Stáisiún Uí Chonghaile, Baile Átha Cliath 1, D01 V6V6
Connolly Station, Dublin 1, D01 V6V6
T 01 703 4293 **E** info@irishrail.ie **W** www.irishrail.ie

13th September 2024

[redacted]
Email: [redacted]

Response: FOI request IE_FOI_829

Dear [redacted],

I refer to your request dated 19th July 2024 made under the Freedom of Information Act 2014, which was received by my office on that date, for records held by Iarnród Éireann.

Request:

- Copy of the following information:

(i) Amount of money spent on Public Relations (in specific Advertisement) from 2020 until 2023

(ii) Any information researched or studies conducted that relate to extending the DART to Wicklow or increasing the amount of trains to Wicklow

(ii) Any action taken by ECRIPP to look after the tracks from Greystones to Wicklow from coastal erosion

The decision makers handling your request are Ms. Joanne Whelan, Dave Cannon and Mick Nugent.

We have now made a final decision to part grant your request on 6th September 2024.

Please find response document and schedule of records now attached.

Rights of appeal

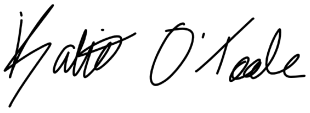
In the event that you are not happy with this decision you can make an appeal in relation to this matter, you can do so by writing to the FOI Unit, Corporate Communications, Iarnród Éireann Irish Rail, Connolly Station, Amiens St, Dublin 1 or by e-mail to foi@irishrail.ie. You should make your appeal within 4 weeks (20 working days) from the date of this notification, where a day is defined as a working day excluding, the weekend and public holidays, however, the making of a late appeal may be permitted in appropriate circumstances.

The appeal will involve a complete reconsideration of the matter by a more senior member of the staff of this body.

Should you have any questions or concerns regarding the above, please contact the FOI Office on [redacted]

Yours sincerely,

PP



Dave Cannon and Mick Nugent, Decision Makers, Iarnród Éireann

IE_FOI_829 Response Doc.

(i)Amount of money spent on Public Relations (in specific Advertisement) from 2020 until 2023

Year	Advertising Spend
2020	€957,994
2021	€1,843,729
2022	€2,722,753
2023	€2,055,755

(iii) Any action taken by ECRIPP to look after the tracks from Greystones to Wicklow from coastal erosion

- ECRIPP is currently at an early stage of the design process and is assessing options that will provide necessary coastal protection works to railway infrastructure
- To date, ECRIPP has conducted topographic surveys, environmental surveys and ground investigations between Greystones and Wicklow. However, no actual coastal protection works have been undertaken as part of ECRIPP.
- ECRIPP will not commence physical coastal defence works ("actions") until the design process is complete, the planning consent (as and if necessary) is approved and funding is provided.
- The public will be consulted at various stages of the optioneering, design and planning process to ensure external feedback is considered to optimise the final coastal protection design.
- ECRIPP's scope is to provide protection to existing railway infrastructure only from coastal hazards.

Freedom of Information Request:
Schedule of Records for IE_FOI_829 : Summary for Decision Making

Record No.	Date of Record	Brief Description	No. of Pages	Decision: Grant/Part Grant/Refuse	Section of Act if applicable	Record Edited/Identify Deletions
1	~	IE_FOI_829 Response Document	1	Grant	~	~
2	05-Apr-24	Wicklow Capacity Enhancements	103	Part-Grant	S37(1)	37. (1) a head shall refuse to grant an FOI request if, in the opinion of the head, access to the record concerned would involve the disclosure of personal information (including personal information relating to a deceased individual).

Signed: Katie O'Toole
Data Protection & Freedom of Information Office

WICKLOW CAPACITY ENHANCEMENTS

PRE-FEASIBILITY REPORT

Iarnród Éireann Infrastructure

NTA
Údarás Náisiúnta Iompair
National Transport Authority

SYSTRA

WICKLOW CAPACITY ENHANCEMENTS

PRE-FEASIBILITY REPORT

IDENTIFICATION TABLE	
Client/Project owner	Iarnród Éireann
Project	Wicklow Capacity Enhancements
Study	Pre-Feasibility Report
Type of document	Final Document
Date	05/04/2024
Reference number	IE01T23B32
Number of pages	104

APPROVAL

Version	Name		Position	Date	Modifications
1	Author	[redacted]	Project Manager	06/02/2024	Final Draft
	Checked by	[redacted]	Project Director	06/03/2024	
	Approved by	[redacted]	Director	06/03/2024	
2	Author	[redacted]	Project Manager	09/03/2024	Final draft, with responses to IE comments.
	Checked by	[redacted]	Project Director	11/03/2024	
	Approved by	[redacted]	Director	12/03/2024	
3	Author	[redacted]	Project Manager	19/03/2024	Final, with further responses to IE comments.
	Checked by	[redacted]	Project Director	20/03/2024	
	Approved by	[redacted]	Director	05/04/2024	

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EXECUTIVE SUMMARY

The Wicklow Capacity Enhancement scheme aims is to improve rail connectivity and support sustainable travel between the City Centre and Wicklow Town. Key objectives of the scheme are to meet increased passenger demand and support decarbonisation, whilst providing value for money. A multi-criteria assessment was used to identify the preferred approach, considering service performance, deliverability, and decarbonisation.

The strategic case for rail service enhancements to Wicklow Town is set out in National Transport Authority's Greater Dublin Area Transport Strategy (GDATS) 2022-2042, including measure RAIL3 – DART Extension, to extend the DART to Wicklow in the lifetime of the Strategy.

The emerging preferred approach for enhancing rail services between Wicklow and Dublin City Centre is to provide 1 train per hour per direction using Battery Electric Multiple Units (BEMUs). This approach aligns with national, regional, and local policy objectives and supports the decarbonisation of rail services. It is in line with the National Investment Framework for Transport Infrastructure (NIFTI) investment hierarchy which priorities optimisation and improvement, over new construction.

1 train per hour per direction using Battery Electric Multiple Units (BEMUs) is anticipated to be the most cost-effective solution to cater for forecast passenger demand at Wicklow and Kilcoole Stations over the next ~15 years. The new BEMU service would have capacity for up to 1,100 passengers, 408 of which is seated. It offers a significant uplift in services throughout the day and could be integrated into the existing timetable and a future DART+ Train Service Specification.

A crowding analysis was used to assess the capacity for 1 train per hour per direction using BEMUs to meet forecast demand at Wicklow and Kilcoole Stations. Passenger demand was estimated using the Passenger Demand Forecasting Handbook (PDFH) method. Its results of 528 additional trips in 2040 AM Peak were consistent with Arklow to Bray Area Based Transport Assessment (GDATS 2022-2042) results of 500 additional trips in the 2042 AM Peak.

The crowding analysis was carried out for 2027 and 2040 AM Peak scenarios. In 2027 AM Peak, it was estimated that 74% capacity is remaining across BEMU and DMU services when trains arrive at Greystones before travelling north towards the City Centre. In 2040 AM Peak, there was 63% capacity remaining across BEMU and DMU services. It is noted regular service frequency to and from Wicklow will help spread demand across the morning and evening peak periods.

This pre-feasibility report explored approaches for enhancing rail services between the City Centre and Wicklow Town, considering potential traction types to provide 1 or 2 trains per hour in each direction. The approaches include extending the electrified network using Electrical Multiple Units (EMUs), operating Battery Electric Multiple Unit (BEMU) trains, or running additional diesel multiple units (DMUs). The relationship between timetabling, service resilience and infrastructure capacity in delivering the approaches was assessed.

This report acknowledges that single line sections of track impose a constraint on service frequency improvements between Wicklow and the City Centre. DART+ Programme proposes a maximum of 3 DART trains per direction per hour between Bray and Wicklow, with DMU Rosslare/Gorey services turning back at Greystones. This is due to the capacity bottleneck associated with the Bray Head

Tunnels section of single track. This constraint has a knock-on effect for approaches associated Wicklow to City Centre services:

- For 1 train per hour per direction, there is scope to build resilience into the timetable. The departure time for Wicklow to City Centre services can include some dwell time to cater for any delays.
- For 2 trains per hour per direction, there is limited scope to build resilience into the timetable even with capacity enhancements in place between Greystones and Wicklow. This performance risk is important to recognise from a customer perspective. There is a tight window for northbound and southbound services to pass as scheduled. Minor delays elsewhere on the network could result in service missing this window. The likely outcome is lengthy delays or cancellations for Wicklow services to maintain wider network performance north of Greystones.

The optimum approach to timetabling and service operations will be identified as part of a subsequent phase of the project, including consideration of the wider rollout and operation of DART+ Fleet, particularly the 2nd Fleet Order of 90 battery-electric carriages. It is envisaged the optimum timetabling solution for Wicklow to City Centre Services will be developed and modelled to take cognisance of timetabling pre and post DART+, possible crowding effects on the corridor, as well as other operational planning studies that may influence preferred timetable operations.

1 train per hour per direction BEMU approach has an indicative CAPEX cost of €56 million including direct and indirect costs but excluding potential land acquisition costs. The BEMU approach assumes the CAPEX cost of rolling stock is borne by DART+ Fleet project, the CAPEX cost of ETCS Level 1 required between Wicklow and Greystones to facilitate operation of BEMU fleet is borne by TPS Trackside National Rollout Project, and the CAPEX cost of accessibility upgrades to both platforms is borne by the Active Travel Bridge (Wicklow Train Station to Port Access Route) Pathfinder project. These projects will need to be integrated to ensure successful delivery of the 1 train per hour per direction BEMU approach.

At Kilcoole Station, works are envisaged to include platform lengthening and station upgrades works to improve passenger facilities and experience.

At Wicklow Station, works are envisaged to include platform lengthening, track reconfiguration, resignalling, power supply and charging facilities, immunisation, and station upgrades works to improve passenger facilities and experience. Station enhancements are proposed at Wicklow Station under the Active Travel Bridge (Wicklow Train Station to Port Access Route) Pathfinder project which has a completion date target of 2025. These enhancements are necessary to support the 1 train per hour per direction BEMU approach.

The infrastructure requirements to deliver 1 train per hour per direction BEMU will be investigated in more detail as part of the Concept, Feasibility & Option Selection Phase. This will include the production of concept designs and feasibility working cost estimates that enable a cost-effective solution which avoids/minimises land acquisition insofar as practicably possible.

INTRODUCTION

1.1 Project Overview

1.1.1 The Project Team has been commissioned by Iarnród Éireann Scope of Services includes the requirement for a Pre-Feasibility Report which is the purpose of this report as Part of Phase 1 of the commission. The report has been prepared in line with IÉ Project Management Guidelines. Within the Phase 2 study the MDC shall determine the infrastructure requirements to deliver the output of Phase 1. For the purposes of pricing, the MDC shall assume that the output of Phase 1 will be a 1 FLU train per hour service and be operated Wicklow Capacity Enhancement Study Scope of Work

1.1.2 The Wicklow Capacity Enhancement Study's aim is to improve public transport connectivity between the City Centre and Wicklow Town to enable more people to travel by sustainable modes along this route; supporting the objectives set by the Project Ireland 2040 and Climate Action Plan.

1.1.3 A significant part of the study is to investigate the feasibility of providing this improved connectivity using heavy rail services. The output of this exercise is to identify an emerging preferred approach to deliver Wicklow Capacity Enhancements, recognising the subsequent need to develop a design for implementation in accordance with the Department of Public Expenditure, NDP Delivery and Reform 'Infrastructure Guidelines' process.

1.1.4 In respect of heavy rail services, the project has two main objectives:

- To determine the optimum fleet type, traction power and operational requirements, including train service specification, to deliver an enhanced service of both 1 and 2 trains per direction per hour between the City Centre and Wicklow Town. Iarnród Éireann will consider Diesel Multiple Units (DMUs), Electrical Multiple Units (EMUs), and Battery Electric Multiple Units (BEMU) Fleet types.
- To determine the infrastructure requirements, estimated cost, programme and delivery strategy, and identification of statutory approvals, to provide the enhanced service from Dublin City Centre to Wicklow Station.

1.1.5 The study is being undertaken within the context of the Transport Appraisal Framework, National Investment Framework for Transport Infrastructure, and Infrastructure Guidelines to ensure any investment proposed aligns with government policy for transport infrastructure investment.

1.1.6 The study takes cognisance of international, regional, and local policies, plans, and objectives.

1.2 Scope of Scheme Pre-Feasibility Report

1.2.1 The Scope of Services states the Scope of Services Phase 1 study shall include a Scheme Pre-Feasibility Report to assess both Fleet Traction and an Operational Timetable as described below:

"Fleet Traction Assessment

The MDC shall conduct an assessment to determine the optimum fleet type and traction type to operate the enhanced services from Dublin City Centre to Wicklow Station. The analysis shall consider DART+ EMU, DART+ BEMU and diesel trains. The MDC shall take the capacity of

the existing electrification into consideration. The study shall also determine the quantity of fleet required to provide both a 1 and 2 Full Length Unit (FLU) train per hour service between the Dublin city centre and Wicklow Station."

"Operational Timetable Assessment

The MDC shall develop operational timetables for running 1 and 2 FLU trains per hour from Dublin City Centre to Wicklow and recommend the proposed frequency. The proposed timetables will consider current and future planned services including the DART+ Train Service Specification. The study will also determine the optimum origin and destination of the services."

1.2.1 In developing the Pre-Feasibility Report, the project team identified the need to broaden the pre-feasibility scope to provide a more robust Scope of Services Phase 1 assessment. As a result, the pre-feasibility study provides consideration of **Network Capacity, Operational Timetabling, Demand Forecasting, Fleet Traction and Benchmark Costs** associated with the provision of 1 and 2 trains per direction per hour between the City Centre and Wicklow Town.

1.2.2 Three approaches are shown in the project scope which are assessed in terms of feasibility:

- Extend the electrified network from Greystones to Wicklow Station to enable EMU DART trains to continue to Wicklow such that they start / terminate here.
- Operate BEMU trains on the DART South Coastal route and extend the current DART services to start / terminate at Wicklow Station, with the train using the power under the overhead lines to Greystones, and battery power for the section beyond to Wicklow Station.
- Run additional diesel trains to supplement the current timetable between the City Centre and Wicklow.

1.2.3 Each approach is considered with respect to existing infrastructure and services as well as planned infrastructure and service enhancements.

1.2.4 There are several ongoing projects which provide context to Wicklow to City Centre Services:

- DART+ Programme, including DART+ Coastal South and DART+ Fleet
- East Coast Rail Infrastructure Protection Programme
- Train Protection System
- Active Travel Bridge (Wicklow Train Station to Port Access Route)

Proposals contained within these projects are considered as part of this study.

1.2.5 Key objectives of the scheme are listed below:

- to cater for increase passenger demand expected to/from Wicklow and Kilcoole Stations to stations northbound towards Dublin City Centre.
- to support decarbonisation of rail services
- to provide value for money in delivering service enhancements

1.2.6 The pre-feasibility report contains a comparison of approaches against these objectives.

1.3 References

1.3.1 Several references were used to support the pre-feasibility report, which are as follows:

- DART+ Coastal South Greystones Capacity Improvements Technical Note D+WP56-ARP-P2-SL-RP-OP-000001
- DART+ Coastal Performance Modelling Results D+WP56-ARP-ZZ-AL-RP-OP-000001
- DART+ Coastal BEMU B2 Substation – SET Preliminary Design Report-D+WP56-ARD-P3-BE-RP-HV-000002-P08
- DART+ BEMU Planning Report D+WP56-ARP-P4-BE-RP-RO-000003
- BEMU Options Study D3422300-JAC-REP-EMF-000001 | P04
- NTA Greater Dublin Area Transport Strategy 2022-2042, including Bray to Arklow Area Based Transport Assessment
- Department of Transport and Department for Infrastructure Draft All Island Strategic Rail Review
- South Eastern Line Capacity Study 2011
- Wicklow County Development Plan 2022-2028
- Wicklow Town & Rathnew Local Area Plan Pre-Draft Issue 2023 and 2013-2019.
- Greystones / Delgany & Kilcoole Local Area Plan 2013 – 2019.

2. RECEIVING ENVIRONMENT

2.1 Introduction

2.1.1 This section sets out the local context for the scheme and local area, including the demographics, socio-economic characteristics, and the existing transport network.

2.1.2 The existing rail line between Dublin and Rosslare is closely aligned with the eastern coastline for much of its length. The section between Pearse Station and Dún Laoghaire is the oldest railway line in Ireland, having opened in the 1830's. Over its almost 200-year history, the rail line has been subject to damage and some realignment due to the direct impacts of coastal erosion.

2.1.3 Wicklow Town is situated along the rail corridor, approximately 48km south of Connolly Station in Dublin City Centre. It is also connected to the Greater Dublin Area by N11/M11 carriageway which caters for vehicular traffic including bus services.

2.1.4 The South East Coast Rail Line (The Line) is a pivotal transport corridor that has been identified as a key enabler of sustainable growth and decarbonisation for the region and towns served. Throughout regional and county development strategies the towns of Bray, Greystones – Delgany, Wicklow – Rathnew and Arklow are identified as Major Towns/Key Settlements with significant growth in population and employment creating the need of an assessment of current transport options to support sustainable development.

2.1.5 The Line forms part of a North South Coastal Corridor which runs from Rosslare Europort in the south, to Dublin City Centre, and onwards to Belfast. It encompasses the electrified DART network currently in operation between Malahide/Howth and Greystones.

2.1.6 South of Bray Station the corridor is single track only which creates capacity constraints. In addition, physical barriers exist with the prominence of Bray Head and the lines coastal route.

2.1.7 A map of the rail corridor between the City Centre and Wicklow Town is shown on the Figure below. The rail corridor is shown by a red line whilst the magenta line shows the N11/M11 carriageway which runs inland in a north south direction.

Figure 1. Map of the rail corridor between the City Centre and Wicklow Town

2.1.8 In November 2021, as part of the Greater Dublin Area Transport Strategy 2022-2042, the National Transport Authority (NTA) commissioned an Area Based Transport Assessment (ABTA) Study for the Bray to Arklow Corridor. The key purpose of an ABTA is to guide the future transport and mobility needs of a scheme area, by considering the transport demand arising from existing and projected development, both within the scheme boundary and the wider area of influence.

2.1.9 The Greater Dublin Area Transport Strategy 2022-2042, through work undertaken on the ABTA, showed the need for public transport improvements along the coastal corridor (rail) and inland corridor (bus).

2.2 Local Context

2.2.1 This section sets out the local context for the scheme and local area, including the demographics, socio-economic characteristics, and the existing transport network.

2.2.2 The study area includes Electoral Districts between the M11 corridor and the coast including Delgany, Greystones, Kilcoole, Newcastle Lower, Wicklow Urban and Wicklow Rural as shown on Figure 2 below.

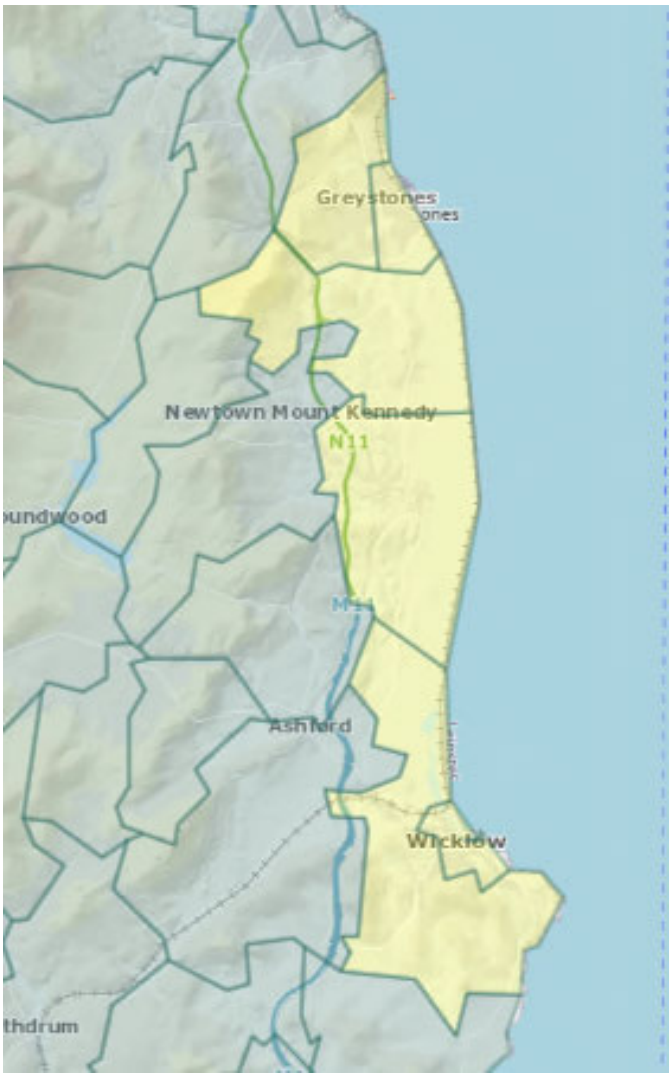


Figure 2. Map of the study area

Demographics

2.2.3 The population of the study area is focused on the EDs of Delgany, Greystones, Kilcoole, Newcastle Lower, Wicklow Urban and Wicklow Rural.

2.2.4 The county of Wicklow's population increased by 9.4% between the 2016 and 2022 Census, increasing from 142,425 to 155,851.

2.2.5 Recent population growth for EDs in the study area is shown in Table 1 below.

Table 1. Recent Population Growth (Source: 2022 Census)

Electoral District	2016	2022	Growth Absolute	Growth %
Wicklow Rural	8,163	10,247	2,084	25.5%
Wicklow Urban	6,762	7,102	340	5.0%
Kilcoole	10,731	12,163	1,432	13.3%
Delgany	5,980	7,707	1,727	28.9%
Greystones	7,258	8,137	879	12.0%
Newcastle Lower	2354	2472	118	5.0%
Wicklow County	142,425	155,851	13,426	9.4%

2.2.6 As shown in **Error! Reference source not found.**, the population growth across the electoral districts has been uneven. The highest growth is experienced in Delgany at 28.9% whilst strong growth is also recorded in Wicklow Rural of 25.5% which encompasses part of the Rathnew area.

2.2.7 The demographic profile of the areas is shown below at their ED level based on the 2022 Census showing the split across broad age categories. Table 2 shows that across all areas the population under 24 is above 25%, rising to approximately 37.3% in Wicklow Rural (encompassing Rathnew). This figure is almost 10% higher than that of Wicklow Urban, the town centre, showing the elevated levels of suburban growth around the town. These differences are continued across age profiles with Wicklow Urban having a higher proportion of over 55's at 32.4% compared to for Wicklow Rural at 19.6%.

2.2.8 Between the two Wicklow ED's variance within working age groups is less acute with similar trends of the highest proportion in the 35 – 44 age category and lowest in 25 – 34 group. Wicklow Rural has a combined higher percentage between 25 – 55 at 43.1% with Wicklow Urban standing at 39.7%. These age groups can be used as an indicator of the long-term travel demand of areas as their populations grow in overall terms and in relation to working age commuters as youthful towns populations mature.

Table 2. Demographic age characteristics. (Source: Census 2022)

	AGE GROUP					
ED	0 – 24	25 – 34	35 – 44	45 – 54	55 – 64	65+
Wicklow Rural	37.3%	9.6%	18.3%	15.2%	9.5%	10.1%

	AGE GROUP					
Wicklow Urban	27.8%	11.1%	14.9%	13.7%	14.2%	18.2%
Kilcoole	35.4%	10.3%	19.4%	16.5%	8.4%	10.1%
Delgany	35.3%	8.5%	17.7%	15.3%	10.2%	13.0%
Greystone	29.7%	8.9%	12.6%	14.2%	14.2%	20.4%
Newcastle Lower	32.2%	9.6%	13.5%	14.1%	14.4%	16.2%

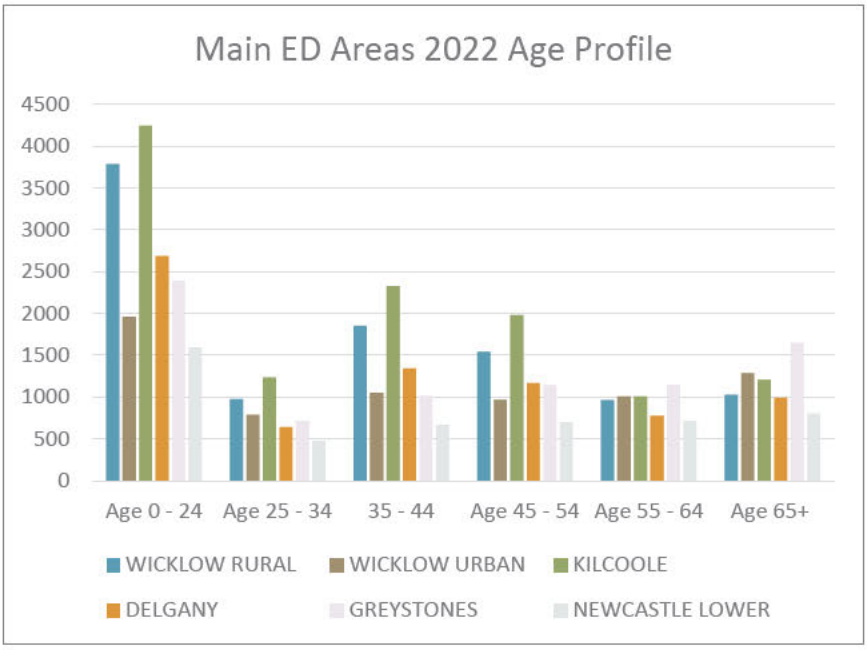


Figure 3. Age Profile (Source: Census 2022)

Socio-economic Characteristics

2.2.9 In the 2013 Wicklow Town – Rathnew Local Area Plan (LAP), the area was classified as an anchor for regional enterprise with significant scope to develop into a major employment zone. The town centre provides an elevated level of services for local and hinterland residents as far as Roundwood with employment also in tourism related services. The major sectors of the area include manufacturing, public administration, and education. Industrial activity takes place at Wicklow Harbour in the form of port functions with business parks including Rathnew and The Village Mill Enterprise Park; the location of light manufacturing.

2.2.10 POBAL data based on the 2022 Census classifies Wicklow Urban ED as Marginally Below Average with a rating of -4.49, with the surrounding area of Wicklow Rural achieving a Marginally Above Average with a 2.76 rating. This shows that while the town does offer prominent level of services and strong employment zones the demographic profile and income levels are below the national average.

2.2.11 Greystones, Delgany and Kilcoole are split across three ED zones with lowest class of Marginally Above Average for Kilcoole with a 6.55 rating, this rises to 9.21 for Greystones. Delgany ED has the highest rating of 10.11 and is classed as affluent, the ED does include some residential estates within Greystones.

2.2.12 The Wicklow County Development Plan notes that the strategic location of Greystones on the DART line close to Dublin results in limited employment opportunities which centre on providing services and amenities for the large and growing population. The Greystones – Delgany – Kilcoole 2013 – 2019 Local Area Plan noted the importance of developing industry at the local level to expand the town's economic base and reduce the need to commute. It highlights the potential of attracting investment in areas of technology manufacturing, pharmaceuticals, distribution and warehousing and light industry to capitalise on the benefits of having a large highly skilled local labour pool.

2.3 Existing Transport Network and Travel Behaviours

2.3.1 This section looks at the existing transport network and people's travel behaviours.

2.3.2 The 2022 Census revealed a continued trend for working from home due to the aftereffects of the Covid-19 pandemic. Alongside this, the mode share for commute travel remains in favour of car over public transport and active modes (see Table 3). For Wicklow in particular, the mode share by train is just 3.5%.

Table 3. Means of travel to work (Source: Census 2022)

TOWN	MODE	PERCENTAGE
Wicklow	On foot	9.6%
	Bicycle	1.0%
	Bus, minibus, or coach	4.0%
	Train, DART, or LUAS	3.5%
	Motorcar – driver	65.3%
	Motorcar -passenger	5.1%
Greystones-Delgany	On foot	4.8%
	Bicycle	1.1%
	Bus, minibus, or coach	5.1%
	Train, DART, or LUAS	11.1%
	Motorcar – driver	63.6%
	Motorcar -passenger	2.9%

TOWN	MODE	PERCENTAGE
Kilcoole	On foot	19%
	Bicycle	2%
	Bus, minibus, or coach	10%
	Train, DART, or LUAS	5%
	Motorcar – driver	42%
	Motorcar -passenger	23%

Walking and Cycling

2.3.3 Kilcoole Train Station is situated on Kilcoole Beach, parallel to the coastline. The village of Kilcoole is 1.6 kilometres from the station. It is a 20-minute walk from the village to the station and there are no dedicated footpaths for approximately 750m of the route and the carriageway is not wide enough for two cars to pass next to a pedestrian walking.

2.3.4 The walking catchment for the Kilcoole Train Station is shown in the following figure, which shows the area that can be covered within 5, 10 and 15 minutes.

