenue was calculated using other existing IÉ information

Methodology to calculate FTS/ATS OD revenues – 2014 example

A Annual Tax Saver (ATS)

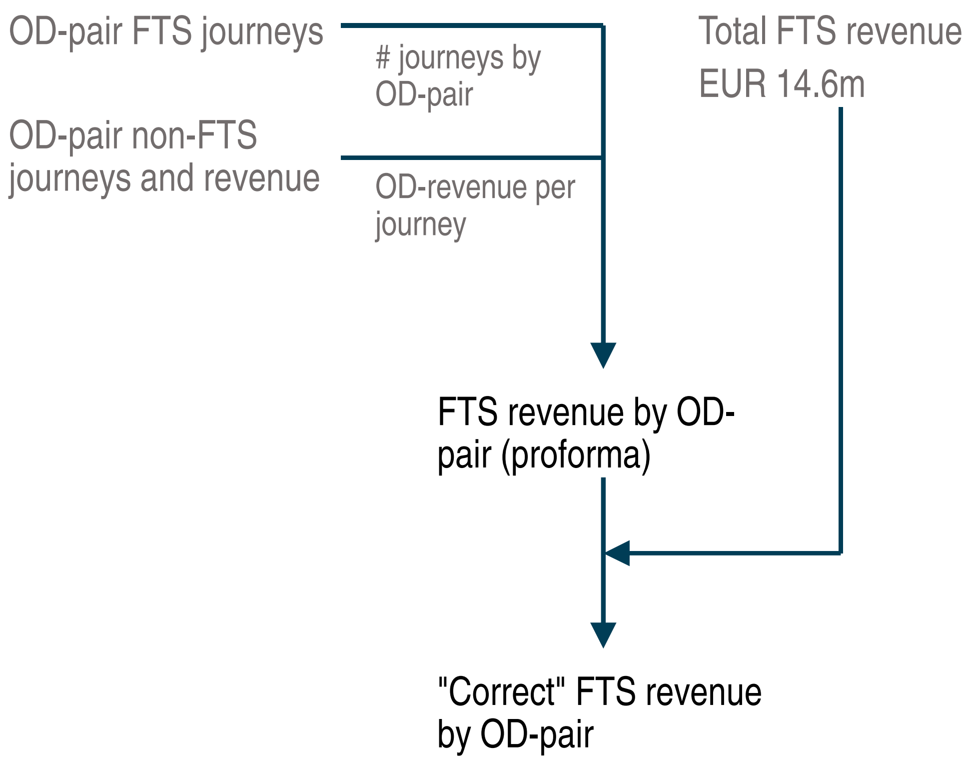
Input

ATS total revenue	EUR 24.1m
ATS OD-pair revenue	EUR 23.8m
Difference	EUR 0.3m

Methodology to allocate difference

Difference is driven by sales timing difference, therefore ATS OD-pair revenue has been scaled up to match total ATS revenue

B Free Travel Scheme (FTS)



The OD-revenue is allocated to routes sharing common infrastructure using particular allocation algorithms

Methodology to allocate OD-revenue to routes sharing common infrastructure

OD-pair characteristics				Allocation to route	
O and D known	A	No interchange		To routes that operate between the OD pair	Allocation to individual routes
		Interchange	B To DART	To IC routes	
			C To other IC	Proportionate to distance of the two journey segments	
O or D not known	D	Either O or D known		To route of known station	
		O and D not known		Split between suburban and DART (pro rated based on above)	

Source: Iarnród Éireann, Roland Berger

The first step in the allocation of OD pairs to routes is the identification of respective route possibilities

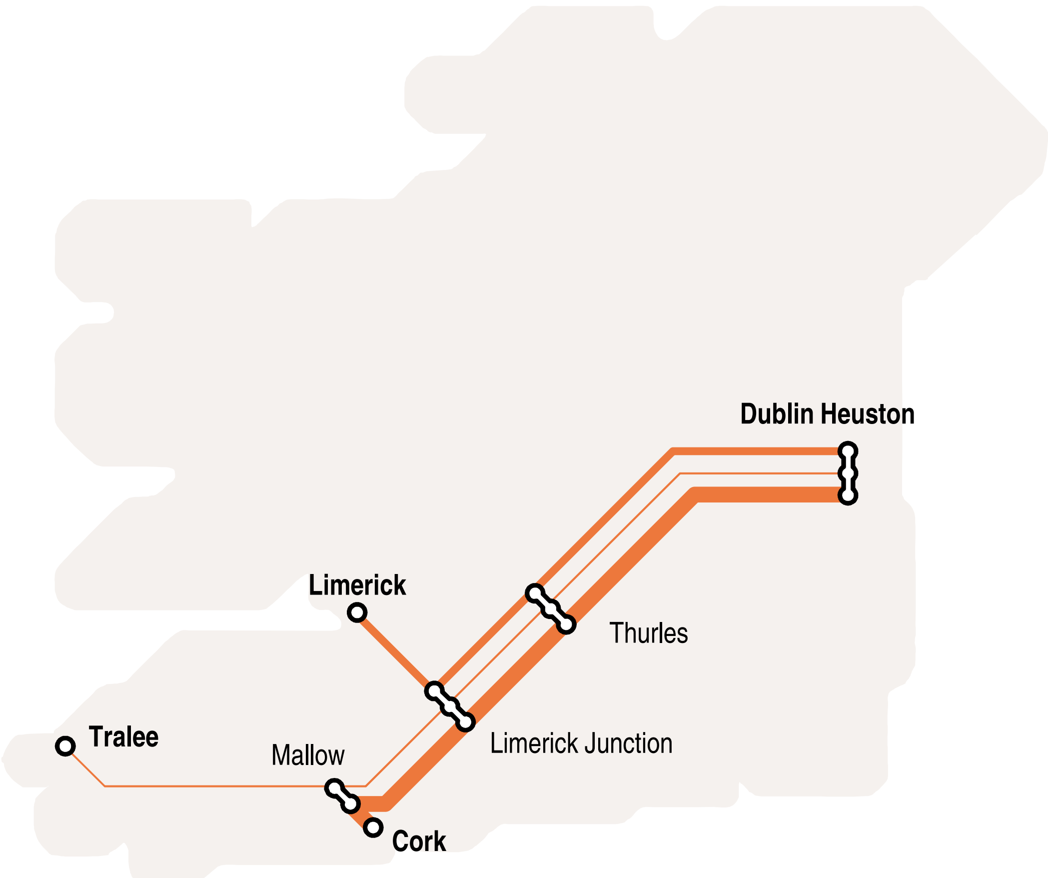
Examples of allocations of OD-revenue to route groups

A No interchange		B Interchange to DART	C Interchange to other IC	D Either O or D not known
OD-pair				
Cork – Heuston	Thurles – Heuston	Cork – Lansdowne Road	Mallow – Waterford	Cork – Unknown
Allocated to routes				
Cork – Heuston	Cork – Heuston Tralee – Heuston Limerick – Heuston	Cork – Heuston	Mallow – Limerick Junction: > Cork – Heuston > Tralee – Heuston Limerick Junction – Waterford: > Limerick Junction – Waterford	Cork – Heuston Cork – Cobh Cork – Midleton Cork – Mallow

Source: Iarnród Éireann, Roland Berger

OD-revenue which can be attributed to multiple routes has then been allocated by the relevant routes' service frequencies

Example for allocation of OD-revenue in cases of route ambiguity



> Passengers travelling from Thurles to Dublin Heuston have three route choices:
  – Cork – Dublin Heuston
  – Tralee – Dublin Heuston
  – Limerick – Dublin Heuston

> Revenue of the Thurles – Dublin Heuston OD-pair has been allocated pro-rata by the frequency of these routes on the OD-pair
  – This roughly approximates to a passenger taking the next train coming (neglecting times of travel)

> Thurles – Dublin Heuston OD-revenue therefore splits between routes as follows:

– Cork – Dublin Heuston	EUR 1.31 m 75%, 27/36tpd
– Tralee – Dublin Heuston	EUR 0.09 m 6%, 2/36tpd
– Limerick – Dublin Heuston	EUR 0.34 m 19%, 7/36tpd

Source: Iarnród Éireann, Roland Berger

F.2 TO cost allocation

IÉ collects expenditures in SAP cost centres which are disaggregated and allocated to route

Example for cost disaggregation and allocation to route [EUR]

SAP cost centre

Cost centre: Carlow station

Cost elements:

- Exec & clerical pay — EUR AAA
- Guards/TTCs pay — EUR BBB
- Station Ops pay — EUR CCC
- Overheads[2] — EUR DDD
- Maintenance & repair — EUR EEE
- Materials — EUR FFF
- Depreciation — EUR GGG

Σ **EUR XXX**

Disaggregated cost bucket

Guards/TTCs — EUR BBB

Carlow station, cost elements:

- Exec & clerical pay — EUR AAA
- Station Ops pay — EUR CCC
- Overheads[2] — EUR DDD
- Maintenance & repair — EUR EEE
- Materials — EUR FFF
- Depreciation — EUR GGG

Σ **EUR XXX**

Allocation

Heuston – Waterford route[1]

Kildare – Carlow track segment

Σ **EUR XXX**

1) Based on Guards/TTC roster; 2) Primarily contains utility expenditures

Source: Iarnród Éireann, Roland Berger

We have validated all TO cost elements, cost centres and allocation methodologies with IÉ TO management

Proposed cost allocation methodology – Train Operations

Disaggregated cost centre type	Level of disaggregation	Allocation key to route	Validated with
Pax Ops station	Single station	Station to track segment, track segment to route based on service frequency	John Stack
Pax Ops district	Pax ops geographical district	District to routes based on service frequency	John Stack
Pax Ops drivers	All routes	Driver shed to route by roster	John Stack
Pax Ops overhead	All routes	Overhead to route by train km	John Stack
Pax Ops train crew	All routes	Train crew to route by roster	John Stack
Pax Ops freight	Freight routes	Freight expenditures to freight route by train km	John Stack
CME maintenance depot	CME geographical district	CME maintenance depot to fleet, fleet to routes by train km	John Stack
CME heavy maintenance	All fleet	Heavy maintenance to fleet based on maintenance schedule, fleet to routes by train km	John Stack
CME department workshop	All fleet	Workshop to fleet, fleet to route by train km	John Stack
CME department overhead	All fleet	Overhead to fleet, fleet to route by train km	John Stack
Fuel	All fleet	Fuel to fleet, fleet to route by train km	John Stack
Commercial department overhead	All pax routes	Overhead to route by train km	John Stack

Source: Iarnród Éireann, Roland Berger

F.3 IM cost allocation

IM expenditures are allocated to routes via intermediary cost buckets and track segments

Cost allocation to routes: IM

Current cost collection	Intermediary cost bucket	Cost elements	Allocation	Operational expenditures	Care & maintenance expenditures	Route expenditures
CCE[1]	→ IM subdivision	Engineers Materials Overheads	Track segment	On/off	EUR/km x track km	∑ Annual IM expenditures for route
SET[2]	→ IM subdivision	Engineers Materials Overheads	Track segment	On/off	EUR/km x track km	
IMO[3]	→ IM track segment	Gatekeepers Signal staff Overheads	Track segment	On/off	EUR/km x track km	
B&F[4]	→ IM region	Engineers Materials Overheads	Track segment	On/off	EUR/km x track km	
New works[5]				Segment adjustments		

Other expenditures (e.g., IM overhead) allocated to track segment on basis of share of total track km

1) Chief Civil Engineer; 2) Signalling, Electrification, Telecommunications; 3) Infrastructure Management Operations; 4) Buildings & Facilities; 5) Out of scope

Source: Iarnród Éireann, Roland Berger

We have validated all IM cost elements, cost centres and allocation methodologies with IÉ management (1/2)

Proposed cost allocation methodology – Infrastructure Management[1] (1/2)

Disaggregated cost centre type	Level of disaggregation	Allocation key to route	Validated with
IM Business Unit	Full network	Overhead to track segment based on track km, to route based on service frequency	Cathy McVicker
CCE department overhead	Full network	Overhead to track segment based on track km, to route based on service frequency	Cathy McVicker
PWI[2] subdivision	PWI geographical subdivision	PWI subdivision to track segment based on track km, to route based on service frequency	Cathy McVicker
PWI division	PWI geographical division	PWI division to PWI subdivision based on geograhpy, PWI subdivision to track segment based on track km, to route based on service frequency	Cathy McVicker
SET department overhead	Full network track km	Overhead to track segment based on track km, to route based on service frequency	Cathy McVicker
SET division	SET geographical division	SET division to track segment based on signalling complexity[3], to route based on service frequency	Cathy McVicker
Route type	Route type (IC, comm., DART)	Route type to track segment based on track km, to route based on service frequency	Cathy McVicker
Telecoms divisions	Telco geographical division	Telecom division to track segment based on telco complexity[3] , to route based on service frequency	Cathy McVicker

1) The New Works department is not included in the route profitability analysis; 2) PWI = Permanent Way Inspector; 3) Allocation keys developed and provided by Eric Nolan

Source: Iarnród Éireann, Roland Berger

We have validated all IM cost elements, cost centres and allocation methodologies with IÉ management (2/2)

Proposed cost allocation methodology – Infrastructure Management[1)] (2/2)

Disaggregated cost centre type	Level of disaggregation	Allocation key to route	Validated with
B&F division	B&F geographical division	B&F division to stations based on passenger footfall, stations to track segment based on geography, to routes based on service frequency	Cathy McVicker
B&F department overhead	B&F division	B&F overhead to B&F division based on B&F division spend, B&F division to stations based on passenger footfall, stations to track segment based on geography, to routes based on service frequency	Cathy McVicker
IMO department overhead	Full network	Overhead to track segment based on track km, to route based on service frequency	Cathy McVicker
IMO signalperson division	IMO geographical division	Signalperson division to track segment based on location and headcount, to route based on service frequency	Cathy McVicker
IMO gatekeepers division	IMO geographical division	Gatekeeper division to track segment based on location and headcount, to route based on service frequency	Cathy McVicker
IMO LXCC[2)]	IMO LXCC division	LXCC to track segment based on LX geography, to route based on service frequency	Cathy McVicker
IMO CTC[3)]	IMO CTC division	CTC to track segment based on geography, to route based on service frequency	Cathy McVicker

1) The New Works department is not included in the route profitability analysis; 2) LXCC = Level Crossing Control Centre; 3) CTC = Central Traffic Control

Source: Iarnród Éireann, Roland Berger

We have validated all freight cost elements, cost centres and allocation methodologies with IÉ freight management

Proposed cost allocation methodology – Freight[1)]

Disaggregated cost centre type	Level of disaggregation	Allocation key to route	Validated with
Freight department overhead	All freight routes	Overhead to route by train km	John Stack
Fastrack	All passenger routes	Fasttrack to route by train km	John Stack

