The Atlantic Railway Corridor

THE GALWAY–MAYO RAIL LINK

AN APPRAISAL

DR JOHN BRADLEY

WEST=ON=TRACK

CONNECTING THE WEST

Cover images, clockwise from Top Left:
Passengers boarding Galway Train at Limerick (N. Dinnen)
InterCity Railcar at Athenry (N. Enright)
Passengers alighting at Oranmore WRC Station (N. Dinnen)
IWT freightliner crosses Moy bridge en route to Dublin (N. Enright)
Passengers alighting at Oranmore WRC Station (N. Dinnen)

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TABLE OF CONTENTS

TIOMNÚ

Tiomnaítear an tuairisc seo ar athchóiriú Bhealach Iarnróid an Iarthair agus Chonair Iarnróid an Atlantaigh i gcoitinne, don Dr. Micheál Mac Gréil, SJ, ar ócáid a nóchadú breithlá. Le blianta fada tá dua agus dúthracht caite aige chun forbairt eacnamaíoch agus shóisialta Iarthar na hÉireann a chur chun cinn.

Ba údar misnigh riamh é do ghlúnta de ghníomhaithe pobail ar fud Éireann a theachtaireacht go bhféadfaí forbairt fhuinniúil, inbhuanaithe agus mhorálta a bhaint amach in ár gceantair tuaithe uilig.

Fear sármhisniúil agus sárfhuinniúil é an Dr. Mac Gréil. Anuas ar a chuid dualgaisí tréadacha is liosta le háireamh iad na tionscnaíochta pobail atá curtha chun cinn aige, idir chur chun cinn an iarnróid trasghathaigh idir Luimneach agus Sligeach, a staidéar ar thionscnaíochta turasóireachta i gCathair na Mart agus athbhunú oilithreacht agus scrín stairiúil Mhám Éan. Tugtar ómós don Ath. Mac Gréil mar fhear misniúil agus físiúil. Ní mór dúinn an fhís sin a fhíorú.

OVERVIEW OF KEY FINANCIAL AND ECONOMIC INDICATORS FOR PHASES 2 AND 3 RESTORATION OF THE WESTERN RAIL CORRIDOR

Capital Costs (undiscounted, ex. VAT)) **€153.8m** (excluding SPPF[1]) **€199.9m** (including SPPF)	**Total Passengers** **575k p.a.** (2030) Including 23k Tourist Journeys p.a.
Operating Costs **€3.3m p.a.** (2030)	**Ticket Revenue** **€2.6m p.a.** (2030) Including 23k Tourist Journeys p.a.
Net Present Value (NPV) **€46.1m** (excluding SPPF) **€7.6m** (including SPPF)	**Passenger Time Savings** **139k hrs p.a.** (2030)
Benefit to Cost Ratio (BCR) **1.26** (excluding SPPF) **1.04** (including SPPF)	**Passenger Travel Cost & Other Savings** **€7.7m p.a.** (2030)
Additional Funding Needed **€0.7m p.a.** (2030)	**Reduced Road Transport** **5.5m km p.a.** (2030, passengers) **2.8m km p.a.** (2030, HGVs)
Air Quality and Greenhouse Gas Benefits **–€0.1m p.a.** (2030, Legacy Rolling Stock)[2] **€0m p.a.** (2030, New Rolling Stock) **+€0.2m p.a.** (2030, Electrification)	**Road Safety & Physical Activity Benefits** **€0.3m p.a.** (2030)

KEY FINDINGS

A COST BENEFIT ANALYSIS OF REACTIVATING PHASES 2 & 3 OF THE WESTERN RAIL CORRIDOR (WRC) YIELDS A POSITIVE NET PRESENT VALUE (NPV) AND BENEFIT-TO-COST RATIO OF >1.0. WHEN ADDITIONAL NON-MONETISED BENEFITS OF A PROJECT APPRAISAL ARE CONSIDERED, A STRONG BUSINESS CASE EXISTS TO CARRY OUT THE PROJECT.

1 Shadow Price of Public Funds

2 Value Used in CBA

INTERCITY RAILCAR AT ATHENRY (N. ENRIGHT)

Executive Summary

EXECUTIVE SUMMARY

The purpose of this report is to address two main issues. The first arises out of the conclusions of the EY Report published in January, 2021, entitled *Western Rail Corridor: Financial and Economic Appraisal*. The second arises out of the need to correct the deficiencies and errors of that report by carrying out an alternative appraisal of the restoration of the rail link between Athenry and Claremorris.

The Galway-Mayo rail link forms an integral part of the Western Rail Corridor, which is the name given to the rail line that originally ran from Limerick in the south, via Galway and northwards to Sligo. It is a key element of what might be better described as the Atlantic Railway Corridor (or ARC), a rail link that starts at Rosslare Europort, connects to the ports of Waterford and Cork, and continues northwards to Limerick city and the port of Foynes. In the present report the main focus is on the restoration of an element of that wider ARC, namely the part of the WRC linking Athenry (on the Dublin-Galway east-west InterCity line) to Claremorris (on the Dublin-Westport/Ballina east-west line). However, the implications for the entire ARC need to be kept in mind since the full network benefits will only be achieved when the entire ARC is restored and in operation.

THE STRUCTURE OF THE REPORT

This report consists of eight sections. After a general introduction in **Section 1**, **Section 2** sets out as background information an historical account of the origins and subsequent history of the Western Rail Corridor. The underutilisation of the rail link that eventually led to its closure came about as a result of a systemic social and economic decline in the west rather than as a consequence of any specific or intrinsic failing of the line itself. A better understanding of these historical factors will assist in the re-evaluation of the future role for the rail link as part of the economy of the Northern and Western region of the country in the 21st century, and as a driver of growth and transformation.

In **Section 3** we describe the process that led to the restoration of the rail link between Limerick city and Galway city. At the initiative of government, the McCann Report of 2005 had provided a detailed costing of the restoration of the complete WRC, extending all the way from Limerick to Sligo.[1] In the event, only Phase 1 was restored, the detailed costs of which were set out in a report prepared for Iarnród Éireann by Faber Maunsell.[2] A description of the restoration process is provided, together with a review of the subsequent operational performance of the line which restored the direct inter-city rail link between Limerick city and Galway city.

An important motivation for Phase 1 of the WRC restoration had been that it provided a direct inter-city link between Ireland's third and fourth largest cities. However, the rationale for restoring Phases 2 and 3 of the WRC is different from the rationale for restoring Phase 1. **Section 4** sets out such a rationale, based on the need to link the relatively small towns of the north-west region more effectively to each other, thus creating agglomeration effects that cannot be achieved based on any single large metropolitan region or the linking of large metropolitan regions. This is the first of three crucial elements that serve to determine the viability of the Phase 2 and 3 WRC restoration and the cost/benefit side of the financial appraisal.

1 https://web.archive.org/web/20060922090156/http://www.transport.ie/upload/general/6645-0.pdf

2 "Study Report and Cost Estimate on Reinstatement of the Western Rail Corridor", Report prepared by FaberMaunsell for Iarnród Éireann, Dublin, January 1st, 2005.

Section 5 examines the construction and operating costs of restoring and operating Phases 2 and 3 of the WRC. This is the second of three crucial elements that serve to determine the eventual cost/benefit side of the financial appraisal. The cost estimates of restoring the line from Athenry to Claremorris provided in the present report turned out to be significantly lower than the costs estimated in the EY Report. The EY estimated capital costs per kilometre of rail line came out at about 60% higher than the estimated capital costs in this report.

Section 6 and Section 7 focus on estimating the likely revenue that could be generated when Phases 2 and 3 of the restored WRC, in conjunction with the existing Phase 1, are operating. This is the third of three crucial elements that serve to determine the eventual cost/benefit side of the financial appraisal. Section 6 deals with projecting revenue from passenger fares and includes other monetised benefits of the restoration. Section 7 relates to revenue from the carriage of freight.

Section 8 brings together the costs and benefits estimates and arrives at a benefit/cost ratio (BCR) for the Phase 2 and 3 restoration. A comparison is made between the results of the present cost-benefit analysis and the analysis presented in the EY report. The areas where the greatest differences arise are identified.

SUMMARY OF THE COST BENEFIT ANALYSIS RESULTS

The present report provides a cost benefit analysis (CBA) of reopening Phases 2 and 3 of the Western Rail Corridor (WRC). The CBA was performed in accordance with the Common Appraisal Framework (CAF), which provides standard methods and procedures for making a transport business case for submission to the government in compliance with the Public Spending Code.[3]

Reopening Phases 2 and 3 of the WRC would provide a link between Westport, Castlebar, Ballina, Claremorris, and Tuam to Athenry, Galway, Gort, Ennis, and Limerick, with onward connections to the South and East. This would also reopen a direct route for rail freight traffic from Mayo to Waterford Port, which has an existing rail connection, and also to Foynes Port when reopened.

The project parameters on which this CBA is based are described in the relevant sections of the Report, but the project generally envisions frequent services travelling from Westport/ Ballina via Claremorris onwards to Galway, with intermediate stops at Tuam, a new 'N63 Park and Ride' station (Abbeyknockmoy), Athenry, and Oranmore.

It is also anticipated that prior to project operation, an upgrade of the Athenry-Galway line will occur in the form of either double-tracking, or alternatively, a passing loop at Oranmore (as an interim measure) along with installation of an automatic level crossing at the last unprotected crossing on this segment (XG159 east of Oranmore). These measures will allow for an increased speed limit, and together with the provision of rolling stock capable of travelling at the higher limit, will reduce the Athenry-Galway journey times to what is shown below.

3 Available at gov.ie - Common Appraisal Framework (www.gov.ie)

Anticipated journey times along the reopened section are summarised as follows:

Executive Summary: Table 1 Claremorris-Galway Origin/Destination Timings

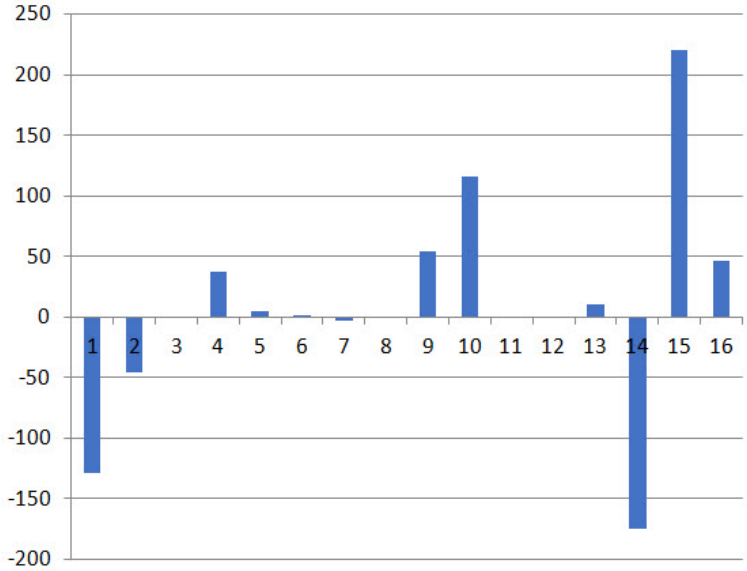
	ORIGIN/DESTINATION	MINUTES
1	Claremorris to Tuam	19
2	Stop at Tuam	1
3	Tuam to N63 Park & Ride	7
4	Stop at N63 Park & Ride	1
5	N63 Park & Ride to Athenry	10
6	Stop at Athenry	1
7	Athenry to Oranmore	10
8	Stop at Oranmore	1
9	Oranmore to Galway	8
10	Total Time Claremorris to Galway	58

The results of the CBA are presented below, both excluding and including the shadow price of public funds (SPFF).

Executive Summary: Table 2 Summary of Cost Benefit Analysis

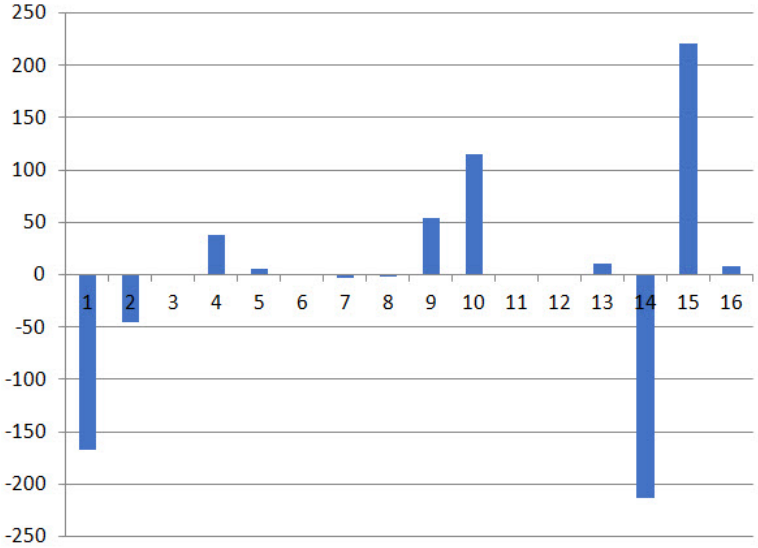
MAIN ITEMS DISCOUNTED VALUES	INCL SPPF	EX SPPF
Capex (Total)	-166.9	-128.4
Opex (Total)	-46.0	-46.0
Opportunity cost	0.0	0
Revenue	37.6	37.6
Total safety benefit	5.0	5.0
Total Physical Activity benefit	0.5	0.5
Local Air Quality benefits	-2.7	-2.7
Greenhouse Gas benefits	-0.1	-0.1
Total time savings benefit	54.3	54.3
Total other cost-saving benefits	115.5	115.5
Total Exchequer taxation benefits	0.0	0.0
Total noise benefits	0.0	0.0
Residual value	10.4	10.4
Total discounted costs	-212.9	-174.4
Total discounted benefits	220.6	220.6
Net present value	7.6	46.1
Benefit/cost ratio	1.04	1.26

Executive Summary: Figure 1 Summary of Cost Benefit Analysis excluding shadow price of public funding



1	Capex (Total)
2	Opex (Total)
3	Opportunity cost
4	Revenue
5	Total safety benefit
6	Total Physical Activity Benefit
7	Local Air Qualitybenefits
8	Greenhouse Gas benefits
9	Total time savings benefit
10	Total other cost-saving benefits
11	Total Exchequer taxation benefits
12	Total noise benefits
13	Residual value
14	Total discounted costs
15	Total discounted benefits
16	Net present value

Executive Summary: Figure 2 Summary of Cost Benefit Analysis including shadow price of public funding



1	Capex (Total)
2	Opex (Total)
3	Opportunity cost
4	Revenue
5	Total safety benefit
6	Total Physical Activity Benefit
7	Local Air Qualitybenefits
8	Greenhouse Gas benefits
9	Total time savings benefit
10	Total other cost-saving benefits
11	Total Exchequer taxation benefits
12	Total noise benefits
13	Residual value
14	Total discounted costs
15	Total discounted benefits
16	Net present value

COMPARISON TO EY CBA

This CBA is being prepared subsequent to a prior CBA entitled, *Western Rail Corridor, Financial and Economic Appraisal*, prepared jointly by EY and Mott McDonald and dated June 2020 (henceforth, the EY Report).[4] While this report is not intended to be a technical critique of the EY report, but rather a fresh appraisal, the CBA strives to adhere to the format and assumptions of the EY report to the degree possible. These assumptions include the use of 2019 as the present year (Year 0), an initial operating year of 2026, a 31-year appraisal period after operation begins (2026-2056), a 4.0% social discounting rate, and inclusion of the shadow price of public funding at 130%.

The EY Report was reviewed and found to contain an unusually high level of typographical errors and data corruption errors in key tables. Additionally, several key inputs to the CBA contained in the EY Report were not supported by substantial evidence. Finally, it is considered that the EY Report exhibited a want of detail regarding the methods, data, and calculations relied upon, rendering its results impossible to replicate or review for accuracy.

Because the conclusions of this revised CBA diverge significantly from those of the EY Report, a comparison of each contribution to the NPV was made and is presented in Table 3. Line-items are based on Table 75 of the EY Report for the 'central scenario' of a direct Claremorris-Galway service.

*Executive Summary: Table 3 Comparison of Cost Benefit Analyses – Contribution to Net Present Value (NPV)**

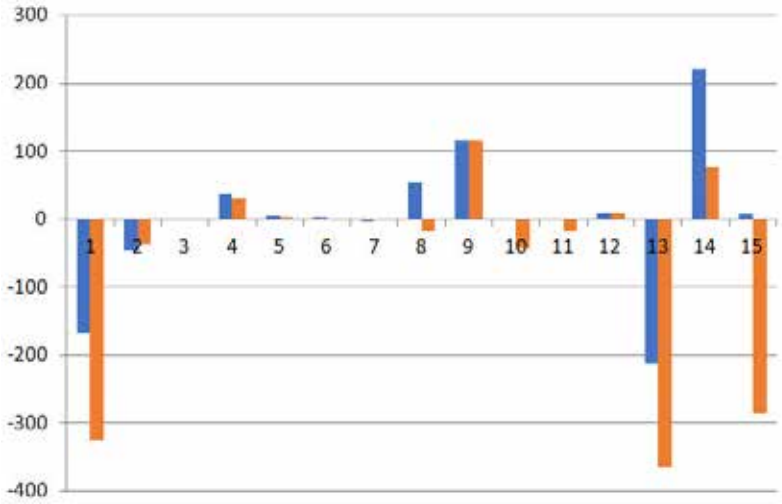
MAIN ITEMS DISCOUNTED VALUES	WOT	EY
Capex (Total)	-166.9	-325.2
Opex (Total)	-46.0	-37.4
Opportunity cost	0.0	-0.6
Revenue	37.6	30.3
Total safety benefit	5.0	0.8
Total Physical Activity Benefit	0.5	0
Total emissions benefits	-2.9	-0.3
Total time savings benefit	54.3	-18.4
Total other cost-saving benefits	115.5	115.5
Total Exchequer taxation benefits	0.0	-42.4
Total noise benefits	0.0	-18.6
Residual value	10.4	10.4
Total discounted costs	-212.9	-363.2
Total discounted benefits	220.5	77.3
Net present value	7.6	-285.9
Benefit/cost ratio	1.04	0.21

**Values may not total precisely due to rounding.*

4 Available at: gov.ie - Review of Western Rail Corridor Phases 2 and 3 (Athenry to Claremorris) (www.gov.ie)

Executive Summary: Figure 3. Comparison of Cost Benefit Analyses – Contribution to Net Present Value (NPV)

Orange for EY, blue for this CBA.



1	Capex (Total)
2	Opex (Total)
3	Opportunity cost
4	Revenue
5	Total safety benefit
6	Total Physical Activity Benefit
7	Total emissions benefits
8	Total time savings benefit
9	Total other cost-saving benefits
10	Total Exchequer taxation benefits
11	Total noise benefits
12	Residual value
13	Total discounted costs
14	Total discounted benefits
15	Net present value

Figure 3 above shows that the largest difference between the EY CBA and this CBA is the estimation of capital costs required to build the project: (Orange represents EY CBA). These are discussed in detail in Sections 5.4 and 5.5 of this report.

The second largest difference relates to the time savings benefits of reopening the line. The EY Report assumes that the overall effect of adding a new transport mode will be increased overall transit times. This item is addressed in detail in Section 6.8 of this report. This section shows that reopening Phases 2 and 3 of the WRC provides faster transit times compared to existing bus services, and in many cases, car travel, especially during peak travel times (rush hour). It is noted that the project does not anticipate the closure or reduction in frequency of any bus service. The impact on their CBA outcome of EY choosing the year 2012 (the lowest point of the global recession) as the base year for journey frequency projections is also likely to produce depressed rail passenger demand because the 2012 travel patterns used were seriously reduced by the global and national economic recession with its accompanying high unemployment levels.

The third largest difference relates to exchequer taxation benefits. Regarding this item, the EY Report contains a three-paragraph analysis estimating losses in road tax (from 18 lorries) and fuel duties being paid of €3.0m per annum. Section 6.10 of this report addresses this issue and indicates that these exchequer losses are not supported by substantial evidence.

The fourth largest difference relates to a noise dis-benefit presented in the EY Report. This item is addressed in Section 6.3 of this report. Regarding noise, it appears that the EY Report did not consider a minimum noise threshold below which no noise dis-benefit should be quantified according to the CAF. The number of noise receptors for which impacts were calculated does not agree with Ireland's submission to the European Environmental Agency as required by the Environmental Noise Directive. Additionally, the EY Report appears to have disregarded the noise benefits accrued by the removal of lorries from local roadways resulting from a shift to rail freight.

The remainder of the CBA inputs do not differ significantly and may be attributed to minor differences in assumptions and input values.

Finally, Section 8 of this report provides a Project Appraisal Balance Sheet (PABS) summarising the monetised and non-monetised benefits of the project. The PABS shows that the project scores 36 out of a possible 42 points, indicating that a strong business case exists to undertake the project. In the case of the government's Sustainable Mobility Strategy the restoration of the rail line assists linking people and places in a sustainable way by supporting comfortable and affordable journeys to and from work, home, school, college, shops and leisure; travelling by cleaner and greener transport; and a shift away from the private car to greater use of active travel (walking and cycling) and public transport (e.g. bus, rail, tram).

POLICY IMPLICATIONS

The present CBA exercise was called into being by the extremely negative and damning conclusions and policy recommendations reached in the EY Report. Examination of the EY methodology and assumptions strongly suggested that the EY policy conclusions were flawed and the basis upon which their conclusions rested needed to be challenged.

The costs derived in this Report were rigorously researched and were prepared with the advice and guidance of railway experts in Ireland and the UK. In addition, the construction of the Phase 1 restoration linking Limerick/Ennis to Athenry/Galway provided an accurate indicator of the likely costs of the Phase 2 and 3 restoration, when the Phase 1 costs were adjusted for inflation. The fact that this difference in capital cost estimates is by far the most significant driver of the differences in the base case BCR of 1.04 in the present report, and the value of 0.21 in the EY Report, is particularly striking.

The Capital Costs represented in this report are realistic and achievable if the template used in constructing Phase 1 is replicated i.e., using an in-house Iarnród Éireann team, familiar with the alignment and any challenges it may present. This proven model is likely to be the most effective and economical way of delivering this project and ensuring the best value for money for the state.

The present Report demonstrated that there were significant monetised benefits to the WRC restoration that were either understated or ignored in the EY analysis. In addition, there were potential dis-benefits that were greatly overstated.

The assertion by EY that the restoration of the WRC would impose a high cost on the exchequer due to the lower revenue from road tax and fuel excise tax was also shown to be flawed. Indeed, if the WRC restoration were to be analysed in a wider social and economic context, its overall impact on exchequer revenue is likely to be positive rather than negative.

The conclusion to be reached from the present CBA exercise is that it demonstrates that there is a very good business case in support of the restoration of the WRC link between Athenry and Claremorris, and almost certainly for the eventual restoration of the link from Claremorris to Collooney/Sligo. The restoration of Phases 2 and 3 yields a positive net present value (NPV) for the base case and a benefit/cost ratio (BCR) greater than unity. When additional non-monetised benefits of the project are considered, an even stronger business case exists to justify the immediate implementation of this major high quality and potentially transformational infrastructure project. The analysis justifying this conclusion is fully transparent and all supporting data, calculations, evidence and assumptions upon which it is based are visible to decision makers.

It is further strongly recommended that the decision of Government in 2005, deferred in 2011, to reconstruct the railway from Galway to Mayo and to conduct a further review of the reconstruction of the railway between Claremorris on Dublin-Westport/Ballina radial route and Collooney on the Dublin-Sligo radial route be immediately renewed having regard to the objectives of the N&WRA Regional Spatial and Economic Strategy and the findings of this report. This objective is consistent with that of the Government commitment to promote development of the Atlantic Economic Corridor.

The urgency of a Government commitment to commence the reconstruction of the Galway-Mayo section of the WRC, which is the subject of this business and economic appraisal, is all the more relevant due to the increased strategic focus on vulnerabilities in Ireland's supply chain as a result of BREXIT. Such vulnerabilities require improved connectivity and direct access to the south-eastern and southern ports of Foynes, Cork and Waterford.

Finally, it is noted that in August 2019 the Irish Government applied to the European Commission to include the "Western Arc" region in the Ten-T Core Network and that this application received a positive response. When taken together with the confirmation by the European Commission in January 2020 that, as a result of its declining economic performance, the current status of the west and northwest region was being downgraded from "developed region" to a "region in transition", these factors add greater urgency to the inclusion of the extension of the Western Rail Corridor as a priority action in the forthcoming National Development Plan.

Ireland's Existing Railway Transport Assets 2021

WESTPORT TO WATERFORD TIMBER TRAIN WITH CROAGH PATRICK IN BACKGROUND (N. ENRIGHT)

Section 1

General Introduction

[1] GENERAL INTRODUCTION

A government commitment to review the financial and economic feasibility of re-opening the Athenry-Claremorris section of the Western Rail Corridor (WRC) was included in the national spatial planning process set out in Project Ireland 2040: National Planning Framework.[1] The public investment decisions to begin implementing that strategy were described in Project Ireland 2040: National Development Plan 2018-2027.[2]

In late 2018 a contract was awarded to the consultancy firm EY requiring them to carry out the promised financial and economic appraisal of restoration of Phases 2 and 3 of the WRC.[3] Phase 1, linking Limerick city to Galway city via Ennis and Athenry had already been reopened and had been in operation since 2010.[4] Phase 4, linking Claremorris to Collooney was outside the terms of the EY contract.

EY, working in association with the engineering consultants Mott MacDonald, completed their assignment in the Summer of 2020. Their submitted report went through a process referred to as a "peer review", carried out by the JASPERS, a group within the structure of the European Investment Bank.[5] The EY report was eventually published on January 8th, 2021.[6]

The term "peer review" implies a rigorous error-checking process resulting in an error free publication. However, JASPERS only carried out a "high-level screening" of EY's conclusions, as referred to in DTT&S and in Iarnród Éireann commentaries. JASPERS say they were requested in July 2020 by DTT&S to undertake a review of the project material prepared by EY, and provide independent technical advice regarding the potential of the project to attract EC grants, as well as its potential candidacy for EIB financing. JASPERS commented:

> "Our note is not a critique of the EY report, but is instead a broad assessment of the maturity and feasibility of the project based on material that has been published to date."

However, at the time of completion of the JASPERS Report (October 2nd, 2020) the EY report had not been published.

If the EY report had been perceived as being comprehensive, balanced and accurate, its highly negative conclusions would have had to be acknowledged, however reluctantly, by groups in the west of Ireland who had been campaigning for many years for the reopening of the WRC. In the face of a negative appraisal, however well justified it was, some may have pressed for the WRC restoration, even if the analysis had shown that such a decision would not have represented the optimum use of scarce public funding in the best interests of regional development strategy along the Atlantic Economic Corridor. However, as the published EY report was examined in detail and its assumptions and projections checked, it became increasingly apparent that the conclusions reached by EY arose out of assumptions and analysis that were very questionable. This perception provided the motivation for work undertaken in preparing the present re-examination of the feasibility of the WRC restoration.

The challenges we faced in addressing the many problems with the EY analysis were complex since there is far more wrong with the EY report than minor issues and disagreements related to data and methodology. Rather, the errors and omissions in the EY analysis are of an extremely serious nature and if left unchallenged would risk depriving the west of Ireland of

1 https://www.gov.ie/en/campaigns/09022006-project-ireland-2040/

2 https://www.gov.ie/en/policy-information/07e507-national-development-plan-2018-2027/

3 The details and technical terms of the EY contract are examined later in Section 4 of this report.

4 The Limerick-Galway (Phase 1) operation is discussed in Section 3 of this report.

5 https://www.gov.ie/en/publication/1174d-review-of-western-rail-corridor-phases-2-and-3-athenry-to-claremorris/

6 https://www.gov.ie/en/publication/1174d-review-of-western-rail-corridor-phases-2-and-3-athenry-to-claremorris/

significant monetised and non-monetised benefits of a new communication infrastructure that could be of transformative magnitude for the region.

It was in light of this realisation that West-on-Track assembled a working group of experts with wide experience in rail engineering, economic analysis, regional development strategy, financial analysis, business, and social issues. This group was tasked initially with carrying out a very detailed and searching "peer review" of the EY work and then with the preparation of a more comprehensive, balanced and accurate alternative appraisal. The present report presents the results of that "peer review" and the alternative financial and economic evaluation of the WRC restoration. It places its analysis in a wider context, both historical and economic, and is designed to assist the reader in understanding the great potential of systematically restoring what is, in effect, an Atlantic Railway Corridor (or ARC) that serves to link together the cities and towns of the better known Atlantic Economic Corridor (or AEC).[7]

> "The errors and omissions in the EY analysis are of an extremely serious nature and if left unchallenged would risk depriving the west of Ireland of significant monetised and non-monetised benefits of a new communication infrastructure that could be of transformative magnitude for the region."

Our report is structured into eight sections as follows. As background information **Section 2** sets out an historical account of the origins and subsequent history of the Western Rail Corridor. This will be useful in familiarising readers with an important west coast infrastructural asset that has lain dormant for over 20 years. The neglect and underutilisation of the rail link that eventually led to its closure came about as a result of a systemic social and economic decline in the west rather than as a consequence of any specific or intrinsic failing of the line itself. A better understanding of these historical factors will assist readers in re-evaluating the future role for the rail link as part of a west of Ireland economy in the 21st century that has great potential to develop and grow. The negative forces that caused decline and stagnation in the west in the late 19th century and during the 20th century resulted in distorted concentration of economic growth in the east (Dublin) and south (Cork). In the 21st century the WRC, embedded in the wider ARC, can play a vital role in rebalancing development on this island in a more socially desirable and sustainable way.[8]

In **Section 3** we describe the process that led to the restoration of the rail link between Limerick city and Galway city. At the initiative of the government, the McCann Report of 2005 had provided a detailed costing of the restoration of the complete WRC, extending from Limerick to Sligo.[9] Phase 1 was the Limerick-Galway section. Phase 2 was the Athenry-Tuam section. Phase 3 was the Tuam-Claremorris section and Phase 4 was the Claremorris-Collooney section. In the event, only Phase 1 was restored, the detailed costs of which were set out in a report prepared for Iarnród Éireann by Faber Maunsell.[10] We describe the restoration process and the subsequent operational performance of the line which restored the direct inter-city rail link between Limerick city (population 90,000) and Galway city (population 80,000).

7 https://www.atlanticeconomiccorridor.ie/

8 For the historical reasons for western underdevelopment, see "To Hell or to Connaught: The origins of Ireland's east-west economic divide", lecture to Westport Civic Trust, October 17th, 2019.

9 https://web.archive.org/web/20060922090156/http://www.transport.ie/upload/general/6645-0.pdf

10 "Study Report and Cost Estimate on Reinstatement of the Western Rail Corridor", Report prepared by FaberMaunsell for Iarnród Éireann, Dublin, January 1st, 2005.

> "In the 21st century the WRC, embedded in the wider ARC, can play a vital role in rebalancing development on this island in a more socially desirable and sustainable way."

An important motivation for Phase 1 of the WRC restoration had been that it provided a direct inter-city link between Ireland's third and fourth largest cities. However, as one travels north of Galway into Mayo, Roscommon, Sligo, Leitrim and Donegal, there are no such large urban agglomerations. The two largest towns in the Northern & Western Region (excluding Galway city, which lies at the extreme southern end of the region) are Letterkenny (population 19,000) and Sligo (population 19,000).[11] The largest town in Mayo is Castlebar (population 12,500), with Ballina second (population 10,000). So the rationale for restoring Phases 2 and 3 of the WRC is different from the inter-city rationale for restoring Phase 1. In Section 4 we set out such a rationale, based on the need to link the relatively small towns of the north-west region more effectively to each other, thus creating agglomeration effects that are not based on any single large metropolitan region or the linking of large metropolitan regions. This will be the first of three crucial elements that serve to determine the viability of the Phase 2 and 3 WRC restoration and the cost/benefit side of the financial appraisal. The underlying regional strategic development model is different from the "five cities" model that is at the heart of Project Ireland 2040.[12] We show how the northward extension of Phases 2 and 3 of the WRC opens up and will sustain such a development model for the N&W region that is different from, but entirely complementary to the "five cities" model used in the eastern and southern regions of the island.

In **Section 5** we turn our attention to the construction and operating costs of restoring and operating Phases 2 and 3 of the WRC. This is the second of three crucial elements that serve to determine the eventual cost/benefit side of the financial appraisal. The fact that our estimates of the capital costs of restoring the line from Athenry to Claremorris are significantly lower than the costs proposed by Mott MacDonald and EY came as a surprise. This was an area of the EY consultancy remit where different groups estimating the capital costs of reconstruction might have been expected to produce results that clustered closely together. For any specific rail restoration technical specification, cost differences would be expected to be small. However, the EY capital costs per kilometre of rail line came out at about 60% higher than our estimated capital costs. We take up the cost-benefit consequences of these differences later in Section 8.

In **Section 6** and **Section 7** we turn to estimating the likely revenue that could be generated when Phases 2 and 3, in conjunction with the existing Phase 1 are operating. This is the third of three crucial elements that serve to determine the eventual cost/benefit side of the financial appraisal. **Section 6** deals with projecting revenue from passenger fares and includes other monetised benefits of the restoration. **Section 7** relates to revenue from the carriage of freight. The crucial choice here is the methodology upon which to base future revenue projections. The EY approach was to base projections broadly on the status quo ante (i.e., effectively present inter-town journey and freight patterns in the absence of the restored rail link). An alternative approach would be to base them on a realistic projection of how future traffic and freight patterns could be affected by a transformational change in the availability of new rail infrastructure in the Northern and Western region. Because of time constraints,

11 We exclude Athlone (population 21,000) from this analysis since it belongs more to the eastern region centred on Dublin and is administered as part of Westmeath.

12 The "five cities" in Project Ireland 2040 are Dublin, Cork, Limerick, Galway and Waterford.

limited resources and lack of access to the necessary official data sources in Iarnród Éireann and the National Transport Authority (NTA), we were obliged to adopt the first approach in our quantitative analysis. But in light of government planning strategy for the Northern and Western region, as presented in the Northern and Western Regional Assembly Regional Spatial and Economic Strategy document, we draw attention to the importance of the second approach, keeping in mind that future projections need to be solidly grounded and realistic.

We are influenced in our approach to revenue projections by the fact that the Department of Finance's Common Appraisal Framework (CAF) requires us to run our projections out for at least thirty years (i.e., to beyond 2050).[13] For a project like the WRC, with its long time horizon, one must think in terms of a radically different future; a world where there is a binding requirement to prevent further global warming by reducing the use of fossil fuels; where new communication technologies will produce major changes in settlement patterns and behaviour; where the older model of seeking productivity gains through population concentration into a few of large metropolises will be replaced by a wider and more efficient distribution of economic activity across the island. Consequently, environmental and other wider economic and social benefits of the WRC must be taken very seriously over the long time horizon of the WRC evaluation.

> "If the Ireland of the 2050s is not radically transformed from the Ireland of 2021, then something serious will have gone wrong with national development strategy."

In **Section 8** we bring together our costs and benefits estimates and arrive at a benefit/cost ratio (BCR) for the Phase 2 and 3 restoration. At this stage we turn to a comparison of the present cost-benefit analysis and the analysis presented in the EY report. We track down the areas where the biggest differences arise as well as the areas where there is a degree of agreement between the two estimates. It will be for policy makers and the wider public to judge which estimates - the present ones or those published in the EY Report - are the most credible, robust and comprehensive. But the size of the differences are so large as to require an investigation into why this is so and to determine which set of estimates should be used to guide public policy with respect to the restoration of the WRC.

Our report contains five Appendices. **Appendix 1** presents correspondence with Iarnród Éireann and the Department of Tourism, Transport and Sport (DTTaS) related to efforts made to obtain information on the EY cost/benefit analysis that was not included in the published EY report. **Appendix 2** presents the independent cost review of the WRC prepared by consultants Permanent Rail Engineering (UK) Ltd. **Appendix 3** presents a brief socio-economic profile of Tuam as an example of development processes in small towns that would benefit from the WRC restoration. **Appendix 4** presents a comparison of bus and rail travel times for a sample of comparable journeys. **Appendix 5** contains the full annual detailed CBA table of the analysis carried out in this report.

13 https://www.gov.ie/en/organisation-information/800ea3-common-appraisal-framework/

2

LOCAL MEN BUILDING THE RAILWAY AT TUBBERCURRY, 1890s (FLANNERY FAMILY ARCHIVE)

Section 2

Historical background of the Western Rail Corridor

[2] HISTORICAL BACKGROUND OF THE WESTERN RAIL CORRIDOR

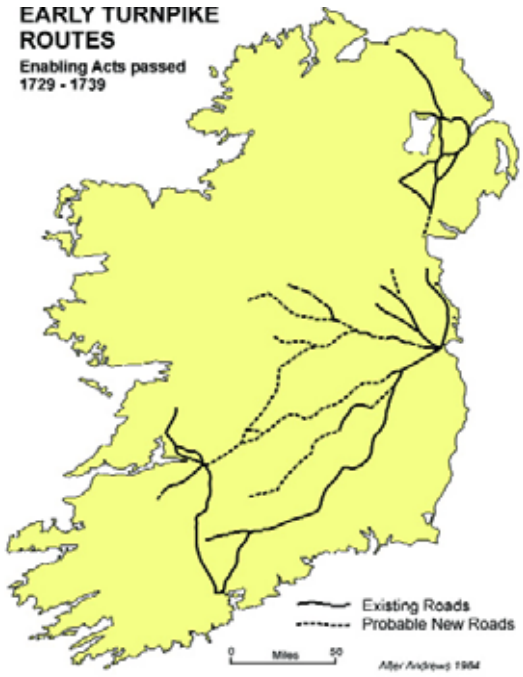
2

[2.1] ROADS, HARBOURS AND EARLY REGIONAL DEVELOPMENT

A toxic combination of many historical, religious, political and locational factors was not conducive to orderly development of the South-West, West and North-West parts of the island between the 17th and 19th centuries. Road access to Connacht from the east was massively underdeveloped. In the early 1700s it was decided to improve the main roads - introducing the so called turnpike roads - and these are illustrated in the map showing their evolution in the mid 18th century. A modern twist is that the evolution of modern motorways developed in a similar pattern, emanating mainly from Dublin and effectively ignoring the north-west region.

Figure 2.1: Comparing the core all island road network in 1729 and 2020

(a) Early turnpike routes: 1729-1739



(b) Motorway networks: 2020

A very negative view of the west of Ireland developed during the 18th century, even among people who were sympathetic to its plight. Kevin Whelan quotes the Jacobite Nicholas Plunkett as noting in 1698 that Connacht was

> "a waste country, thin peopled, having not one corporation of note but Galway, small improvements, no money, no markets, for all are sellers, no buyers".[1]

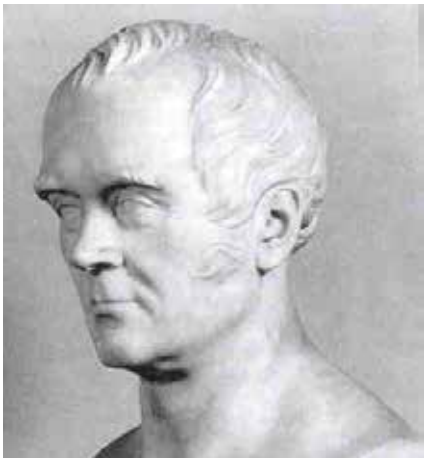
This was the grim situation that prevailed when the Act of Union was passed in 1801 and Ireland was fully incorporated into the "United Kingdom of Great Britain and Ireland". The Scottish engineer Alexander Nimmo first came to work in Ireland during 1811-1813 when he was charged by the Bogs Commissioners to carry out a comprehensive geological survey of Connacht. For the first time we see someone who has positive views about the potential of the region:[2]

1 See "The bases of regionalism" by Kevin Whelan, in Regions: Identity and Power, ed. Proinsias O Drisceoil, Institute of Irish Studies, QUB.

2 See Alexander Nimmo: Master Engineer 1783-1832, by Noel P. Wilkins, published by Irish Academic Press, Kildare, 2016

> "Though the general improvement and cultivation of Connemara would seem an undertaking of the most arduous description, it is not without facilities, which might, upon a candid consideration, make it appear a subject more worthy of attention than many other of the waste lands of the Kingdom". (Wilkins, op. cit., page 88)

Figure 2.2: Bust of Alexander Nimmo



The presence of a market at Westport was seen by Nimmo to have acted as a spur to agriculture north of Killary and he was confident that new towns and markets would also arise in Connemara once decent roads were constructed. He decided that opening up the whole district was warranted, feasible and likely to be profitable.

Nimmo returned to the west of Ireland in the 1820s, commissioned to direct public works to alleviate the effects of a famine that afflicted the region. If he had been a less humane person, he might have paid more attention to his official guidelines, which included:

> ".. combine the utility in the work with the employment as far as possible; but still make the employment of the poor, rather than the accomplishment of the work the object; to prefer small local undertakings, and those that would not be otherwise carried on, to those of a great scale, or which would certainly be done, though at a more distant period." (Wilkins, op. cit., page 188)

It seems that Nimmo ignored these restrictions, a decision which thankfully led to significant improvement in the western road and harbour infrastructure which endures to this day, but which ultimately led to his dismissal. By intentionally designing long lines of communication, and purposely linking them to the piers and harbours of the coast on the one hand, and to the two major canals at the Shannon on the other, Nimmo conceived the first, comprehensive, integrated approach to the development of the infrastructure of the west coast and, indeed, of the whole of Connacht.[3] When the authorities came to realise what Nimmo was up to, complaints were made in Westminster to the effect that Nimmo had

> "embarked on works not so much calculated to afford employment to relieve immediate distress as to promote more what appeared to him as great national improvements".

3 See Wilkins, op. cit., page 193.

[2.2] THE ARRIVAL OF THE RAILWAYS

Railways spread initially from the three main population centres of Dublin, Belfast and Cork.[4] The first rail line in Ireland was built in 1834, linking Dublin to Kingstown (sic.). However, as *laissez faire* was the overriding political policy of the day, there was no overall national or regional strategy in place to act as a guide to how a railway system should develop. This is in marked contrast to the policies adopted in many Continental European countries, where central planning of railway lines was undertaken. What this meant was that rail connections were only established where they were most immediately profitable, i.e., connecting the larger population centres of Belfast, Dublin and Cork on the east and south coasts.

The problem was that the post-Famine population in Ireland was in free fall and the population of Connacht, in particular, was hollowing out. The Great Famine of 1845-1847 initiated the population collapse. The absence of much by way of employment, other than as family members assisting on subsistence farms, caused its continuation and acceleration.

Table 2.1: Provincial population changes (percentage growth rates) - 1841 to 2016

	LEINSTER	MUNSTER	CONNACHT	(MAYO)	ULSTER	TOTAL
1841						
1911	-41.2	-55.2	-54.5	-50.5	-55.2	-50.8
1956	15.2	-18.5	-31	-30.7	-28.7	-9.9
2016	96.9	46.5	23.5	-2.3	-0.4	62.4

By the middle of the 20th century, a combination of under-investment in the railways and a corresponding growth in investment in the national roads network, was already leading to a weakening of the rail system. Just as the railways had supplanted the canals, the growing competition of motorised road transport was gradually supplanting almost all but the main east-west rail links to big population centres (Belfast, Dublin, Cork, Limerick and Galway).

These singular and unique historical circumstances tend to be used today to reject proposals to restore rail links in Connacht, in particular the restoration of the Western Rail Corridor connecting Cork, Limerick, Galway and Sligo and intersecting the radial links that originate in Dublin. But there are increasing reasons - demographic, commercial and ecological - to think otherwise.

[2.3] THE WESTERN RAIL CORRIDOR

The 240km of rail track running northwards from Limerick to Sligo has come to be designated as "The Western Rail Corridor" or WRC. The name is of recent origin and has come about as a result of efforts to 'brand' it as a single entity and to assist in raising public awareness of the efforts that are being made to restore it fully as a key strategic link in western regional infrastructure. In the wider region of the Atlantic Economic Corridor (AEC), the WRC is part of what can be designated as the Atlantic Rail Corridor (ARC), running from Rosslare and Waterford in the south to Sligo in the north-west.

The line from Limerick northwards to Sligo originally operated as part of the Waterford,

4 For a comprehensive account of the history and evolution of the Irish rail system, see Ewan Duffy at http://industrialheritageireland.info/railwayarchaeology/index.php/railway-archaeology-of-ireland/

Limerick & Western Railway (WL&WR).[5] It was built over a period of about 40 years by several different private railway companies. The first twenty four mile long section from Limerick to Ennis built by the Limerick & Ennis Railway Company (L&ER) was completed in 1859, serving intermediate stations at Longpavement, Cratloe, Sixmilebridge, Ballycar, Ardsollas & Quin and Clarecastle. There was a junction four miles from Limerick for a mile long branch to the ESB Power Station at Arnacrusha that was constructed in the 1920s.

> "In the wider region of the Atlantic Economic Corridor (AEC), the WRC is part of what can be designated as the Atlantic Rail Corridor (ARC), running from Rosslare and Waterford in the south to Sligo in the north-west."

The next thirty five mile section from Ennis to Athenry via Crusheen, Tubber, Gort, Ardrahan and Craughwell, was built by the Athenry & Ennis Junction Railway (A&EJR) and joined the Midland Great Western Railway (MGWR) Dublin-Galway line in 1869, while the sixteen mile section from Athenry to Tuam via Ballyglunin had been constructed by a local company the Athenry & Tuam Railway Company (A&TR) nine years earlier in 1860. Tuam was a terminus for thirty four years until in the year 1894 the extension to Claremorris via Castlegrove, Milltown and Ballindine was completed.

The final link in what became the Western Rail Corridor was the forty seven mile extension from Claremorris to Colooney, via Kiltimagh, Swinford, Charlestown, Curry, Tubbercurry, Carrowmore, and Leyney. This section was constructed by the W&LR. Collooney was reached in 1895 when the line joined the MGWR line from Dublin to Sligo. Since two separate companies were involved, the W&LR sought and obtained powers to run its trains from Collooney over the six miles of MGWR track into Sligo. The Waterford & Limerick Railway (W&LR) was contracted by all the various local companies to operate services between Limerick and Sligo. In the year 1896 the W&LR changed its name to the Waterford Limerick & Western Railway (WL&WR) to better reflect its extended status.