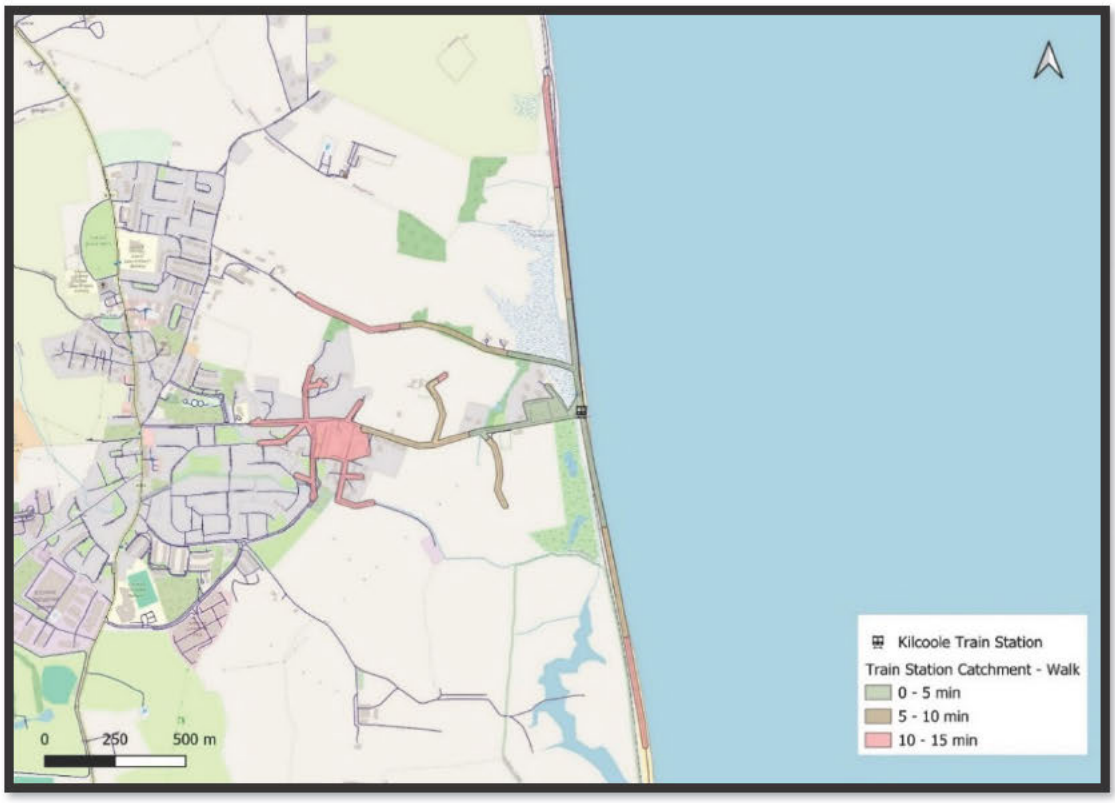


Figure 4. Kilcoole Train Station Walking Catchment

2.3.5 As shown in the map above, the access by is limited to the coastline and the sea road. There are very few people living within the 5-minute walking catchment, which is limited to the Sea Road and approximately 250 metres of Ballydonarea Lane. The 10-minute catchment for walking is also limited to 400 metres of the sea road and Greyfort. The 15-minute catchment for walking does not include the Town Centre, ends on the outskirts of the town, and includes the roundabout for Holywell Avenue, Meadowbrook, and the School, St Josephs.

2.3.6 The cycle catchment is also shown in the following figure for the same times as the walking figure, 5, 10 and 15 minutes. There are no dedicated cycle facilities to access the station and three Sheffield stands for bicycle parking.

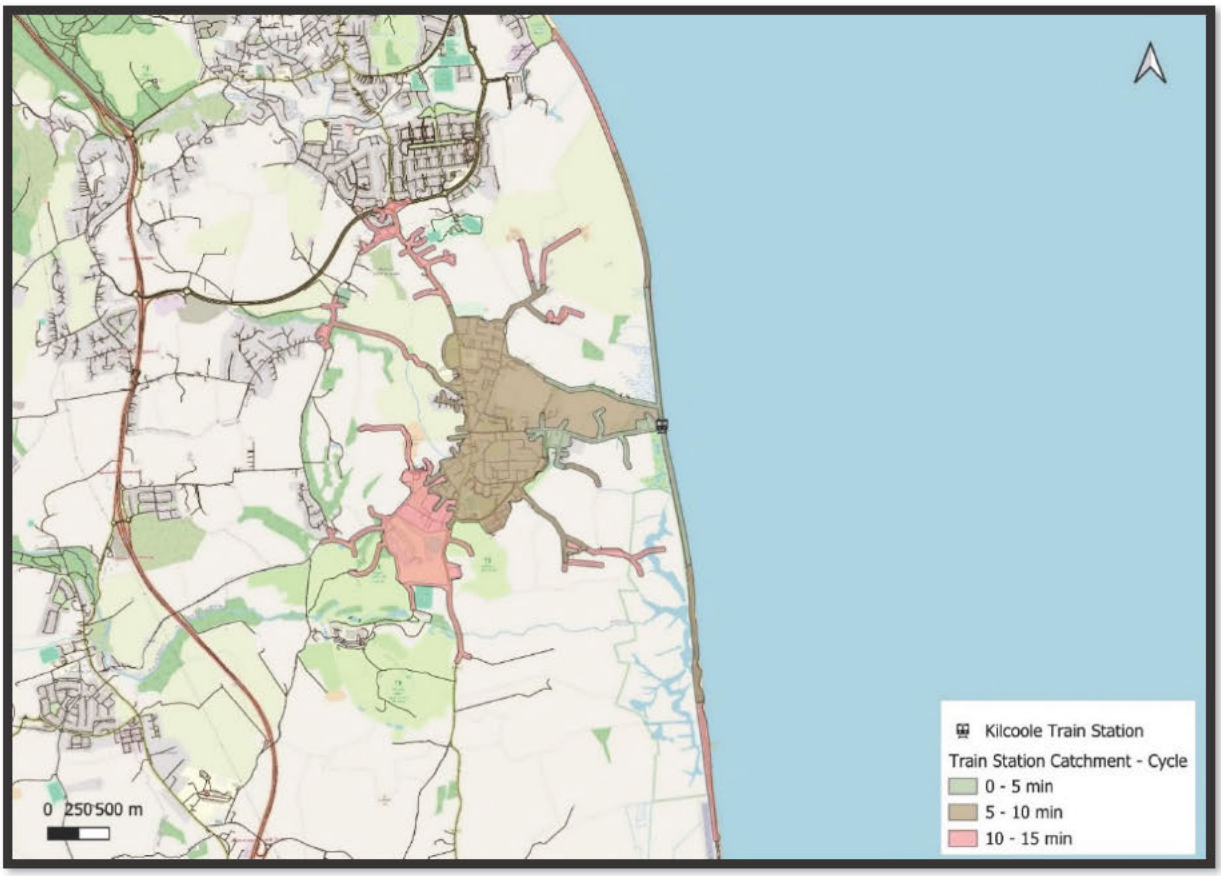


Figure 5. Kilcoole Train Station Cycle Catchment

2.3.7 As shown in the figure above, the cycle catchment for Kilcoole Train Station spans a wider area than the walking catchment. It is possible to cycle from Greystones Driving Range to the train station within 15 minutes. Priory Road, Kilquade Road, and Druids Golf Course are all within the 15-minute catchment, as to are the housing estates within this location and the town centre. Newcastle Airfield is also within this catchment along the coastline.

2.3.8 The following figure shows the current walking catchment for Wicklow Town Train Centre. It shows the distance that can be covered within 5, 10 and 15 minutes from the train station.

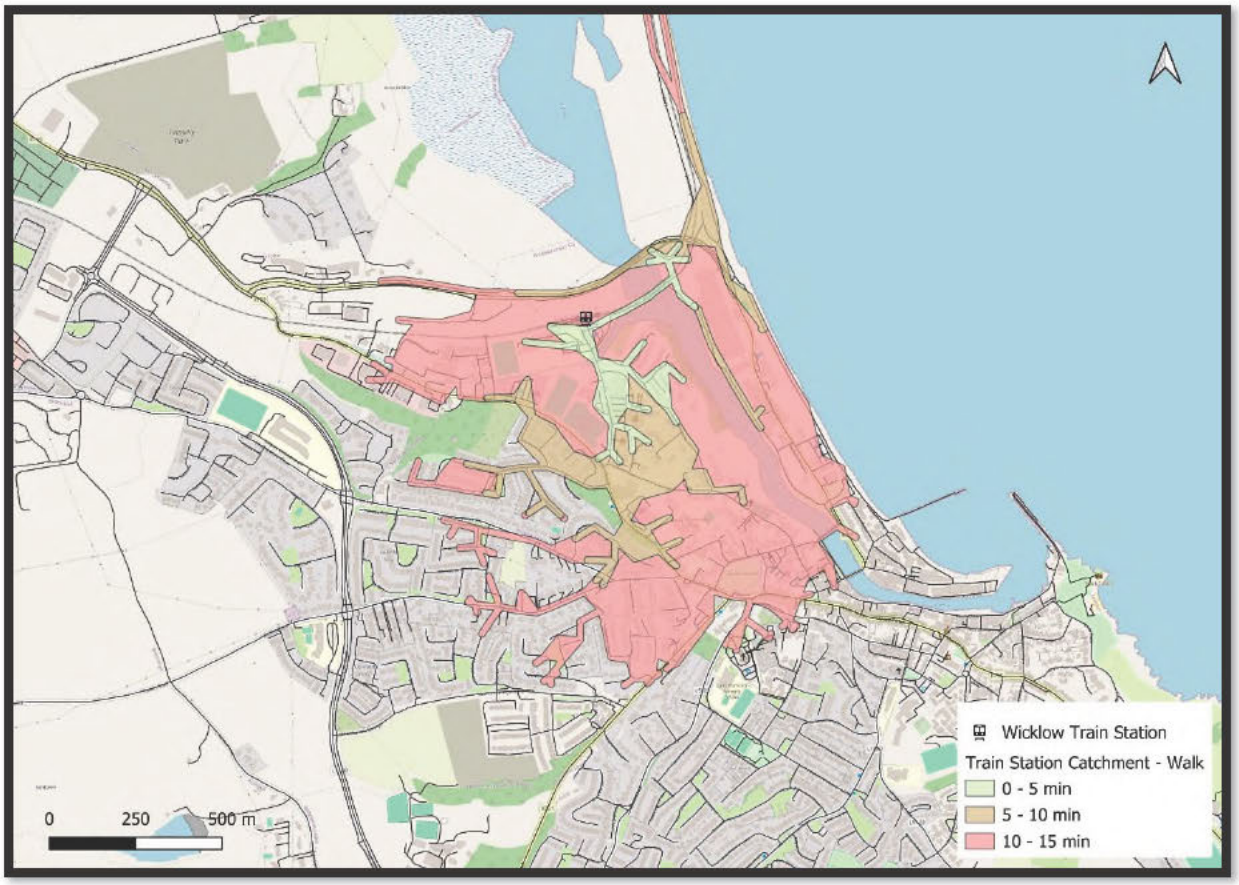


Figure 6. Wicklow Train Station Walking Catchment

2.3.9 Wicklow Town Station is situated on Station Road. There is a dedicated footpath along Station Road from the south of the station which connects to a wider footpath network.

2.3.10 As shown in the figure above, access to the North of the train station is extremely limited due to restricted access from the R999 Wicklow Port Access Road. Although this road is next to the station, it would take 10 to 15 minutes to walk to the station from this location. The catchment area for walking shows that most of this area can only be reached between 10 to 15 minutes. There are only small areas that are within the 0-to-5-minute catchment and the 5-to-10-minute catchments.

2.3.11 The following figure shows the current cycling catchment for Wicklow Town Train Centre. It shows the distance that can be covered within 5, 10 and 15 minutes from the train station. There are no dedicated cycle facilities on Station Road to access the station and there is a mix of on-road advisory and off-road part shared facilities on the adjoining road network; these facilities would not align with National Cycle Manual guidance. There are 9 Sheffield stands for bicycle parking at the Station.

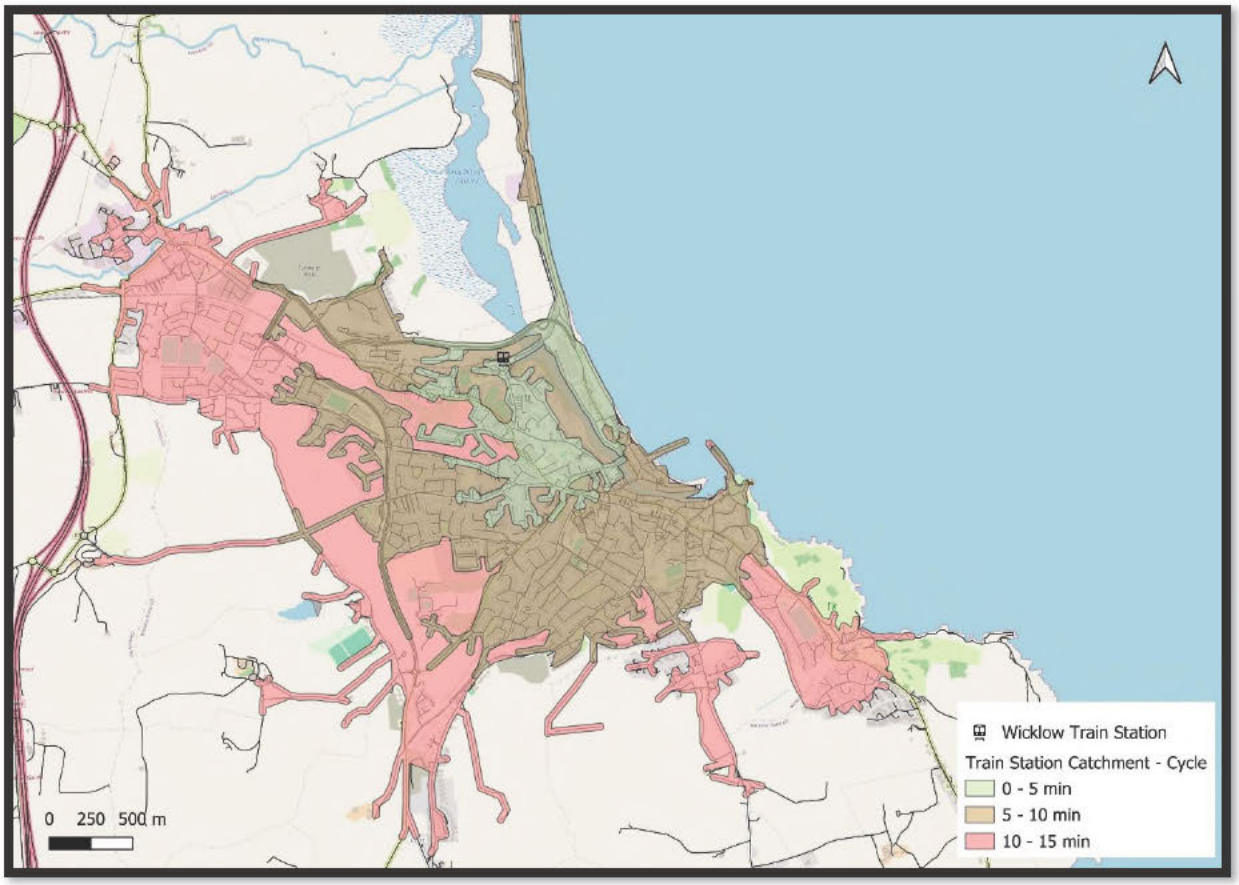


Figure 7. Wicklow Train Station Cycling Catchment

2.3.12 As shown in the figure above, the cycling catchment area is larger than the walking catchment shown previously. The issue is still the same as the current walking infrastructure, access from the North of the train station is limited and areas near the station take 5 to 10 minutes to reach the station cycling. There are dedicated two-way cycle facilities in both directions on R999 Wicklow Port Access Road.

Rail

2.3.13 Most towns are served by rail links with stations situated in or next to the respective town centre. The exception is the area of Newtownmountkennedy which does have direct bus routes to Greystones DART station.

2.3.14 The area of Greystones – Delgany benefit from the availability of DART services with operational frequency of two services an hour with journey times of 50 minutes from Wicklow to Dublin. Weekdays journey times to Dun Laoghaire and the city centre are approximately 30 and 55 minutes respectively with Howth/Malahide reached in 80 minutes.

2.3.15 Services to and from Wicklow and further south are currently more limited. As shown below in Figure 8, from Wicklow on a typical weekday there are:

- Towards the City Centre, there are two DMU services originating from Gorey and four originating from Rosslare Europort across the day. All six services stop at

Wicklow Station but only four services stop at Kilcoole Station. Both Wicklow Station and Kilcoole Station are served by trains that reach Connolly Station at 07:48 and 08:46 in the morning.

- Towards Rosslare, there are six DMU services across the day that all start in Connolly. All six services stop at Wicklow Station but only four services stop at Kilcoole Station. Both Wicklow Station and Kilcoole Station are served by two trains leave Connolly at 16:33 and 17:33 in the evening.

		Luan go hAoine Monday to Friday					
STÁISIÚN UÍ CHONGHAILE	Ime						
DUBLIN CONNOLLY	Dep	09:33	13:33	16:33	17:33	18:35	20:05
Sráid na Teamhrach	Ime						
Tara Street	Dep	09:36	13:36	16:36	17:36	18:38	20:08
Stáisiún na bPiarsach	Ime						
Pearse	Dep	09:39	13:38	16:38	17:39	18:40	20:10
Stáisiún Uí Mhealláin, Dún Laoghaire	Ime						
Dun Laoghaire (Mallin)	Dep	09:58	13:58	16:59	17:59	19:00	20:30
Stáisiún Uí Dhálaigh, Bré	Ime						
Bray (Daly)	Dep	10:22	14:22	17:22	18:22	19:21	20:52
Na Clocha Liatha	Ime						
Greystones	Dep	10:32	14:32	17:32	18:32	19:32	21:02
Cill Chomhghaill	Ime						
Kilcoole	Dep	..	..	17:37	18:37	19:36	21:07
Cill Mhantáin	Ime						
Wicklow	Dep	10:47	14:47	17:49	18:49	19:48	21:18
Ráth Droma	Ime						
Rathdrum	Dep	10:59	14:59	18:03	19:05	19:59	21:29
An tInbhear Mór	Ist						
Arklow	Arr	11:14	15:14	18:17	19:21	20:14	21:45
Gualre	Ist						
Gorey	Arr	11:27	15:27	18:30	19:34	20:27	21:59
Inis Córthaidh	Ist						
Enniscorthy	Arr	11:47	15:47	18:55	19:55	20:47	..
STÁISIÚN UÍ ANNRACHÁIN, LOCH GARMAN	Ist						
WEXFORD (O'HANRAHAN)	Arr	12:08	16:08	19:17	20:17	21:10	..
STÁISIÚN UÍ ANNRACHÁIN, LOCH GARMAN	Ime						
WEXFORD (O'HANRAHAN)	Dep	12:09	16:09	19:18	20:19	..	..
Trá Ros Láir	Ime						
Rosslare Strand	Dep	12:26	16:27	19:36	20:37	..	..
EUROPORT ROS LÁIR	Ist						
ROSSLARE EUROPORT	Arr	12:31	16:33	19:41	20:42	..	..

		Luan go hAoine Monday to Friday					
EUROPORT ROS LÁIR	Ime						
ROSSLARE EUROPORT	Dep	..	05:35	07:20	12:55	17:30	..
Trá Ros Láir	Ime						
Rosslare Strand	Dep	..	05:40	07:26	13:01	17:36	..
STÁISIÚN UÍ ANNRACHÁIN, LOCH GARMAN	Ist						
WEXFORD (O'HANRAHAN)	Arr	..	05:57	07:43	13:18	17:53	..
STÁISIÚN UÍ ANNRACHÁIN, LOCH GARMAN	Ime						
WEXFORD (O'HANRAHAN)	Dep	..	05:59	07:45	13:20	17:55	..
Inis Córthaidh	Ime						
Enniscorthy	Dep	..	06:20	08:05	13:40	18:15	..
Gualre	Ime						
Gorey	Dep	05:50	06:43	08:25	14:00	18:37	22:10
An tInbhear Mór	Ime						
Arklow	Dep	06:03	06:58	08:38	14:13	18:50	22:23
Ráth Droma	Ime						
Rathdrum	Dep	06:21	07:16	08:54	14:29	19:05	22:40
Cill Mhantáin	Ime						
Wicklow	Dep	06:33	07:31	09:05	14:46	19:16	22:51
Cill Chomhghaill	Ime						
Kilcoole	Dep	06:43	07:41	09:16	..	..	23:02
Na Clocha Liatha	Ime						
Greystones	Dep	06:48	07:48	09:21	15:00	19:32	23:07
Stáisiún Uí Dhálaigh, Bré	Ime						
Bray (Daly)	Dep	07:00	07:59	09:32	15:10	19:43	23:16
Stáisiún Uí Mhealláin, Dún Laoghaire	Ime						
Dun Laoghaire (Mallin)	Dep	07:21	08:20	09:49	15:30	20:00	23:32
An Charraig Dhubh	Ime						
Blackrock	Dep	07:27	08:27	..	..	..	..
Bóthar Lansdún	Ime						
Lansdowne Road	Dep	07:36	08:36	..	..	..	..
Dug na Canálach Móire	Ime						
Grand Canal Dock	Dep	07:39	08:39	..	..	..	..
Stáisiún na bPiarsach	Ime						
Pearse	Dep	07:42	08:42	10:12	15:51	20:22	23:48
Sráid na Teamhrach	Ime						
Tara Street	Dep	07:44	08:44	10:14	15:53	20:25	23:50
STÁISIÚN UÍ CHONGHAILE	Ist						
DUBLIN CONNOLLY	Arr	07:48	08:46	10:18	15:56	20:29	23:55

Go Dún Dealgan To Dundalk

Figure 8. Train timetables (Source: Irish Rail)

2.3.16 As shown in Figure 8 these train services are more concentrated to the peak hours. The journey time between Wicklow to Dublin is approximately 50minutes.

2.3.17 Rail passenger demand on the South East DART South services grew strongly between 2014 and 2019 at all stations between Bray and Wicklow Town, based on data from the annual IÉ rail census. The Table below shows the combined station boardings and alightings at each station.

Table 4. Rail Census Boardings and Alightings

STATION FOOTFALL (BOARDING & ALIGHTINGS), CENSUS DAY	2014	2015	2016	2017	2018	2019	2022	2023	*2019-2023*
Bray	5,570	5,794	6,364	7,704	7,378	6,798	6,203	6,799	0%
Greystones	3,021	3,581	3,670	4,769	4,522	4,361	3,225	3,340	-23%
Kilcoole	58	120	48	192	101	124	59	78	-37%
Wicklow	314	342	349	503	564	462	298	370	-20%

2.3.18 Rail Census 2017 recorded the highest passenger numbers across the four stations of any year.

2.3.19 The rail census was not undertaken in 2020 due to COVID-19 and the 2021 figures have not been reported here due to the significant disruption to travel caused by the pandemic.

2.3.20 Rail Census 2022 pointed to a recovery from the pandemic period but reflected the subdued return to commuting.

2.3.21 Rail Census 2023 figures show a greater return to rail travel. Passenger numbers at Bray are back to 2019 pre-pandemic levels, Greystones at 77%, Kilcoole at 63% and Wicklow at 80%.

2.3.22 In mid-2023, additional late evening return services were announced between Gorey and Connolly Station, serving Wicklow Town which are expected to assist in meeting the latent demand along the corridor.

Bus

2.3.23 Growth in the town population has seen the creation of a bus network, with services provided by both public and private operators. The main provider for city centre services from Wicklow is the 133 Bus Éireann route along the N11 corridor, incorporating a radial loop around Wicklow town to serve residential areas. There are also deviations from the N11 to serve Ashford, and Newtownmountkennedy with a peak hour journey time of 90 mins to UCD and 2 hours to Busáras from Wicklow. This service passes Station Road in Wicklow Town. A new service, Route 131, provides the first dedicated local bus service between Bray and Wicklow town, with 112 departures each way per week, connecting passengers with DART services at Bray. The 133 and 131 services run along the R750 to the south of Station Road near Wicklow Station. The bus stops are up to 700m from Wicklow Station.

2.3.24 In addition, the 740A Wexford Bus from Gorey serves Wicklow Town and Rathnew with one stop in each location and an additional stop at Kilmacanogue before continuing through South Dublin to the City Centre and Dublin Airport. Peak hour journey times on this route from Wicklow is 60 minutes to UCD, 75 mins to Custom House and 100 mins to Dublin Airport.

2.3.25 Dublin Bus offers two services in the study area, the 145 from the south of Bray through the town core to the city centre and Heuston station via Cabinteely and Donnybrook with a peak hour journey time of 1 hour to UCD and 80 mins to the city centre. Another service, the 84, operates from Newcastle to Blackrock passing through Kilcoole, Greystones and Bray providing connectivity between the towns with an end-to-end journey time of 90 minutes. Go Ahead route 184 provides connections from Newtownmountkennedy to Kilpedder, Greystones (DART Station) and Bray with full length peak hour journey time of 55 mins. The 84-bus stop on Sea Line Road is approximately 750m from Kilcoole Station and there are no dedicated footpaths on Sea Road between them.

2.3.26 In addition, extensive local link services provide connections between smaller settlements of Redcross and Brittas to Arklow/Wicklow, and from Rathnew/Newtownmountkennedy to Nutgrove and Blanchardstown shopping centres. The 183 Arklow to Sallins Route serves Wicklow Train Station 4 times a day Monday-Sunday.

Private Car

2.3.27 All major towns along the north-south corridor benefits from multiple access points to the N11 corridor via regional or local roads that offer different route options that can be selected based on traffic volumes or origin- destination points. Peak hour congestion on the N11 corridor is guided by a car mode share of 65.3% for County Wicklow reported in the 2022 Census (Table 2) with access routes in the north of the study area closest to Dublin also affected resulting in significant journey delays. Figure 9 below shows a breakdown of car journey times to trip attractors in the area and shows that Wicklow to Dublin City has a considerable journey time, despite having a close location to the N11.

Figure 9. Car journey times (Source: Google Maps Traffic Data Weekday Avg.))

TOWN	DUBLIN CITY
Greystones	68
Kilcoole	65
Wicklow Town	90

2.3.28 The journey time by rail to Dublin City Centre from Station to Pearse Street is typically 60-70mins for Wicklow, 60mins for Kilcoole and 52 minutes for Greystones.

2.3.29 Park and Ride is possible at Wicklow Town and Kilcoole Stations, and there are ticket machines at both stations.

2.3.30 The train station in Wicklow Town has 73 parking spaces with parking charges in place. Four of the spaces are for accessible users. Its average occupancy is 42% which indicates some capacity to serve latent demand in the wider catchment.

2.3.31 The train station in Kilcoole has close to 30 parking spaces, the majority of which are unmarked, and parking is free. Two of the spaces are for accessible users.

3. EXISTING RAIL CORRIDOR CONSIDERATIONS

3.1 Introduction

3.1.1 The existing infrastructure between the City Centre and Wicklow Town is described in this section. The description reflects findings in an earlier study undertaken by Iarnród Éireann/NTA's South Eastern Line Capacity Study prepared in 2011 by the New Works Department.

3.1.2 A quail map of existing infrastructure along the corridor is shown on the Figure below to illustrate the receiving rail corridor. A new station is under construction at Woodbrook between Shankill and Bray Stations which is not currently shown on the quail map.

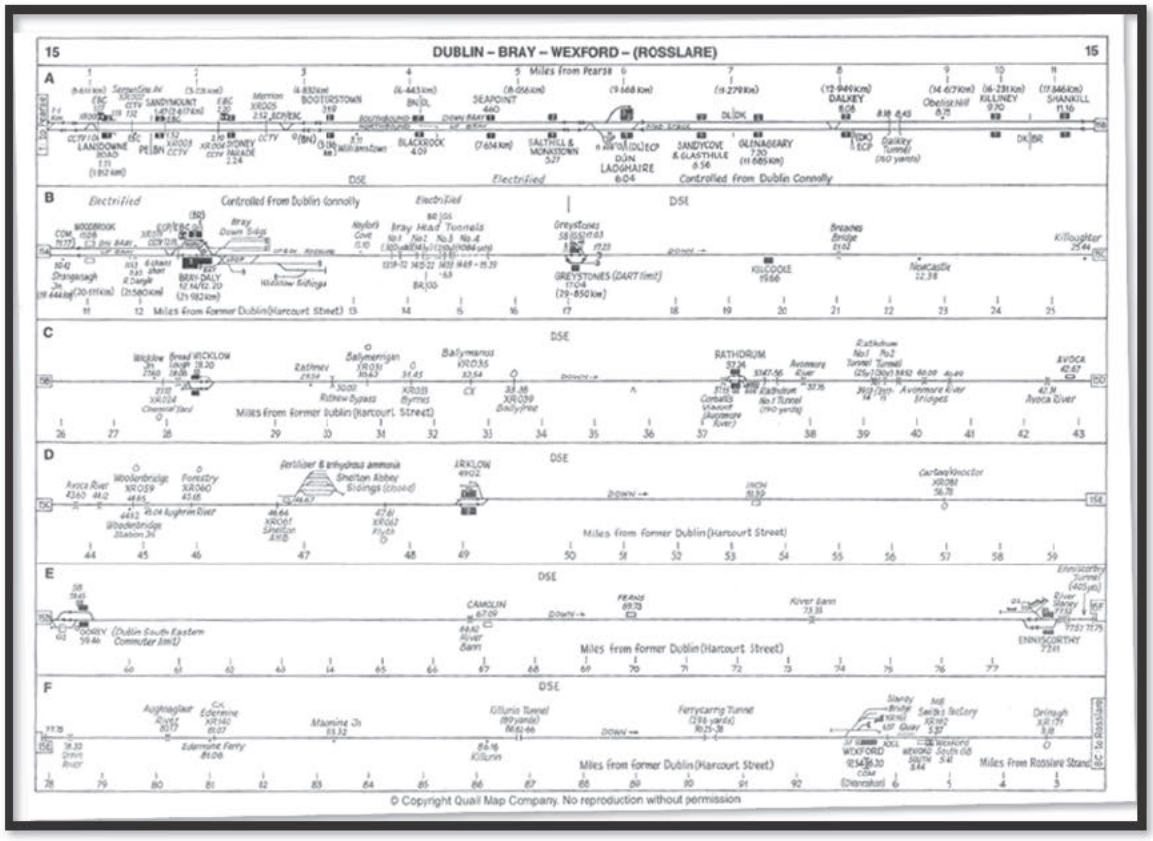


Figure 10. Quail Map for Dublin to Rosslare South Eastern Line

3.2 City Centre to Bray

3.2.1 A summary of City Centre to Bray infrastructure is described below.

- This section consists of electrified double track. It runs through built up residential and commercial areas, with sections on the coast and through cutting. There are several major level crossings along the route at Lansdowne Rd., Serpentine Ave., Sandymount Ave., Sydney Parade, Merrion Gates and Bray. These are all manually controlled CCTV crossings.