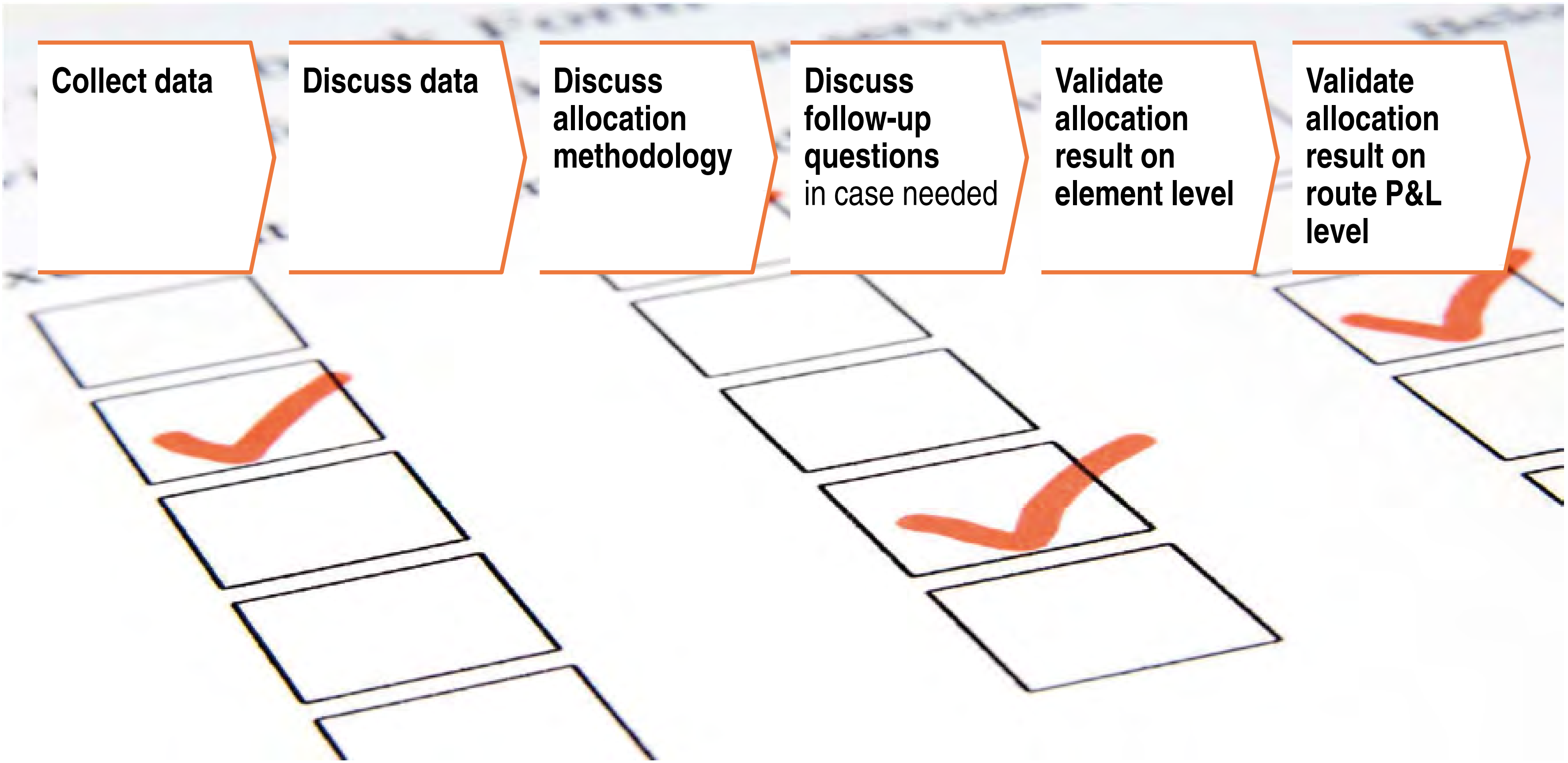
1) Many of the operational freight expenditures are booked in Train Operations cost centres and have been disentangled from those cost centres and allocated to freight routes

Source: Iarnród Éireann, Roland Berger

F.4 Validation

All elements within the route profitability model have been validated with the responsible counterparts within Iarnród Éireann

Validation process route profitability analysis



Source: Iarnród Éireann, Roland Berger

All data and allocation processes used have been validated by IÉ management

Validation progress at project finalisation

	Division	Primary cost types	General allocation methodology	Validation	IÉ validation ownership
Train Operations	Passenger Operations	Revenues	Service frequency	●	Maria Finnegan
		Drivers	Roster-route (service frequency)	●	John Stack
		Train hosts	Roster-route (service frequency)	●	
		Stations	Station-route (service frequency)	●	
		Station managers	# station mgrs/station-TS-route	●	
		Other	Various	●	
	Commercial		Train km	●	
	CME	Materials, labour, maintenance, overhead	Train km	●	John Stack
Infrastructure Management	SET	Labour, materials	Subdivision-TS-route	●	Cathy McVicker
	CCE	Labour, materials	Subdivision-TS-route	●	
	IMO	Labour, overhead	Headcount-TS-route	●	
	B&F	Labour, overhead	Headcount/region-TS-route	●	

● Done ○ Not discussed yet

1) Track segment

Source: Iarnród Éireann, Roland Berger

F.5 Interpretation of results

Limitations of data impact the scope and detail of analyses

Limitations of data

> Revenues and passenger journeys
  - For Smartcard OD-pair revenue (captured in RMS), the allocation to a single IÉ route has been used due to the fact that the OD-pair source data could not be extracted from the system due to resource constraints (SQL programming)
  - The bucket of "other revenues" (i.e. revenues not captured in VAX, RMS and non-OAP or BIK) has been allocated to routes using the historical percentages used by IÉ
  - OD-pair passenger journey data cannot be used for directional analysis, as certain ticket types book a return ticket on a single leg of the OD-pair only (i.e. O gets 2 pax journeys, D none)

> Expenditures allocation
  - The train service overview provided by IÉ, containing the train kms per train service operated on the network does not fully correspond to the route frequency overview provided by IÉ, which reflects the 2015 timetable. As a result, the train kms by route used as an allocation key for several expenditures might not fully reflect reality. However, the difference compared to reality is assumed to be of small impact given the fact the train km results by route have been validated by IÉ TO timetable planning staff

Source: Iarnród Éireann, Roland Berger

Limitations of data impact the extent to which the model results reflect reality

Limitations of approach

> The revenue allocation methodology used reflects passenger behaviour to a certain extent but has its limitations:
  - If both O and D are on DART it is allocated directly to DART
  - If both O and D are both on a route they are allocated to it. If they are both on more than one route, it is split between the routes according to their frequency.
  - If O or D are "unknown" or "All Stations" then the revenue is split according by frequency of the routes through the other station in the OD-pair
  - If O or D are on DART then the revenue is split according by frequency of the routes through the other station in the OD-pair
  - Split by interchange algorithm
  - The "Unknown"-"Unknown" and "All Stations"-"All Stations" OD-pair revenue is split between Suburban Dublin and DART routes according their sub-total revenue fraction

Source: Iarnród Éireann, Roland Berger

The nature of the data and the analysis in the model necessitates careful interpretation of results

Starting points for model result interpretation

Revenues

> Revenues have, as far as possible, been determined on a station-to-station OD basis
  – However, we do not know the true geographical OD of the passengers' total journey (i.e., including their station access and egress trips)

> OD revenues have been attributed to routes on the basis of service frequency (a significant change to previous practice)

Expenditures

> Cost centres have been disaggregated to a level where a single allocation key is reasonable to allocate the expenditures across routes

> Expenditures have then been identified as being unique to a route, or shared with other routes

> 2015 actuals IM expenditures are biased towards the main routes (due to having received less attention in previous years)

> Under-investment has been addressed through incor-poration of the AECOM report results

The resulting calculation gives an allocation of the total profitability across each route

> This is an allocation of the Actuals 2015 profitability

> The model does not calculate a business case for organisational or train-service changes (other than the intended switch to 'steady-state' IM expenditures by route)

Source: Iarnród Éireann, Roland Berger

In considering possible changes to a route, additional analysis would be required to build a full business case

Additional considerations for business case development

	Unique to a route	Shared between routes
Revenues	> To what extent can revenues be recaptured, through rail-heading and improved bus services to stations still served?	> To what extent would journeys be lost due to reduced frequency and/or increased journey time or interchange requirements?
Train-based expenditures	> How quickly could expenditures be reduced in line with reduced services, and at what cost? > Efficiencies of rostering and diagramming	> No shared train-based expenditures
Geography-based expenditures	> How quickly could expenditures be reduced in line with reduced services, and at what cost? > Validation of estimated high-level care and maintenance cost requirements	> With what extent would reduced/expanded services allow reductions/require increases in station or IM expenditures?
Central expenditures	> No central unique expenditures	> With a reduced/expanded service, what changes could/would need to be made to the central functions?

Source: Iarnród Éireann, Roland Berger

Roland
Berger

Appendix 7

August 2016

Line Segment Analysis (Roland Berger Report)

Údarás Náisiúnta Iompair
National Transport Authority

Iarnród Éireann
Irish Rail

Iarnród Éireann
Irish Rail

Roland Berger

Route Profitability

Segment analyses – (DRAFT)

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9 May 2016

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Contents

Roland Berger

A. Introduction

Iarnród Éireann Irish Rail

The Segment Analyses represent the first step towards developing business cases for network/service changes

Context of route profitability project

Current situation	Route profitability	Segment analysis impact on IÉ operations	Business case for segment analyses	Wider issues
> Revenues and costs by business unit	> Profit by route by: – Contribution level – Business unit	> Direct revenue impact > Escapable unique expenditures impact	> Capex required > Organisational change > Exceptionals > Alternative usage of assets > Indirect revenue impact > Timing of savings quantified	> Wider economic impact > Stakeholder views > Environmental impact > …
	Core Route Profitability Project	**Segment Analyses**		

Source: Roland Berger

The Segment Analyses can be used for an initial view of the impact of network changes. They are not a business plan development tool

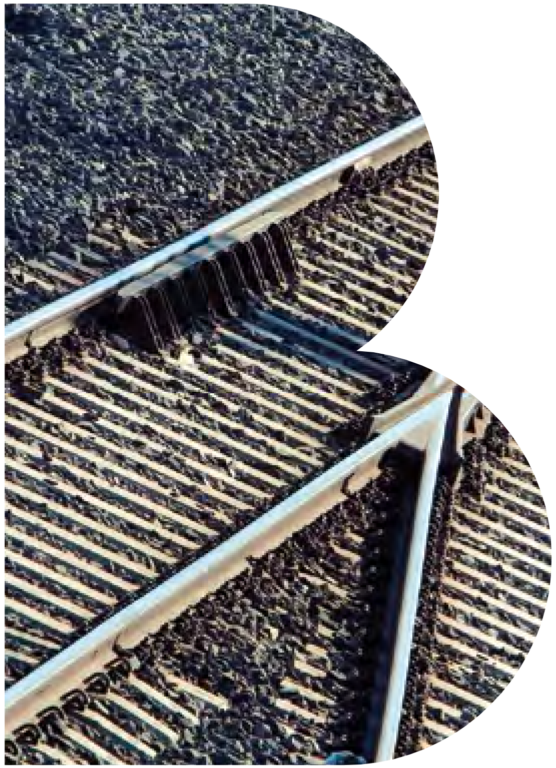
Applicability of Segment Analyses

	Description
Approach	> The Segment Analyses are a mathematical first-estimate analysis of the impact of network changes on IÉ's financials and passenger volumes > A number of 'real life' considerations are not taken into account
Limitations[1)]	> All impacts are assumed to be immediate. Timing is not taken into account > There is no provision for the cost of implementation (e.g., severance payments) > Passenger reaction is 'mechanical', i.e., not considering alternative routes on the network or rail heading > Indirect impact on other services, e.g., crowding, is not taken into account
Ability to draw conclusions	> Initial view of commercial impact of network changes > Gain understanding of components affected > Assess directional impact on other parts of network and other services > Obtain initial high-level understanding of impact on passengers

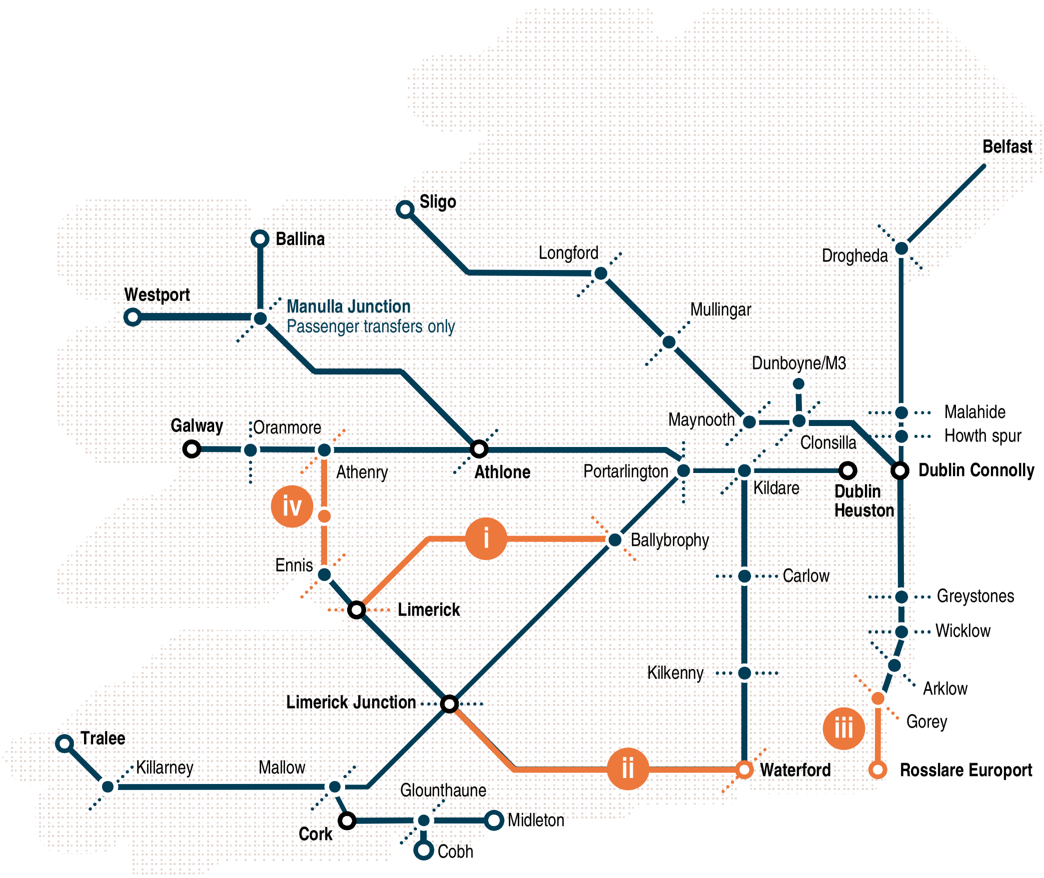
1) List not comprehensive

Source: Iarnród Éireann, Roland Berger

B. Segment definition



Segment analyses have been defined along four routes



Affected by discontinued services in segment analyses

Routes with segment analysis

- i Limerick – Ballybrophy (via Nenagh)
- ii Limerick Junction – Waterford
- iii Dublin – Rosslare
- iv Limerick – Galway

Source: Iarnród Éireann, Roland Berger

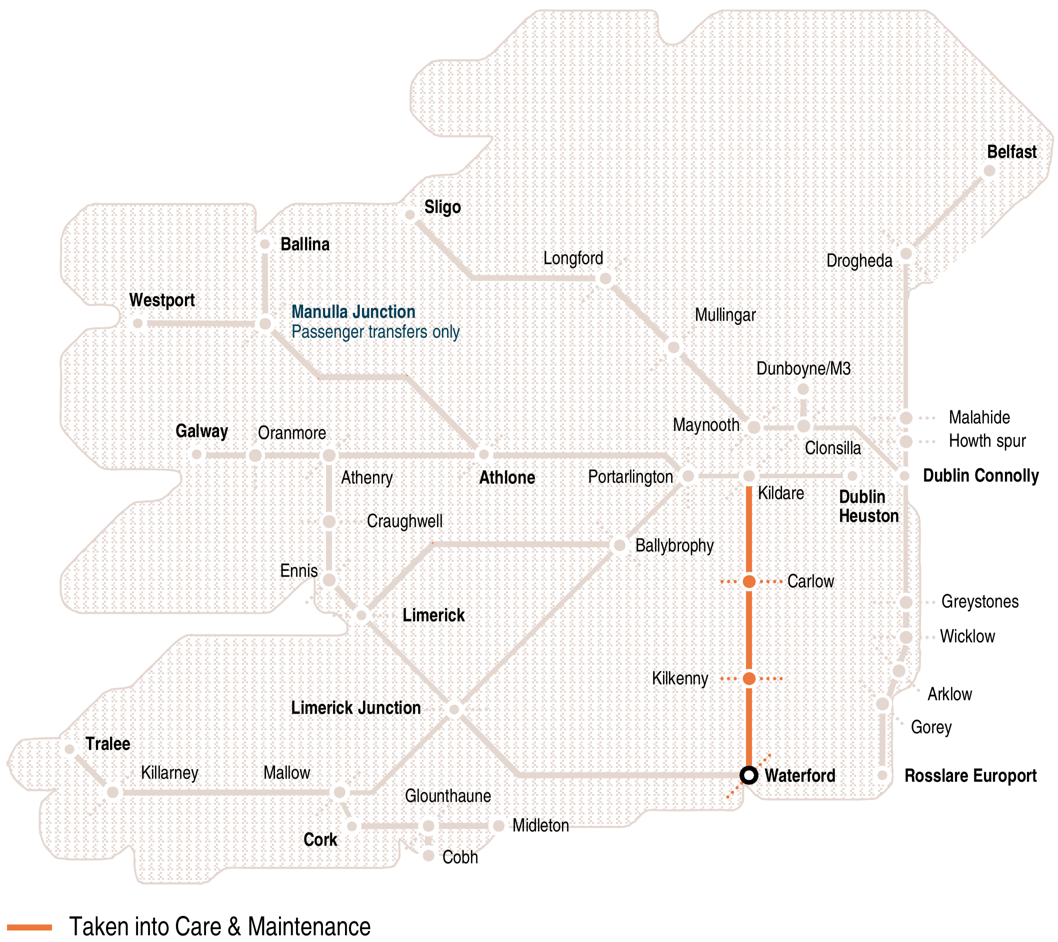
The segment analysis is only the first step in the development of a business case; further considerations need to be assessed