The Western Rail Corridor was born, and by degrees the small private companies involved in building it were absorbed into the WL&WR. On 1st January 1901 the larger and more southerly neighbour, the Great Southern & Western Railway (GS&WR), took over the WL&WR. The Western Rail Corridor now became a natural continuum of one axis of the GS&WR network which stretched from the port of Rosslare through Waterford, Tipperary, Limerick, Clare, Galway, Mayo to Sligo. Amalgamation of the entire network into the national Great Southern Railways (GSR) occurred in the year 1925. From 1925 until 1945 GSR owned and operated all railways that lay wholly within the then Irish Free State.

Córas Iompair Éireann (CIÉ) was formed as a private company by the Transport Act 1944 and incorporated the GSR and the Dublin United Transport Company, adopting the logo of the latter company, the so-called "flying snail". Essentially it became a monopoly transport operator. The Transport Act 1950 amalgamated CIÉ and the Grand Canal Company and formally nationalised CIÉ, changing its structure from that of a private limited company to a corporation under a board appointed by the Minister for Transport. This brought the Western Rail Corridor directly under state control.

5 See Ernie Shepherd, "Waterford Limerick & Western Railway", published by Ian Allen Publishing, 2006.

[2.4] THE ATHENRY-CLAREMORRIS SECTION

The Athenry to Tuam Railway was opened in 1860 before any other railways in Mayo or Sligo. It was constructed to the highest standards of the day by the renowned railway engineer, William Dargan, at a cost of £67,000 stg. Dargan had been the contractor for Ireland's first railway from Dublin to the then Kingstown, now Dún Laoghaire, and he had also built the Dublin to Cork mainline. Dargan was the son of a tenant farmer from near Carlow who excelled in maths and studied to be an engineer under the famous Thomas Telford in England. Today, a fine commemorative statue of Dargan stands outside the National Gallery and he was recently celebrated with the naming of the LUAS Dargan Bridge in Dundrum in his honour, as was Ireland's longest bridge, the Dargan Rail Bridge (1,490m) in Belfast, opened in 1995.

The initial Athenry to Tuam railway line played a major part in the subsequent expansion of railways into the West, serving agricultural development, industrial development, sport and religious events as well as featuring in 1952 in one of Ireland's most iconic films, *The Quiet Man*.

A local contractor, Andrew Egan, was engaged to construct the stations at Tuam and Ballyglunin at a cost of £4,000. Within twelve months over twelve miles were constructed and the railway was within three miles of Tuam. The railway opened on Thursday 27th September, 1860 with the entire construction of sixteen miles taking just eighteen months. Dargan praised the skills and commitment of the 750 men, mostly local, who had constructed the railway to such a high standard and completed the project well ahead of schedule.

Figure 2.3: William Dargan statue at National Gallery, Dublin (Pic. Leinster Express)

Great celebrations followed and it was declared by the Chairman of the Athenry & Tuam Railway (A&TR), Denis Kirwin, that the railway would prove an incalculable advantage to the district, "giving it railway accommodation with the metropolis and other important towns in Ireland"

Initially four services in each direction ran daily between Tuam and Athenry with one return service from Tuam travelling through to Galway. Cattle and sheep "specials" serviced the respective fairs in Tuam from October 1860 when one hundred and seventy nine wagon loads of livestock were carried on the first two days. By November 13th, 1860, Tuam was

opened to general goods traffic and Ballyglunin opened to goods and livestock. While the arrival of the railway created at its peak sixty eight direct and many indirect jobs, there were consequences for some local businesses who could not compete with the external competition, such as Blake's Brewery, Ryan's Pottery and a match factory.

Figure 2.4 Construction of the original Atlantic Railway Corridor (National Library)

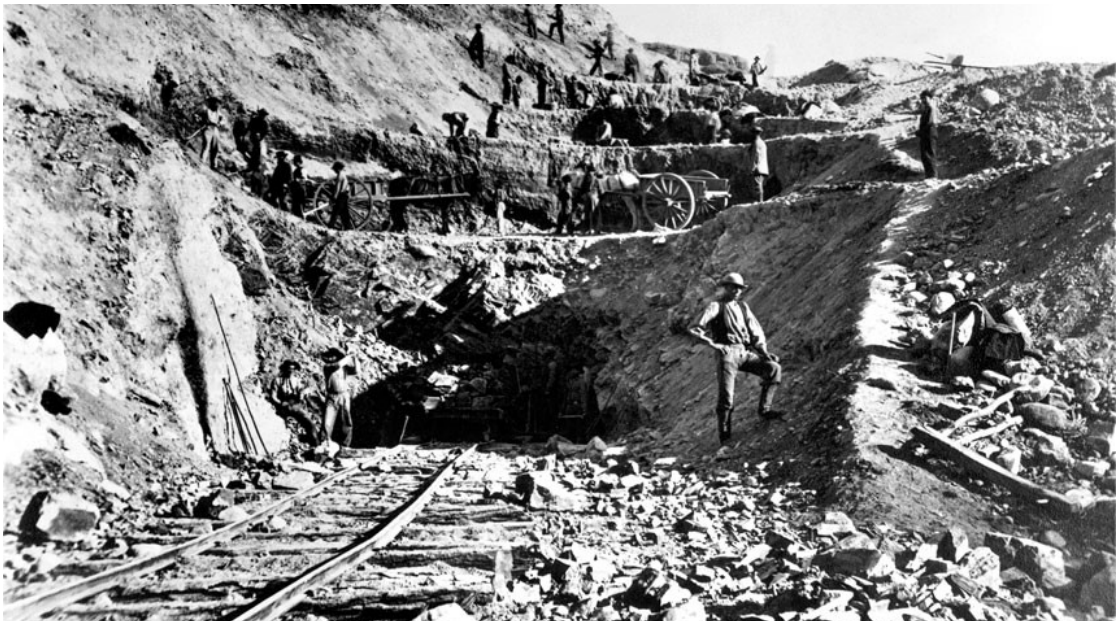


Figure 2.5: A local construction gang and horses at Tubbercurry, 1895 (Flannery Family Archive)

[2.5] TRADING CHALLENGES FOR A&TR

A condition of the agreement between the A&TR and the MGWR to operate the line included a stipulation that A&TR would not extend their track north of Tuam to Claremorris, since the Great Northern & Western Railway (GN&WR) feared the impact of such an extension on their emerging Athlone to Mayo (via Roscommon) railway, which was to be operated by the MGWR. A dispute arose at the end the initial ten year contract between the two companies and all Athenry-Tuam services, at the time operated by the MGWR, ceased in October 1870. The A&TR decided to manage their own operations and bought some engines and rolling stock from the Dublin & Meath Railway.

However, through train services onward to Galway did not recommence since the MGWR controlled the Athenry to Galway section. When the A&TR announced its intention to construct an extension from Tuam to Claremorris, the MGWR reacted by refusing to allow A&TR wagonloads onto their track, thereby necessitating the transfer of goods from one wagon to another at Athenry. A direct impact on Ballyglunin was the loss to the railway of seaweed traffic from Galway which farmers used as fertiliser. However, the A&TR struck a deal in November 1870 with the Waterford & Limerick Railway, who operated the line from Limerick to Athenry, that they would work through to Tuam. A&TR services between Tuam and Athenry re-commenced on December 1st, 1870.

The UK House of Commons was asked to approve an extension from Tuam to Claremorris as the Athenry to Tuam Railway was considered to be highly successful having carried 40,000 passengers and large quantities of cattle, sheep, wine, and American meal in 1869. However, the application was refused. The approval of the extension from Tuam to Claremorris would have to wait another twenty years.

In 1894 the extension from Tuam to Claremorris finally opened, having been constructed by William Martin Murphy, owner of the Irish Independent. With the strong support of Tuam District Council, the UK Parliament approved the sale of the A&TR to the W&LR in the year 1893, thus ending the role of the A&TR on the route. From January 1st 1901 the GS&WR took over the WL&WR and introduced passenger and goods trains linking Limerick directly to Sligo, with good connections for Galway, Westport, Ballina, and east bound stations at Athenry, Claremorris and Collooney. Service interruptions occurred in the year 1912, caused by a British coal strike, and in the year 1917 heavy snowstorms blocked the line between Ballyglunin and Belville for four days. But far greater disruption came during the Civil War in the year 1922. In September/October 1922 every railway bridge between Tuam and Athenry was blown up and many of those repaired were destroyed again. There were train hi-jacks, arrests and imprisonment. As a result, some fifty railway staff were laid off. On November 4th, 1922, Ballyglunin signal cabin was burnt down and as repairs continued, in January 1923 an armoured train was introduced to patrol the Athenry-Tuam section.[6]

6 See Bernard Share, " In Time of Civil War: The conflict on the railways", published by The Collins Press, 2006; and Brian Mac Aongusa, "Broken Rails: Crashes and Sabotage on Irish Railways", published by Currach Press, 2005.

Figure 2.6: Sligo-Limerick train Claremorris 1953 (Pics. H.C. Casserley)

Figure 2.7: Sligo train Athenry, 1938

Peace came in 1923 and the railway returned to full service. By October 1923 traffic was very significant once again with four hundred people travelling from Tuam to a football match in Dublin on October 7th and livestock carriage during that month of three thousand pigs, nearly six thousand cattle, over four thousand five hundred sheep and nearly fifty goats. The Tuam Railway Social Club had a celebratory dance attended by over six hundred people.

Employees almost doubled during the beet campaigns associated with the opening of Tuam Sugar Factory in 1935. On June 26th 1936, the Eucharistic Congress in Dublin required thirteen special trains to transport over ten thousand passengers involving twenty three locomotives. On the following day special trains carried over four thousand six hundred children to the event. Special trains with all-in Pullman catering operated to the Curragh and other racecourses. Horseboxes were a regular feature carrying horses and stable staff in conjunction with the Galway Blazers Hunt.

The Beet Growers Association held regular conferences in Tuam catered for by special trains and the GAA were huge supporters of the railway due to the proximity of Tuam Railway Station to Tuam Stadium. For Ballyglunin the time of greatest fame was when it was chosen by US film Director John Forde to become "Castletown" in the film classic, The Quiet Man, starring John Wayne, Maureen O'Hara and a host of Abbey actors. Less than five minutes in the film took almost three weeks to shoot. The train in the film was the regular Tuam–based set used on the Galway commuter services.

Following the beet factory closure in 1986, a heritage railway preservation society decided to move its operations to Tuam and during a seven year period introduced diesel and steam-hauled heritage trains on the Tuam, Ballyglunin Athenry section, based on the theme of The Quiet Man.

Figure 2.8: Loading beet 1960 (Pic. Ask About Ireland)

Figure 2.9: Tuam Sugar Factory 1935 (Pic. Pinterest)

Pilgrimage trains were introduced for Knock Shrine, close to Claremorris, in the 1940s and scores of trains from the south of Ireland operated on Sundays in Summer and Autumn for over fifty years. Numbers began to decline in the 1990s and gradually ceased with the last passenger train travelling from Mayo through Galway passing almost un-noticed in November 1997. Occasional block freight trains continued until February 2000, when an empty train, having delivered its five hundred tonne consignment of bagged fertiliser to Ballina, rumbled through Tuam with a Limerick crew bringing to an end all train services after one hundred and forty years. The very last train to travel on the Claremorris-Athenry section was an engineer's maintenance train with a Portlaoise crew in May 2001.

[2.6] THE WRC AND THE CIÉ ERA

In 1957 the Government established an inquiry into the affairs of CIÉ, headed by Dr. James Beddy, a Dublin economist. The committee's report was published in May 1957 and expressed the view that the country's railway system had been built, equipped and staffed to meet needs which no longer existed. While the committee was not prepared to recommend the complete abandonment of the railways, it did recommend that more than half the system and approximately three-quarters of the stations and halts be closed. As a result CIÉ adopted a policy of focussing mainly on routes radiating from Dublin and a programme of closures of branch lines and non-radial routes was rolled out in the early 1960s. The Rosslare to Sligo railway became a prime target for run-down of services and ultimate closure. Outright closure was considered politically problematic, so instead closure by stealth was preferred. The systematic closure of the Limerick to Sligo railway was conceived.

"Outright closure was considered politically problematic, so instead closure by stealth was preferred. The systematic closure of the Limerick to Sligo railway was conceived."

Certain realities were also taken into account in the closure process. Scheduled passenger trains and goods trains could be easily run down and made unattractive, leading to ultimate withdrawal. However, there was a logistical need for special trains to operate at certain times of the year. First, beet supplies to the Sugar factories called for hundreds of trains nationwide during the winter months, serving intensive growing areas along the Wexford-Galway route as well serving as a means of balancing supplies between plants in Mallow, Carlow, Thurles and Tuam. A second seasonal demand was for pilgrimage trains referred to above. A third demand resulted from cattle and sheep fairs which generated large revenues for the railway in the 1950s. For example, a fair day would see up to four hundred and fifty wagons of cattle or sheep leave Tuam for the North Wall in Dublin, for Limerick via Athenry, or for Belfast via Claremorris, travelling on through Sligo and Enniskillen. However, with the closure of Tuam Sugar Factory, the decline of pilgrimage train demand and the cessation of fair day cattle trains due to the arrival of livestock marts, this seasonal demand disappeared.

"...a fair day would see up to four hundred and fifty wagons of cattle or sheep leave Tuam for the North Wall in Dublin, for Limerick via Athenry, or for Belfast via Claremorris, travelling on through Sligo and Enniskillen."

Figure 2.10: Former Sugar Factory sidings Tuam 1975 (Pic. David Carse)

Figure 2.11: Ballyglunin 1950 (Pic. H.C. Casserley)

Prior to the CIÉ retrenchment strategy in the early sixties, there were scheduled Galway-Limerick passenger and goods trains in operation; scheduled Sligo-Limerick passenger and goods trains; and scheduled Tuam-Galway passenger trains, including a commuter train service between Tuam and Galway.[7] In the CIÉ programme of line closures in 1963 there was no reference to closing the Sligo-Limerick railway. Rather there was a dramatic cessation of scheduled passenger services which would inevitably lead to reduced demand, reduced income, reduced expenditure on maintenance and inevitably justification for line closure. Galway-Limerick passenger services ceased, as did Tuam-Galway passenger trains, including the commuter service and all scheduled passenger trains ceased between Claremorris and Sligo. The sole surviving passenger service left Limerick at 3.15 p.m. and was diverted to Ballina instead of Sligo, while in the southerly direction a single passenger train left Ballina at 9.30 a.m. for Limerick.

Various developments subsequently destroyed the remaining passenger demand such as having the single train service stop at stations such as Ballyglunin and Craughwell in one direction only! The consequence was that you could depart, for example, for Galway from Ballyglunin but the single daily 'return' service did not stop at Ballyglunin on the return journey. As a result, passenger numbers boarding at these stations plummeted and the company used this fact to justify closure. The ultimate initiative came in the year 1973 when the schedule for the single daily return service from Ballina to Limerick changed to an afternoon service in both directions meeting half way in Athenry, removing the prospect of a return journey on the same day for most passengers.

Figure 2.12: Westrail steam train Athenry 1991 (Pic. Roger Joanes)

Figure 2.13: Claremorris, Knock Specials Summer 1950s (Pic. Irish Railway Record Society)

7 For example, the service departed Tuam at 07.55, serving Ballyglunin at 8.05, Athenry at 8.19 and Oranmore at 8.34, arriving in Galway at 8.45. The return service left Galway at 18.25.

In 1976 CIÉ announced that all scheduled passenger services would cease between Claremorris and Limerick from April 4th, leaving only a single daily passenger train between Limerick and Ennis. However, this was to succumb a year or so later, leaving the entire route without any scheduled passenger train service. The termination of all scheduled passenger trains on the Western Rail Corridor between Limerick and Sligo was completed in just thirteen years.[8]

Weekend pilgrimage train traffic remained a regular feature up until the mid-1990s and up to ten trains to and from the south of the country might use the route on any given Sunday during Summer months. The freight situation also began to disimprove in the 1980s as CIÉ began to withdraw from carriage of general goods. Intermediate stations on the route such as Gort and Tuam were boarded up, left to become covered in weeds, and in some cases demolished.

Figure 2.14: Beet train at Belville, Athenry (Pics. David Carse) Limerick passenger train crosses a northbound

Figure 2.15: Tuam 1972. A southbound Ballina to Limerick to Sligo goods train

Bulk freight traffic remained buoyant, and especially during seasonal beet campaigns when Tuam Sugar Factory generated thousands of tons of beet from all over the country and dispatched beet pulp, sugar and other products. Although the Tuam Sugar Factory closed in 1987, substantial bulk freight traffic continued especially between Limerick, Galway and Mayo. Examples include coal, oil, fertiliser, and cement, with up to four 500-ton trains daily until February, 2000, when the line was placed in engineers' possession between Claremorris and Ennis and all revenue-earning traffic over this section ceased.

8 Simultaneously, passenger services on the Limerick to Rosslare route were being dismantled.

Crowds exiting Tuam Stadium after a 1951 Galway-Tipperary hurling match, attended by 17,018 people. (Pic. Al O'Dea)

3

NEW TRACK AND CULVERT ON PHASE 1 OF WRC (H. GLEESON)

Section 3

Limerick-Galway Phase One of the Western Rail Corridor

[3] LIMERICK-GALWAY - PHASE ONE OF THE WESTERN RAIL CORRIDOR

3

[3.1] BACKGROUND

The reopening of the Western Rail Corridor (WRC) has its roots in the publication of the *National Spatial Strategy* (NSS) in 2002.[1] The strategy advocated an interlinked 'gateways and hubs' approach as a means of promoting balanced regional development and identified the provision of connecting regional infrastructure as being central to its effective delivery.

Subsequently, a strong community campaign was launched, building on the long-standing work of the Western Inter-County Railway Committee in seeking the reopening of the railway from Limerick to Sligo.[2] In 2004 the Minister for Transport, Séamus Brennan, established an expert working group chaired by hotelier Pat McCann to consider the project. The McCann Report was issued in 2005.[3]

In late 2005 the phased reopening of the Western Rail Corridor was included in the *Transport 21* programme as recommended in the McCann Report.[4] In 2006 this approach was ratified by Cabinet and work commenced on Phase 1 in the Autumn of that year. This required the relaying of new track between Ennis and Athenry in order to link Limerick and Galway as well as the provision of stations and other associated infrastructure both inside and outside of that section. The total cost was €106m and the project was delivered precisely on budget by Iarnród Éireann.

[3.2] REOPENING

The Limerick-Galway route, incorporating 'Phase 1' of the Western Rail Corridor, was officially launched by the then Minister for Transport, Noel Dempsey, on 29th March 2010 and services recommenced on the 30th March 2010.

Figure 3.1 Launch of Phase 1 of the WRC at Limerick Station 29th March 2010:

(L-R): Jim Meade IÉ (now CEO), Deputy Peter Power TD (FF), Minister Noel Dempsey, Cllr. Michael Hourigan and Deputy Ciarán Cuffe TD (GP)..

1 The Strategy may be viewed at: Complete.pdf (nss.ie)

2 The Western Inter-County Railway Committee is a joint committee of six local authorities (county councils) in the West of Ireland committed to the re-establishment of rail services between Limerick and Sligo via Clare, Galway axnd Mayo.

3 McCann recommended the reopening of the railway in three phases as far as Claremorris to be followed by a review of the section to Sligo.

4 Transport 21: https://www.rte.ie/news/2005/1101/69233-transport/

The timing of the reopening, in the depths of the recession, was inauspicious, coinciding as it did with a sharp contraction of all economic activity in the state and a calamitous drop in numbers using all forms of public transport. This was exacerbated by the fact that the Limerick-Galway route was treated as the poor relation of Ireland's railways. For example, unlike the Midleton service close to Cork, which had opened a short time previously, there was no free travel promotion in the first week to attract customers, nor were any reduced promotional fares offered. Instead, a competing Galway-Limerick bus service was launched by CIÉ, the X51 Expressway, featuring a new fleet of coaches and fares which undercut the train service with 13 round trips per day taking one hour and twenty minutes. [5] Press releases and advertising for the new bus route focused on the journey times being quicker by road. It was notable that no comparable high-profile PR drive was in evidence for the new rail service.

Figure 3.2: Phase 1: New track being laid during renewal of Ennis-Athenry (P. Newman)

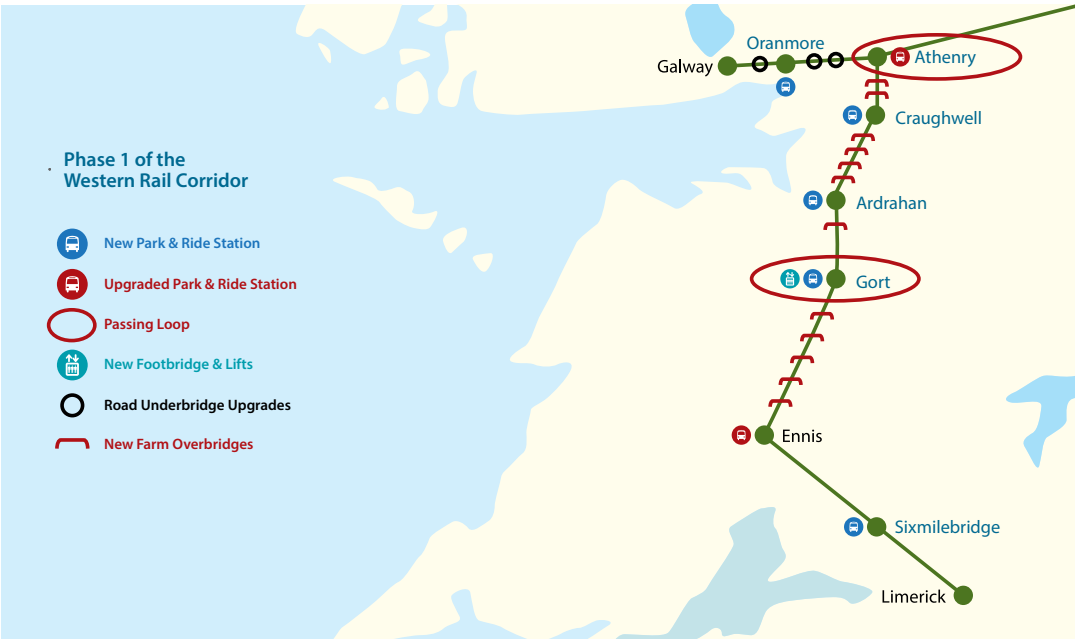
Shortly before the reopening of the Limerick-Galway route, details of a negative 'independent review' by the Department of Transport were widely leaked with newspaper reports headlining that the service would run at a loss and would require an annual subvention of €2.4m.[6] In fact all Irish train services receive subventions. The 2015 *Rail Review* reported that, in 2015, the DART was subsidised by €17m while other commuter services in the Greater Dublin Area were subsidised by €25m. Dublin-Cork was subsidised by €6m and the IÉ share of subsidy on the Dublin-Belfast route was €3m. Elsewhere it was suggested that the reintroduction of the Galway-Limerick link was partly responsible for the termination of Waterford-Rosslare services.[7]

5 This service was discontinued in 2020.

6 Irish Independent, Thursday March 25 2010, Paul Melia article.

7 Irish Times, September 2010, Tim O'Brien article.

Fig 3.3 Infrastructural elements delivered between Limerick and Galway as part Phase 1of the WRC.



The new Limerick-Galway route would continue to bear the brunt of sustained media criticism for a number of years in newspapers, on radio and on television. This included a Prime Time special in January 2012, entitled pejoratively 'Ghost Railway'. Despite the growing success of the railway in recent years this misleading negative narrative continues to inform much of the thinking about the WRC and its proposed extension. A more balanced critique of the Limerick-Galway line was provided in the AECOM/Goodbody *Strategic Rail Investments Needs Review* commissioned by Iarnród Éireann and published in February of 2012.[8]

That report into the future strategy for the national rail network recommended that improvements in speeds and capacity on intercity lines, including the Limerick-Galway route, be prioritized. From a WRC perspective, its most significant conclusion was that Limerick-Galway was in fact an intercity route and needed to be developed as such. This was directly contrary to the 'Ennis-Athenry' narrative of the day.

The report made the following observations regarding Phase 1 of the WRC:

> "The Western Rail corridor opened to business during 2010, and provides direct InterCity connections between Galway and Limerick. Nevertheless, whilst commuting demand from its catchment into Galway and Limerick is strong, the level of intercity travel is very low, and central sections of the line remain lightly trafficked."

The consultants then gave their view as to why that was the case:

> "It does not offer consistency within the InterCity network, having no capability for seat reservations, promotional tickets and catering."

Having identified Limerick-Galway as an 'InterCity' route they went on to make the following proposals (numbered references as per AECOM Report):

> 11.1 Upgrade all services to inter-city branding with seat reservations, advance purchases and catering.

8 Aecom for Irish Rail: https://www.irishrail.ie/IrishRail/media/Imported/IrishRail_28FebFinal_Part11.pdf

> 11.2 Increase frequency to 8 trains per day.
>
> 12.1 Introduce 5 direct services per day from Cork – Limerick – Galway as an extension of the Western Rail Corridor.

AECOM summarised their key finding as follows:

> "The key proposal for this route is therefore to introduce consistency with other InterCity services. The increase in service frequency is proposed as a measure to stimulate more intercity demand."

Although the above comments were made by consultants engaged by Iarnród Éireann, they went largely unheeded in the media. It should be noted however, that in subsequent months and years, and in consultation with community groups, Iarnród Éireann took a series of steps to improve the marketing and competitiveness of the route, while stopping short of upgrading it to InterCity status.

> "The key proposal for this route is therefore to introduce consistency with other InterCity services. The increase in service frequency is proposed as a measure to stimulate more intercity demand."

AECOM/Goodbody Strategic Rail Investments Needs Review for Iarnród Éireann 2012

[3.3] MEASURING PASSENGER NUMBERS

It is standard practice in Ireland, in the UK and in mainland Europe to measure passenger numbers on any route as the total number of patrons who use the train at any point along its journey.

However, from an early stage the question of what actually constituted the Western Rail Corridor was disputed. Despite the fact that new stations at Sixmilebridge and Oranmore were costed as an integral part of the Phase 1 Limerick-Galway restoration plan, along with extensive railway works between Limerick-Ennis and Athenry-Galway, media commentary remained fixated exclusively on the newly re-laid 'Ennis-Athenry' section.

Separate figures for passenger numbers on the 'Ennis-Athenry' section still continue to be issued although, according to the official timetable, no such rail route officially exists, the actual route being Limerick-Galway. These separate (and smaller) figures are commonly represented as being those of 'the WRC'.

However, in the Business Case for the route, entitled *Limerick-Galway Service Development including the reintroduction of Passenger Rail Services between Ennis-Athenry*,[9] the Chief Executive of Iarnród Éireann, Dick Fearn, had clearly spelt out a projected increase in passenger numbers of 200,000 on the entire Galway-Limerick route:

9 p20 Business Case Final Report (February 2006)

1. Up to seven round trips a day will be operated between Galway and Limerick.
2. Five new locations will be directly connected to the rail network.
3. Initially 0.1m additional passengers will be carried, growing to 0.2m within five years.[10]

He is clearly referring to the entire route because he mentions five new stations, two of which are outside of the Ennis-Athenry section, i.e., Oranmore and Sixmilebridge.

> "The (Faber Maunsell) model has predicted an additional 320 daily trips between Galway and Limerick with, as expected, Galway - Ennis and Galway - Limerick the most popular pairing of origin - destinations. Iarnród Éireann's own assessment is in line with this projection which translates to approximately 100,000 trips per annum."
>
> *Mr. Dick Fearn, CEO of Iarnród Éireann, Business Case Final Report (February 2006), p13.*

While analysing the performance of various elements of rail routes separately may be a useful internal exercise for rail operators worldwide, particularly for marketing and development purposes, it is clear that:

A. measuring *all* passenger journeys on WRC trains serving the Limerick-Galway route is the only way to properly evaluate the success of Phase 1.

B. the notion of Ennis-Athenry passengers being counted separately as the 'full' WRC cohort is incorrect and misleading.

According to the parallel Ennis-Athenry narrative, the Business Case projected 200,000 passenger journeys on that section by 2015 with fourteen trains per day or seven in each direction i.e., approximately 14,285 passengers per train per annum. However, for most of its ten years in operation only five services were actually provided in each direction i.e., a total of ten, or 30% less than promised. The same calculation for the ten daily services gives a total of 142,857 passengers. Despite the reduced number of services, the Department of Transport continues to insist on the 200,000 figure in order to claim that Phase 1 has not met its targets.

[3.4] PASSENGER NUMBERS ON PHASE 1 OF THE WESTERN RAIL CORRIDOR 2010-2019

The positive measures taken by Iarnród Éireann in 2013-14 marked the beginning of a steady annual growth in annual passenger numbers culminating in 531,000 passenger journeys in 2019 (the last full year available, pre-Covid). It should also be noted that there were an additional 140,000 journeys on exclusively Ennis-Limerick commuter services, bringing the total number of journeys on the Limerick-Galway route in 2019 to 671,000.

10 Ibid.

Figure 3.4: Passengers queue at Limerick for the Galway train on a busy Friday evening. (N. Dinnen)

Table 3.1 Passenger Numbers on Phase 1 of the Western Rail Corridor 2010-2019.

YEAR	LIMERICK - GAWAY	CHANGE ±	ENNIS - ATHENRY*	CHANGE
2010	185,254		43,799	Mar-Dec 2010 only
2011	224,166	21%	34,461	-21%
2012	235,555	5%	34,235	-1%
2013	219,209	-7%	28,473	-17%
2014	225,116	3%*	51,128	80%
2015	278,532	24%	102,486	100%
2016	289,323	4%*	100,564	-2%
2017	352,706	22%	133,835	33%
2018	457,688	30%	137,784	3%
2019	531,336	16%	160,135	16.2%
Increase since 2011	**307,170**	**+137%**	**125,674**	**+365%**

*Figures supplied by Iarnród Éireann (updated 11th September 2020). *Flooding at Ballycar necessitated closure of the line between Ennis and Limerick in 2014 and 2016, hence the lower growth figures for those years.*[11]

As can be seen from Table 3.1, there was an increase of 73,648 passengers (or 16.1%) between 2018 and 2019. Due to the Covid-19 Pandemic a full set of figures is not available for 2020 but average growth for the previous three years was 23%. Replicating this strong growth pattern at a relatively conservative 10% per annum, estimated figures for 2020-23 might be projected as follows:

Table 3.2 Projected passenger numbers based on 10% growth

YEAR	LIMERICK-GALWAY	CHANGE ±	ENNIS- ATHENRY*	CHANGE
2019	531,336	16.1%	160,135	16.2%
2020	584,469	10%	176,148	10%
2021	642,915	10%	193,763	10%
2022	707,207	10%	213,139	10%
2023	777,927	10%	234,452	10%

A comparison of the performance of the Limerick-Galway route with other intercity routes in the country for the year 2019 (the last full year available) shows the performance of the WRC is rapidly approaching that of a number of other intercity services such as Dublin-Westport/Ballina, Dublin-Tralee and Dublin-Rosslare.

11 In 2014 flooding to a depth of 1.9m caused the closure of the line at Ballycar between Limerick and Ennis for over 16 weeks between February and May. This event was at odds with the previous understanding of the catchment hydrology. The line remained closed for over 16 weeks between 2nd February, 2014 and 20th May, 2014. The railway was also closed for a period of 22 weeks by a flood event from 15th December, 2015 to 17th May, 2016 as result of prolonged heavy rain.

Table 3.3 WRC Phase 1 comparison to other InterCity routes.

ROUTE	2018	2019	CHANGE %
National			+ 4.4
Dublin - Cork	3,460,000	3,660,000	+ 6
Cork - Midleton	437,000	480,000	+ 10
Cork - Cobh	908,000	971,000	+ 7
Dublin - Limerick		1,100,000	+ 6.7
Limerick - Galway	457,688	531,000	+ 16
Limerick - Ballybrophy	33,000	38,000	+ 15.1
Limerick Jct – Waterford	41,000	43,000	+ 4.9
Dublin - Waterford		1,490,000	+ 7.2
Dublin - Tralee	653,000	686,000	+ 5
Dublin - Galway		2,130,000	+ 4.1
Dublin – Westport/Ballina		605,000	+ 4.9
Dublin - Sligo		1,450,000	+ 3.3
Dublin - Rosslare		723,000	+ 1.7
Dublin - Belfast	1,200,000	1,324,000	+ 16.9
Dublin - Kildare		3,100,000	+ 6.5
Dublin - Maynooth		4,600,000	+ 4.9
Dublin - Drogheda		5,750,000	+ 4.4

Data Source: Iarnród Éireann Press office

Figure 3.5: Phase 1: Passengers alighting at Oranmore WRC station (N. Dinnen)

[3.5] OBSERVATIONS ON THE DELIVERY AND SCALE OF SERVICES PROVIDED ON PHASE 1

The Iarnród Éireann Business Case written in 2005 described a service that bore little resemblance to what was actually delivered.[12] Passenger numbers were projected on the basis of a clock face timetable service of 7 round trips daily between Galway and Limerick. i.e., with services departing at regular intervals, at the same number of minutes past the hour. However, only five non-clock face services were delivered.

Attractive links to InterCity services ex. Limerick and Galway were promised but not delivered, e.g., Galway to Cork still requires up to two train changes with delays at Limerick or Limerick Junction.

It was 2014, four years after train services were introduced, before it became possible to purchase a Galway-Limerick train ticket online. There were immediate positive results. On February 3rd, 2014 Iarnród Éireann reported that following the introduction of online booking and new promotional adult fares, passenger numbers travelling between the two cities or to and from stations on the renewed section of the line, had increased by over 38% since the start of December, when compared to the same period twelve months previously, and that the increase was being maintained and accelerating.

Additional positive measures undertaken by Iarnród Éireann included the introduction of attractive student fares and the provision of free parking at all WRC stations, including Sixmilebridge and Oranmore. Due to strong growth in passenger numbers to all destinations, the Oranmore car park, developed by Galway County Council and opened with the station in 2013 as part of Phase 1 of the WRC, has now been approved for a major extension.

Figure 3.6: Intercity Limerick-Galway service passes Ballymaquiff Castle, Labane, Co. Galway on WRC Phase 1. (P. Newman)

A journey time of 1h:50m was projected for the Galway to Limerick service in the Business Case, at a maximum line speed of 60mph. However, in spite of the fact that the line was

12 P20 Business Case Final Report (February 2006)

actually constructed to a maximum line speed of 80mph the fastest journey time is 4 minutes slower than that projected.

A passing loop was planned for Sixmilebridge, which would make for better scheduling, but it was never built. An additional Park and Ride station at Crusheen was promised in 2012. Although planning permission was granted by Clare County Council, this has now lapsed.

The Business Case promised 'an integrated transport measure for the western corridor, incorporating both road and rail modes (i.e., complementarity between bus and rail services). This did not happen. Instead, a competing bus service was introduced between Galway and Limerick, with thirteen round trips per day taking one hour and twenty minutes and bus services from Ennis station to other parts of Clare routinely departing before any potentially linking train services arrived.

The Business Case suggested that the new rail service would be closely integrated with the roads programme and other traffic developments.[13] However, there is little evidence that this ever happened. For example, the 2016 Galway Transport Strategy, supported by the NTA, ignored the railway.[14]

The Faber Maunsell demand model prepared for Iarnród Éireann in support of their Business case, predicted an additional 320 daily trips between Galway and Limerick.[15] The IÉ Business Case stated that: 'Iarnród Éireann's own assessment is in line with this projection which translates to approximately 100,000 trips per annum'. In 2019 there were 531,000 rail trips on Galway - Limerick train services with 160,135 on the new section between Athenry and Ennis. In summary, overall passenger demand on the Limerick-Galway rail service was projected in 2004 by Faber Maunsell at 169,000. Actual performance in 2019 was 531,000, i.e., over 300 per cent higher than projected.

Although 'on-board revenue protection' was specified in the IÉ Business Case, in the course of a survey of 78 trains over eight days in November 2015 there were no ticket checks on any service.[16] The projected operating costs in 2005 are the same as the reported operating costs today, even though only 70% of the projected services were delivered. The average diluted fare assumed in the Business Case per trip was €5. By 2015, the target year of the IÉ Business Plan, 102,000 passengers travelled on the Athenry-Ennis section generating €500,000 according to Irish Rail.[17] This amounts to approximately €5 per trip.

Vistacon (2015) found that more than two-thirds of passengers using the Western Rail Corridor are travelling at least once a month, or once a week, or more often than once a week. An improvement to early morning services would increase the daily commuter cohort.

Of those surveyed by Vistacon in 2015 more than 78% said their destination was Galway, Limerick or Ennis. Only 14% indicated that Oranmore, Athenry, Craughwell, Ardrahan or Sixmilebridge was their destination. Vistacon concluded: "This confirms that this part of the route is mostly InterCity, with a strong commuting pattern on the Limerick-Ennis and Galway-Athenry sections."[18]

13 P8 Business Case Final Report (February 2006)

14 See: GTS Appendix A Transport Demand.pdf (galwaycity.ie)

15 Table 5.1 Western Rail Corridor Patronage Forecasting, Faber Maunsell (2005)

16 The Vistacon (formerly Cicero) report may be viewed at: https://www.vistacon.ie/wp-content/uploads/2018/10/4_Rail-Strategy.pdf

17 Vistacon (2016) p8.

18 ibid., p16.

Rolling Stock assigned to Phase 1

"On a minority of services, a three-car ICR set seating 190 is run. These trains (22000 Class Diesel Multiple Units) have a top speed of 100 mph (160 km/h) and are both comfortable and well-appointed... The majority of services are formed by the Commuter fleet (2800 Class DMU seating 85 people in a two-car or 170 in a four-car set], These trains have a top speed of 75 mph (120 km/h). Spartan in comparison with ICRs, they are less comfortable and have few of the ICR's creature comforts. There is no hard-and-fast rule with regard to which train type, ICR or Commuter, passengers can expect. This is incongruous for an InterCity route."

Vistacon (2016), p8.

Because restoration of Phases 2 and 3 of the WRC was deferred due to the recession of 2007-2012, it was not possible for freight services to operate on Phase 1 of the railway as all rail freight in the Midwest had by then ceased in line with the new policy of Iarnród Éireann to disengage almost entirely from the rail freight business. However, the McCann Report had identified a rail freight demand in Mayo for access to the ports of Dublin and Waterford. Proponents of the Western Rail Corridor succeeded in bringing about an arrangement where logistics companies chartered freight trains to operate on these routes at no financial risk to Iarnród Éireann. The demand for direct WRC access to Waterford Port was proven and today Mayo generates 100% of all intermodal rail freight traffic in the State, with over 400 intermodal and pulpwood trains annually serving Dublin and Waterford.

The reconnection of Galway to Mayo through the next phases of the WRC, i.e., Athenry-Tuam (Phase 2) and Tuam-Claremorris (Phase 3), will offer rail freight traffic to Waterford and the Port of Shannon-Foynes a shorter and less congested route than the present path which requires the routing of all such traffic between the West and South of Ireland through the Greater Dublin Area.

Fig 3.7 Passengers from Galway alight at Ennis (N. Dinnen)

[3.6] FURTHER DEVELOPMENT OF THE LIMERICK-GALWAY ROUTE

The Limerick-Galway railway directly links the third and fourth largest cities of the state. It might reasonably be expected therefore that it would be recognised and marketed as an Inter-City service with the level of services and rolling stock commensurate with such status. To date this has not been the case.

It is notable that the recently published 'Iarnród Éireann Strategy 2020-2027' fails to make any significant mention of the route linking these two major cities via Ennis, the 12th largest settlement in the state (population 25,276 in 2016 Census).[19] Instead, there are references to Athenry-Galway and Ennis-Limerick with only an un-keyed dotted line indicating the presence of an intercity standard railway between Limerick and Galway.

While the desirability of developing commuter rail for all cities in the state is strongly promoted in the Iarnród Éireann Strategy document, it is noted that with the exception of those lines that connect to Dublin, there is a singular lack of ambition for the connectivity which the rail links between other cities affords. To maximise the investment of the state and to build on the success of the Limerick-Galway route, there are a series of measures that should be undertaken.

The first set of measures relates to inter-city connections. The Limerick-Galway route should be re-branded as an InterCity route, which would be a true reflection of its status. In addition, direct services linking Cork, Limerick and Galway should be introduced as an extension of the scope of the Western Rail Corridor.

The second set of measures relates to the efficiency of the WRC operation. The service timetable should be accelerated to reflect the full potential of line-speed capacity. The number of daily services should be increased to the level originally planned. Bus Éireann and Local Link services in Clare and Galway should be linked into and co-ordinated with the timetable, providing integrated public transport from the railway to rural communities. Finally, a Leap Card should be introduced for all rail services in the western region.

The third set of measures relates to the need for further investment to improve the service. The flooding problem at Ballycar should be remedied without further delay. A Park and Ride station should be opened at Crusheen, as planned in 2012-13. A passing loop should be provided at Sixmilebridge, as originally planned, and the current commuter stock should be replaced by InterCity trains.

Fig 3.8 Passengers for Limerick boarding at Athenry (N. Dinnen)

19 Iarnród Éireann Strategy (irishrail.ie): https://www.irishrail.ie/en-ie/about-us/company-information/iarnrod-eireann-strategy

4

WATERFORD BOUND TIMBER TRAIN NEAR CLAREMORRIS (P. NEWMAN)

Section 4

Economic Development Rationale for the WRC

[4] ECONOMIC DEVELOPMENT RATIONALE FOR THE WRC

[4.1] INTRODUCTION

To address the task of identifying the strategic development rationale for the Western Rail Corridor it is necessary to understand the challenges and the complexities of regional planning. Regional development perspectives can be distorted because from a mainly public policy perspective it is difficult to understand the true potential and structural characteristics of regional economies and how they can evolve and grow in an organic way. They also tend to be partial because there is a tendency to focus heavily on the role of public policy-makers and neglect the reactions of private sector actors. Regional strategies are sometimes poorly organised, not for lack of regional needs or enthusiasm, but because it is difficult to co-ordinate the many actors and layers of decision making that need to be involved at a regional level. Ultimately, regional policies can end up being ineffective because there is a strong preference to fall back on national development frameworks with the hope that centralised policies will generate sufficient spillover and trickle-down effects from core densely populated regions to peripheral, sparsely populated regions.

In this section we discuss the appropriate strategic development context within which the evaluation of the likely benefits of restoring Phase 2 and 3 of the WRC should be carried out. But first we need to make a clear distinction between two separate but inter-related project appraisal approaches:

> (a) the study of the restored rail link as just an additional local transport mode mainly for the benefit of the towns and villages in the immediate vicinity of the restored track and its stations;
>
> and
>
> (b) a wider framework that takes (a) into account but also recognises that the restoration of the rail link between Athenry and Claremorris opens up a missing north-south connection between the Dublin-Ballina/Westport line and the Dublin-Galway line. In addition, since the Phase 1 Ennis-Athenry link is already restored and operating, this extends the direct north-south rail connection further south to Limerick and onwards to Cork and Waterford.

Since the present analysis was carried out in the aftermath of publication of the report by the consultants EY, in Section 4.2 we review the consulting brief that Iarnród Éireann prepared for EY when the latter were awarded the appraisal contract on the Phase 2 and 3 restoration. We show that great emphasis was placed in the consulting brief on the need to use a context wide enough to "recognise and quantify demand that may be created by virtue of the WRC potentially becoming a development driver of the Atlantic Economic Corridor in its own right".[1]

Although the "peer review" carried out by JASPERS concurred with the conclusions of the EY Report, they also noted the absence "of clear economic objectives", and stated, "If it is considered that the project will generate a fundamental change in the regional economy, then the investment should be presented as part of a broader strategic concept for the corridor."

1 Later we will show that the analysis methodology actually used by EY largely ignored this aspect of the Iarnród Éireann consulting brief.

In Section 4.3 we address the challenge of actually identifying the correct regional development context for evaluating the restoration of the WRC. In addition to knowledge of the geographical area in the immediate proximity to the restored line, it requires an understanding of how the societies and economies of the counties that are located in the central region of the Atlantic Economic Corridor actually function and what are the drivers and the barriers associated with regional growth and development.

In Section 4.4 we discuss how any effective development strategy for the central-AEC region is likely to be very different from the development strategy set out in Project Ireland 2040 mainly for the five-city regions centred on Dublin, Cork, Limerick, Galway and Waterford. Agglomeration benefits arise naturally in large urban metropolitan centres, but they need pro-active policy actions if they are to be created in regions where towns are small and dispersed geographically. A crucial policy instrument will be the improvement of transport and communication links that assist in the generation of agglomeration effects through creating better links between smaller urban centres. This is where one needs to demonstrate that the benefits of restoring the WRC are likely to play a regional developmental and transformational role.

"Agglomeration benefits arise naturally in large urban metropolitan centres, but they need pro-active policy actions if they are to be created in regions where towns are small and dispersed geographically."

We conclude in Section 4.5 by taking a forward looking perspective on the evolution of the economy of the central-AEC region. A more spatially balanced pattern of national growth is the goal set out in the government's Project Ireland 2040 and in the Regional Spatial and Economic Strategy prepared by the Northern and Western Regional Assembly. If the towns of the central AEC region continue to exist in relative isolation from each other, dominated by their links mainly to the east (Dublin), the historical spatially distorted national growth pattern will continue and deepen. However, with an appropriate region-specific development strategy, the central-AEC region has the potential to develop rapidly and robustly. The investigation of the likely financial benefits of the WRC, to be undertaken later in Section 6, needs to be carried out in this future-oriented dynamic perspective rather than in a backward looking static perspective that will perpetuate the regional status quo.

[4.2] THE IARNRÓD ÉIREANN CONSULTING BRIEF PREPARED FOR EY[2]

In this section we focus on the need to take account of the wider regional development rationale of the restored WRC. Of course, there are narrower financial criteria that must also be examined. For example:

> "The appraisal must ensure that any extension of the WRC meets all of the relevant appraisal processes and value-for-money tests required under the Public Spending Code and the Department of Transport, Tourism and Sport (DTTaS) Common Appraisal Framework for Transport Projects and Programmes (CAF)".