- Connolly to Bray (DART area) has a maximum line speed limit of 60mph, with some lower restrictions. This is a sufficient maximum speed given the density of stations the route which restrict opportunities for achieving higher maximum speeds. Outer suburban/Intercity services will also be restricted in the maximum speed they can achieve by the density of DART stopping services on the route.
- At Bray Station, there are constraints to operations and achievable speeds within and adjacent to the station, with the track layout at the south end of the station being a known operating constraint.

3.3 Bray – Greystones Station

3.3.1 A summary of Bray to Greystones infrastructure is described below.

- The railway becomes single track immediately south of Bray station, before routing around Bray Head and through four tunnels (Bray Head Tunnels).
- Between Bray station and the Bray Head Tunnels the single track is constrained with single span bridges, clearances to properties and a steep topography with the railway running through cutting and along embankments, making twin tracking this section challenging and costly.
- Bray to Greystones varies between 40mph and 60mph. This is dictated by curvature and the permitted speeds through the Bray Head tunnels.
- A second line around Bray Head for additional track requires new tunnels or a new alignment.
- Approximately 2.5km north of Greystones station is the southern end of the Bray Head Tunnels, where the single-track returns to the surface and continues as a single track until just north of Greystones Station. Through this area, there are some pinch points with existing properties, a level crossing at Rathdown Road and existing bridges.
- Greystones station has two platforms, and a stabling siding to the south of the station.

3.3.2 A photo of the Bray to Greystones corridor is shown on the Figure below. It demonstrates the constrained nature of the route.

Figure 11. A photo of the route between Bray and Greystones

3.4 Greystones Station – Wicklow Station

3.4.1 From Greystones to Wicklow the line is single track and runs predominantly adjacent to the coast, with rock revetments and sand dunes defining the boundary between the railway and the foreshore. For the last kilometre into Wicklow the line veers gradually inland before taking a sharp curve into Wicklow station.

3.4.2 The Greystones to Wicklow line speed is 70mph with a 45mph speed restriction on approach to Wicklow station in the Down line direction and speed restrictions of 30mph through the Wicklow Down Mainline and20mph through the Wicklow Up Loop.

3.4.3 This section of the route contains Kilcoole Station. A map of Kilcoole Station and its surrounding are shown on the Figure below.

Figure 12. Map of Kilcoole Station (Google Maps)

3.4.4 A summary of Greystones Station to Wicklow Station infrastructure is described below.

- South of Greystones Station the track returns to a single-track layout, but there is an existing siding on the western side of the mainline. This siding ends just prior to an existing underbridge that is only wide enough to allow the single mainline track to cross.
- The corridor runs between recreational amenities to the west and the coast to east for approximately 1km south of Greystones Station.
- As the route moves further south, the corridor narrows and is confined between the beach and rock revetments or sand dunes to the east, as well as private lands to the west.
- A large area between Greystones and Wicklow Town is designated as a Special Area of Conservation by National Parks and Wildlife Service (NPWS) and it includes the Murragh Special Protection Area.
- Kilcoole Station is a single-track station with a platform of approximately 130m in length, adjacent to rock revetments. At the south end is a pedestrian level crossing meaning platform lengthening to the north to achieve the required 174m in length is preferrable.

- There are 8 unattended level crossings along the corridor. Three of the crossing points provide well used routes for the public accessing the seaside at the L5065 Blackditch 5 Mile Point Bay Beach, Kilcoole Station and Sea Road (Old Newcastle Station).
- South of Kilcoole Station, there is a track bridge that only allows for a single track to cross, any modifications are required to take place in an area of special conservation.
- On the approach to Wicklow Station, the railway passes under the R999, so any proposals need to consider the clearances in this area.
- Given the narrow corridor between private lands on the west and coast on the east, the ability to double track and provide passing loops needs to carefully consider availability of land; particularly given the need for coastal protection measures.
- There are 8 unattended level crossings along the corridor. Three of the crossing points provide well used routes for the public accessing the seaside at the L5065 Blackditch 5 Mile Point Bay Beach, Kilcoole Station and Sea Road (Old Newcastle Station).
- The line speed for the corridor is 70mph. There are some permanent line speed restrictions close to Wicklow Town as shown on the Figure below.

SCHEDULE OF PERMANENT SPEED RESTRICTIONS

Line	Between	Trains to which Restriction apply	MILEAGE		GENERAL SPEED RESTRICTIONS		LOCO HAULED SPEED RESTRICTIONS	
			From	To	Miles per Hour	Km per Hour	Miles per Hour	Km per Hour
Greystones to Rosslare Europort	Maximum line speed limit subject to lower limits set out below	Down	-	-	70	110	201 class may operate normally at the speeds shown in adjacent column	
			Mileage includes 17 1/4 - 92 3/4 (Greystones - Wexford) 6 1/4 - 0 (Wexford -Rosslare Strand) 110 3/4-114 (Rosslare Std.-R'lare E'port)					
	Greystones to Wicklow	Down	27 1/2	27 3/4	45	70		
	Through Wicklow Down Main	Down	27 3/4	28 3/8	30	50		
	Through Wicklow Up Loop	Down	28 1/8	28 3/8	20	30		
	Wicklow to Rathdrum	Down	36 1/8	37	65	105		
	Wicklow to Rathdrum	Down	37	37 1/8	45	70		
	Through Rathdrum	Down	37 1/8	38	30	50		

Figure 13. Permanent Speed restrictions

3.5 Wicklow Station and Surrounding Area Constraints

3.5.1 Wicklow station has two platforms and a loop siding. Trains are regularly scheduled to pass here.

3.5.2 A map of Wicklow Station and its surrounding area is shown on the Figure below.

Figure 14. Map of Wicklow Station (Google Maps)

3.5.3 A summary of Wicklow Station infrastructure and its surrounding environs is described below and with an aerial view of the station shown on the Figure below.

Figure 15. Aerial View of Wicklow Station

- The **Kala Wicklow** nature reserve lies south of the track and east of the station.
  - Given the proximity to the station and car park, it is unlikely any further land could be accessed in this area.

- The **Iron Bridge** sits approximately 150m east of the station.
  - On a curve with single track and no space to double track.
  - The bridge abutments extend to the north which may allow some widening, but it does not appear sufficient to accommodate an additional track without major engineering works.

- The **existing siding** to the northeast of the station is approximately 100m long.
  - As shown above, extending this over the Iron Bridge seems an unlikely solution given cost and clearance issues, not to mention the requirement for the buffer stop to fall on straight track, which would meaning that the siding should be likely be extend fully across the bridge to the northeast side of the River Vartry.

- The existing platforms are approximately 130m in length, from top of ramp to top of ramp at either end.
  - For two coupled 5-car units a platform length of 174m is needed, so the platforms will need to be extended.

- To extend towards the east, the short siding is lost, and it is likely a bespoke turnout is required on curved track as well as the curving of the platform at the eastern end.
- If the platforms are extended to the west, the platforms could remain straight, however, the turnout to the west of the station would ideally need to move to the west and may end up on a curve, needing to become bespoke, or end up even further to the west.

- The existing platforms appear quite narrow at approximately 3.5m.
  - It is necessary to assess if the platform widths are suitable for forecasted passenger numbers and whether there is sufficient room to install the required charging infrastructure, i.e., OHLE masts.
  - Platform widening may be required if their width is considered insufficient to cater safely for passenger demand.
  - The track geometry and Points and Crossings (P&C) around the platforms need to be considered when extending the platforms
  - The turnout to the east of the station appears to be on a curve and thus bespoke. This curve appears to extend approximately 30m into the platform from the eastern end. Ideally, given the custom nature of this area, it would be left as is.
  - The western end of the station is on tangent track, including the turnout west of the platforms. Just west of this P&C it does appear that the track starts to curve, which will have impacts on the platform extensions as well as the proposed new siding.
  - The station, based on CCE-TRK-GDN-033 Schedule of Gradients for I.E. Permanent Way Rail Network, is on an approximate 1:500 gradient which is the maximum for sidings, however, west of the station the gradient increases to 1:100. This needs to be considered if a new siding is placed to the west.

- The current double tracking is only through the platform area, so given the platforms would need extending, the double tracking would also.
  - Track currently reverts to single track approximately 23m from the top of platform ramp at the east end of the station, and 35-40m from the top of platform ramp at the west end of the station.

- Existing bridges west of the station: there are two existing bridges west of the station, one is likely to be a services bridge, traversing the single track located approximately 195m west of the platforms. The clearance below this bridge for a second track needs to be considered. There is also a second bridge which is an underbridge approximately 510m west of the station that is quite narrow with just enough room for the single track to pass over it. The aim should be to keep any alterations east of the underbridge and avoid the services bridge.
  - There would need to be consideration regarding the impacts of:
    - extending the double tracking to the west for the extension of the platforms.
    - The provision of any additional stabling to the west of the station.

- The school to the southwest of Wicklow station as well as the housing further to the west, on the south side of the track, would limit the potential to place infrastructure to the west of the station, on the south side of the track.
  - The narrow strip of land between the school and the track does not appear to be wide enough for a substation; however, the adjacent school is a key consideration here.
  - As the line moves westwards the width of the strip of land reduces, although there may potentially be enough room for a proposed siding; however, the proximity of the houses to the south is a key consideration here.

- The Wicklow Station has a 73-space car park and small IÉ compound at the east end of the platforms on the south side of the rail.
  - There may be scope to reorientate the car park and compound i.e. the number of parking spaces and the area and infrastructure within the compound to create space for a substation, subject to cable routing and agreement with ESB.

- The **existing pedestrian bridge** within the station is very narrow and only has stairs. Given that turnback operations from either platform may be required, this bridge does not allow for accessibility requirements and would, in this case, need to be replaced. It is noted there is an ongoing Active Travel Bridge (Wicklow Train Station to Port Access Route) Scheme being developed by National Transport Authority and Wicklow County Council, in consultation with Iarnród Éireann, which includes provision for stairs and lifts to both platforms.

- **Existing ESB infrastructure**, to be confirmed by ESB, in the proximity of Wicklow Station is indicated on the map below. Exact locations are to be considered as indicative only and capacity within this network need to be confirmed through discussion with ESB.

  - The existing station is served by an LV connection, taken from an MV overhead line north of the station at 'Ballarney N.'
  - There are further 10kV/20KV MV overhead lines north and south of the station. The capacity of these lines for future connections needs to be discussed with ESB.
  - There does not appear to be any 38kV assets near the station.

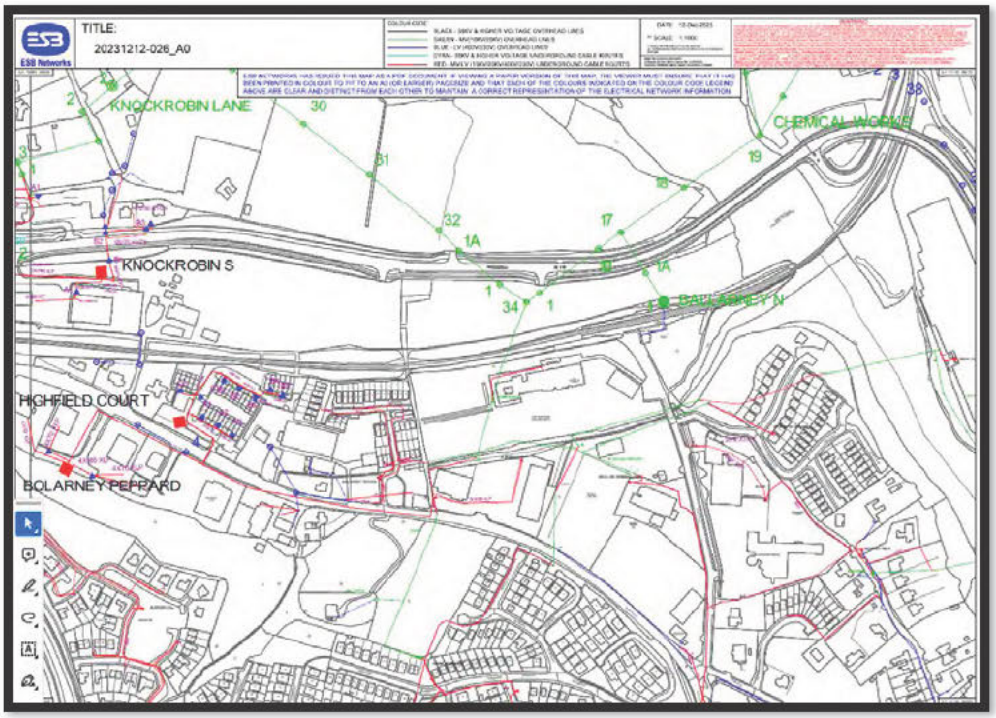


Figure 16. Existing ESB Record of Network

(Copyright of ESB and used for illustrative purposes only)

3.6 Coastal Erosion and Flooding

3.6.1 There are several sections of rail corridor between Dublin City and Wicklow Town which are at risk of coastal erosion and flooding.

3.6.2 Sections which are the subject of coastal infrastructure protection projects as part of the East Coast Railway Infrastructure Protection Projects (ECRIPP).

3.7 Special Area of Conservation

3.7.1 The National Parks and Wildlife Service (NPWS) has designation an area between Greystones and Wicklow Town as a Special Area of Conservation. An extract from the NPWS website is shown on the Figure below.

3.7.2 It includes The Murragh Special Protection Area.

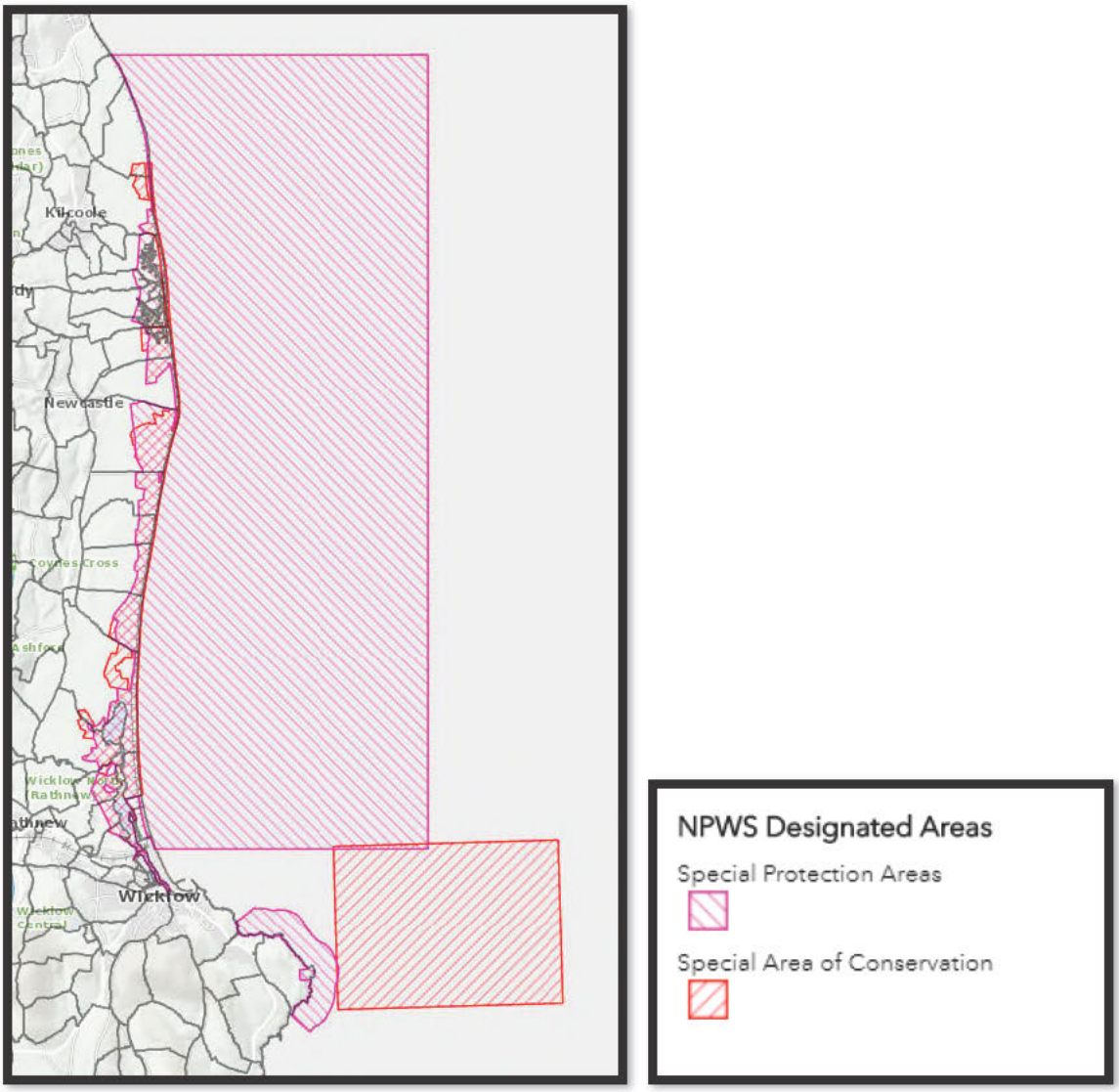


Figure 17. Special Protection Area: The Murrough SPA (NPWS)

4. RELEVANT POLICIES, PLANS, AND OBJECTIVES

4.1 Introduction

4.1.1 There is a strong policy basis for improving rail services along the corridor to Wicklow Town.

4.2 Policy Context

4.2.1 International and EU All United Nations Member States, including Ireland, adopted the 2030 Agenda for Sustainable Development in 2015. The 2030 Agenda provides a shared plan for now and the future to achieve peace and prosperity for people and the planet. The 17 Sustainable Development Goals (SDGs) identified in these goals issue an urgent call to action for all countries. There is a strong correlation between the United Nations (UN) SDGs and the National Strategic Outcomes of the National Planning Framework 2040.

4.2.2 At a European Union Level:

- **Fit for 55** relates to the EU's target of reducing net greenhouse gas emissions by at least 55% by 2030
- **Sustainable & Smart Mobility Strategy** lays the foundation for how the EU transport system can achieve its green and digital transformation and become more resilient into the future
- **European Green Deal Policy** contains a set of initiatives with the overarching aim of making the European Union (EU) climate neutral by 2050
- **European Commission TEN-T Regulations** EU's TEN-T policy aims to build an effective, EU-wide, and multimodal transport network across the EU's comprehensive network.

4.2.3 The Table below outlines the key existing National, Regional, and local polices, plans, and guidelines, relevant to the scheme.

Table 5. Planning and Policy Documents

National Level
• Project Ireland 2040: National Planning Framework 2040 and National Development Plan 2021-2030 • National Investment Framework for Transport in Ireland 2021 • Climate Action Plan / National Adaptation Framework / Sectoral Adaptation Plan for Transport Infrastructure • 2022 National Sustainable Mobility Policy • Our Journey Towards Vision Zero: Road Safety Strategy 2021 – 2030 • Iarnród Éireann Strategy 2027 • All Island Strategic Rail Review (Draft)
Regional Level
• NTA's Greater Dublin Area Transport Strategy 2022-2042 • NTA's GDATS Bray – Arklow Demand Study • Eastern and Midland Regional Spatial & Economic Strategy 2019 – 2031

Local Level

- Wicklow County Development Plan 2022-2028
- Greystones – Delgany and Kilcoole Local Area Plan 2012 – 2019
- Wicklow – Rathnew Local Area Plan 2013 – 2019
- Greystones Transport Study (ongoing)

4.3 National Policies

National Planning Framework

4.3.1 The National Planning Framework (NPF) is the Government's high-level strategic plan for shaping the future growth and development to 2040. The NPF sets out the vision and strategy for policy and how public and private investment will be allocated in support of the national strategic outcomes.

4.3.2 There are several national strategic objectives within the NPF that are of particular relevance for this study:

- National Strategic Objective: Enhanced Regional Accessibility
- National Strategic Objective: Sustainable Mobility
- National Strategic Objective: Transition to a Low Carbon and Climate Resilient Society
- National Strategic Objective: Access to Quality Childcare, Education, Healthcare and Employment
- National Strategic Objective: Compact Growth

4.3.3 Enhanced rail services under Wicklow Capacity Enhancements are envisaged to create a more resilient and sustainable future for the country by contributing to the decarbonisation of our transport system. They will enable greater accessibility to services by sustainable mode along the corridor. They will support compact growth by connecting homes and businesses with frequent and reliable services to key trip destiantions such as Dublin City Centre.

National Development Plan 2021- 2030

4.3.4 The National Development Plan (NDP) 2021-2030 details the major public investment approved by Government. It will play a significant role in addressing the opportunities and challenges faced by Ireland over the coming years from issues such as Covid-19, Brexit, housing, health, climate action and a population projected to grow by one million people between 2016 and 2040.

4.3.5 It accelerates investment in public transport infrastructure, including rail through heavy rail investment programmes and protection & renewal programmes.

4.3.6 DART+ Programme is an investment under the NDP that will double the capacity and treble the electrification of the Greater Dublin Area network, facilitating sustainable mobility and development to enhance quality of life in our capital and its surrounding counties.

National Investment Framework for Transport in Ireland

4.3.7 As outlined in the National Investment Framework for Transport in Ireland (NIFTI), future investment in transport should meet one or more of the NSO's, the delivery of Wicklow Capacity Enhancement is an example of meeting a number of key NSO objectives, as set out above, including sustainable mobility, supporting regional accessibility, strongly supporting compact growth and transitioning to a low carbon society.

4.3.8 The NIFTI policy outlines investment priorities, and the delivery of Wicklow Capacity Enhancement is well aligned to three:

- **Decarbonisation:** Future travel demand, which will increase with the growing population, will present a challenge to the 'decarbonisation' priority. To reduce the carbon emissions and other environmental impacts of transport, steps must be taken to provide people with a sustainable transport option as an alternative to the private car and change overall travel behaviours.
- **Mobility of people and goods in urban areas:** Compact growth, with the growing population accommodated within existing cities, can lead to transport efficiencies. For this to be achieved however, city and town living must be an attractive and viable option. The policy recognises that residents will be deterred from living in such locations if they face congestion and unreliable transport. Therefore, the 'mobility of people and goods in urban areas' priority flags the role that additional cycling and walking infrastructure can play alongside improved public transport provision, to make cities even more accessible.
- **Enhanced regional and rural connectivity:** This priority is about improving the links between the regions and towards the rural areas and the Wicklow Capacity Enhancement will assist in providing increased mobility and the facility will aid to make journeys simpler for people travelling from outside the city to travel further within the city.

4.3.9 The NIFTI outlines hierarchies for investment both in terms of the mode of transport and the type of intervention, as set out in the Figure below.

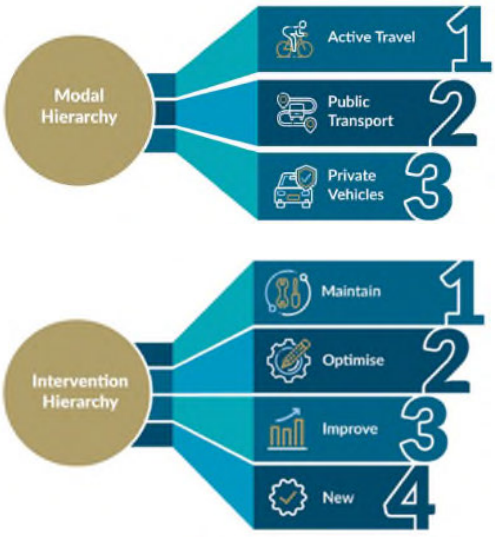


Figure 18. NIFTI Modal and Intervention Hierarchies

4.3.10 With respect to the modal hierarchy, active travel is at the top, followed by public transport, with private vehicular travel last. With respect to the intervention hierarchy the 'maintenance'

of existing assets is prioritised, with 'new' infrastructure coming fourth on the list, and in between are the approaches to 'optimise' infrastructure by using it in a more efficient manner, and the approach to 'improve' infrastructure. With these two hierarchies in mind, enhancing the existing walking and cycling and public transport networks should be the preferred transport interventions.

4.3.11 The delivery of Wicklow Capacity Enhancements will supply a critical function in supporting the ongoing development of homes and employment growth next to and within walking and cycling distances of station along the route. The enhancements aim to drive a modal shift from private vehicles located third in the modal hierarchy up towards more sustainable modes.

4.3.12 In terms of the intervention hierarchy, the Wicklow Capacity Enhancement the project prioritises the top motives with the aim to maintain the existing rail line and optimise its performance while recognising that improvements or light new infrastructure may be needed to achieve project goals.

4.3.13 The scheme provides a sustainable approach for transport and therefore drives a modal shift from private vehicles located third in the modal hierarchy up towards more sustainable transport modes.

The delivery of the Wicklow Capacity Enhancements is aligned with the NPF and NDP, and by extension the NIFTI. The strategic aim aligns directly with the NIFTI investment priority for mobility of people in urban areas and supports the other investment priorities targeting decarbonisation and enhanced regional and rural connectivity.

Wicklow Capacity Enhancement are a response to action required to enhance ensure the rail network can continue to serve growing populations and expanding urban centre along its length and will serve to support the optimisation and improvement of Wicklow's transport networks enabling the sustainable compact growth around county towns and their environs and reduce the overreliance on unsustainable private car travel.

Climate Action Plan / National Adaptation Framework / Sectoral Adaptation Plan for Transport Infrastructure

4.3.14 The Climate Action Plan 2023 (CAP23), which follows CAPs 2019 and 2021, lays out the road map for Ireland's climate ambition. It is consistent with the legally binding economy-wide carbon budgets and sectoral ceilings agreed to by the Government in July 2022. Ireland set the goal of halving its greenhouse gas emissions by 2030, and of becoming carbon neutral by 2050, through strengthened climate legislation, supported by annually updating of CAP to monitor progress.

4.3.15 To meet the sectoral emission ceiling, the plan calls for significant reductions in transportation emissions by 2030. Meeting Ireland's 2030 transport abatement targets will necessitate transformative change and rapid action across all key decarbonisation channels. To meet this higher level of ambition, the earlier CAP 2021 targets have been revised, including:

- a 20% reduction in total vehicle kilometres;
- a reduction in fuel consumption; and
- significant increases in sustainable transportation trips and modal share.

4.3.16 In the absence of interventions, transport demand will increase significantly in line with population and economic growth resulting in negative impacts on our national competitiveness, quality of life and a failure to meet our decarbonisation goals. Cleaner, safer, and more sustainable mobility, such as will be provided by the Wicklow Capacity Enhancements, is critical for climate policy.

4.3.17 It is noted that the decarbonisation of transport will be challenging, and the measures identified in CAP2023 are guided by five key principles:

1. Systems innovation;
2. Just transition;
3. Accelerated implementation;
4. Communication and citizen engagement;
5. Enhanced governance, particularly at local authority level.

4.3.18 Support to the direction of CAP 2023 will be apparent from strategy set out in the forthcoming All Ireland Rail Review that will include a focus on improving the rail service quality, directly driving demand and modal shift from car. The Climate Action Plan 2023 Annex of Actions recognises the need for continued investment in passenger rail and advancing with the DART+ Programme, including the DART+ Coastal Route which will deliver improved services to Bray and Greystones.

4.3.19 The Wicklow Capacity Enhancements scheme will contribute to the aspirations of the CAP2023 by facilitating sustainable growth in towns served and significantly enhancing regional connectivity to promote a modal shift in favour of sustainable modes.

4.3.20 The Transport Climate Change Sectoral Adaptation Plan 2019 was commissioned by the Department of Transport, Tourism and Sport (DTTAS) (now Department of Transport) under the guidance/requirement of the National Adaptation Framework to ensure the sector meet necessary obligations to improve the resilience of the national transport network to climate change impacts in line with cross sector policies, efforts, and objectives. The East Coast Rail Infrastructure Protection Programme (ECRIPP) is underway to address adaptation needs within the scheme extents.