Additional considerations to develop business case from segment analysis

	Unique to a route	Shared between routes
Revenues	> To what extent can revenues be recaptured, through rail-heading and improved bus services to stations still served?	> To what extent would journeys be lost due to reduced frequency and/or increased journey time or interchange requirements?
Train-based costs	> How quickly could costs be reduced in line with reduced services, and at what cost? > Efficiencies of rostering and diagramming	> No shared train-based costs
Geography-based costs	> How quickly could costs be reduced in line with reduced services, and at what cost? > Validation of estimated high-level care and maintenance cost requirements	> With what extent would reduced/expanded services allow reductions/require increases in station or IM costs
Central costs	> No central unique costs	> With a reduced/expanded service, what changes could/would need to be made to the central functions

Source: Iarnród Éireann, Roland Berger

Example of approach: impact of hypothetical segment analysis Heuston-Kildare (not included in this year's exercise)



Example: Waterford-Kildare segment

> Previously unique revenue from OD-pairs that contain a station between Kildare and Waterford (other than Kildare and Waterford) are excluded

> Revenue previously allocated to the Heuston-Waterford route from OD-pairs that contain Waterford are reallocated to Limerick-Limerick Junction and interchange routes from Limerick Junction

> Costs between Kildare and Waterford (other than Kildare and Waterford stations) are excluded, except for care and maintenance`

These identified changes can then provide the inputs to a business case analysis

Source: Iarnród Éireann, Roland Berger

C. Segment analysis results

The segment analyses have net financial impacts ranging from c. EUR 3-5m and pax journey impacts ranging from c. 20-180k

Impact of segment analyses

	Unit	i Limerick-Ballybrophy	ii Limerick Jct. -Waterford	iii Gorey-Rosslare	iv Ennis-Athenry
Revenue lost	[EUR '000]	(159)	(253)	(1,621)	(128)
Train-based expenditure saving	[EUR '000]	751	638	1,617	1,284
Geography-based expenditure saving	[EUR '000]	4,559	4,738	4,480	2,075
Total expenditure saving	[EUR '000]	5,310	5,376	6,097	3,359
Cash result improvement	**[EUR '000]**	**5,151**	**5,123**	**4,476**	**3,231**
Pax journeys lost[1)]	**[#]**	**22,856**	**35,018**	**177,326**	**19,769**
Saving per pax journey	[EUR/jrny]	225.4	146.3	25.2	163.5

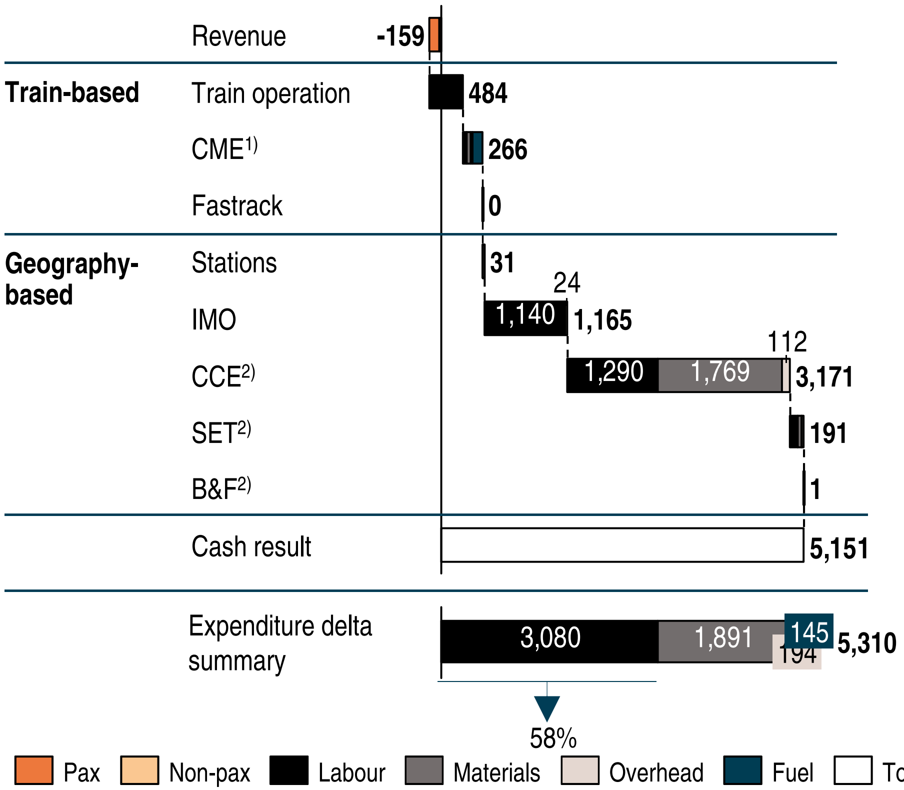
1) For Limerick – Ballybrophy and Limerick Junction – Waterford, the pax journeys lost exceed the pax journeys allocated to the route, this is due to pax journeys traveling OD-pairs with O or D on those routes but D or O on another route – these pax journeys are partially allocated to other routes but will be lost as soon as the O or D station will be closed

Source: Iarnród Éireann, Roland Berger

The financial benefits from the Limerick – Ballybrophy segment analysis are mainly driven by CCE and IMO savings

Financial impact of Limerick – Ballybrophy segment analysis [EUR '000]

Delta compared to base case



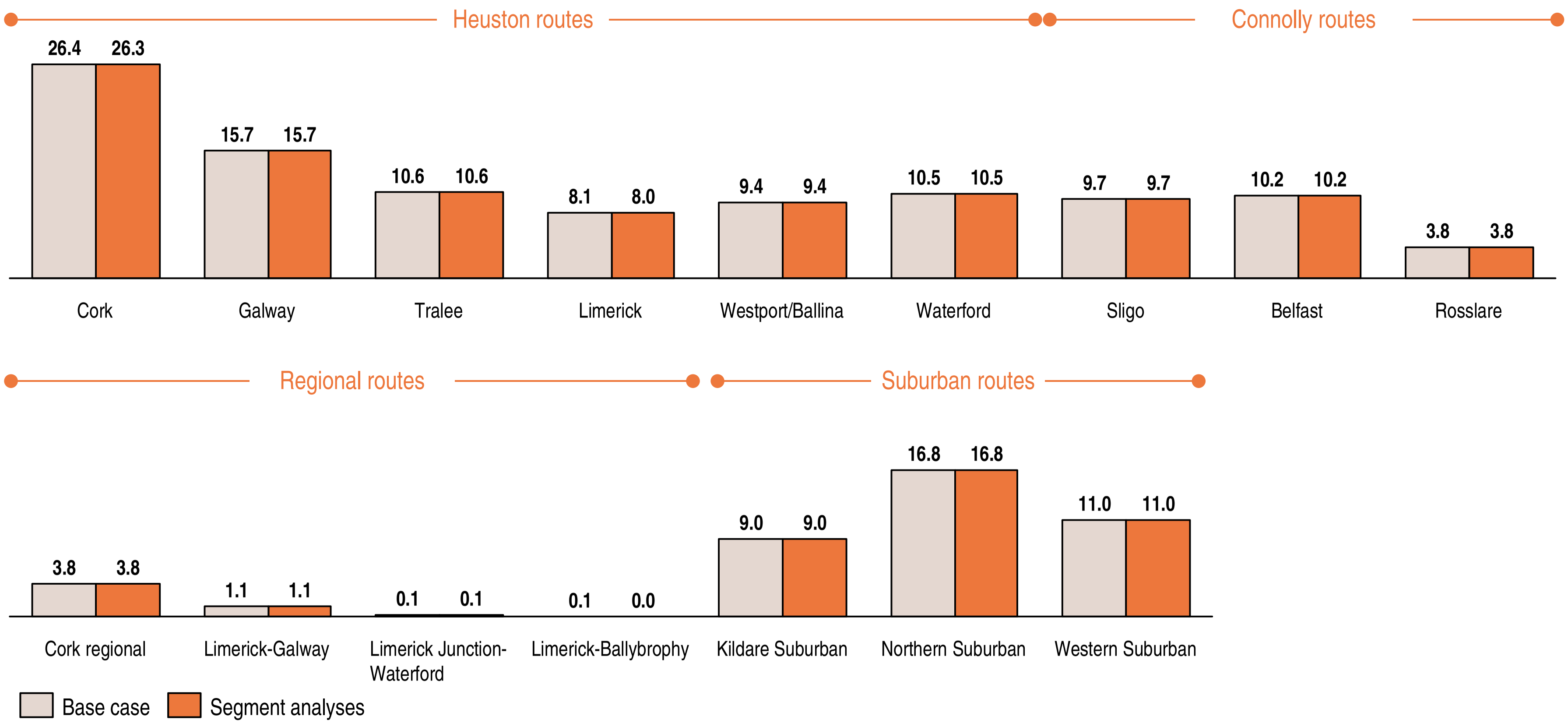
Drivers of delta

- > Pax: OD-pairs containing Castleconnell, Birdhill, Nenagh, Cloughjordan, Roscrea; non-pax: car park, property & retail
- > Drivers, DTEs, Train crew, train hosts on route
- > Fuel/DART traction, maintenance for fleet used on route
- > Fastrack transport on route
- > Station managers, station staff, CAN & property
- > Signal persons, gatekeepers, central traffic control, level crossing control centre on track segment Limerick - Ballybrophy
- > Permanent way inspectors, ballast drivers on track segment Limerick - Ballybrophy
- > Signalling, electrification, telecoms workers on track segment Limerick - Ballybrophy
- > Buildings & facilities workers on track segment Limerick - Ballybrophy

1) CME = Chief Mechanical Engineer; IMO = Infrastructure Management Operations; CCE = Chief Civil Engineer; SET = Signalling, Electrification, Telecoms; B&F = Buildings & Facilities;
2) Includes maintenance and renewal expenditures
Source: Iarnród Éireann, Roland Berger

The impact on revenue by route of the Limerick – Ballybrophy segment analysis is limited

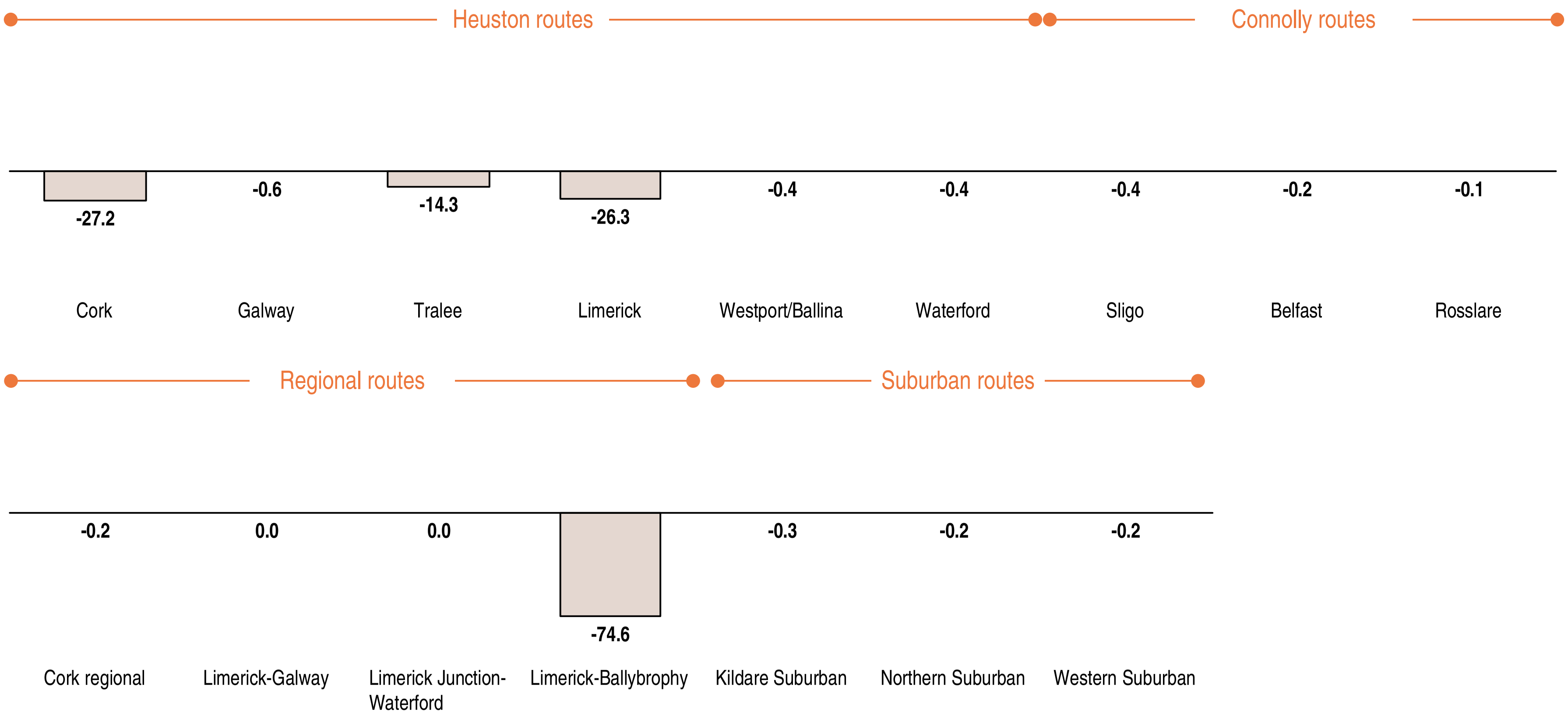
Net revenue change with segment analysis LRS-2 (Limerick-Ballybrophy) [EUR m]



Source: Iarnród Éireann, Roland Berger

The Limerick – Ballybrophy segment analysis also has a minor negative revenue impact on the Cork, Tralee and Limerick routes

Net impact of Limerick-Ballybrophy segment analysis on route revenues [EUR'000]



Source: Iarnród Éireann, Roland Berger

The potential expenditure benefits from the Limerick – Ballybrophy segment analysis are mainly driven by CCE and IMO

Limerick – Ballybrophy cost benefit (saved vs. retained) [EUR '000]

Line item	Route unique & shared costs	Benefit from Segment Analysis	Cost from route remaining	Rationale for costs not saved
Costs	6,009	5,310	699	
Train-based costs	752	751	2	
Train operation	486	484	2	
DTEs	0	0	0	
Drivers	314	312	2	District IM ballast drivers are reallocated to other routes
Train crew	172	172	0	
Train hosts	0	0	0	
Administrative	0	0	0	
CME	266	266	0	
Fuel / DART Traction	141	141	0	
Drivers	1	1	0	
Maintenance labour	42	42	0	
Maintenance materials	48	48	0	
Maintenance overhead	35	35	0	
Fastrack	0	0	0	
Geography-based	5,256	4,559	697	
Stations	375	31	344	
Station managers	0	0	0	
Station operation	361	24	336	Shared station operation costs Limerick Junction and Waterford reallocated to other routes
CAN & Property	14	7	7	Shared CAN & Property costs Limerick Junction and Waterford reallocated to other routes
IMO	1,338	1,165	173	
Signal persons	219	213	6	Shared signal persons Kilonan Junction - Limerick reallocated to other routes
Gatekeepers	923	857	65	Shared gatekeepers Kilonan Junction - Limerick reallocated to other routes
Central traffic control	102	0	102	Shared central traffic control Kilonan Junction - Limerick reallocated to other routes
Level crossing control centre	95	95	0	
Administrative	0	0	0	
CCE	3,268	3,171	97	
PWI maintenance	3,268	3,171	97	Care & maintenance costs for track segment Ballybrophy - Kilonan Junction (via Nenagh)
IM Ballast drivers	0	0	0	
Administrative	0	0	0	
SET	222	191	30	
Signalling maintenance	129	103	25	Shared signalling maintenance costs Kilonan Junction - Limerick reallocated to other routes
Electrification maintenance	0	0	0	
Telecoms maintenance	93	88	5	Shared telecoms maintenance costs Kilonan Junction - Limerick reallocated to other routes
Administrative	0	0	0	
B&F	53	1	52	
Maintenance	53	1	52	Shared building & facilities maintenance costs Limerick and Ballybrophy reallocated to other routes
Administrative	0	0	0	