2 All quotations in this sub-section are taken from the Iarnród Éireann Consulting Brief. We focus only on the aspects of the brief that are directly relevant to regional development. For the full Iarnród Éireann Consulting Brief, refer to the DTT&S web site.

This is a standard requirement of infrastructure investment appraisals. The capital costs of an infrastructure investment have to be evaluated fully, as have the likely future utilization and revenue-generating potential of the investment. However, if the wider development rationale is ignored and revenue-generation is narrowly focused, then the resulting benefit-cost ratio (BCR) of the infrastructure project is likely to be understated. On the other hand, if a wider rationale is taken into account with unchanged capital costs, this will boost likely revenue projections and will increase the project BCR.

As stated in the Iarnród Éireann consulting brief:

> "According to the recently published National Development Plan (NDP 2018 – 2027): The Western Rail Corridor Phase 2 from Athenry to Tuam, and phase 3 to Claremorris could play an important role in the Atlantic Economic Corridor. The extension of the WRC could increase passenger, tourist and commercial use. In line with the Programme for Government an independent review will be undertaken immediately. If the findings of the review are approved by Government, the project will be prioritised during this plan.

The brief further emphasised the role of the WRC in the context of the Atlantic Economic Corridor:

> "The railway between Athenry and Claremorris represents the missing link in a much longer existing transport corridor that connects Mayo by rail to Cork and Waterford via Athenry, Ennis and Limerick. The restoration of this currently unused state asset can play a significant part in the development of the Atlantic Economic Corridor (AEC) in terms of connectivity and regional development.
>
> The AEC recognises a changing economy in Ireland where the sustainable development of all natural and infrastructural resources is the basis of economic development and the key comparative advantage when attracting FDI or other investment. An integrated and modern railway that provides a freight, inter-regional and commuter backbone may have a role to play in regional development".

> "The railway between Athenry and Claremorris represents the missing link in a much longer existing transport corridor that connects Mayo by rail to Cork and Waterford via Athenry, Ennis and Limerick. The restoration of this currently unused state asset can play a significant part in the development of the Atlantic Economic Corridor (AEC) in terms of connectivity and regional development."

Iarnród Éireann Consulting Brief 2019

The Iarnród Éireann Consulting Brief then set out how user demand for the restored rail link should be examined. Two basic kinds of demand were identified:

A. Diverted demand: i.e., demand on the new services that is expected to shift from other modes (such as car and bus/coach) to rail

B. Latent demand: i.e., new travel demand which is the result of a transformative enhancement to transport access.

Sophisticated transport planning models are required to analyse future demand in this way.[3]

3 At the national level, the National Transport Planning Model (NTpM) is used by TII to analyse transport management and planning issues.

Separate consideration needs to be given to passenger transport and to freight transport. Within each of the two categories there are two inter-related issues. First, one must project the likely total demand for each category (i.e., total journeys undertaken - cars, bus/coaches and rail - and total freight tonnage carried) and second, one must estimate how each category is likely to split between car, bus and rail (in the case of passengers) and between road and rail (in the case of freight).[4]

The Iarnród Éireann Consulting Brief further emphasised the role that a restored WRC could play in the AEC:

> "As well as measuring diverted and latent demand, the review must also recognise and quantify demand that may be created by virtue of the WRC potentially becoming a development driver of the Atlantic Economic Corridor in its own right. The WRC may support a new type of agglomeration in the economic corridor. The value of the new rail link as a driver for the development model for the Atlantic Economic Corridor shall be assessed and provided by the Consultant.
>
> The Athenry –Claremorris link will integrate the WRC into the national Intercity rail network and the uplift in demand as a result of this wider rail integration shall also be quantified. The scheme could link many of the smaller urban centres by rail e.g. Gort, Tuam, and Claremorris. The review must quantify agglomeration benefits likely to accrue to these smaller urban centres as a result of being rail connected."

With respect to freight, the Consulting Brief required an examination of how freight originating in as well as destined for the west of Ireland could be handled more efficiently by the availability of a direct north-south rail link:

> As part of the demand modelling and projections task the Consultant shall also quantify the direct and indirect cost benefits of moving freight directly to and from ports other than via the greater Dublin area, and should quantify the value of diverting south-bound freight from the Claremorris-Athlone-Kildare corridor. This will include an assessment of the potential reduction in delay minutes, and the potential opportunity of increasing rail passenger frequency on the Mayo-Dublin corridor.

The Consulting Brief specified an additional concept of "agglomeration-type benefits" that are relevant to regional development in the AEC as follows:

> Agglomeration benefits (...) arise because firms derive productivity benefits from being close to one another and from being located in large labour markets. If transport brings firms closer to their workforce this may generate an increase in labour productivity above and beyond that which would be expected from the direct user benefits alone.

Agglomeration benefits can arise through imperfect competition effects as transport investments reduce the operating costs of firms, who respond by increasing their output and reducing their prices. They can also arise through labour market effects as improved transport allows more people to enter the regional work force, and improves the opportunities available to people already in the labour force. Such effects can be difficult to quantify, even using sophisticated economic models.[5] They are normally evaluated qualitatively using business case studies and regionally focused data gathering and analysis.

4 We do not include transport by sea, although the opening of the rail link to Foynes Port provides the potential for access to two ports (Foynes and Waterford) via the restored WRC.

5 For example, agglomeration effects arise nationally as a result of EU Structural Fund investments and can be studied at a national economy level using sophisticated macroeconomic models.

The challenge faced in carrying out an appraisal of a large infrastructure investment like the WRC is the requirement to spell out what the wider context, such as elaborated by Iarnród Éireann in their Consulting Brief, might actually look like. However, here we face a serious barrier since there is a dearth of detailed regional economic and business research at the NUTS 3 level (e.g., treatment of the aggregate economies of Galway, Mayo and Roscommon that make up the West region) and at the more detailed county level (e.g., Mayo separately from the rest of the West region). To implement these requirements one needs an understanding of the current state of the economy of the central AEC region, and of Mayo in particular. We turn to this aspect in what follows.

[4.3] THE ECONOMY OF THE CENTRAL AEC REGION

When we examine how the Irish national economy and regional economies have developed over time and over space, there are three important features:

A. Economic activity tends not to be spread uniformly over space or over sectors, but tends to cluster or concentrate;

B. Such clustering is clear evidence of some kind of increasing returns (i.e. doubling inputs more than doubles outputs) and this should be exploited by policy makers;

C. 'Growth centres' in specific locations (usually, but not always, around cities or towns of above a certain size) will tend to interact with each other over space to form corridors, or elongated growth centres.

The historical context in which this clustering of towns and cities failed to occur in the west of Ireland in the 18th and 19th centuries is well known.[6] After independence in 1922, Irish governments were reluctant to implement any excessively narrowly focused "growth centre" policies, opting essentially for a pragmatic policy of "light touch", laissez faire dispersal.[7] Their approach tried to reconcile the often conflicting aims of the claimed economic efficiency of growth poles and the wider social equity of dispersal. But where policy makers stood back, market forces stepped in. Dublin's explosive growth was unchecked; Cork, Limerick, Galway and Waterford continued to grow, but more slowly; the rest of the country struggled to develop against uneven odds. Development strategy became focused on the "five cities", but mainly Dublin. Less thought was given to the strategic needs of regions that were remote from these cities, in particular the Northern and Western Region that had suffered from neglect since the 18th century.[8]

In order to understand how a regional economy functions it is essential to examine the structure and behaviour of enterprises in a way that is relevant to the specific features of the economy of the central AEC region. Given the known characteristics of the region – small towns, mainly rural, with a very low population density - this requires special attention to the SME and micro-firm levels, where self-employment and small firm activity in the production of goods and services tend to be more dominant than in more centrally located regions with their large, urban-based population agglomerations. Of particular interest is the extent to which

6 For the historical reasons for western underdevelopment, see "To Hell or to Connaught: The origins of Ireland's east-west economic divide", lecture to Westport Civic Trust, October 17th, 2019.

7 See Buchanan & Partners, Regional Studies in Ireland, Dublin: An Foras Forbartha, 1968

8 The Northern and Western NUTS 2 region consists of counties Donegal, Sligo, Leitrim, Cavan, Monaghan, Roscommon, Mayo and Galway.

such activities can sometimes draw inspiration and support from the special characteristics and circumstances of the wider West region, i.e. a relatively pristine environment, lack of congestion, and improving transport and communication links internally and to external markets. Of course, it also requires us to explore links between larger firms, both indigenous and multinational, and smaller local firms, even in cases where the larger firms may lie outside the region. The enterprise sector needs to be at the core of regional development.

Specific insights into the economy of the central AEC region can be obtained by examining the economy of Mayo. It is useful to focus on Mayo for two reasons. First, the direct benefits of the restoration of the Athenry-Claremorris rail link to the economy of Mayo are likely to be higher than for adjoining counties. Second, we can examine the performance of the Mayo economy drawing on a recent detailed study that pulls together the available data and information.[9]

We can drastically simplify analysis by focusing on two core strategic issues: population and enterprises. By population we include the spatial and social aspects of life in Mayo; the size, distribution and attractiveness of Mayo towns and villages; the quality of life that is available; the level of provision of a wide range of social and other public services (schools, hospitals, libraries, etc.). By enterprises we encompass all of the sources of employment available in the county. With the exception of social income support, it is mainly through the enterprise sector (including public enterprises, state and local government) that people can find fulfilment and earn the income to support their families.

The population density in Mayo is the second lowest in Ireland (23 persons/sq km, with only Leitrim lower, at 20 persons/sq km).[10] In addition to the low density, the population of Mayo is dispersed throughout the county area in many small towns and villages. The largest three towns in Mayo are Castlebar (12,500), Ballina (10,000) and Westport (6,500).[11] Figure 4.1 shows that the Mayo towns can usefully be examined in three clusters centred on Ballina (to the north); Castlebar/Westport (in the centre); and Claremorris/Ballyhaunis/Ballinrobe (to the south and east).

Figure 4.1: Mayo town clusters

9 See The Economy of the AEC: A Study of County Mayo, March 2019 (available at https://www.westportchamber.ie/presentations)

10 By comparison, County Dublin has 1345 persons/sq km; County Cork 72 persons/sq km; County Galway 42 persons/sq km.

11 By way of population comparison, Galway to the south has a population of 80,000 and Sligo to the north has 19,000.

Table 4.1 lists the populations of the main towns in Mayo, where the cut-off point was set at 1,000. This cut-off is quite arbitrary since towns with populations below the 1,000 threshold can be hosts to some remarkably innovative manufacturing and service activities.[12] Table 4.1 emphasises the fact that Mayo towns are widely distributed over the whole county and that although their populations have grown between the Census of Population for 1996 and for 2016, the population growth is shared over most of the towns rather than being concentrated in one or a few. However, on closer inspection, a disturbing pattern is apparent. The towns to the centre and south of the county highlighted in yellow (Castlebar, Westport, Claremorris, Ballinrobe and Ballyhaunis) all display above average growth while towns lying to the north of the county highlighted in orange display below average growth. One northern town, Crossmolina, actually suffered a population decline of 13% in the years between the 1991 and 2016 censuses.

Table 4.1: Population of Mayo towns 1991-2016

TOWN	POPULATION	POPULATION	% CHANGE
	1991	**2016**	**1991-2016**
Castlebar	7648	12068	57.8
Ballina	8167	10171	24.5
Westport	3688	6198	68.1
Claremorris	1907	3687	93.3
Ballinrobe	1229	2786	126.7
Ballyhaunis	1282	2366	84.6
Swinford	1216	1394	14.6
Foxford	974	1315	35
Kiltimagh	952	1069	12.3
Crossmolina	1202	1044	-13.1
Charlestown	712	1033	45.1
Belmullet	986	1019	3.3
Mayo Urban	29963	44150	47.3
Mayo total	110713	130507	17.9
Roscommon	51897	64544	24.4
Galway	180364	258058	43.1
West NUTS 3	342974	453109	32.1

There are many factors underlying this pattern of asymmetric north-south population growth. For example, the towns lying in the centre and to the south of the county have good existing rail and transport links to Dublin.[13] A second factor is likely to be the fact that the town of Sligo is simply too small to act as an urban "attractor" for businesses located in north Mayo in the way that Galway acts for businesses in central and south Mayo.

Turning to the enterprise sector in Mayo, we can divide it into four categories: public services, private services, manufacturing and agriculture. In the public services sector there is a close relationship between the size of this sector and the size of the county population. If some national public services are re-located to Mayo through a renewed decentralisation programme, this relationship can change. But it is never likely to deviate very much from a national average since all other peripheral counties also have their claims.

12 For example, PEL is based in Balla (population 769) and develops and manufactures highly innovative and versatile refuse compacting machinery that it exports to the UK, the EU and the USA. Westire Technology is based in Belmullet (population 1019) designs and manufactures sophisticated electronic switching devices that are exported all over the world.

13 In The Economy of the AEC: A Study of County Mayo it was noted that an enterprise located in Claremorris stressed the importance of having easy access to the Galway-Dublin motorway to facilitate interaction with its customer base outside Mayo.

> "Rail services also play an important role in providing connectivity in many rural areas. Ireland's rail network primarily serves inter-urban connections, but the potential catchment areas for railway stations in rural areas can extend far beyond the immediate hinterlands, thus presenting a viable and attractive option for rural dwellers and tourists alike to travel safely, efficiently and comfortably throughout Ireland. Ensuring a fit-for-purpose network, particularly in terms of quality and reliability, is therefore an important socio-economic enabler for rural areas. €1 billion has been committed over the period 2020 to 2024 to ensure the optimal maintenance, renewal and improvement of our rail infrastructure."
>
> *'Our Rural Future': Government Strategy document – March 2021*

The private services sector is and will remain the largest employer in the county, just as it is even in a large urban agglomeration like Dublin city. Almost 45 per cent of employment in the West region (Mayo, Galway and Roscommon) is in private services. Adding public services brings the total for services to just under 70 per cent. It is useful to split the private services sector into two components: "non-traded" and "traded".

Non-traded services are directed at the local population and employment numbers will rise or fall as the county population and incomes rise or fall. Government policies of any kind are likely to have only a limited direct impact on employment in the non-traded private service sector, other than through training, retraining and skill development as older service activities are displaced by new activities. Traded services are sold either outside the county or to people who do not live in the county. Here there is the possibility of growing the sector beyond the natural limits imposed on further growth of non-traded activities by Mayo's low population density. The most obvious example relates to tourism, where services are effectively "exported" to visitors and can grow if visitor numbers grow, but there are many other examples.[14] But many other traded service enterprises also exit and this sector has the potential to grow if the conditions are right.

The next enterprise category, manufacturing, also provides a way of expanding the Mayo enterprise sector as a whole since in almost all cases firms produce goods (including any associated services) that are traded outside the local county and regional markets. They consist of indigenous manufacturing and multinational manufacturing. Most indigenous firms make use of manufacturing and service inputs that can frequently be sourced locally. Such firms have large "multiplier" impacts on the local economy.[15] The multinational manufacturing enterprises are central to the Mayo economy. Although Mayo does not have all of the advantages of the so-called "five cities", nevertheless it has successfully attracted and retained a wide range of modern multinational plants.[16]

Finally, the fact that we have left the agriculture sector to the end is a measure of how its share of the Mayo economy, although still important, has declined since the 1950s. The estimated value of Mayo's annual farm output today is about €250 million. The value of Mayo net industrial output in 2015 was almost €5 billion, about 20 times larger.[17] However, these stark numbers conceal the potential that this sector could come to play in the Mayo

14 See The Economy of the AEC: A Study of County Mayo.

15 If inputs to an enterprise are sourced locally, this generates further local demand. The concept of a "multiplier" captures this process.

16 See The Economy of the AEC: A Study of County Mayo.

17 See The Economy of the AEC: A Study of County Mayo.

economy, both through expanded farming activity and through activities that could both increase the incomes of farmers and land owners and facilitate ancillary activities that are land based (renewable energy, high nature-value farming, agri-tourism). The recently launched Sustainable Agricultural Strategy for Mayo develops these ideas.[18]

THE MAYO ECONOMY - A SWOT ANALYSIS

We can bring together a qualitative overview of the state of the Mayo economy (and by inference, of the state of the central-AEC economy) in the form of a SWOT analysis. The assumption here is that the internal positive and negative attributes of the economy can be distinguished from factors that characterise its external environment. The internal analysis serves to pinpoint important strengths and weaknesses of the county economy and wider county-level society. The external analysis serves to identify strategic opportunities and threats that the county economy has to deal with. Within the SWOT framework policy makers have at least some ability to influence the internal performance of the county economy (e.g., through public investment and other programmes), but have less power over the nature and behaviour of its external environment, which is largely set by the national economic policy makers in the context of the global economy. The SWOT analysis is presented in Tables 4.2(a) - (d).[19]

With respect to key strengths, the presence of a significant base of modern foreign multinational enterprises operating in the county is a sign that the central-AEC business environment can attract and retain modern and sophisticated industrial operations.[20] The existing indigenous manufacturing base in Mayo is sectorally diversified with enterprises ranging over low, medium and high technologies as well as over small, medium and large firms in terms of employment. Diversity is sustained by a skilled labour force and local availability of professional and technical inputs.[21] Firms located in the southern part of Mayo benefit from easier access to the Dublin-Galway motorway. However, firms located in the northern part of Mayo do not have these benefits. Broadband availability is adequate in towns, and high speed connections are available in Castlebar, Ballina, Westport and Claremorris.

With respect to key weaknesses, the most important is the low population density in Mayo (second lowest in Ireland). This is exacerbated by the second factor, namely the dispersed pattern of small towns with poor linking infrastructure joining them to each other as well as to the more developed business and population centres in the eastern and southern regions. Clearly, the poor quality of physical infrastructure is related to the dispersed pattern of urbanisation and the low population density. Causality goes in both directions. These weaknesses have deep historical roots and past public policy appears to have had limited success in remedying them. We have seen that the towns to the north have had much slower rates of population growth than the towns in the centre and south. Both the centre and the south of the county have much better road and rail links to Galway, Limerick and Dublin. The towns to the north have poorer quality links to each other, to the rest of the county and lack the benefits of a large "attractor" city like Galway in the south.

18 See A Sustainable Agricultural Strategy for Mayo, Mayo County Council, November 2018, page 2.

19 A more detailed presentation of the SWOT analysis is available in The Economy of the AEC: A Study of County Mayo.

20 See The Economy of the AEC: A Study of County Mayo.

21 Possibilities of a higher quality of life in regions of Mayo, with improved social amenities, acts as an "attractor" and is likely to continue into the future.

Table 4.2(a): SWOT analysis - Strengths

STRENGTHS	
1	Significant base of foreign multinationals
2	Robust, modern indigenous manufacturing sector
3	Adequate physical infrastructure, but needs upgrading
4	Fast broadband in most big towns but not in hinterlands
5	Rapidly improving social living environment

Table 4.2(b): SWOT analysis - Weaknesses

WEAKNESSES	
1	Second lowest population density of Irish counties
2	Small, dispersed towns with poor linking infrastructure
3	Serious north-south divide in development pattern
4	Weaknesses in Third Level institution in GMIT-Castlebar
5	Difficulty in making transition from non-traded to traded manufacturing/service activities
6	High dependence on social transfers to sustain income

Table 4.2(c): SWOT analysis - Opportunities

OPPORTUNITIES	
1	Ability to attract inward migration to drive non-traded activity
2	Better roads and the availability of the Western Rail Corridor to link north and south of county
3	Availability of Ireland West Airport Knock as future enterprise hub
4	Option to scale up and re-focus GMIT-Castlebar
5	Opportunity to exploit county-specific sectors (energy, marine, eco-tourism)

Table 4.2(d): SWOT analysis - Threats

THREATS	
1	Policies in NDP and Project Ireland 2040 may be too weak to reverse agglomeration processes in the "five" cities
2	N&W Regional Assembly may be too weak to build a strong regional economic consensus
3	Third level N&W educational institutions not sufficiently focused on regional development
4	Top-down broadband strategy may be too blunt for specific needs of county like Mayo
5	Negative impacts of a messy BREXIT

With respect to key opportunities, the first addresses ways open to handling what is the main weakness to achieving faster development of the Mayo economy, namely the low population density. Future opportunities to attract people to settle in counties like Mayo will arise from the higher quality of life on offer in the context of attractive job opportunities.[22] However, this will only come about if the basic regional transport and communication infrastructure linking its scattered towns is improved. The second opportunity relates to the possibility of improving the intra-county and inter-county road network and restoring the

22 See Galway-Mayo Relocation Survey 2018, op. cit.

Western Rail Corridor from Limerick to Sligo. Less densely populated regions will remain weak and sparsely populated if they have only limited internal and external transport and communication links. In the case of the central AEC region, even the present links in the public transport system are poorly organised.[23]

The third opportunity relates to the presence of Ireland West Airport Knock (IWAK) in the central-AEC region. Many of the enterprises interviewed in the Mayo Economy study stressed how important it was to have easily accessible air links to the UK and mainland Europe.[24] In addition, as the enterprise sector expands and develops in the central-AEC region, air freight could give added inducements to locate modern plants near the airport, in much the same way that the SFADCO initiative of the 1960s was a major boost to the development of the Limerick region near Shannon Airport.[25] The role of IWAK in boosting tourism in the Wild Atlantic Way is obvious and could be further enhanced if there was a rail link from the airport to a restored Western Rail Corridor. In future years, as IWAK grows and expands its services, serious consideration will need to be given to connecting the airport to the WRC via such a rail link in order to handle both passengers and freight.

Finally, with respect to threats, the first relates to the possible weakness of Project Ireland 2040 and NDP 2018-2027 as galvanising forces to promote faster and more equitable development in a region like the mid-AEC. Reasons for this policy weakness may be exacerbated by the poor quality of the available regional economic and business data; the very limited research backing to the strategy (also due to poor data availability); the selection of three NUTS 2 "super-regions" with little regional strategy justification or logic for the choices made; the weak acknowledgement of the role of the AEC, which does have very clear regional underpinning; and the lack of any in-depth examination of the characteristics of the regional enterprise sector.[26]

> "The WRC can provide an economic stimulus to the region, while also offering the inhabitants of the region a sustainable alternative to car travel. The re-opening of the WRC has the potential to provide the greatest transformational change both in terms of a shift towards a low-carbon society/economy but also at a regional level as a key enabler to strengthen the functionality of the Atlantic Economic Corridor and to capitalise on the enterprise and employment hub of the Strategic Development Zone (SDZ) at Ireland West Airport Knock (IWAK)."
>
> *Western Inter-County Railway Committee – March 2021*

[4.4] DEVELOPMENT STRATEGY FOR THE CENTRAL AEC REGION

The kernel of development models designed for large urban agglomerations like Dublin, Cork and Belfast is that with everyone essentially located in the one small space, communication and connectivity problems either do not arise, or are easy to handle. This is usually contrasted with the challenges facing development in (say) the central-AEC region and specifically in a county like Mayo, where population density is low, small towns are geographically scattered, and communication channels do not always work seamlessly or efficiently. However, such assumptions have begun to be challenged as cities experience

23 See The Economy of the AEC: A Study of County Mayo.

24 See The Economy of the AEC: A Study of County Mayo.

25 https://en.wikipedia.org/wiki/Shannon_Development

26 See The Economy of the AEC: A Study of County Mayo.

a toxic combination of high house prices, congestion, pollution and onerous commuting times and when improvements in communication technologies produce, if not the "death of distance", then at least a rapid diminution of the costs of distance.[27]

The most important enabler of development strategy in Mayo concerns "connectivity", within which are included roads, rail, airports, sea ports and digital connectivity. The next concerns "facilities", by which mean the advance preparation of a welcoming environment for new enterprises. The third concerns "skills and capabilities", to ensure that enterprises can attract a work force appropriate for their activities. Although the three kinds of enablers are usually treated separately, they must work in a fully integrated way if development opportunities are to be realised.

Access and connectivity are vital in a region where towns are relatively small and are dispersed over a large geographical area. If accelerated development is to occur, it is essential to connect groups of adjacent towns in a way that encourages them to become more interdependent, giving more efficient access for people, products and services to internal and external markets. The focus needs to be on the continual upgrading of road, rail, airport and digital infrastructure. But it also needs to embrace the more efficient and effective organisation of the public transport system, both road and rail.[28] These kinds of improvements will require imaginative and flexible transport policies and are likely to be relatively low cost when compared to the construction costs of motorways.

"Access and connectivity are vital in a region where towns are relatively small and are dispersed over a large geographical area. If accelerated development is to occur, it is essential to connect groups of adjacent towns in a way that encourages them to become more interdependent, giving more efficient access for people, products and services to internal and external markets."

The population table below shows each of the towns served by Phase 2 and 3 of the Western Rail Corridor. The population of the Local Electoral Areas is also shown as the Local Electoral Area represents the population catchment of each station. The total population of the towns and Electoral Areas is 130,260 and 245,313 respectively.

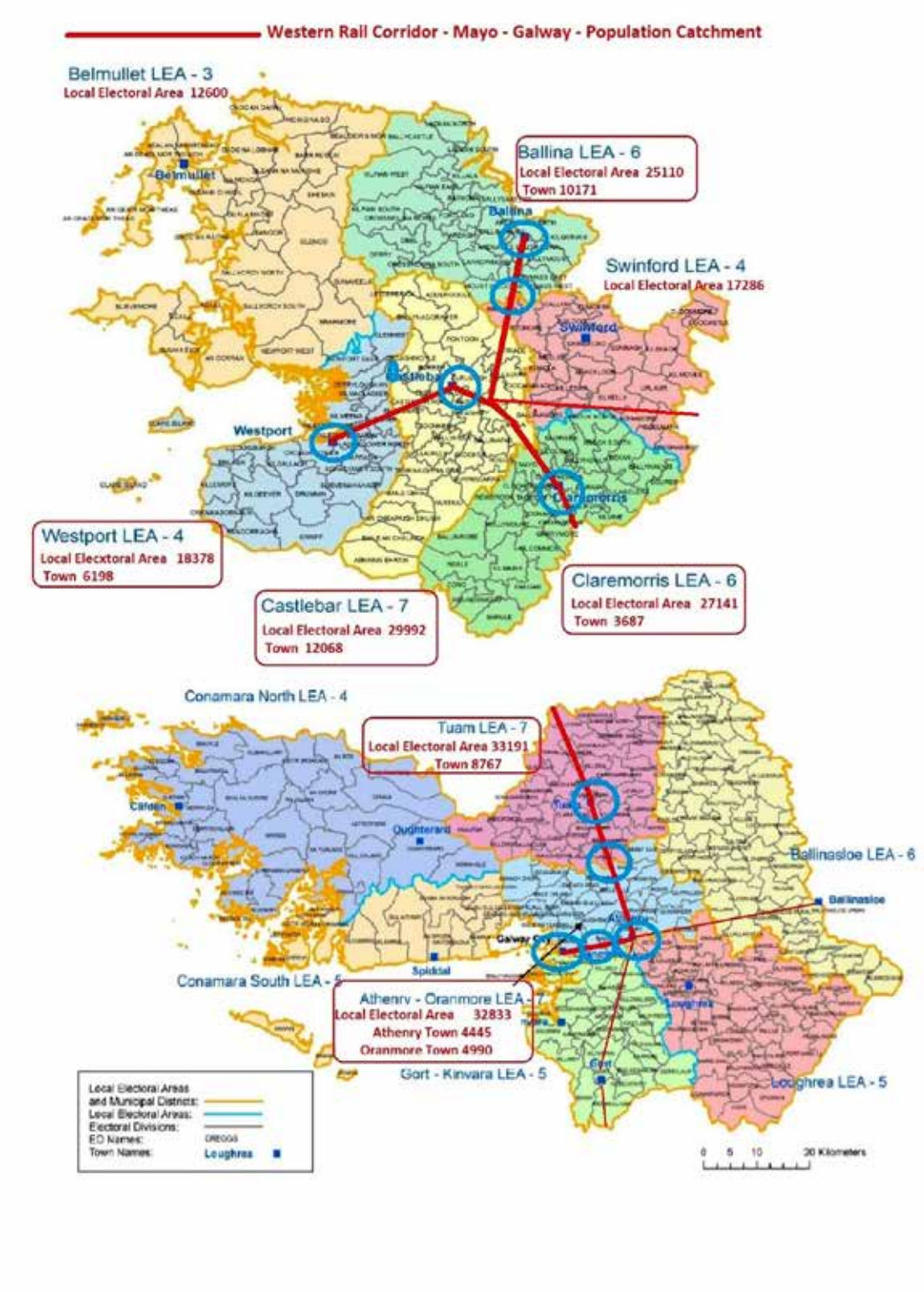
Table 4.3: Town & Local Electoral Area population served by the WRC link to Galway

WRC STATIONS	TOWN POPULATION 2016 SOURCE CENSUS 2016	LOCAL ELECTORAL AREA POPULATION SOURCE BOUNDARY COMMITTEE 2018
Westport	6198	18378
Castlebar	12068	29992
Ballina	10171	25110
Claremorris	3687	27141
Tuam	8767	33191
Athenry	4445	
Oranmore	4990	
Athenry/Oranmore		32833
Galway	79934	78668
Total	**130,260 Town Total**	**245,313 Electoral Area Total**

27 See https://www.brookings.edu/research/countering-the-geography-of-discontent-strategies-for-left-behind-places/

28 "Last April, the Dáil was told about the Swiss region where villages meeting the threshold of 300 residents, jobs or educational places are guaranteed hourly transport links to the overall public transport network." Kathy Sheridan, Irish Times, Wed, Oct 16, 2019

Figure 4.2: The Galway and Mayo town WRC linkages



With the above kinds of improvements to communication and transport infrastructure and services, it would be possible to create competitive and collaborative centres of scale in the central-AEC region. In Mayo, examples would include Castlebar/Westport in the centre of the county; Kiltimagh/Claremorris/Balla/Ballinrobe/Ballyhaunis and environs in the east and south-east; and Ballina/Killala/Belmullet/ Crossmolina/Foxford/Swinford/Charlestown and environs in the north and north-west of the county (see Figure 4.1 above). The best way to encourage the evolution of a more dynamic enterprise sector in the central-AEC region would be to link its smaller towns in such a way that the groupings of towns take on some of the functional characteristics of larger "virtual" towns.[29]

The current plans for improving the Mayo road network are illustrated in a map taken from National Development Plan 2018-2027 (page 43). The blue lines denote work still at the early pre-appraisal stage; the red lines denote work at planning, design and construction stage. This suggests that a lower priority has been assigned to addressing deficiencies in the north-south links in Mayo in favour of focus on east-west links. Currently, the rail system in Mayo consists of the radial connection with Dublin. When it enters Mayo, it links a series of towns: Ballyhaunis-Claremorris, and branching at Manulla, it serves Foxford-Ballina and Castlebar-Westport. Restoration of the north-south Western Rail Corridor from Athenry into Mayo and at a later stage onward to Sligo would address the deficit in north-south transport links in the county.

Figure 4.3: Road improvement plans central-AEC region. Source: National Development Plan 2018-2027 (page 43)

29 As shown in Table 4.1, treating Castlebar and Westport as a "twin" town gives it an effective population about equal to that of Sligo (18,266 vs. 19,199 in 2016). Furthermore, the population growth rate between 1991 and 2016 for Sligo, Castlebar and Westport were, respectively, 6.9%, 57.8% and 68.1%. This strongly suggests that the Castlebar-Westport twin-town complex is a dynamic growth centre and has the potential, together with its rail and air links, to act as a wider population and enterprise "attractor" for the whole central region of Mayo.

In the context of towns that are better linked to each other, there is greater potential to encourage business clustering to enable complementary businesses to start up and progress to making the move from non-traded to traded activities by facilitating cooperation, specialisation, marketing, distribution and sales. If this kind of evolution is to have any chance of happening and a development model based on clusters of small towns is to be established, the connectivity issues discussed above will need to be placed at the centre of the regional development strategy.

> "Restoration of the north-south Western Rail Corridor from Athenry into Mayo and at a later stage onward to Sligo would address the deficit in north-south transport links in the county."

Modern means of transport and communication have already started to lay down a very attractive working environment in the central-AEC region. Examination of the manufacturing and service sectors show that advanced, competitive and highly productive enterprises can and do locate in the region, even if a range of larger science and technology-driven enterprises sometimes need a more complex and sophisticated urban-based university environment like that in Dublin, Cork, Limerick and Galway.

[4.5] THE WRC IN A DEVELOPMENT CONTEXT: THE N&WRA RSES

The publication of the Regional Spatial and Economic Strategy by the N&WRA in 2019 was the first time that a serious effort had been made to plot out a development strategy for the Northern and Western region of the island. In tackling this, there were serious challenges to be faced. First, there was little by way of detailed economic or business research on this region that would be a normal requirement prior to drawing up a forward-looking strategy.[30] Second, the region was quite heterogeneous. Donegal was almost an island, isolated from the rest of the nation. Four of the N&WRA counties (Donegal, Leitrim, Cavan and Monaghan) were "border" counties, across which Irish strategic planning came to a halt. The only large urban agglomeration - Galway city - was located in the extreme south of the region. There was no other town in the region with a population larger than 21,000. And the rest of the towns with smaller populations were scattered all over the region.

The core of the RSES was stated succinctly as follows:

> "Our RSES introduces the concept of a Growth Framework to achieve this integration, because regional growth cannot be achieved in linear steps. It's a symbiotic process. We recognise the regions weaker urban infrastructure, so have adopted a clear strategy for compact growth. The focus of this strategy is on the Metropolitan Area Strategic Plan (MASP) for Galway and tailored Regional Growth Centre Plans for Sligo, Athlone and Letterkenny – which perform city-like functions". (RSES Director's View, page vii)

30 The Economy of the AEC: A Study of County Mayo, published in 2019, was a first effort to define and study an economy at the county level (available at https://www.westportchamber.ie/presentations).

The choice of Letterkenny, Sligo and Athlone as the three "regional growth centres, seems to have been influenced by location (extreme north, centre and extreme east of the region) and by size (these were the three largest towns in the region). The expectation was that they would perform "city-like" functions.

> Our five cities are not evenly distributed across our three regions and the Northern and Western Region is recognised as having a weak urban structure, with Galway being the only city within our region. However, it is acknowledged that Sligo, Letterkenny and Athlone fulfil city-like roles to a greater extent than elsewhere and that they perform as regional drivers that have the potential to grow as centres of scale. (RSES Page 10)

The development strategy had three objectives:

> (a) Compact growth: Carefully managing the sustainable growth of compact cities, towns and villages, will add value and create more attractive places in which people can live and work. Activating centrally located development areas and achieving effective density and consolidation is a top priority.
>
> (b) Enhanced regional accessibility: A co-priority is to enhance accessibility between key urban centres of population and their regions. This means ensuring that all parts of the region have a high degree of accessibility to Dublin, as well as to each other.
>
> (c) Sustainable mobility: In line with Ireland's Climate Change mitigation plan, we need to progressively electrify our mobility systems moving away from polluting and carbon-intensive propulsion systems to new technologies such as electric vehicles and introduction of electric and hybrid traction systems for public transport fleets, enabling our cities and towns to enjoy a cleaner, quieter environment. (RSES Page 7, National Strategic Outcomes)

It was recognised that on the basis of Gross Value Added (GVA) per head, the N&W region was seriously lagging behind the other two Irish regions and that it had moved back from a "More Developed Region" to a "Transition Region". The RSES noted that:

> Whilst this is of concern, it also presents an opportunity to avail of the 'positive discrimination' provided by the European Structural Funds towards regions that are not within the "More Developed" category, as they are designed to counter any imbalance among regions. This means that the region will qualify for greater EU support. It means that the region will qualify for more flexible funding opportunities, better financing rates and greater funding levels Post 2020 to use EU Structural funds as a means to "Positively Discriminate" to help develop our region, as a Smart, Green, Connected Region of the future. (RSES Page 30)

Great stress was placed on what are called "centres of scale":

> In the absence of centres of scale that can provide these items, certain economic activities will not operate in the region and specific groups of workers will migrate out of the region. If these resources are lost, the region risks entering a vicious circle of regional economic decline. Thus, the NWRA is concerned with initiatives that focus on achieving higher economic growth from both the existing (or mature) sectors of our economy as well as those that are new or emerging. (RSES Page 31)

There was a certain logic behind the RSES choice of Letterkenny, Sligo and Athlone as designated "centres of scale". However, in the case of Sligo, examination of population growth in recent years would have suggested that Sligo was not exhibiting the kinds of characteristics that one associates with dynamic "centres of scale". Between the census of 1991 and that of 2016 the population of Sligo grew by 6.9%. During the same period, five Mayo towns grew by between 58% (Castlebar) and 127% (Ballinrobe). Ballina, the Mayo town nearest to Sligo, grew by 24.5%, over 3.5 times faster than Sligo. In the case of Tuam, this town has the potential to grow rapidly and shows how relatively small towns can sustain a wide range of enterprises and activities. Appendix 3 presents a short survey of how Tuam is developing.

> "The Western Rail Corridor is of strategic importance as it represents a piece of key enabling and sustainable transport infrastructure for the region that presents an opportunity to effect 'transformational change' in the realisation of the Atlantic Economic Corridor. It can link the economies of three major centres in this part of the region (Limerick, Galway and Sligo) and IWAK SDZ. It also offers a sustainable alternative to car travel and advancing Ireland's sustainable development goals."
>
> *Regional Spatial and Economic Strategy (N&WRA, 2019)*

This creates a potential risk that planning at the N&W level will bypass the dynamic Mayo towns in favour of slightly larger towns in other N&W counties (e.g., Sligo, Letterkenny and Athlone). A better approach that took these specific Mayo demographic features into account would be to examine how the populations of Mayo towns have grown and how they could be linked to form more effective joined-up urban centres both within Mayo and between Mayo, Sligo and other N&W counties. For example, the towns of Castlebar and Westport are very close to each other and are about to be linked by an improved road. They already have a rail link. Their combined population (as a kind of "twin" town) is 18,266, which is almost the same as the population of Sligo (19,199). With the exception of Galway city, excessive focus on individual slightly larger towns like Sligo, Letterkenny and Athlone, rather than focusing on how slightly smaller towns can be better connected, risks distorting regional planning in the N&W region (see Table 4.3).

Table 4.4: Largest towns in N&W NUTS 2 region. (Source: CSO Database)

COUNTY	LARGEST TOWN	POPULATION
Donegal	Letterkenny	19,274
Sligo	Sligo	19,199
Cavan	Cavan	10,914
Monaghan	Monaghan	7,678
Leitrim	Carrick on Shannon	4,062
Mayo	Castlebar	12,068
Roscommon	Athlone	21,349
Galway	Galway	79,934

The RSES recognised the pivotal role that could be played by Ballina, drawing attention to its role as a rail freight hub and the fact that the Phase 2 and 3 WRC restoration would link it directly south to Galway, Limerick, Cork and Waterford as well as to Dublin, as it is at present:

> As Mayo's most northerly town with a population of over 10,000, Ballina functions as the main economic driver for a large area of north Mayo. Furthermore, due to its proximity to the border of County Sligo, Ballina also serves as the main economic, commercial and social/educational centre for parts of west Sligo. This influence, in turn, overlaps with the western sphere of influence of the Regional Growth Centre of Sligo Town. This juxtaposition highlights Ballina's current and future role both as a stand-alone economic driver and integrating as part of the network of other key population centres and economic drivers along this section of the AEC.
>
> The town has rail connectivity to Dublin, as well as to the south should the Western Rail Corridor be realised. Ballina has the most significant rail freight activity outside of Dublin, providing a vital service to commercial/industry in the town and beyond and supports the transition to a low carbon region.
>
> The proximity of Ireland West Airport Knock to Ballina benefits the town and significantly broadens the transport network capacity to an international catchment. (RSES Page 122)

The importance of Ballina and the other Mayo towns is further recognised in the RSES in its call for enhanced rail services (thereby supporting the transition to a low carbon region) to Dublin and commuter services between Ballina, Castlebar, Westport and Claremorris with connectivity to Galway and Limerick Metropolitan Cities and major international ports such as Shannon/Foynes, should the Western Rail Corridor be realised.[31]

The RSES also draws attention to the strategic role that can be played by Ireland West Airport Knock (IWAK):

> The presence of an airport in the region acts as a magnet to draw people and investment to the region, driving economic activity in the form of business and investment as well as tourism and travel. The Airport acts as an international gateway to the West of Ireland as well as the North, North West and Midlands areas. The Northern and Western Region is home to many world-leading multinationals, local companies with global success as well as yet untapped economic sectors. ..... In this regard, the concept of the place-based approach which requires tapping into the inherent potential of the area is central to the future growth of the region. In terms of business and enterprise, investment in the creation of 'place' is important to realising regional potential and to position itself to attract skills/talent, to grow businesses and to embrace the creative and innovative economic activity. (RSES Page 139)

The RSES concludes that a priority core outcome to be delivered across the region shall include strengthening inter-regional connectivity, through the improvement of inter-urban road and rail connectivity, with a particular emphasis on improved connectivity between the largest urban centres and access to ports and airports, for the movement of both people and goods.[32] In relation to the future role to be played by rail links, the RSES notes the following:

31 RSES Page 123 (https://www.nwra.ie/rses/)

32 RSES page 214 (https://www.nwra.ie/rses/)

> Many gaps exist within the region's rail network and the National Development Plan 2018-2027 confirms that the Western Rail Corridor Phase 2 from Athenry to Tuam and phase 3 to Claremorris could increase passenger, tourist and commercial use.
>
> The Western Rail Corridor is of strategic importance as it represents a piece of key enabling and sustainable transport infrastructure for the region that presents an opportunity to effect 'transformational change' in the realisation of the Atlantic Economic Corridor. It can link the economies of three major centres in this part of the region (Limerick, Galway and Sligo) and IWAK SDZ. It also offers a sustainable alternative to car travel and advancing Ireland's sustainable development goals.

These findings are then stated in terms of four Regional Policy Objectives (RPOs)[33]

> RPO 6.11
>
> To seek commencement and completion of the review of the Western Rail Corridor project as a priority for passenger and freight transport.
>
> RPO 6.12
>
> Promote the upgrade of the capacity of the Athlone - Athenry - Galway rail line, including the provision of dual tracks and support provision of increased service stops between Athlone and Galway.
>
> RPO 6.13
>
> (a) It shall be an objective to deliver the Athenry - Tuam - Claremorris - Sligo Rail to an appropriate level of service and to a standard capable of facilitating passenger and freight transport.
>
> (b) It shall be an objective to progress through pre-appraisal and early planning the extension of the railway from Athenry - Tuam - Claremorris - Sligo.
>
> RPO 6.16
>
> Investigate the feasibility of extending the rail network to the North West City region from Sligo and Dublin.

Although the current WRC appraisal relates to the linking of Galway and Mayo by reinstating Athenry to Claremorris, there is an obvious future need (highlighted in the N&WRA RSES) to add the link from Claremorris to Collooney (on the Dublin-Sligo line) at a future stage. That would re-establish a north-south rail link joining Sligo directly to Limerick and further south. With this link in place, it would gradually become as natural to do business on the north-south axis of the AEC as it currently is to look east to Dublin for everything. This would provide a key mechanism for small western towns to strengthen and grow. The northern and western region could grow through better linkage of its towns rather than through plumping for a small number of regional growth centres (Letterkenny, Sligo and Athlone) that are never realistically going to rival Galway city in size.

In this kind of development context, how should one investigate the role that a restored WRC Phase 2 and 3 rail link might play in a strategy that is based on making it easier for the scattered towns of the central AEC region to interact with each other? We return to this question in Section 6 when we examine passenger and freight forecasts likely to arise when Phases 2 and 3 are restored and fully operational.

33 RSES Pages 222-223 (https://www.nwra.ie/rses/)

"Although the current WRC appraisal relates to the linking of Galway and Mayo by reinstating Athenry to Claremorris, there is an obvious future need (highlighted in the N&WRA RSES) to add the link from Claremorris to Collooney (on the Dublin-Sligo line) at a future stage. That would re-establish a north-south rail link joining Sligo directly to Limerick and further south. With this link in place, it would gradually become as natural to do business on the north-south axis of the AEC as it currently is to look east to Dublin for everything."

5

DONELLI GANTRY TRAIN NORTH OF CRAUGHWELL ON PHASE 1 (P. BOWEN WALSH)

Section 5

Project Capital and Operational Costs

[5] PROJECT CAPITAL AND OPERATIONAL COSTS

5

[5.1] INTRODUCTION

In this section we examine the Project Capital and Operational Costs and other issues related to the physical restoration of Phases 2 and 3 of the Western Rail Corridor extending from Athenry on the Dublin/Galway line to Claremorris on the Dublin/Westport-Ballina line passing through Tuam in County Galway. This consists of a total length of 51.9km (32.25 miles), with new Park and Ride stations at Tuam and at Abbeyknockmoy. We describe the physical state of the (currently) disused line, the estimated capital costs of restoration, and compare these costs to the costs proposed in the EY report.

As described earlier in Section 2, when constructing the Athenry to Tuam section of this railway in 1859, William Dargan, the engineer in charge of the works, expected it to become a major railway artery connecting the Dublin-Galway line at Athenry through Tuam to County Mayo. His design therefore mirrored the mainline railways he had constructed throughout the country, including the Dublin-Cork line. All overbridges were constructed with a view to potential double tracking, and he favoured the use of grade separated crossings by Overbridge and Underbridge structures in order to keep level crossings to a minimum. As such there are 27 bridges that are public roads and cattle passes leaving only 1 Public Road Level Crossing and 10 user-worked crossings on the entire 16-mile long route.

Remarkably, in the 21st century, as a direct result of these visionary design features, trains from Athenry to Tuam should be capable of 100mph operation.

Figure 5.1: *Varley's bridge showing straight alignment on the Tuam - Claremorris section (P. Newman).*

The Tuam - Claremorris section was constructed thirty years later. In contrast to the Athenry –Tuam section it has many at-grade crossings with 18 public road crossings and 65 user-worked occupation and field crossings which may limit its probable maximum operating speed to 60mph.

[5.2] PHASES 2 AND 3: THE RAIL INFRASTRUCTURE

In 2016 extensive vegetation clearance of the Athenry-Claremorris rail line was undertaken by Iarnród Éireann and the condition of the line and its assets were photographed. The following is a selection of images (courtesy of Iarnród Éireann) illustrating various aspects of the infrastructure on the line.