Draft All Island Strategic Rail Review

4.3.21 The Draft All-Island Strategic Rail Review (AISRR) was jointly commissioned by the Department of Transport in Ireland and the Department for Infrastructure in Northern Ireland. Once finalised, the review will inform the future development of the railway system across the island of Ireland to 2050, in line with net-zero emissions commitments in both authorities. The review considered intercity travel, as suburban rail has been considered in the GDA and Metropolitan Area transport strategies for Ireland's cities. A draft report and supporting documentation were published in July 2023. Key recommendations include:

- Recommendation 1 – Develop and implement an All-Island Rail Decarbonisation Strategy that includes an electrified rail network
- Recommendation 2 – Develop plans to invest in the skills, supply chains and rolling stock to deliver decarbonisation
- Recommendation 3 Procure hybrid and electric rolling stock in the medium term
- Recommendation 4 – Increase service frequencies on intercity

4.3.22 The draft strategy suggests a turnback for Rosslare InterCity services at Greystones to enable passengers interchange with the 3 services per hour per direction proposed between Greystones and the City Centre under DART+ Programme. It also suggests an hourly shuttle service between Wexford and the end of the DART route at Greystones.

4.3.23 It also suggests further connectivity improvements by reinstating the railway between Waterford and Rosslare (including a chord/curve to the south of Wexford) and extending some Dublin – Waterford intercity services to a new station to the south of Wexford 'Hanrahan once the line between Heuston and Waterford has been upgraded.

4.4 Regional Policies and Strategies

Transport Strategy for the Greater Dublin Area 2042

4.4.1 The NTA's Transport Strategy for the Greater Dublin Area (GDA) provides a framework for the planning and delivery of transport infrastructure and services between 2022 and 2042. This strategy provided an assessment of projects implemented from the 2016 publication and establishes areas for improvement including the electrification of public transport fleets and ongoing monitoring of travel demand patterns post Covid and changing development patterns.

4.4.2 The Strategy sets out the transport provisions necessary to contribute to the economic, social, and cultural progress of the GDA by providing for the efficient, effective, and sustainable movement of people and goods which result in modal share, environmental, economic and land use benefits.

4.4.3 Major projects provided for in the Strategy include DART+ (referred to as DART Expansion within the Strategy) and Dublin Bus Connects. DART+ is described as "a cornerstone project of the strategy" with the aim to deliver high capacity, frequent rail services.

4.4.4 The DART+ Programme will revolutionise travel in the Greater Dublin Area. It will see the DART network grow from its current 50km in length to over 150km. Bringing DART travel with all its benefits to new and existing communities.

4.4.5 It will promote multi modal transit, active transport, boost regional connectivity and make public transport the preferred approach for more and more people. The DART+ Programme will deliver frequent, modern, electrified services within the Greater Dublin Area (GDA) and will improve connectivity to Regional towns and cities.

4.4.6 The DART+ Programme will involve rail improvements from:

- DART+ West – Maynooth and M3 Parkway to the City Centre
- DART+ South West – Hazelhatch & Celbridge to the City Centre
- DART+ Coastal North – Drogheda to the City Centre
- DART+ Coastal South – Greystones to the City Centre
- DART+ Fleet – purchase of new train fleet to increase train services

4.4.7 A map of the DART+ Network is shown on Figure 19 below.

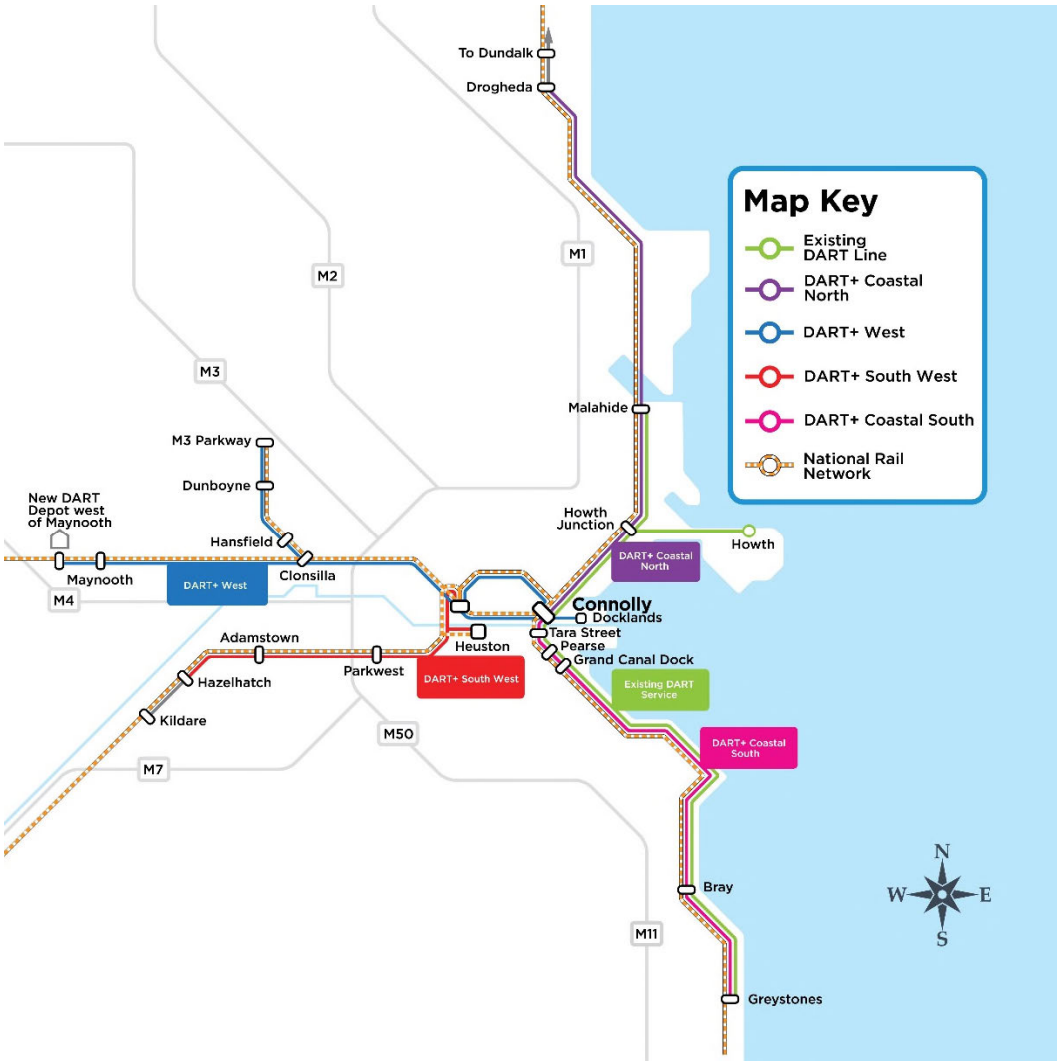


Figure 19. DART+ Proposed Network

4.4.8 The NTA Greater Dublin Area Strategy 2042 included an Area Based Transport Assessment for Bray to Arklow. The study used NTA's multi-modal Eastern Regional Model to analyse the level of public transport demand along key movement corridors if certain levels of mode shift away from car were to occur. The purpose of the mode shift supports the Study objectives to reduce traffic congestion vehicular emissions associated with car usage along the corridor. This analysis provides an indicative level of demand to help inform the options development process in terms of level of provision required. Analysis was undertaken on two identified movement corridors passing through the study area:

- The Inland N11 Corridor
- The Coastal Rail Corridor

4.4.9 This analysis assessed that, in order to enable a car mode shift of 50% (i.e. 50% of all car trips in 2042 shift to other modes including public transport, with shorter trips proportionally allocated to active modes), capacity for 700 extra public transport trips would be required to cater for northbound demand from the study area along the inland corridor and 500 extra public

transport trips along the coastal corridor in the AM Peak Period. This figure includes both modelled public transport demand, and additional demand from shifted car trips.

4.4.10 The findings of the analysis were used to inform recommendations contained within the NTA Greater Dublin Area Strategy 2042. They study recommended improvements to both bus service provision on The Inland N11 Corridor and rail service provision on The Coastal Rail Corridor; including measure **RAIL3 – DART Extension** to extend the DART to Wicklow in the lifetime of the Strategy.

Regional Spatial and Economic Strategy

4.4.11 The Regional Spatial and Economic Strategies (RSES) for the Southern Region and Eastern & Midlands Region are 12-year strategic regional development frameworks establishing a broad framework for the way in which society, environment, economy, and the use of land should evolve within the two regions. The RSES primarily aims to support the regional delivery of the programme for change set out in Project Ireland 2040, the National Planning Framework (NPF) and the National Development Plan 2030 (NDP) (previously NDP 2018-2027).

4.4.12 Both strategies identify the issue of the rail network to accommodate the need for greater frequency and capacity passenger services alongside the movement of increased freight. There is a collective argument for increases in investment in rail service for commuters to the Dublin Region and large (metropolitan) towns throughout both regions to offer alternatives to car-based travel for travel and achieve greater interregional connectivity. Specific mention is made to the integration of services across rail, light and heavy and with the respective regions bus networks to facilitate multi modal journeys. Both assemblies reference the importance of continued investment in the strategic transport corridor along the eastern seaboard from Rosslare to Dublin and north to Belfast. The economic value of the Dublin – Rosslare Europort line for rail freight is to be examined with growth in direct EU trade due to Brexit. The feasibility of improved services is supported by the RSES to further develop the value of the railway and support economic growth in the region.

4.4.13 Within the EMRA Wicklow – Rathnew is classified as a key settlement of the regional with a strategic location on the M/N11 and rail line offering a prominent level of services and strengthening employment base. It is future development and population growth would benefit from improved public transport with higher levels of capacity to align with the NPF NSO of Compact Growth and Sustainable Mobility.

4.4.14 The Southern Regional Assembly identifies Gorey and Wexford as Key Towns with strategic location to Dublin for the former and Waterford and Kilkenny for the latter. It is noted that the growth of these towns as economic bases will require continued investment in rail infrastructure to provide increased line speeds, greater levels of service through higher frequencies and reduced journey times

4.4.15 Both strategies include specific regional policy objectives of which the following specifically relate and support the scheme objectives:

Eastern & Midlands Region

- RPO 4.58: To support ongoing investment in rail infrastructure to ensure its continued renewal, maintenance, and improvement to an elevated level to ensure high quality of frequency, safety, service, accessibility, and connectivity.

The Southern Region Assembly

- RPO 42: To support the development of the Eastern Economic Corridor, strengthening economic links with the South-East by extending to Rosslare Europort, strengthening public transport connectivity and optimising the potential for rail freight.

- RPO 140: To sustainably maintain the strategic capacity and safety of the national roads and rail network including planning for future capacity enhancements to ensure effective land transport connections to the major ports, airports and markets.
- RPO 160: To support reduction in the use of fossil fuels for public transport and increasing use of technology and green energy sources to pursue low emission public transport fleets.

4.5 Local Policies and Strategies

Wicklow County Development Plan 2022-2028

4.5.1 The Plan sets out the overall strategy for sustainable development across the county and four of the counties municipal districts contain the Dublin – Rosslare Europort rail line – Bray, Greystones, Wicklow, Arklow. The 2022 Census saw the county population increase by 9% since 2016 to 155,851. Four of the county's major towns are served by the rail line – Bray, Greystones – Delgany, Wicklow – Rathnew and Arklow.

4.5.2 The reliance of Private Vehicles across the county, with low levels of public transport mode share outside of the DART service area for towns located on the rail line, is a key indicator that service frequency and journey times are inadequate to support daily commutes. The Wicklow CDP highlighted the mode share in the Table extract below.

Table 6. Wicklow CDP 2022-2028 Extract on Modal Split

Modal Split (trips to work and school)	Active		Public Transport		Private vehicles	
	2011	2016	2011	2016	2011	2016
Bray	21%	20%	21%	21%	58%	57%
Wicklow-Rathnew	18%	15%	8%	10%	74%	75%
Greystones-Delgany	10%	11%	22%	22%	68%	67%
Arklow	22%	24%	5%	5%	72%	71%
Blessington	19%	19%	9%	10%	72%	71%
Baltinglass	28%	34%	4%	4%	68%	62%
Enniskerry	6%	5%	18%	17%	76%	78%
Kilcoole	17%	17%	15%	16%	68%	67%
Newtown	12%	10%	17%	18%	71%	72%
Rathdrum	22%	24%	7%	6%	72%	70%

4.5.3 Encouragement of public transport will be achieved with improved integration of land use in the growth of local employment with towns reducing travel distances. Ongoing issues of congestion on the M11/N11 which resulted in extended journeys times for the variety of bus services that utilise the corridor will be mitigated with NTA funding for dedicated bus land from the M50 interchange to J8 Kilmacanogue.

4.5.4 The Wicklow CDP recognises the need to integrate bus and rail timetables throughout the county to create an interconnected regional network of public transport services. The rail line is noted as having been allocated 75% of the future population to the county in towns directly served by it. For this growth to be achieved in a sustainable manner service frequency along the rail line requires improvements. The CPD supports cooperation with IÉ while acknowledging the reliance on bus transport for residents that live in the east of the county and to access Dublin centres such as Sandyford and UCD that are not served by direct rail routes.

4.5.5 The plan includes a number of objectives relating to coastal zone management including: "to facilitate the provision of new or the reinforcement of existing coastal defences and protection measures where necessary along the full coastline of the County and in particular to support the implementation of the measures identified in the Murrough Coastal Protection Study and any other similar studies that are produced during the lifetime of the plan".

4.5.6 Relevant objectives relating to rail, including:

- CPO 12.2 Through sustainable planning and investment in transport infrastructure, including roads and public transport systems, to reduce journey times, length, congestion and to increase the attractiveness of public transport
- CPO 12.20 To cooperate with NTA and other relevant transport planning bodies in the delivery of a high quality, integrated and accessible transport system in County Wicklow.
- CPO 12.21: develop improved interchange facilities, in the form of strategic P&R sites at rail stations, improve bus links to rail stations,
- CPO 12.22: To support electrification of the rail line south of Greystones and the provision of high speed and high frequency services on the existing underutilised southeast rail line to south Wicklow.
- CPO 12.23: maintain and improve the operational capacity of the Dublin – Rosslare line, including neighbouring land uses and coastal protection measures to protect rail infrastructure while assessing options for corridor relocation in the event of line closure due to erosion.
- CPO 10.59: support the improvement and protection of the TEN-T network to strengthen access routes to Ireland's and Wicklow's ports, including investment in the ongoing development of the N11/M11 to improve connectivity to Rosslare and improvements to the Dublin-Wexford rail line.

Greystones – Delgany and Kilcoole Local Area Plan 2012 – 2019

4.5.7 The most recent adoption of local area plan for Greystones – Delgany and Kilcoole followed consultation that highlight the need for a connected strategy of the settlements given their elevated levels of shared services, infrastructure, and amenities. While the plan sets out the development strategy for a six-year period its projections and measures were based on a longer period up to 2022. With greater coordination of their development better provision can be made

for community services, transport infrastructures and protection of the environment to ensure sustainability.

4.5.8 Greystones is the key town of the plan area, located approx. 30km from Dublin and 10km south of Bray, with Delgany located west of the town and forms part of the broader built-up environs, with Kilcoole located 5km further south.

4.5.9 The larger settlement of Greystones – Delgany is a Large Growth Town required to accommodate a large population and appropriate level of services and employment. Kilcoole is designated a Small Growth Town and is provided to maintain a smaller population base with services focused on local needs.

4.5.10 Land use objectives contained within the Local Area Plan 2013 – 2019 are shown on the figure below.

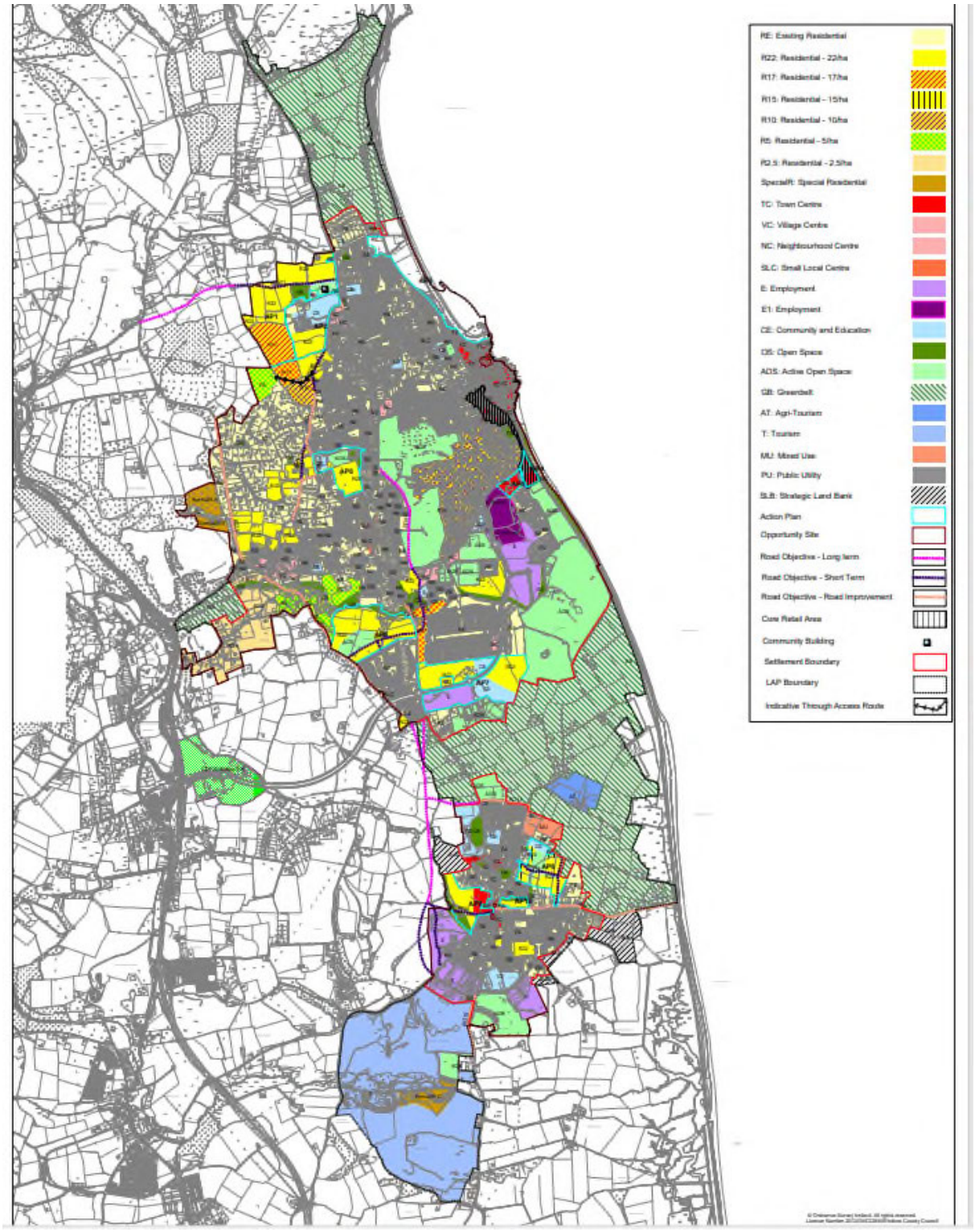


Figure 20. Greystones Delgany and Kilcoole Local Area Plan 2013 – 2019 Land Use zoning objectives

4.5.11 The zoning objectives south of Greystones Station include active open space, which is currently a golf course, and greenbelt uses.

Wicklow – Rathnew Local Area Plan 2013 – 2019

4.5.12 The area of Wicklow – Rathnew is currently consultation review for an update of the 2013 – 2019 Local Area Plan, this version will be used for the purpose of this report acknowledging that updated data of the town is provide in the Wicklow County Development Plan.

4.5.13 Wicklow town is the administrative capital of the county with its broader area encompassing the area of Rathnew to the west of the town close to the N11, Dunbar to the southeast and Murragh. The main purpose of the plan is to provide a framework for the sustainable growth of the town that incorporates strategic land use zoning, economic and social development through community involvement. The plan predicted a 2022 population of 24,000 that includes broader environs area previously mentioned.

4.5.14 A key focus of the plan is the integration of land use and transport planning to reduce commuting distances and provide more jobs locally to address a major issue of long-distance commuting that impacts on quality of life in the town. A key measure identified to improve transport options was the introduction of local services that can facilitate journeys throughout the town and to the train station to provide opportunities to interchange given the stations location north of the town distanced from Rathnew and large housing areas of the South (East). In addition, the potential for a dedicated P&R facility at the station was to be considered in land designation to encourage rail use. In response to the time of the plan's publication during the recission the noted difficulties to secure investment in public transport have been reduced as the financial constraints on government expenditure have eased.

4.5.15 Relevant objectives relating to the project include:

- PT3: To reserve lands of c. 1ha to the north of the train station for future expansion of car parking facilities.
- PT4: To ensure that possibilities for the improvement of the Dublin-Rosslare line are maintained and to ensure that land uses adjacent to the station and rail lines are appropriate and will facilitate future improvements.
- PT5: Encourage the development of a transport interchange at the train station with expansion of bus services (feeder routes), improved cycling links and pedestrian accessibility.

4.5.16 Land use objectives contained within the Local Area Plan 2013 – 2019 are shown on the figure below.

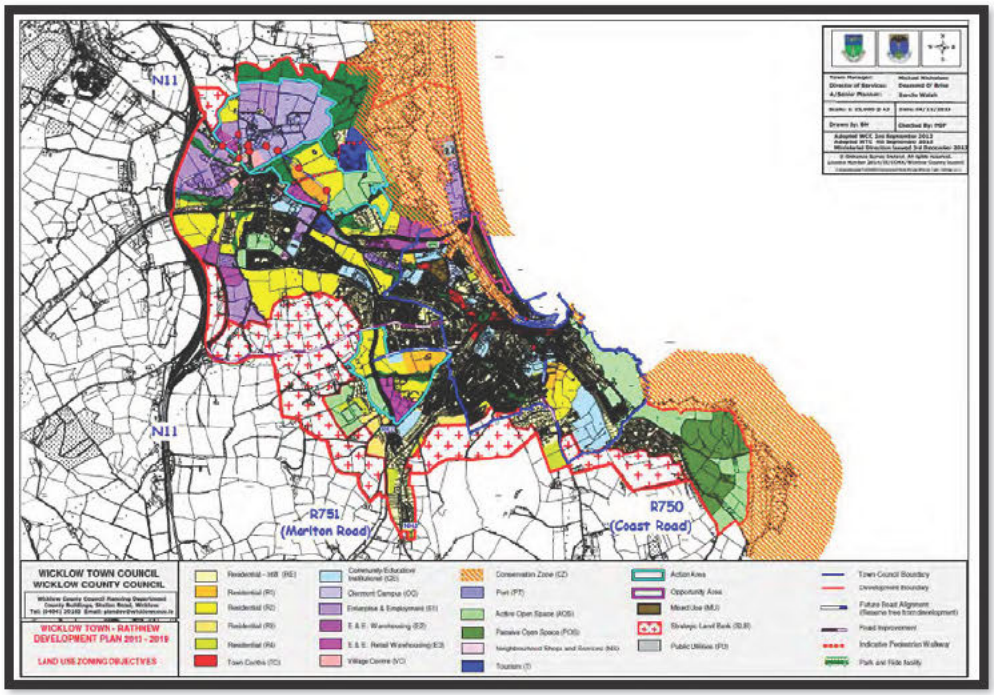


Figure 21. Wicklow Rathnew Local Area Plan 2013 – 2019 Land Use zoning objectives

4.5.17 The zoning objectives highlight the conservation zone to the north of Wicklow Town along the coastal rail corridor. Lands immediately north of Wicklow Station and rail corridor are zoned enterprise and employment noting PT3 above to reserve land for car parking facilities. Lands to the west are zoned community/education/institutional. Kala Wicklow Nature Reserve, an amenity associated with Varty River is to the south of Wicklow Station.

5. PROPOSED TRANSPORT ENHANCEMENTS

5.1.1 There are several transport enhancements ongoing projects which propose to enhance rail services along the corridor. Except for Train Protection System National Rollout, the other schemes do not have Railway Orders or planning permission in place at the time of writing. **However, for the purpose of this study they are committed schemes**.

5.1.2 At the time of writing, the Department of Transport and Department for Infrastructure's All Island Strategy Rail Review is in draft form its proposals have not been outlined for this reason.

5.2 DART+

5.2.1 DART+ Coastal South forms part of the wider DART+ Programme. Proposals include a service frequency of every 5 minutes to Bray and every 20 minutes to Greystones to/from the City Centre.

5.2.2 To achieve 12 trains per hour per direction to Bray the following non-exhaustive list of interventions are envisage:

- additional train stabling and turnback facility at Bray Station
- remodelling of south end of Bray station to increase capacity and flexibility – also required to increase service frequency to Greystones (see below)
- closure of level crossings to remove road traffic / rail constraints at the following locations.

5.2.3 To achieve 3 DART trains per hour per direction between Bray and Greystones the following interventions are envisage:

- Passing loop south of Bray Head tunnels to facilitate the increase in service between Bray and Greystones
- A turnback facility at Greystones Station facing south to facilitate shuttle services to/from Rosslare and Gorey
- Further measures to improve service performance such as signalling upgrades.

5.2.4 The Rail Power Systems Team is investigating the need for OHLE power upgrades to facilitate service level improvements proposed under DART+ Coastal South.

5.3 East Coast Railway Infrastructure Protection Programme

5.3.1 East Coast Railway Infrastructure Protection Programme (ECRIPP) is a railway infrastructure protection project and will focus on the railway corridor specifically and where this is impacted by coastal erosion climate change effects.

5.3.2 The scope of ECRIPP is to deliver coastal protection measures to protect the railway from further coastal erosion, coastal flooding, cliff instability and wave overtopping that is due to increase in frequency and severity due to climate change.

5.3.3 Areas along the coast requiring intervention, known as coastal cells, are shown on the Figure below.

Figure 22. ECRIPP Coastal Cell Areas

5.4 Train Protection System

5.4.1 The new Train Protection System (TPS), which will be ETCS (European Train Control System) Level 1, is to be deployed across the network. It will provide automatic train stop, set train-regulated line speed, and ensure compliance with speed restrictions.

5.4.2 The rollout of ETCS Level 1 will be a prerequisite for the operation of BEMU trains to Wicklow, and its delivery will need to be completed in advance of a Wicklow BEMU scheme. The cost and delivery of ETCS Level 1 Works are currently assumed to sit within Phase 5 of the TPS Trackside National Rollout Project. The provision of 1500V DC charging infrastructure at Wicklow will require immunisation of any installed systems to ensure they are not affected by the return traction current. This will require signalling immunisation works.

5.5 N11/M11 Junction 4 to Junction 14 Improvement Scheme and N11/M11 Bus Priority Interim Scheme

5.5.1 N11/M11 Junction 4 to Junction 14 Improvement Scheme and N11/M11 Bus Priority Interim Scheme form part of the 'Inland Corridor' described in the Greater Dublin Area Transport Strategy 2022-2042 to improve access sustainably along the Arklow to Bray corridor.

5.5.2 The N11/M11 Junction 4 to Junction 14 Improvement Scheme aims to alleviate congestion, improve safety, and optimise the efficiency and function of the N11/M11 as a transport corridor. The section under consideration for this commission, i.e. the N11/M11 Scheme, is approximately 22km in length, extending from the existing M11/M50 junction west of Shankill, Co. Dublin, to the N11/M11 junction at Coyne's Cross, Co. Wicklow.

5.5.3 N11/M11 Bus Priority Interim Scheme' (N11/M11 BPIS), is progressing as a multi-authority project involving Transport Infrastructure Ireland (TII), the National Transport Authority (NTA), Wicklow County Council and Dún-Laoghaire Rathdown County Council.

5.5.4 The overriding objective of the N11/M11 BPIS is to develop a proposal for the provision of bus priority measures (in both directions) during peak periods on the N11/M11 national road. Priority facilities can be used by buses/coaches to avoid congested traffic lanes and help to reduce the current unsustainable dependency on the private car. Where feasible, it is envisaged that the N11/M11 BPIS could be considered for implementation in advance of the larger and more comprehensive N11/M11 Junction 4 to Junction 14 Improvement Scheme.

5.5.5 These interventions are required in combination with Wicklow Capacity Enhancements.

5.6 2022 Greater Dublin Area Cycle Network Plan

5.6.1 The 2022 Greater Dublin Area Cycle Network Plan includes cycle network enhancement for Wicklow Town. They include measures to improve cycle accessibility to Wicklow Train Station.