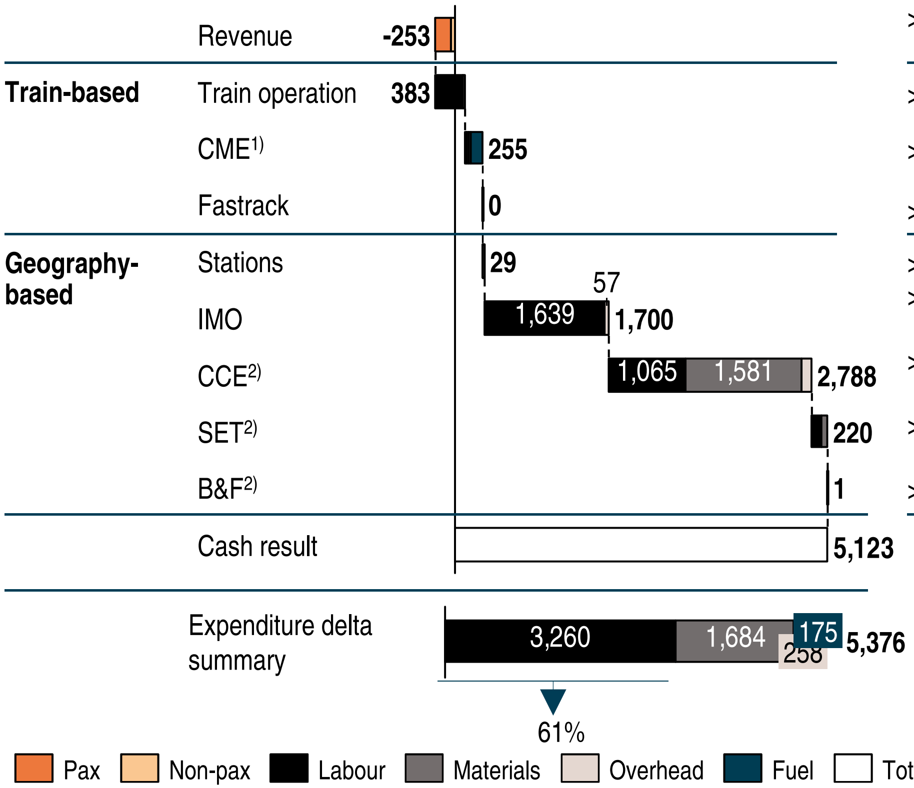
1) DTE = District Traction Executive; CME = Chief Mechanical Engineer; CAN = Commuter Advertising Network; IMO = Infrastructure Management Operations; CCE = Chief Civil Engineer; PWI = Permanent Way Inspector; IM = Infrastructure Manager; SET = Signalling, Electrification, Telecoms; B&F = Buildings & Facilities

Source: Iarnród Éireann, Roland Berger

The financial benefit from the Limerick Junction – Waterford segment analysis is mainly driven by CCE and IMO savings

Financial impact of Limerick Junction – Waterford segment analysis [EUR '000]

Delta compared to base case



Drivers of delta

> Pax: OD-pairs containing Carrick on Suir, Clonmel, Cahir, Tipperary; non-pax: car park, property & retail

> Drivers, DTEs, Train crew, train hosts on route

> Fuel/DART traction, maintenance on route

> Fastrack transport on route

> Station managers, station staff, CAN & property

> Signal persons, gatekeepers, central traffic control, level crossing control centre on track segment Lim. Jct. – Waterford

> Permanent way inspectors, ballast drivers on track segment Lim. Jct. – Waterford

> Signalling, electrification, telecoms workers on track segment Lim. Jct. – Waterford

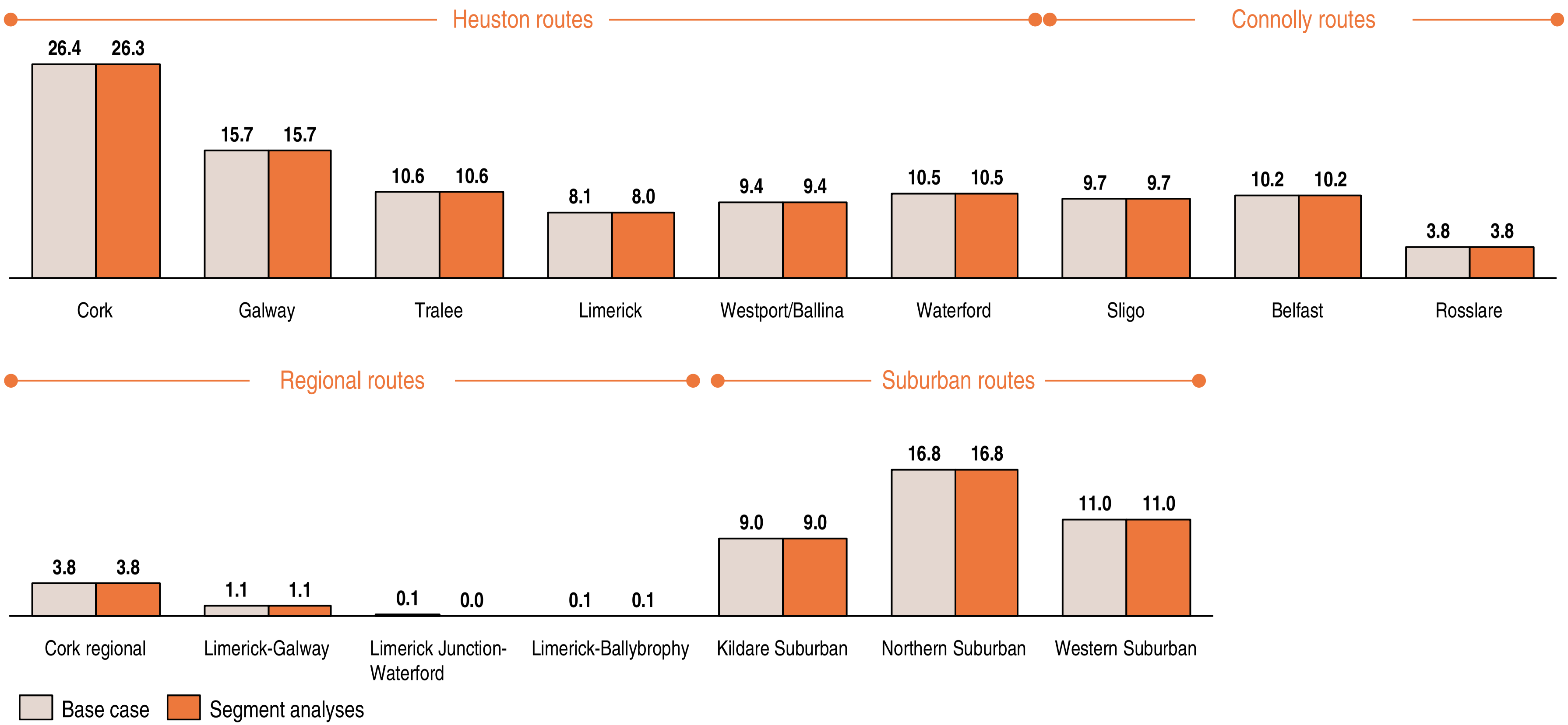
> Buildings & facilities workers on track segment Lim. Jct. – Waterford

1) CME = Chief Mechanical Engineer; IMO = Infrastructure Management Operations; CCE = Chief Civil Engineer; SET = Signalling, Electrification, Telecoms; B&F = Buildings & Facilities;
2) Includes maintenance and renewal expenditures

Source: Iarnród Éireann, Roland Berger

The impact on revenue by route of the Limerick Junction – Waterford segment analysis is limited

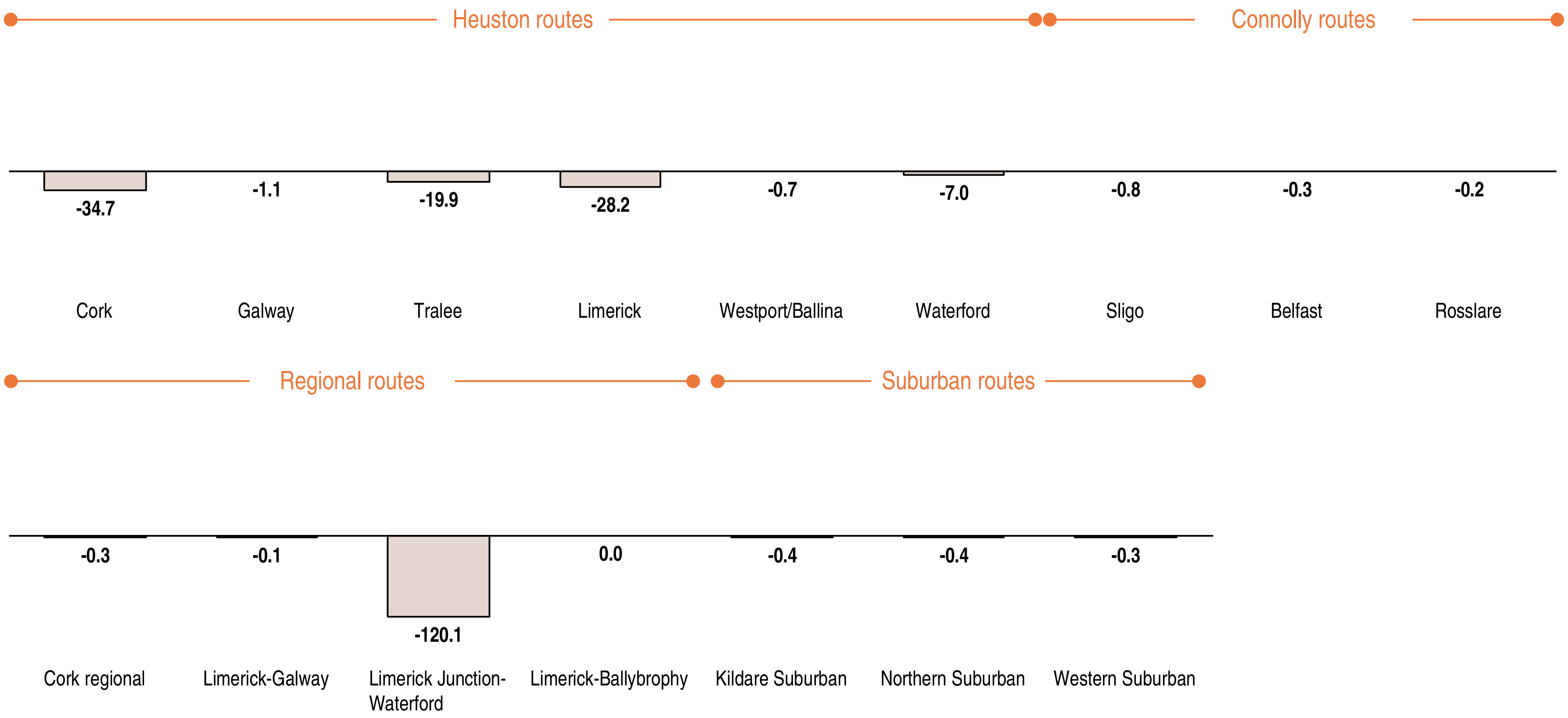
Net revenue change with segment analysis LJW-1 (Lim. Junction-Waterford) [EUR m]



Source: Iarnród Éireann, Roland Berger

The Limerick Junction – Waterford segment analysis also has a minor negative revenue impact on Cork, Tralee and Limerick routes

Net impact of Lim. Junction-Waterford segment analysis on route revenues [EUR'000]



Source: Iarnród Éireann, Roland Berger

The potential expenditure benefit from the Limerick Junction – Waterford segment analysis is driven by CCE and IMO savings

Limerick Junction – Waterford expenditure benefit (saved vs. retained) [EUR '000]

Line item	Route unique & shared costs	Benefit from Segment Analysis	Cost from route remaining	Rationale for costs not saved
Costs	6,007	5,376	630	
Train-based costs	638	638	0	
Train operation	384	383	0	
DTEs	0	0	0	
Drivers	243	243	0	
Train crew	141	141	0	
Train hosts	0	0	0	
Administrative	0	0	0	
CME	255	255	0	
Fuel / DART Traction	170	170	0	
Drivers	0	0	0	
Maintenance labour	32	32	0	
Maintenance materials	10	10	0	
Maintenance overhead	43	43	0	
Fastrack	0	0	0	
Geography-based	5,368	4,738	630	
Stations	359	29	330	
Station managers	0	0	0	
Station operation	339	14	325	Shared station operation costs Limerick Junction and Waterford reallocated to other routes
CAN & Property	20	15	5	CAN & Property costs Limerick Junction and Waterford reallocated to other routes
IMO	1,835	1,700	135	
Signal persons	569	569	0	
Gatekeepers	875	875	0	
Central traffic control	114	2	112	Shared CTC district costs reallocated to other routes
Level crossing control centre	253	253	0	
Administrative	24	0	23	Shared IMO administrative district costs reallocated to other routes
CCE	2,907	2,788	119	
PWI maintenance	2,907	2,788	119	Care & maintenance costs for track segment Limerick Junction - Waterford
IM Ballast drivers	0	0	0	
Administrative	0	0	0	
SET	220	220	0	
Signalling maintenance	111	111	0	
Electrification maintenance	0	0	0	
Telecoms maintenance	109	109	0	
Administrative	0	0	0	
B&F	47	1	45	
Maintenance	47	1	45	Shared buildings & facilities mainteance costs Limerick Junction and Waterford reallocated to other routes
Administrative	0	0	0	

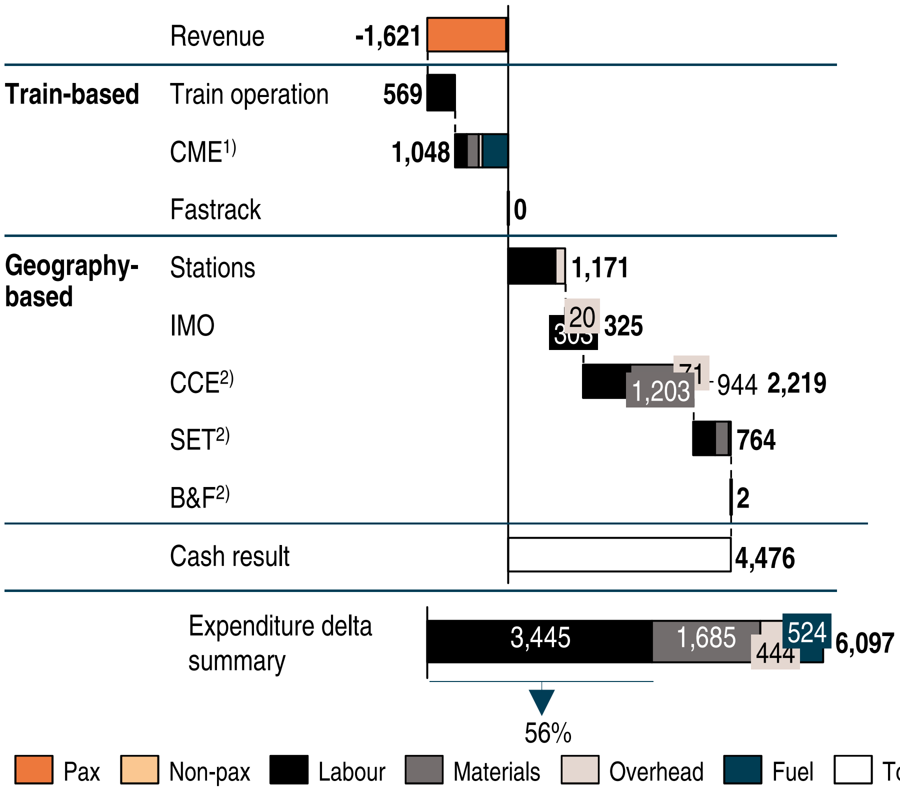
1) DTE = District Traction Executive; CME = Chief Mechanical Engineer; CAN = Commuter Advertising Network; IMO = Infrastructure Management Operations; CCE = Chief Civil Engineer; PWI = Permanent Way Inspector; IM = Infrastructure Manager; SET = Signalling, Electrification, Telecoms; B&F = Buildings & Facilities