Figure 5.2

Figure 5.2 is a view looking towards Tuam of bridge (OBE168) (at milepost 60 miles 1724 yards) following vegetation clearance and minor re-pointing works in 2016. It carries a public road in Caherroyn, Athenry. This well-built bridge is a protected structure (NIAH No. 30332005 and RPS 3972) and was built in 1860. It is in good condition. (Courtesy of Iarnród Éireann).

Figure 5.3

Figure 5.3 is a closer view of OBE168 (at milepost 60 miles 1724 yards) following vegetation clearance and minor re-pointing works. This skew-arch soffit shows some water staining but is in good condition. (Courtesy of Iarnród Éireann).

Figure 5.4

Figure 5.4 is a view across culvert UBE173A (at milepost 62 miles 0528 yards) looking towards Tuam. (Courtesy of Iarnród Éireann).

Figure 5.5

Figure 5.6

Figures 5.5 and 5.6 are views from down side showing the entrance and internal view of culvert UBE173A (sheep pass). The shape is good and condition is fair. (Courtesy of Iarnród Éireann).

Figure 5.7

Figure 5.7 is a view across level crossing XE212 (f-type) (at milepost 63 miles 0876 yards) looking towards Tuam. (Courtesy of Iarnród Éireann).

Figure 5.8

Figure 5.9

Figures 5.8 and 5.9 are views of 9ft gates at level crossing XE212 (f-type) (at milepost 63 miles 0876 yards). Down-side (l) and up-side (r). (Courtesy of Iarnród Éireann).

Figure 5.10

Figure 5.10 is a view looking towards Tuam of bridge OBE176 (at milepost (at milepost 63 miles 1617 yards) following vegetation clearance. It carries the public road R339 across the railway in Caraun, county Galway. This well-built bridge is a protected structure (NIAH No. 30407114 and RPS 3745) and was built in 1860. It is in good condition. (Courtesy of Iarnród Éireann).

Figure 5.11

Figure 5.12

Figures 5.11 and 5.12 are close-up views following vegetation clearance of the wing walls of OBE176 (at milepost 63 miles 1617 yards). Down-side (l) and up-side (r). This structure is in good condition. (Courtesy of Iarnród Éireann).

Figure 5.13

Figure 5.13 is a view looking towards Athenry across bridge UBE180 (at milepost 65 miles 1220 yards) following vegetation clearance. This is a public road in Laragh Beg, county Galway. This well-built bridge is a protected structure (NIAH No. 30407105 and RPS 3744) and dates from 1860. It is in good condition. The addition of a ballast guards for retention and handrails would be required at this and similar under-bridges on the line for reopening. (Courtesy of Iarnród Éireann).

Figure 5.14

Figure 5.15

Figures 5.14 and 5.15 are close-up views following vegetation clearance of the wing walls of UBE180 (at milepost 65 miles 1220 yards). Down-side (l) and up-side (r). This structure is in good condition. (Courtesy of Iarnród Éireann).

Figure 5.16a

Figure 5.16a (at milepost 1 mile 1520 yards) is a major steel truss-type bridge (UBE206) of 20m span across the River Clare near Tuam. This structure has potential to be renovated and re-used. (Courtesy of Iarnród Éireann).

Figure 5.16b

Fig 5.16b Looking east (upstream) at Abbert River bridge just south of Ballyglunin, at MP 69 miles 1300 yards. The steelwork on this bridge is in good condition as it was painted in 2002 to protect it from deterioration. (P. Bowen Walsh)

Figure 5.17

Figure 5.17 is a view towards Claremorris across XE239 (at milepost 3 miles 0940 yards) (f-type crossing). (Courtesy of Iarnród Éireann).

Figure 5.18

Figure 5.19

Figures 5.18 and 5.19 are views of gates at XE239 (at milepost 3 miles 0940 yards) (f-type crossing). Down-side (l) and up-side (r). (Courtesy of Iarnród Éireann).

Figure 5.20

Figure 5.20 is a view towards Claremorris across cattle pass UBE212 (at milepost 4 miles 1520 yards). Fair condition. (Courtesy of Iarnród Éireann).

Figure 5.21

Figure 5.21 is a view of cattle pass UBE212 (at milepost 4 miles 1520 yards). (Courtesy of Iarnród Éireann).

Figure 5.22

Figure 5.23

Figures 5.22 and 5.23 are views of cattle pass UBE212 (at milepost 4 miles 1520 yards). Concrete deck with masonry abutments. (Courtesy of Iarnród Éireann).

Figure 5.24

Fig 5.24 is bridge OBE205C at 1 mile 0319 yards, Airglooney, N17 Tuam Bypass. (N. Miller)

Figure 5.25

Fig 5.25 is bridge OBE222 at 16 miles 1270 yards, a pedestrian footbridge at Lower James Street, Claremorris. (E O'Boyle)

[5.3] THE RESTORATION TASK

It is important to note that the railway from Athenry to Claremorris is disused but not closed. Its official status is described in the Weekly Circular of Iarnród Éireann as follows:

> The line from Claremorris to Athenry is signed out of use, and considered an Engineers Siding from Temporary Buffer at milepost 16 miles 1500 yards on Claremorris (Siding 1) to Stop Blocks Athenry. The Manual Staff for the section will be held by the Per Way Inspector, Claremorris who will conduct any engineers train required to enter the section. No other trains are permitted to enter the line.

The renewal of this section of railway, which last had a service train in 2000, will provide a rail link between Westport, Castlebar, Ballina, Claremorris and Tuam to Athenry, Oranmore, Galway, Gort, Ennis and Limerick with onward connections to the South and eastwards to Ballinasloe, Athlone and Dublin. It will also reopen a direct route for rail freight traffic from Mayo to Waterford, to the Port of Shannon Foynes and to Cork (when reinstated).

A passing loop will be constructed in Tuam which will facilitate crossing freight and passenger trains. It is noted that the Draft Tuam Regeneration Master Plan, funded by the Rural Regeneration Development Fund, has identified the former railway station and surrounding lands in Tuam for comprehensive mixed use development. This will involve the restoration of historic buildings and the creation of new spaces for enterprise development.

The planned development of this area will facilitate a reintroduced rail connection, while also creating a public transport interchange and improved pedestrian links to the town centre. The provision of a Park and Ride station on public land at the interchange of the N63 Longford/Roscommon to Galway road, would be in line with the stated objectives of the NTA to create a necklace of park and ride facilities on approaches to Galway City.

All works will be carried out to a standard providing a maximum line speed of 100 mph between Athenry and Tuam and 60mph between Tuam and Claremorris. As well as track renewal throughout the whole section other works will include upgrading of embankments, level crossings, bridges, culverts, drainage, fencing, signalling and station services.

A journey time from Claremorris to Galway of 58 mins is achievable (allowing for stops in Tuam, N63 Park and Ride, Athenry and Oranmore) using 100mph capable rolling stock.

Table 5.1 Indicative Journey Times 2025-6

SECTION	JOURNEY TIME
Claremorris - Tuam	19 mins 60mph max speed
Stop at Tuam	01 min
Tuam – N63 Park and Ride Abbeyknockmoy	07 mins 100mph max speed
Stop at N63 Park and Ride	01 min
N63 Park and Ride -Athenry	10 mins
Stop at Athenry	01 min
Athenry -Oranmore	10 mins
Stop at Oranmore	1 minute
Oranmore – Galway	8 mins

It should be noted that these times are indicative and are predicated on the completion of proposed infrastructure improvements between Athenry and Galway and the use of 100 mph capable rolling stock. This will become available due to the ongoing electrification of more Greater Dublin Area routes. As a result no purchase of new trains, as included by EY, will be required for this project. (Note that if rolling stock of maximum speed 75mph were to be used, then additional journey time would be incurred between Tuam and Galway and the benefit of the higher line speed of the infrastructure would not be exploited.)

The required civil engineering final works will be determined by specialist engineers following further assessment of the permanent way and structures (see estimates under preliminary costs). Signalling equipment, associated power supplies and networks will be provided at Athenry, Tuam and Claremorris, and at remotely monitored level crossings. Allowance has been made for the provision of remote monitored barrier type crossings at fifteen locations. Eleven of these will require protection provided by their own train detection and colour light signals. Four will be included in station signalling. A fibre network, transmission system and power supplies will be provided at all barrier type crossings and signalling locations.

Table 5.2 Proposed CCTV level crossings

CROSSING NAME	SECTION	EXISTING STATUS	PROPOSED STATUS ON REOPENING
Kilkelly's	Athenry to Tuam	Occ. on Public Road	CCTV
Tuam Stn.	Tuam to Claremorris	Attended	CCTV
Galway Rd	Tuam to Claremorris	Attended (Road)	CCTV
Killbannon	Tuam to Claremorris	Occ. on Public Road	CCTV
Castlegrove Rd	Tuam to Claremorris	Attended	CCTV
Brooklawn L.C.	Tuam to Claremorris	Attended	CCTV
Liskeavy	Tuam to Claremorris	Occ. on Public Road	CCTV
Milltown	Tuam to Claremorris	Attended	CCTV
Drim	Tuam to Claremorris	Attended	CCTV
Ballindine Rd.	Tuam to Claremorris	Barrier	CCTV
Ballindine Stn.	Tuam to Claremorris	Attended	CCTV
Avenue	Tuam to Claremorris	Barrier	CCTV
Garryduff	Tuam to Claremorris	Occ. on Public Road	CCTV
Lisduff	Tuam to Claremorris	Barrier	CCTV
Southern Yrd. Claremorris Stn.	Tuam to Claremorris	Attended	CCTV

Table 5.2 shows proposed CCTV level crossings, including four crossings upgraded from "Occupation on Public Rd." to "CCTV", to give a total of 15 CCTV crossings. The requirement for CCTV at existing unattended crossings would be reviewed following surveys at design stage.

Passenger facilities will include the use of existing station facilities in Athenry and Claremorris. A passenger lift will be required in Claremorris. Station facilities at Tuam will require the provision of lifts, footbridge, CCTV, lighting, ticket vending machines, help points etc. The existing platforms at Tuam will require upgrade. A car park including CCTV and lighting will also have to be provided in Tuam where the prospect of a transport interchange is currently being examined under the Tuam Regeneration Masterplan.

N63 PARK AND RIDE RAILWAY STATION ABBEYKNOCKMOY

It is recommended that consideration be given to the establishment of a new Park and Ride railway station between Tuam and Athenry serving the N63 at Ballynakilla, Abbeyknockmoy as part of the approved works. The successful template is Oranmore, a green field railway station built as part of Phase 1 of the Western Rail Corridor in a joint venture with Galway County Council. Continuing growth in passenger numbers (more than 60,000 passengers per annum) has recently led to Galway County Council, in association with Iarnród Éireann, being awarded €9.28m under the Rural Regeneration Development Fund to double track the station, construct a second platform and increase car parking capacity.[1]

The N63 Park and Ride at Abbeyknockmoy will require one platform, CCTV, lighting, ticket vending machines, help points, etc. A car park and associated services will be required which could possibly be located on existing state owned land and delivered by Galway County Council as is the case with the Phase 1 WRC station in Oranmore. No additional signalling infrastructure is required for the N63 Park and Ride.

The N63 is a major commuting corridor from north-east Galway and south Roscommon and is a major contributor to growing traffic congestion on the N63/N17 approach to Galway city. A Park and Ride Railway Station at Abbeyknockmoy with connections southwards to Athenry, Oranmore and Galway City and northwards to Tuam, Claremorris, Castlebar, Westport and Ballina, would add considerably to the quality of life of the growing population within the N63 catchment. The site is equidistant from Galway city by rail and via the new motorway.

Figure 5.26

Aerial view of the site for proposed Abbeyknockmoy N63 Park and Ride (N. Enright).

1 Press Release from Minister for Housing, Local Government and Heritage, Darragh O'Brien TD, 12th March 2021.

As the accompanying aerial image shows, there is already a large site adjacent to the old railway overbridge/N63 road which is owned by Galway County Council and which would lend itself to development as the Park and Ride Station. This may have been acquired as part of the road improvement works but appears to be used solely for water attenuation purposes. This plot is similar in size to the car park at Oranmore, which can accommodate one hundred and fifty cars.

The former Ballyglunin Railway Station is now the site of a major heritage project. The new Park and Ride Station described above will protect it as a heritage site where the 'Quiet Man' theme can be further progressed and developed. A 700m pathway can be accommodated along the foot of the railway embankment from the new station platform to the heritage site.

Figure 5.27 (a)

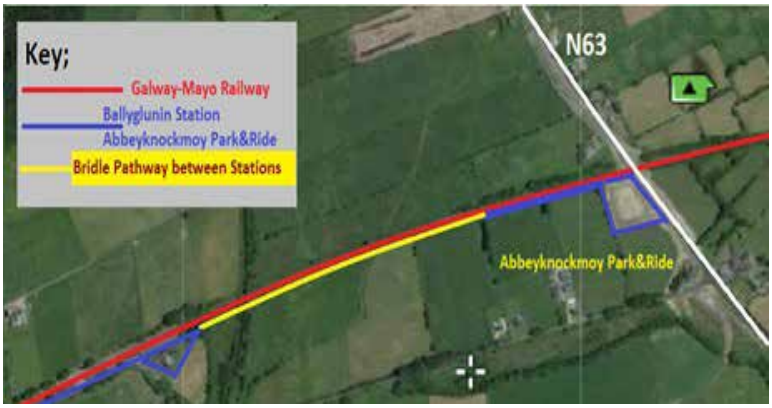


Figure 5.27 (a) shows the location of the proposed new Park and Ride Station at Abbeyknockmoy which will replace the former station at Ballyglunin. The former station will continue to develop as a major heritage site. The proposed 700 metre path between the two stations is indicated.

Figure 5.27(b)

Figure 5.27 (b) shows the location of the proposed new Park and Ride Station at Abbeyknockmoy in relation to the N63 and the proposed car park owned by Galway County Council.

It should also be noted that the full cost of replacing the railway bridge over the N63 at Abbeyknockmoy, including any works necessitated by the altered rail alignment, is not included in our costs. Under the terms of a legally binding agreement this will be met in full by Transport Infrastructure Ireland (TII).[2]

> "The Land Use and Transportation Policies of both Mayo and Galway County Councils have long supported the objective of reopening the Western Rail Corridor for passengers and freight. For example, Galway County Council has developed the Oranmore Park and Ride station in association with Iarnród Éireann which was constructed as part of Phase 1 of the Western Rail Corridor. An ambitious plan for an integrated transport hub (bus and rail) at Tuam station called 'The Station Quarter' is currently being prepared under the Rural Regeneration Development Fund which is supported by CIÉ and the NTA. For its part, in anticipation of the reopening of the Mayo-Galway link, Mayo County Council has previously built a new road and large car park to serve the railway station at Claremorris."
>
> *Western Inter-County Railway Committee - March 2021*

[5.4] CAPITAL COSTS OF PHASE 2 AND 3 RESTORATION

EY REPORT APPROACH TO CAPITAL COSTS

The EY report presents project capital costs in EY Section 5.3. Unit quantities (e.g., bridges, level crossings, and stations) were determined and multiplied by 'Mott MacDonald's own database of costs for Railway Works.' Several statements are provided in support of this source on the basis of the consultant's own experience, that the rates have previously been 'assured/endorsed by Network Rail,' and that they are based on similar UK projects, such as the East West Rail Phase 2.

DEFICIENCIES IDENTIFIED IN THE EY REPORT APPROACH

'Mott MacDonald's own database' is not an industry-accepted source for railway unit costs. The database is not in the public domain and the unit costs originating from this source are nowhere provided in the EY report.

Mott MacDonald's project costs for Phases 2 and 3 are presented in EY Report Table 5 and total €263.8m for rehabilitating 53.0 kilometres of the WRC from Athenry to Claremorris.[3] The values presented in Table 5 do not align with the unit descriptions that then follow. For example, Table 5 includes substantial costs for 'Preliminaries' and 'Rolling Stock' which are not discussed in the supporting sections that follow. Conversely, there is a section

2 Signed at the time of the demolition of the former railway bridge in order to facilitate the improvement of the N63 in that area.

3 This CBA calculates the railway line length of Phases 2 and 3 to be 32.3 miles or 52.0 km. An extra kilometre of track length may be attributed to the passing loop at Tuam.

discussing the work required at stations; however, no cost for 'Stations' is included in Table 5. Additionally, the allowance for 'Contingency' shown in Table 5 is quite low (under 10%).

Solely for the purpose of making a comparison of EY's Phase 2 and 3 build costs to the Phase 1 actual build costs, EY's Table 5 values were adjusted as described in the letter from Permanent Rail Engineering (UK) Limited contained in Appendix 2 to the present report. The adjustments lowered EY's estimated build costs to €240.1m (2021) to rehabilitate the 53.0 km Phase 2 and 3 line, which equates to €4.629m/km. This was compared to the rehabilitation cost for WRC Phase 1, which was €106.5 m at the time,[4] or €114.3m (2021) after adjusting for inflation. Because Phase 1 was 58.0 km in length, the per-kilometre build costs equalled €1.970 m/km.

The fact that EY's cost estimate for rehabilitating Phases 2 and 3 of the WRC is 2.3 times (230%) higher than the cost of Phase 1 must be highly scrutinized. Additionally, EY's reliance on an unsubstantiated data source of railway construction unit costs, the exclusion of the actual data from report, and the arithmetical error contained within Table 5 render EY's capital cost estimate unreliable.[5]

REVISED APPROACH TO CAPITAL COSTS

Due to the deficiencies identified above, it is considered that a fresh estimate of the capital cost of WRC Phases 2 and 3 is required that more closely reflects the actual costs of rehabilitating Phase 1. This is described below.

The Western Rail Corridor Phases 2 and 3 extends from Athenry on the Dublin/Galway line to Claremorris on the Dublin/Westport line passing through Tuam, Co. Galway a total length of approximately 52.0km. As part of the track relay a passing loop will be constructed in Tuam and will be of sufficient length to accommodate passing freight trains. The provision of a Park & Ride station should be investigated at Abbeyknockmoy where the railway crosses the N63 Longford/Roscommon to Galway road and where there is the availability of state-owned land for the provision of a car park. Costs for a Park & Ride station are included in this analysis, while we propose that the costs of the carpark be borne by the County Council on the same basis as that agreed at Oranmore when it was constructed under Phase 1 of the WRC. The cost of replacing the bridge over the N63 is not included and will be provided by TII as per their formal agreement with IÉ in February 2016.[6]

All works will be carried out to a standard providing a maximum line speed of 100 mph (160 kph) between Athenry and Tuam, and 60 mph (95 kph) between Tuam and Claremorris. Track renewal is required throughout the entire length of the project, as well as other works including upgrading of embankments, level crossings, bridges, culverts, drainage, fencing, signalling and station services as described in further detail below.

4 Written answer to Parliamentary Questions 234, 235, and 246 submitted 26th May 2016, Available at: Rail Network Expansion – Thursday, 26 May 2016 – Parliamentary Questions (32nd Dáil) – Houses of the Oireachtas. This equates to €105.4m when adjusted for inflation to the 2019 reference year, using the CSO Consumer Price Index for all items, with 2011 as a base year (2011 = 100). Note that €10m of the figure of €105.4m quoted for Phase 1 was spent on works outside of the Ennis-Athenry section.

5 The Table 5 "Total" for Phase 2 only is €9.1m higher than the sum of the individual items.

6 Letter from TII to Iarnród Éireann dated 26th February 2016.

PRELIMINARIES

The category of 'Preliminaries' includes items such as project design, project management, planning permissions (where needed), temporary works, etc. The estimated cost for Preliminaries is shown in Table 5.3 and estimated to be 20% of the total project costs including the contingency. This cost was assumed to occur in the same four-year roll-out pattern (2022-2025) as used by EY.[7]

Table 5.3: Preliminaries

ITEM	QUANTITY	UNITS	COST (000'S €)
Preliminaries	20	%	25,630

The following tables set out the projected capital costs associated with the reconstruction of the 32.25 mile (51.9km) railway comprising Phases 2 and 3 of the Western Rail Corridor, linking the existing mainline stations at Athenry and Claremorris via Tuam.

Costs are presented under three headings: Civil (Permanent Way) Upgrade works, Signalling and Telecommunications works and Passenger Facilities.

CIVIL WORKS (PERMANENT WAY)

Civil and Permanent Way Upgrade works will include continuous welded rail on concrete sleepers with new ballast foundations, a long-freight passing loop at Tuam and civil works to bridges, culverts, fencing and farm crossings.

The following civil works will be required to restore the permanent way:

1. Track renewal throughout with continuously welded rail and concrete sleepers
2. Ballasting, tamping, and track alignment
3. Bridge repairs
4. Culvert repairs
5. Drainage
6. Embankment stabilisation works
7. Rural stock-proof fencing
8. Urban fencing (palisade)
9. Level crossing upgrade works (user operated)
10. Level crossing removals due to land purchase
11. Level crossing removals due bridge construction
12. Provision of a passing loop in Tuam
13. Connection to the Galway Line at Athenry allowing crossing of trains
14. Connection to the Westport Line at Claremorris allowing crossing of trains

7 See Appendix 5 for details of capital expenditure roll-out.

The necessary civil engineering works will be determined by specialist engineers following assessment of the permanent way and structures. The costs estimated with the above works, including a 10% contingency are shown in Table 5.4 below. For the purposes of performing the CBA, it is assumed that the costs will occur in the same four-year roll-out pattern (2022-2025) as used by EY.

Table 5.4 Civil Works (Permanent Way)

ITEM	QUANTITY	UNITS	COST (000'S €)
Track Renewal*	52	km	38,400
Point Work @ Athenry	2	Points	600
Point Work @ Tuam	2	Points	600
Point Work @ Claremorris	2	Points	600
Existing Bridge Repairs	78	Structures	12,200
Culvert Repairs	52	km	7,000
Drainage	52	km	2,500
Embankment Stabilisation	52	km	5,500
Rural Stock-Proof Fencing	84	km	2,500
Urban (Palisade) Fencing	20	km	1,500
Level Crossing (User Operated) Upgrades or Closings	TBD	Level crossings	7,000
Level Crossing (User Operated) Closings, Bridges	TBD	Bridges	6,000
Contingency	10	%	8,440
Total			**92,840**

**Including trackwork for a passing loop at Tuam.*

A section of track south of Tuam between Mileposts 73.5 and 74 has settled due to deep peat extraction from adjacent lands as detailed in a report commissioned by Iarnród Éireann from consultants Roughan & O'Donovan in 2011.[8] The solution assumed for the purposes of this report is a confinement system of sheet-piled walls with waler beam installed longitudinally by the track. This solution has previously been used successfully by Iarnród Éireann on the Ballina branch at Shanclough at Milepost 161.75 in 2012. The cost is included under Embankment Stabilisation in Table 5.4 above.

SIGNALLING AND TELECOMMUNICATIONS

Signalling and Telecommunications works will include train control, communications and protection systems, centrally controlled and integrated with fully automatic level crossings.

Signalling equipment, associated power supplies, and telecommunications/transmission networks will be provided at Athenry, Tuam, Claremorris, and at remote monitored automatic level crossings, to be determined by the signalling engineers. Allowance has been made for the provision of remote-monitored barrier-type automatic level crossings at fifteen locations. Eleven of these will require protection provided by a train detection system and colour light signals, while four will be protected by station signalling. A fibre network, transmission system, and power supply are required for all barrier-type automatic level-crossings and signalling locations.

8 Existing Railway Embankment Stability Cloonascragh Bog, Tuam, Co. Galway, Athenry to Claremorris Line, MP 73.5 to 74 Geotechnical Interpretive Report.

1. Colour light signalling, train detection and points machine with required interlocking, interface, cabling, power, telecommunications (including a train radio and transmission system) at Athenry.
2. Colour light signalling, train detection and point's machines (4) along with required interlocking, interface, cabling, power, telecommunications (incl. train radio) and transmission system at Claremorris
3. Colour light signalling, train detection and point's machines (2) along with required interlocking, cabling, power, telecommunications (incl. train radio) and transmission system at Tuam
4. Eleven (11) remotely monitored barrier-type level crossings with colour light signalling and associated equipment
5. Four (4) remotely monitored barrier-type level crossings interlocked with station signalling
6. Equipment required for level crossing monitoring and control
7. Signalling control point in existing signalling centre
8. 52km fibre optic cable and a cable route between Athenry and Claremorris.
9. Allowance for intermediate train radio sites (depending on survey)

The costs estimated with the above works, including a 10% contingency are shown in Table 5.5 below.

Table 5.5: Signalling and Telecommunications Works

ITEM	QUANTITY	UNITS	COST (000'S €)
Signalling, Train Detection, Points (x1), Transmission/Radio, Cabling, and Power Supply @ Athenry	1	System	1,000
Signalling, Train Detection, Points (x2), Transmission/Radio, Cabling, and Power Supply @ Tuam	1	System	2,300
Signalling, Train Detection, Points (x4), Transmission/Radio, Cabling, and Power Supply @ Claremorris	1	System	1,300
Remote Monitored Barrier-Type Automatic Level Crossings	11	Auto Level Crossings	11,900
Barrier-Type Automatic Level Crossings Interlocked with Station Signalling	4	Auto Level Crossings	2,800
Additional Equipment Required for Automatic Level Crossing Monitoring and Control	1	System	700
Central Signalling Control Point at Signalling Centre	1	Control Point	200
Intermediate Train Radio Sites (Depending on Survey)	Survey Dependent	Sites	3,000
Fibre Optic and Cable Route	52.0	km	4,000
Contingency	10	%	2,720
Total			**29,920**

PASSENGER FACILITIES (STATIONS)

Passenger facilities will be provided at three stations, including the construction of new stations at Abbeyknockmoy and Tuam and improvement works at Claremorris.

Passenger facilities will also include the use of existing station facilities in Athenry and Claremorris. Two lifts will be required in Claremorris to allow disabled access. However, some of this cost should be offset against the Westport line.

Station facilities in Tuam will require the provision of similar lifts, a footbridge, CCTV, lighting, ticket vending machines, help points etc. The existing platforms in Tuam will require upgrade. A car park including CCTV and lighting will also have to be provided in Tuam.

The N63 Park and Ride will require one platform, CCTV, lighting, ticket vending machines, help points, etc. A car park and associated services will be required which could possibly be located on existing state-owned lands as occurred with the Oranmore station. No additional signalling infrastructure will be required for the N63 Park and Ride.

A summary of the expected cost of passenger facilities is shown in Table 5.6. Due to the range of uncertainty of this item, costs are not broken out by item, but were conservatively estimated at the high end of the range.

Table 5.6: Passenger Facilities

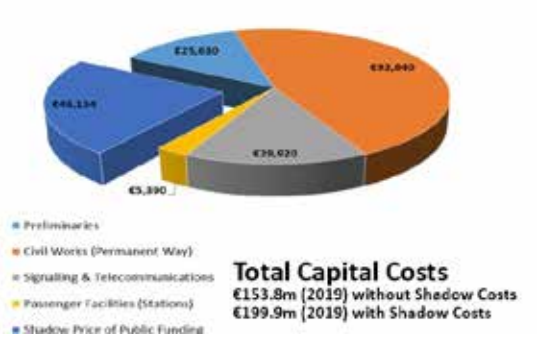
ITEM	QUANTITY	UNITS	COST (000'S €)
Refurbish Tuam Railway Station, including New Platforms, CCTV, Lighting, Ticket Vending Machines, Help Points, and Remote Monitoring from Existing Monitoring Facility	1	Station	4,900
Passenger Lifts at Tuam Station	2	Lifts	
Car Park at Tuam Station, including CCTV and Lighting	1	Systems	
New N63 Park and Ride Railway Station, including Platforms, CCTV, Lighting, Ticket Vending Machines, Help Points, and Remote Monitoring from Existing Monitoring Facility	1	Station	
Passenger Lifts at Claremorris Station	2	Lifts	
Contingency	10	%	490
Total			**5,390**

Total estimated project capital costs, and the years in which they are anticipated to occur are presented in Table 5.7. These costs include a 10% contingency for all items except Preliminaries, but do not include the shadow price of public funds. Figure 5.7 below and the summary tables included in Section 8 later present the capital costs both including and excluding shadow price.

Table 5.7: Total Capital Costs by Year

	2022	2023	2024	2025	TOTAL
Costs (€million 2019)					
Preliminaries	3.1	8.5	9.2	4.9	**25.6**
Civil (Permanent Way) Upgrade Works	11.1	30.9	33.2	17.6	**92.8**
Signalling and Telecommunications	3.6	10.0	10.7	5.7	**29.9**
Passenger Facilities	0.6	1.8	1.9	1.0	**5.4**
Capex (Total)	18.3	51.3	55.1	29.1	**153.8**
Shadow Price of Public Funds (30 percent)	5.5	15.4	16.5	8.7	**46.1**
Total costs	23.8	66.6	71.6	37.8	**199.9**
Expenditure pattern (taken from EY)	0.1193	0.3333	0.3581	0.1893	**1.0**

Figure 5.28: Summary of Capital Costs



Removal of old track is included in our capital cost estimates, but no deductions have been made for scrap value of ironwork.[9]

Figure 5.29 Old track awaiting disposal alongside the new alignment between Ennis and Athenry (P. Newman).

9 The estimated scrap value would be calculated as follows: 52kms x 2 rails @ (assuming 80Lbs./yard) = 41,245 metric tonnes @ €120-€150/tonne = €4.94million-€6.18million. Less approx. 15% for transport and recovery (say, €750K).

[5.5] COMPARATIVE CAPITAL EXPENDITURES FOR THE PHASE 2 AND 3 RESTORATION

The capital expenditure requirements for the various elements of the project are summarized below. We compare these estimates with current Irish railway costs. By contrast, we note that the review of the EY report by the JASPERS Consultancy states that EY's costings of €5m/km were "at the higher end of the range when benchmarked against comparable European projects".[10]

For purposes of validation we commissioned Permanent Rail Engineering (UK) Limited to review and assess our capital expenditure estimates (See Appendix 2). Such an external review by a UK entity was considered appropriate as EY had chosen to model its construction costs on rates used in UK projects that bore little resemblance to the rail line between Athenry and Claremorris.

Permanent Rail Engineering (PRE) undertook a review of the 2021 comparator price (as given below) against the 2020 EY/Mott MacDonald (EY/MM) price for reinstating the railway. In order to make a reasonable assessment of the validity of the 2021 comparator price, PRE reviewed both of those costings against the recorded total expenditure on Phase 1 of the Western Rail Corridor, which was opened in 2010. In all cases, cost values were adjusted for inflation using the Irish Central Statistics Office's (CSO) CPI Inflation Calculator.[11]

The assessment sought to compare the various prices both at a high level, by looking at normalised unit costs, and at a lower level by confirming that assumptions made in the 2021 comparator price matched the technical requirements of Iarnród Éireann infrastructure. The number of structures and length of infrastructure corridor were taken from the EY/MM report for consistency in generating unit rates.

The combined Phase 2 and Phase 3 capital cost data included in Chapter 5 of the EY/MM report was used. As that report quoted 2019 prices, these were adjusted by 1.1% to account for inflation.

Because no value for preliminaries (project management, design, temporary works, etc.) was included in the comparator price given to PRE this was assumed at 20% and the overall cost increased to a total of €153.8m in 2021 prices. The cost of additional rolling stock was removed as it was not determined as a requirement in the 2021 comparator price.

The comparative unit rates for each of the three were as follows:

Table 5.8 Comparative Unit Rates

UNIT RATES	€M/KM
2021 comparator unit rate	€2.900 m/km
2020 EY/MM unit rate	€4.629 m/km
2010 Phase 1 unit rate	€1.970 m/km

PRE noted that the EY/MM overall unit rate is over double (2.4 times) the recorded costs during the construction of Phase 1, and observed that this "would appear to be unreasonable given that the same overall technical specification is required for all three phases."

As a result of the addition of 20% for preliminaries into the total cost, PRE concluded that it would expect the final quoted price to increase from €128.15m to €153.78m.

10 JASPERS Project Screening Note, p6, 4.4.

11 The care and maintenance undertaken by Iarnród Éireann to protect the railway alignment on the Athenry-Claremorris route (vegetation clearance, checking structures, fencing, etc.) would indicate that the costs of reinstating Phases 2 and 3 are more comparable to Phase 1.

We therefore consider that the Capital Costs represented in this report are realistic and achievable if the template used in constructing Phase 1 is replicated i.e., using an in-house Iarnród Éireann team, familiar with the alignment and any challenges it may present. On Phase 1 a Project Manager was appointed from senior engineering ranks who brought together such an in-house team with input from General Works, Structures, SE&T, Property & Legal, Infrastructure and PR, while IÉ's Athlone Division undertook the track renewal. This proven model is likely to be the most effective and economical way of delivering this project and ensuring the best value for money for the state.

Fig 5.30 A new CCTV level crossing at N18 Kiltartan on Phase 1 (A Mogridge).

[5.6] OPERATIONAL COSTS

EY REPORT APPROACH TO OPERATIONAL COSTS

The EY report presents project operational costs in Section 5.4. A summary of annual railway undertaking costs is presented in EY Table 8, preceded by a statement that the costs were provided by Iarnród Éireann. A summary of additional infrastructure manager annual costs is presented in EY Table 9 with no reference source. The EY Table 9 costs escalate from €1.2m per annum in 2026 to €4.1m per annum in 2051 and beyond.

DEFICIENCIES IDENTIFIED IN THE EY REPORT APPROACH

The fundamental deficiency with EY's operating costs is the complete lack of documentation and justification for the EY Table 9 additional infrastructure manager costs. While these seem reasonable in the initial years, no justification is provided for the costs rising by 3.4 times (340%) over the analysis period, over and above the normal rate of inflation. Given that this item significantly impacts the results of the CBA, it is considered that a fresh estimate is required based on recent Iarnród Éireann data, and that this should be substituted for the unsubstantiated estimate contained in the EY report.

Additionally, it is noted that EY's costs as shown in Tables 8 and 9 of their report were not correctly transferred to their Appendix F, Table 75—the main cost-benefit computation table for the 'central scenario' of rehabilitating WRC Phases 2 and 3. EY Table 75 contains over €40m in additional cumulative costs that cannot be substantiated by the report that are negatively affecting the CBA.

REVISED APPROACH TO OPERATIONAL COSTS

Revised operational costs were derived from the detailed data contained in Iarnród Éireann's Rail Review 2016.[12] Appendix D of that report includes a detailed Line Segment Analysis of four specific lines that were analysed in detail, including the Ennis-Athenry segment of WRC (Phase 1). The reported costs reflect a base year of 2015 and were therefore increased to by 1.6%[13] to achieve 2019 prices.

It is noted that the costs presented reflect a 58.0 km section of Phase 1 of the WRC, compared to a somewhat shorter project of Phases 2 and 3 at 52 km. Costs were left unadjusted (not reduced based on shorter distance) to reflect a contingency. An adjustment was made for station operation costs based on the number of intermediate stations. Both Phase 1, as well as Phases 2 and 3 contain several intermediate stations with stations "shared" with other lines at each endpoint. Phase 1 included three such intermediate stations (Gort, Ardrahan, Craughwell), whereas Phases 2 and 3 are anticipated to include two such stations (Tuam and the N63 Park and Ride). Therefore, station costs were reduced by one-third.

The line segment costs presented in the report evaluates 'route unique' and 'shared' costs. Route unique costs are those considered to be incurred entirely by the segment being analysed (i.e., occurring between Athenry and Ennis. Shared costs are those occurred by WRC trains that continue onwards on segments shared by another service (for example WRC trains travelling between Athenry and Galway which is shared by the Galway-Dublin Intercity service). The report performed a segment analysis which apportions the shared-segment costs to the segment being analysed. It is noted that some line-items indicate zero cost. These items are included to indicate they have been considered in the analysis.

The revised project operation costs used in the CBA are shown in Table 5.9 and Figure 5.30 below. It is noted that the shadow costs of labour specified in the CAF (80% - 100%) were not applied, and the full cost of labour was attributed to the project.

12 Available at: https://www.bing.com/newtabredir?url=https%3A%2F%2Fwww.nationaltransport.ie%2Fwp-content%2Fuploads%2F2016%2F11%2F151116_2016_Rail_Review_Report_Complete_Online.pdf

13 Based on the CSO CPI Inflation Calculator from 7/2015 to 7/2019. Available at: CPI Inflation Calculator - CSO - Central Statistics Office

Figure 5.31: Summary of Operational Costs

Table 5.9: Operational Costs

ITEM	WRC PHASE 1 OPERATING COSTS FROM ROUTE (000'S €, 2015)	WRC PHASES 2 AND 3 OPERATING COST FROM ROUTE (000'S €, 2019)
Train Operation		
DTEs	0	0
Drivers	447	454
Train Crew	5	5
Train Hosts	0	0
Administrative	0	0
Chief Mechanical Engineer (CME)		
Fuel	121	123
Drivers	1	1
Maintenance Labour	53	54
Maintenance Materials	56	57
Maintenance Overhead	47	48
Stations		
Station Managers	0	0
Station Operation	1,428	967 (a)
Commuter Advertising Network and Property	45	46
Infrastructure Management Operations (IMO)		
Signal Persons	43	44
Gatekeepers	263	267
Central Traffic Control	70	71
Level Crossing Control Centre	10	10
Administrative	6	6
Chief Civil Engineer (CCE)		
Permanent Way Inspector Maintenance	724	736
Infrastructure Manager Ballast Drivers	0	0
Administrative	0	0
Signalling, Electrification, Communications (SET)		
Signalling Maintenance	65	66
Telecoms Maintenance	103	105
Administrative	0	0
Buildings and Facilities		
Maintenance	245	249
Administrative	0	0
Total Operatonal Costs	3,732	3,308

Note: Cost has been reduced by one-third to adjust for two (rather than 3) intermediate stations

[5.7] OPPORTUNITY COST

EY REPORT APPROACH TO OPPORTUNITY COST

The EY report includes an opportunity cost of €1m on the basis that 'The land could be sold for agricultural or construction purposes or could be transformed into a Greenway.'

DEFICIENCIES IDENTIFIED IN THE EY REPORT APPROACH

The CAF defines opportunity cost as, 'The value of a resource in its most productive alternative use.' In its current state as a disused railway line that is not closed, the permanent way would not be usable as a greenway without a formal statutory process and significant development costs. No greenway proposal is included for this location in the Department of Tourism, Transport, and Sport's current Strategy for the Future Development of National and Regional Greenways[14] and therefore such use cannot be considered 'an alternative use' in the context of the CAF. It is worth noting that since the Attymon Junction-Loughrea Branch in 1988, no disused railway alignment has been formally abandoned back to its previous landowners. Disused lines have since remained in CIÉ/State ownership.

REVISED APPROACH TO OPPORTUNITY COST

In nearly all cases, alternative uses of the permanent way would entail significant civil works to remove rails, sleepers, ballast, fencing, embankment, and structures to the degree that the cost of the works likely would exceed the value of the underlying real estate. For these reasons, no opportunity cost has been accounted for in the CBA.

Figure 5.32

New farmer's crossing affording greater visibility to the user. (Agri News)

14 Available at: https://www.gov.ie/en/publication/ed5d17-strategy-for-the-future-development-of-national-and-regional-greenwa/

IWT FREIGHTLINER CROSSES MOY BRIDGE EN ROUTE TO DUBLIN (N. ENRIGHT)

Section 6

Project Benefits

[6] PROJECT BENEFITS

[6.1] INTRODUCTION

Of the two sides of any cost-benefit appraisal of an investment project, the benefit side is always the more difficult to project. Construction costs are incurred up front, but revenue and other benefits are generated downstream and over the expected long lifetime of the investment asset. The availability of a new resource—a bridge, a restored rail service, etc.—is likely to provide some clear and transparent benefits, but over time, the new resource is likely to alter the behaviour of potential users in a way that is complex and can be difficult to predict.

In the case of restoration of Phases 2 and 3 of the WRC, the capital costs—by far the largest cost element—are incurred during 2022 to 2025, while the revenue and other benefits are generated over a thirty one year period from 2026 to 2056. During those thirty years, the world will face a massive challenge to slow down and reverse climate change brought about in large part by anthropogenic CO_2 emissions. This is likely to have a significant impact on the way that we travel by air, by sea, and on land. On land, there will need to be a transfer from modes of travel that use fossil fuels in a profligate way, to modes that minimise fossil fuel use and eventually shift to the use of electricity generated by renewable sources.

In this section of our report, we address the challenge of quantifying the benefits that will be associated with the restoration of the WRC network link from Athenry to Claremorris. An important part of these benefits will be the opportunity to switch an element of current road transport to rail, and the revenue from passenger and freight operations that could be generated to support the rail services. The provision of a new, efficient and cost-effective transport mode linking the towns located on the north-south axis of the Atlantic Economic Corridor (AEC) is also likely to generate greater interaction between these towns which currently lack high quality north-south transport infrastructure.

To carry out a detailed evaluation of project benefits from scratch would be a task requiring the time and resources that were originally available to the consultants (EY) when they executed the appraisal commissioned by Iarnród Éireann over the period 2018 to 2020. We made efforts immediately after the publication of the EY report on January 8th, 2021 to obtain vital data that were not included in the published EY report. But these efforts were unsuccessful.[1] Consequently, we are obliged to follow the broad lines of the EY forecasting methodology in order to examine whether its use by EY in their report presented a robust and accurate picture of what future revenue would be generated by the restoration of Phases 2 & 3 and what other benefits were likely to be associated with its restoration.

"An important part of these benefits will be the opportunity to switch an element of current road transport to rail, and the revenue from passenger and freight operations that could be generated to support the rail services. The provision of a new, efficient and cost-effective transport mode linking the towns located on the north-south axis of the Atlantic Economic Corridor (AEC) is also likely to generate greater interaction between these towns which currently lack high quality north-south transport infrastructure."

1 See Appendix 1 for the correspondence with IE and the DSSaT that sought the missing data from the EY report.

To follow the broad lines of the EY forecasting methodology we use the same examples of Origin/Destination pairings (O/D) used by EY, for validation purposes. However we consider the 10 EY pairings are poor samples of future journeys on the extended Western Rail Corridor as they include journeys that will be either impossible on the new service (Claremorris-Kiltimagh; Balla-Castlebar; Claremorris-Balla), or are outside the outside the proposed route (Craughwell-Galway). The pairings specifically illustrated by EY exclude any between a Mayo railway station and Galway City.

In Section 6.2 we set out a clear exposition of our forecasting methodology used for projecting revenue from passengers.[2] In Section 6.3 we address the issue of 'noise benefits', i.e., the extent to which the operation of the restored rail link is likely to decrease or increase noise above levels regulated by statute. In Section 6.4 we address local 'air quality' benefits since the environmental factor of local air quality is required to be evaluated under the CAF. This pertains to emissions of oxides of nitrogen (NOx) and particulate matter (PM) emitted by petrol and diesel engines. In Section 6.5 we address the issue of 'greenhouse gas' benefits, i.e., the extent to which the operation of the rail link is likely to lower or raise emission of CO_2, a factor that is central to the requirement of slowing down and reversing climate change. In Section 6.6 we examine 'physical activity' benefits associated with the restored rail link. The CAF provides for the calculation of project benefits related to 'active travel values,' where applicable. The concept is that the use of active modes of transport (walking and cycling) reduce inactivity, which in turn, reduces premature mortality and absenteeism. In Section 6.7 we examine 'collision' benefits, i.e., a road safety benefit for reduced collisions based on the CSO's national accident rates per kilometre travelled, and the reduction in kilometres travelled due to Phases 2 and 3 of the WRC. Sections 6.8 and 6.9 examine, respectively, net transport user benefits associated with 'time' savings and 'travel cost' savings. In Section 6.10 we examine the possible impacts of restoration of the rail link on the public finances, i.e., implications for future revenue from direct and indirect tax revenues.

Section 6.11 concludes, and we step outside the narrowly focused CBA methodology used by EY to draw on the previous discussion in Section 4 on the economic development rationale for the WRC. As highlighted previously in Section 4, the historical NTA journey data used by EY may not always provide a good basis for projecting the consequences of a radical transformation of the public transport system in a region like Mayo in the centre of the AEC. Such consequences are difficult to quantify within strict CAF guidelines, but do suggest that there is very likely to be an upside to our analysis in terms of higher passenger numbers and faster growth.

[6.2] PASSENGER REVENUE

EY REPORT APPROACH TO PASSENGER REVENUE

Passenger revenue is the product of rail travel demand (journeys per year) multiplied by the average fare paid per journey. To estimate rail travel demand for WRC Phases 2 and 3, a bespoke travel demand model was created by EY, referred to as a 'nested multinomial logit model.'[3] The theory behind logit modelling is described in Sobel (1980)[4] and underlies the methods described in the Rail Delivery Group's Passenger Demand Forecasting Handbook.[5]

2 EY treated revenue from carriage of freight in a very cursory manner. We examine this aspect in detail in the following Section 7.

3 The model is also referred to as a "logistical regression."

4 Sobel, Kenneth L., Travel Demand Forecasting by Using the Nested Multinomial Logit Model, 1980.

5 Available at: About the Passenger Demand Forecasting Handbook | Rail Delivery Group

But the application is relatively straightforward.

Simply put, a logit model yields a probability function that describes observed travel mode choices (i.e., between car, bus/coach, or train) according to a series of explanatory variables (i.e., journey time and cost). Once the probability function is determined, it can be used to forecast future travel mode choices, and whether travel demand is shifted from existing modes (extracted) or new (induced).

The logit model used in the EY report is referred to as 'nested' because it first determines the probability that passengers will choose private cars versus public transit (Nest 1), and subsequently for passengers choosing public transit, whether they will choose a bus/coach versus rail transport (Nest 2). For the purposes of this CBA, it is not necessary to describe the fundamentals of logit modelling in detail; however, it is useful for discussion purposes to list the explanatory variables typically affecting the passenger choice for each travel mode. These variables are shown in Table 6.1 below.