5.6.2 The cycle network plan for Wicklow Town, Rathnew and Ashford is shown on the figure below.

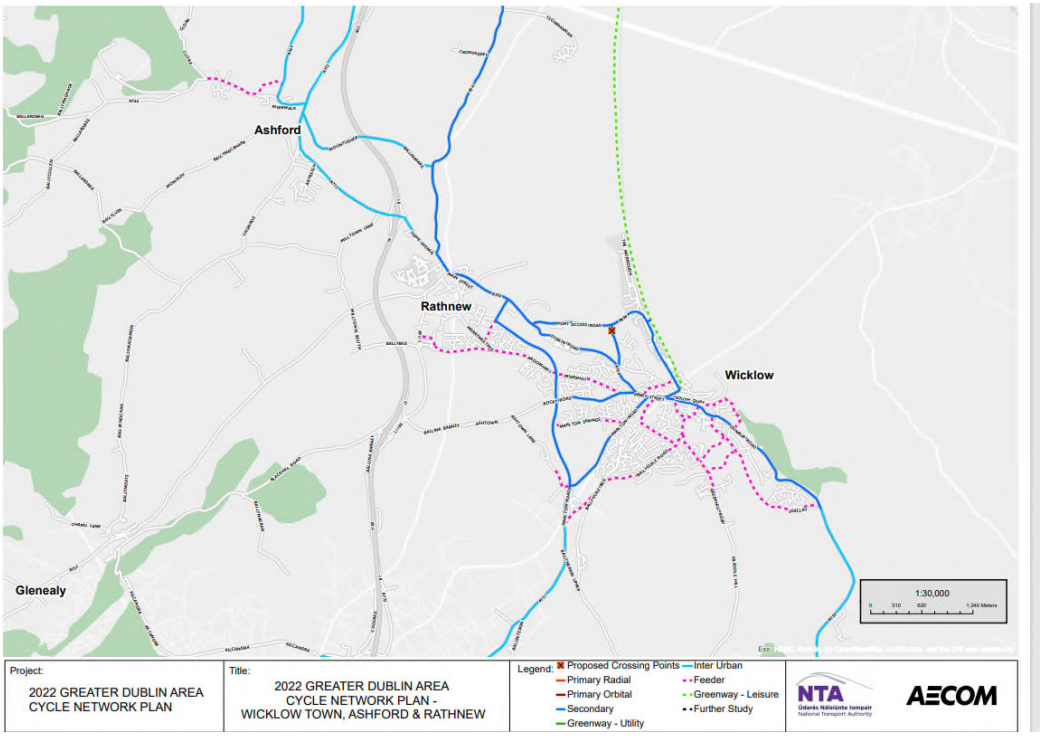


Figure 23. 2022 Greater Dublin Area Cycle Network Plan for Wicklow Town, Rathnew and Ashford

5.6.3 The 2022 Greater Dublin Area Cycle Network Plan includes cycle network enhancement for Kilcoole. They include measures to improve cycle accessibility to Kilcoole Train Station.

5.6.4 The cycle network plan for Kilcoole and Newtown Mount Kennedy is shown on the figure below.

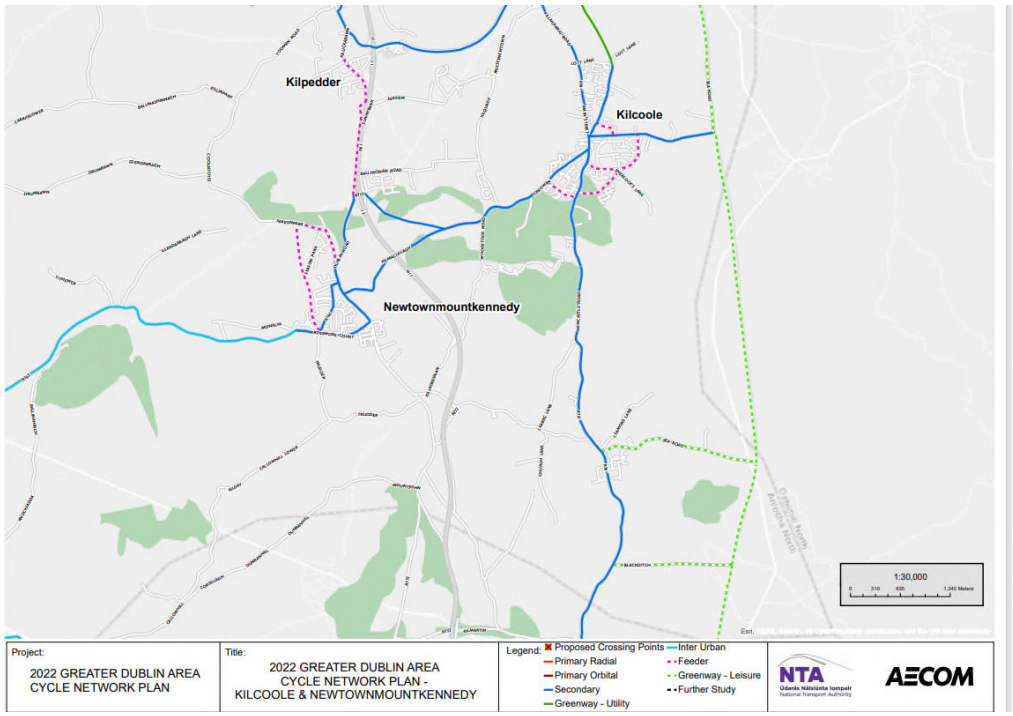


Figure 24. 2022 Greater Dublin Area Cycle Network Plan for Kilcoole

5.7 Active Travel Bridge (Wicklow Train Station to Port Access Route)

5.7.1 The 2022 Greater Dublin Area Cycle Network Plan includes proposals for a pedestrian and cycle bridge to cross over the railway, connecting active travel users on R999 Drumkay Road/Wicklow Port Access Road directly with Wicklow Train Station and Station Road.

5.7.2 The Active Travel Bridge (Wicklow Train Station to Port Access Route) Scheme, being developed by Wicklow County Council and National Transport Authority, includes this scheme proposal, together with car parking and a bus set down area. The scheme is being developed in consultation with Iarnród Éireann.

5.7.3 It is identified under the Pathfinder Programme projects for 2022-2025 under the National Sustainable Mobility Policy. The scheme is currently at Phase 4 – Statutory Process.

5.7.4 Access stairs and lifts are to be provided from the proposed bridge to the Platform No.1 and No.2 at Wicklow Train in line with Iarnród Éireann's future accessibility plan for the station. The existing footbridge is to be removed as part of the proposals.

5.7.5 The Active Travel Bridge (Wicklow Train Station to Port Access Route) Scheme is shown on the Figure below.

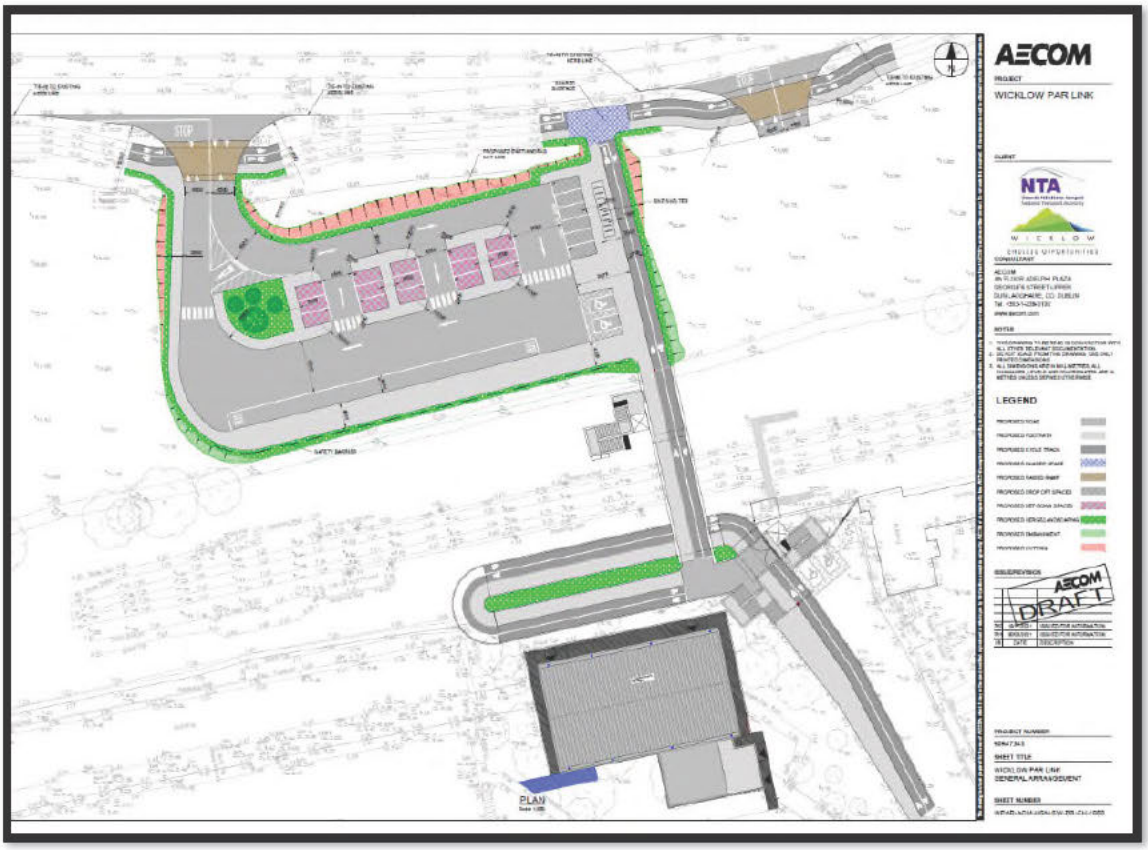


Figure 25. Draft Active Travel Bridge (Wicklow Train Station to Port Access Route)

5.7.6 The following figure shows the impact that the addition of the new active travel from Station Road to Drumkay Road would have on the accessibility to the walking catchment area to the train station, and in turn the school directly to the West of the station.

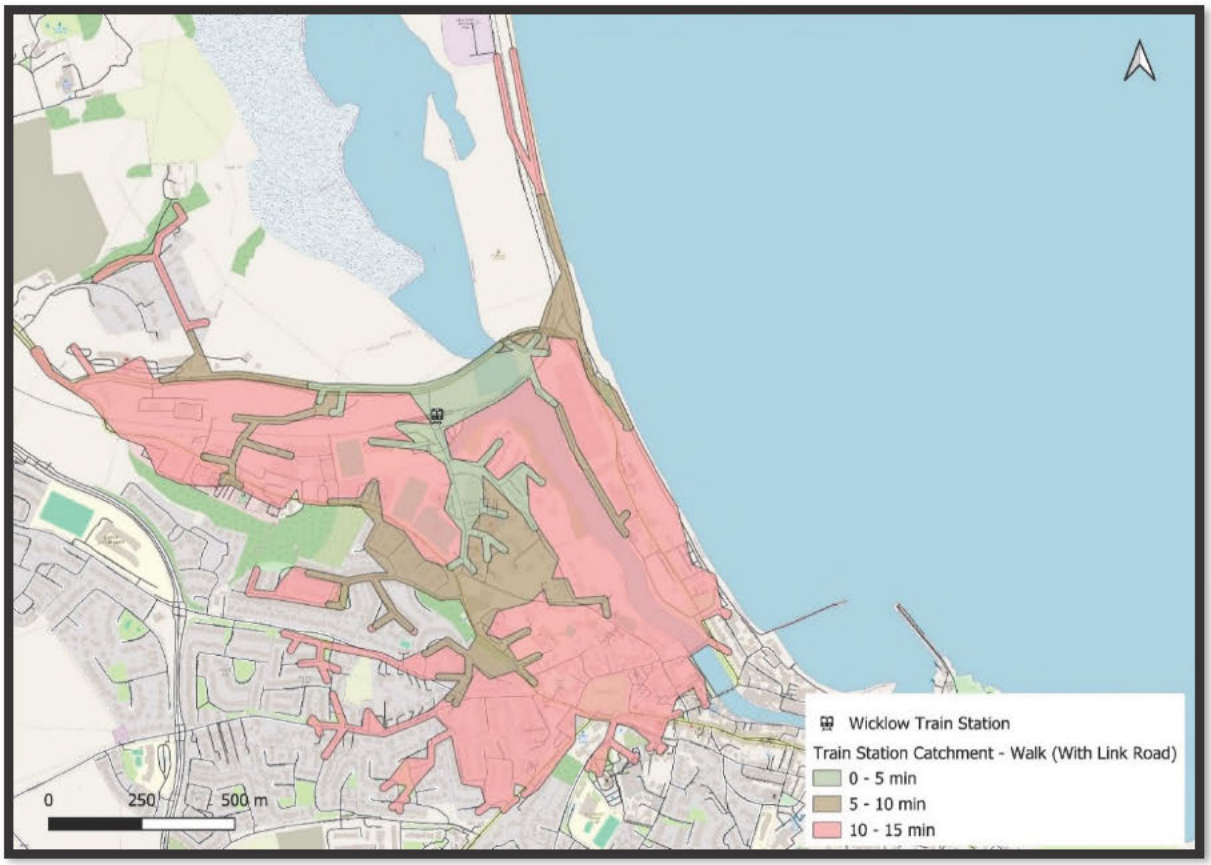


Figure 26. Wicklow Train Station Walking Catchment – Including the New Footbridge Scenario

5.7.7 As shown in the above figure, the addition of the footbridge extends the 0-to-5-minute catchment significantly. It also increases the access to the school. It opens the access to the North of the train station allowing more pedestrians to reach the train station within 5 minutes. It also extends the 5-to-10-minute catchment area.

5.7.8 The following figure shows the current cycling catchment for Wicklow Town Train Centre. It shows the distance that can be covered within 5, 10 and 15 minutes from the train station.

5.7.9 As with the walking catchment area, the following figure shows the impact that the addition of the new footbridge from Station Road to Drumkay Road would have on the accessibility to the walking catchment area to the train station, and in turn the school directly to the West of the station.

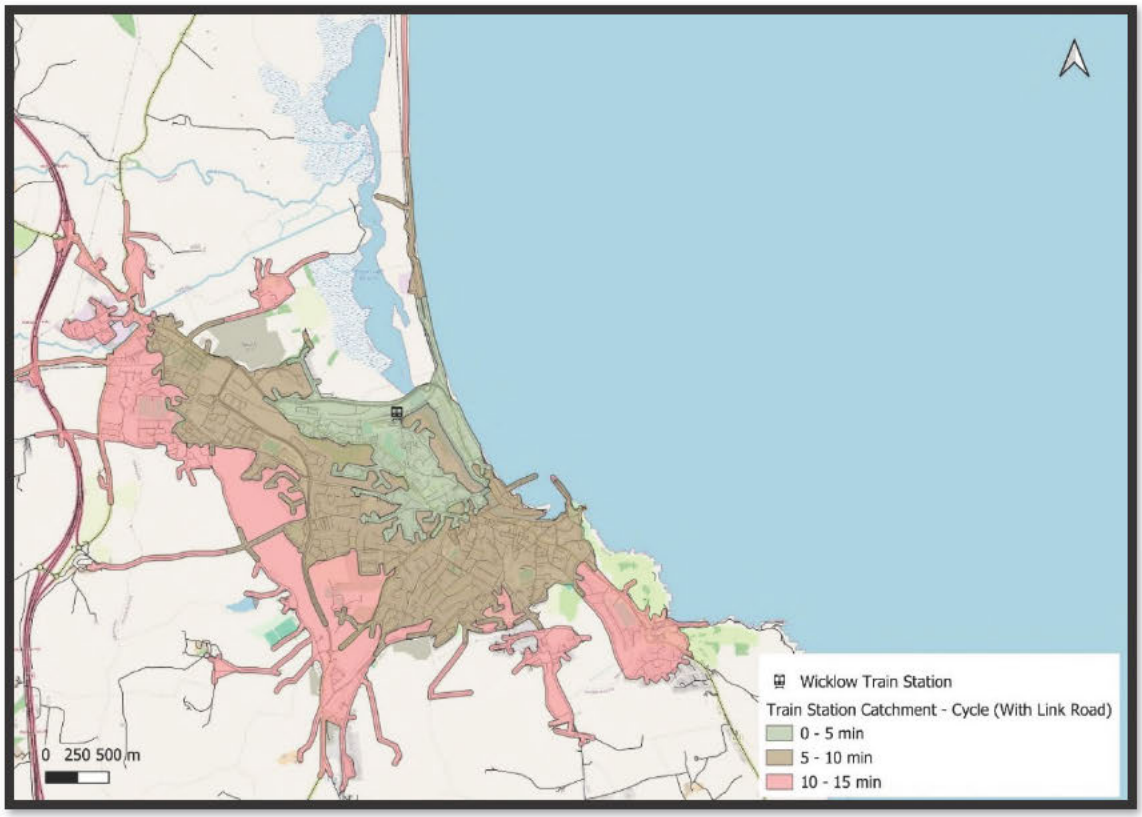


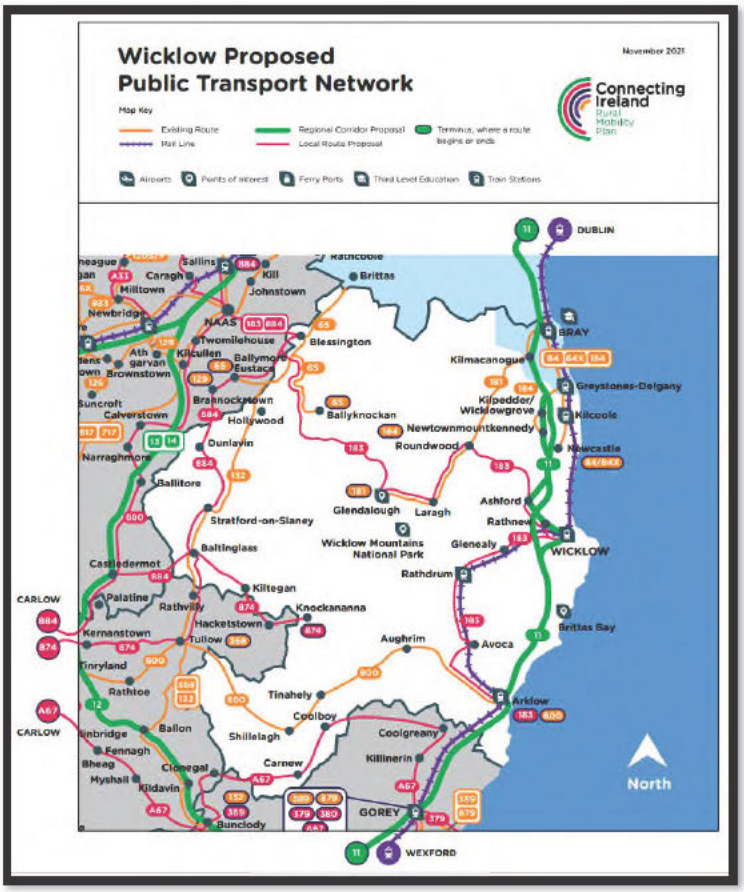
Figure 27. Wicklow Train Station Cycling Catchment – Including the New Footbridge Scenario

5.7.10 The scenario including the New Footbridge is shown in the above figure and produces the same results as the walking catchment. The footbridge decreases the time taken to travel from the North of the train station to within 0 to 5 minutes. It also increases the area that can be covered within the 5-to-10-minute catchment. It is clear in comparison that the introduction of the footbridge has a significant impact for cyclists and the time taken to reach the station and the school from the North of this area.

5.8 Connecting Ireland

5.8.1 Growth in the town population has seen the creation of a bus network with services provided by both public and private operators. The main provider for city centre services from Wicklow is the 133 Bus Éireann route along the N11 corridor, incorporating a radial loop around Wicklow town to serve residential areas. There are also deviations from the N11 to serve Ashford, and Newtownmountkennedy with a peak hour journey time of 90 mins to UCD and 2 hours to Busáras from Wicklow. A new service, Route 131 provides the first dedicated local bus service between Bray and Wicklow town, with 112 departures each way per week, connecting passengers with DART services at Bray.

5.8.2 The serves will integrate into the Connecting Ireland plan to improve public transport services for Wicklow. The initial publication of the plan is shown on the Figure below.



Proposed Public Transport Improvements in County Wicklow

	Proposal	Connecting		Serving*	Description
Regional Corridor Proposals	11	Wexford	Dublin	Enniscorthy, Gorey, Arklow, Wicklow and other places en route	This corridor is currently served by routes 2, 133, 133B, 133X, 740 and 740A. We propose a better integration of routes along this corridor. A minimum service frequency of 30 minutes is proposed between Wexford and Dublin and between Wicklow and Dublin.
Local Route Proposals	183	Sallins	Arklow	Naas, Blessington, Wicklow, Avoca and other places en route	We propose a new route from Sallins to Arklow via Naas, Blessington, Glendalough, Wicklow and Rathdrum. Minimum service frequency of 4 return trips Monday to Saturday and 3 return trips on Sunday.
	874	Carlow	Knockananna	Kernanstown, Tullow, Baltinglass, Hacketstown and other places en route	We propose to extend route 874 from Hacketstown to Knockananna, with an increase in frequency. Minimum service frequency of 3 return trips a day.
	884	Carlow	Sallins	Baltinglass, Blessington, Naas and other places en route	We propose to extend route 884 from Ballymore Eustace to Carlow. Minimum service frequency of 4 return trips on weekdays and 3 return trips at weekends.
	A67	Carlow	Gorey	Fennagh, Bunclody, Kilinerin and other places en route	We propose a new route from Carlow to Gorey via Bunclody and Carnew. Minimum service frequency of 3 return trips a day.

	Route	Connecting		Serving*
Existing Routes	65	Dublin	Ballyknockan / Ballymore Eustace	Tallaght, Blessington and other places en route
	132	Bunclody	Dublin	Tullow, Baltinglass, Blessington and other places en route
	181	Glendalough	Dublin	Laragh, Roundwood, Bray and other places en route
	184	Newtownmountkennedy	Bray	Kilpedder, Delgany, Greystones and other places en route
	64 / 64X	Blackrock	Newcastle	Bray, Greystones, Kilcoole and other places en route
	805	Carlow	Arklow	Tullow, Shillelagh, Tinahely, Aughrim and other places en route
	Train	Dublin	Rosslare	Bray, Greystones, Gorey and other places en route

Figure 28. Connecting Ireland Wicklow Proposed Public Transport

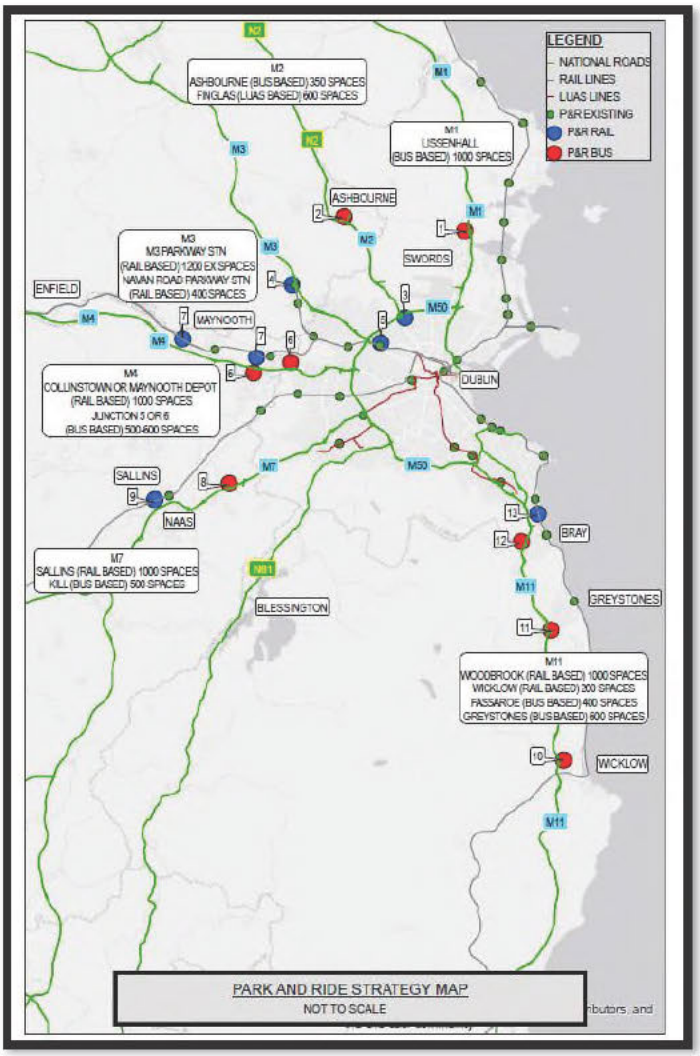
5.9 GDA Transport Strategy 2022-2042 Park and Ride Facilities

5.9.1 The GDA Transport Strategy 2022-2042 includes a strategy for park and ride to support and encourage private vehicle users to switch to public transport for long-distance trips on key radial route into Dublin Centre.

5.9.2 It includes proposals for the southeast corridor comprising both rail park & ride and bus park and ride. A new rail park and ride facility is proposed at Woodbrook Station in addition to existing park and ride facilities at train stations. It is recognised that there may be an opportunity to enhance facilities at existing train stations.

5.9.3 New bus park and ride facilities are envisaged at Wicklow Town, Greystones, and Bray along the M11/N11 corridor.

5.9.4 Park and Ride Strategy proposals for the Greater Dublin Area are shown on the Figure below.



F (M11/N11)	10	Bus	Wicklow	Junction 16	200	Yes	All 3 can be delivered in the relatively short term.
	11		Greystones	Junction 11	600	Yes	
	12		Fassaroe	Junction 7	400	Yes	
	13	Rail	Woodbrook	Junction 5	1000	No	Longer term proposal once Dart+ has been implemented and in conjunction with the proposed M11 upgrades.

Figure 29. GDA Transport Strategy 2022-2042 Park and Ride Facilities

6. DEMAND FORECASTING AND CAPACITY ANALYSIS

6.1 Introduction

6.1.1 The chapter looks at potential in growth in passenger numbers associated with increased rail service provision to Wicklow Station.

6.1.2 Recent rail service provision and associated demand for rail travel is described in Section 2 of this report. The Policy and Planning context for Wicklow Capacity Enhancements is described in Section 3 of this report.

6.1.3 The receiving environment and future plans for the scheme area indicate a demand for enhanced rail services to Wicklow.

6.1.4 The level of demand is influenced by:

- **Background growth –** underlying demand associated with population and employment, including the proximity of this growth near to rail stations
- **Travel demand** – factors which influence an individual's travel behaviour; where we live, our work habits, personal mobility, stage of life, cost of living, environmental concerns, are all things that shape behaviour
- **Travel Supply** – the attractiveness of a rail services to generate demand; the frequency and reliability of services, availability of park and ride and interchanging facilities, quality of station and on-board services.

6.1.5 The recent publication of the 2022 Census indicates that background growth has surpassed previous estimates, with population growth in the catchments of Greystones-Delgany and Wicklow-Rathnew already close to 2040 levels assumed in NTA Planning Sheet Data assumed for the GDA Transport Strategy 2042. Continued growth will further increase the demand for travel.

6.1.6 Across the study area the population under the age of 24 is above 25%. New residential areas are currently under construction which can be expected to increase this proportion; with many young families moving further outside of Dublin because of housing availability and cost of living affordability. Many of this younger demographic will continue to travel to Dublin for commuting, education, and other purposes; increasing demand on already constrained transport services.

6.1.7 The reliance on Private Vehicles across the county, with low levels of public transport mode share outside of the DART service area for towns located on the rail line, is a key indicator that service frequency and journey times are inadequate to support daily commutes. This is reflected in the modal share figures for public transport, with 20.5% of commuters using public transport in Greystones, compared to 15.9% in Kilcoole and 10.4% in Wicklow Urban.

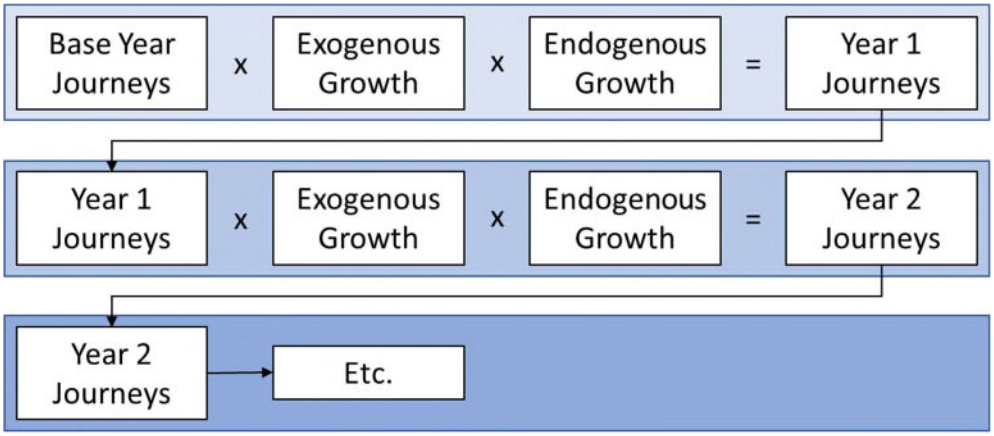
6.2 Demand for enhanced rail services to Wicklow Station

6.2.1 The demand for enhanced rail services to Wicklow Station has been assessed using a modelling approach set out in the Passenger Demand Forecasting Handbook (PDFH). The PDFH recommended approach is used in the British Rail Industry for rail demand forecasting

and was previously used as part of Iarnród Éireann Strategy 2027 and the NTA/IÉ 41 ICR Unit Business Case.

6.2.2 The PDFH recommended approach is a direct demand modelling approach and is spreadsheet based. It is based on predicting changes in demand for rail travel in response to factors internal and external to the railway. In general, it is best suited to forecasting incremental changes to an established network, as is the case for this scheme. To produce a forecast a recent base year of passenger journeys is required which is grown on a year-by-year basis in response to predicted changes in internal and external factors.

6.2.3 The PDFH recommended approach sets out elasticity-based relationship between demand for rail services and series of drivers of rail demand; covering external socio-economic factors, competing modes and changes in the level, cost, or quality of service provision on the railway. The PDFH Method is summarised below:



6.2.4 Where changes in the level of service are more significant, the PDFH recommends considering additional modelling approaches as the elasticity-based equations will typically under-estimate the step change in demand that is likely to occur. The proposed changes on the Wicklow corridor, to provide a more regular timetabled service, are significant and we have also produced some bespoke analysis within our modelling which aims to assess the increase in trip-making at Wicklow as a response to this (see para 6.2.5 below).