Source: Iarnród Éireann, Roland Berger

The financial benefit from the Gorey – Rosslare segment analysis is predominantly driven by CCE, stations, CME and SET savings

Financial impact of Gorey – Rosslare segment analysis [EUR '000]

Delta compared to base case



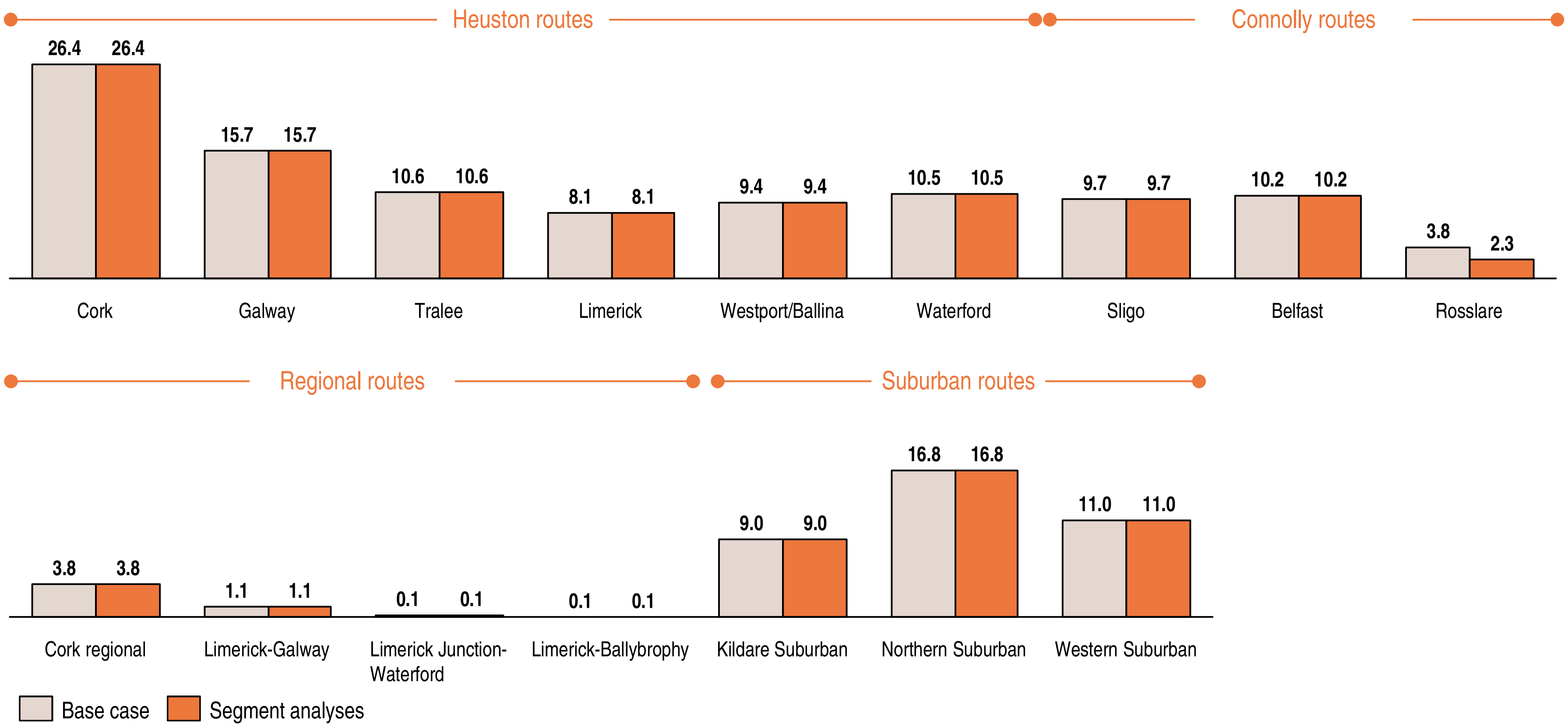
Drivers of delta

- Pax: OD-pairs containing Enniscorthy, Wexford, Rosslare Strand, Rosslare Europort; non-pax: car park, property & retail
- Drivers, DTEs, Train crew, train hosts on Gorey – Rosslare
- Fuel/DART traction, maintenance on Gorey – Rosslare
- Fastrack transport on Gorey – Rosslare
- Station managers, station staff, CAN & property[3]
- Signal persons, gatekeepers, central traffic control, level crossing control centre on track segment Gorey – Rosslare
- Permanent way inspectors, ballast drivers on track segment Gorey – Rosslare
- Signalling, electrification, telecoms workers on track segment Gorey – Rosslare
- Buildings & facilities workers on track segment Gorey – Rosslare

1) CME = Chief Mechanical Engineer; IMO = Infrastructure Management Operations; CCE = Chief Civil Engineer; SET = Signalling, Electrification, Telecoms; B&F = Buildings & Facilities; 2) Includes maintenance and renewal expenditures; 3) Rosslare Harbour (a.k.a. Rosslare Europort – part of Rosslare Europort Business Unit) not included in station expenditures
Source: Iarnród Éireann, Roland Berger

The impact on revenue by route of the Gorey – Rosslare segment analysis is limited

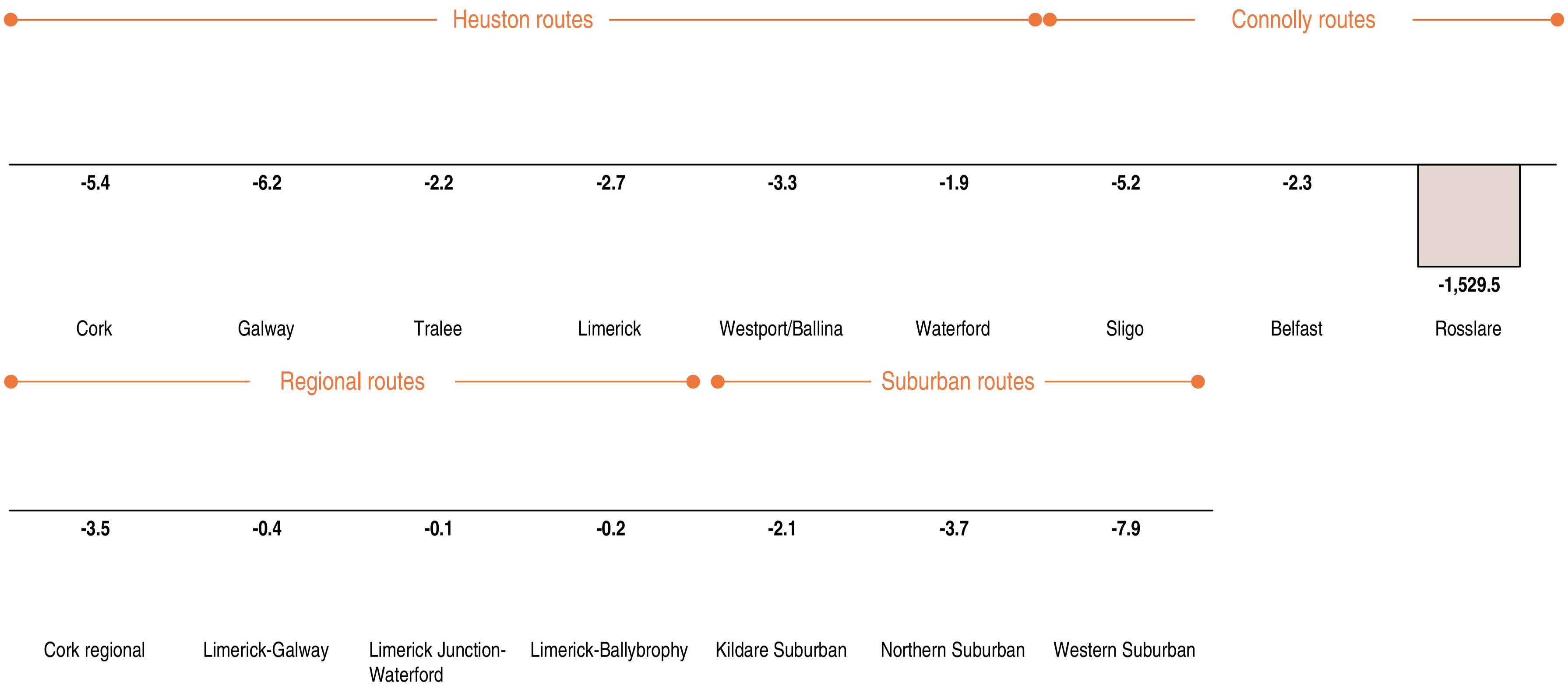
Revenue change with segment analysis CRE-1 (Gorey-Rosslare) [EUR m]



Source: Iarnród Éireann, Roland Berger

The revenue lost in the Gorey – Rosslare segment analysis is virtually all tied to the Rosslare route

Impact of Gorey-Rosslare segment analysis on route revenues[1)] [EUR'000]



Source: Iarnród Éireann, Roland Berger

The potential expenditure benefit from the Gorey – Rosslare segment analysis is mainly driven by CCE, stations, CME and SET

Gorey – Rosslare cost benefit (saved vs. retained) [EUR '000]

Line item	Route unique & shared costs	Benefit from Segment Analysis	Cost from route remaining	Rationale for costs not saved
Costs	14,369	6,097	8,271	
Train-based costs	3,761	1,617	2,144	
Train operation	1,190	569	621	
DTEs	0	0	0	
Drivers	953	456	498	Truncation of route from Dublin - Rosslare to Dublin - Gorey
Train crew	237	113	123	Truncation of route from Dublin - Rosslare to Dublin - Gorey
Train hosts	0	0	0	
Administrative	0	0	0	
CME	2,571	1,048	1,523	
Fuel / DART Traction	1,131	498	633	Truncation of route from Dublin - Rosslare to Dublin - Gorey
Drivers	9	3	5	Truncation of route from Dublin - Rosslare to Dublin - Gorey
Maintenance labour	496	191	305	Truncation of route from Dublin - Rosslare to Dublin - Gorey
Maintenance materials	378	137	241	Truncation of route from Dublin - Rosslare to Dublin - Gorey
Maintenance overhead	558	220	339	Truncation of route from Dublin - Rosslare to Dublin - Gorey
Fastrack	0	0	0	
Geography-based	10,607	4,480	6,127	
Stations	2,185	1,171	1,014	
Station managers	0	0	0	
Station operation	1,922	1,069	853	Shared station operation costs for station between Dublin and Gorey remain
CAN & Property	264	102	162	Shared CAN & Property costs for station between Dublin and Gorey remain
IMO	723	325	398	
Signal persons	360	194	166	Shared signal person costs for track segments between Dublin and Gorey remain
Gatekeepers	34	34	0	
Central traffic control	143	2	141	Shared CTC costs for track segments between Dublin and Gorey remain
Level crossing control centre	128	93	35	Shared LXCC costs for track segments between Dublin and Gorey remain
Administrative	57	1	56	Shared CTC costs for track segments between Dublin and Gorey remain
CCE	5,896	2,219	3,677	
PWI maintenance	6,112	2,219	3,677	C&M costs for track segment Gorey - Rosslare + shared PWI maintenance costs for Dublin - Gorey
IM Ballast drivers	0	0	0	
Administrative	0	0	0	
SET	1,621	764	857	
Signalling maintenance	1,035	553	482	Shared signalling maintenance costs for track segments between Dublin and Gorey remain
Electrification maintenance	0	0	0	
Telecoms maintenance	586	211	375	Shared telecoms maintenance costs for track segments between Dublin and Gorey remain
Administrative	0	0	0	
B&F	182	2	180	
Maintenance	182	2	180	Shared buildings & facilities maintenance costs for stations between Dublin and Gorey remain
Administrative	0	0	0	

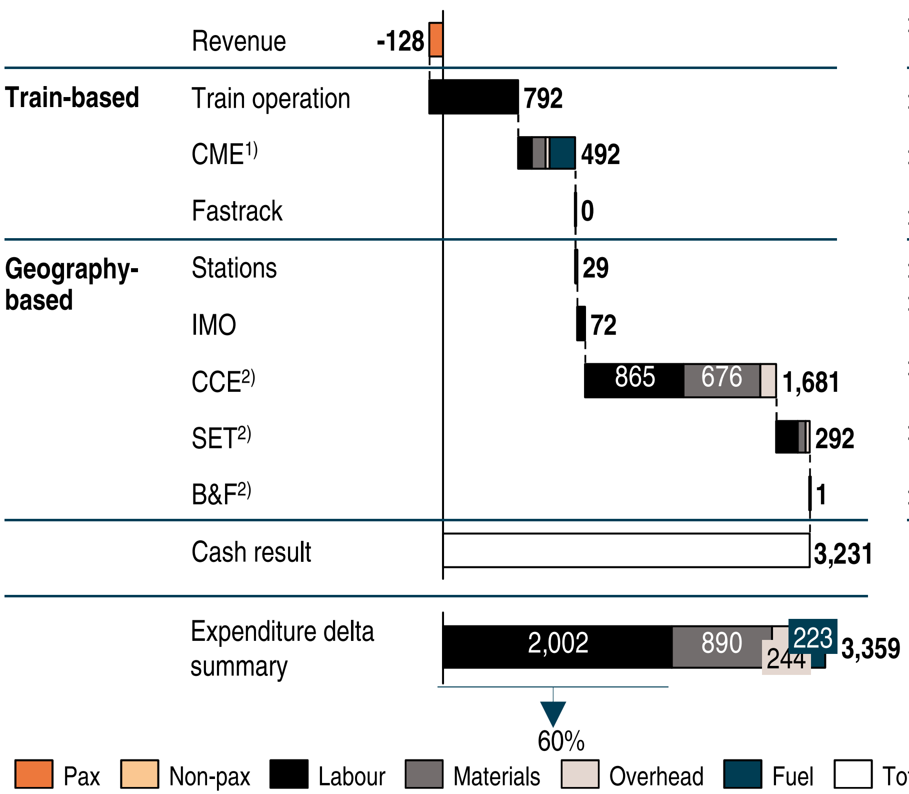
1) DTE = District Traction Executive; CME = Chief Mechanical Engineer; CAN = Commuter Advertising Network; IMO = Infrastructure Management Operations; CCE = Chief Civil Engineer; PWI = Permanent Way Inspector; IM = Infrastructure Manager; SET = Signalling, Electrification, Telecoms; B&F = Buildings & Facilities

Source: Iarnród Éireann, Roland Berger

The financial benefit from the Ennis – Athenry segment analysis is predominantly driven by CCE, train operation and CME savings

Financial impact of Ennis – Athenry segment analysis [EUR '000]