Table 6.1: Travel Demand Model Variable Inputs

PRIVATE CAR	BUS/COACH	RAIL
Walking Time To/From Car	Walking Time To/From Stop	Walking Time To/From Stop
In-Vehicle Travel Time	Waiting Time at Stop	Waiting Time at Stop
Vehicle Operating Cost	In-Vehicle Travel Time	In-Vehicle Travel Time
Vehicle Parking Cost	Interchange Penalty (if applicable)	Interchange Penalty (if applicable)
	Ticket Fare	Ticket Fare

Once the logit model is developed, rail passenger demand is determined for an initial year of operation of the restored rail link (i.e., 2026). A three year 'ramp-up' of demand is assumed to account for the period required for passengers to adjust their travel patterns to the new transport mode, with the full projected demand being realised in the fourth year of operation (i.e., 2029). Demand from 2030 to 2056 was assumed to expand at the same rate as the underlying regional population growth.

Ticket revenue was assumed by establishing and assigning fare zones to each modelled origin/destination (O/D) flow. The fare schedule remains constant over the analysis period reflecting an assumption that fares increase at the national rate of price inflation.

DEFICIENCIES IDENTIFIED WITH EY REPORT APPROACH

The following list of deficiencies was identified with the passenger demand modelling contained within the EY report. The deficiencies are listed in the approximate order in which they are believed to be affecting the results.

1. A 20-minute 'interchange penalty' was improperly applied to Tuam-Galway flows for an interchange at Athenry.[6] The central scenario (Claremorris to Galway, direct) does not include an interchange at Athenry. This applied penalty results in unrealistically long journey times, including 80 minutes for Claremorris-Galway and 50 minutes for Tuam-Galway. More realistic journey times are 58 minutes for Claremorris-Galway and 38 minutes for Tuam-Galway. The impacts of this penalty on the CBA result in depressed rail passenger demand and revenue,

6 See Table 27 of the EY report.

depressed time-savings benefits, and lower extraction rates from cars, all of which have a significant negative impact on the CBA outcome derived by EY.

2. The EY demand modelling relied upon an outdated (calendar year 2012) 'origin-destination matrix' extracted from the National Transport Authority's (NTA) National Transport Model (NTpM). However, the current NTpM 'base year' is 2016, and uses the 2016 census data.[7] The impact of this on the CBA outcome derived by EY is likely to produce depressed rail passenger demand because the 2012 travel patterns used were seriously reduced by the global and national economic recession with its accompanying high unemployment levels.

3. The EY travel demand model forecasts 552,000 journeys per annum by the year 2030 for the EY central scenario. An additional 23,000 tourist journeys were estimated in Section 4.6.2 of the EY report. However, these appear to have been excluded from the fare revenue calculations.

4. The EY fare rail fare schedule shown in EY Table 29 shows a lower one-way fare for Category 'C' (at €4.11) than for Category 'B' (at €4.28). This means that a passenger travelling from Galway to Athenry would pay a higher fare than a passenger travelling from Galway to Tuam via Athenry.

5. Many of the data and calculations necessary to review the rail demand forecasts for accuracy and to replicate the results are missing from the EY report. These include:

- 'Origin-destination matrix' extracted from the NTAs NTpM model
- Specific Rail Passenger Census data
- Catchment population for each origin/destination
- All demand model variable inputs shown in Table 6.1 above
- Calculations of Generalised Journey Times (GJT) and Generalised Costs (GC).
- Calculations of passenger elasticity (ε) and 'spread parameters' (λ) used in the model
- Population growth data
- Adjustments to data made by what were referred to as 'benchmarking' and 'sense-checks.'

6. EY do not include a single example of an O/D pairing between a Mayo railway station and Galway City on what is a proposed Mayo-Galway rail passenger service. EY do not explain the inclusion of Kiltimagh and Balla which will not be served by the proposed rail service, or the inclusion of Craughwell-Galway, which is outside the proposed route.

The passenger demand and revenue calculations contained in Tables 42 and 43 of the EY report for the central scenario (as well as all other scenarios) contain erroneous results that may be the result of data corruption or carelessness. For example, in EY Table 42, the 'Total rail demand growth' journeys per O/D pair, multiplied by the corresponding one-way fares in EY Table 29, do not equal the 'Total revenue' values shown. The revenue values presented in EY Table 42 are, in aggregate, understated by approximately 8%.

All of the deficiencies identified above have the effect of lowering the CBA derived by EY and skewing the analysis in a manner pessimistic to reopening Phases 2 and 3 of the WRC.

> "EY do not include a single example of an O/D pairing between a Mayo railway station and Galway City on what is a proposed Mayo-Galway rail passenger service."

7 See Section 3.3 of the National Transport Demand Model Update, Model Development Report, NTpM Volume 1, December 2019, Available at: NTpM-Vol1-Model-Development-Report.pdf (tii.ie).

REVISED APPROACH TO PASSENGER REVENUE

It was not feasible to undertake entirely new rail passenger demand forecasting to replace the analysis within the EY report, mainly because the data and the model (NTpM) that were used are not fully in the public domain. The revised approach therefore relies on the EY report's demand forecasts, with the following corrections and revisions:

- 23,000 tourist journeys per annum were added to EY's year 2030 passenger totals to equal 575,000 journeys per annum as described in Section 4.6.2 of the EY Report. These were distributed according to the proportion of flows shown in EY Table 42. The passenger numbers for 2026-2029 were increased by the same proportion as the existing analysis, using EY's ramp-up and growth rate over those years.[8]
- The one-way average fare for Category 'C' (e.g., Tuam-Galway) was corrected to be the average of Categories 'B' and 'D,' or €4.55 per one-way journey.
- The annual passenger growth rate for the years 2030-2056 was increased from 0.6% per annum to 1.0% per annum (from 2030 to 2040) and to 0.8% thereafter. The rail passenger growth rates are based on the NTpM Travel Demand Forecasting Report, Table 7.11—NTpM Central Growth (PT) Passenger Trip Matrix Totals – Republic of Ireland, 'Heavy Rail (15hr)' values.[9]

The results of the revised rail passenger demand forecasting and revenue calculation is shown in Table 6.2 below.

Table 6.2: Revised 2030 Travel Demand and Revenue (€2019) - EY O/D Pairings

O/D REF.	ORIGIN / DESTINATION	REVISED TOTAL RAIL DEMAND GROWTH (PASSENGERS/ YEAR)	REVISED ONE-WAY AVERAGE FARE (€/ YEAR)	REVISED TOTAL REVENUE (€/YEAR)
1	Tuam - Galway	197,085	4.55	896,739
2	Athenry - Galway	73,346	4.28	313,922
3	Tuam - Claremorris	70,150	4.55	319,184
4	Athenry - Tuam	52,808	4.55	240,276
5	Claremorris - Kiltimagh	21,081	2.80	59,026
6	Balla - Castlebar	18,109	2.80	50,705
7	Tuam - Ennis	13,253	7.01	92,902
8	Craughwell - Galway	11,179	4.28	47,847
9	Tuam - Dublin	9,028	7.01	63,284
10	Claremorris - Balla	6,638	4.55	28,410
11	All Other Flows	27,321	5.57[a]	152,107
12	15% of Other flows (not modelled)	75,000	4.53[a]	339,661
Total		**575,000**		**2,604,063**

(a) Calculated from EY Report Table 42 with Fare Category 'C' correction to €4.55/one-way journey.

8 Westport is likely to be the biggest beneficiary tourism-wise of the reopening of Athenry – Claremorris. The natural flow of rail borne overseas tourists in South West/Western Ireland is from South to North, as evidenced since the reopening of Phase One, with significant numbers travelling from Cork/ Kerry to Limerick and Galway. A significant number of these could be expected to continue northwards towards Westport from Galway should the natural and direct route be available.

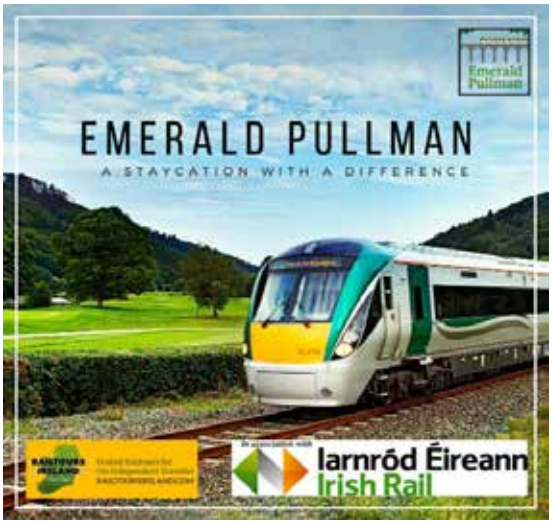
9 Available at: NTpM-Vol3-Travel-Demand-Forcasting-Report.pdf

The EY estimate for tourist journeys quoted above, appears conservative given that official 2017 statistics from Fáilte Ireland show Galway at 1.6m overseas visitors and Mayo at 324,000. If even a modest 5% of this proven Galway cohort were enabled to travel by rail from the regional capital to destinations such as Westport and Ballina, it could add a potential 80,000 tourist journeys per annum to the WRC by 2030.[10]

Fig 6.1 Regional connectivity: Westport is likely to be the biggest beneficiary tourism-wise of the reopening of Athenry – Claremorris.

The rail tourism company, Railtours Ireland First Class Ltd, estimates generating some 5,000 bespoke rail passenger journeys annually from Galway to Westport (via Athenry and Claremorris) with guests touring Connemara by coach from Westport and back to Galway. This Dublin-based enterprise has 22 years' experience of working with Iarnród Éireann, using both scheduled and chartered train services, and offers visitors an extensive programme of escorted day and overnight tours to major tourist attractions throughout Ireland.[11]

Figure 6.2: Railtours Ireland



10 Topline Tourism Performance by County, Fáilte Ireland (2017).

11 Correspondence from Railtours Ireland First Class, March 2021. Tours operate Monday - Saturday year round.

In addition to the revised rail travel demand and revenue forecasts shown in Table 6.2, it is necessary to calculate the number of trips extracted from cars and the avoided passenger vehicle kilometres travelled resulting from the project. This was done by calculating the ratio of the sum of 'rail abstracted from car' and 'newly generated rail demand' to 'total rail demand growth (daily)' shown in Table 41 of the EY report and applying that ratio to the revised total rail demand growth above. Travel distances were obtained from Google Maps API, Distance Matrix. Road type was determined by manual review of the routes. The total avoided passenger vehicle travel distance is shown in Table 6.3.

> "Official 2017 statistics from Fáilte Ireland show Galway at 1.6m overseas visitors and Mayo at 324,000. If even a modest 5% of this proven Galway cohort were enabled to travel by rail from the regional capital to destinations such as Westport and Ballina, it could add a potential 80,000 tourist journeys per annum to the WRC by 2030."

Table 6.3: Avoided 2030 Passenger Vehicle Distance Travelled - EY O/D Pairings

O/D REF.	ORIGIN - DESTINATION	TRIPS	DISTANCE (KM)	ROAD TYPE	RURAL DISTANCE (KM)	MOTORWAY DISTANCE (KM)
1	Tuam - Galway	2,545	33.8	Motorway	0	86,034
2	Athenry - Galway	34,858	24.9	Motorway	0	867,954
3	Tuam - Claremorris	45,071	28.3	Rural	1,275,500	0
4	Athenry - Tuam	45,888	29.1	Motorway	0	1,335,350
5	Claremorris - Kiltimagh	1,817	15.2	Rural	27,623	0
6	Balla - Castlebar	10,865	14.0	Rural	152,116	0
7	Tuam - Ennis	0	83.1	Motorway	0	0
8	Craughwell - Galway	11,179	25.0	Rural	279,478	0
9	Tuam - Dublin	0	216.0	Motorway	0	0
10	Claremorris - Balla	4,794	10.0	Rural	47,940	0
11	All Other Flows	5,464	47.9	Average	147,272	114,677
12	15% of Other flows (not modelled)	24,372	47.9	Average	656,899	511,513
Total		**186,854**			**3,093,509**	**2,408,848**

The above tables show an analysis of the O/D pairings used by EY and the revised CBA does not assume any reduction in existing bus-based public transport services.

[6.3] NOISE BENEFITS

EY REPORT APPROACH TO NOISE BENEFITS

The EY report contains an assessment of noise benefits in EY Section 7.4.1 and EY Appendix E. It was stated that a 'high-level desktop review' was carried out by EY to determine the number of sensitive noise receptors within five distance bands of 0-50m, 50-100m, 100 to 150m, 150-200m and 200 to 500m from the railway corridor. The number of people within each distance band was determined, as well as the average additional noise levels in decibels, and presented in Table 19. The product was multiplied by €30 per person-decibel to calculate a total noise dis-benefit of (€1.4m) per annum, experienced by an aggregate of 4,387 individuals.

DEFICIENCIES IDENTIFIED WITH EY REPORT APPROACH

No noise modelling data are contained within the EY report to substantiate the increases in sound pressure levels presented in EY Table 19. Additionally, it is not clear whether a minimum noise threshold for noise impacts (below which no dis-benefit is considered to occur) was applied as recommended in the CAF. Specifically, the CAF recommends that Lden50 be used as a threshold for this purpose, and that no noise impacts below this threshold should be assessed.[12] The EY report does not present any Lden levels for noise receptors.

ADDITIONALLY, APPENDIX E OF THE EY REPORT STATES:

The transport modal change as a result of the reopening of the railway line has the potential to have a positive impact on noise sensitive receptors in proximity to the existing road network and a potential for adverse impact on those in proximity to the existing rail corridor.

While a potential increase in noise along the railway line is acknowledged, the analysis does not calculate any corresponding reductions along roadways and is therefore considered incomplete.

REVISED APPROACH TO NOISE BENEFITS

Noise from major railways is regulated under the Environmental Noise Directive (2002/49/EC). In Ireland only two rail agglomerations are subject to the Environmental Noise Directive (2002/49/EC)—those being Dublin and Cork. An excerpt from the most recent data submitted to the European Environment Agency is presented in Table 6.4 below.

Table 6.4: 2017 Railway noise data reported under the Environmental Noise Directive

AGGLOMERATION	INHABITANTS	NUMBER OF PEOPLE EXPOSED TO DIFFERENT NOISE BANDS (LDEN)					
		AREA (SQ KM)	55-59	60-64	65-69	70-74	>75
Cork	190,900	186	300	100	0	0	0
Dublin	1,308,900	936	14,000	11,800	2,800	300	100

12 Lden = 'day-evening-night level'

The above data show that for the 186 sq. km Cork rail agglomeration, 300 individuals experience an Lden of 55-59, and 100 individuals experience a Lden between 60-64, with no higher noise exposures reported. Given that the agglomeration population is 190,900 inhabitants, the data indicate that a relatively small percentage—those likely to reside in very close proximity to the rail line—experience reportable levels of noise.

In the case of the Phases 2 and 3 of the WRC, the endpoints of Athenry and Claremorris already have active railway stations, and hence, would not experience significantly higher Lden values. The rail line through the town of Tuam enjoys generous buffer lands on either side of the line, with only about two dozen homes lying within 50m of the line. The remainder of potential noise receptors along the railway line are sparsely located single family dwellings in rural areas.

It is considered that Phases 2 and 3 of the WRC will generate above-threshold (Lden50) noise levels for a very small number of new receptors and that any dis-benefit would be more than offset by a positive noise benefit accrued by the removal of 18 lorries per freight train from regional roadways.

Additionally, the foreseeable replacement of legacy rolling stock with new rolling stock would further reduce noise levels, and the ultimate introduction of electric, battery-electric, or hybrid rolling stock would reduce above-threshold noise entirely. Noise dis-benefits were therefore considered negligible in the CBA and were set at zero.

[6.4] LOCAL AIR QUALITY BENEFITS

EY REPORT APPROACH TO LOCAL AIR QUALITY BENEFITS

The environmental factor of local air quality is required to be evaluated under the CAF guidelines for project appraisals. This pertains to emissions of oxides of nitrogen (NOx) and particulate matter (PM) emitted by diesel engines. The EY report mentions these two pollutants briefly but does not contain any emission calculations. If NOx and PM emissions were quantified, their net benefits appear to have been combined with greenhouse gas (GHG) benefits.

DEFICIENCIES IDENTIFIED WITH EY REPORT APPROACH

The EY report does not quantify emissions of NOx or PM or evaluate specific benefits to the net emissions change.

REVISED APPROACH TO LOCAL AIR QUALITY BENEFITS

Emissions of NOx and PM were quantified by first calculating emissions from passenger and freight trains. The avoided emissions from passenger trips extracted from cars, and lorries travelling between Ballina in Mayo and the ports of Waterford and Foynes were then subtracted.

For the rail freight component, the assumption was made that four Ballina-Waterford trains and one Ballina-Foynes train per week would operate from calendar years 2026-2030.

From 2031-2035, these values were assumed to double to eight Ballina-Waterford trains and two Ballina-Foynes trains per week. And finally, from 2036 and for future years, an additional Ballina-Foynes freight train per week was assumed. In reality, rail freight traffic would increase gradually, rather than as a step-function. While the rail freight growth rate may appear optimistic, the analysis shows that this is a conservative assumption from the perspective of NOx and PM emissions.

NOx and PM emission factors were taken from Tables A.19 and A.20 of the CAF. The CAF does not contain emission factors for diesel multiple unit (DMU) railcars or diesel freight locomotives. DMU emission factors were therefore based on the Stage IIIA non-road mobile machinery certification standards for power Category H (130 ≤ kW 560). These standards were first required for new railcars and new engines used in railcars manufactured on or after 1st January 2006.

The diesel locomotive fleet was assumed to be entirely freight locomotives powered with diesel engines of equivalent rating to those currently in operation. The source of the emission factors used is Table 4 of the Union of International Railways (UIC's) *1990-2030 Environment Strategy Reporting System Methodology and Policy*.[13]

Table 6.5: NOx and PM Emission Factors

ROADWAY (G/KM)[a]				
	Rural		Motorway	
Pollutant	NOx	PM	NOx	PM
Petrol Car (2026-2029)	0.025	0.00100	0.015	0.00100
Petrol Car (2030+)	0.024	0.00100	0.014	0.00100
Diesel Car (2026-2029)	0.256	0.00244	0.285	0.00251
Diesel Car (2030+)	0.181	0.00112	0.200	0.00113
Ordinary Goods Vehicle (OGV) (2026-2029)	0.568	0.00694	0.335	0.00625
Ordinary Goods Vehicle (OGV) (2030+)	0.224	0.00262	0.105	0.00242

RAILWAY (G/KWH)[b]		
Pollutant	NOx	PM
Diesel Multiple Unit (Railcar)[c]	4.000	0.200
Freight Locomotive[d]	9.694	0.239

(a) From CAF Table A.18.
(b) Based on brake-specific fuel consumption of 212 g/kWh.
(c) Stage IIIA, Category H emission standards from Directive 97/68/EC
(d) From U.S.EPA Technical Highlights, Locomotive Emission Factors, Table 1.

DMU and Locomotive activity and emissions were based on a 58-minute journey time for Claremorris-Galway, a 3.75-hour journey time Ballina-Foynes, and a 5-hour journey time for Ballina-Waterford. A load factor of 34% of engine maximum rated power was assumed, based on the European Load Response (ELR) certification test cycle. Railway NOx and PM emissions are shown in Table 6.6 below.

13 Available at: 1990-2030 Environment Strategy Reporting System (uic.org)

Table 6.6: Railway NOx and PM Emissions

YEARS	UNIT TRAINS PER WEEK	ROUTE	MOTIVE POWER	RATED POWER (KW)	MWH/ YEAR	NOx EMISSIONS (TPY)	PM EMISSIONS (TPY)
All	210	Claremorris - Galway	Railcar	2 x 265 kW	1.621	6.48	0.32
2026 - 2030	4	Ballina - Waterford	Locomotive	1,827 kW	1.542	14.95	0.37
	1	Ballina - Foynes	Locomotive	1,827 kW			
2031 - 2035	8	Ballina - Waterford	Locomotive	1,827 kW	3.084	29.90	0.74
	2	Ballina - Foynes	Locomotive	1,827 kW			
2036 - 2056	8	Ballina - Waterford	Locomotive	1,827 kW	3.327	32.25	0.80
	3	Ballina - Foynes	Locomotive	1,827 kW			

Rated power equivalent to Series 2800 DMU railcars and Series 071 freight locomotive.

Reduced NOx emissions from passenger trains were calculated based on trip lengths and road types of rail journeys extracted from cars previously shown in Table 6.5. The fraction of petrol versus diesel cars was derived from the most recent (2016) data published by the Central Statistics Office (CSO) showing that approximately 58% of private car operation was by diesel vehicles, and 42% by petrol vehicles on a per-kilometre basis. Reduced NOx emissions from passenger cars are shown in Table 6.7 below.

Table 6.7: Reduced NOx Emissions from Rail Passengers- EY O/D Pairings

REDUCED CAR TRAVEL (KM/YEAR)			PETROL EMISSION FACTORS (G/KM)		DIESEL EMISSION FACTORS (G/KM)		REDUCED NOx EMISSIONS (TPY)	
O/D	Petrol	Diesel	2026-2029	2030+	2026-2029	2030+	2026-2029	2030+
1	36,306	49,728	0.015	0.014	0.285	0.200	0.01	0.01
2	366,277	501,678	0.015	0.014	0.285	0.200	0.15	0.11
3	538,261	737,239	0.025	0.024	0.256	0.181	0.20	0.15
4	563,517	771,832	0.015	0.014	0.285	0.200	0.23	0.16
5	11,657	15,966	0.025	0.024	0.256	0.181	0.00	0.00
6	64,193	87,923	0.025	0.024	0.256	0.181	0.02	0.02
7	0	0	0.015	0.014	0.285	0.200	0.00	0.00
8	117,940	161,538	0.025	0.024	0.256	0.181	0.04	0.03
9	0	0	0.015	0.014	0.285	0.200	0.00	0.00
10	20,231	27,710	0.025	0.024	0.256	0.181	0.01	0.01
11	110,543	151,407	0.019	0.018	0.272	0.192	0.04	0.03
12	493,070	675,342	0.019	0.018	0.272	0.192	0.19	0.14
Total							**0.91**	**0.65**

Reduced NOx emissions from HGVs displaced by rail freight were calculated based on trip lengths and road types estimated from Google Maps. Each unit train was estimated to displace eighteen round trips made by diesel-fuelled HGVs. Reduced NOx emissions from HGVs displaced by rail freight are shown in Table 6.8 below.

Table 6.8: Reduced NOx Emissions from HGVs Displaced by Rail Freight

YEARS	UNIT TRAINS PER WEEK	ROUTE	RURAL DISTANCE (KM/YEAR)	MOTORWAY DISTANCE (KM/YEAR)	RURAL EMISSION FACTORS (G/KM)	MOTORWAY EMISSION FACTORS (G/KM)	REDUCED NOx EMISSIONS (TPY)
2026 - 2030	4	Ballina - Waterford	1,821,082	507,686	0.568	0.355	1.43
	1	Ballina - Foynes	256,090	210,038			
2031 - 2035	8	Ballina - Waterford	3,642,163	1,015,373	0.224	0.105	1.08
	2	Ballina - Foynes	512,179	420,077			
2036 - 2056	8	Ballina - Waterford	3,642,163	1,015,373	0.224	0.105	1.16
	3	Ballina - Foynes	768,269	630,115			

Reduced PM emissions from passenger trains were calculated in the same manner as for NOx and are shown in Table 6.9 below.

Table 6.9: Reduced PM Emissions from Rail Passengers - EY O/D Pairings

REDUCED CAR TRAVEL (KM/YEAR)			PETROL EMISSION FACTORS (G/KM)		DIESEL EMISSION FACTORS (G/KM)		REDUCED PM EMISSIONS (TONS/YEAR)	
O/D	Petrol	Diesel	2026-2029	2030+	2026-2029	2030+	2026-2029	2030+
1	36,306	49,728	0.00100	0.00100	0.00251	0.00113	0.000	0.000
2	366,277	501,678	0.00100	0.00100	0.00251	0.00113	0.002	0.001
3	538,261	737,239	0.00100	0.00100	0.00244	0.00112	0.002	0.001
4	563,517	771,832	0.00100	0.00100	0.00251	0.00113	0.003	0.002
5	11,657	15,966	0.00100	0.00100	0.00244	0.00112	0.000	0.000
6	64,193	87,923	0.00100	0.00100	0.00244	0.00112	0.000	0.000
7	0	0	0.00100	0.00100	0.00251	0.00113	0.000	0.000
8	117,940	161,538	0.00100	0.00100	0.00244	0.00112	0.001	0.000
9	0	0	0.00100	0.00100	0.00251	0.00113	0.000	0.000
10	20,231	27,710	0.00100	0.00100	0.00244	0.00112	0.000	0.000
11	110,543	151,407	0.00100	0.00100	0.00248	0.00113	0.000	0.000
12	493,070	675,342	0.00100	0.00100	0.00248	0.00113	0.002	0.001
Total							**0.010**	**0.006**

Reduced PM emissions from HGVs displaced by rail freight were calculated in the same manner as for NOx and are shown in Table 6.10 below.

Table 6.10: Reduced PM Emissions from Rail Freight

YEARS	UNIT TRAINS PER WEEK	ROUTE	RURAL DISTANCE (KM/YEAR)	MOTORWAY DISTANCE (KM/YEAR)	RURAL EMISSION FACTORS (G/KM)	MOTORWAY EMISSION FACTORS (G/KM)	REDUCED PM EMISSIONS (TPY)
2026 - 2030	4	Ballina - Waterford	1,821,082	507,686	0.00694	0.00625	0.019
	1	Ballina - Foynes	256,090	210,038			
2031 - 2035	8	Ballina - Waterford	3,642,163	1,015,373	0.00262	0.00242	0.014
	2	Ballina - Foynes	512,179	420,077			
2036 - 2056	8	Ballina - Waterford	3,642,163	1,015,373	0.00262	0.00242	0.016
	3	Ballina - Foynes	768,269	630,115			

Planned electrification of Ireland's rail network will create significant emission reductions and positive benefits, provided that the renewable electricity share increases accordingly.

The number of rail passenger services and traction shown in the above examples is consistent with that described in the EY report. Our expectation is that the scale of passenger services will be less than the EY projected 30 per day and that combined with newer 22000 class traction, lower emissions will result.

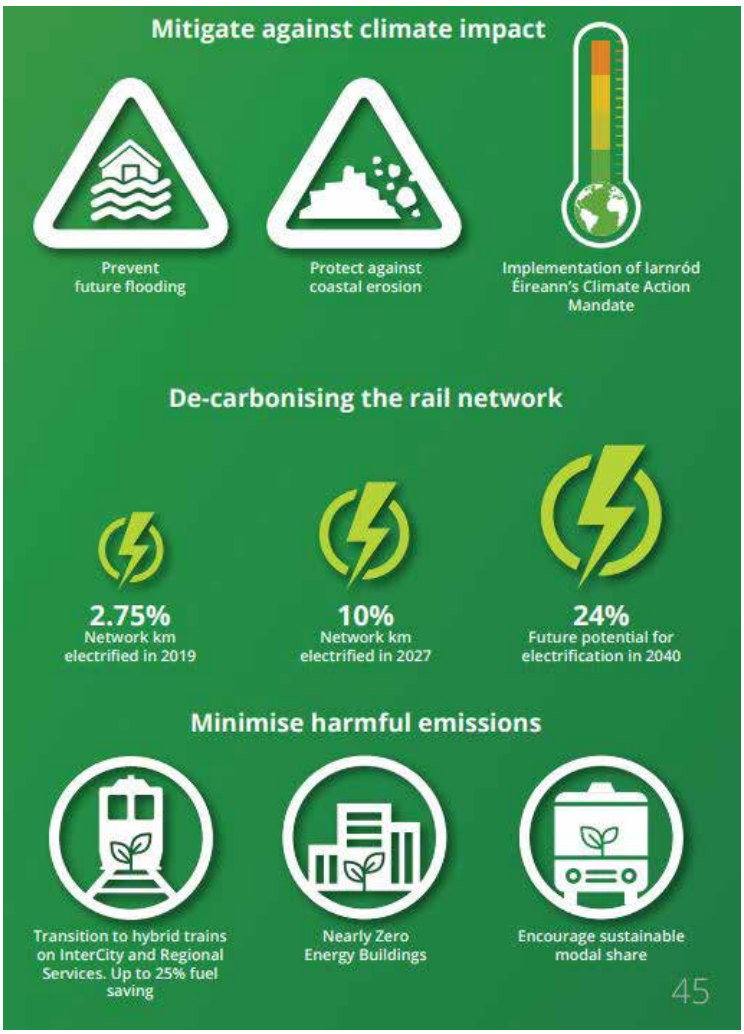
Use of new rolling stock would significantly reduce or remove any dis-benefit. Future electrification of the line will create significant emission reductions and positive benefits, provided that the renewable electricity share increases accordingly. However, for the purpose of this CBA, the NOx and PM (rural) contained in Table A.17 of the CAF were applied.

EU Regulation No 2016/1628 (2016) establishes Stage V emission certification standards for railway locomotives (Category RLL-v/c-1) and railcars (Category RLR-vc-1) which are approximately 50% lower for NOx and 90% lower for PM compared to the emission factors shown in Table 6.5. Additionally, the revised CBA does not assume any reduction in existing bus-based public transport services.

Planned electrification of Ireland's rail network will create significant emission reductions and positive benefits, provided that the renewable electricity share increases accordingly. This ambition is strongly reflected in Iarnród Éireann's recently published Network Strategy for 2027.

> "Playing a central role in Ireland's Climate Action Plan we will make rail, the greenest mode of domestic travel, greener still. Electrification of our network, including an order for up to 600 new electric and battery powered carriages, will expand our services and result in almost 80% of journeys being potentially emission free. The development of new freight services will also help to reduce congestion and harmful emissions on Ireland's road network."
>
> *Iarnród Éireann: Network Strategy 2027*

Fig 6.3 Climate objectives - Iarnród Éireann Network Strategy 2027, p45.



[6.5] GREENHOUSE GAS BENEFITS

EY REPORT APPROACH TO GREENHOUSE GAS BENEFITS

The EY Report discusses the issue of climate change and emissions of greenhouse gases (GHG) in Sections 2.4.3 and 7.3.3. The latter states that "...the total emissions before and after the reactivation of the WRC were calculated and the total benefit to the WRC was the difference between these two."

No account appears to have been taken of the fact that some of this rail freight would be traffic diverted from current rail freight routes through the greater Dublin Area (GDA), such as pulpwood.

DEFICIENCIES IDENTIFIED WITH EY REPORT APPROACH

The EY Report does not contain any calculations of GHG emissions, nor does it provide net emission changes for GHG emissions as a result of the project.

REVISED APPROACH TO GREENHOUSE GAS BENEFITS

GHG emissions from Phases 2 and 3 of the WRC were calculated in a similar manner as NOx and PM emissions in the previous section. Greenhouse gas emission factors for road transport were taken from Table A.18 of the CAF. The CAF does not include GHG emission factors for locomotives; therefore, these were estimated using the maximum brake-specific fuel consumption from the engine manufacturers' technical data sheets and source test data (Table 6.11).

Table 6.11: GHG Emission Factors

ROADWAY (G CO_2/KM)[a]		
	Rural	Motorway
Petrol Car (2026-2029)	105.927	118.490
Petrol Car (2030+)	100.654	107.356
Diesel Car (2026-2029)	104.057	111.666
Diesel Car (2030+)	99.748	107.356
Ordinary Goods Vehicle (OGV) (2026-2029)	406.726	527.828
Ordinary Goods Vehicle (OGV) (2030+)	406.674	527.575
RAILWAY (G CO_2/KWH)[B]		
Diesel Multiple Unit (Railcar)	671.724[b]	
Freight Locomotive	671.724	

(a) From CAF Table A.18.
(b) Based on fuel consumption rate per kW for a representative railway diesel engine.

GHG emissions from railway operations are shown in Table 6.12 below.

Table 6.12: Railway GHG Emissions

YEARS	UNIT TRAINS PER WEEK	ROUTE	MOTIVE POWER	RATED POWER (KW)	MWH/ YEAR	GHG EMISSIONS (TONNES CO_2 /YEAR)
All	210	Claremorris - Galway	Railcar	2 x 265 kW	1,621	1,089
2026 - 2030	4	Ballina - Waterford	Locomotive	1,827 kW	1,542	1,036
	1	Ballina - Foynes	Locomotive	1,827 kW		
2031 - 2035	8	Ballina - Waterford	Locomotive	1,827 kW	3,084	2,071
	2	Ballina - Foynes	Locomotive	1,827 kW		
2036 - 2056	8	Ballina - Waterford	Locomotive	1,827 kW	3,327	2,235
	3	Ballina - Foynes	Locomotive	1,827 kW		

Similar to NOx and PM emissions, the high number of passenger trains assumed throughout the CBA is causing elevated GHG emissions. Our expectation is that fewer than 30 trains daily, as projected by EY, will actually constitute the new services. Planned electrification of Ireland's rail network could create significant GHG emission reductions and positive benefits, provided that the renewable electricity share increases accordingly.

Reduced GHG emissions from passengers were calculated in the same manner as NOx and PM in the prior section and are shown in Table 6.13 below.

Table 6.13: Reduced GHG Emissions Rail Passengers – EY O/D Pairings

REDUCED CAR TRAVEL (KM/YEAR)			PETROL CO2 EMISSION FACTORS (G/KM)		DIESEL CO2 EMISSION FACTORS (G/KM)		REDUCED GHG EMISSIONS (TONNES CO_2/YEAR)	
O/D	Petrol	Diesel	2026-2029	2030+	2026-2029	2030+	2026-2029	2030+
1	36,306	49,728	118.49	107.356	111.666	107.356	10	9
2	366,277	501,678	118.49	107.356	111.666	107.356	99	93
3	538,261	737,239	105.927	100.654	104.057	99.748	134	128
4	563,517	771,832	118.49	107.356	111.666	107.356	153	143
5	11,657	15,966	105.927	100.654	104.057	99.748	3	3
6	64,193	87,923	105.927	100.654	104.057	99.748	16	15
7	0	0	118.49	107.356	111.666	107.356	0	0
8	117,940	161,538	105.927	100.654	104.057	99.748	29	28
9	0	0	118.49	107.356	111.666	107.356	0	0
10	20,231	27,710	105.927	100.654	104.057	99.748	5	5
11	110,543	151,407	112.99011	104.422	108.3349	104.0253	29	27
12	493,070	675,342	112.99011	104.422	108.3349	104.0253	129	122
Total							**607**	**573**

Reduced GHG emissions from HGVs displaced by rail freight were calculated in the same manner as NOx and PM in the prior section and are shown in Table 6.14 below.

Table 6.14: Reduced GHG Emissions from HGVs Displaced by Rail Freight

YEARS	UNIT TRAINS PER WEEK	ROUTE	RURAL DISTANCE (KM)	MOTORWAY DISTANCE (KM)	RURAL DISTANCE (KM/YEAR)	MOTORWAY DISTANCE (KM/YEAR)	REDUCED GHG EMISSIONS (TONNES CO_2/YEAR)
2026 - 2030	4	Ballina - Waterford	243	68	1,821,082	507,686	1,224
	1	Ballina - Foynes	137	112	256,090	210,038	
2031 - 2035	8	Ballina - Waterford	243	68	3,642,163	1,015,373	2,444
	2	Ballina - Foynes	137	112	512,179	420,077	
2036 - 2056	8	Ballina - Waterford	243	68	3,642,163	1,015,373	2,658
	3	Ballina - Foynes	137	112	768,269	630,115	

It should be noted that the rail freight component of the project will reduce GHG emissions progressively during the period of the CBA and is therefore critical to reducing overall GHG emissions.

Similar to NOx and PM emissions, the high number of passenger trains assumed throughout the CBA is causing elevated GHG emissions. Planned electrification of railways would create significant GHG emission reductions and much higher positive benefits, provided that the renewable electricity share increases accordingly. However, for the purpose of this CBA, the GHG prices contained in Table A.2 of the CAF were applied to the emission changes. These values include a shadow price of carbon, which increases from €20/ton in 2019 to €256/ton in 2050 and beyond.

[6.6] PHYSICAL ACTIVITY BENEFITS

The CAF provides for the calculation of project benefits related to 'active travel values,' where applicable. The concept is that the use of active modes of transport (walking and cycling) reduces inactivity, which in turn, reduces premature mortality and absenteeism. Benefits are accrued after five years of new induced physical activity have elapsed, after project operation. Premature mortality reduction benefits are based on the reduction in the mortality rate of project users in the 15-64 age range. The valuation benefit is assumed to be the same as an avoided fatal collision, as shown in Table A.22 of the CAF. Absenteeism reduction benefits are based on the reduction of lost workdays lost by project users and the valuation of work time per hour.

EY REPORT APPROACH TO PHYSICAL ACTIVITY BENEFITS

The EY Report does not discuss the possibility of physical activity benefits or attempt to calculate a benefit value.

DEFICIENCIES IDENTIFIED IN THE EY REPORT APPROACH

The EY Report does not discuss the possibility of physical activity benefits or attempt to calculate a benefit value.

REVISED APPROACH TO PHYSICAL ACTIVITY BENEFITS

Physical activity benefits are primarily associated with walking and cycling infrastructure projects, such as bicycle lanes, segregated walking and cycling paths, bicycle parking facilities, and greenways. However, new railway links also have the potential to induce cycling beyond baseline levels due to the relative ease with which bicycles may be accommodated by a train compared to other transport modes. The ability of a bicycle-train-bicycle commute vastly increases the number of origins and destinations that may be accessed via the railway network. Therefore, a small number of induced cycling journeys and associated benefits were attributed to the project, with benefits ramping up from commencement to year five of operation and increasing in line with the forecasts of GDP.

This CBA assumes that the Phases 2 and 3 of the WRC could induce up to thirty new cycle commuters per day, based on the number of daily trains assumed in the EY report, and the capacity of each train to accommodate at least two bicycles. Actual train-bicycle commuting rates could be significantly higher.

Table 6.15 below shows the physical activity benefits from decreased premature mortality.

Table 6.15: Physical Activity Benefits – Premature Mortality (CAF Case Study A)

BEGAN CYCLING	YEARS BENEFITS	NO. OF CYCLISTS	AVERAGE MORTALITY	EXPECTED DEATHS X REDUC-TION IN RR	% OF TOTAL ACCRUED BENEFIT	POTENTIAL LIVES SAVED	VALUE OF PRE-VENTED FATALITIES (2011 €)	VALUE OF PRE-VENTED FATALITIES (2019 €)
2026	1	30	0.0019	1.08E-4	20%	2.12E-5	5,531	5,755
2027	2	30	0.0019	1.08E-4	40%	4.33E-5	11,063	11,510
2028	3	30	0.0019	1.08E-4	60%	6.50E-5	16,594	17,265
2029	4	30	0.0019	1.08E-4	80%	8.66E-5	22,125	23,019
2030	5	30	0.0019	1.08E-4	100%	1.08E-4	27,657	28,775
2030+	5+	30	0.0019	1.08E-4	100%	1.08E-4	-	+2% per year

Table 6.16 below shows the physical activity benefits from decreased absenteeism.

Table 6.16: Physical Activity Benefits – Absenteeism (CAF Case Study B)

BEGAN CYCLING	YEARS BENEFITS	NO. OF CYCLISTS	AVG SICK LEAVE P.A.	AVG HOURS WORKED PER DAY	AVG. BENEFIT PER MIN ACTIVE TRAVEL	% OF TOTAL ACCRUED BENEFIT	REDUCED ABSEN-TEEISM FOR CYCLISTS	HOURS SAVED PER CYCLIST	VALUE OF SAVED TIME (2019 €)
2026	1	30	4.9	7.5	0.002	20%	0.06	0.44	454
2027	2	30	4.9	7.5	0.002	40%	0.12	0.88	908
2028	3	30	4.9	7.5	0.002	60%	0.18	1.32	1,363
2029	4	30	4.9	7.5	0.002	80%	0.24	1.76	1,817
2030	5	30	4.9	7.5	0.002	100%	0.29	2.21	2,271
2030+	5+	30	4.9	7.5	0.002	100%	0.29		+2% per year

[6.7] COLLISION BENEFITS

EY REPORT APPROACH TO COLLISION BENEFITS

The EY report includes a road safety benefit for reduced collisions based on the CSO's national accident rates per kilometre travelled, and the reduction in kilometres travelled due to Phases 2 and 3 of the WRC. EY forecast that the accident rates would decline due to 'stricter driving regulations, improved car technology and advances in medical technology.'

DEFICIENCIES IDENTIFIED IN THE EY REPORT APPROACH

EY's approach is not incorrect, except that their data and calculations are not documented in their report. However, it is likely that the artificially low rail abstraction rates from cars derived by EY are causing the collision benefit to be underestimated. As shown in Table 35 of the EY report, the trend of declining road fatalities has been less pronounced since 2012, so the basis for a continually declining casualty/fatally rate per kilometre over the next 35 years may not be appropriate.

REVISED APPROACH TO COLLISION BENEFITS

A revised analysis of collision benefits was performed by applying the most recent road safety statistics available from the CSO to the displaced passenger transport (shown in Table 6.3) and HGVs (shown in Table 6.8). Because the value of collision benefits is highly sensitive to the fatal collision rate, and the number of road fatalities varies from year to year, a five-year average rate was used in this analysis. The CSO road safety data and derived collision rates are shown in Table 6.17 below.

Table 6.17: Five-Year Road Safety Data

ROAD SAFETY METRIC	CALENDAR YEAR				
	2012	2013	2014	2015	2016
Total Injuries	7,942	6,880	8,079	7,840	7,710
Serious Injuries	794	688	808	784	771
Slight Injuries	7,148	6,192	7,271	7,056	6,939
Fatalities	163	188	193	162	186
Total Distance Driven (million km)	40,648	41,757	42,447	45,950	48,519
Serious Injury Rate (per million km)	1.95E-02	1.65E-02	1.90E-02	1.71E-02	1.59E-02
Slight Injury Rate (per million km)	1.76E-01	1.48E-01	1.71E-01	1.54E-01	1.43E-01
Fatality Rate (per million km)	4.01E-03	4.50E-03	4.55E-03	3.53E-03	3.83E-03

The collision valuations from Table A.22 of the CAF were applied, and the collision benefits were calculated and shown in Table 6.18 below. The collision benefits were assumed to increase at the same rate of rail passenger and rail freight growth.

Table 6.18: Collision Benefits

ACCIDENT TYPE	2011 VALUE (000'S €)	2019 VALUE (000'S €)	5-YEAR AVERAGE RATE (PER 10^6 KM)	REDUCED KM TRAVELLED (10^6 KM)	COLLISON BENEFIT VALUE (000'S €)
Serious Injuries	331.4	542.4	1.76E-02	11.092	79.2
Slight Injuries	31.1	50.9	1.58E-01	11.092	66.9
Fatalities	2,310.5	3,781.9	4.08E-03	11.092	128.1
Total Collision Benefit					**274.2**

[6.8] NET TRANSPORT USER BENEFITS – TIME SAVINGS BENEFITS

EY REPORT APPROACH TO TIME SAVINGS BENEFITS

The EY report discusses time savings benefits in Section 7.3.5. It is stated that a total of 315 car journeys per day would be prevented and 55% of these would be during rush hour. The section further states:

> '[I]t is not possible to provide an accurate assessment of the total economic benefit...however it is assessed to be negligible and as such has not been included in the final valuation of the economic benefits.'

Regarding passenger rail transport, Section 7.6 of the EY report states:

> 'Average journey times were also found to slightly increase, leading to a negative value for time savings. This was because the train is slower than car journeys, leading to a negative value for time savings.'

The EY report shows a time savings dis-benefit of -€0.9m in EY Table 21.

DEFICIENCIES IDENTIFIED IN EY APPROACH

The EY report contains no car passenger journey time calculations. As discussed above in Section 6.2, a twenty-minute 'interchange penalty' was improperly applied to Tuam-Galway flows for an interchange at Athenry, even though the central travel demand forecasting does not include an interchange. This penalty results in unrealistically long rail journey times, including 80 minutes for Claremorris-Galway and 50 minutes for Tuam-Galway.

On page 102 of the EY report it is stated that journey times to/from Galway were taken from Google Maps. However, it is not clear whether time-of-day considerations (i.e., rush hour journey times) were properly accounted for.

Finally, the time values shown in EY report Table 14 are outdated, and not the current values included in the NTpM or CAF.

REVISED APPROACH TO TIME SAVINGS BENEFITS

A revised time savings benefit analysis was performed based on more realistic rail journey times of 58 minutes for Claremorris-Galway and 38 minutes for Tuam-Galway. For car journeys, distances and peak/non-peak travel times were obtained from the Google Maps Distance Matrix API. For bus/coach journeys, travel times were taken from the Transport for Ireland journey planner.[14] Trips were assumed to occur equally during peak and non-peak hours.[15]

Journey times for the car and bus/coach rail transport options are shown in Table 6.19 below for peak and non-peak hours. The primary bus operator(s) serving the route and the route number(s) are shown for reference. Other bus operators not shown may also provide services. See case study in Appendix 4.

14 Available at: Your Journey Starts Here | Transport for Ireland

15 See Appendix 4 for a detailed comparison of bus and train travel times for a sample of journeys.

Table 6.19: Car and Bus Transport Times

ORIGIN – DESTINATION	CAR JOURNEY TIME (MIN)		CAR DISTANCE (KM)	BUS JOURNEY TIME (MIN)		BUS OPERATOR(S)	BUS ROUTE NO(S).
	PEAK	NON-PEAK		PEAK	NON-PEAK		
Tuam - Galway	50	37	33.8	49	39	Burke's	427 & 428
Athenry - Galway	35	26	24.9	37	30	Farrell	418
Tuam - Claremorris	30	24	28.3	30	26	Expressway	52
Athenry - Tuam	30	25	29.1	120	92	Burke's/Farrell	427 & 428/418
Claremorris - Kiltimagh	16	14	15.2	27	25	Bus Éireann	421
Balla - Castlebar	18	14	14.0	17	17	Bus Éireann	440
Tuam - Ennis	65	52	83.1	171	137	Burke's/BÉ	427 & 428/51
Craughwell - Galway	45	27	25.0	40	35	Healy	920
Tuam - Dublin	160	136	216.0	219	209	Burke's/Citylink	427 & 428/660
Claremorris - Balla	14	13	10.0	18	18	Expressway	52
All Other Flows	46	37	47.9	73	63	Various	-
15% of Other Flows	46	37	47.9	73	63	Various	-

Rail journey times were estimated based on the distances between origin-destination pairs and anticipated train speeds. For existing rail-served flows, actual journey times were obtained from Iarnród Éireann schedules. The time savings for each origin destination pair were calculated and are shown in Table 6.20 below.