6.2.5 The demand forecasting approach uses the following steps:

- Apply exogenous growth –
  - background growth in line with NTA planning-sheet data. This includes land-use plans, population and employment projections along rail corridors that are consistent with NPF 2040.
  - OECD Forecast for economic growth
  - modal competition for car cost, car journey times and bus journey times including use of National Transport Model values for In-Vehicle Time
- Apply endogenous growth:
  - Account for the impact of service changes by calculating the average Generalised Journey Time (GJT) using the current timetable as a basis. The impact of GJT is calculated through reduced journey or wait times for passengers where new services are added, or existing services are modified.

- Analyse potential growth in demand for services using the Generalised Journey Time (GJT) results, supported by trip rates (using Kildare as a donor station) to uplift demand at Wicklow based on the improved levels of service. Kildare Station is used due to its station's characteristics in terms of rail service provision, population, employment, and proximity to Dublin.
- Implement the timetable change to give a new level of demand for future assessment years.

6.2.6 There has been a high degree of fluctuation in demand for rail services in recent years. 2019 saw an all-time high across the network. This was followed by Covid-19 and changes in office work patterns which saw substantial drops in years 2020 and 2021.

6.2.7 2022 Rail Census a rebound in demand for rail travel compared to previous years.

6.2.8 2023 Rail Census continued this trajectory with passenger levels back at 90% of their 2019 network peak.

6.2.9 Specific to the corridor, 2023 Rail Census results indicated passenger numbers back to 2019 pre-pandemic levels at Bray, 77% at Greystones, 63% at Kilcoole and 80% at Wicklow.

6.2.10 For Wicklow Station, passenger levels are still 34% below their previous high of 564 experienced in 2018. The year 2018 has been used as a proxy for a 2024 Baseline Year for the following reasons:

- There are no barriers at Wicklow Station or Kilcoole Station so available ticketing information does not compute to passenger demand
- Avoid uncertainty associated with Covid-19 years
- Provide a conservative assessment for residual capacity following the implementation of any service enhancements at Wicklow Station.

6.2.11 Using a 2023 Base Year, a + 4 Opening Year of 2027 is provisionally used for the implementation of Wicklow Capacity Enhancement Services to align with delivery of the 2nd Order of BEMU Fleet which are anticipated to arrive from 2026.

6.2.12 The provisional Opening Year of 2027 is in advance of DART+ Coastal South enhancements which will improve capacity north of Greystones.

6.2.13 The results of the demand forecasting analysis are provided in the table below for the following timetables:

- 1 train per hour per direction (tphpd)
- 2 tphpd

Table 7. Annualised forecast demand for rail services resulting from Wicklow Capacity Enhancement approaches

Demand in:	2027	2024	Increase in Trips	%
1 tphpd	272,369	121,273	151,097	125%

2 tphpd	310,710	121,273	193,145	156%

6.2.14 The results indicate a 125% growth in passenger levels by offering a 1tphpd service on the line.

6.2.15 The 2tphpd increases demand by 156% in totality, however over three quarters of this growth occurs when 1tphpd is introduced, and the jump to offering 2tphpd only further increases demand by 42,048 trips per annum. The incremental uplift to 2tphpd therefore makes a modest impact to demand levels over and above the 1tphpd approach.

6.3 Capacity Assessment

6.3.1 The available capacity for demand growth on the City Centre to Wicklow Station corridor has been estimated for future scenarios based on current timetable information and the 2018 Rail Census Figures to provide a conservative assessment for residual capacity. This study does not assess capacity south of Wicklow Station.

6.3.2 The assessment considers an opening year of 2027. This is prior to the implementation of DART+ Coastal South and wider DART+ Programme measures, which will improve service capacity across the Greater Dublin Area network, including between Greystones and the City Centre. A longer-term outlook of 2040 is also considered, post the implementation of DART+ and aligned with Project Ireland 2040.

6.3.3 There are currently five DMU Gorey/Rosslare service per day in each direction serving Wicklow Station. Not all services stop at Kilcoole Station. Both 22000 ICR units and 29000 Dublin Commuter units work through Wicklow Station on Gorey/Rosslare services with ICRs operating most of the services. ICRs have a seated capacity of 262 in a 4-car formation with a standing capacity of 234. 29000 fleet have a reduced seating capacity of 185 with a standing capacity of 415. For operational reasons 29000 fleet work peak period services and their reduced seating capacity can present issues when passengers stand for longer periods of their journey than desirable.

6.3.4 Wicklow to City Centre capacity enhancements will create additional demand for rail services along the corridor, however existing and new demand will be split across existing and new services depending on a passenger's preferred time of departure from Wicklow Station and arrival time in the City Centre.

6.3.5 Crowding analysis was carried for the morning peak periods of 2027 and 2040. The analysis assumed an existing DART service is extended to Wicklow, resulting in overall additional passenger capacity of 1,100 serving Wicklow Station, 408 of which is seated. The results of the analysis are described below.

6.3.6 In the 2027 morning peak:

- 1tphpd, there is 74% capacity remaining between DART+ and DMU services arriving at Greystones travelling northbound.
- 2tphpd, there is 78% capacity remaining between DART+ and DMU services arriving at Greystones travelling northbound.

The results indicate the 1tphpd approach provides capacity to meet demand when overall capacity is considered. It is noted regular service frequency to and from Wicklow will help spread demand across the morning peak periods.

6.3.7 In the 2040 morning peak:

- 1tphpd, there is 63% capacity remaining between DART+ and DMU services arriving at Greystones travelling northbound.
- 2tphpd, there is 76% capacity remaining between DART+ and DMU services arriving at Greystones travelling northbound.

The results indicate the 1tphpd approach provides capacity to meet demand when overall capacity is considered. It is noted regular service frequency to and from Wicklow will help spread demand across the morning and evening peak periods.

6.3.8 In advance of DART+ Coastal South enhancements there is potential for instances of localised overcrowding north of Greystones. This would be on a short-term basis prior to the capacity benefits of DART+ Coastal South being realised.

6.3.9 Timetabling, fleet traction, and infrastructure requirements associated with the delivery of 1 train per hour and 2 trains per hour per direction in the peak period, to service potential demand, are described in the next chapters of this report.

7. TRAIN TIMETABLE ASSESSMENT

7.1 Introduction

7.1.1 Timetable approaches for the Wicklow Capacity Enhancement Study are considered in this section.

7.1.2 Consultation was held with Iarnród Éireann's Rail Operations team members who provided insight to the assessment through a series of meetings and by response to Technical Query IE-WCE-TQ-001.

7.1.3 The assessment was informed by a review of relevant previous studies at strategic and technical levels, including:

- DART+ Coastal Performance Modelling Results (April 2023)
- DART+ Annex 3.3 Bray to Greystones Capacity Enhancements P03 – D+WP56-ARP-P2-SL-RP-GE-000212 (October 2022)
- National Transport Authority's GDA Transport Strategy 2022-2042 (2023) & supporting document on Arklow to Bray Area Based Transport Assessment (2021)

7.1.4 The assessment was also informed by existing service levels, service proposals under DART+ Coastal South and proposals under this WCE8248 Wicklow Capacity Enhancement Study which are described below.

7.2 Existing Services

7.2.1 Existing DART services currently run at a frequency of six trains per hour to Bray with two trains per hour extending to Greystones.

7.2.2 Existing Rosslare/Gorey Commuter Diesel Multiple Units (DMU) services are infrequent throughout the day, though services are clustered around the peak period.

7.2.3 Towards Dublin, there are two DMU services originating from Gorey and four originating from Rosslare Europort across the day. All six services stop at Wicklow Station but only four services stop at Kilcoole Station. Both Wicklow Station and Kilcoole Station are served by morning peak trains that reach Connolly Station at 07:48 and 08:46 in the morning.

7.2.4 Towards Rosslare, there are six DMU services across the day that all start in Connolly. All six services stop at Wicklow Station but only four services stop at Kilcoole Station. Both Wicklow Station and Kilcoole Station are served by peak trains leave Connolly at 16:33, 17:33 and 18:35 in the evening.

7.2.5 The above timetable provides Wicklow with a basic peak hour service, but few opportunities to travel in the off-peak period.

7.3 Wicklow Capacity Enhancement Proposals

7.3.1 The scope of the study is to consider 1 train per hour per direction and 2 trains per hour scenarios for services between Wicklow and the City Centre.

7.3.2 The demand forecasting and capacity analysis provided in Chapter 6 indicates that 1 train per hour per direction provides a sufficient level of service to meet demand well into the 2030s. This is indicated by the residual overall spare capacity of 63% forecasted in the 2040 1tphpd scenario.

7.4 DART+

7.4.1 **DART+ Coastal South** will enable an increase in the frequency of DART services between Dublin City Centre and Bray from 6 trains per hour per direction up to 12 trains per hour per direction per direction, and an increase in frequency of DART services between Bray and Greystones from 2 trains per hour per direction per direction up to 3 trains per hour per direction.

7.4.2 DART+ Coastal South studies highlight the maximum number of trains which could operate between Bray and Greystones is limited to 3 trains per hour per direction. The single line section of track between Bray and Greystones through the Bray Head Tunnels presents a major infrastructure constraint. To achieve a reliable 4TPH (or more) service to Greystones, full twin tracking and tunnelling works of the route would be required. A three train per hour per direction service will require a new passing loop to the south of the Bray Head tunnels.

7.4.3 Currently the section of line between Bray and Greystones can accommodate three trains per hour in each direction if services are flighted to operate close together. This allows the Dublin – Rosslare services to operate by following Greystones DART services. An intermediate signal between Bray and Greystones is provided to facilitate this, however it is not possible to achieve this in both directions in the same hour, nor spread services out in such a way that an attractive frequency can be provided.

7.4.4 The constraint of three trains per hour per direction between Bray and Greystones may impact the Rosslare/Gorey Commuter Diesel Multiple Units (DMU) currently using this route when the DART+ Coastal South services are implemented.

7.4.5 In a post-DART+ scenario, depending on demand and timetabling decisions, if the capacity of three trains per hour per direction is utilised by DART services, the Rosslare/Gorey Commuter Diesel Multiple Units (DMU) are assumed to turn back at Greystones, where passengers will be required to interchange to travel further north towards the City Centre. Provision of additional turnback facilities to support this were considered as part of DART+ TSS1c.

7.5 DART+ Fleet

7.5.1 The procurement of DART+ Fleet has an impact on the availability of rolling stock to serve the Wicklow route. There are two fleet orders in place described below.

7.5.2 First order of fleet consists of 95-carriages which are anticipated to come into operation from 2025, with most delivered in 2026:

- 65 new battery-electric carriages (13 five car units) will be deployed first on Drogheda to Dublin Northern Commuter services with ten sets in daily operation. This will allow a cascade of 29000 DMUs to other routes.

- 30 electric carriages (6 five car units) will be deployed on existing Malahide/Howth to Bray/Greystones DART services, allowing all services to be operated at maximum length. Four out of six trains will be in service each day.

7.5.3 Second order of fleet consists of 90 battery-electric carriages (18 units) which are anticipated to arrive from 2026:

- Facilitate the overall DART+ network, with potential to use them on other parts of the rail network in advance of wider electrification, subject to available funding for necessary infrastructure
- Introduction of the new fleet will also free up existing carriages to increase capacity on other Commuter and Intercity services

7.5.4 The potential provision of BEMU services between City Centre and Wicklow is linked to the second fleet order, with the first order being fully utilised serving Drogheda to City Centre.

7.6 Timetabling Assessment Assumptions

7.6.1 The following key assumptions were derived from discussions with Iarnród Éireann and form the basis for future timetable scenarios:

- DART+ Train Service Specification (TSS1C). The timetabling work to deliver the TSS1c is ongoing. There is no requirement to produce Railsys Modelling as part of the Wicklow Capacity Enhancements Study. An infrastructure model in a spreadsheet format is suitable for this study.
- Post DART+ Scenario timetable scenarios include the following assumptions:
  - Infrastructure includes Loop to south of Bray Head No.4 Tunnel and Remodelling at Bray to address 115 points (increasing capacity and flexibility at the south end Bray station). Proposed infrastructure enhancements between Bray and Greystones will be enable the operation of 3 services in each direction.
  - The It is assumed in line with TSS1C, that DART+ TSS 1c which uses additional capacity to provide three DARTs per hour to Greystones includes the turnback of DMU Rosslare/Gorey services at Greystones, with the exceptions of one or two DMU services each day that will work through to Dublin to swap units over for maintenance and fuelling purposes.
- Full length Units (a 10-coach train formed of two coupled five car trains), are assumed to serve Kilcoole and Wicklow, meaning platform extensions will be required at both locations.
- There will be a potential need for Wicklow – Dublin services to interwork with services north or west of Dublin, subject to platform capacity at Dublin Connolly to terminate services from the south. The details of these linkages will form part of further assessment by IE, at a later date, though in the sections that follow we explore linkages to address issues relevant to the service structure south of Dublin City Centre with a Wicklow service in place.

7.6.2 These timetable assumptions inform the assessment of timetable scenarios.

7.7 Timetable Scenarios

7.7.1 The timetable scenarios consider a combination of the service approaches described above:

- Existing timetable
- Service proposals put forward as part of the Wicklow Capacity Enhancement Study
- Proposed service improvements under DART+ Coastal South

7.7.2 The timetable scenarios are described below.

7.8 Timetable Scenario 1 – Existing timetable

7.8.1 A graph of the current timetable in the morning period is shown on the Figure below.

7.8.2 The graph includes several different train paths that are denoted by assorted colours:

- Green represents a DART service
- Blue/Purple represent Rosslare/Gorey Commuter Diesel Multiple Units (DMU) services
- Orange represents a train re-positioning out-of-service before coming back into service.

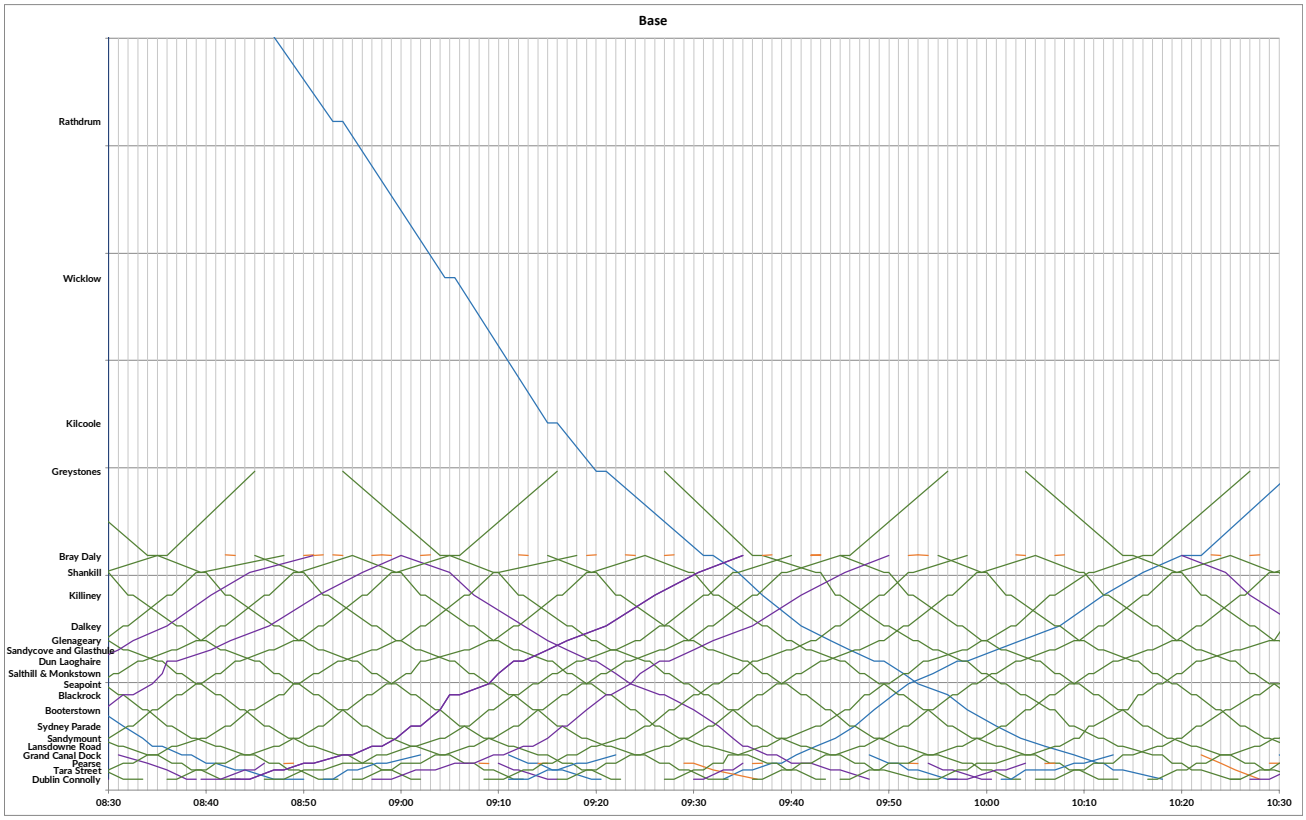


Figure 31. Current Timetable Graph

7.8.3 A description of the services is provided below to support an understanding of the graph.

DART services

7.8.4 Six trains per hour operate between Dublin and Bray of which two services per hour extend to Greystones. They run close to every half hour, but it is not an exact clockface timetable and sometimes vary throughout the day. Typically, services have a turnaround time of around 10 minutes at Greystones.

Rosslare/Gorey Commuter Diesel Multiple Units (DMU) services

7.8.5 Three Rosslare/Gorey Commuter Diesel Multiple Units (DMU) services are shown travelling inbound to the City Centre departing Wicklow Station at 06:33, 07:31 and 09:05.

7.8.6 An outbound Rosslare/Gorey Commuter Diesel Multiple Units (DMU) service is shown passing Wicklow Station at 10:00

7.8.7 The adhoc Rosslare/Gorey Commuter Diesel Multiple Units (DMU) service pattern requires an intermediate signal to flight these services between Bray and Greystones. This flighting process allows two services to operate in a single direction in quick succession, allowing a total of three services to operate per hour in a single direction. It is not however possible to achieve this in both directions in the same hour.

Empty Stock Movements

7.8.8 Orange represents a train re-positioning out-of-service (empty stock). There are two group of empty stock movements, the first being services moving from depots to Bray or Greystones stations as the service starts up at the beginning of the day, whilst a second group exists at the end of the morning peak period. This latter group are typically peak additional DMU Commuter services which run from Dublin to Bray to stable in the off-peak period.

7.9 Timetable Scenario 2 – 1tphpd Wicklow, Pre DART+

7.9.1 In Scenario 2, the timetable assessment is for pre-DART+, specifically DART+ Coastal South. The follow services levels are envisaged:

- **Scenario 2a**: Greystones is served by two DART services per hour per direction throughout the day, with one of the Dart services extended to Wicklow (per hour, per direction, stopping at Kilcoole), **or**
- **Scenario 2b**: A new train path is provided between City Centre and Wicklow which could be linked to other services north of City Centre or terminate in the City Centre. To accommodate this, an existing Greystones DART service would be terminated at Bray, to provide a path for the Wicklow service on the single line Bray – Greystones section. The new service would run closely behind the path of the truncated service ensuring that Greystones retained two services per hour to and from Dublin at approximately the same minutes past the hour as current services.
- Existing Rosslare/Gorey Commuter Diesel Multiple Units (DMU) services continue to operate unimpacted.

7.9.2 Graphs of the Scenario 2a and 2b timetables in the morning period are shown in the figure below.

7.9.3 The graph includes several different train paths that are denoted by the following colours:

- Green represents a DART service
- Blue represent Rosslare/Gorey Commuter Diesel Multiple Units (DMU) services
- Purple represents existing Commuter services and in Scenario 2b Wicklow services
- Orange represents a train re-positioning out-of-service before coming back into service.

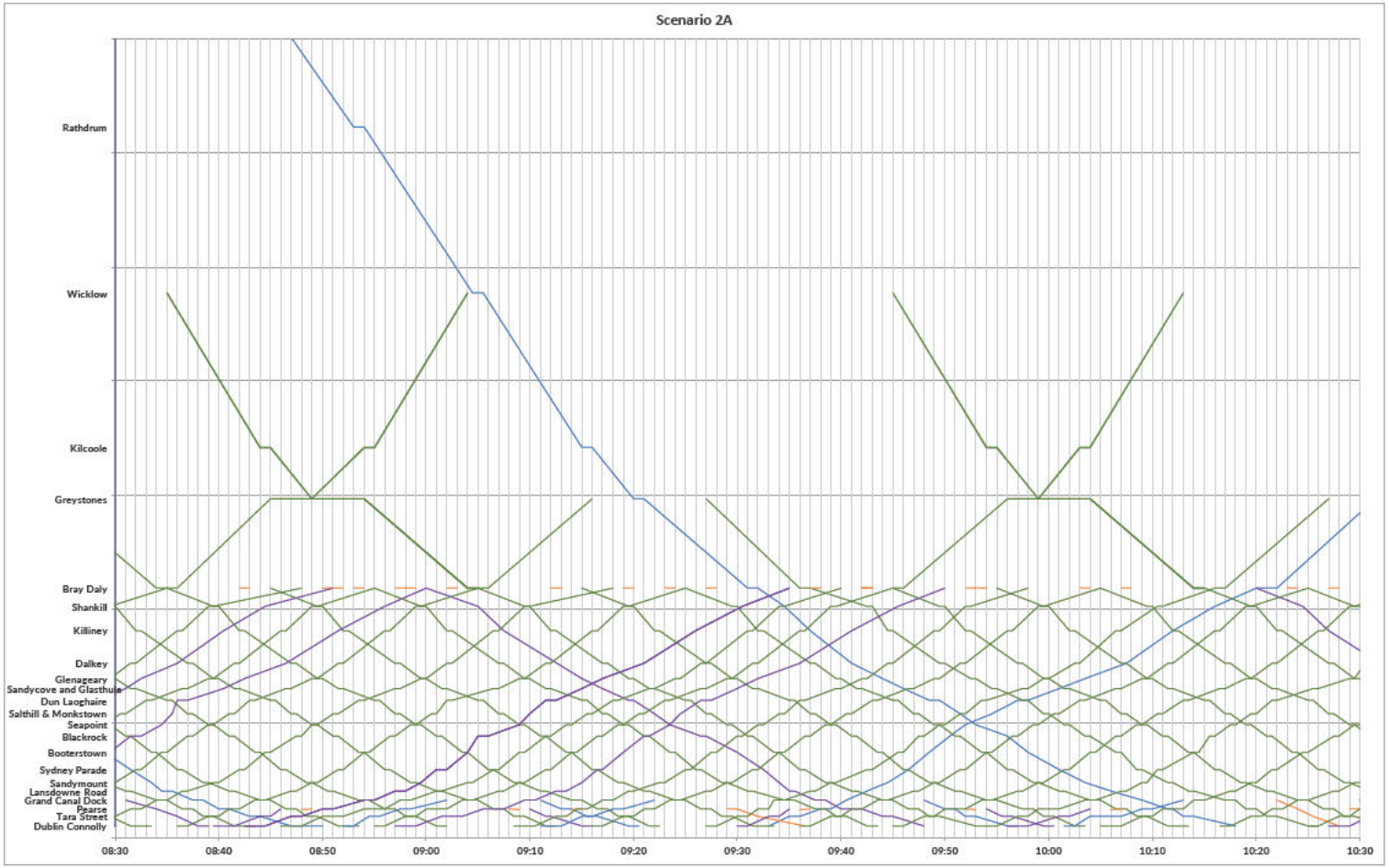


Figure 32. Scenario 2a – 1tphpd Wicklow Pre DART+ Coastal South

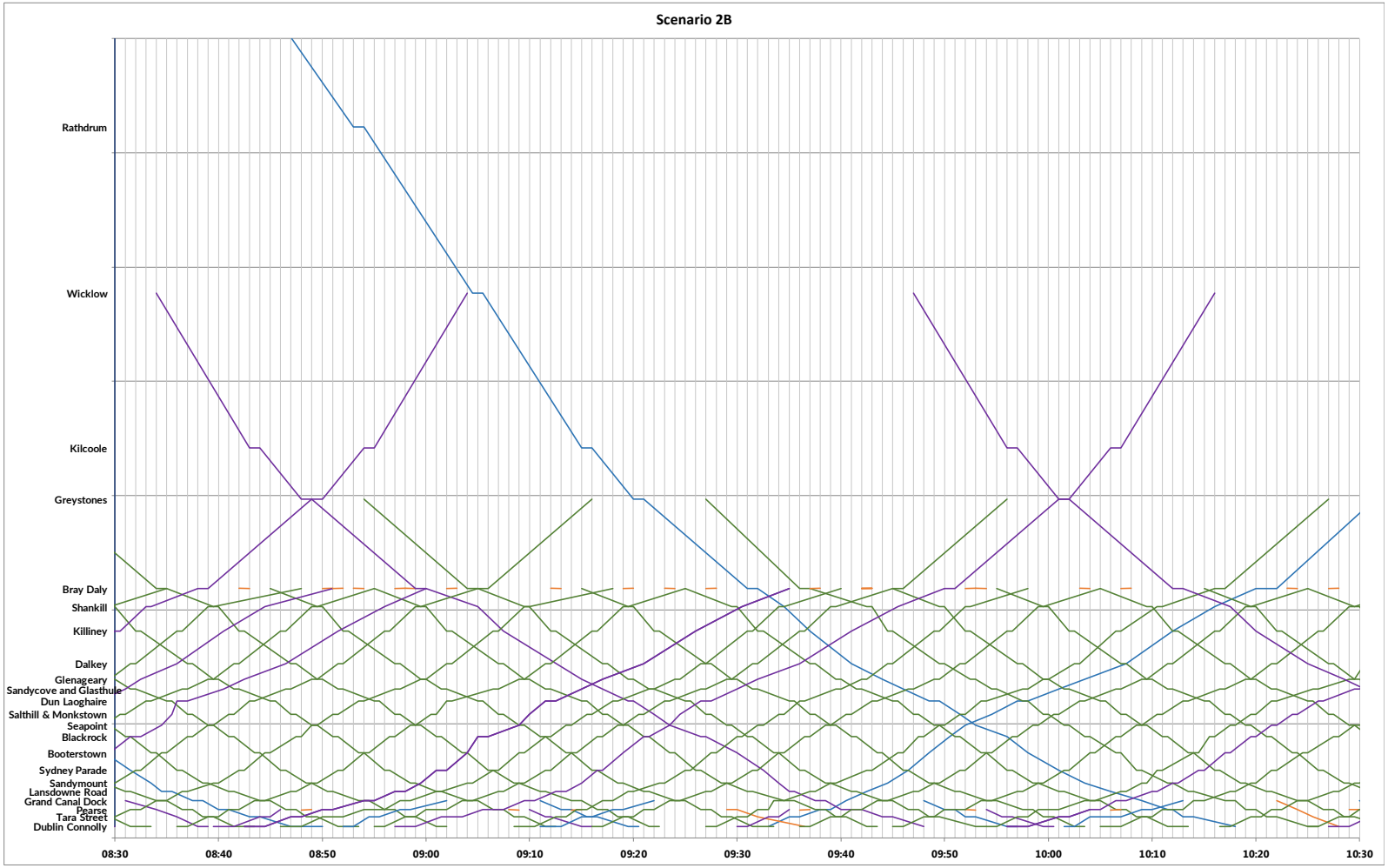


Figure 33. Scenario 2b – 1tphpd Wicklow Pre DART+ Coastal South

7.9.4 It can be seen in both scenarios that there is a robust turnaround time of around 20 minutes at Wicklow station. There are strengths and weaknesses associated with Scenarios 2a and 2b:

Scenario 2A

- Scenario 2a requires the Wicklow services to be an all stations stopping service
- Wicklow services pass in Greystones station and to manage line capacity an extended dwell must be provided for services in both directions at Greystones – though this does help provide a performance buffer
- Alterations to the wider DART service structure are required to link services north of the City Centre (discussed in detail below)
- To ensure robust BEMU operation, services operating to Wicklow will have to be formed from dedicated BEMU rolling stock diagrams, reducing interworking with other DART services
- The operating costs of this approach will be lower than Scenario 2b as only one extra Full-Length Unit (two five car sets) will be required (though it does require sufficient BEMUs to be available to replace existing DART EMUs), and the only additional mileage will be between Greystones and Wicklow

Scenario 2B

- This requires an additional train path (though in peak periods this would be an extension of an existing path) between City Centre and Bray increasing the typical number of services per hour to seven. The timetable can accommodate this, and it is understood that there is sufficient electrical supply to accommodate the additional service.
- There is an impact on level crossing operations with an additional service every hour.
- There is a requirement for an additional service to turnback at Bray, resulting in five services per hour instead of four turning back at Bray
- The operating costs incurred will be higher as three additional trains will be needed, and operating costs will be incurred for the additional services between the City Centre and Wicklow
- There is less performance resilience in this approach as the dwell times at Greystones are reduced.
- This approach requires no alterations to the DART service structure beyond the truncation of a Greystones DART service at Bray.
- The service could potentially be a semi-fast service to preserve timetable operations. Passengers on this 7th service would receive a marginally faster service as the train would operate semi fast with services only calling at Dun Laoghaire, Blackrock, Sydney Parade and Lansdowne Road between Bray and Grand Canal Dock. Passengers at these stations would maintain the same level of service, however, there may be a negative perception of seeing a service pass by their stop.