Delta compared to base case



Drivers of delta

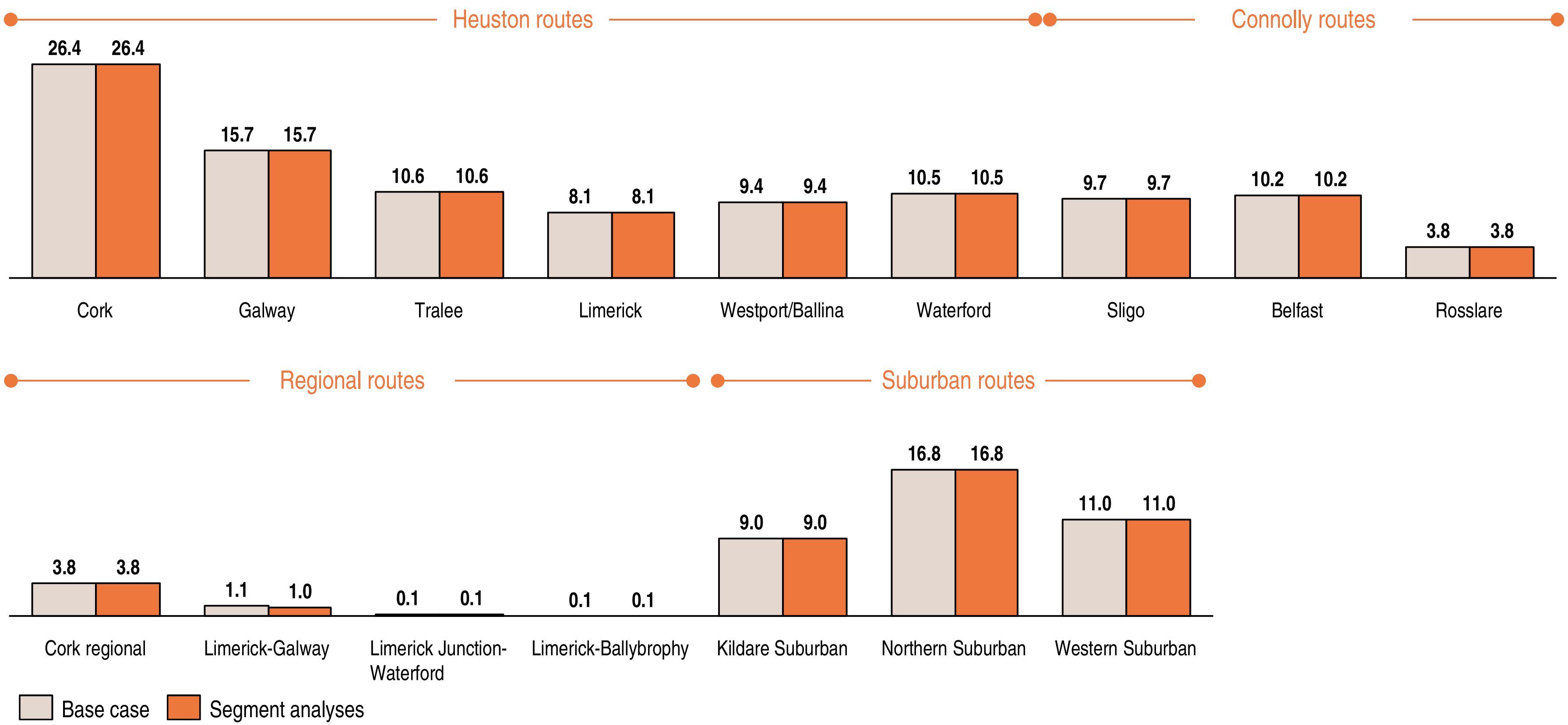
- > Pax: OD-pairs containing Gort, Ardrahan, Craughwell; non-pax: car park, property & retail for those stations
- > Drivers, DTEs, Train crew, train hosts on Ennis - Galway
- > Fuel/DART traction, maintenance on Ennis – Galway
- > Fastrack transport on Ennis – Galway
- > Station managers, station staff, CAN & property
- > Signal persons, gatekeepers, central traffic control, level crossing control centre on track segment Ennis – Athenry
- > Permanent way inspectors, ballast drivers on track segment Ennis – Athenry
- > Signalling, electrification, telecoms workers on track segment Ennis – Athenry
- > Buildings & facilities workers on track segment Ennis – Athenry

1) CME = Chief Mechanical Engineer; IMO = Infrastructure Management Operations; CCE = Chief Civil Engineer; SET = Signalling, Electrification, Telecoms; B&F = Buildings & Facilities;
2) Includes maintenance and renewal expenditures

Source: Iarnród Éireann, Roland Berger

The impact on net revenue by route of the Ennis – Athenry segment analysis is limited

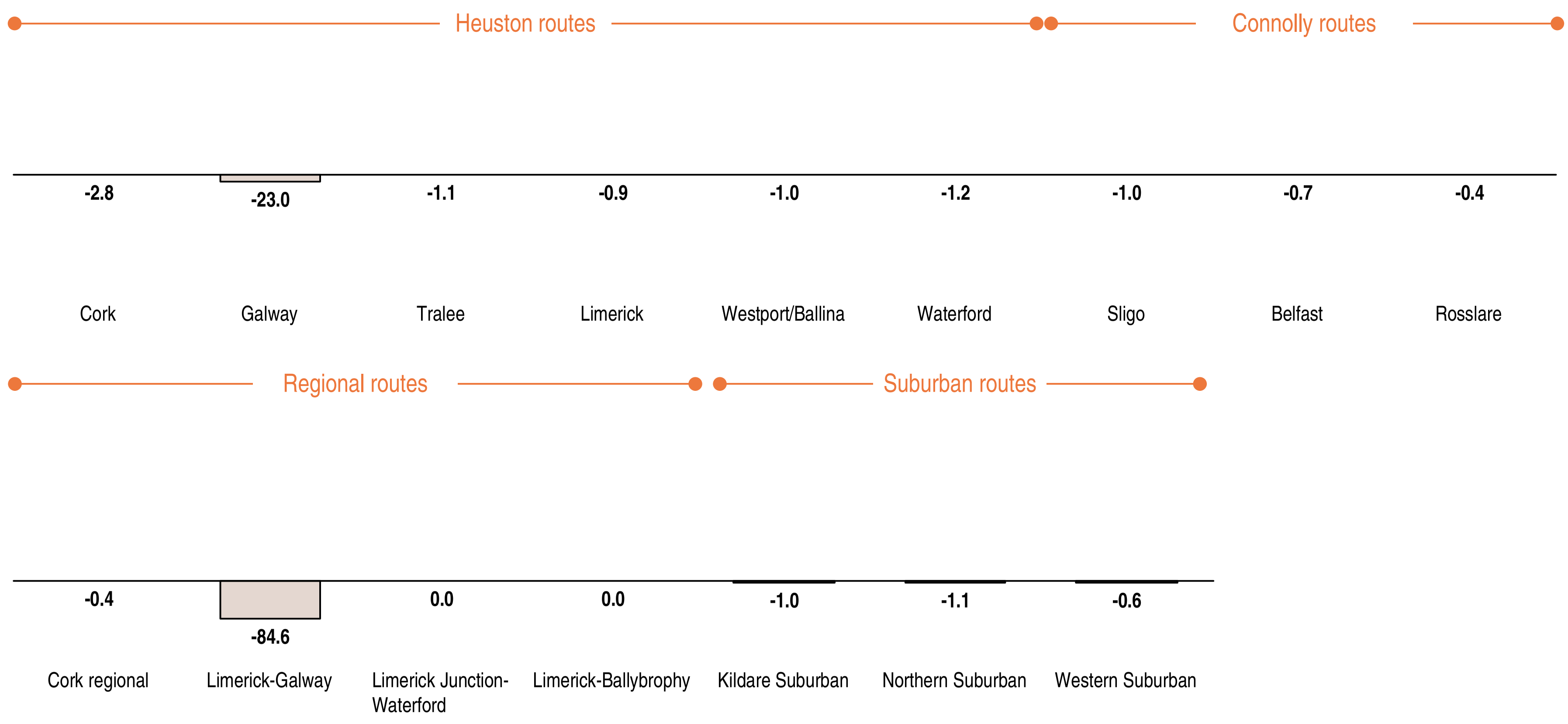
Net revenue change with segment analysis LRS-1(Ennis-Athenry) [EUR m]



Source: Iarnród Éireann, Roland Berger

The net impact on revenues is low due to a large share of the 'lost' revenue being retained on the Galway route

Net Impact of Ennis-Athenry segment analysis on route revenues [EUR'000]



Source: Iarnród Éireann, Roland Berger

The potential expenditures benefit from the Ennis – Athenry segment analysis is driven by CCE, train operation and CME

Ennis – Athenry expenditure benefit (saved vs. retained) [EUR]

Line item	Route unique & shared costs	Benefit from Segment Analysis	Cost from route remaining	Rationale for costs not saved
Costs	7,091	3,359	3,732	
Train-based costs	2,014	1,284	730	
Train operation	1,244	792	451	
DTEs	0	0	0	
Drivers	1,230	784	447	Truncation of route from Limerick to Ennis
Train crew	13	8	5	Truncation of route from Limerick to Ennis
Train hosts	0	0	0	
Administrative	0	0	0	
CME	770	492	278	
Fuel / DART Traction	334	213	121	Truncation of route from Limerick to Ennis
Drivers	3	2	1	Truncation of route from Limerick to Ennis
Maintenance labour	147	94	53	Truncation of route from Limerick to Ennis
Maintenance materials	156	100	56	Truncation of route from Limerick to Ennis
Maintenance overhead	130	83	47	Truncation of route from Limerick to Ennis
Fastrack	0	0	0	
Geography-based	5,077	2,075	3,002	
Stations	1,502	29	1,473	
Station managers	0	0	0	
Station operation	1,453	25	1,428	Shared station operation costs for station between Limerick and Ennis remain
CAN & Property	49	4	45	Shared CAN & Property costs for station between Limerick and Ennis remain
IMO	463	72	392	
Signal persons	43	0	43	Shared signal person costs for track segments between Limerick and Ennis remain
Gatekeepers	263	0	263	Shared gatekeeper costs for track segments between Limerick and Ennis remain
Central traffic control	71	0	70	Shared CTC costs for track segments between Limerick and Ennis remain
Level crossing control centre	81	71	10	Shared LXCC costs for track segments between Limerick and Ennis remain
Administrative	6	0	6	Shared CTC costs for track segments between Limerick and Ennis remain
CCE	2,405	1,681	724	
PWI maintenance	2,509	1,681	724	C&M costs for track segment Ennis - Athenry + shared PWI maintenance costs for Limerick-Ennis
IM Ballast drivers	0	0	0	
Administrative	0	0	0	
SET	460	292	167	
Signalling maintenance	175	110	65	Shared signalling maintenance costs for track segments between Limerick and Ennis remain
Electrification maintenance	0	0	0	
Telecoms maintenance	285	182	103	Shared telecoms maintenance costs for track segments between Limerick and Ennis remain
Administrative	0	0	0	
B&F	247	1	245	
Maintenance	247	1	245	Shared buildings & facilities maintenance costs for stations between Limerick and Ennis remain
Administrative	0	0	0	

1) DTE = District Traction Executive; CME = Chief Mechanical Engineer; CAN = Commuter Advertising Network; IMO = Infrastructure Management Operations; CCE = Chief Civil Engineer; PWI = Permanent Way Inspector; IM = Infrastructure Manager; SET = Signalling, Electrification, Telecoms; B&F = Buildings & Facilities

Source: Iarnród Éireann, Roland Berger

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Berger

Appendix 8

August 2016

Potential Alternative Service Provision

Údarás Náisiúnta Iompair
National Transport Authority

Iarnród Éireann
Irish Rail

Contents

1.0 Bus Service implications relating to suspension of rail services Gorey - Rosslare

The following is a high level consideration of the need to provide replacement bus services in the event of the suspension of rail services currently operating between Gorey and Rosslare on the Dublin to Rosslare Line (Southern Line) line as considered under scenario CRE-1 of the Rail Review. Under this scenario operations would remain as far as Gorey but be suspended beyond it meaning services would no longer operate at Enniscorthy, Wexford, Rosslare Strand and Rosslare Europort stations.

1.1 Existing rail service provision

At present services operating at these stations are Dublin/Rosslare and return, Dublin to Wexford and Gorey to Dublin services.

In the southbound direction the current timetable provides for 4 services per day each way, Monday to Friday between Dublin and Rosslare and 1 Dublin-Wexford service. On Saturday and Sunday there are 3 Dublin-Rosslare services. Services operate between the hours of 09.40 and 18.38 for arrival into Rosslare Europort between 12.26 and 21.28 Monday to Saturday.

In the northbound direction there are 4[1] services operating between Rosslare and Dublin Monday-Fri with 1 additional Gorey-Dublin service. There are 3 services operated from Rosslare to Dublin on Saturday and Sunday. An additional early morning Gorey to Dublin service is also in operation on Saturday. Hours of operation from Rosslare are between 05.35 and 18.35 Monday to Fri providing for arrival into Dublin between 08.46 and 21.44.

The quantum of service at each station on this section of the network is summarised below

Table 1 Quantum of rail service

Station	Southbound			Northbound		
	M-F	Sat	Sun	M-F	Sat	Sun
Enniscorthy	5	3	3	4	3	3
Wexford	5	3	3	4	3	3
Rosslare Strand	4	3	3	4	3	3
Rosslare Europort	4	3	3	4	3	3

[1] 2 of which extend to Dundalk

1.2 Potential replacement bus services

There are a number of existing bus services operating in this region – both PSO and private commercial services. The services are listed in Table 2.

The following points provide a high-level summary of the potential need for public transport replacement services in the event of the removal of rail:

- Wexford and Enniscorthy are well served by a significant volume of existing bus services, for travel to Arklow, Dublin City and Airport
- Rosslare Europort is reasonably well served by Bus Éireann Route 40 to Wexford where interchange is required for onward travel. The connections are not seamless, however. Bus Éireann also provides a limited service on Route 370 to Rosslare Strand and Wexford
- Rosslare Strand has a local service to Wexford provided by Wexford Bus and a limited service provided by Bus Éireann on Route 370 to Rosslare Europort and Wexford

Based on the above a potential bus replacement service is set out in Figures 1 and 2. The service has been designated as Route 340 in the tables which also show the rail services to be suspended, the remaining rail services and connections to and from Dublin and other relevant bus services and connections. The proposed service will provide the following:

From Rosslare Europort

- A Monday to Saturday peak service from Rosslare Europort connecting with the current train service departure from Gorey
- An early Sunday morning service from Rosslare Europort connecting with the current train service departure from Gorey
- A Monday to Saturday midday service from Rosslare Europort connecting with the current train service departure from Gorey
- An early afternoon Sunday service from Rosslare Europort connecting with the current train service departure from Gorey
- A late afternoon Sunday service from Rosslare Europort connecting with the current train service departure from Gorey
- A late afternoon Monday to Friday service from Wexford connecting with the current train service departure at Gorey. Passengers from Rosslare Europort use Bus Éireann Route 40 and change at Wexford. Passengers from Rosslare Strand use Wexford Bus Route 878 and change at Wexford
- A late afternoon Saturday service from Rosslare Europort connecting with the current train service departure at Gorey. Passengers from Rosslare Strand use Wexford Bus Route 878 and change at Wexford
- No service is proposed for the early morning departure from Rosslare Europort and Rosslare Strand as there are no or very few passengers travelling on this service. Connections from Wexford are provided by Bus Éireann Route 40 connecting with the current train service departure from Gorey

From Gorey

- A late morning Monday to Saturday service from Gorey to Wexford connecting with the current train service arrival at Gorey. Passengers for Rosslare Strand use Wexford Bus Route 878 and passengers for Rosslare Europort use Bus Éireann Route 40
- A late morning Sunday service from Gorey to Rosslare Europort connecting with the current train service arrival at Gorey
- A mid-afternoon Monday to Saturday service from Gorey to Rosslare Europort connecting with the current train service arrival at Gorey. Passengers for Rosslare Strand use Wexford Bus Route 878
- A mid-afternoon Sunday service from Gorey to Rosslare Europort connecting with the current train service arrival at Gorey
- A Monday to Friday evening peak service from Gorey to Rosslare Europort connecting with the current train service arrival at Gorey
- A Monday to Friday late evening peak service from Gorey to Wexford connecting with the current train service arrival at Gorey.
- A daily mid-evening service Gorey to Rosslare Europort connecting with the current train service arrival at Gorey

It is estimated that the gross annual cost of providing this service will be circa €325,000.