Table 6.20: Total Time Savings

ORIGIN – DESTINATION	RAIL DEMAND GROWTH	RAIL JOURNEY TIME (MIN)	TOTAL TIME SAVINGS (HOURS/YEAR)			
			EXTRACTED FROM CARS		EXTRACTED FROM BUSSES	
			PEAK	NON-PEAK	PEAK	NON-PEAK
Tuam - Galway	197,085	38	255	-21	17,833	1,621
Athenry - Galway	73,346	19	4,648	2,033	5,773	3,528
Tuam - Claremorris	70,150	19	4,131	1,878	2,299	1,463
Athenry - Tuam	52,808	18	2,677	4,589	6,191	4,492
Claremorris - Kiltimagh	21,081	12	61	30	2,362	2,047
Balla - Castlebar	18,109	13	453	91	241	241
Tuam - Ennis	13,253	70	0	0	11,154	7,400
Craughwell - Galway	11,179	28	1,584	-93	0	0
Tuam - Dublin	9,028	140	0	0	5,943	5,191
Claremorris - Balla	6,638	15	-40	-80	46	46
All Other Flows	27,321	37	392	5	6,592	4,740
15% of Other Flows	75,000	37	1,746	20	15,022	10,802
All	575,000		15,905	8,452	73,458	41,572
Total Time Savings			**139,387**			

Tables A.6-A.9 of the CAF provide values for 'in-work,' 'leisure,' and 'commuting' time. Additionally, Table 4.24 of the NTpM Model Development Report contains value-of-time figures for peak and non-peak (inter-peak) commuting. For the purposes of this analysis,

the number of rail journeys is known; however, the fraction of journeys taken for each purpose is unknown. Therefore, the NTpM value-of-time figures were used because they present the value of time in terms of peak and non-peak journeys.

The O/D Pairings shown in Table 6.21 below are those created by EY and are replicated here solely for analytical and comparison purposes. Note that some of these pairings are not served by stations on Phase 2 or 3 of the WRC e.g., Balla-Castlebar, Claremorris-Balla and Craughwell-Galway.

Table 6.21: Value of Time

VALUE OF TIME FROM DERIVED FROM COMMON APPRAISAL FRAMEWORK (CAF) TABLES A.6-A.9			
Journey Purpose	€/hour (2011)	2011-2019 GNP Adjustment	€/hour (2019)
Commuting	9.67	1.24	11.95
In-Work	30.90	1.24	38.19
Leisure	9.67	1.24	10.75
VALUE OF TIME FROM NATIONAL TRANSPORT MODEL, MODEL DEVELOPMENT REPORT TABLE 4.24			
Journey Time	User Class	€/hour (2019)	
AM Peak	Light Vehicle	26.65	
Inter Peak	Light Vehicle	27.52	

Using the NTpM value of time values, the time savings benefits were calculated and are shown in Table 6.22 below.

Table 6.22: Total Time Savings Benefit from WRC Phases 2 and 3

JOURNEY TIME	USER CLASS	UNIT VALUE OF TIME (€/HOUR)	TOTAL TIME SAVINGS (HOURS)	TOTAL VALUE OF TIME (000'S €)
AM Peak	Light Vehicle	26.65	89,364	2,382
Inter Peak	Light Vehicle	27.52	50,024	1,377
Total Time Savings Benefit			**137,387**	**3,758**

[6.9] NET TRANSPORT USER BENEFITS – TRAVEL COST SAVINGS

EY REPORT APPROACH TO TRAVEL COST SAVINGS

Section 7.3.2 of the EY report briefly discusses the benefit of travel cost savings. The savings are stated to occur from passengers who 'swap from car journeys to rail journeys' and also from '...remov[ing] 18 lorries a day from the long journeys from Ballina to the ports.' For rail passengers, the savings are attributed to reduced operating, maintenance and parking costs for private cars users. For rail freight, the cost savings are attributed to the 'lorry drivers or haulage companies.'

The EY report implies that a cost savings calculation was performed according to the CAF methodology, quantifying the cost savings between the current situation (i.e., without the restored WRC rail link) and if the WRC were to be restored.

It is noted that this benefit includes the savings associated with the fare categories presented in Table 29 of the EY report and used in this revised CBA (as corrected). Upon examination, the EY fare categories are significantly lower than current adult return fares. For example, the one-way Athenry-Galway fare (Category 'B') is assumed to be €4.28. The current adult return fare for this flow is €11.78, or €5.89 each way. While details are not provided by EY, the discrepancy may be attributable to:

(i) free travel pass travellers,

(ii) TaxSaver fares,

(iii) student fares, and

(iv) child fares.

The cost savings provided by these categories of reduced fares was assumed to be included in this aspect of the EY report, which was retained. To the degree that these beneficial fares are not availed of, the passenger revenues calculated in Section 6.2 would increase.

DEFICIENCIES IDENTIFIED IN THE EY APPROACH

No travel cost savings analysis is contained in the EY report. The relevant data relied upon are also not contained in the report, whether originating from the Annex of the CAF or from other sources. These data include vehicle fuel and nonfuel operating costs, maintenance costs, parking costs, distances travelled, and driver costs (for lorry drivers). It is therefore not possible to replicate or confirm the results in the EY report.

REVISED APPROACH TO TRAVEL COST SAVINGS

The travel cost savings benefits calculated by EY are closely related to their rail travel demand modelling, and specifically the generalised cost calculations performed for the 'car versus public transit' nest of their logit model.[16] Because EY's demand forecasts were largely retained in the present analysis (except as revised above), the travel cost savings benefits listed in EY Table 75 were also retained in the current analysis in order to maintain consistency.

These values may underestimate the true travel cost savings benefits due to the modest increase in adjusted demand shown in Section 6.2 and the fact that that EY appear to have used a passenger vehicle operating cost of €0.10/km rather than the values specified in Annex 1 of the CAF, which are significantly higher.[17]

Finally, it is noted that according to the text of the EY report, their travel cost savings benefit calculations appear to include benefits associated with rail freight. Therefore, to avoid double counting, no additional transport cost benefits were attributed to rail freight in this revised CBA.

16 Incorrectly referred to as 'Generalised Journey Time' or 'GJT' throughout the EY report.

17 See Table 26 of the EY report.

Table 6.23: Travel Cost Savings Benefit

CALENDAR YEAR	EY REPORT TABLE 75 'TOTAL OTHER COST-SAVING BENEFITS' – SUM OF YEARS (MILLION €)	NUMBER OF YEARS	REVISED TRAVEL COST SAVINGS BENEFITS PER YEAR (000'S €)
2026	5.1	1	5,100
2027-2030	30.7	4	7,675
2031-2035	41.9	5	8,380
2026-2040	43.0	5	8,600
2041-2045	43.8	5	8,760
2046-2050	44.8	5	8,960
2051-2056	55.2	6	9,200

[6.10] WIDER PUBLIC FINANCES (INDIRECT TAXATION REVENUES)

EY REPORT APPROACH TO WIDER PUBLIC FINANCE ISSUES

The EY report addresses this item in Section 6.3.4 by assigning a €3.0m per annum dis-benefit. EY's analysis is quoted in its entirety as follows:

> 6.3.4 Wider government revenues
>
> Whilst there are direct financial benefits associated with the increased use of the rail network, there are some offsetting reductions to other areas of government revenue. This is due to reduced car usage meaning less road tax and fuel duties being paid.
>
> Road tax reductions will only occur as a result of lorries being removed off the road due to the small increase in rail freight, however the reduction in use of buses, cars and lorries will all directly result in less fuel being consumed and less tax therefore being paid. It is, however, noted that the reduction in fuel consumption will have significant environmental benefits which are assessed in the next chapter.
>
> Based on the demand assessment, wider government revenues are expected to fall by up to €3.0m per annum by 2030.

DEFICIENCIES IDENTIFIED IN THE EY APPROACH

EY's analysis is quite terse at three paragraphs yet assigns a significant annual cost of €3.0m per annum to the WRC restoration project. This exceeds the entire subvention amounts through 2050, calculated in EY Section 6.3.3, and therefore requires further scrutiny.

EY appear to assume that the introduction of freight train services between Mayo and the southern ports will lead to redundancy in road haulage as their calculations include the loss of road tax revenue from lorries at Section 7.3.1. We note that the maximum road tax for a goods vehicle weighing over 12,000 kg is €900 per annum.[18]

18 Motor Tax Online

No evidence is provided by EY for their assertion that while the project 'will remove 18 fewer *[sic]* lorries travelling daily to Shannon, Foynes or Waterford Port,' this will result in 18 fewer lorries being employed nationally.

EY appear to be unaware that a large proportion of anticipated rail freight traffic is already using a more circuitous and congested rail route (via the GDA), and that the balance includes anticipated new traffic based on demand from industry for connectivity between the west and southern ports.

We also note that there is a widely reported pressure on the road freight industry to meet current supply chain demand.[19]

REVISED APPROACH TO WIDER PUBLIC FINANCE ISSUES

Considerable research beyond the scope of this appraisal has been undertaken to quantify the economic benefits of railway services to communities as well as the wider 'exchequer benefits' that indirectly result. One potentially positive impact relates to higher housing prices in the areas adjacent to railway stations, resulting in higher Local Property Tax (LPT) revenue. Additionally, new housing, and transport-oriented redevelopment and infill projects could be prompted by the development, resulting in stamp duty on property transactions and ongoing LPT and commercial rates inflows. Additional benefits may arise from reduced rural unemployment and social welfare outlays, to increased occupancy rates of shop units in town centres, again improving commercial rates inflows. Overall, the project is expected to have neutral to positive effect on the exchequer, with the greatest benefits accruing to local authorities.

Due to the difficulties in forecasting the direct wider public finances and taxation benefits, and establishing the causal relationship of the project, no benefits were attributed to this item in the CBA. However, there is no justification for the dis-benefits, as contained in the EY Report.

There is also a significant societal benefit to those entitled to free travel that has not been monetised.

"One potentially positive impact relates to higher housing prices in the areas adjacent to railway stations, resulting in higher Local Property Tax (LPT) revenue. Additionally, new housing, and transport-oriented redevelopment and infill projects could be prompted by the development, resulting in stamp duty on property transactions and ongoing LPT and commercial rates inflows."

"Overall, the project is expected to have neutral to positive effect on the exchequer, with the greatest benefit accruing to local authorities... There is also a significant societal benefit to those entitled to free travel..."

19 https://fleet.ie/truck-driving-in-crisis-due-to-health-problems-and-recruitment-crisis/

[6.11] CONCLUSION

In this section of the report we have presented our quantification of the monetary benefits that are likely to arise from the restoration and operation of Phases 2 and 3 of the WRC. Without access to the resources and institutional assistance (e.g., from IÉ and the NTA) to carry out a financial appraisal starting from basic principles, we have been obliged to work mainly within the methodological framework used by EY in their appraisal. Where we found errors in the EY work, or where we disagreed with any of their assumptions and analysis, we have documented our corrections and alternative analysis carefully and transparently.

The results of this section together with the following one on rail freight are designed to feed into Section 8 to follow, where the quantified project benefits are combined with the quantified project costs (as described in the previous Section 5) to generate a cost-benefit analysis. In Section 8, a standard process of time discounting will be applied to all costs and benefits, where the discount rate is set at 4% as required by the CAF.

An area of our benefit analysis that is least satisfactory relates to future revenue generated by passengers. For this, we used EY's data supplied to them by Iarnród Éireann and the NTA, which treated the Phase 2 and 3 extension as merely an additional transport mode to those currently available (i.e., cars and bus/coaches), intended mainly to serve people living close to the rail line running from Athenry to Claremorris. A series of origin-destination journeys (O/D), including some that will not be served by the new service and omitting others with far higher populations that will be served, were derived by EY and populated using NTA data from the base year 2012. These data were then projected forward to the year of opening of the Phases 2 and 3 WRC project, i.e., 2026 (14 years after the base year assumptions).

> "EY did not include a single example of an O/D pairing of a Mayo town with Galway City on what is a proposed Mayo-Galway rail passenger service."

It was not feasible to undertake entirely new rail passenger demand forecasting to replace the analysis within the EY report, mainly because the data and the model (NTpM) that were used are not fully in the public domain. This report has therefore followed the range of Origin-Destinations (O/D) pairings used by EY.

It is remarkable that EY excluded such populous O/D pairings as Castlebar-Galway, Westport-Galway, Ballina-Galway, Claremorris-Galway and Castlebar/Westport/Ballina-Tuam, while O/D pairings that currently do not have operational railway stations such as Balla and Kiltimagh are included. Also, the O/D of Craughwell-Galway, which is not on the proposed route, is included by EY for reasons that are not explained.

The combined population of the omitted O/D pairings of Westport, Castlebar, Claremorris and Ballina towns is 32,124 and the combined population of Local Electoral Areas served by these towns is 100,611. The combined population of the two communities chosen by EY that do not have railway stations is 1,828.

In summary, EY did not include a single example of an O/D pairing of a Mayo town with Galway City on what is a proposed Mayo-Galway rail passenger service.

As discussed in Section 4, a more relevant perspective within which to evaluate the WRC is a regional development context where the rail line serves a transformational role in linking the towns of north Galway, Mayo, and Sligo/Leitrim/Roscommon on a north-south axis. Consequently, the EY report's focus mainly on a narrow geographical area close to the Athenry-Claremorris alignment is almost certainly resulting in a significant under-estimate of the true potential of the WRC. However, the absence of access to Iarnród Éireann and NTA data sources prevented us following up our appraisal in a way that would include the wider regional development remit of the WRC. We will return to this issue in the final section of this report.

"A more relevant perspective within which to evaluate the WRC is a regional development context where the rail line serves a transformational role in linking the towns of north Galway, Mayo, and Sligo/Leitrim/Roscommon on a north-south axis. Consequently, the EY report's focus mainly on a narrow geographical area close to the Athenry-Claremorris alignment is almost certainly resulting in a significant under-estimate of the true potential of the WRC."

7

FREIGHT TRAIN UNLOADING AT BELVIEW, PORT OF WATERFORD 2015 (PORT OF WATERFORD)

Section 7

Rail Freight

[7] RAIL FREIGHT

7

[7.1] INTRODUCTION

Until the mid-1970s freight trains in Ireland were known as “goods” trains. A vast range of commodities was carried by these trains. This included cattle for export, live chickens, sugar beet, telegraph poles, motor cars, tractors, coffins, beer, agricultural products, feedstuff and fertiliser, cement in bags and in bulk, tar, liquid molasses, petrol, diesel, retail grocery supplies, processed meat for export, mined bulk loads of gypsum, dolomite, coal and zinc, and hazardous loads such as ammonia and acrylonitrile (used as raw material for the manufacture of acrylic fibres).

In the years up to the 1970s, apart from liquids and bulk loads, commodities were carried mainly in general purpose wagons in rakes of up to 70 wagons hauled by locomotives. Almost every station in the country handled goods traffic on a daily basis. In the Mayo/Galway area, for example, goods and wagon loads were handled daily at Ballyhaunis, Claremorris, Balla, Castlebar, Westport, Westport Quay, Ballina , Kiltimagh, Swinford, Charlestown, Milltown, Tuam Sugar Factory, Tuam, Ballyglunin, Athenry, Craughwell, Ardrahan, Gort, Ballinasloe, Woodlawn, Attymon, Oranmore and Galway City.

Fig 7.1 A Goods Trains departs Claremorris for Limerick 1970 (Irish Railway Record Society).

Those involved in the transport of goods were originally known as “shipping agents” but the term ‘logistics managers’ was widely adopted in the 1970s. At the same time the “goods” transport business became known as “freight” transport, reflecting a more acceptable international image associated with ships (freighters) and the huge US freight trains. This transformation from ‘goods’ to ‘freight’ also saw a switch over to 20ft and 40ft containers in which products and supplies were carried. As the concept of transporting general freight exclusively in such containers became widely adopted in Europe, specialized logistics firms assumed responsibility for these containers and their transportation to the individual industry or end user.

The arrival of 20ft and 40ft containers into the general freight marketplace led to the discontinuation of wagon-load traffic, with massive implications for railway staff and the status of railway stations. The new market demand moved to trains consisting of 20ft or 40ft containers where the railway staff never saw the actual load inside the container. This traffic was known as "multi modal", as the container could travel via a number of different modes, e.g., by truck from factory to station; by train from station to port; and by ship from port to port, etc.

In order to handle containers, stations now required forklifts or gantry cranes and as the containers were designed for 20-30 tonne loads, the capacity to send smaller consignments began to disappear. The number of stations handling such container loads decreased dramatically and in Galway and Mayo, only Westport, Castlebar, Claremorris, Ballina, Ballinasloe, Athenry and Galway City remained open to freight traffic.

Figure 7.2 Cars sent by rail from the Ford factory in Cork passing through Claremorris in September 1950 (Pic. James P. O'Dea)

With an eye on the smaller consignments that local merchants might be more likely to send and receive, CIÉ came up with the novel idea of acquiring hundreds of 10ft containers which they then took responsibility for filling with smaller consignments for daily distribution throughout the country. These were off-loaded onto CIÉ lorries (in the reduced number of towns) and the contents were distributed to local businesses under a brand known as UNILOAD.

Fig 7.3 A 10ft Uniload container off-loaded from a train to a lorry for local delivery of its contents.

Scheduled weekday all-island rail freight services were introduced, departing North Wall in Dublin for destinations such as Belfast, Sligo, Ballina, Westport, Galway, Limerick, Tralee, Cork, Waterford and Wexford, with corresponding return night services from the provinces. In addition to the new containers, these new freight trains carried oil, beer and cement. Special "as required" trains also ran regularly, comprising full loads of particular products such as oil, fertiliser, cement, ammonia, coal, beer, mined materials, pulpwood or containers. These were known as "block trains".

Fig 7.4 An Esso Oil Block Train passes Milltown on a Galway-Claremorris service 1985 (D. Carse).

In 2005 Iarnród Éireann took a corporate decision on economic grounds to cancel all scheduled freight trains and to close the Uniload service. With Ireland continuing to be unique in Europe by having no grant aid or subsidy to rail freight, Iarnród Éireann felt obliged to confine their freight activities to block trains where they were confident of an economic return. The result was the closure of all container freight terminals including North Wall in Dublin. Virtually all rail freight traffic ceased within months leaving only Tara Mines to Dublin Port, and Pulpwood from Westport and Ballina to Waterford on the railways. Some freight yards were sold and staff numbers were reduced dramatically, while a modernisation of the mainline railway network got underway with an emphasis on passenger services.

This closure of the rail freight sector happened as the McCann Report sponsored by the Minister for Transport Seamus Brennan to investigate the merits of opening the Western Rail Corridor between Sligo and Limerick, was reporting a demand from Mayo Industries for a continued multi modal container service to Dublin Port and also to Waterford Port.[1] Thanks to the combined efforts of community, industry and Iarnród Éireann, a model was quickly designed in Mayo to facilitate the operation of container (multi modal) trains between Ballina and the Port of Waterford. This successful pilot project led to the re-introduction, after a short suspension, of container trains between Ballina and Dublin Port.

Subsequently, Dublin Port invested in new rail sidings that enabled transfer of loads between ship and train within the port confines. In 2011 there was significant investment in the expansion of sidings at Ballina with a further €2m invested there in rail freight facilities in 2020. It has recently been announced that Shannon Foynes Port, Ireland's newest Tier 1 port located 40 kilometres west of Limerick, is to have its rail connections restored. With the advent of BREXIT, it is clearly logical to invest in rail connectivity between the inland port at Ballina and the increasingly important southern ports so as to maintain the supply chain to the West and North West.

Fig 7.5 An IWT Intermodal container train approaches Ballina from Dublin Port 2020 (N. Enright)

1 https://web.archive.org/web/20061103083820/http://www.transport.ie/viewitem.asp?id=6645&lang=ENG&loc=845

[7.2] RAIL FREIGHT TODAY

Currently there are three main freight customers of Iarnród Éireann. The first, International Warehousing & Transport (IWT), charters six container trains weekly making round trips between Ballina and Dublin Port with an average payload of 700 tonnes. The second, Coillte, the state-owned commercial forestry company, charters two/three trains weekly for the carriage of bulk pulpwood from Ballina and Westport to their Smartply Plant at Waterford. The third, Boliden, a Sweden-based producer of zinc, copper, nickel, charters between ten and fifteen trains weekly from Tara Mines to Dublin Port.

Remarkably, all container rail freight in Ireland today operates either to or from the rail freight terminus at Ballina. This is currently the only location on the entire Irish railway network owned by Iarnród Éireann that has the capacity to load or offload containers to and from trains. The other two rail container facilities are the property of Waterford and Dublin Ports. As a railhead, Ballina gathers containers from its wider hinterland. Commodities in the containers range from inbound imported raw materials for regional industries to finished products such as beverage concentrate and other products for export.

The fact that Mayo generates over 400 such freight trains annually on round trips to and from two ports, begs the question as to what is the true national potential of rail freight for other parts of the country. There is increasing recognition that transporting freight by rail across Ireland has many advantages, not only from an economic viewpoint, but also in terms of the environment. Working with logistics companies, Iarnród Éireann has operated a modern and efficient intermodal container freight train service between Ballina and the Ports of Dublin and Waterford (intermittently) for the past 15 years. These trains displace approximately 15,000 truck journeys, each averaging 300 kilometres, amounting to 4.5 million truck kilometres per annum.

Fig 7.6 Container and Pulpwood Trains pictured in the freight yard at Ballina Inland Port (N. Enright)

Ireland's newest Tier 1 Europort is currently being developed at Foynes and will be reconnected to the national rail network. Unless the rail link from Claremorris to Athenry is reinstated simultaneously, direct rail access to Foynes from the country's only inland port at Ballina will be restricted to a circuitous route via the Midlands and Greater Dublin Area (GDA) that is 290 kilometres longer than via the extended Western Rail Corridor for each round trip.[2] Such diversions would further congest the predominantly single track route serving Dublin and add 75,000 kilometres annually, in circumstances where there were five weekly services on the Ballina to Foynes route.[3]

Such diverted freight trains would also incur additional Track Access Charges, which are the tolls charged by the railway company for the use of its track. Charges for these diverted trains would be 60% greater than those for the direct WRC route. From the point of view of a freight logistics company, based on five weekly freight services between the inland port at Ballina and the Port of Shannon Foynes, the difference in annual Track Access Charges would be approximately €400,000.[4] Such an excessive cost could undermine the economic viability of the rail business proposition and potentially lead to over 9,000 truck journeys to replace the potential rail service, with all of the associated environmental disadvantages.[5]

Details of the Track Access Charges payable for projected freight services on the revitalised Western Rail Corridor are given in Table 7.2. This represents a direct cash contribution from rail freight traffic towards the maintenance of railway infrastructure. It is equally important that the economies associated with the shorter direct access to the Port of Waterford afforded by the WRC be realised.

[7.3] RAIL FREIGHT PERFORMANCE

In 2019, Iarnród Éireann's key rail freight traffic included container (intermodal) trains from Ballina to Dublin Port; Zinc ore from Tara Mines to Dublin Port; and pulpwood trains from Westport and Ballina to Waterford. Total rail freight revenue was €3.9m. Iarnród Éireann has worked successfully with end users to gradually reverse the decline in rail freight traffic experienced in the early 2000s, and is currently developing a new strategic focus to chart the role that rail freight services can play into the future, in the context of the Climate Action Plan.

In its Annual Report of 2019 Iarnród Éireann declares that it is "committed to the growth of rail freight which will focus on the commercial, environmental and economic value that rail freight can provide in the years ahead."[6] Based on the success of the Ballina Inland Port there is clearly the opportunity for similar railheads in Galway and Limerick. In 2015, the Western Development Commission (WDC) commissioned a study to investigate the potential for further demand for rail freight services into and from the Northern and Western Region that indicated a potential four-fold growth in rail freight nationally, if properly supported.[7]

2 Ballina to Foynes is 388 kms via Portarlington and 243 kms via Galway – additional distance 145 x round trip = 290kms.

3 Additional 290 kms per round trip x 260 trains annually = 75,400 additional kilometres annually.

4 Additional distance 75,400 kms x 700 tonnes average gross weight x Track Access Charge € 0.0077 per gross tonne/km = €406,406 additional annual Track

5 Each train carries 18 lorry loads at present – cancellation of 260 trains will lead to 4,680 lorry trips in each direction = 9360

6 Iarnród Éireann annual Report 2019 page 53

7 "In the short term, there is scope to almost double the number of trains operating to and from the Western Region, from an average of four per day (two in each direction), adding a further 2.8 to 3.7 trainloads per day" WDC 4.5.3. (https://www.wdc.ie/wp-content/uploads/WDC-Rail-Freight-Study-Final-Report-18-12-15.pdf)

Addressing the potential for new rail freight traffic to and from the western region (s5.2.11) the WDC analysis concluded:

> "Rail freight services also need tracks to run on, timetable paths to run in, and railheads to interchange freight with other modes of transport and facilities such as factories and warehouses. The current network has a finite capacity, so in order to grow the level of traffic (and the length of trains), investment in the rail network will need to start within the next 5 years and ramp up considerably in the years that follow. This could include reinstatement of disused lines such as the Western Rail Corridor, connections to ports and rail freight interchanges."

The availability and further expansion of rail freight services (with its low carbon footprint relative to road haulage) could help provide a regional advantage, attracting new enterprises which might have a need for a high-volume, environmentally-sustainable transport solution, while also tapping in to existing businesses who might make the change from road to rail. The prospects for this kind of rail freight expansion are illustrated by the views of three actual and potential users of the service, Waterford Port, Shannon Foynes Port and International Warehousing and Transport (IWT) as set out below.

WATERFORD PORT

The Port of Waterford is a modern, efficient port and the closest Irish lift-on/lift-off and bulk port to mainland Europe. A national rail link runs through the port extending the full length of the Atlantic Rail Corridor northwards to Ballina and Sligo. The main centre of operations is at Belview Port on the River Suir, 8km downstream from Waterford city.[8]

Fig 7.7 Ballina Rail Freight liner unloading at Waterford Port (Belview) 2015 (Port of Waterford).

8 www.portofwaterford.com;

The Port of Waterford is strongly supportive of the restoration of the rail freight connection to the West and Northwest. A new Ballina-Waterford service, to be operated by XPO Logistics, a new entrant into the Irish rail freight business, is expected to commence in 2021.[9] The Port of Waterford Corporate Plan for 2020-24 states: "Re-activation of the rail freight connection to Ireland's Northwest and West is an ongoing priority. This facility can support growth in container handling through the Port and provide an economic and environmentally sound option for exporters and importers outside of our immediate region."

> "Port of Waterford fully supports the opening of the Atlantic Rail Corridor and will assist in whatever way it can to revitalise rail freight throughout Ireland, particularly in the West. Opening of the Atlantic Rail Corridor from Mayo via Limerick to Waterford would bring fantastic new opportunities to shift freight from road to rail."
>
> *Mr Frank Ronan, Chief Executive, Port of Waterford – March 2021*

SHANNON FOYNES PORT

Shannon Foynes Port Company is the statutory authority for the 500 sq. km Shannon estuary and is Ireland's largest bulk port, catering for approximately eleven million tonnes annually. It is one of three Tier 1 ports of national significance, as designated by the Irish Government, along with Dublin and Cork. Shannon Foynes Port is also a Ten-T, European Commission Core corridor port on the Europe/North Atlantic corridor and on the North Sea/ Mediterranean Corridor. Shannon Foynes Port's development plan for the future called Vision 2041[10] sets out ambitious plans to develop a multimodal transhipment facility at the port.

Fig 7.8 An aerial view of Shannon Foynes Ten-T Port (Shannon Foynes Port).

9 XPO Logistics, Inc. is the second largest contract logistics provider and the second largest freight broker globally. Pivotal Supply Chain Solutions | XPO Logistics

10 www.sfpc.ie; The Shannon estuary is Ireland's deepest and most sheltered watercourse.

As part of the port development it is expected that the reopening of the Foynes to Limerick rail line will commence soon. It is notable that for many years the Western Rail Corridor incorporated that section of railway with regular freight services from Ballina and back. The last Ballina-Foynes service ran in 2000. The Port is anxious to restore the direct link to Ballina as part of its development. In September of 2020 the Minister for Transport Mr. Eamonn Ryan TD spoke of the two projects as being complementary describing them as "missing links". He observed:[11]

> "Developing those two small links would give us a national rail freight service connected to two international deep-water ports"

> "The reopening of the Western Rail Corridor is viewed by the Shannon Foynes Port Company as a vital element for the success of the proposed new container services in Foynes. It offers viability to the service offering and nationally it reduces traffic to east coast congested ports and makes an overall contribution to our national decarbonisation ambitions."
>
> *Mr. Jerry Hallisey Head of Business Development SFPC - March 2021*

INTERNATIONAL WAREHOUSING AND TRANSPORT (IWT)

IWT is the largest single freight customer of Iarnród Éireann. It currently charters twelve rail freight services weekly on the Ballina–Dublin Port route and is strongly supportive of restoring the direct rail link from Mayo to the southern ports. IWT has invested in excess of €2 million in its depot in Ballina, with a capacity to operate the first and last mile on a 24/7 basis. A modern fleet of trucks and heavy lift port-type reach stackers for lifting containers are available on site.

Fig 7.9 The first chartered IWT train from Dublin Port to Ballina passes Claremorris 20th August 2009. More than 3,000 such trains have operated since. (L. Khorsheed)

11 Dáil Éireann debate - Thursday, 24 Sep 2020 https://www.oireachtas.ie/en/debates/debate/dail/2020-09-24/

IWT has specifically indicated its interest in expanding its rail freight operations to serve locations on the Western Rail Corridor. A number of other potential customers have also been identified, including potential traffics from Cork to Ballina, Foynes to Ballina and Waterford to Tuam, Claremorris and Ballina.[12]

> "The restoration of the rail freight connection from Mayo southwards to those southern ports, as proposed recently by the Minister for Transport, would allow for greater flexibility and alternative exit points for current business as well as the development of such new business opportunities."
>
> *Mr. Colin Dunne, Joint Managing Director, IWT, - March 2021*

THE IRISH EXPORTERS ASSOCIATION (IEA)

In its 2021 pre-budget submission, published on October 1st, 2020, the Irish Exporters Association (IEA) welcomed the comments by Transport Minister Eamon Ryan about the potential reopening of the Western Rail Corridor linking to the ports of Foynes and Waterford, and highlighted the importance of creating sustainable alternatives to the UK land bridge for Irish freight.

In its submission the IEA stated: "It is becoming increasingly apparent and ever more urgent that Irish freight both outbound and inbound will be snarled up in any delays that occur in British ports post January 1st, 2021, whatever the outcome of the negotiations. This has been abundantly clear to us in the lEA for some time. Britain is not ready for the transport (and by extension the supply chain) challenges of Brexit. Alternatives to the land bridge using direct shipping from Irish ports to France and the Netherlands will be required to keep our supply chains flowing. We urge Government to remain vigilant that support may be required to open new routes directly to the continent."

> We welcome recent comments made by the Minister for Climate Action, Communication Networks and Transport about the independent review of and consideration being given to the potential reopening of phases 2 and 3 of the Western Rail Corridor. The IEA believes that increased rail freight capacity should play an important and significant part in our climate change agenda. The further expansion of rail freight also has the potential to contribute to Ireland's regional development."
>
> *Irish Exporters Association - October 2020.*

It is noted that Dublin Port's Masterplan 2040 recognizes that the port, as currently configured, will be unable to cope with projected volumes of freight traffic by 2035 and that any further growth will have to be at other locations.[13] IMDO research figures show the number of TEU (20ft. equivalent units) being shipped through Irish Ports reached one million units in 2019. Annual growth from 2013 had been 7%. Data for 2019 broken down

12 IWT to Joint Oireachtas Committee on Transport, Tuesday 16th February 2021. https://www.oireachtas.ie/en/debates/debate/joint_committee_on_transport_and_communications_networks/2021-02-16/

13 https://www.dublinport.ie/masterplan/masterplan-2040-reviewed-2018/

by port were: Cork 240,186, a growth of 5% on the previous year; Dublin 774,056, , a 7% growth in 2018; and Waterford, 49,348, a 12% growth in 2018. It is not unreasonable to assume that industrial development policy in Ireland will seek to encourage the development of manufacturing activities towards the West and other regions away from Dublin. A key element in ensuring the success of such a policy will be to guarantee access to markets through efficient links to our gateway ports.

[7.4] THE WRC AS PART OF THE IRISH RAIL FREIGHT NETWORK

The EU designation of 2021 as European Year of Rail is a part of the "European Green Deal" suite of political objectives and policies.[14] The case for increasing the railway's share of heavy freight traffic on the island of Ireland has been well made as part of the "greening" of the Irish economy agenda. Other significant factors include a reduction of road congestion and accident levels, the increasing pressure on road hauliers to secure and retain drivers, working time restrictions and uncertain fuel costs.

The view is sometimes expressed that Ireland is too small for rail freight. However, it is sustainability rather than distance that determines whether a rail freight path is viable or not. This is illustrated by the success of bulk rail freight flows of just 80 km from Tara Mines to North Wall and the evidence of intensive container (intermodal) and pulpwood rail traffic between Mayo and Dublin/Waterford ports over the past 15 years.

Mayo freight trains carry payloads amounting to 240,000 tonnes annually, displacing 15,000 truck journeys covering 4.5 million kilometres while Tara mines trains carry additional payloads of 340,000 tonnes annually displacing 17,000 truck journeys over 1.2 million kilometres. With the exception of pulpwood traffic operated by Iarnród Éireann on behalf of Coillte, all Ireland's rail freight traffic runs into and out of Irish ports. The ports of Dublin, Waterford, Foynes and Cork all see the growth of rail freight volumes as a key element in their masterplans and development strategies.

14 https://europa.eu/year-of-rail/index_en

Fig 7.10 WRC direct route to Shannon, Foynes and Waterford Ports i.e., the Atlantic Railway Corridor.

> "In terms of key sources of new traffic, Irish ports (42 million tonnes handled through Dublin, Shannon Foynes, Cork, Rosslare and Waterford) are and will continue to be critical to rail's prospects. Ports provide key nodes where international trade can be concentrated into trainload quantities, but without the need for significant levels of intermediate road haulage between quayside and railhead, which can impact on the overall viability of a rail-based offer. Distance between ports and inland centres of demand, combined with quayside and hinterland road congestion, create logistical challenges by road which then create opportunities for rail. It is no surprise therefore that all the current rail freight services in Ireland start or finish at a port."
>
> *Rail Freight & the Western Region, p63, 5.2.4, WDC Report – Dec 2015*

THE RAIL FREIGHT NETWORK

The IÉ track infrastructure is predominantly single track and is subject to congestion where train movements increase. In the case of traffic to and from Mayo, the current routes for both Dublin bound and Waterford bound rail traffic are increasingly congested. The 205 km railway from Portarlington to Ballina is single track. Re-use of the Athenry to Claremorris section would offer a *de facto* double track access as far west as Claremorris which is just 50 kilometres from Ballina. The continuing expansion of Dublin's rail commuter belt is likely to further increase congestion on the network east of the Shannon.

The railway line from Mayo through Galway to Limerick, Cork and Waterford, offers considerable capacity for both passenger and rail freight. Restoration of the Claremorris-Athenry link will enable traffic to the existing rail-served Port of Waterford and planned rail connections to Shannon Foynes and Cork ensuring a better overall utilization of the rail network.

Fig 7.11 A recent trial of the longest freight train to date in Ireland with 50 TEUs (25 wagons), leaves Dublin en route to Ballina (N. Dinnen).

ENVIRONMENTAL ADVANTAGES OF RAIL FREIGHT

Modern rail freight generates less than a quarter of the CO2 emissions of road haulage. It decongests the road network and provides a complementary and efficient route to market for business which is both reliable and cost effective. In the UK, a total of ninety TEUs (20ft containers) are common on trains. In Ireland thirty-six is the maximum at present. Plans are in place to increase train lengths, increasing rail freight competitiveness and further reducing environmental emissions (see Fig 7.11 left).

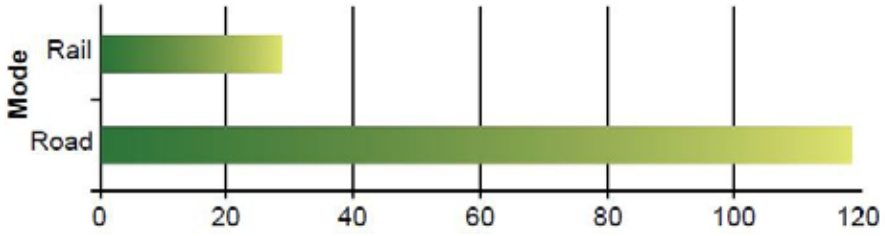
As understanding of the public health impacts of poor air quality has grown, so the pressure on sectors responsible for the majority of diesel emissions has increased. Road haulage, buses and private cars are increasingly under the spotlight. A 2017 scoping paper by the rail freight group *Campaign for Better Transport* found that air pollution is increasingly a major public health issue.[15] The World Health Organisation implicates outdoor air pollution in three million premature deaths each year, including 400,000 premature deaths a year in EU countries. Such pollution is recognised as contributing to conditions including cardio-vascular illnesses, lung cancer, childhood asthma and Parkinson's disease.[16] Other pressing pollution concerns associated with diesel emissions include Nitrogen Oxide (NOx), particulate pollution, benzene and carbon monoxide.

Overall, rail plays an important role in reducing the environmental impact of transport and has the capacity to do more. Research suggests that transferring more freight from road to rail could bring major reductions in pollution. For example, the current eight weekly freight train movements in and out of Mayo translates to around 300 fewer lorries per week between Ballina and Dublin/Waterford. The re-introduction of rail freight to the Western Rail Corridor has the potential to increase this to 500 fewer truck movements per week and to further ameliorate road congestion and reduce pollution.

The movement of freight by rail, where industry shares a transportation mode with others, is analogous to the way in which carpooling helps move more people for less fuel, cost, and road congestion. In terms of fuel consumption rail freight is more economical than road, as illustrated below.

Fig 7.12 (a) Distance a tonne of goods can travel on a gallon of diesel comparing Rail and Road[17]

Fig 7.12 (b) Grammes of CO2 released per tonne km[18]



15 http://www.rfg.org.uk/wp-content/uploads/2017/12/Air-quality-freight-FINAL-2.pdf

16 http://www.who.int/mediacentre/news/releases/2016/ air-pollution-estimates/en/

17 Source: Guideline to Defra's GHG Conversion Factors: Methodology Paper for Transport Emission Factors (Oct 2009).

18 Source: European Environment Agency (2017) Railway Transport – Goods transported, by type of transport provided by Statistical Office of the European Union (Eurostat).

Reductions of 75% in fuel emissions are achieved by using rail over truck transport with consequent reductions in greenhouse gases. In addition, road repairs and replacements are not only expensive, they also involve the use of heavy machinery that consumes fuel, contributing further to greenhouse gas emissions. Fewer trucks on the road also means that roads require less maintenance. Fewer trucks also means less traffic. Traffic congestion means that drivers are regularly forced to waste fuel as they wait or move at low speeds.

EU GREEN OBJECTIVES

In 2020 the European Commission announced its 'Sustainable and Smart Mobility Strategy' and 'Action Plan' with regards to the transformation of European transportation.[19] Objectives include the doubling of rail freight traffic by 2050, and the doubling of high-speed rail traffic by 2030. Additionally, there is a strong focus on the TEN-T network and the European Rail Traffic Management System (ERTMS). Specifically, the TEN-T and Rail Freight Corridors regulations will be addressed together, in order to establish a single integrated 'European Transport Corridors' system.[20]

> The Action Plan foresees changes in connectivity across different transport modes that will allow the seamless transhipment of freight... The Action Plan aims to reduce carbon emissions by 90 per cent by 2050 and create a smart, competitive, sustainable, and safe transportation system in Europe. The EU Commissioner for Transport stated: "Transport matters to us all because it is the backbone that connects European citizens and businesses. We shouldn't lose time in getting fit for the future and unfold the potential to revolutionise the way we move, making our mobility smarter, more efficient, and also greener."
>
> *European Commission*

RAIL FREIGHT REVENUE

Revenue received by Iarnród Éireann from rail freight customers is divided between the Railway Undertaking (RU) Division which operates the trains and the Infrastructure Manager (IM) Division which maintains the track, signalling, etc. The figure payable to the IM is known as a Track Access Charge (TAC). This is a form of toll charged for the use of the railway and its freight handling facilities. This is calculated using a formula determined by an Essential Functions Body (EFB) designated under the European Union (Regulation of Railways) Regulations 2015. Córas Iompair Éireann, as distinct from Iarnród Éireann, is the essential functions body.

19 https://www.railfreight.com/railfreight/2020/12/11/rail-freight-transport-at-the-centre-of-europes-mobility-strategy/

20 On 9th August 2019 Ireland formally requested the European Union to amend the Ten-T Regulation and requested the European Commission to consider the existing requirements for the Ten-T Core Network with a view to including the Atlantic seaboard region of Ireland on the Ten-T Core Network. A successful outcome would render rail investment in the WRC eligible for EU grant aid.

The current Iarnród Éireann Network Statement, for the 2022 timetable period, states that the variable usage track infrastructure charge applied to services operating on the network is at a rate of €0.0077 per gross tonne kilometre. The amount payable for each rail journey is calculated by multiplying the gross tonne kilometres operated by €0.0077. On this basis, a freight train on a round trip from Ballina to Waterford Port via the Western Rail Corridor would pay a Track Access Charge of €3450; while a train from Ballina to Foynes would pay €2650. This is in addition to whatever charge the Railway Undertaking makes for the actual operation of the trains, e.g., fuel, crews, maintenance, replacement, etc.[21]

Table 7.1 illustrates the value to Iarnród Éireann of Track Access Charges (TACs) from existing Mayo freight train operations, estimated to amount to approximately €1.3m per annum. In addition there is a charge for the operation of the train by Iarnród Éireann.

Table 7.1 Estimated Value of Current Track Access Charges (TACs)

CURRENT	ORIGIN - DESTINATION	WEEKLY TRAINS	TRACK ACCESS CHARGE PER TRAIN €	GROSS ANNUAL TRACK ACCESS CHARGES (TACS) €M
Current	Ballina/Dublin	6 inter-modal	€3000	0.940
	Ballina/Westport-Waterford	2 Pulpwood	€3350	0.350
Annual Total		**416 Trains**		**1.29m**

It is understood that a new intermodal (container) service will commence between the inland port of Ballina and Waterford Port in the near future. These trains will be required to take the more circuitous and congested route via the Greater Dublin Area until such time as the Western Rail Corridor becomes available. Clearly, this new service and the existing pulpwood services could be operated more economically via the extended Western Rail Corridor. If the reconnection of Shannon Foynes Port is undertaken in tandem with the WRC extension, it is reasonable to project a total of five weekly freight services (i.e. one daily) to and from the inland Port in Ballina during the first five years of operation. These may turn out to be conservative projections.

21 It is noted that while EY confirmed on page 1 of their report that revenue is "ticket revenue plus additional rail access charges for freight" they gave no value for these payments in their calculations of rail freight income.

Fig 7.13 Waterford-bound Coillte Pulpwood Train at Westport (N. Enright).

Over the first five years after the proposed restoration of the WRC (2026-2030), freight services on the extended Western Rail Corridor are projected to number five weekly round trip services to Waterford and Shannon Foynes Ports carrying containers, pulpwood and bulk products on alternate days.

In the second five year period of operations (2031-2035) freight services on the route are projected to double, as has happened on the Mayo-Dublin route. Thereafter, services may be expected to plateau at 12 weekly freight services or a conservative 20% increase for the following 20 years. There is every likelihood that current Track Access Charges in Ireland will be reduced, as they are regarded as a disincentive to the transfer of road freight to rail, and are among the highest in the EU.

It is expected that any reduction in income from such TACs will be offset by a state subsidy of the rail freight infrastructure, as is the case throughout the EU. While charges to customers for the use of the railways will decrease, revenue earnings for the Railway Undertaking will actually increase due to substantial growth in business. In anticipation of such growth, Iarnród Éireann has recently undertaken a major review of rail freight by the consultants AECOM. In addition to the Track Access Charges by the Infrastructure Management Division, illustrated below, there will be a charge by the Railway Undertaking Division for operating the services, to cover fuel, crews, maintenance, depreciation, etc. It is considered that the Track Access Charges represent approximately 40% of the total charge to the customer.

Table 7.2 Projections of Track Access Charges from Rail Freight on WRC

PROJECTED ON WRC PERIOD	ORIGIN - DESTINATION	WEEKLY TRAINS	TRACK ACCESS CHARGE PER TRAIN €	GROSS ANNUAL TRACK ACCESS CHARGES €M
2026 - 2030 5 year period	Ballina/ Westport - Waterford	2x Pulpwood 2x inter-modal	€3,150 €3,450	0.328 0.359
	Ballina-Foynes	1x inter-modal	€2,650	0.137
Weekly Total		5 weekly		
Annual Total		260		0.824
5 year Total		1300 Trains		4.12
2031-2035 year period	Ballina/ Westport – Waterford	3 x Pulpwood 5 x inter-modal	€3,150 €3,450	0.491 0.897
	Ballina - Foynes	1x inter-modal 1x Bulk	€2,650 €2,400	0.275 0.125
Weekly Total		10 weekly		
Annual Total		520		1.79
5 year Total		2600 Trains		8.9
2036 – 2055 20 year period	Ballina/ Westport – Waterford	3 x Pulpwood 5 x inter-modal	€3,150 €3,450	0.491 0.897
	Ballina - Foynes	2x Bulk 2 x inter-modal	€2,400 €2,650	0.25 0.275
Total		12 weekly		1.913
20 Year Total		12480 Trains		38
30 Year Grand Total				51

[7.5] SUMMARY

The only intermodal (container) rail freight traffic on the island of Ireland today is the daily operation between Mayo and Dublin. All Waterford round trips carrying pulpwood from Mayo must currently travel via the Greater Dublin Area on a circuitous route that is 40 kilometres longer and subject to higher Track Access Charges than would be the case if the more direct and less congested route via Galway and Limerick were used. Ballina is currently the only rail freight container handling facility on the entire Iarnród Éireann network, and is Ireland's only inland port.