7.9.5 Scenario 2a and 2b present some challenges around the linking of services north of the City Centre, whilst it is outside the scope of this report to consider this in detail, the two approaches do have quite different impacts which are discussed below.

7.9.6 In Scenario 2a there is a need to convert around 1/3 of DART services to BEMU operation. This is because services that currently operate to Greystones operate on the following pattern – Howth – Greystones – Malahide – Bray – Howth. The pattern cannot be easily altered as the two origins north of Dublin each operate on a 20-minute headway whilst Greystones to the south operates on a 30-minute headway meaning that the origin of services arriving at Greystones alternates. Six DART workings would be required to convert from EMU to BEMU to accommodate the Wicklow service, with a further unit required to serve the extended service. If all services operated as Full-length Units, this would require a total of 14 BEMUs. This could be accommodated within the second fleet order for BEMUs but, with maintenance cover would absorb nearly all of the 18 available units. If the BEMUs replaced life expired DART units which were then withdrawn, the net increase in the number of trains required each day would only be one Full length Unit.

7.9.7 In Scenario 2b the new service can be linked to one of the two Drogheda – City Centre services that operate each hour which are due to be converted to BEMU operation during 2025/26, terminate in the City Centre, or potentially extend to other locations subject to further demand and capacity assessments. This operationally isolates the Wicklow service from the DART network. Linking to another route, for example Drogheda is likely to be the most operationally convenient as it avoids the need for services to reverse at Connolly station and improve the utilisation of rolling stock. Operating a new service would require three Full Length Units (six half-length units), although it may be possible to resource some of these units from units that operate peak additional services and stable in the off-peak period.

7.9.8 The figures below summarise these approaches – though it should be noted that this is an area where more detailed work is required to determine the optimum timetable.

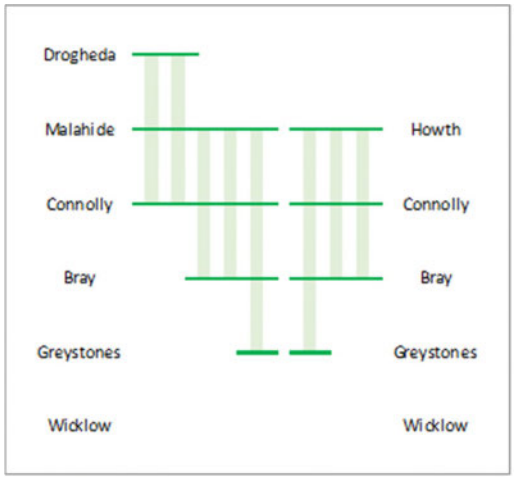


Figure 34. Base service pattern

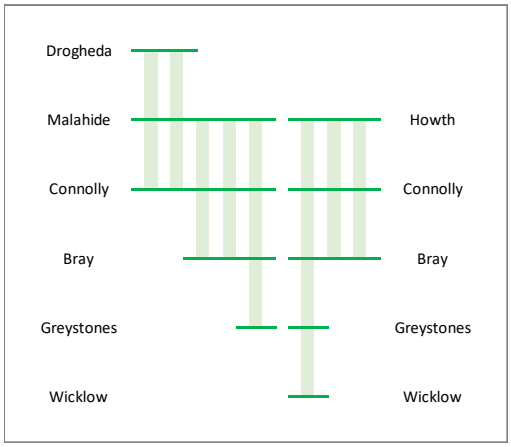


Figure 35. Scenario 2a Service Pattern

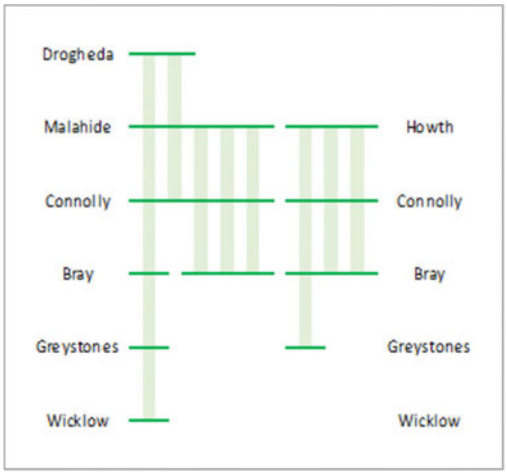


Figure 36. Scenario 2b Service Pattern

7.10 Timetable Scenario 3 – 2tphpd Wicklow, Pre DART+

7.10.1 The two train per hour per direction approach has been considered and the following is noted:

- Without mitigation, two trains per hour introduces an unacceptable performance risk by doubling the number of intensely used single line sections south of the City Centre. This presents an issue with primary delay localised to the area between Bray and Wicklow, but also a wider issue of reactionary delay radiating across the DART network, making recovery from disruption more challenging.
- Without infrastructure mitigation the Greystones – Wicklow single line would be occupied for around 55 minutes each hour by Wicklow to City Centre services – this presents an unacceptable performance risk and would prevent the Gorey/Rosslare DMU services operating north of Wicklow, unless additional infrastructure were provided to improve capacity of the line.

7.10.2 Mitigating infrastructure, based on the current service pattern would be to double track immediately south of Greystones and provide an Intermediate Block Signal near Kilcoole, the latter to facilitate Gorey/Rosslare DMU services.

7.10.3 However, the change in timetable associated with DART+ TSS1C will result in further double tracking being required between Kilcoole and Wicklow to align with new timetable workings.

7.10.4 Even with the two passing loops in place, there is still a significant performance risk due to intensive use of remaining single line sections along the full corridor, including existing tunnelled sections between around Bray Head. This performance risk is important to recognise from a customer perspective. There is tight window for northbound and southbound services to pass as scheduled on the passing loop. Minor delays elsewhere on the network could result in service missing this window. The likely outcome is lengthy delays or cancellations for Wicklow services to maintain wider network performance north of Greystones.

7.10.5 The complexities of providing a two train per hour approach is shown on the timetable graph for '2tph Wicklow – Off peak timetable' on the Figure below.

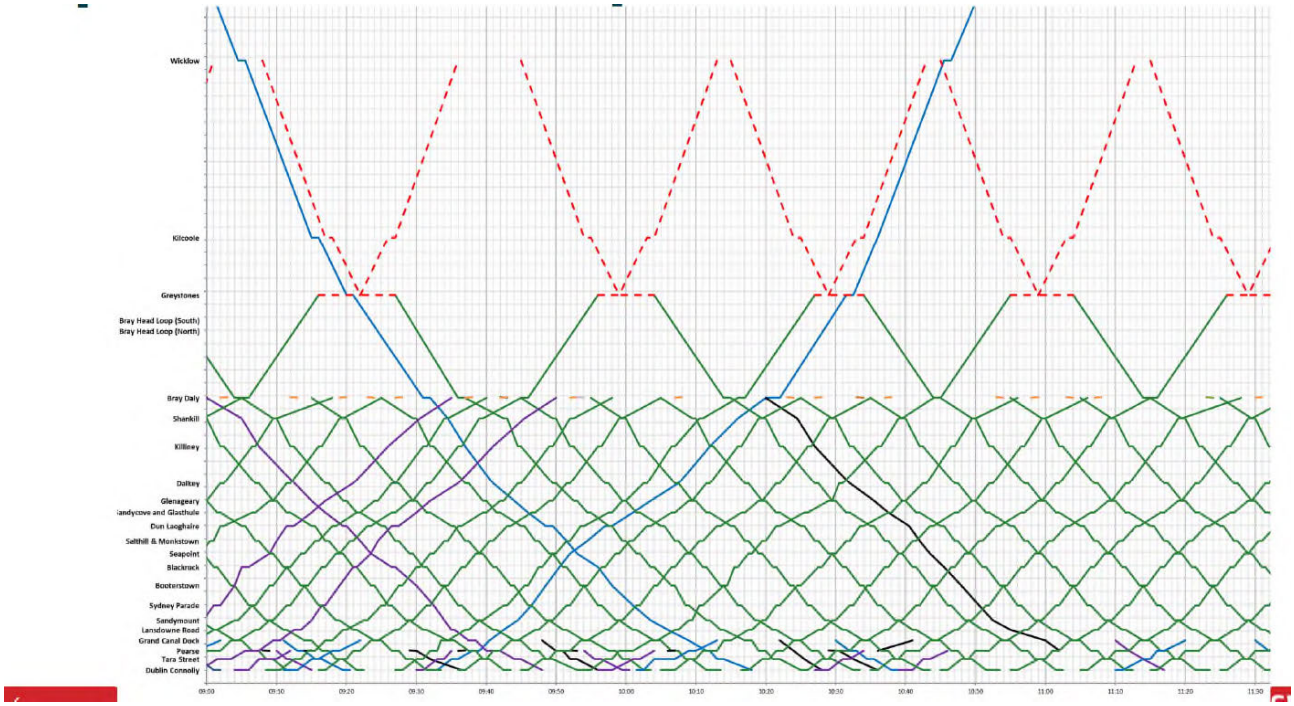


Figure 37. Graph of Scenario 3 – 2tphpd Wicklow Off Peak Timetable

7.10.6 It is evident from the above analysis that delivering 2tphpd comes with several significant operational challenges and the full extent of mitigating infrastructure cannot be determined at this stage. In addition, demand vs capacity analysis undertaken in Chapter 6 indicates 1tphpd is sufficient to cater forecast demand in the short-medium term.

7.11 Timetable Scenario 4 – Post DART+

7.11.1 At the time of writing, the DART+ TSS1c has been finalised, but the associated timetabling is under preparation. The timetable for Wicklow services is to be determined when the DART+ timetable is finalised. The service frequency proposed between Dublin and Bray of 12 trains per hour implies that Wicklow services will of necessity call at all stations, as there would be no benefit from a semi-fast service as it would catch up services ahead and in so doing not

save any time over stopping services. At this point, the linkage of services could be reviewed with the approach to operate services to Malahide, Drogheda, Howth, Maynooth or Hazelhatch.

7.11.2 In Scenario 4, the timetable is considered after DART+ TSS1c is implemented:

- Greystones is served by three DART services per hour per direction throughout the day, with one of the DART services extended to Wicklow (one per hour, per direction, stopping at Kilcoole)
- Rosslare/Gorey Commuter Diesel Multiple Units (DMU) services turn back at Greystones. It is noted that DART+ TSS1c didn't consider Wicklow Capacity Enhancements.

7.11.3 The outcome of this scenario is as follows:

- Wicklow and Kilcoole Stations are served by one DART service train hour per direction throughout the day, similar to Scenario 2a. Passengers can choose the DART service to travel to/from the City Centre without the need to interchange.
- Wicklow and Kilcoole Stations are also served by Rosslare/Gorey Commuter Diesel Multiple Units (DMU) services, however, DMU services will no longer operate passenger services north of Greystones. This means passengers who wish to travel to/from the City Centre need to interchange with a DART service on their journey.

7.11.4 For passengers travelling northbound:

- Alight at Greystones Station and interchange with one of the three DART services per hour
- Alight at either Wicklow Station or Kilcoole Station and interchange with the one DART service per hour which extends to Wicklow

The choice of Greystones for interchange will be favoured by many passengers given the option of three DART services. However, some passengers may choose to interchange at Wicklow or Kilcoole Stations.

7.11.5 For passengers travelling southbound:

- All passengers must take a DART service to travel southbound from the City Centre
- Passengers can take one of three DART services to interchange with a Rosslare/Gorey Commuter Diesel Multiple Units (DMU) at Greystones

The choice of Greystones for interchange will be favoured by many passengers given the option of three DART services. However, some passengers may choose to interchange at Wicklow or Kilcoole Stations.

7.11.6 Timetabling in the post DART+ scenario will have an impact on the suitability of fleet traction types. For example, integrating the Wicklow service into the core DART+ service implies that rolling stock needs to be EMU or BEMU to maintain the integrity of DART+ fleet plans for operational and maintenance planning.

7.12 Key Timetable considerations

7.12.1 1tphpd is the emerging preferred timetable approach to meet forecast demand. It is a workable timetable that provides an improved level of service whilst minimising operational risks that could affect service performance.

7.12.2 Timetable scenarios 2a and 2b both provide potential timetable solutions for 1tphpd.

7.12.3 Timetable scenario 3 for 2tphpd is not preferred as 1tphpd is shown to cater for demand in the short-medium term and 2tphpd introduces service performance risks that need substantial infrastructure investment to mitigate against.

7.12.4 Timetable scenario 4 necessitates services to call at all stations. Integration with the future DART+ Train Service Specification and future DART+ timetable is required to deliver service performance.

8. FLEET TRACTION

8.1 Introduction

8.1.1 This chapter considers potential fleet traction types for either 1 or 2 trains per direction per hour (tphpd) between Wicklow and the City Centre.

8.1.2 Fleet traction is interrelated with infrastructure capability and operational planning considers; together they impact on the preferred approach for enhanced service delivery.

8.1.3 Three traction types are assessed as part of the study:

- Diesel Multiple Unit (DMU)
- Electric Multiple Unit (EMU) – operating on overhead electric power at 1500v DC
- Battery Electric Multiple Unit (BEMU) – Bi Mode train capable of operating either from on board batteries or from overhead wires

8.1.4 DMU and EMUs are already operated by IÉ, and two orders are placed for BEMU fleet.

8.2 Diesel Traction

8.2.1 The use of diesel traction is considered in the context of the strategy to decarbonise rail services. It is not desirable to order new build diesel trains where a sustainable alternative is feasible to deliver. This is especially the case for short to medium distance services in a commuter network that is being decarbonised under the DART+ Programme. Already there is move away from new build DMUs on the northern line between Drogheda and the City Centre through the ordering of BEMUs to replace 29000 Class fleet as part of the DART+ Fleet renewal programme.

8.2.2 There are currently four diesel fleet types in operation on the network:

- 2600 Class – Text * 2 car units based in Cork
- 2800 Class – 10 * 2 car units based in Limerick
- 29000 Class – 29 * 4 car units that operate Dublin commuter services
- 22000 Class – *63 InterCity Railcar (ICR) sets operating suburban and long-distance services.

8.2.3 Of these four fleets, only the 29000 and 22000 fleets are relevant to Wicklow services, as both the 2600 and 2800 fleets are fully deployed on services in the Cork and Limerick areas.

8.2.4 Both the 22000 ICR units and the 29000 Dublin Commuter units work through Wicklow on Rosslare services with ICRs operating most services. ICR units are designed to operate long distance services and are not suited to more urban operations with short dwell times and high passenger loadings with their narrow end doors being a barrier to such operation. In contrast, 29000 are more suited to short to medium distance work on urban routes and have wider doors at 1/3 and 2/3 position making them suitable for higher density services which support busy commuter passenger flows.

8.2.5 In principle, 29000 units could operate a DMU Commuter service to Wicklow under Timetable Scenario 2b. However, as part of the DART+ Programme, BEMU services are already set to replace existing 29000 diesel fleet for City Centre to Drogheda services. Similarly, it can be expected that this issue will apply to both Maynooth and Hazelhatch as the fleet renewal programme develops as part of the DART+ Programme with the objective of fleet decarbonisation.

8.2.6 It would also require an existing DART service to turnback at Bray, resulting in an existing EMU service to Greystones being replaced with a DMU Commuter Service.

8.2.7 Post DART+ under Scenario 4, Wicklow to City Centre services will need to be fully integrated into the DART+ Timetable as envisaged under the DART+ Train Service Specification 1C. Under the DART+ TSS, all services between Greystones and the City Centre operate as DART services and there are no other train paths available for alternative services. This means Wicklow to City Centre services will have to match the performance characteristics of DART+ services, with fleet being able to support busy commuter passenger flows.

8.2.8 In conclusion, the use of DMU services to deliver 1 or 2 trains per direction per hour (tphpd) between Wicklow and the City Centre is not viable as part of a strategy that integrates with DART+ Programme objectives for the Greater Dublin Area.

8.3 Electric Multiple Units

8.3.1 Currently the route from the City Centre to Greystones is electrified, as part of the DART network, at 1500VDC. To operate EMUs on the Wicklow to City Centre route the remaining Greystones – Wicklow part of the corridor would need to be electrified.

8.3.2 The cost effectiveness of an electrified route is likely to be poor if the train service frequency is one train per hour per direction and costs are high. Two trains per hour per direction would incur the added cost of track capacity upgrades and their electrification.

8.3.3 The case for electrification is therefore intricately linked to the type of service operated and other operational planning constraints as well as the cost effectiveness of electrification.

8.3.4 The table below assesses electrification against the Timetable Scenarios 2a and 2b.

Table 8. Assessment of electrification against timetable scenarios 2a and 2b

Service	Electrification
Timetable Scenario 2a	In the case of Timetable Scenario 2a, Wicklow to City Centre services would be linked to the core DART network of Malahide/Howth – Bray/Greystones which is already fully electrified. The Wicklow to City Centre Service could integrate with these services if Greystones to Wicklow is electrified.
Timetable Scenario 2b	In the case of Timetable Scenario 2b, Wicklow to City Centre services would be linked to services to the north and west of Dublin on routes which are currently unelectrified. This arrangement would not work prior to electrification of these routes as there is no capacity to turnback services arriving from the south in the City Centre.

8.3.5 The assessment indicates Timetable Scenario 2a is feasible when Greystones to Wicklow is electrified, whereas Scenario 2b relies on the electrification of other routes in the GDA under DART+ Programme to operate services. These conditions apply for both 1tphpd and 2tphpd.

8.3.6 The timetabling scenarios highlight the complexity involved in interworking Wicklow to City Centre with other linked services when there are different traction types in operation across the network.

8.3.7 The electrification of Greystones to Wicklow is likely to be challenging due to the following considerations:

- The 18.5km corridor is sited within a Special Area of Conservation for much of its length, including The Murragh SPA. This may impact the feasibility of siting, installing, and maintaining OHLE, and substation infrastructure associated with electrification along the route.
- There is limited ESB infrastructure along the corridor, potentially affecting the feasibility and timeliness of delivering new connections for 4 substations along the corridor.
- The land available to deliver OHLE and substation infrastructure is constrained by natural assets and private lands to the west, and the Irish Sea coast which is subject to climate adaptation and protective measures to the east.

8.3.8 It is not realistic to assume funding will be made available for the electrification of Wicklow to Greystones in advance of the DART+ Programme commitments under the National Development Plan 2030 given the complexities of scheme delivery, stage of the project, and its reliance on DART+ Programme to achieve longer term benefits for passengers along the corridor. On this basis, electrification of the corridor is only anticipated in a post DART+ Scenario should a future timetable structure necessitate Wicklow to City Centre Services to form part of an interworked timetable plan with EMUs.

8.4 Battery Electric Multiple Units (BEMU)

8.4.1 BEMU services can operate using overhead electric wires, or an on-board battery when away form an overhead supply. BEMU rolling stock that is available under the Fleet Framework Agreement signed between Alstom SA and IÉ can be charged either via dedicated charging equipment or through regenerative braking. They can also travel under overhead wires without using battery power provided there is sufficient power available to draw upon from the overhead wires.

8.4.2 Two fleet orders have been placed for the delivery of rolling stock. The Alstom units are capable of operating from Malahide to Drogheda under battery power which is a greater distance than a return journey from Greystones to Wicklow.

8.4.3 The initial BEMU order of 65 new battery-electric carriages (13 five car units) will be deployed first on Drogheda to Dublin Northern Commuter services. BEMU Charging infrastructure is being delivered at Drogheda Station to facilitate the rollout.

8.4.4 A second order includes a further 90 battery-electric carriages (18 five car units). The potential provision of BEMU services between City Centre and Wicklow is linked to this second fleet order which is due to arrive in 2026.

8.4.5 Whilst BEMU operation provides a pragmatic way of achieving urban commuter service performance without electrification, it does present some additional challenges relative to either diesel or electric traction:

- A requirement for charging facilities to be provided at unelectrified terminal stations, at depots and potentially at intermediate locations if the distance proposed to travel by battery is greater than the range of the battery. The cost of these facilities can vary depending on the frequency and volume of charging to be undertaken (e.g. number and length of trains) and the availability of suitable grid connection
- The need for additional turnaround time to be factored into timetables to allow time for charging
- Higher capital costs and additional costs relative to electric trains for the periodic renewal of the on-board batteries

8.4.6 The flexibility of battery operation with lower capital costs than electrification makes the mode attractive for providing service enhancements where practicable to delivery.

8.4.7 In the table below BEMU is considered against the Timetable Scenarios 2a and 2b.

Table 9. Assessment of BEMU against timetable scenarios 2a and 2b

Service	BEMU
Timetable Scenario 2a	In the case of Timetable Scenario 2a, Wicklow to City Centre services would form an all stopping service whilst retaining 6 trains per hour to Bray. There would be no net change in services to/from the City Centre for northbound or southbound DART passengers. Currently services that operate to Greystones do so as part of a series of working that repeat on the following pattern – Howth – Greystones – Malahide – Bray – Howth. This represents the resourcing requirement for around 1/3 of all DART services, but as a self-contained group of working could be converted to BEMU operation. Doing so would require 14 half-length units (seven Full Length Units), including the additional units needed to extended services to Wicklow. This could be resourced from the second fleet order for BEMUs, which totals 18 Half Length Units. This would allow a comparable number of the older 8100 units to be withdrawn. The operating costs of this approach will be lower than Scenario 2b as only one extra train will be required, and the only additional mileage will be between Greystones and Wicklow.
Timetable Scenario 2b	In the case of Timetable Scenario 2b, Wicklow to City Centre services would either terminate in the City Centre or be linked to services to the north or west of Dublin. For example, the ongoing installation of charging facilities at Drogheda could enable services to be linked to one of the two Drogheda – Dublin services that operate each hour, which are due to be converted to BEMU operation during 2025/26. This operationally isolates the

	Wicklow to City Centre Service from the DART network. The optimum destination for the BEMU service is subject to further demand and capacity assessment. The operation results in a 7th all day electric train path along the corridor, placing additional demand on power supply between the City Centre and Bray, and potentially requiring additional closure time for level crossing operations throughout the day and introducing a 5th turnback of a service at Bray. There is less performance resilience in this approach as the dwell times at Greystones are reduced. The operating costs incurred will be higher than Scenario 2a as additional trains and running distances will be required. The number of trains required is determined by stopping patterns and destination of services. For example, in the case of semi-fast services linked to the BEMU Drogheda service, it is estimated 3 additional trains are required with running costs associated with continuing these services between the City Centre and Wicklow, though some of these trains could be resourced from trains that operate peak hour services and are currently spare in the off peak. Linking of services to destinations other than Drogheda would require more BEMUs to replace existing DMU services.

8.4.8 The table highlights that there are several approaches to deliver a BEMU services in the pre-DART+ scenario. The preferred approach for delivery needs to be worked through at subsequent stages of this scheme.

8.4.9 A BEMU service could provide two trains per direction per hour (tphpd) with further timetable complexities needing to be worked through and the necessary infrastructure upgrades being in place.

8.4.10 Post DART+, services will be required to stop at all stations as part of the current DART+ TSS 1c. This reduces the timetable approaches but there is a similar need to operationally isolate the BEMU service to minimise the number of BEMU services in operation under wires and mitigate against service disruption.

8.4.11 BEMU charging infrastructure is proposed at Wicklow Station to support a resilient service. It may be the case that charging infrastructure is not required in Wicklow for normal every day service, however, its provision supports continued operation in the event of planned or unexpected service disruptions/closure north or west of the City Centre.

8.4.12 The following non-exhaustive list of infrastructure requirements associated with BEMU infrastructure at Wicklow Station are considered:

- Power supply requirements and availability of ESB Connection
- Siting of substation and cabling routes
- Siting of charging infrastructure at the platforms
- Platform modifications
- Resignalling

8.4.13 This study does not look at potential stabling/maintenance facility upgrades that may benefit the rollout of BEMU fleet across the network.

8.5 Key Fleet Traction Considerations

8.5.1 Fleet traction types were assessed in the context of the demand forecasting and timetabling analysis provided in Chapter 6 and 7, respectively.

8.5.2 Wicklow to City Centre services will be fully integrated with the DART+ TSS. The fleet choice therefore needs to match the fleet performance characteristics. DMU fleet is not preferred for this reason.

8.5.3 Wicklow to City Centre services is anticipated to commence operation in the short term prior to the full rollout of DART+ Programme. EMU services require electrification of the line between Wicklow and Greystones. Therefore, to operate EMU services, this infrastructure work would need to be completed before DART+ Programme works. For EMUs:

- Pre DART+: EMU fleet is not practical to deliver
- Post DART+: Dependent on DART+ Timetable being able to address interworking of EMUs and BEMUs. If BEMUs cannot be operationally isolated, then this could trigger the need to electrify the route.

8.5.4 BEMU is the preferred traction type for Wicklow to City Centre services. They do not incur the cost of electrifying the line and can match DART+ Timetable performance characteristics for frequent urban commuter services. There are however additional costs associated with the periodic renewal of the on-board batteries.

8.5.5 Implementation of BEMU services does involve operational considerations that need to be worked through. There are several approaches for the introduction of BEMU services on Wicklow to City Centre route:

- As part of existing DART service structure plan but with the BEMU service isolated operationally
- As part of a linked service to BEMU operations between the City Centre and Drogheda
- A Wicklow to City Centre service terminating at the City Centre
- Linked with other services subject to demand and capacity assessment, recognising BEMU operations for Wicklow to Centre are associated with the 2nd fleet order, and there may be a preferred timetable identified as part of further studies associated with the fleet order.

9. INFRASTRUCTURE REQUIREMENTS

9.1 Introduction

9.1.1 The outline infrastructure to deliver each of the six approaches is described in this chapter:

- 2 trains per hour EMU
- 1 train per hour EMU
- 2 trains per hour BEMU
- 1 train per hour BEMU
- 2 trains per hour Diesel
- 1 train per hour Diesel

9.1.2 The infrastructure requirements are considered at a high-level to enable comparative assessment to support pre-feasibility stage findings.

9.1.3 They include consideration of power supply, permanent way, OHLE, station upgrade works and re-signalling.

9.1.4 The following assumptions and exclusions are noted as part of the assessment:

- A BEMU or EMU solution relies on the rollout of ETCS Level 1 between Wicklow and Greystones for its operation. The rollout of ETCS Level 1 on this section of the network is currently planned under Phase 5 of the TPS Trackside National Rollout. The cost for these works sits within the TPS Trackside National Rollout Project. These works could potentially be delivered out of the currently planned sequence to support the delivery of WCE.
- Roll out of GSM-R infrastructure for DART+ fleet
- Rolling stock units and associated maintenance facilities are delivered through the DART+ Fleet Programme for EMU and BEMU, or existing 29000 for DMU services.
- DART+ Coastal South enhancements are delivered through the DART+ Programme.
- Active Travel Bridge (Wicklow Train Station to Port Access Route) scheme is being delivered by others including the station accessibility upgrades at Wicklow Station.
- Maintenance and operating costs have not been assessed at this stage, including different requirements associated with running EMU, BEMU, or Diesel rolling stock units.
- The extent of third-party Landtake has not been assessed at this stage.

9.1.5 The infrastructure requirements are considered under the following headings:

- Infrastructure for EMUs
- Infrastructure for BEMUs
- Corridor Track Capacity Upgrades
- Station Works to accommodate new fleet types serving Kilcoole and Wicklow Stations
- Station Works to accommodate an increase in passenger numbers

9.2 Infrastructure for EMUs

9.2.1 Electrification of the 18.5km (11 miles) route to 1500v DC involves a significant amount of new infrastructure.

9.2.2 Traction substations are envisaged every 4-5km. Assuming four in total, they could potentially be located near to Kilcoole Station, old Newcastle rail station, Clonmannon Farm/Stud and Wicklow Station where there is existing road access and the best opportunity for ESB supply. There is limited ESB infrastructure along the coastal corridor and the availability of power and new connections are subject to agreement with ESB.

9.2.3 OHLE infrastructure is required along the length of the corridor. Climate adaptation is a significant factor for electrification along a corridor that is subject to coastal erosion and flooding. Proposals for OHLE infrastructure will need to align with ECRIPP measures to ensure risks are appropriately mitigated. The line runs through a Special Area of Conservation, including Murragh SPA, which needs to be factored into plans for construction and maintenance.

9.2.4 There is one pedestrian rail overpass, one stream rail overpass, a rail bridge over Kilcoole Estuary spanning 50m and an iron bridge over Varty River spanning ~60m. The siting of OHLE infrastructure along these sections requires special attention.

9.2.5 Electrical clearances are typically a major consideration for electrification projects. Between Greystones to Wicklow Town there is one road overbridge and no rail under bridges. The R999 Wicklow Town Port Access Road was completed in 2010 and contains a concrete bridge over the rail line spanning 22m. The clearance to this bridge for OHLE infrastructure is yet to be confirmed.

9.2.6 Immunisation is required along the length of the corridor. This includes line side and station equipment but also any third-party assets which may be affected.

9.2.7 There are 8 at-grade level crossings along the corridor. Additional safety measures are envisaged to support line electrification.

9.3 Infrastructure for BEMUs

9.3.1 New charging infrastructure at Wicklow Station is proposed to support BEMU service delivery. The charging infrastructure provides service resilience along a section of corridor with no overhead lines and supports continued operation in the event of planned or unexpected disruptions/closure north or west of the City Centre.