Table 2 Existing Bus services in the area

Operator	No	Service	Locations on Rail Line Served
BE	2/X2	WEXFORD – ENNISCORTHY – GOREY – DUBLIN - AIRPORT	Wexford, Enniscorthy, Gorey, Arklow, Dublin
BE	40	ROSSLARE EUROPORT – WEXFORD – WATERFORD – CORK - TRALEE	Rosslare Europort, Wexford
BE	370	ROSSLARE EURPORT – WEXFORD – NEW ROSS - WATERFORD	Rosslare Europort, Rosslare Strand, Wexford
Wexford Bus	740	WEXFORD – ENNISCORTHY – GOREY – DUBLIN - AIRPORT	Wexford, Enniscorthy, Gorey, Arklow, Dublin
Wexford Bus	878	WEXFORD – ROSSLARE STRAND	Rosslare Strand, Wexford

Figure 1 Potential replacement bus service Rosslare Europort to Gorey

	Rail	BE X2	Rail	Rail	WEX	WEX	BE 384	WEX	BE 2	BE 40	WEX	Rail	Bus 340	BE 2	Rail	WEX		BE 2	BE 2
	M-F	Daily	M-F	SAT	M-F	S	M-F	M-F	M-S	DAILY	DAILY	M-S	M-S	DAILY	Su	DAILY	Su	DAILY	DAILY
Rosslare Europort			05:35							07:00		07:20	06:45		09:40		09:05		
Rosslare Strand			05:40									07:24	07:00		09:44		09:20		
Wexford		05:50	05:59		06:15	06:15			07:00	07:25	07:30	07:43	07:20	08:00	10:03	10:30	09:40	10:00	13:00
Enniscorthy		06:10	06:23		06:40	06:40			07:20		07:55	08:04	07:45	08:20	10:24	10:55	10:05	10:20	13:20
Gorey arr			06:45									08:24	08:15		10:44		10:35		
Gorey dep	05:55	06:40	06:45	06:45		07:05	06:50	07:05	07:50		08:25	08:24		08:50	10:44	11:30		10:50	13:50
Arklow	06:08		07:00	07:00		07:20	07:15	07:20	08:10		08:40	08:37		09:10	10:57	11:45		11:10	14:10
Rathdrum	06:26		07:18	07:18								08:53			11:13				
Wicklow	06:38		07:33	07:33								09:04			11:24				
Dublin	07:46	08:06	08:46	08:47	08:40	08:40	08:55	08:40	09:25		09:55	10:15		10:25	12:30	12:55		12:25	15:25

	Bus 340	Rail	WEX	BE 40	BE 2	BE 370	Rail	Bus 340	BE 40	BE 40	WEX	WEX	Bus 340	Bus 340	Bus 340	Rail	Rail	BE 2	BE 40
	M-S	M-S	DAILY	DAILY	DAILY	M-S	Su	Su	DAILY	M-F & Su	DAILY	M-S	Su	M-F	S	Su	M-S	DAILY	DAILY
Rosslare Europort	12:20	12:55		13:00		13:45	14:20	13:50	14:40	17:00			17:10		17:30	17:40	17:55		19:00
Rosslare Strand	12:35	13:01				13:55	14:26	14:05				17:10	17:25			17:45	18:01		
Wexford	12:55	13:20	13:30	13:25	14:00	14:15	14:45	14:25	15:05	17:20	17:30	17:45	17:45	17:55	17:55	18:05	18:20	18:30	19:25
Enniscorthy	13:20	13:41	13:55		14:20		15:06	14:50			17:55		18:10	18:20	18:20	18:27	18:44	18:50	
Gorey arr	13:50	14:01					15:28	15:20					18:40	18:50	18:50	18:47	19:03		
Gorey dep		14:01	14:30		14:50		15:28				18:25					18:47	19:03	19:20	
Arklow		14:13	14:45		15:10		15:40				18:40					19:00	19:15	19:35	
Rathdrum		14:30					15:57									19:17	19:31		
Wicklow		14:41					16:08									19:28	19:42		
Dublin		15:45	15:55		16:25		17:10				19:50					20:35	20:44	20:45	

Figure 2 Potential replacement bus service Rosslare Europort to Gorey

	BE 370	Rail	Bus 340	BE 40	WEX	BE 2	Rail	Bus 340	WEX	BE 40	BE 2	WEX	Rail	Bus 340	WEX	Rail	Bus 340
	M-S	M-S	**M-S**	M-S	M-S	DAILY	Su	**Su**	DAILY	Su	M-S	M-S	M-S	**M-S**	M-S	Su	**Su**
Dublin		09:40				10:30	10:25		10:50		13:30	14:00	13:36			13:45	
Wicklow		10:40					11:26						14:41			14:46	
Rathdrum		10:53					11:38						14:54			14:58	
Arklow		11:08				11:45	11:54		12:05		14:45	15:05	15:10			15:14	
Gorey arr		11:21					12:06						15:22			15:27	
Gorey dep		11:21	**11:30**			12:05	12:06	**12:20**	12:20		15:05	15:20	15:22	**15:30**		15:27	**15:30**
Enniscorthy		11:42	**12:00**			12:35	12:25	**12:50**	12:45		15:35	15:45	15:41	**16:00**		15:46	**16:00**
Wexford	11:45	12:02	**12:25**	12:30	12:30	12:55	12:48	**13:15**	13:15	14:15	15:55	16:20	16:04	**16:25**	16:45	16:08	**16:25**
Rosslare Strand	12:05	12:19			12:58		13:04	**13:35**					16:21		17:10	16:25	**16:45**
Rosslare Europort	12:15	12:26		12:55			13:10	**13:45**		14:40			16:26	**16:50**		16:32	**16:55**

	BE 2	BE 2	WEX	Rail	Bus 340	BE X2	WEX	Rail	Bus 340	BE 40	WEX	Rail	BE 2	Rail	Bus 340	BE 2
	DAILY	DAILY	DAILY	M-F	**M-F**	DAILY	DAILY	M-F	**M-F**	M-S	M-S	Su	DAILY	M-S	**DAILY**	DAILY
Dublin	14:30	16:30	16:50	16:37		17:30	17:50	17:36			18:50	18:30	18:30	18:38		20:30
Wicklow				17:42				18:44				19:29		19:42		
Rathdrum				17:56				18:59				19:41		19:54		
Arklow	15:45	17:45	18:05	18:11			19:00	19:16			19:50	19:57	19:45	20:10		20:45
Gorey arr				18:24				19:45				20:10		20:23		
Gorey dep	16:05	18:10	18:20	18:24	**18:30**	18:55	19:15	19:45	**19:55**		20:05	20:10	20:10	20:23	**20:30**	21:05
Enniscorthy	16:35	18:40	18:45	18:44	**19:00**	19:25	19:40	20:06	**20:25**		20:35	20:29	20:40	20:42	**21:00**	21:35
Wexford	16:55	19:00	19:15	19:05	**19:25**	19:45	20:15	20:27	**20:50**	20:30	20:55	20:51	21:00	21:04	**21:25**	21:55
Rosslare Strand				19:19	**19:45**							21:08		21:21	**21:45**	
Rosslare Europort				19:25	**19:55**					20:50		21:15		21:28	**21:55**	

2.0 Bus Service implications relating to suspension of rail services Ennis - Athenry

The following is a high level consideration of the need to provide replacement bus services in the event of the suspension of rail services currently operating between Ennis and Athenry on the Galway-Limerick line.

2.1 Existing rail service provision

The Galway-Limerick line branches off the main Dublin/Galway line at Athenry with 5 other stations enroute to Limerick Colbert namely Craughwell, Ardrahan, Gort, Ennis and Sixmilebridge.

This scenario involves consideration of the removal of all rail services currently operating between Galway and Limerick/Limerick Junction – a number of short working services between Ennis and Limerick and Athenry and Galway would remain in place.

The core service comprises 5 trains per day from Limerick to Galway operating at irregular intervals of between 1hr 15mins and 5hours approximately while from Galway to Limerick there are 4 daily services at 3-4 hour intervals. Services run between the hours of 6am and 8pm approximately and stop at all stations between Galway and Limerick with the exception of the recently opened station at Oranmore which is served by one less train in the Limerick-Galway direction.

Two of the services (13.45 and 17.50) departing Galway run through to Limerick Junction – it is possible to connect with a services to Cork/Mallow at Limerick Junction however the interchange time for the 13.45 is 1hour and 34minutes resulting in a highly unrealistic and uncompetitive overall journey time. The similar is evident in the return direction although to a lesser extent. Both the 07.00 and the 12.20 departures from Cork serve Limerick Junction where connections to Galway are available with interchange waiting time of 42 and 24 minutes respectively.

In addition to the above there is an 18.40 Galway to Ennis service stopping at all intermediate stations. An onward connection to Limerick is possible however the excessive interchange time of 1hr and 17mins makes this unattractive.

2.2 Potential replacement bus services

There are a number of existing bus services operating in this region – both PSO and private commercial services. The main services are listed in Table 5.

Tables 3 & 4 below summarise the existing service offering (both bus and rail) from the settlements along the rail line in both directions.

Table 3 Summary of bus/rail service levels to southern destinations

From	**To Limerick / Shannon Airport / Dublin / Dublin Airport**		
	M-F	**Sa**	**Su**
Crusheen	14 of which 0 are trains	14 of which 0 are trains	14 of which 0 are trains
Gort	20 of which 5 are trains	19 of which 5 are trains	14 of which 4 are trains
Ardrahan	20 of which 5 are trains	19 of which 5 are trains	19 of which 4 are trains
Craughwell	26) of which 5 are trains	23 of which 5 are trains	19 of which 4 are trains

Table 4 Summary of bus/rail service levels to northern destinations

From	**To Galway / Dublin Airport / Dublin / Athlone**		
	M-F	**Sa**	**Su**
Crusheen	12 of which 0 are trains	12 of which 0 are trains	12 of which 0 are trains
Gort	18 of which 5 are trains	17 of which 5 are trains	16 of which 4 are trains
Ardrahan	18 of which 5 are trains	17 of which 5 are trains	16 of which 4 are trains
Craughwell	23 of which 5 are trains	23 of which 5 are trains	18 of which 4 are trains

The following points provide a high-level summary of the potential need for public transport replacement services in the event of the removal of rail

- Craughwell in particular is served by a significant volume of existing bus services, given its population[2], for travel to Limerick city (and connections with Shannon), Galway city and to Dublin.
- There is no current bus service linking Craughwell with the other settlements on the rail line (Gort, Ardrahan, Ennis). In the absence of rail these connections would be lost, however given the size of the settlements and the relationship between Craughwell and Galway demand is likely to be low. Data from IE (2012 O/D Passenger Matrix) showed only 317 passengers **annually** travelled between Craughwell and the other stations. Such low levels of demand are unlikely to warrant the development of a fixed replacement bus service.
- The removal of the rail would impact more on local public transport connections. The rail is currently the only direct service linking Ennis, Gort and Ardrahan with Athenry. It may be possible to amend existing bus services to facilitate connectivity between these locations in the absence of rail.

[2] 665 people within the settlement boundary (Census 2012) however also significant dispersed population in the surrounding rural area

- An hourly bus offering is available between Ennis and Galway, also serving Gort and Ardrahan but not Athenry. The first of these services departs Ennis at 10.25. Rail currently provides an earlier option for this journey with arrival in Athenry at 07.43 and Galway at 08.10. It is likely that a replacement bus service would be required to facilitate travel Ennis-Athenry/Galway serving the intermediate stations for pre 9am arrival in the absence of rail

Based on the above a potential bus replacement service is set out in Figures 3 and 4. The service has been designated as Route 351 in the tables which also show the rail services to be suspended, the remaining rail services and connections to and from Dublin. The proposed service will provide the following:

From Ennis

- A Monday to Saturday peak service extending to Galway for a comparable arrival time to the current train service with a connection to Dublin from Athenry
- A daily morning service to Athenry providing onward connections towards Dublin (daily) and Galway (Monday to Saturday)
- An early afternoon Sunday service to Athenry providing onward connections towards Dublin
- A mid-afternoon Monday to Saturday service to Athenry providing onward connections towards Galway
- A mid-afternoon Sunday service to Athenry providing onward connections towards Dublin
- A daily early evening service to Athenry providing an onward connection towards Galway
- A mid-evening Monday to Saturday service providing onward connections towards Galway and Athlone
- Departures from Ennis have been co-ordinated where possible with Bus Éireann Expressway Route 51 and operate at the opposite half hour over the common section of route (Gort and Ardrahan)

From Athenry

- A Monday to Saturday peak service extending to Limerick for a comparable arrival time to the current train service.
- A mid-morning Sunday service to Ennis
- A mid-morning Monday to Saturday service to Ennis offering a connection from Dublin at Athenry
- A mid-morning Sunday service to Ennis
- An early afternoon Monday to Saturday service to Ennis offering a connection from Dublin at Athenry
- A daily afternoon peak service to Ennis
- A Monday to Saturday early evening service to Ennis offering a connection from Dublin at Athenry
- Arrivals at Ennis have been co-ordinated where possible with Bus Éireann Expressway Route 51 and generally operate at the opposite half hour over the common section of route (Gort and Ardrahan)

Table 5 Existing Bus services in the area

Operator	No	Service	Locations on Rail Line Served
BE	51	CORK – LIMERICK – SHANNON AIRPORT – GALWAY	Ennis, Gort, Ardrahan
BE	343	LIMERICK – SHANNON AIRPORT -ENNIS	Ennis, Sixmilebridge
BE	434	GALWAY – GORT	Ardrahan, Gort
BE	20/X20	DUBLIN – AIRPORT – ATHLONE – BALLINASLOE – GALWAY	Craughwell
BE	70	GALWAY – ATHLONE – MULLINGAR – DUNDALK	Craughwell
Citylink	763	Galway - Athlone - Dublin - Dublin Airport	Craughwell
Healy Bus	920	Loughrea / Galway Daily Services	Craughwell

Figure 3 Potential replacement bus service Ennis to Athenry

	Rail	Rail	351	Rail	351	Rail	Rail	Rail	Rail	Rail	351	Rail	351
	M-S	M-S	M-S	Su	M-Su	Su	M-S	M-S	M-S	Su	Su	Su	M-S
Limerick	05:55			09:00			09:20			12:20			
Ennis (arr)	06:34			09:37			09:57			12:57			
Ennis (dep)	06:49		06:25	09:41	09:55		09:58			13:04	13:55		15:05
Gort	07:12		06:55	10:03	10:25		10:20			13:26	14:25		15:35
Ardrahan	07:22		07:05	10:12	10:35		10:30			13:35	14:35		15:45
Craughwell	07:31		07:20	10:21	10:50		10:39			13:43	14:50		16:00
Athenry (arr)	07:43		07:35	10:34	11:05		10:53			13:57	15:05		16:15
Athenry (dep)	07:43	07:47		10:34		11:18	10:53	11:25	11:26	13:57		15:22	
Galway	08:10		08:05	10:55			11:13		11:47	14:17			
Dublin		09:47				13:25		13:40				17:40	
Athlone													

	Rail	351	Rail	Rail	Rail	351	Rail	Rail	Rail	Rail	351	Rail	Rail
	M-S	Su	Su	Su	M-S	M-Su	Su	M-S	Su	M-S	M-S	Su	M-S
Limerick	14:20		15:55		18:00		18:15			19:45			
Ennis (arr)	14:57		16:35		18:37		18:57			20:23			
Ennis (dep)	14:58	16:05	16:35		19:05	19:05	18:57			20:25	20:55		
Gort	15:20	16:35	17:01		19:32	19:35	19:24			20:47	21:25		
Ardrahan	15:29	16:45	17:10		19:42	19:45	19:33			20:56	21:35		
Craughwell	15:37	17:00	17:18		19:51	20:00	19:41			21:04	21:50		
Athenry (arr)	15:53	17:15	17:32		19:57	20:15	19:51			21:15	22:05		
Athenry (dep)	15:53		17:32	17:38	20:04		19:55	20:29	20:58	21:18		22:27	22:31
Galway	16:12		17:52		20:25		20:15	20:50	21:18	21:40		22:46	
Dublin				19:50									
Athlone													23:10

Figure 4 Potential Replacement Bus Service Athenry to Ennis

	Rail	351	Rail	Rail	351	Rail	Rail	351	Rail	351	Rail	Rail	351	Rail	Rail	Rail	Rail	351	Rail	Rail	Rail	351	Rail	Rail
	M-S	**M-S**	Su	M-S	**Su**	Su	M-S	**M-S**	M-S	**Su**	Su	M-S	**M-S**	M-S	Su	Su	M-S	**M-Su**	M-S	Su	M-S	**M-S**	M-S	M-S
Dublin							07:35					11:25				14:35					16:30			
Galway	06:20	**05:50**	08:30	08:40					10:30		11:55			13:45	16:10		16:30		17:50	18:30			18:40	
Athenry (arr)				09:00			09:48					13:23				16:40	16:50				18:28			
Athenry (dep)	06:41	**06:20**	08:52		**09:20**			**10:20**	10:55	**11:35**			**13:35**	14:06	16:33			**17:20**	18:15	18:53		**18:35**	19:06	
Craughwell	06:50	**06:35**	09:00		**09:35**			**10:35**	11:03	**11:50**	12:23		**13:50**	14:14	16:41			**17:35**	18:23	19:01		**18:50**	19:14	
Ardrahan	06:59	**06:50**	09:09		**09:50**			**10:50**	11:11	**12:05**	12:32		**14:05**	14:23	16:50			**17:50**	18:31	19:10		**19:05**	19:22	
Gort	07:16	**07:00**	09:18		**10:00**			**11:00**	11:21	**12:15**	12:41		**14:15**	14:32	17:01			**18:00**	18:40	19:23		**19:15**	19:31	
Ennis (arr)	07:40	**07:35**	09:40		**10:35**			**11:35**	11:43	**12:50**	13:03		**14:50**	14:55	17:23			**18:35**	18:58	19:45		**19:50**	19:53	
Ennis (dep)	07:45	**07:40**	09:40			11:35			11:43		13:03			15:00	17:23				19:02	19:45				21:40
Limerick (arr)	08:25	**08:25**	10:20			12:14			12:22		13:42			15:39	18:03				19:43	20:23				22:19

3.0 Bus Service implications relating to suspension of rail services Limerick Junction - Waterford

The following is a high level consideration of the need to provide replacement bus services in the event of the suspension of rail services currently operating between Waterford and Limerick Junction.