In the post-Brexit era there will be increased use of southern ports for importing raw materials and exporting finished product to the continent. Enterprises located in the Northern and Western region need to have direct rail access to these ports. Forcing these enterprises to rely wholly on trucks for access to these ports will inevitably carry a heavy environmental penalty.

Rail freight in Ireland generates approximately €1.5m gross profit annually. Customers are subject to one of the highest Track Access Charges in the EU for use of the railway network. Five weekly freight train services using the extended WRC will contribute €4m to Iarnród Éireann's Infrastructure Manager (IM) Division in Track Access Charges within the first five years of its operation, and €50m over the 30 year period of the cost-benefit analysis.

Fig 7.14 Timber and intermodal freight trains at Ballina Inland Port (N. Enright).

Mayo intermodal trains currently contribute to carbon savings by displacing approximately 15,000 long-distance lorry movements involving over 4.5 million road kilometres annually. It may be extrapolated that intermodal trains on the Western Rail Corridor would displace over 9,000 long distance lorry movements involving 2.5 million road kilometres annually from the start of operations. Rail transport of freight uses 15-25% of the direct energy per tonne-kilometre compared with transport by road.[22] Unlike most EU countries Ireland offers no state aid or subsidies towards rail freight.

> "What success stories like Mayo rail freight show is that there is an appetite for freight operators to switch from road haulage to more efficient and sustainable modes. What is required to support these operators, and others, is an increased investment in rail infrastructure across the country. There also needs to be increased connectivity between other major urban nodes. For example, a more extensive rail network that extends the length of the west coast could see linkages created between some of Ireland's busiest ports (Cork-Ringaskiddy, Waterford, Rosslare Europort, Shannon-Foynes, Killybegs), airports (Cork, Shannon and Knock) and major settlements (Cork, Limerick, Galway, Sligo and Letterkenny). This would facilitate a greater number of freight operators to switch from road haulage to a more sustainable rail mode."
>
> *The Atlantic Economic Corridor (AEC) Chambers Group*

22 INFRAS/IWW, 2000. SEI Aug 2004

The restoration of the rail link between Mayo and Galway, linking in to the existing rail route to the South, will help to address one of the Government's headline priorities, i.e., minimising the impact of BREXIT on trade and the economy in a timely and cost-effective manner. It will also offer new opportunities for industry in Galway, Clare, Limerick and Tipperary to access rail freight while freeing up paths for more passenger services on the radial Dublin-Westport/ Galway routes, which will continue to be utilised for Dublin Port traffic.

The year 2021 is the European Year of Rail. It is an objective of the EU action plan to double the volumes of rail freight by 2050. The action plan aims to reduce carbon emissions by 90 per cent until 2050 and create a smart, competitive, sustainable, and safe transportation system in Europe. The freight developments projected in this report would facilitate a doubling of rail freight volumes to and from the Northern and Western Region within the timeframe established by the EU.

> "It is critical for rail to play an expanding role in the new economic and social landscape that is set to emerge in post-pandemic Europe. Now more than ever is the time to expand the use of rail. Now is the time to ensure that all regions have modern rail infrastructure and strong network links."
>
> *Ms. Elisa Ferreira, EU Commissioner for Cohesion and Reforms (29 March 2021).*

IMPRESSION OF BONHAM QUAY DEVELOPMENT AT GALWAY DOCKS (BDP)

Section 8

Cost Benefit Analysis and Policy Recommendation

[8] COST BENEFIT ANALYSIS AND POLICY RECOMMENDATION

[8.1] INTRODUCTION

In this concluding section we bring together our analysis of the construction and operating costs of restoring the Athenry-Claremorris section of the WRC (as described in Section 5) with the revenue and wider benefits that are likely to flow from its use (as described in Sections 6 and 7). The present value (PV) of the costs and benefits is defined as the current value of a future expenditure or a stream of future monetised benefits using a specific discount rate. Future expenditures and monetised benefits are discounted by a rate of 4%, as mandated in the CAF.

The difference between the present value of total benefits and the total costs is defined as the net present value (NPV) of the project.

Net Present Value = Present value of monetised benefits less costs[1]

A NPV of zero means that the benefits and costs exactly offset each other. A positive NPV means that the projected benefits exceed the projected costs. A negative NPV means that the benefits are less than the costs.

Another way of expressing this is to calculate a benefit-cost ratio (BCR) as follows:

Benefit-cost ratio (BCR) = Present value of benefits / Present value of costs

Conventionally, investment projects that generate a negative NPV (or, equivalently, a BCR lower than unity) have questionable justification in terms of committing public investment funding. Projects that generate a positive NPV (or, equivalently, a BCR greater than unity) would be deemed to merit further and more detailed examination in the context of a range of other such projects that also have positive NPVs. Projects with higher BCRs tend to have first call on public funding, other things being equal.[2]

Any cost-benefit analysis can only deal in terms of benefits that can be monetised with an acceptable degree of confidence. However, in a project like the restoration of the WRC link between Athenry and Claremorris there are many wider economic benefits which cannot be formally included in the current NPV calculation. As noted in the EY Report, the existence of such benefits was often raised during the EY consultation process by the public as being important to the local community. Examples included the benefits linked to new journeys being undertaken as a result of the restored WRC rather than journey swapping from car and bus/coach to rail. Other examples focused on social benefits for a scattered rural population that are difficult to quantify and monetise. These views often touched on the regional development considerations that were discussed earlier in Section 4. A full appraisal of the WRC restoration that was placed firmly at the core of the Regional Spatial and Economic Strategy of the Northern & Western Regional Assembly would be required in order to identify and attempt to monetise such benefits.

In this report we have restricted analysis to the restoration of the complete rail link between Athenry and Claremorris (Phases 2 and 3 of the WRC). We note that the EY Report considered two additional options: restoration of Phase 2 (Athenry-Tuam) in isolation and restoration of Phase 3 (Tuam-Claremorris), also in isolation. We chose not to analyse these two separate options for the obvious reason that one would never split the analysis of a

1 "Monetised" benefits are those benefits that can be quantified in monetary terms. The easiest to monetise are revenues from passengers and freight. More difficult are benefits from GHG, pollution and noise reduction, where statutory cost standards are used. Most difficult would be the role of the rail link in transforming the future pattern of rural habitation and rail-based commuting.

2 An advantage of the BCR over the NPV is that the BCR is "scale free", i.e., it is not affected by the magnitude of the project investment.

project involving a bridge construction across a river into two parts: from the left bank to the middle of the river and from the right bank to the middle of the river. Either the complete bridge is built or it is not. The defining logic of the WRC restoration derives from its role in linking north Mayo and Sligo via south Mayo to Galway and onwards to Limerick, Cork and Waterford, i.e., the integrated network benefits.

As with every cost/benefit analysis exercise it is important to ensure that there is a "Do nothing" option, a standard requirement in the Public Spending Code (PSC) to set up a project counterfactual. In this case the "Do nothing" option means the Athenry-Claremorris line would remain deactivated and in its current dilapidated state. This was assumed by EY to have zero costs and generate zero benefits and therefore to have a NPV of zero euro. We adopt the same convention.

To recap, the key assumptions underlying the current cost-benefit analysis exercise are mostly the same as those used by EY:

1. NPV is calculated in 2019 prices
2. CAF values are in 2011 prices which were then raised to relevant 2019 using Real GNP per person employed
3. The shadow price for public funds is set at 130% but a shadow price for labour is not included due to the competitive nature of the labour market. In other words, the WRC restoration project is unlikely to drive up wage rates in the regional labour market
4. Construction works begin in 2022 and complete in 2025[3]
5. The evaluation window goes out thirty one years from 2026 to the year 2056
6. A discount rate of 4% is used to calculate net present values
7. Regional population growth is based on currently available CSO and ESRI projections

In Section 8.2 we include the formal Project Appraisal Balance Sheet (PABS), as mandated in the CAF. In Section 8.3 we present the full cost-benefit analysis for the single case of the combined Phase 2 and 3 of the WRC restoration. In Section 8.4 we compare and contrast these CBA results with the results contained in the EY Report. In Section 8.5 we present a sensitivity analysis of the CBA results, looking at down-side and up-side risks and possibilities. Section 8.6 concludes with policy recommendations.

> "The EY Report considered two additional options: restoration of Phase 2 (Athenry-Tuam) in isolation and restoration of Phase 3 (Tuam-Claremorris), also in isolation. We chose not to analyse these two separate options for the obvious reason that one would never split the analysis of a project involving a bridge construction across a river into two parts: from the left bank to the middle of the river and from the right bank to the middle of the river. Either the complete bridge is built or it is not."

3 Given the long delay in producing the EY Report, commissioned in 2018 and only published in January 2021, the 2022 project start date would now possibly be unrealistic. But we continue to use it in the current analysis in order to ensure maximum comparability with the EY methodology.

[8.2] THE PROJECT APPRAISAL BALANCE SHEET

The Common Appraisal Framework for Transport Projects and Programmes (CAF) requires the preparation of a Project Appraisal Balance Sheet (PABS) which contains three elements:[4]

1. A Qualitative Statement summarising the impact of the project in qualitative terms;
2. A Quantitative Statement that sets out quantified and monetised indicators of the impact; and
3. A Scaling Statement that ranks the project on a seven point scale in terms of each criterion.

The items evaluated include economic issues, safety, physical activity, environmental issues, accessibility and social inclusion and integration. The PABS for the restoration of the WRC is shown below.

WRC restoration: Project Appraisal Balance Sheet

CRITERIA	QUALITATIVE STATEMENT	QUANTITATIVE STATEMENT
Economy (5 out of 7 points)		
Transport Efficiency and Effectiveness	New rail service provides shorter journey times than existing public transit and at a lower cost than private car journeys.	NPV Time Savings = €54.3m NPV Time Savings = €54.3m NPV Cost Savings = €115.5m
Transport Reliability and Quality	Rail transport is highly reliable and provides a superior journey quality to buses and private vehicles.	Ability to work on train can reduce the cost of 'in-vehicle' value-of-time.
Other Economic Impacts	Effect on wider public finances (indirect taxation revenues) ranging from neutral to positive. Rail freight is self-sustaining.	NPV Capex = (€166.9m) Excludes shadow price of public funds NPV Opex = (€46.0m) NPV Revenue = €37.6m
Safety (6 out of 7 points)		
Safety	Reduction in minor, serious, and fatal accidents by reducing road usage by 8.3 million km per annum.	NPV Safety = €5.0
Physical Activity (5 out of 7 points)		
Physical Activity	Minor physical activity benefit due to trains enabling bicycle commuters and onward journeys.	NPV Physical Activity = €0.5m

4 The Common Appraisal Framework for Transport Projects and Programmes guidelines are available to download at https://www.gov.ie/en/organisation-information/800ea3-common-appraisal-framework/

Environment (6 out of 7 points)		
Air Quality	Emission increases in NOx and PM due to use of legacy rolling stock can be reduced or eliminated by use of new or repowered rolling stock meeting Stage V certification standards. Near neutral change in GHG emissions can become a benefit if the line is electrified or battery electric rolling stock (EMUs) are utilised.	NPV NOx and PM = (€2.7m) NPV GHG = €0.1m)
Noise and Vibration	Negligible change in noise and vibration impacts to sensitive receptors. Impact of new rail service offset by removal of HGVs due to rail freight.	NPV Noise = 0
Landscape and Visual Quality	Regenerative effect to Tuam station quarter due to refurbishment of railway station and surrounding areas. Visual improvement to permanent way returned to active use.	Not Quantified
Biodiversity	Slight negative impact as permanent way is reclaimed for transit use. Hedgerows to be maintained according to current best practices.	Zero Special Areas of Conservation (SACs) or Special Protection Areas (SPAs) affected.
Cultural, Archaeological, and Architectural Heritage	Tuam railway station is a protected structure that will be refurbished and returned to use.	One protected structure will be refurbished and returned to use.
Land Use, Soils, and Geology	Near zero additional land will be required. Access and accommodation costs for the elimination of level crossings included in Capex.	Near zero land take required.
Land Use, Soils, and Geology	Near zero additional land will be required. Access and accommodation costs for the elimination of level crossings included in Capex.	Near zero land take required.
Accessibility and Social Inclusion (7 out of 7 points)		
Vulnerable Groups	Railway service provides maximum accommodation for those with physical and intellectual disabilities. Pensioners and others with Free Travel Passes benefit from rail transport proportionately.	Capex includes accommodation improvements to railway stations, including lifts and disabled parking. Rolling stock accommodates wheelchair users to a greater degree than busses.
Deprived Geographic Areas	Provides greater rural access to centres of employment such as Galway and greatly improves travel times to other urban centres such as Dublin and Limerick.	Increased service levels to residents in these areas will reduce travel times. Example: Tuam-Dublin public transport time will be reduced by > 1 hour each way.
Integration (7 out of 7 points)		
Transport Integration	An 'N63 Park & Ride' station near Ballyglunin will facilitate modal shift from cars to rail, thereby reducing congestion in Galway. Increased train frequency to Galway will enable greater rail/walk commuting to the new, significant Galway job centres/transport hub of Ceannt Station Quarter and Bonham Quay. Rail freight will enable intermodal and bulk freight transport between Mayo and the southern ports (Waterford and Foynes), thereby relieve pressure from Dublin Port.	Average commute times will be significantly reduced. Rail/ walk commuting will significantly increase.
Land Use Integration	Utilises key centrally located railway station at Tuam and increases use of centrally located railway stations at Athenry and Claremorris. This will facilitate high-density, transport orientated development of significant sites in these towns.	Project is included in relevant local and regional planning documents such as the Northern and Western Regional Assembly's Regional Spatial and Economic Strategy (RSES).

Geographical Integration	Provides transport links between the Mayo towns of Westport, Ballina, Foxford, Castlebar and Claremorris and those in Galway and Clare, of Tuam, Abbeyknockmoy, Athenry, Oranmore, Ballinasloe, Gort and Ennis which do not currently have direct transport links and are therefore geographically isolated for non-road users. Provides access to Ceannt Station transport hub.	Increases the access to jobs and skilled labour in smaller towns. Increases the attractiveness of these towns for Foreign Direct Investment and the likelihood of development of strategic IDA landholdings.
Other Government Policy Integration	Supports the Atlantic Economic Corridor and Balanced Regional Development	Improves local access to gateways such as Knock Ireland West Airport, Shannon Airport, Dublin Airport, and international deepwater ports of Waterford and Foynes.
Project Appraisal Overall Score (36 out of 42 points)		

Fig 8.1 Transport integration: An aerial view of Ballina rail freight operations serving Dublin and Waterford (N. Enright).

Increased train frequency to Galway will enable greater rail/walk commuting to the new, significant Galway transport hub and job centres of Ceannt Station Quarter and Bonham Quay. The Bonham Quay development is situated just two minutes walk from Ceannt Station and is a mixed use project comprising 26,000sq.m of Grade A office space, 2,000 sq.m of retail and restaurant space and student accommodation offering 345 beds. The office development is designed as four office blocks alongside two public squares that all connect via landscaped bridges and will accommodate a working community of 2,600 from across the region.

Fig 8.2 Transport Integration: The Bonham Quay Development at Galway Docks beside Ceannt Station.

[8.3] COST-BENEFIT ANALYSIS

The cost-benefit analysis results are presented in Table 8.1. We refer to this as the "base case". As noted above, we do not evaluate the two separate phases of the WRC project in isolation from each other.

In Table 8.1 we aggregate costs under three headings: capital costs (CAPEX), operating costs (OPEX) and opportunity cost. The capital costs were derived in Section 5.4 and it is assumed that the construction phase of the restoration will start in 2022 and run for four years.[5] The operating costs were outlined in Section 5.6 and are only generated from 2026 onwards when the rail service starts operating on the restored line. The opportunity cost is essentially the cash benefits foregone from not realising the value of the disused rail link. However, as explained in Section 5.7, a strong case can be made for this to be effectively zero.

5 See previous footnote.

The benefits and dis-benefits are aggregated under the same eight headings used in the EY Report, as follows:

1. Revenue obtained from operating the restored WRC
2. Safety benefits
3. Emissions benefits
4. Time saving benefits
5. Other cost saving benefits
6. Exchequer taxation benefits/dis-benefits
7. Noise dis-benefits
8. Residual value after 30 years

Table 8.1 shows that the main benefits arise from future revenue generated, monetised time savings, monetised other cost savings and the residual value of the rail system after 30 years of use. In addition, there is a small benefit associated with monetised safety improvements. A small dis-benefit is associated with emissions since, as discussed in Section 6 the restored WRC rail link is assumed to operate initially using older diesel multiple units (DMUs) until they are replaced with more fuel-efficient traction.[6]

In order to derive a benefit/cost ratio (BCR), the total annualised costs and total annualised benefits are discounted over time using the CAF-mandated 4% discount rate. The net present value (NPV) is the difference between the benefits and costs. Table 8.1 shows that the "base case" WRC restoration has a small positive NPV of €7.6million in 2019 prices and a BCR of 1.04.

In Appendix 5 we present the complete annual analysis details of the CBA where we include more detail taken from Sections 5 and 6 and additionally include the case where the shadow price of public funding is set at 100% rather than the value of 130%, as mandated in the CAF and used in Table 8.1. This would illustrate a situation where EU funding was made available specifically for the WRC restoration and the cost was not a specific charge on the Irish exchequer. Table 8.1 is a shortened version of the Appendix 5 CBA table, and shows the case where the shadow price of public funds is included.

6 See Sections 6.4 and 6.5 for information on the use of older, more polluting traction that are assumed to be used when operating the WRC.

Table 8.1: CBA results

CBA RESULTS															
Social Discount Rate:	4.00%														
Project Year	0	1	2	3	4	5	6	7	8 - 12	13-16	17-21	22-26	27-31	32-37	
		2020	2021	2022	2023	2024	2025	2026	2027-2030	2031-2035	2036-2040	2041-2045	2046-2050	2051-2056	
Costs															
Capex				23.9	66.7	71.4	37.8								
Opex								3.3	13.2	16.5	16.5	16.5	16.5	19.8	
Opportunity cost								0.0							
Total costs				23.9	66.7	71.4	37.8	3.3	13.2	16.5	16.5	16.5	16.5	19.8	
Benefits															
Revenue								1.3	9.5	13.4	14.1	14.7	15.3	19.2	
Total safety benefit								0.2	1.0	1.9	2.0	2.0	2.1	2.5	
Total emissions benefit								(0.2)	(0.6)	(1.1)	(1.2)	(1.1)	(1.1)	(1.3)	
Total time savings benefit								1.9	13.7	19.4	20.4	21.3	22.1	27.7	
Total other cost-saving benefits								5.1	30.7	41.9	43.0	43.8	44.8	55.2	
Total Exchequer taxation benefits								0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Total noise benefits								0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Total physical activity benefits								0.0	0.1	0.2	0.2	0.2	0.2	0.3	
Residual value														44.5	
Total benefits								8.4	54.5	75.6	78.5	80.9	83.4	148.2	
															Totals
Annualized discounted costs				21.2	57.0	58.7	29.9	2.5	9.1	9.6	7.9	6.5	5.3	5.1	212.8
Total discounted benefits								6.4	37.5	43.7	37.3	31.6	26.8	37.2	220.5
NPV (2019 prices)	7.6														
BCR	**1.04**														

The summary results from the two cases are shown in Table 8.2.

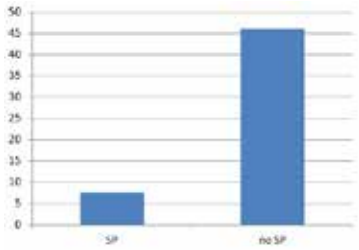
Table 8.2: CBA summary results, with and without shadow price

	WITH SHADOW PRICE	WITHOUT SHADOW PRICE
	€million, 2019	€million, 2019
Net present value (NPV)	7.6	46.1
Benefit/cost ratio (BCR)	1.04	1.26

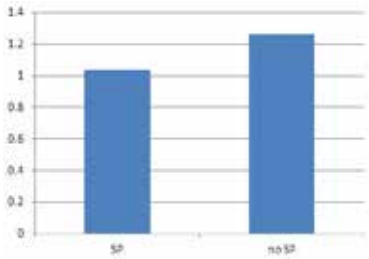
These results are illustrated in Figures 8.3(a) and 8.3(b).

Figure 8.3: CBA summary results, with and without shadow price

(a) NPV

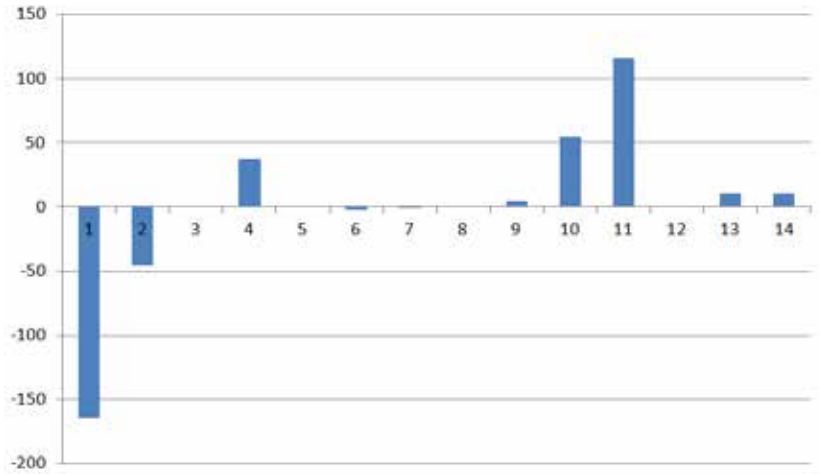


(b) BCR



The individual costs and benefit items for the base case "with shadow price" from Table 8.1 and Appendix Table A4.1 were separately discounted and are shown in Figure 8.4.

Figure 8.4: Individual item discounted costs and benefits for "with shadow" price case



	Item
1	Capital Costs
2	Operating Costs
3	Opportunity Cost
4	Passenger Revenue
5	Noise
6	Local Air Quality
7	Greenhouse Gasses
8	Physical Activity
9	Collision (Safety)
10	Time Savings
11	Cost Savings
12	Exchequer Position
13	Residual Value
14	Net Present Value (2019)

[8.4] COMPARISON WITH EY CBA

In Table 8.3 we show the CBA results derived in the published version of the EY Report. However, as was noted earlier in Section 6, there are many inaccuracies and errors of various kinds in the published version of the EY Report.[7] Even where these errors do not have a significant impact on the results of the EY CBA, we have corrected them in Table 8.3 (corrections are shown in red).

7 A full presentation of the errors in the EY Report is available on request.

Table 8.3: EY CBA results

EY CBA RESULTS															
Social Discount Rate:	4.00%														
Project Year	0	1	2	3	4	5	6	7	8 - 12	13-16	17-21	22-26	27-31	32-37	
Appendix F CBA outputs															
Table 75 Full WRC															
		2020	2021	2022	2023	2024	2025	2026	2027 - 2030	2031 - 2035	2036 - 2040	2041- 2045	2046- 2050	2051- 2056	
Costs															
Capex				40.9	114.3	122.8	64.9	1.5	6.2	9.7	11.7	18.0	22.2	31.7	
Opex								2.6	9.8	12.4	13.1	13.9	14.9	19.4	
Opportunity cost								0.8							
Total costs (EY)				36.8	102.9	110.5	55.7	3.9	15.9	22.1	24.8	32.0	37.1	58.7	
Total costs (Corrected)				40.9	114.3	122.8	64.9	4.9	16.0	22.1	24.8	31.9	37.1	51.1	
Benefits															
Revenue								1.1	7.9	11.0	11.3	11.7	12.0	14.9	
Total safety benefit								0.1	0.3	0.3	0.3	0.2	0.2	0.2	
Total emissions benefit								0.0	0.0	(0.1)	(0.1)	(0.2)	(0.2)	(0.3)	
Total time savings benefit								(0.1)	(2.8)	(4.8)	(5.6)	(8.4)	(11.1)	(15.8)	
Total other cost-saving benefits								5.1	30.7	41.9	43.0	43.8	44.8	55.2	
Total Exchequer taxation benefits								(1.9)	(11.0)	(15.1)	(15.7)	(16.2)	(16.9)	(21.1)	
Total noise benefits								(1.3)	(5.4)	(6.9)	(7.1)	(6.3)	(6.3)	(7.8)	
Residual value														44.5	
Total benefits (EY)								7.7	19.6	26.3	26.1	24.7	22.5	74.2	
Total benefits (Corrected)								3.0	19.7	26.3	26.1	24.6	22.5	69.8	
															Totals
Annual discounted costs (EY)				36.4	97.7	100.9	51.3	3.8	11.0	12.8	11.8	12.5	11.9	13.2	
Annualized discounted costs (Corrected)				36.4	97.7	100.9	51.3	3.7	11.0	12.8	11.8	12.5	11.9	13.2	363.2
Total discounted benefits (EY)								2.3	13.4	15.2	12.4	9.7	7.2	17.0	
Total discounted benefits (Corrected)								2.3	13.6	15.2	12.4	9.6	7.2	17.0	77.3
Cumulative benefits (EY)								2.3	42.0	125.5	192.9	247.3	287.6	395.9	
Cumulative benefits (Corrected)								2.3	15.9	31.1	43.5	53.1	60.3	77.3	
NPV (2019 prices) (EY)	(286.1)														
NPV (2019 prices) (Corrected)	(285.9)														
BCR (Corrected)	0.21														

The first fact to note when comparing Tables 8.1 and 8.3 is that the bottom lines of the two CBAs are dramatically different, as illustrated in Table 8.4.

Table 8.4: Comparison of WoT and EY CBA aggregate results

	PRESENT CBA	EY CBA
NPV (€million, 2019 prices	7.6	-285.9
BCR	1.04	0.21

Table 8.5: Comparison of EY and WoT CBA items (discounted, 2019 prices)

MAIN ITEMS DISCOUNTED VALUES	WOT	EY
Capex (Total)	**-166.9**	**-325.2**
Opex (Total)	**-46**	**-37.4**
Opportunity cost	**0**	**-0.6**
Revenue	37.6	30.3
Total safety benefit	5	0.8
Total Physical Activity Benefit	0.5	0
Total emissions benefits	-2.9	-0.3
Total time savings benefit	54.3	-18.4
Total other cost-saving benefits	115.5	115.5
Total Exchequer taxation benefits	0	-42.4
Total noise benefits	0	-18.6
Residual value	10.4	10.4
Total discounted costs	-212.9	-363.2
Total discounted benefits	220.5	77.3
Net present value	7.6	-285.9
Benefit/cost ratio	1.04	0.21

Examination of Tables 8.1, 8.3 and 8.5 show that the greatest difference between the WoT and EY CBAs arises from the capital expenditure requirements for the WRC restoration (CAPEX). The origins of the differences were discussed in Section 5 where it was asserted that the EY capital costs appear to have been seriously overstated. The lower WoT CAPEX expenditures were separately refereed by the consultants Permanent Rail Engineering, as shown in Appendix 2.

The second main source of differences between WoT and EY was in the "time savings" benefits. As discussed in Section 6.8, a relatively modest correction to the transit times between Claremorris and Galway had major implications for monetised time savings. The higher WoT "time savings" benefits arise out of a more effective and efficient rail operation.

The third main source of differences between WoT and EY was in the "exchequer" benefits (or dis-benefits, as in the EY CBA). The WoT analysis suggested that these claimed dis-benefits were not justified by the EY analysis. They were set as zero in the WoT CBA, but could very well be a positive benefit if the evaluation took wider regional development aspects into account.

In terms of benefits, corrections made to EY errors, as discussed in Section 6.2, produced slightly higher projected revenue.

It should be noted that a more accurate treatment of benefits/dis-benefits associated with "local air quality" and "greenhouse gas emissions" produced a slightly higher WoT dis-benefit. As mentioned above, this is largely associated with the assumed continued use of older type diesel traction in the WRC operation. While we have calculated freight train emissions on the basis of the current diesel locomotive fleet, it must be noted that 50% of this fleet is currently 45 years old and the remainder 27 years old. During the early part of the CBA period this fleet can be expected to be replaced with bi-mode locomotives resulting in further major reductions in emissions.

"While we have calculated freight train emissions on the basis of the current diesel locomotive fleet, it must be noted that 50% of this fleet is currently 45 years old and the remainder 27 years old. During the early part of the CBA period this fleet can be expected to be replaced with bi-mode locomotives resulting in further major reductions in emissions."

[8.5] SENSITIVITY ANALYSIS

In order to establish the robustness of the WoT CBA as presented in Table 8.1 above, a series of sensitivity analyses were undertaken. Sensitivity analysis is necessary in situations when there may be a degree of uncertainty surrounding estimates of costs and benefits. An example would be the manner in which revenue from transport of rail passengers was projected. The use of formal models to analyse how travel modes are selected (i.e., the nested logit model of Section 6) usually serves to eliminate any gross errors. But model-based projections are based on key assumptions such as population, baseline traffic patterns, etc. So a sensitivity analysis that looks at a series of different assumptions will assist in identifying any that may have a very large impact on the CBA bottom line.

The following components of the WoT CBA were examined in the sensitivity analysis:

a. The required capital expenditure derived in Section 5 (i.e., the base case, described in Section 5.4) was increased and decreased by 20%. The most relevant danger would be a capital cost over-run, but for symmetry we also examine a capital cost 20% lower than the base case.

b. For similar reasons, we examine the consequences of a 20% increase and decrease in the operating costs of the base case discussed in Section 5.6.

c. In the case of benefits and dis-benefits discussed in Section 6 (the base case), we single out revenue, emissions, time savings and cost savings and subject the base case estimates to a 20% increase and decrease.

d. Finally, we explore two extreme situations where everything goes worse than the base case (a "doomsday" scenario) and where everything goes better than the base case (a "golden" scenario). In the "doomsday" scenario we increased all costs and dis-benefits by 20% and reduced all benefits by 20%. In the "golden" scenario we did the opposite, i.e., decreased all costs and dis-benefits by 20% and increased all benefits by 20%.

The results are displayed in Table 8.6.

Table 8.6: CBA sensitivity analysis

		20% INCREASE	20% INCREASE	20% CUT	20% CUT
		NPV	**BCR**	**NPV**	**BCR**
Costs	**CAPEX**	-25.8	0.895	41.0	1.228
	OPEX	-1.6	0.993	16.8	1.082
	Emissions	7.1	1.033	8.2	1.038
Benefits	**Revenue**	15.1	1.071	0.1	1.000
	Time savings	18.5	1.087	-3.3	0.985
	Other cost savings	35.3	1.166	-12.5	0.941
		NPV	**BCR**		
	Doomsday scenario	-72.1	0.718		
	Base scenario	7.6	1.036		
	Golden scenario	99.6	1.585		

A sensitivity analysis was also carried out by EY who looked at the impact on their base case results of changing the assumptions around certain key variables. Four additional scenarios to the base case were generated; two cases where the assumptions were moved in favour of the reactivation (effectively by 20% and 10%); and two cases where the results were moved in favour of not reactivating the line (also effectively by 20% and 10%).[8]

a. Costs: the impact of increasing/decreasing capital and operating costs was included

b. Demand: the impact of increasing/decreasing passenger demand and rail freight demand was also considered. In addition, an increase in the number of those passengers who transfer from cars was also modelled

c. Population: demand is based on regional population growth projections. The impact of increasing/decreasing this forecast was also modelled

d. Electric vehicles: the base model assumes no increase in the numbers of electric vehicles. A steady increase in the fleet (aligned to Government targets in this area) were considered in the less favourable cases

e. Road safety: the base case also assumes that the current levels of road safety will continue. However, as shown in EY Section 7.3.4, safety has improved year on year and therefore an ongoing trend of improved road safety was also considered in the less favourable cases

The results for the aggregate EY sensitivity analysis are reproduced in Table 8.7.

8 Note that EY Table 22 showing sensitivity assumptions contains an error for the "worse" case for freight (i.e., -100% instead of -10%).

Table 8.7: EY WRC sensitivity test results NPV values (€m), 2019 prices[9]

EY SCENARIO	NPV
Best case	-198.1
Good case	-242.0
Base case	-286.1
Bad case	-333.8
Worst case	-377.2

The implications of the sensitivity analysis:

Our sensitivity analysis clearly shows that variations of +/- 20% in CAPEX, OPEX, Revenue, time savings and other cost savings have significant impacts on the bottom line BCR. For example, in the case of the all important CAPEX, a 20% over-run in capital expenditure reduces the BCR from the base case of 1.04 to 0.895. A 20% saving in capital expenditure increases the BCR from the base case of 1.04 to 1.228.

> Even in the case where everything goes wrong in the WoT analysis, the BCR only falls from 1.04 to 0.72, i.e., from a base case NPV of 7.6 €million in 2019 prices to a "doomsday" -72.1 €million.
>
> In the case where everything goes wrong in the EY analysis, the NPV falls from the base case of -€198.1 €million to -€377.2 million.
>
> In the case of the WoT analysis, when everything goes better than the base case (by 20%), the BCR rises from 1.04 to 1.59 and from a base case NPV of 7.6 €million to a "golden" NPV of 99.6 €million.
>
> In the case of the EY analysis, the costs and some dis-benefits are so high and the imputed benefits so low that even in their best case scenario the NPV is still negative to the extent of almost -€200 million.

We conclude that while sensitivity analyses can be useful in examining how marginal changes in assumptions might change the CBA bottom line, they are not useful for examining scenarios where there are massive differences to specific cost and benefit items. A massively negative outcome will always remain a massively negative outcome even in the upside of a sensitivity analysis. Logically, a situation like this should direct us back to the deeper scrutiny of the analysis and data upon which the base case CBA was constructed.

[8.6] POLICY IMPLICATIONS OF THE CBA

The exercise of cost/benefit analysis is designed to ensure that scarce public funding is allocated to projects that have both social merit and represent a good business case. Ideally, such analysis should be carried out by people who are qualified technically and who are not biased in favour of, or against, the project being evaluated. For example, it would be easy to portray the group of experts selected by West-on-Track to carry out the present CBA of the WRC restoration as being probably biased in favour of the project. It would be equally

9 The EY Report only recorded NPV and did not include BCRs.

easy to portray the EY Consultancy, Iarnród Éireann and even the Department of Tourism, Transport and Sport (DTTaS) as not being in favour of the project.

If the practice of cost/benefit analysis were a purely scientific activity, such concerns would not be relevant. However, what the confrontation of two CBAs of the WRC restoration - the original EY Report and the present Report - shows is that one should never accept the results uncritically.

POLICY IMPLICATIONS

The present CBA exercise was called into being by the extremely negative and damning conclusions and policy recommendations reached in the EY Report. Acting on the advice above, i.e., that one should never accept any CBA results uncritically, the initial examination of the EY methodology and assumptions strongly suggested that the EY policy conclusions were flawed and the basis upon which their conclusions rested needed to be challenged. Realistically, the only way to mount such a challenge was to carry out a separate CBA based on deeper regional knowledge and on sounder assumptions.

It is a truth universally acknowledged that public investment projects always seem to exceed their budgeted costs.[10] There might be a temptation to attribute the huge difference between the discounted capital costs derived in this Report (164.4 million euro in 2019 prices) and those derived by EY (325.2 million euro in 2019 prices) to the naivety of the former and the realism of the latter. Nothing could be further from the truth.[11] The costs derived in this Report were rigorously researched and were prepared with the advice and guidance of railway experts in Ireland and the UK. In addition, the construction of the Phase 1 restoration, linking Limerick-Ennis to Athenry-Galway, provided an accurate indicator of the likely costs of the Phase 2 and 3 restoration, when the Phase 1 costs were adjusted for inflation. The fact that this difference in capital cost estimates is by far the most significant driver of the differences in the base case BCR of 1.04 in the present report and the value of 0.21 in the EY Report points to a disturbing cause for concern.

"The construction of the Phase 1 restoration, linking Limerick-Ennis to Athenry-Galway, provided an accurate indicator of the likely costs of the Phase 2 and 3 restoration, when the Phase 1 costs were adjusted for inflation."

The present Report demonstrated that there were significant monetised benefits to the WRC restoration that were either understated or ignored in the EY analysis. In addition, there were potential dis-benefits that were wildly overstated. For example, the EY analysis attributed a significant monetised dis-benefit to the noise pollution that would be generated by the operation of the new rail service linking Athenry to Claremorris. However, in section 6.3 it was shown that these noise dis-benefits were largely illusory and could not be justified in terms of the analysis presented by EY. On the contrary, the WoT analysis showed that the noise dis-benefits were essentially zero.

10 'Yet, Iarnród Éireann delivered Phase 1 of the WRC precisely in line with the budget provided.

11 See Table 8.5 above for the data.

The assertion by EY that the restoration of the WRC would impose a high cost on the exchequer due to the lower revenue from road tax and fuel excise tax was also shown in Section 6.10 to be flawed. Indeed, if the WRC restoration were to be analysed in a wider social and economic context, its overall impact on exchequer revenue is likely to be positive rather than negative.

The conclusion to be reached from the present CBA exercise is that it demonstrates that there is a very good business case in support of the restoration of the WRC link between Athenry and Claremorris, and almost certainly for the eventual restoration of the link from Claremorris to Collooney/Sligo. The restoration of Phases 2 and 3 yields a positive net present value (NPV) for the project and a benefit/cost ratio (BCR) greater than unity. When additional non-monetised benefits of the project are considered, an even stronger business case exists to justify the immediate implementation of this major high quality and potentially transformational infrastructure project. The analysis justifying this conclusion is fully transparent and all supporting data, calculations, evidence and assumptions upon which it is based are visible to decision makers. Major costs and benefits are fully described, and the values attached to each clearly shown. The Report was executed under severe time and data constraints, but attempted to work within these constraints.[12]

"The conclusion to be reached from the present CBA exercise is that it demonstrates that there is a very good business case in support of the restoration of the WRC link between Athenry and Claremorris, and almost certainly for the eventual restoration of the link from Claremorris to Collooney/Sligo. The restoration of Phases 2 and 3 yields a positive net present value (NPV) for the project and a benefit/cost ratio (BCR) greater than unity. When additional non-monetised benefits of the project are considered, an even stronger business case exists..."

As was described in Section 2 on the history of the WRC, the people of the West of Ireland objected vehemently almost fifty years ago to the termination of scheduled passenger train services between Mayo, Galway and Limerick. Since the closure, local authority members succeeded in protecting the route from being dismantled and reassigned to other uses through successive County Development Plans. Local authorities have adopted successive statutory objectives through Regional Planning Guidelines to revitalise the route for passenger and freight purposes.

Most recently, as discussed in Section 4, in 2019 the Northern & Western Regional Assembly adopted an objective in the Regional Spatial Economic Strategy (RSES) to reconstruct the railway northwards from Galway - not just to Mayo - but onwards through north Mayo to Sligo. The present economic appraisal validates the vision and judgement of these statutory authorities and provides business and socio economic justification for action on the part of Government.

12 For an example of the severe difficulties faced by the West-on-Track experts in accessing data used in the EY Report, see Appendix 1.

Fig 8.5 Transport Integration: Linking Westport to Galway by rail will strengthen an emerging Galway-Mayo tourism corridor (J. Mee).

It is strongly recommended that the decision of Government in 2005, deferred in 2011, to reconstruct the railway from Galway to Mayo and to conduct a further review of the reconstruction of the railway between Claremorris on Dublin-Westport/Ballina radial route and Collooney on the Dublin-Sligo radial route be immediately renewed having regard to the objectives of the RSES and the findings of this report. This objective is consistent with that of the Government commitment to promote development of the Atlantic Economic Corridor.

The urgency of a Government commitment to commence the reconstruction of the Galway-Mayo section of the WRC, which is the subject of this business and economic appraisal, is all the more relevant due to the increased strategic focus on vulnerabilities in Ireland's supply chain as a result of BREXIT. Such vulnerabilities require improved connectivity and access to the south-eastern and southern ports of Foynes, Cork and Waterford.

We note and welcome the fact that in August 2019 the Irish Government applied to the European Commission to include the "Western Arc" region in the Ten-T Core Network and that this application received a positive response which should now be followed up on by Government.[13] This must be viewed in the context of the announcement by the European Commission in January 2020 that the current status of the west and northwest region was being downgraded from "developed region" to a "region in transition".

Success on the part of the Government will render the current proposed renewal of the WRC between Galway and Mayo eligible for EU financial assistance.

Finally, it is imperative that Government include the WRC restoration project in the forthcoming strategic review of the National Development Plan, due for adoption this year.

"It is strongly recommended that the decision of Government in 2005, deferred in 2011, to reconstruct the railway from Galway to Mayo and to conduct a further review of the reconstruction of the railway between Claremorris on Dublin-Westport/Ballina radial route and Collooney on the Dublin-Sligo radial route be immediately renewed having regard to the objectives of the RSES and the findings of this report. This objective is consistent with that of the Government commitment to promote development of the Atlantic Economic Corridor."

13 DoTTS: Letter from Minister Shane Ross, 9th August, 2019, to European Commission and reply from Commissioner Violeta Bulc, 10th October 2019.

Fig. 8.6 Eastern approach to Claremorris Railway Station, April 2020 (Sinead Mallee)

Appendix 1

Request for background EY data to IÉ and the DTTaS

[A1] REQUEST FOR BACKGROUND EY DATA TO IÉ AND THE DTTAS

[1]

On January 22nd, 2021 a request was sent by email to Iarnród Éireann for access to data used in the preparation of the EY Report on The Western Rail Corridor: A Financial and Economic Appraisal. The text is reproduced below.

> "With a view to examining the validity of the EY Report on the WRC, West=on=Track are working with a group of consultants with professional knowledge in the areas of rail engineering, economic analysis, regional development strategy, financial analysis, business and social issues.
>
> Our objective is to verify some calculations in the EY report. Specifically, we are seeking detailed information to allow reconstruction of the Logit Model used by EY for demand modelling.
>
> The table below sets out the information we are requesting, with specific references to the locations in the EY report where the relevant information is used, but not provided in the published report.
>
> As the time schedule of our expert working group is very short (about five weeks from January 22nd), we ask that you would kindly address our request as a matter of urgency".

REQUESTED INFORMATION	REPORT REFERENCE	NOTE
1. Mott McDonald's database of costs for Railway Works	p. 47, ¶ 5	
2. Operating costs for the WRC produced by ÍE	p. 50, ¶ 6	
3. Infrastructure Manager costs produced by ÍE	p. 51, ¶ 2	
4. All Logit Model Input and Output Data, Including the Following:		
a. Generalised Journey Time (GJT) equations and calculations for all modes and flows contained in the Logit Model.	p. 98 and 102	
b. Spread parameters (λ) for all modes and flows contained in the Logit Model and calibrations to replicate 2012 mode shares to the values in Table 28.	p. 98 and p. 103 p. 102, ¶ 6	
c. Base year (2012) data (matrix) of car and public transport journeys for each flow that were extracted from the Irish National Transport Model.	p. 100	NTpM data are not available online.
d. "Other current data" and benchmarking calculations performed on the data in (c) used to derive the daily journeys shown in Table 25.	p. 100, ¶ 2	
e. Journey times for flows to/from Galway taken from Google Maps.	p. 102, ¶ 2	Google Maps journey times vary in real time. Request is for the values used to calculate GJTs in the Logit Model.

f. Base year (2012) and reference Year (2040) car in-vehicle times (IVTs) data extracted from the National Transport Model for each flow.	p. 102, ¶ 2 and Table 26	
g. Parking cost data obtained from internet search for each flow.	Table 26	
h. Car trip distances for each flow used in vehicle operating cost calculations.	Table 26	
i. Walk to/from car times provided by Mott McDonald for each flow.	Table 26	
j. In-vehicle times for each public transport, from ÍE and Mott McDonald for each flow.	Table 27	
k. Waiting time at origin estimates for each public transport mode, for each flow.	Table 27	
l. Waiting times at interchange for each public transport mode, for each flow.	Table 27	
m. Walk times for each public transport mode, for each flow.	Table 27	
n. Ticket fares for each public transport mode, for each flow.	Table 27 and Table 29	
o. Elasticity parameters (ε), GJT_{old}, and GJT_{new} values.	p. 104 ¶ 1	
p. Calculation details of one-way average fares, including Irish Rail original data (same as (n) above for rail).	Table 29	
5. All Trip Rate Model Input and Output Data, Including the Following:	Table 29	
a. Number of trip ends per station provided by the National Transport Authority (NTA).	p. 105 ¶ 1	
b. 10 km band population data derived from electoral division population data.	p. 105 ¶ 1	Electoral division population data is available online, but the specific EDs used and the derivation of the 10km band population is not specified in the report.
c. Irish Rail passenger census data used with the Trip Rate Model.	p. 105 ¶ 2	Census data is available online, but the census year used is not specified in the report.
a. Population growth data provided by Oxford Economics.	p. 106 ¶ 5	
6. Alternative values for the data requested above used in the Sensitivity Analysis	p. 123 ¶ 1	

[2]

On January 25th the following email response was received from Iarnród Éireann:

> "Iarnród Éireann commissioned EY to produce the study of the WRC Phases 2 and 3. The report was sought at the direction of, funded by, and to the terms of reference established by the Department of Transport.
>
> We were charged with the responsibility of procuring the consultant and ensuring that the appraisal guidelines for major projects were observed, and that the study met the terms of reference established by the Department.
>
> Therefore, the report is proprietary to the Department, who would be best placed to review and respond to your queries".

[3]

On January 28th the following email request was sent to the Department of Tourism, Transport and Sport (DTTaS)

> "Recently I wrote to [....] of Iarnród Éireann who has kindly advised me to write to you (see correspondence below).
>
> With a view to examining the validity of the EY Report on the WRC, West=on=Track are working with a group of consultants with professional knowledge in the areas of rail engineering, economic analysis, regional development strategy, financial analysis, business and social issues.
>
> Our objective is to verify some calculations in the EY report. Specifically, we are seeking detailed information to allow reconstruction of the Logit Model used by EY for demand modelling.
>
> The table below sets out the information we are requesting, with specific references to the locations in the EY report where the relevant information is used, but not provided in the published report.
>
> As the time schedule of our expert working group is very short (about five weeks from January 22nd), we ask that you would kindly address our request as a matter of urgency".

[4]

On February 9th, the following email response was received from the DTTaS:

> "I refer to your email below to the Secretary General in relation to details contained within the report entitled 'Western Rail Corridor: Finance and Economic Appraisal'.
>
> I can confirm that the Report referred to was commissioned by Iarnród Éireann, paid for by Iarnród Éireann and submitted by EY to Iarnród Éireann in line with the contractual commitments agreed between Iarnród Éireann and EY. Therefore queries in relation to the detail of the Report are a matter for Iarnród Éireann in the first instance and should be directed to it for answer. This position, and your email dated 28 January along with its request for information, has been shared with Iarnród Éireann and a copy of this email will be forwarded to the CEO's office also".

[5]

On February 16th, the following email was sent to Iarnród Éireann:

> "Please see below correspondence received last week from the office of the Secretary General of the Department of Transport as well as my previous email to your colleague [....].
>
> As suggested by the Department, I am writing to you to ask if you could kindly facilitate us in acquiring the information requested in the table below".

[6]

No response to the above email was received (by April 8th, 2021)

Appendix 2

Western Rail Corridor Phases 2 and 3: Independent cost review

[A2] WESTERN RAIL CORRIDOR PHASE 2 AND 3 INDEPENDENT COST REVIEW

Appendix 2:

Western Rail Corridor Phase 2 and 3

Independent cost review

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Date of issue **9 March 2021**

To Dr John Bradley

Western Rail Corridor Phase 2 and 3 independent cost review

As requested, I have undertaken a review of the 2021 comparator price against the 2020 Ernst & Young/Mott MacDonald (EY/MM) price for reinstating the railway line between Athenry, Tuam and Claremorris in the west of Ireland (also referred to as Phase 2 and 3 of the Western Rail Corridor).

In order to make a reasonable assessment of the validity of the comparator price, I have reviewed both of these costings against the recorded total expenditure on Phase 1 of the Western Rail Corridor, which was opened in 2010. In all cases, I have adjusted cost values for inflation using the Irish Central Statistics Office's (CSO) CPI Inflation Calculator.

My assessment has looked to compare the various prices both at a high level by looking at normalised unit costs, and at a lower level by confirming that assumptions made in the 2021 comparator price matched the technical requirements of Iarnród Éireann Infrastructure.

The high level assessment has used the following three datasets: the 2021 Phase 2 and 3 comparator price, the 2020 Phase 2 and 3 EY/MM price, and the 2010 Phase 1 actual costs following construction. These are shown in Tables 1, 2 and 3.

Phase 2 & 3 Athenry to Claremorris (comparator price)	**2021 value [€m]**	**Units [..]**		**2021 rate [€m/ ..]**	*Rate and total comparison [% of Phase 1 costs]*
Permanent way	44.2	53.0	km	0.834	129%
Signalling & telecoms	29.9	53.0	km	0.564	168%
Retained level crossings	7.7	70	crossings	0.110	-
Underbridges and overbridges	20.0	78	structures	0.257	177%
Stations and station works	5.4	2	stations	2.695	142%
Ancillary works	20.9	53.0	km	0.394	296%
Contingency (included in above figures)	12.8			10%	
TOTAL with contingency	**128.2**				**124 %**
Preliminaries	25.6			20%	
TOTAL with preliminaries	**153.8**	53.0	km	2.900	147%

Table 1: the 2021 comparator price, with added preliminaries assumed at 20%

The 2021 comparator price is as provided, with no requirement to adjust for inflation. The number of structures and length of infrastructure corridor have been taken from the EY/MM report for consistency in generating unit rates.

It should be noted that no value for preliminaries (project management, design, temporary works, etc) was included in the comparator price. This has been

assumed at 20% and the overall cost increased to a total of €153.8m in 2021 prices.

Phase 2 & 3 Athenry to Claremorris (MM/EY)	2019 value [€m]	2021 value [€m]	Units [..]		2021 rate [€m/..]	*Rate and total comparison [% of Phase 1 costs]*
Permanent way	78.1	79.0	53.0	km	1.489	*231%*
Signalling & telecoms	59.7	60.4	53.0	km	1.139	*338%*
Retained level crossings	11.8	11.9	70	crossings	0.170	-
Underbridges and overbridges	33.4	33.8	78	structures	0.433	*298%*
Stations and station works	-	5.4	2	stations	2.695	*142%*
Ancillary works	5.0	5.0	53.0	km	0.094	*71%*
Contingency (included in above figures)	18.8	19.5			10%	
TOTAL with contingency	**188.0**	**195.4**				*189%*
Preliminaries	49.5	50.0			26%	
TOTAL with preliminaries	**237.5**	**245.5**	53.0	km	4.629	*235%*

Table 2: the 2020 EY/MM price excluding rolling stock and using the 2021 comparator figure for station works

The combined Phase 2 and Phase 3 capital cost data included in Chapter 5 of the EY/MM report was used. This report quoted 2019 prices, so these have been adjusted by 1.1% to account for inflation.

The EY/MM report refers to station works within the body text of the report, but no value is given in the table of costs (this appears to be an error on the part of EY/MM) so the figure quoted in the 2021 comparator price has been used to allow a fair comparison of final capital costs.

Likewise, the cost of additional rolling stock has been removed as this is not determined as a requirement in the 2021 comparator price. If later determined as required, the value in the EY/MM report could be added to the 2021 price and so would make no difference to the outcome of this review.

The contingency value quoted in the EY/MM report was lower than 10% so this figure has been disregarded and each line of capital costs has had its own contingency included at 10%, to allow comparison between the three datasets. Preliminaries were included as a line item in the EY/MM report and these have been included as quoted in the report.

This gives a total of €240.1m in 2021 prices.

Phase 1 Ennis to Athenry (IE recorded costs)	2010 value [€m]	2021 value [€m]	Units [..]		2021 rate [€m/..]
Permanent way	34.9	37.4	58.0	km	0.646
Signalling & telecoms	18.2	19.5	58.0	km	0.337
Retained level crossings	22.2	23.8	-	crossings	-
Underbridges and overbridges	8.8	9.4	65	structures	0.145
Stations and station works	5.3	5.7	3	stations	1.896
Ancillary works	7.2	7.7	58.0	km	0.133
Contingency (included in above figures)	-	-			-
TOTAL with contingency	**96.6**	**103.7**			
Preliminaries	9.9	10.6			10%
TOTAL with preliminaries	**106.5**	**114.3**	58.0	km	1.970

Table 3: the 2010 cost of constructing Phase 1 as provided by Iarnród Éireann

The final dataset represents the actual costs for building Phase 1 between Ennis and Athenry, as provided by Iarnród Éireann in 2014. These costs have been adjusted by 7.3% to account for inflation and allow direct comparison with the other datasets. No contingency figures are included as these values are as recorded after construction.

In all of the above tables, the "2021 rate" column refers to a unit rate in 2021 prices that can be compared across the three datasets. In Table 2 and Table 3, the "Rate and total comparison" column provides a comparison value against the as-constructed Phase 1 price.

2021 comparator unit rate	2020 EY/MM unit rate	2010 Phase 1 unit rate
€2.900 m/km	€4.629 m/km	€1.970 m/km

Table 4: comparison of unit rates between datasets

In the context of the additional length and complexity of the Phase 2 and 3 works compared to the Phase 1 works, it is expected that there would be an increase in unit costs (see Table 4). On this basis, and on further inspection of the individual line items related to the physical works, the 2021 comparator price would appear to be sound. A greater volume of ancillary works has been determined as necessary in this price, but again this appears to match the required works detailed in relation to the existing conditions of the Phase 2 and 3 corridor. As previously mentioned, ancillaries need to be added to the 2021 comparator price, as it is not realistic to exclude the cost of, for example, office staff costs, design and surveys or construction site compounds.

Conversely, the EY/MM overall unit rate is over double (2.4 times) the recorded costs during the construction of Phase 1, and this would appear to be unreasonable given that the same overall technical specification is required for all three phases. The validity of this price is further undermined by the lack of inclusion of costs for station works costs and the low predicted costs for ancillary works (which would be expected to increase the overall cost further still), though it is possible that in the latter case this is due to the way these costs have been distributed amongst the other line items.

Unfortunately, the number of renewed crossings as part of the Phase 1 works was not available, so comparison could not be drawn between the unit rates of this work.

At this stage the 2021 comparator price is still a high-level cost estimate. However, sufficient details have been included in the cost build up to review the validity of the assumptions made.

It is assumed by the 2021 comparator price that no station works will be required at Athenry. Given the works that have already been undertaken for Phase 1, this would appear to be a sound assumption, but this should be verified to ensure a rigorous cost estimate.

The permanent way and structures work is based on principles and unit rates provided by Iarnród Éireann and would appear to be sound on that basis. These are dependent on the line operating at a lower speed than specified by the EY/MM report (80mph versus 90mph), however the assessment of the impact of this on the operational model for the reopened Phase 2 and 3 is outside the scope of this review.

The breakdown of signalling and telecoms versus level crossing costs is difficult to compare with the Phase 1 costs, but summing the costs of both signalling, telecoms and level crossing works gives a unit rate in 2021 prices of €0.747m/km for Phase 1 and €0.709m/km for Phase 2 and 3, which is nominally comparable. However, given that the Phase 2 and 3 unit rate is lower than the Phase 1 unit rate, further work is required to verify these costs.

As a result of the addition of preliminaries into the total cost, I would expect the final quoted price to increase from €128.15m to €153.78m, assuming a 20% preliminaries uplift.

In my review I have made the following recommendations:

- Include preliminaries in the total cost.
- Verify that no station works are required at Athenry.
- Verify that signalling, telecoms and level crossings cost assumptions are correct.

Given the available information I have been provided, and subject to these recommendations being carried out, I believe that the 2021 comparator price is valid.

If any further explanation is required, please contact me as above.

Yours faithfully

Gareth Dennis MEng (Hons) GMICE MPWI

Director, Permanent Rail Engineering

Appendix 3

A Brief Socio-economic Profile of Tuam

[A3] A BRIEF SOCIO-ECONOMIC PROFILE OF TUAM

INTRODUCTION

This profile looks at employment in Tuam and the commuting patterns associated with the largest town in County Galway. The prospect of renewed rail services between Galway and Mayo offers the Tuam Local Electoral Area a rare opportunity to regain access to the national railway network with two new stations, one in Tuam itself and another at Abbeyknockmoy. While all other towns on the railway corridor between Galway and Westport are already on the network the gain for Tuam and Abbeyknockmoy is one that many similar communities who have lost their railway connectivity over recent decades of railway closures might well relish.

BACKGROUND

Tuam is the largest town in County Galway (population 8,767, Census 2016) and is identified as one of eight "key towns" under the National Planning Framework/Regional Spatial Economic Strategy. The town has experienced sustained growth patterns since the last Census period, comfortably exceeding the forecast level of 2016 population growth in the Galway County Development Plan.

As described in Section 2, thanks to the initiative of local business leaders and landowners who realised the opportunities it would present, the town was one of the first in Connacht, to be served by the emerging railway system in 1860.

A century later, due to the national strategy adopted in the 1960s of focusing railway investment on the radial routes from Dublin, the Sligo -Limerick railway, on which Tuam was one of the principal destinations, was downgraded and lack of investment over the closing decades of the 20th century led eventually to the total withdrawal of services in 2000.

Since then the 52km railway through Tuam linking the 'radial' stations of Athenry and Claremorris has lain derelict and is viewed by many as a symbol of decline and state neglect.

Despite the consistent inclusion of objectives in successive County and Local Development Plans the State has shown little interest until relatively recently in the prospect of revitalising this railway. What follows is a profile of a major Irish town on the cusp of a major infrastructural development, a cathedral city with a rich history that is uniquely poised for economic and social growth within the metropolitan influence of Galway City.

> - The socio-economic data for Tuam sits largely in line with wider County electoral area and frequently acts as the County average benchmark.
> - The population of the wider Tuam Area is 40,494 people with approximately 25% of the population aged under 15 and 12.5% aged 65+.
> - Tuam has the highest percentage of populace who leave home before 7am and joint highest percentage of journey times exceeding 1 hour indicating a large commuter population.
>
> *Tuam Regeneration Masterplan - April 2021*

Figure A3.1 Tuam Railway Station (J. Canney)

PLANNING STRATEGY

The Core Strategy within the current Galway County Development Plan projects a population growth target of almost 11,000 for Tuam with growth of 24% (2,080 persons) by 2021 and a housing land requirement of 52.39ha to accommodate residential development over the plan period.

Tuam has benefitted from key infrastructural upgrades in recent years with the Tuam Water Distribution and Main Drainage project, and an investment of €28million including ducting for the gas pipeline and high-speed broadband network, both of which became operational as of 2019. The opening of the M17 motorway in 2018 has directly connected Tuam with Shannon Airport, Limerick, and Dublin.

This investment primes the town with capacity and opportunities for population and employment growth as an enterprise hub, ideally situated to serve and collaborate with the significant growth areas of Galway, Sligo and Athlone, while supporting the Atlantic Economic Corridor's drive towards a low carbon, high value economy.

The Tuam Local Area Plan 2018-2024,[1] effective since November 2018, includes a vision, objectives and spatial strategy for the town which aims:

> "To promote Tuam as a thriving vibrant market town, providing a focus for future residential, economic & social development in a sustainable manner, encouraging new development and capitalising on the town's unique historic identity and character, as well as its accessibility, thereby realising Tuam's potential, as well as supporting the surrounding rural hinterland."

The Tuam Local Area Plan contains a specific commitment to rail development in Sustainable Transportation Objective ST 2:

> "To facilitate any Smarter Travel initiatives that will improve sustainable transportation within the plan area and facilitate sustainable transportation options including public transportation, rail freight, electric vehicles, car clubs, public bike schemes, as appropriate."

TUAM REGENERATION MASTERPLAN

The Tuam Local Area Plan (LAP) 2018-2024 also contains Objective ED 5: which identifies the need to progress a Town centre management plan. In this context a "Tuam Regeneration Masterplan" has been created to incorporate the management plan into the wider regeneration objectives.

The key area of the "Station Quarter" is specifically included and has been identified as an Opportunity Site within the Tuam LAP 2018-2024 (Figure 2). The Regeneration Masterplan recommends proposals for land use, buildings, public spaces, movement/transport opportunities, and matches these proposals to a phased delivery programme aligned with available external funding opportunities. In this framework, the Station Quarter will be considered as an integrated transport hub for the town and environs. The Masterplan has recently been published.[2]

Figure A3.2

1 http://www.galway.ie/en/services/planning/planspolicy/lap/tuam/

2 http://www.galway.ie/en/services/communityenterpriseeconomicdevelopment/regen/tuam/

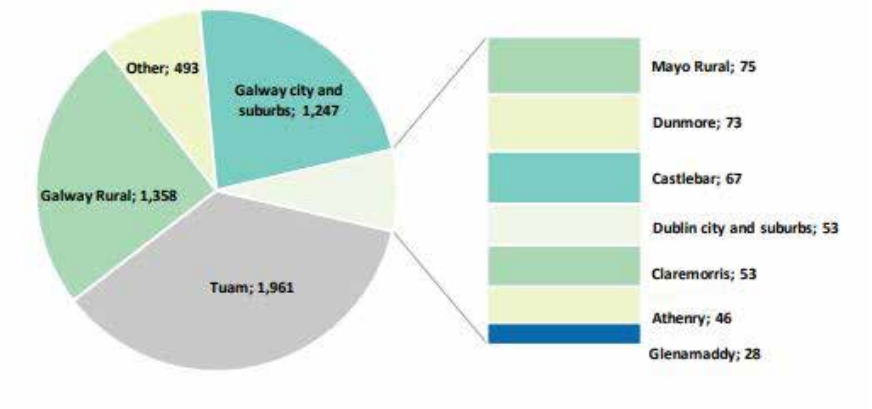
ENTERPRISE AND EMPLOYMENT

The CSO POWCAR 2016 found that the total number of jobs located within the Tuam Boundary Area was 3,700. Tuam town as a place of work now accounts for nearly 2,000 workers, double that in 2006. The majority (26%) of the working age population within the settlement of Tuam, are employed in manufacturing. In addition, 20% are employed in commerce and trade and 21% in professional industries.

The French automotive company Valeo Vision is the largest employer. In March 2019, Valeo announced a €44m investment in their Tuam facility for Advanced Driver Assistance System technology. The expansion will increase those employed in R&D roles to 500 making the Tuam site one of the largest R&D facilities in Ireland. Other significant employers in Tuam include JFC Engineering with turnover of over €100m and employing 400 people in eight facilities worldwide. The Action Tuam organisation, which is prominent in the promotion of business and commerce in the town, provides a 20,000 sq ft high specification business incubation facility at Beechtree Park and is strongly committed to supporting the implementation of the Tuam Masterplan referred to earlier.

According to a "Profile of the Tuam Labour Catchment" published by the Western Development Commission,[3] of those living in the Tuam labour catchment (total = 5,454), 36% (1,961) are employed within Tuam town and 64% (3,493) are employed outside the town. As Figure A3.3 below shows, key employment destinations outside the town are Galway Rural (24.9% or 1,358), Galway city and suburbs (22.9% or 1,247) and Mayo Rural (1.4% or 75).

Figure A3.3

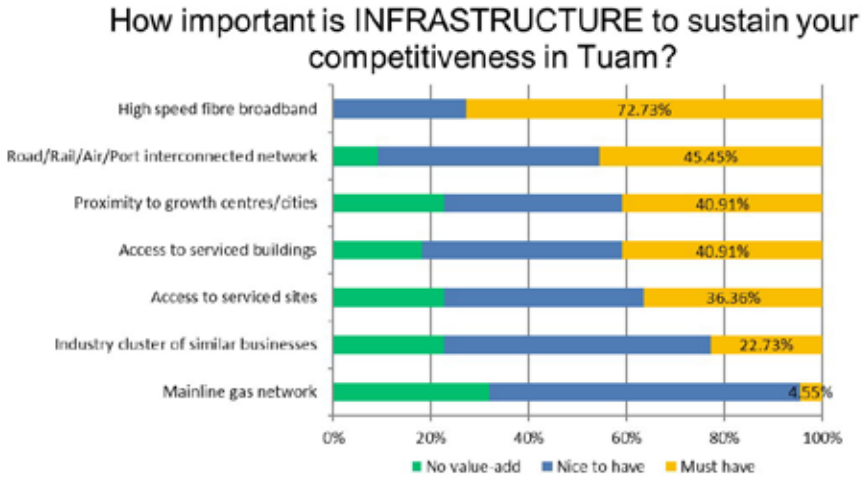


Unemployment in the 2016 census was 12 % - higher than the national average of 8%. However, this has fallen year on year and the figure stands at 1,405 for January 2021 despite the impacts of COVID on the national economy.

In 2019, a survey of over 80 local businesses was undertaken to understand the priorities of businesses in order to sustain their competitiveness in Tuam. The survey covered themes such as the labour market, finance, employee welfare, regulatory concerns and infrastructure. Interestingly, under the infrastructure theme, the key concern after broadband availability was an interconnected rail/port/road network. (See Figure A3.4.)

3 https://www.wdc.ie/wp-content/uploads/Tuam-WDC-LC-May-2019.pdf

Figure A3.4



The regeneration of the Western Rail Corridor between Galway and Mayo will help to address this connectivity deficit and is in line with the National Development Plan and Atlantic Economic Corridor objectives. Tuam was once one of the principal rail freight hubs in Ireland. Now, due to its central location on the Atlantic Economic Corridor and its proximity to the motorway and national road distribution network, Tuam retains the capacity to play a pivotal role in the 21st century rail freight industry as a potential inland port. In the area of transport and connectivity broader national challenges must now be met, including the potential impacts of Brexit and the achievement of Ireland's climate change targets. Meeting these challenges will require an improvement in efficient transport connectivity throughout the island and also, through our ports and airports to EU and global markets.

LOCAL ECONOMIC INDICATORS - IBEC

In 2018, IBEC compiled Local Economic Indicators across 8 regions to better understand strengths and weaknesses of the economy and the impact on the ground of national policies. A set of Key Economic Indicators were produced specifically for Tuam in March 2019 – the first town to have this level of analysis conducted. The insights show a town with a young, well-educated population, a supportive enterprise environment with low commercial rates and very high broadband connectivity. (See Figures A3.5 and A3.6.)

Figure A3.5

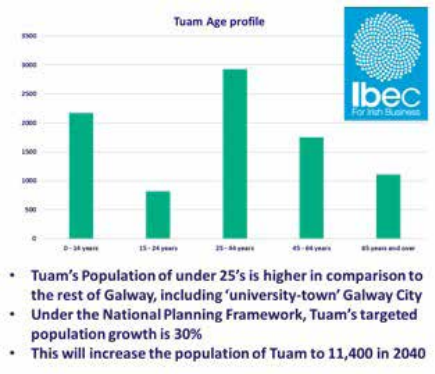
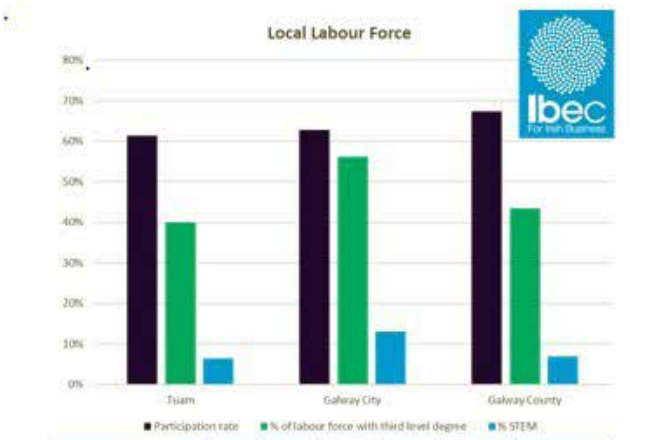


Figure A3.6



	Natl Aver	Tuam	Galway City	Ranking	Galway Co	Ranking
Participation rate	65.2%	61.4%	62.8%	20/31	67.3%	5/31
% of labour force with third level degree	43.3%	39.9%	56.2%	2/31	43.4%	9/31
% STEM	7.1%	6.4%	13%	1/31	6.9%	10/31

'OUR RURAL FUTURE'

The IBEC findings are further underpinned by the recently launched Our Rural Future strategy, the blueprint to transform rural Ireland with key actions. Launched by Government in March 2021, Our Rural Future provides a framework for the development of rural Ireland over the next five years. The policy is forward-looking and ambitious and addresses both the challenges facing rural areas and the opportunities which rural economies and communities can benefit from in the coming years.

The importance of rail services for the future of rural communities is specifically referenced in the strategy:

> "Rail services also play an important role in providing connectivity in many rural areas. Ireland's rail network primarily serves inter-urban connections, but the potential catchment areas for railway stations in rural areas can extend far beyond the immediate hinterlands, thus presenting a viable and attractive option for rural dwellers and tourists alike to travel safely, efficiently and comfortably throughout Ireland. Ensuring a fit-for-purpose network, particularly in terms of quality and reliability, is therefore an important socio-economic enabler for rural areas. €1 billion has been committed over the period 2020 to 2024 to ensure the optimal maintenance, renewal and improvement of our rail infrastructure."

TRANSPORT PATTERNS TO AND FROM TUAM

At county level, Tuam has the highest percentage of population who leave home before 7am and joint highest percentage of journey times exceeding 1 hour, indicating a large commuter population.[4]

Data from the last three censuses show that cars are the main means of travel to work in Tuam, having risen from 42% to 62% over the course of 2006 to 2016. This bears out the IBEC analysis presented above. In 2016 there were 675 persons in the settlement of Tuam who commuted to Galway city and suburbs which equates to 20.6% of persons at work and living in Tuam. Of these commuters 370 were women and 305 were men. The average journey time of workers who commute from Tuam to Galway city and suburbs was 43 minutes and their average age was 40. Significantly, 570 of these workers travelled by car while 67 travelled by bus.[5]

COMMUTER FLOWS (INWARD COMMUTERS LESS OUTWARD) BY ELECTORAL DIVISION, 2016

In 2016 there were 686 commuters who lived in the Electoral Division of TUAM URBAN but worked elsewhere. There were 1,523 commuters who travelled in to the electoral division to work, a net flow of 837 commuters.

COMMUTER FLOWS (INWARD COMMUTERS LESS OUTWARD) BY ELECTORAL DIVISION, 2016

In 2016 there were 1,366 commuters who lived in the Electoral Division of TUAM RURAL but worked elsewhere. There were 1,799 commuters who travelled in to the electoral division to work, resulting in a net flow of 433 commuters.[6]

ANNUAL AVERAGE DAILY TRAFFIC (AADT)

AADT is the total two-way traffic volume passing a point or segment of a road for one full calendar year, divided by the number of days in a year (365). The projected future traffic volumes were calculated to be 37,400 Annual Average Daily Traffic (AADT) between Galway City and Tuam in the year 2032.[7]

4 Source: The Paul Hogarth Company for the Tuam Regeneration Masterplan.

5 Source: CSO: http://census.cso.ie/p6map42/

6 Source: CSO http://census.cso.ie/p6map41/

7 Source: http://www.pleanala.ie/documents/reports/HA0/RHA0005.pdf

TRAVEL TO WORK FLOWS

TUAM LABOUR CATCHMENT:

Of those living in the Tuam labour catchment (total = 5,454), 36% (1,961) are employed within Tuam town and 64% (3,493) are employed outside the town. Key destinations outside the town are Galway Rural (24.9% or 1,358), Galway city and suburbs (22.9% or 1,247) and Mayo Rural (1.4% or 75). 1247 work in Galway City & suburbs, 46 work in Athenry, 53 work in Claremorris.[8]

GALWAY CITY LABOUR CATCHMENT

Of those living in Galway City 1285 work in Tuam, 1248 work in Athenry, and 556 Mayo Rural.[9]

Fig A3.7 Tuam town centre, 2020 (J. Canney)

8 Source: https://www.wdc.ie/wp-content/uploads/Tuam-WDC-LC-May-2019.pdf

9 Source: https://www.wdc.ie/docs/TraveltoWork_LabourCatchments_WesternRegion2016_GalwayCity.pdf

WALKING DISTANCE FROM TUAM RAILWAY STATION

Figure A3.8

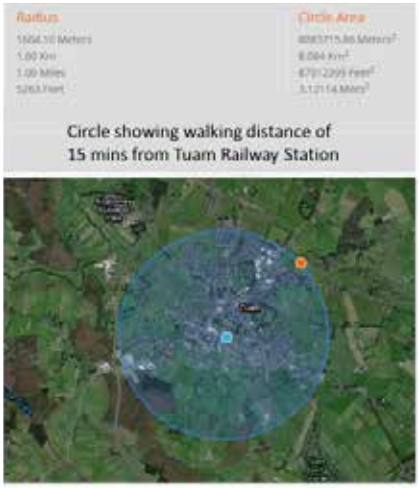
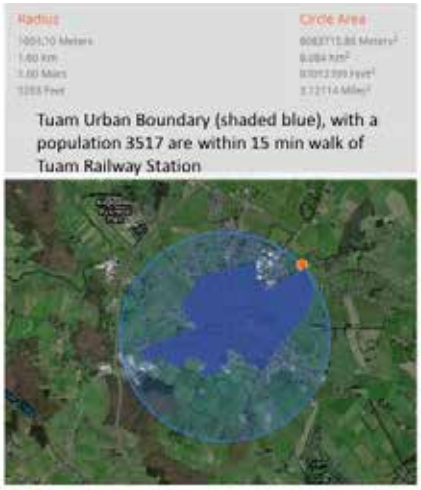


Figure A3. 9

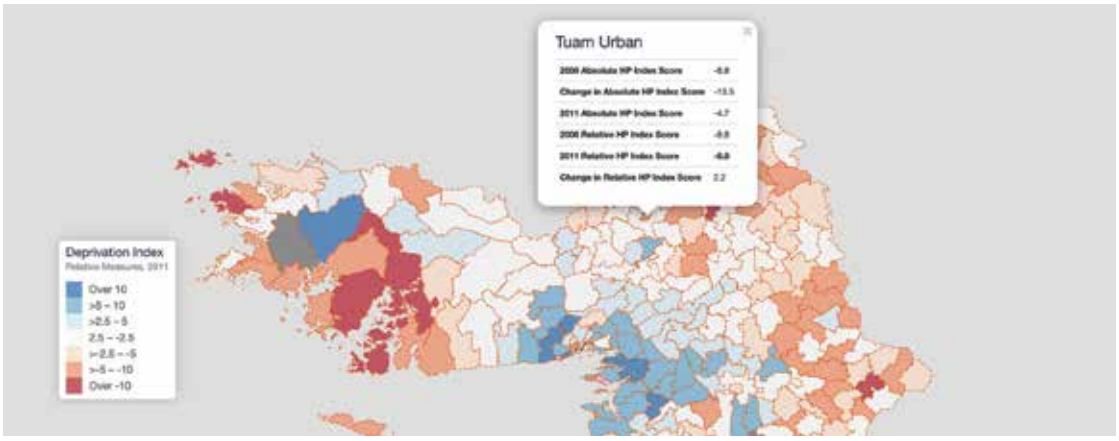


Population within 15 mins walking distance of Tuam Railway Station.[10]

SOCIAL DEPRIVATION

Tuam has a social deprivation Score of -6.6 which is in the second highest bracket for social deprivation.[11] Galway Children and Young People's Services Committee (CYPSC) is responsible for improving the lives of children, young people and families at local and community level through integrated planning, working and service delivery and was established by Tusla, Child and Family Agency, under the auspices of the Department of Children and Youth Affairs. A consultation with young people and children in Tuam, carried out by CYPSC, revealed that the number one issue they experienced was lack of transport/poor transport between towns.[12]

Figure A3.10



10 Population Source CSO data 2016 accessed http://airo.maynoothuniversity.ie/external-content/galway-county

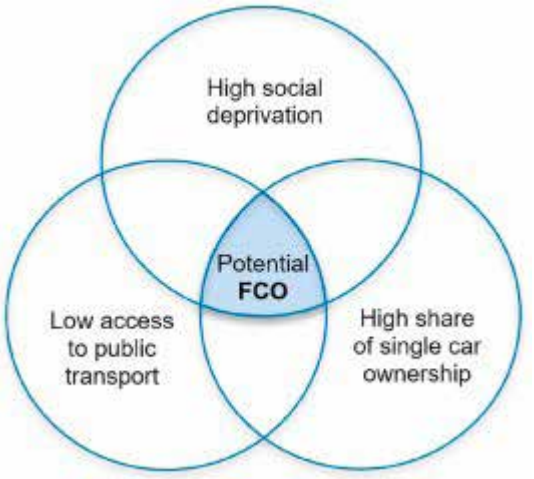
11 https://galwaydashboard.ie/social#deprivation-index

12 https://www.cypsc.ie/_fileupload/Documents/Resources/CYPP/FINAL-Galway%20CYPP%202016%20-%202018%20AA.pdf

CAR OWNERSHIP AND USE

Forced Car Ownership (FCO) is thought to result in households cutting expenditure on other necessities and/or reducing travel activity to the bare minimum, both of which may result in social exclusion.[13]

Figure A3.11 Households who own cars despite limited economic resources.



CSO 2016 data show that 78% of Tuam respondents have one or more cars while 62% of Tuam respondents to CSO 2016 travel to work/school by car. It is to be expected that the availability of modern rail transport in the town will contribute significantly to a reduction in levels of forced car ownership.

Table A3.1 Tuam: Number of households with cars (CSO 2016)

No motor car	622	18%
One motor car	1,775	51%
Two motor cars	837	24%
Three motor cars	59	2%
Four or more motor cars	18	1%
Not stated	141	4%
Total	3,452	

Table A3.2 Tuam: Population aged 5 years and over by means of travel to work, school or college (CSO)

	TUAM	WORK	SCHOOL	%
Car driver	2,010	61	2,071	41%
Car passenger	153	937	1,090	21%
Total car			3,161	62%
Total respond	3,267	1,821	5,088	

13 Source: https://www.sciencedirect.com/science/article/pii/S0967070X20309215#fig3

THIRD LEVEL EDUCATION

Almost 9,000 students from Mayo and Galway attend 3rd level education in Galway while just under 2,000 attend college in Limerick. By comparison only 2,096 students from Galway and Mayo attend in Dublin. Students travelling to college in Galway and Limerick could provide significant business for Phases 2 and 3 of the restored north-south rail link. In the case of Tuam the reopening of the railway would increase the options to live at home and commute to college in Galway.

Table A3.3 County of permanent residence of Irish-domiciled Full-time Students 2017/2018[14]

		3RD LEVEL INSTITUTION		
	2017/18	GALWAY	DUBLIN	LIMERICK
COUNTY OF ORIGIN	Galway	6,806	1,057	1215
	Mayo	2,079	1,039	715

HEALTH

Tuam is recognised as a health care hub for the outlying catchment area of 33,000 people, extending to North Galway and the western region, for specific health care needs relating to mental health and disability. A newly established Primary Care Centre located in the "Station Quarter" provides services including audiology, ophthalmology and dental as well as ultrasound and x-ray facilities.

Development of a new Mental Health and Disability Centre is underway at the former Grove hospital site beside Tuam Railway Station. The centre, costing €13 million, will incorporate a specialised Mental Health Services Facility, Early Intervention and Disability Services Facility and Shared Services for the HSE Western region.

DISABILITY

It is notable that Tuam has over 21% higher levels of disability than for county Galway as a whole and 13% higher than the State average. Of those who have a disability 17% do not have access to a car or van compared to 6% of the general population.[15] It is also the case that trains are far more accessible than buses for mobility impaired public transport users.

Table A3.4

CSO 2016	TOTAL PERSONS	TOTAL PERSONS WITH A DISABILITY	%
State	4761865	643131	13.5%
Galway County	179,048	22,523	12.6%
Tuam	8767	1338	15.3%

14 Source: https://hea.ie/statistics/

15 Source: https://www.disability-federation.ie/publications/disability-profile-galway-county/#_ftn1

Figure A3.12 A wheelchair user is assisted by an Iarnród Éireann employee at Craughwell WRC station (P. Bowen Walsh)

TUAM STADIUM AND STATION QUARTER

Tuam Stadium, which opened in 1950, has a special regional significance in Gaelic games. Current proposals for major development at Tuam Stadium are complemented by the prospect of an intermodal transport hub at the adjacent 'Station Quarter'. As the historic photo below shows Tuam Railway Station is located beside the stadium.

Figure A3.13 Crowds exiting Tuam Stadium after a 1951 Galway-Tipperary hurling match, attended by 17,018 people. (Pic. Al O'Dea)

Appendix 4

Case Study - Comparison of bus and rail times

[A4] CASE STUDY - COMPARISON OF BUS AND RAIL TIMES

As is the case with all towns served by rail, those towns served by the Western Rail Corridor enjoy a selection of local and regional bus services. The examples provided below for Westport, Claremorris and Tuam are taken from the Transport for Ireland website, and illustrate that the train journey times projected in this report mean that the new train services will complete the respective journeys from Westport, Claremorris and Tuam, faster than existing bus services.[1]

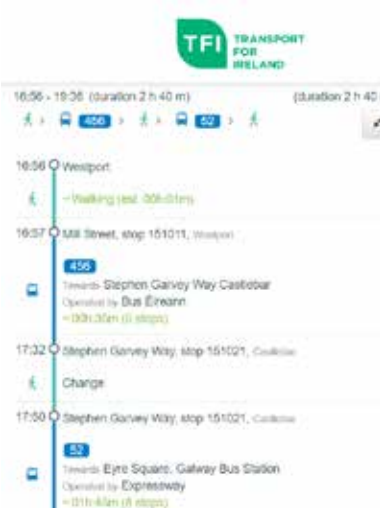
It is also important to note that the bus and train journeys from Tuam to Galway service entirely different intermediate communitities. Tuam – Galway bus services serve the Belclare, Corofin, Corrandrum, Knockdoe, Loughgeorge, Claregalway and Castlegar areas while the train will serve intermediate stations at Abbeyknockmoy, Athenry and Oranmore.

EXAMPLE 1: BUS FROM WESTPORT/CASTLEBAR TO GALWAY

The first example shows that an Expressway bus service from Westport to Galway via Claremorris requires a bus change at Castlebar and involves a total of 12 stops taking 2 hours and 39 minutes to complete its journey. The bus is legally restricted to a maximum speed of 80kph (48mph).[2]

The train will complete the Westport to Galway journey in 1 hour and 32 minutes serving 7 intermediate stations at Castlebar, Manulla Junction (for Ballina and Foxford), Claremorris, Tuam, Abbeyknockmoy, Athenry, and Oranmore at a maximum speed of 140kph (100mph).[3]

> Road Speed Limit for Buses
>
> A single or double deck bus that is not designed for carrying standing passengers 80kph (48mph) on all roads except motorways or dual carriageways
>
> *Source: Rules of the Road p114*



1 https://www.transportforireland.ie/plan-a-journey/

2 There is another bus service from Westport to Galway via Ballinrobe and Headford that does not serve any of the intermediate stations on the Westport-Galway rail route, with a journey time of one hour and 34 minutes.

3 https://www.garda.ie/en/crime/traffic-matters/rules_of_the_road.pdf

EXAMPLE 2: EXPRESSWAY BUS FROM CLAREMORRIS TO GALWAY

The second example shows that an Expressway service from Claremorris to Galway via Tuam makes 7 stops taking 1 hour and 17 minutes, and is legally restricted to a maximum speed of 80kph (48mph). Six intermediate bus stops are: Castlemacgarett, Ballindine, Milltown, Tuam, Claregalway, and Mervue.

However, the train can complete the Claremorris to Galway section of its journey in 58 minutes, at a maximum speed of 140kph (100mph). Four intermediate railway stations will be at Tuam, Abbeyknockmoy N63 Park & Ride, Athenry Park & Ride, Oranmore Park & Ride. Other than Tuam, the intermediate stops for the train will be entirely different from those of the bus.

EXAMPLE 3: LOCAL BUS SERVICE TUAM TO GALWAY

The third example shows that a local bus service from Tuam to Galway serves 36 potential stops, taking 49 minutes and is legally restricted to a maximum speed of 80kph (48mph).

The bus serves thirty six intermediate potential stops as detailed below on the TFI Journey planner:

12:02	Gilmartin Road, Tuam (Galway)
12:03	Killaloonty Road Tuam, Tuam (Galway)
12:03	MG Business Park, Tuam (Galway)
12:04	N17 Business Park, Tuam (Galway)
12:05	Galway Road, Tuam (Galway)
12:05	Cloonmore Road Galway, Belclare
12:06	Claretuam Tuam, Belclare
12:07	Caherhugh Road Galway, County Galway
12:08	Rusheens, Rusheens (Galway)
12:08	Moneen, Moneen (Galway)
12:09	Caherlea Road Galway, County Galway
12:10	N17, Corrofin (Galway)
12:11	Corofin Cross, stop 350491, Corrofin (Galway)
12:11	Tavanagh, Corrofin (Galway)
12:12	Anbally Road Galway, County Galway
12:13	Currandrum, stop 531982, Corrofin (Galway)
12:13	Corbally North, Corrofin (Galway)
12:14	Corbally South, Corrofin (Galway)
12:15	Knockdoe, Knockdoemore
12:16	Bawnmore, Baunmore (Galway)
12:17	Knockdoemore
12:18	Roscommon Road, Rooaunmore
12:19	Loughgeorge, stop 533631, Knockdoemore
12:20	Cois Chlair, stop 530311, Claregalway
12:22	Cregboy, Cregboy (Galway)
12:23	Cloone, Pollaghrevagh
12:24	Cloonacuneen Road Galway, Cloonacauneen
12:25	Cloonacauneen, stop 533772
12:26	Parkmore Road, Cloonacauneen
12:30	Castlegar Galway, Castlegar Village
12:34	Monivea, stop 520301, Ballybrit
12:35	Tuam Road Galway, Monivee (Galway City)
12:36	Trappers Inn, Wellpark
12:37	Mervue, Wellpark
12:38	Ballybrit, Wellpark

The train will complete the Tuam to Galway section of its journey in thirty eight minutes, at a maximum speed of 140kph (100mph). Three intermediate railway stations will be served at Abbeyknockmoy (N63 Park & Ride), Athenry (Park & Ride), Oranmore (Park & Ride).

CONCLUSION

The table below shows the comparative timings for equivalent journeys by rail compared to bus (as outlined above). It demonstrates that the respective journeys will be faster by train than by bus.

ROUTE	BUS TIME	TRAIN TIME
Westport – Galway via Castlebar	2h:39m	1h:32m
Claremorris -Galway	1h:17m	0h:58m
Tuam - Galway	0h:49m	0h:38m

Appendix 5

Full WRC CBA Results

[A5] FULL WRC CBA RESULTS

Social Discount Rate:	0.04																
Shadow Cost of Public Funds	1.3																
Project Year	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
Phases 2 and 3 of the WRC																	
€million, 2019 prices	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035
Costs																	
Preliminaries				3.1	8.5	9.2	4.9										
Civil (Permanent Way) Upgrade Works				11.1	30.9	33.2	17.6										
Signalling and Telecommunications				3.6	10.0	10.7	5.7										
Passenger Facilities				0.6	1.8	1.9	1.0										
Capex (Total)				18.3	51.3	55.1	29.1										
Train Operation								0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5
CME								0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3
Stations								1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
IMO								0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4
CCE								0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7
SET								0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2
B&F								0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2
Opex (Total)								3.3	3.3	3.3	3.3	3.3	3.3	3.3	3.3	3.3	3.3
Opportunity cost								0									
Shadow Price of Public Funds				5.5	15.4	16.5	8.7										
Total costs				23.8	66.6	71.6	37.8	3.3	3.3	3.3	3.3	3.3	3.3	3.3	3.3	3.3	3.3
Benefits																	
Revenue								1.3	2.0	2.3	2.6	2.6	2.6	2.7	2.7	2.7	2.7
Total safety benefit								0.2	0.2	0.3	0.3	0.3	0.4	0.4	0.4	0.4	0.4
Total Physical Activity Benefit								0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total GHG Benefits								0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Local AQ Benefits								-0.1	-0.1	-0.1	-0.1	-0.1	-0.2	-0.2	-0.2	-0.2	-0.2
Total time savings benefit								1.9	2.9	3.3	3.7	3.8	3.8	3.8	3.9	3.9	4.0
Total other cost-saving benefits								5.1	7.7	7.7	7.7	7.7	8.4	8.4	8.4	8.4	8.4
Total Exchequer taxation benefits								0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total noise benefits								0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Residual value																	
Total benefits								8.4	12.6	13.5	14.2	14.2	15.0	15.0	15.1	15.2	15.3
Excluding Shadow Costs																	
Discounted costs				16.3	43.8	45.3	23.0	2.5	2.4	2.3	2.2	2.1	2.1	2.0	1.9	1.8	1.8
Discounted benefits								6.4	9.2	9.5	9.6	9.2	9.4	9.0	8.7	8.4	8.1
NPV (2019 prices)	46.12																
BCR	1.26																
Cumulative Benefits				-16.3	-60.1	-105.4	-128.4	-124.5	-117.7	-110.6	-103.2	-96.2	-88.9	-81.8	-75.0	-68.4	-62.0
Including Shadow Costs																	
Discounted costs				21.2	57.0	58.8	29.9	2.5	2.4	2.3	2.2	2.1	2.1	2.0	1.9	1.8	1.8
Discounted benefits								6.4	9.2	9.5	9.6	9.2	9.4	9.0	8.7	8.4	8.1
NPV (2019 prices)	7.61																
BCR	1.04																

17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	
2036	2037	2038	2039	2040	2041	2042	2043	2044	2045	2046	2047	2048	2049	2050	2051	2052	2053	2054	2055	2056	
0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	
0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	
1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	
0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	
0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	
0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	
0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	
3.3	3.3	3.3	3.3	3.3	3.3	3.3	3.3	3.3	3.3	3.3	3.3	3.3	3.3	3.3	3.3	3.3	3.3	3.3	3.3	3.3	
3.3	3.3	3.3	3.3	3.3	3.3	3.3	3.3	3.3	3.3	3.3	3.3	3.3	3.3	3.3	3.3	3.3	3.3	3.3	3.3	3.3	
2.8	2.8	2.8	2.8	2.9	2.9	2.9	2.9	3.0	3.0	3.0	3.0	3.1	3.1	3.1	3.1	3.2	3.2	3.2	3.2	3.3	
0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	
0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.1	
0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
-0.2	-0.2	-0.2	-0.2	-0.2	-0.2	-0.2	-0.2	-0.2	-0.2	-0.2	-0.2	-0.2	-0.2	-0.2	-0.2	-0.2	-0.2	-0.2	-0.2	-0.2	
4.0	4.0	4.1	4.1	4.2	4.2	4.2	4.3	4.3	4.3	4.4	4.4	4.4	4.5	4.5	4.5	4.6	4.6	4.6	4.7	4.7	
8.6	8.6	8.6	8.6	8.6	8.8	8.8	8.8	8.8	8.8	9.0	9.0	9.0	9.0	9.0	9.2	9.2	9.2	9.2	9.2	9.2	
0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
																				44.5	
15.6	15.6	15.7	15.8	15.8	16.1	16.1	16.2	16.2	16.3	16.6	16.6	16.7	16.7	16.8	17.1	17.2	17.2	17.3	17.4	61.9	
1.7	1.6	1.6	1.5	1.5	1.4	1.3	1.3	1.2	1.2	1.1	1.1	1.1	1.0	1.0	0.9	0.9	0.9	0.8	0.8	0.8	174.4
8.0	7.7	7.4	7.2	7.0	6.8	6.5	6.3	6.1	5.9	5.7	5.5	5.3	5.2	5.0	4.9	4.7	4.5	4.4	4.2	14.5	220.5
-55.7	-49.7	-43.8	-38.1	-32.6	-27.2	-22.0	-17.0	-12.2	-7.5	-2.9	1.6	5.9	10.0	14.0	17.9	21.7	25.4	29.0	32.4	46.1	
1.7	1.6	1.6	1.5	1.5	1.4	1.3	1.3	1.2	1.2	1.1	1.1	1.1	1.0	1.0	0.9	0.9	0.9	0.8	0.8	0.8	212.9
8.0	7.7	7.4	7.2	7.0	6.8	6.5	6.3	6.1	5.9	5.7	5.5	5.3	5.2	5.0	4.9	4.7	4.5	4.4	4.2	14.5	220.5