3.1 Existing rail service provision

The Waterford-Limerick Junction route currently operates two services a day on Modays to Saturdays in each direction serving Carrick-On-Suir, Clonmel, Cahir and Tipperary before arriving in Limerick Junction. This is a reduction from 3 services a day each way in 2012. The rail journey time is approximately 1 hour and 40 minutes to Limerick Junction where it is possible to connect with services to Cork, Limerick and Dublin.

In terms of travel between Waterford and Limerick Junction, services operate one in the morning and one in the late afternoon each way. The removal in 2013 of the mid-day each way services resulted created a service gap of between 8 and 9 hours along the corridor.

Total journey times between Waterford and Limerick and Waterford and Cork vary significantly due largely to interchange delays at Limerick Junction.

There is no Sunday service.

3.2 Potential replacement bus services

There are a number of existing bus services operating in this region – both PSO and private commercial services. The main services are listed in Table 6.

The following points provide a high-level summary of the potential need for public transport replacement services in the event of the removal of rail:

- All locations on the rail line are well served by a significant volume of existing bus services, for travel to Limerick city, Waterford city and to Dublin
- In particular Bus Éireann Expressway Route 55 replicates the rail line and operates on a regular frequency[3]. As such the need for additional replacement services is minimal. Route 55 has recently been augmented by additional journeys being provided on Bus Éireann PSO Route 355 between Waterford and Clonmel via Carrick-on-Suir. Additional local journeys between Limerick and Tipperary are provided by Bus Éireann PSO Route 347
- Both Bus Éireann and JJ Kavanagh provide commercial services linking Clonmel to Dublin City and Airport

[3] 9/10 services a day each way Monday to Saturday

- Bus Éireann provides commercial services linking Cahir to Dublin City and Airport and to Cork

Based on the above there is limited potential or need for additional bus replacement services, but there is scope to make some minor additions to improve the network of public transport services in the area as a whole. The details are set out in Figures 5 and 6 and incorporate additional departures on Route 355. The tables also show the rail services to be suspended, the remaining rail services and connections to and from Dublin, Cork and Limerick. The proposed service will provide the following:

From Waterford

- An early morning Monday to Friday connecting service by commencing the current Tipperary to Limerick PSO service 347 at Waterford and operating via Carrick-on-Suir, Clonmel and Cahir. This service will provide connections at Limerick Junction for onward rail travel to Dublin and Cork
- A Monday to Saturday rail replacement service (Route 355) at similar times to the current rail service, maintaining connections at Limerick Junction for onward rail travel to Dublin and Cork and extending to Limerick City
- Extension of the current 1340 Route 355 departure from Waterford to Clonmel to continue to Limerick via Cahir, Tipperary and Limerick Junction
- Extension of the current 1610 Route 355 departure from Waterford to Clonmel to continue to Limerick via Cahir, Tipperary and Limerick Junction providing connections at Limerick Junction for onward rail travel to Dublin and Cork.
-

From Limerick City/Junction

- Introduction of an early afternoon service (Route 355) operating at 1325 from Limerick to Waterford providing connections at Limerick Junction with rail services from Cork and Dublin. It should be noted that Bus Éireann Expressway Route 55 operates at 1225 and 1425 from Limerick.
- A Monday to Saturday rail replacement service at 1805 from Limerick to Waterford providing connections at Limerick Junction with rail services from Cork and Dublin
- It should also be noted that as Bus Éireann operates Expressway Route 55 at 0925 from Limerick to Waterford, which provides connections at Limerick Junction with rail services from Cork and Dublin. As such there is no requirement for any additional service at this time

Table 6 Existing Bus services in the area

Operator	Route No	Service	Locations on Rail Line Served
BE	55	LIMERICK – TIPPERARY – CAHIR - CLONMEL – CARRICK - WATERFORD	Limerick Junction, Tipperary, Cahir, Clonmel, Carrick-on-Suir
BE	347	LIMERICK – LIMERICK JUNCTION - TIPPERARY	Limerick Junction, Tipperary
BE	355	WATERFORD – CARRICK-ON-SUIR – CLONMEL - CAHIR	Carrick-on-Suir, Clonmel, Cahir
BE	7	AIRPORT – DUBLIN – KILKENNY – CLONMEL	Clonmel
BE	X8	AIRPORT – DUBLIN – CASHEL – CAHIR - CORK	Cahir
JJ Kavanagh	717	AIRPORT – DUBLIN – KILKENNY – CLONMEL	Clonmel

Figure 5 Potential replacement bus service Waterford to Limerick

	M-F	M-S	M-S	M-S	M-S	M-S	M-S	M-S	M-S	M-S	M-S	M-S
	BE 347	Rail	Rail	355	Rail	Rail	Rail	355	355	Rail	Rail	Rail
Waterford	05:40			07:10	07:20			13:40	16:10	16:25		
Carrick-on-Suir	06:10			07:40	07:45			14:10	16:40	16:50		
Clonmel arr	06:35							14:35	17:05			
Clonmel dep	06:45			08:05	08:08			15:05	17:05	17:13		
Cahir	07:05			08:25	08:25			15:25	17:25	17:30		
Tipperary	07:35			08:55	08:47			15:55	17:55	17:51		
Limerick Junction	07:40			09:00	09:00			16:00	18:00	18:05		
		07:56	08:34			09:15	09:33				18:17	18:26
Limerick Colbert	08:35			09:35				16:40	18:40			
Dublin Heuston		09:30				10:47					20:00	
Cork			09:35				10:35					19:30

Figure 6 Potential replacement bus service Limerick to Waterford

	M-S	M-S	M-S	M-S	M-S	M-S	M-S	M-S	M-S	M-S	M-S	M-S	M-S
	355	355	Rail	Rail	Rail	BE 55	Rail	Rail	355	Rail	Rail	Rail	355
Cork			08:00				12:20			17:20			
Dublin Heuston				08:00				12:00			17:00		
Limerick Colbert						09:25			13:25				18:05
Limerick Junction			09:15	09:33	09:45	09:55	13:16	13:34	13:55	18:16	18:26	18:40	18:35
Tipperary					09:57	10:00			14:00			18:52	18:40
Cahir	07:10	08:30			10:20	10:30			14:30			19:15	19:10
Clonmel arr									14:50				
Clonmel	07:30	08:50			10:37	10:50			14:50			19:32	19:30
Carrick-on-Suir	07:50	09:10			11:01	11:10			15:10			19:56	19:50
Waterford	08:30	09:50			11:26	11:50			15:50			20:20	20:30

4.0 Bus Service implications relating to suspension of rail services Limerick - Ballybrophy

The following is a high level consideration of the need to provide replacement bus services in the event of the suspension of rail services currently operating on the Limerick-Ballybrophy line.

4.1Existing rail service provision

The Nenagh line branches from the Dublin/Cork mainline at Ballybrophy serving Roscrea, Cloughjordan, Nenagh, Birdhill, Castleconnell and then on to Limerick Colbert.

All stations on the line are served twice daily (Monday to Saturday) with services operating each way between Ballybrophy and Limerick Colbert with onwards connections to Dublin at Ballybrophy. In addition to this there is an early morning services operating from Nenagh (serving Birdhill and Castleconnell) to Limerick for arrival at 08.45.

On Sundays there is only one service in each direction – again, the northbound train connects to a mainline train for onward travel to Dublin.

The current service offering provides for local travel between the settlements on the rail line and facilitates connections for longer distance inter-urban and inter-regional travel demand between the north Tipperary area and other areas including Galway, Dublin, Shannon etc. albeit at a very limited frequency.

4.2 Potential replacement bus services

There are a number of existing bus services operating in this region – both PSO and private commercial services. The main services are listed in Table 9. Tables 7 & 9 below summarise the existing service offering (both bus and rail) from the settlements along the rail line in both directions.

Table 7 Summary of bus/rail service levels to southern destinations

From	To Limerick / Shannon Airport / Galway		
	M-F	**Sat**	**Sun**
Castleconnell	7 of which 3 are trains	4 of which 2 are trains	1 of which 1 is train
Birdhill	18 of which 3 are trains	17 of which 2 are trains	14 of which 1 is train
Nenagh	25 of which 3 are trains	24 of which 2 are trains	24 of which 1 is train
Cloughjordan	2 of which 2 are trains	2 of which 2 are trains	1 of which 1 is train
Roscrea	18 of which 3 are trains	18 of which 2 are trains	18 of which 1 is train

Table 8 Summary of bus/rail service levels to northern destinations

From	To Dublin / Dublin Airport / Carlow / Athlone / Birr		
	M-F	**Sat**	**Sun**
Castleconnell	3 of which 2 are trains	2 of which 2 are trains	1 of which 1 is trains
Birdhill	15 of which 2 are trains	15 of which 2 are trains	15 of which 1 is trains
Nenagh	23 (1 Bus Mo-Th) of which 2 are trains	22 of which 2 are trains	21 of which 1 is trains
Cloughjordan	2 of which 2 are trains	2 of which 2 are trains	1 of which 1 is trains
Roscrea	19 (1 Bus FO) of which 2 are trains	18 of which 2 are trains	18 of which 1 is trains

The following points provide a high-level summary of the potential need for public transport replacement services in the event of the removal of rail:

- The current level of service provided by rail is low and there are a number of existing bus services that provide a similar function to the rail line
- Nenagh, Roscrea and Birdhill in particular have significant levels of bus service provision for travel to/from Limerick and Dublin (and intermediate locations i.e. Portlaoise). Existing service levels are good given the levels of population[4] in these areas and in comparison to provision in other areas of the country.
  - Roscrea has a service at least every 2 hours into Limerick by bus, from Nenagh there are approximately 2 buses per hour into Limerick with additional services in the peaks
  - In the direction of Dublin 2-3 bus services per hour are in operation from Nenagh and 1-2 from Roscrea
  - Birdhill also has a good level of bus service with a 2 hourly service towards Dublin. Into Limerick the offering is more irregular with hourly or 2 hourly services and a number of additional peak time services
- For some of the existing rail services there are also bus services currently in operation at similar times for travel to Limerick and Dublin

[4] Nenagh is the largest settlement on this rail line, population circa 8,400 (Census 2011)

- There are 2 areas in particular where the removal of the rail service would have an impact on the ability to access public transport and where replacement bus services are likely to be required
  - The existing rail service is the sole public transport option available at Cloughjordan (pop 511, Census 2011). A replacement bus service linking Cloughjordan to the larger service centres of Nenagh, Roscrea and Limerick as well as to the wider transport network for regional connections would be required (to operate 7 days a week)
  - The removal of the existing rail service would reduce the public transport service frequency at Castleconnell (pop 1917, Census 2011) for travel into Limerick (and access to any to onward connections) but there are peak time bus connections available and no rail replacement bus service is, therefore, proposed. There are no such suitably timed bus services for travel to northern destinations including Dublin. This shortfall should be addressed with replacement services.

Based on the above there is limited need for additional bus replacement services other than the requirement to serve Cloughjordan which will have no public transport service and also to provide northbound links from Castleconnell. There is scope to provide a replacement service that operates along the entire length of the rail corridor that would serve the needs of Cloughjordan and Castleconnell and additionally continue to provide connections currently available by rail. The details are set out in Figures 7 and 8. The tables also show the rail services to be suspended, the rail connections to and from Dublin and relevant bus options along the rail line. The proposed service would provide the following:

From Ballybrophy

- A mid-morning Monday to Saturday rail replacement service that will connect with the 0958 train arrival from Dublin, provide onward connections to all current destinations on the rail line, maintain a service for Cloughjordan and also continue to provide an off peak morning service from Castleconnell into Limerick
- An additional mid-afternoon Monday to Saturday service that will connect with the 1458 train arrival from Dublin, provide onward connections to all current destinations on the rail line, provide an additional service for Cloughjordan and also continue to provide an afternoon service from Castleconnell into Limerick
- An evening daily rail replacement service that will connect with the 1854 (1933 on Sundays) train arrival from Dublin, provide onward connections to all current destinations on the rail line, maintain a service for Cloughjordan and also continue to provide an evening service from Castleconnell into Limerick

From Limerick

- An early morning Monday to Saturday rail replacement service that will connect with the 0845 train departure to Dublin and maintain a service for Cloughjordan
- An additional mid-morning Monday to Saturday service that will connect with the 1255 train departure for Dublin
- An afternoon peak Monday to Saturday rail replacement service that will connect with the 1855 (1927 on Sundays) train departure to Dublin and maintain a service for Cloughjordan

Table 9 Existing Bus services in the area

Operator	No	Service	Locations on Rail Line Served
BE	X12	AIRPORT – DUBLIN – PORTLAOISE – ROSCREA - NENAGH – LIMERICK	Roscrea, Nenagh, Limerick
JJ Kavanagh	735	AIRPORT - DUBLIN – PORTLAOISE – ROSCREA – NENAGH – LIMERICK – SHANNON	Roscrea, Nenagh, Birdhill, Limerick
BE	323	LIMERICK–KILLALOE–NEWPORT–NENAGH–BORRISOKANE–BIRR	Limerick, Castleconnell, Birdhill, Nenagh
BE	341	SHANNON–LIMERICK–NEWPORT–CAPPAMORE	Castleconnell, Limerick
BE	72	TRALEE – LIMERICK – BIRR – ATHLONE	Limerick, Birdhill, Nenagh

Figure 7 Potential replacement bus service Ballybrophy to Limerick

	BE 323 M-S	JJK 735 M-S	BE 323 M-F	Rail M-F	Rail M-S	Rail M-S	Bus M-S	Rail M-S	Bus M-S	Rail M-S	Rail M-S	Bus M-S	Rail Su	Rail Su
Dublin					09:00			14:00		18:00			18:25	
Ballybrophy (arr)					09:58			14:58		18:54			19:33	
Ballybrophy (dep)						10:05	**10:05**		**15:05**		19:00	**19:00**		19:4
Roscrea						10:25	**10:25**		**15:25**		19:21	**19:20**		20:0
Cloughjordan						10:46	**10:55**		**15:55**		19:43	**19:50**		20:2
Nenagh		07:30	07:45	07:45		11:05	**11:20**		**16:20**		20:02	**20:15**		20:4
Birdhill	07:25	07:50	08:00	08:13		11:33	**11:35**		**16:35**		20:29	**20:30**		21:0
Castleconnell	07:40			08:22		11:43	**11:50**		**16:50**		20:38	**20:45**		21:1
Limerick	08:10	08:30	08:35	08:45		12:04	**12:15**		**17:15**		21:00	**21:10**		21:3

Figure 8 Potential replacement bus service Limerick to Ballybrophy

	Bus M-S	Rail M-S	Rail M-S	Bus M-S	Rail M-S	Bus M-S	Rail M-S	Rail M-S	Bus Su	Rail Su	Rail Su
Limerick	**06:25**	06:30		**10:25**		**16:35**	16:55		**17:05**	17:25	
Castleconnell	**06:50**	06:53		**10:50**		**17:00**	17:15		**17:30**	17:46	
Birdhill	**07:05**	07:03		**11:05**		**17:15**	17:24		**17:45**	17:55	
Nenagh	**07:20**	07:39		**11:20**		**17:30**	17:50		**18:00**	18:22	
Cloughjordan	**07:45**	07:57		**11:45**		**17:55**	18:08		**18:25**	18:40	
Roscrea	**08:15**	08:17		**12:15**		**18:25**	18:28		**18:55**	19:01	
Ballybrophy (arr)	**08:35**	08:41		**12:35**		**18:45**	18:51		**19:15**	19:24	
Ballybrophy (dep)			08:45		12:55			18:55			19:27
Dublin			09:55		14:00			20:00			20:42

Appendix 9

August 2016

Financial Reconciliation to the
Five Year Plan
(redacted due to presence of
commercial data of Iarnród Éireann)

Údarás
Náisiúnta Iompair
National Transport Authority

Iarnród Éireann
Irish Rail

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Rail Review 2016

REPORT