9.3.2 An initial assessment indicates that a new traction substation may require third party landtake north of the railway, including a new vehicular access. A new/uprated ESB connection is expected, and its availability/delivery is subject to ongoing discussion/agreement with ESB.

9.3.3 An Energy Storage System is not currently envisaged, but this is subject to further investigation as part of Phase 2 of the study and discussion with ESB.

9.3.4 Charging is envisaged at the two platforms at Wicklow Station with new OHLE infrastructure required. The OHLE infrastructure is expected to conflict with an existing metal footbridge

between the platforms, meaning it is likely the footbridge will need to be altered or relocated. It is noted this footbridge is proposed to be replaced as part of the Active Travel Bridge (Wicklow Train Station to Port Access Route) Scheme.

9.3.5 An initial estimate of 400 metres for OHLE has been used. This allows for charging at two full length platforms at a minimum. New cabling infrastructure will be required to connect the traction substation with the platform infrastructure.

9.3.6 Immunisation is required for infrastructure at Wicklow Station including any third-party assets.

9.4 Corridor Track Capacity Upgrades

9.4.1 The railway is single track for 18.5km between Greystones Station and Wicklow Station. There are also single-track operations between Bray and Greystones around Bray Head.

9.4.2 Single track operations have inherent performance risks when the line is well used, and trains frequently need to pass each other along this section of the network. Delays elsewhere on the network are compounded by single track operation. This is particularly an issue where there is insufficient spare time (resilience) in the timetable to allow for any delay; a southbound train arriving late to the single-track section will introduce delay for northbound train as it waits to travel north using same section of track, and so on. To mitigate against this issue, line speed enhancements, passing loops and double tracking between stations can be considered with respect to potential working timetables.

1 train per hour per direction Wicklow to City Centre

9.4.3 The timetabling assessment indicates 1 train per hour per direction Wicklow to City Centre and existing DMU Gorey/Rosslare services can operate without the need for corridor track capacity enhancements.

9.4.4 Dwell time associated with the stopping patterns indicate line speed enhancements would not be cost effective as journey time improvements would be negated by additional dwell time.

2 train per hour per direction Wicklow to City Centre

9.4.5 The timetabling assessment indicates 2 train per hour per direction Wicklow to City Centre will require corridor track capacity enhancements to operate a future timetable.

9.4.6 Double tracking is the preferred solution to mitigate against service performance but comes with the highest cost. These costs need to be justified in terms of service performance and passenger benefits. The introduction of double track operations at unattended level crossings introduces a safety risk that needs to be addressed, which will add to the cost of the capacity upgrades.

9.4.7 Passing loops can provide a more cost-effective solution to add capacity to a corridor. However, they are reliant on timetabling to ensure trains will pass each other on the loop at the right time. Typically, an allowance for some delay is factored into the timetable to provide resilience.

9.4.8 For Wicklow to City Centre Services the train timetable will change in pre and post DART+ scenarios. This means the passing loop location would change:

- Pre DART+ timetable south of Greystones Station (northern loop)
- Post DART+ timetable south of Kilcoole Station (southern loop)

9.4.9 It is not possible to determine passing loop lengths without more detailed timetable information. Given the unknowns, an assumption is made for the purpose of comparative assessment.

9.4.10 An assumption is made that each passing loop is a minimum of 3km in length. In this scenario, the northern passing loop would be in a constrained section of corridor between private lands and the coast. Some land acquisition is envisaged, and its delivery is subject to design, cost, environment, construction, and climate adaptation considerations. The southern loop would be located within a Special Area of Conservation and its delivery also subject to design, land acquisition, cost, environment, construction, and climate adaptation considerations. The passing loops would require additional signalling infrastructure for their operations.

9.4.11 The intensive use of the remaining single section along the corridor means there would still be operational risk to service performance even with the two passing loops. As a result, double tracking cannot be discounted at this early stage, including the potential for works between Bray and Greystones.

9.5 Station Works to accommodate new fleet types serving Kilcoole and Wicklow Stations

9.5.1 The requirement to undertake station works to accommodate full length units is common to all the approaches.

9.5.2 Platform lengths at Kilcoole and Wicklow Station are approximately 130metres. The platforms will need to be extended to 174 metres to accommodate full length units.

9.5.3 At Kilcoole Station, the most likely approach is to extend the single platform northwards. This approach avoids the existing level crossing to the south. The northern extension would require earthworks, a new retaining structure of approximately 2.1m in height adjacent the parallel private road, the platform extension, and associated utilities.

9.5.4 At Wicklow Station, there are several approaches available. It is envisaged the two platforms will be extended to 174 metres which will trigger the need for a new Points & Crossing and track reconfiguration. 400 metres of track upgrades are assumed for the purpose of comparative assessment. Re-signalling at Wicklow Station is envisaged because of the track reconfiguration work. Use of the northern platform requires station accessibility upgrades which are currently proposed as part of the Active Travel Bridge (Wicklow Train Station to Port Access Route) scheme.

9.5.5 It envisaged that alterations to platform heights are not required to facilitate level boarding as new DART+ Fleet is planned to support "independent access" and fitted with low-height doorway thresholds equipped with an automatic retractable step on all carriages.

9.5.6 The requirement for land acquisition to facilitate track upgrades will be assessed as part of Phase 2 of this study, however, it is not envisaged at this stage.

9.6 Station Works to accommodate an increase in passenger numbers

9.6.1 The requirement to undertake station works to accommodate more passengers is common to all the approaches.

9.6.2 Transport improvements are planned for the Wicklow and Kilcoole areas that will support an increase in demand at the two stations. In particular, the Active Travel Bridge (Wicklow Train Station to Port Access Route) scheme will improve accessibility to Wicklow Station.

9.6.3 In conjunction with wider transport improvements, it is expected that enhancements will be required at Kilcoole and Wicklow Stations to support increased passenger demand.

9.6.4 For example, mobility hub facilities could include any of the following facilities if appropriate and not already in place:

- Set down and pick-up points (buses, private cars, and taxis);
- Parking for shared and non-shared scooters and bikes;
- Provision for cargo bikes;
- Tools for repairing cycles and scooters including air pumps;
- Electrical charging points for micro-mobility solutions (shared and private);
- Washroom Cubicles provision;
- Seating and shelters;
- Retail opportunities and parcel lockers; and
- Safety and security measures such as good lighting, CCTV cameras and Operational Communications.

9.7 Indicative infrastructure requirements for each approach

9.7.1 The indicative infrastructure requirements for each approach are presented in the table below.

9.7.2 The approaches include provision for power supply, permanent way/track, OHLE and station upgrade works. Provision is also made for signalling upgrades at Wicklow Station.

Table 10. Indicative infrastructure requirements for each approach

Scenario	Passing Loops		OHLE		BEMU Charging Infrastructure		1500V DC Substations		Station Works Kilcoole and Mobility Hub Interchange		Station Works Wicklow and Mobility Hub Interchange		Wicklow Station Track		Resignalling at Wicklow Station	
	Required	Distance (min.km)	Required	Distance km	Required	Number	Required	Number	Required	Number	Required	Number	Required	m	Required	Number
2 trains per hour EMU	Yes	6	Yes	24.5	Yes		Yes	4	Yes	1	Yes	1	Yes	400	Yes	1
1 train per hour EMU	No		Yes	18.5	Yes		Yes	4	Yes	1	Yes	1	Yes	400	Yes	1
2 trains per hour BEMU	Yes	6	Yes		Yes	1	Yes	1	Yes	1	Yes	1	Yes	400	Yes	1
1 trains per hour BEMU	No		Yes		Yes	1	Yes	1	Yes	1	Yes	1	Yes	400	Yes	1
2 trains per hour Diesel	Yes	6	No		No		No		Yes	1	Yes	1	Yes	400	Yes	1
1 trains per hour Diesel	No		No		No		No		Yes	1	Yes	1	Yes	400	Yes	1

9.7.3 Immunisation associated with full electrification of the corridor is not assessed at this stage. Nor is signalling upgrades associated with the 2 trains per direction per hour.

9.7.4 The extent of land acquisition for each approach is not calculated. However, as described in earlier sections, there is a potential requirement for land acquisition associated with the following infrastructure provision:

- 4 Traction substations and OHLE equipment along corridor for EMU approaches
- Traction substation at Wicklow for BEMU approach
- Passing loops for 2 train per hour approaches

9.7.5 The requirement for land acquisition will be confirmed as part of Phase 2 of this study.

10. BENCHMARKING OF COSTS

10.1.1 A benchmarking cost for each of the approaches is provided in this section. It is based on the assessment of required infrastructure provided in Chapter 9.

10.1.2 A cost for power supply, permanent way, OHLE, station upgrade works is allowed for including direct and indirect build costs associated with the scheme.

10.1.3 The following exclusions are noted:

- A BEMU or EMU solution relies on the rollout of ETCS Level 1 between Wicklow and Greystones for its operation. The rollout of ETCS Level 1 on this section of the network is currently planned under Phase 5 of the TPS Trackside National Rollout. The cost for these works sits within the TPS Trackside National Rollout Project.
- TPS Trackside Provision of GSM-R for BEMUs
- Rolling stock units and associated maintenance facilities are delivered through the DART+ Fleet Programme for EMU and BEMU, or existing 29000 for DMU services.
- DART+ Coastal South enhancements are delivered through the DART+ Programme.
- Active Travel Bridge (Wicklow Train Station to Port Access Route) Scheme is being delivered by others including the station accessibility upgrades at Wicklow Station.
- Maintenance and operating costs have not been assessed at this stage, including difference in running EMU, BEMU, or Diesel rolling stock units.
- Signalling upgrades associated with the passing loops.
- The extent or cost of third-party Landtake has not been assessed at this stage.

10.1.4 The benchmark costs are sourced from the DART+ Programme, Woodbrook Station, UK Rail Bill of Quantities estimates factored for Irish Costs and a Turner & Townsend benchmarking exercise for costs associated with conventional rail upgrades.

10.1.5 Indirect costs are aligned with the DART+ Cost Model and include Preliminaries at 7%, Overheads & Profit at 1%, Design team Fees at 4%, Project Management Fees at 3%, Risk at 13%, Inflation at 22% (2019-2030), VAT at 12%. These costs are expressed as percentages of the overall out-turn cost.

10.1.6 The benchmark cost for each of the approaches is shown in the Table below.

Table 11. Benchmarking of Direct and Indirect Capex Costs including VAT for each Approach

Scenario	Passing Loops		OHLE		BEMU Charging Infrastructure		1500V DC Substations		Station Works Kilcoole and Mobility Hub Interchange		Station Works Wicklow and Mobility Hub Interchange		Wicklow Station Track		Resignalling at Wicklow Station		Total Capex DART+
	Required	€m Incl. VAT	Required	€m Incl. VAT	Required	€m Incl. VAT	Required	€m Incl. VAT	Required	€m Incl. VAT	Required	€m Incl. VAT	Required	€m Incl. VAT	Required	Number	€m Incl. VAT
2 trains per hour EMU	Yes	56	Yes	56	Yes	0	Yes	28	Yes	6	Yes	9	Yes	4	Yes	3	163
1 train per hour EMU	No	0	Yes	36	Yes	0	Yes	28	Yes	6	Yes	9	Yes	4	Yes	3	86
2 trains per hour BEMU	Yes	56	Yes	0	Yes	27	Yes	7	Yes	6	Yes	9	Yes	4	Yes	3	112
1 train per hour BEMU	No	0	Yes	0	Yes	27	Yes	7	Yes	6	Yes	9	Yes	4	Yes	3	56
2 trains per hour Diesel	Yes	56	No	0	No	0	No	0	Yes	6	Yes	9	Yes	4	Yes	3	78
1 train per hour Diesel	No	0	No	0	No	0	No	0	Yes	6	Yes	9	Yes	4	Yes	3	22

The Costs are based on the DART+ Cost Model. Preliminaries at 7%, Overheads & Profit at 1%, Design team Fees at 4%, Project Management Fees at 3%, Risk at 13%, Inflation at 22%, VAT at 12%. These costs are expressed as percentages of the overall out-turn cost. The Costs do not include landtake.

10.1.7 Electrification of the line whilst accommodating 2 trains per hour per direction between Wicklow and Greystones is the highest cost approach at €263m, which includes direct capital cost for power supply, permanent way, OHLE, station upgrade works and indirect capital costs aligned with the DART+ Cost Model inclusive of Preliminaries at 7%, Overheads & Profit at 1%, Design team Fees at 4%, Project Management Fees at 3%, Risk at 13%, Inflation at 22% (2019-2030), VAT at 12%. These costs are expressed as percentages of the overall out-turn cost. They do not include landtake. This cost reflects the need for full corridor electrification to support EMUs and the provision of passing loops to support 2 trains per direction per hour.

10.1.8 As could be anticipated, the cost of an approach reduces with the level of intervention made.

10.1.9 The '1 train per hour Diesel' approach represents the least cost approach. It includes the cost to introduce full length platforms at Kilcoole Station and Wicklow Station, combined with station enhancements to support growth in rail patronage. The cost associated with this infrastructure is common to all approaches at €22m, , which includes direct capital cost for power supply, permanent way, OHLE, station upgrade works and indirect capital costs aligned with the DART+ Cost Model inclusive of Preliminaries at 7%, Overheads & Profit at 1%, Design team Fees at 4%, Project Management Fees at 3%, Risk at 13%, Inflation at 22% (2019-2030), VAT at 12%. These costs are expressed as percentages of the overall out-turn cost. They do not include landtake.

10.1.10 The costs are used as part of a comparative assessment of approaches in the next chapter.

11. COMPARISON OF APPROACHES

11.1 Introduction

11.1.1 This section provides compares approaches available to deliver rail service enhancements from Wicklow to the City Centre.

11.1.2 The purpose of the study is to identify a preferred approach that aligns with the key objectives of the scheme:

- to cater for increased passenger demand expected at Wicklow and Kilcoole Stations
- to support decarbonisation of rail services
- to provide value for money in delivering service enhancements

11.1.3 In line with the scope of services, approaches considered include:

- 2 trains per hour EMU
- 1 train per hour EMU
- 2 trains per hour BEMU
- 1 train per hour BEMU
- 2 trains per hour Diesel
- 1 train per hour Diesel

11.1.4 The approaches are considered with respect to requirements of NIFTI intervention hierarchy. The utilisation of existing infrastructure is an important part of approaches development in keeping with the NIFTI investment hierarchy whilst being conscious of the current policy and the scheme objectives. NIFTI intervention hierarchy priorities maintain, optimise, improve and then new. A brief description on the intervention hierarchy terms, as set out below:

- 'Maintain' refers to measures which protect the existing transport network and keep it at the standard or capability at which it was designed.
- 'Optimise' refers to measures which are targeted at increasing levels of service of transport infrastructure through enabling and encouraging more efficient behaviour and sustainable use of the network.
- 'Improve' refers to measures which increase the capability of existing infrastructure, through increasing the standards of that infrastructure, or measures which shift existing capacity to more sustainable modes.
- 'New' encompasses all measures which entail significant increases to transport infrastructure capacity.

11.1.5 The approaches are also considered with respect to NIFTI investment priorities which include Decarbonisation, Protection and Renewal, Mobility of People and Goods in Urban Areas, and Enhanced Regional and Rural Connectivity. Each priority is given equal weighting under the Framework.

11.1.6 A multi-criteria assessment is used to compare the approaches and put forward an emerging preferred approach for Phase 2 of the study. It uses analysis provided in previous chapters of Demand Forecasting and Capacity Analysis, Train Timetable Assessment, Fleet Traction,

Infrastructure Requirements and Benchmarking of Costs to support the recommendation which aligns with the study objectives.

11.1.7 All approaches provide sufficient overall capacity to meet forecast demand at Wicklow and Kilcoole Stations. As a result, this objective is not featured in the multi-criteria assessment.

11.2 Multi-Criteria Assessment

11.2.1 The MCA approach uses the following criteria for assessment:

- Service Performance
  - Can the approach interwork with other timetabled services, now and in the future, to provide a reliable and resilient service offer for customers?
- Deliverability
  - How does the approach align with NIFTI investment principles of maintain, optimise, improve, new?
  - Is the approach costly to deliver?
- Decarbonisation
  - Does the approach support the decarbonisation of rail services? Recognising all approaches support modal shift.

11.2.2 A Red Amber Green (RAG) scoring system to support the comparison has been developed. It is described below and is accompanied by commentary. The RAG is helpful as it provides a clear visual aid that shows those schemes that have the darkest red (negative) scores, and therefore considered least favourable, and those with the darkest green (positive) scores and therefore considered most favourable. The multi-criteria assessment is scored using a -3 to 3 system.

Table 12. MCA Scoring System

Scoring	
+3 High Positive: The proposal is expected to have a clear and significant benefit when compared to other approaches.	
+2 Positive: The proposal is expected to have a benefit when compared to other approaches.	
+1 Low Positive: The proposal is expected to have a minor benefit when compared to other approaches.	
0 Neutral: Overall, the proposal is expected to have neither a positive nor negative impact when compared to other approaches.	
-1 Low Negative: The proposal is only expected to result in a minor negative impact when compared to other approaches.	
-2 Negative: The proposal is expected to have a negative impact when compared to other approaches.	
-3 High Negative: The proposal is expected to have a clear and considerable negative impact when compared to other approaches.	

11.2.3 The multi-criteria assessment results are provided in the Table below.

Table 13. MCA Results

CRITERIA	APPROACH 1 2TPHPD EMU	APPROACH 2 1TPHPD EMU	APPROACH 3 2TPHPD BEMU	APPROACH 4 1TPHPD BEMU	APPROACH 5 2TPHPD DIESEL	APPROACH 6 1TPHPD DIESEL
Service Performance	1	3	-1	2	-3	-2
Deliverability	-3	-2	-1	2	1	3
Decarbonisation	3	3	3	3	-3	-3

11.2.4 The assessment rationale and emerging preferred approach are provided in further detail below.

11.3 Assessment rationale

11.3.1 The multicriteria assessment scoring ranks the approaches in order of preference as follows:

- Rank 1 – Approach 4 1tphpd BEMU (Score of 7)
- Rank 2 – Approach 2 1tphpd EMU (Score of 4)
- Rank 3 – Approach 1 2tphpd EMU (Score of 1)
- Rank 3 – Approach 3 2tphpd BEMU (Score of 1)
- Rank 4 – Approach 6 1tphpd Diesel (Score of -2)
- Rank 5 – Approach 5 2tphpd Diesel (Score of -5)

11.3.2 The emerging preferred approach is Approach 4 1tphpd BEMU. This approach caters for forecasted demand at Wicklow and Kilcoole Stations well into the 2030s. It enables the integration of Wicklow to City Centre services into the existing timetable and future DART+ Train Service Specification with some allowance for service resilience. It aligns with transport investment priorities to maximise 'optimise' and 'improve' over 'new'. It can be considered the least cost approach to cater for demand whilst support the decarbonisation of rail services. The additional infrastructure could also be used to support a 2tphpd service if demand reaches a point where this is required, though additional infrastructure to address capacity issues may also be required to achieve this.

11.3.3 More detailed consideration under each criterion is provided below.

Service Performance

11.3.4 Approach 2 1tphpd EMU scores a high positive as the fleet matches performance characteristics required under the DART+ Train Service Specification. The service can readily form part of the existing DART timetable as a service extension using EMU fleet. This

operation could be continued as part of the DART+ Programme TSS1c. Resilience can be provided in the timetable to cater for delay north of Greystones; for example, the Wicklow service timetabled departure can make allowance for potential delay to incoming southbound service.

11.3.5 Approach 4 1tphpd BEMU scores a positive as the fleet matches performance characteristics required under the DART+ Train Service Specification. However, it introduces the need to interwork BEMU and EMU fleet along the Wicklow to City Centre corridor. This reduces operational flexibility when compared with Approach 2 due to the need for a BEMU service to run the dedicated Wicklow service. Resilience can still be provided in the timetable to cater for delay north of Greystones.

11.3.6 Approach 1 2tphpd EMU scores a low positive. The additional service to Wicklow reduces resilience in the timetable when compared to Approaches 2 and 4. Any delay north of Greystones cannot be easily offset and would result in knock-on delays for services across the network.

11.3.7 Approach 3 2tphpd BEMU scores a low negative. There is greater need for interworking BEMU and EMU fleet along the Wicklow to City Centre corridor. This reduces operational flexibility due to the need for a BEMU service to run the dedicated Wicklow services. The additional service to Wicklow also reduces resilience in the timetable, noting that charging may also be required. Any delay north of Greystones cannot be easily offset resulting in knock-on delays for services across the network.

11.3.8 Approaches 6 1tphpd scores a negative as Diesel Fleet are not able to operate under similar performance characteristics to DART+ Train Service Specification fleet.

11.3.9 Approach 5 2tphpd Diesel scores a high negative. Diesel Fleet are not able to operate under similar performance characteristics to DART+ Train Service Specification fleet. The additional service to Wicklow reduces resilience in the timetable when compared to Approaches 2 and 4. Any delay north of Greystones cannot be easily offset and would result in knock-on delays for services across the network.

Deliverability

11.3.10 Approach 6 1tphpd Diesel scores a high positive. It requires the lowest level of intervention with least amount of cost and risk. The works at Wicklow and Kilcoole Stations are common to all the approaches.

11.3.11 Approach 4 1tphpd BEMU scores a positive as it requires additional BEMU charging infrastructure when compared to Approach 6. The additional works are localised to Wicklow Station and its environs but the need for an ESB connection, traction substation and new charging infrastructure present additional delivery requirements and cost.

11.3.12 Approach 5 2tphpd Diesel score a low positive. In addition to station works, it requires several kilometres of new track infrastructure to support operation of 2 trains per direction per hour.

11.3.13 Approach 3 2tphpd BEMU score a low negative. In addition to station works and BEMU infrastructure, it requires several kilometres of new track infrastructure to support operation of 2 trains per direction per hour.

11.3.14 Approach 2 1tphpd EMU scores a negative. In addition to station work it requires new electrification infrastructure along the full corridor length, including 4 traction substations and OHLE equipment and their associated cost.

11.3.15 Approach 1 2tphpd EMU scores a high negative. In addition to station work it requires new electrification infrastructure along the full corridor length, including 4 traction substations and OHLE equipment and their associated cost, as well as several kilometres of new track infrastructure to support operation of 2 trains per direction per hour.

Decarbonisation

11.3.16 Approaches 1-4 consist of EMU and BEMU fleet approaches which support the decarbonisation of rail services. They score positively as a result.

11.3.17 Approaches 5 and 6 consist of diesel fleet and score negatively when compared to Approaches 1-4.

11.4 Emerging Preferred Approach of 1tphpd BEMU

11.4.1 The emerging preferred approach to deliver short to medium term Wicklow to City Centre service enhancements is 1tphpd BEMU.

11.4.2 1tphpd BEMU caters for expected demand at Wicklow and Kilcoole Stations. Throughout the day this presents a significant uplift in services for rail customers. During peak periods, customers will benefit from two trains per hour when the service is combined with the DMU Gorey/Rosslare services.

11.4.3 Works at Wicklow and Kilcoole Stations are envisaged to cater for an uplift in passenger demand. They are likely to include at-station multi-modal improvements as well as integration with walking, cycling and bus infrastructure enhancements envisaged under GDA Cycle Network Plan, Connecting Ireland, and Wicklow County Development Plan. In particular, the Active Travel Bridge (Wicklow Train Station to Port Access Route) is vital to make Wicklow Station more accessible for many rail customers.

11.4.4 1tphpd BEMU enables the integration of Wicklow to City Centre services into the existing timetable and future DART+ Train Service Specification with some allowance for service perturbation. It is anticipated that dwell time at Wicklow Station will cater for some delay to southbound services.

11.4.5 There are several approaches to introduce the Wicklow to City Centre service into the timetable pre- DART+, replacing either an existing EMU or DMU Greystones path. There is flexibility in the origination/termination of the service with Wicklow services potentially terminating in the City Centre, Malahide/Howth, or run to Drogheda with a possibility of other locations subject to demand and capacity.

11.4.6 Replacing either an existing EMU or DMU path will not reduce the level of service for existing passengers to the City Centre from northern and southern suburbs. However, a service from Malahide/Howth may terminate in the City Centre instead of Bray to accommodate the new City Centre to Wicklow service.

11.4.7 A preferred timetabling solution for Wicklow to City Centre Services will be further examined as part of Phase 2 of this study, taking cognisance of DART+ timetabling, as well as other operational planning studies that may influence preferred timetable operations.

11.4.8 An important consideration for Wicklow to City Centre Services will be integration with DMU Gorey/Rosslare services following the implementation of DART+ TSS1c. The required turnback for DMU Gorey/Rosslare services at Greystones will introduce a disbenefit for passengers travelling to and from the City Centre, however, it results in a greater overall level of service across along the corridor which is a considerable benefit for passengers. Timetabling work for Wicklow to City Centre Services will aim to improve interchange to mitigate this impact for affected passengers.

11.4.9 A potential turnback at Wicklow Station has been considered, however, this is not favoured for 1tphpd BEMU scenario as Greystones Station is identified as a preferred interchange location for passengers.

11.4.10 The infrastructure required to deliver 1tphpd BEMU represents the minimum quantum to cater for expected demand at Wicklow and Kilcoole Stations whilst supporting the decarbonisation of rail services. As a result, this approach is considered the most cost effective to deliver scheme objectives which minimises the level of 'new' infrastructure in line with National Investment Framework for Transport Infrastructure.

11.4.11 Infrastructure interventions for 1tphpd BEMU include those listed in Sections '**9.3 Infrastructure for BEMUs'**, '**9.5 Station Works to accommodate Full Length Units'**, and '**9.6 Station Works to accommodate an increase in passenger numbers'** of this report. They are described below.

11.4.12 Infrastructure for BEMUs at Wicklow:

- A new traction substation including ESB connection and vehicular access. Envisaged that land acquisition north of rail line may be required. An Energy Storage System is not currently proposed.
- Charging is envisaged at the platforms with new OHLE infrastructure required. The OHLE infrastructure is expected to conflict with an existing metal footbridge between the platforms, meaning it is likely the footbridge will need to be altered or relocated.
- An initial estimate of 400 metres for OHLE has been used. This allows for charging at two full length platforms of at a minimum. New cabling infrastructure will be required to connect the traction substation with the platform infrastructure.
- Immunisation is required for infrastructure at Wicklow Station including any third-party assets.

11.4.13 Station Works to accommodate Full Length Units:

- Platform lengths at Kilcoole and Wicklow Station are approximately 130metres. The platforms will need to be extended to 174 metres to accommodate full length units.
- At Kilcoole Station, one approach could be to extend the single platform northwards. This would require earthworks, a new retaining structure of approximately 2.1m in height adjacent the parallel private road, the platform extension, and associated utilities.

- At Wicklow Station, there are several approaches available. At an elevated level, it is envisaged that the two platforms will be extended to 174 metres which will trigger the need for a new Points & Crossing and track reconfiguration. 400 metres of track upgrades are assumed for the purpose of comparative assessment. Signalling modifications associated with the platform lengthening are envisaged.

11.4.14 Station Works to accommodate an increase in passenger numbers:

- Mobility hub facilities at Kilcoole and Wicklow Station could include any of the following facilities if appropriate and not already in place:

  - Parking for shared and non-shared scooters and bikes;
  - Provision for cargo bikes;
  - Set down and pick-up points (buses, private cars, and taxis);
  - Tools for repairing cycles and scooters including air pumps;
  - Electrical charging points for micro-mobility solutions (shared and private);
  - WC provision;
  - Seating and shelters;
  - Retail opportunities and parcel lockers; and
  - Safety and security measures such as good lighting, CCTV cameras, and natural surveillance.

11.4.15 An indicative Capex Cost of €56m including VAT, inclusive of direct and indirect costs as described below, is identified to deliver the above infrastructure associated with 1 train per direction per hour BEMU, noting the following assumptions and exclusions:

- Direct Costs:
  - A Capex cost for power supply, permanent way, OHLE, resignalling and station upgrade works are allowed for at Wicklow Station.
  - Station upgrades works are allowed for at Kilcoole Station.
- Indirect costs are consistent with based on the DART+ cost model for an early stage of scheme development and include Preliminaries at 7%, Overheads & Profit at 1%, Design team Fees at 4%, Project Management Fees at 3%, Risk at 13%, Inflation at 22% (2019-2030), VAT at 12%. These costs are expressed as percentages of the overall out-turn cost.
- Exclusions and assumptions:
  - A BEMU solution relies on the rollout of ETCS Level 1 between Train Protection System is as far south as Wicklow and Greystones which is assumed to be allowed for its operation. The rollout of ETCS Level 1 on this section of the network is currently planned under Phase 5 of the TPS Trackside in the National Rollout. The cost for these works sits within the TPS Trackside National Rollout Project.
  - Costs associated GSM-R upgrades are not included.
  - Rolling stock units and associated maintenance facilities are assumed to be delivered as part of DART+ Programme.
  - DART+ Coastal South enhancements are delivered through the DART+ Programme.
  - Active Travel Bridge (Wicklow Train Station to Port Access Route) Scheme is being delivered by others including the station accessibility upgrades at Wicklow Station.

- Landtake cost has not been assessed at this stage.
- Maintenance and operational running costs associated with the BEMU services have not been assessed at this stage.

11.4.16 The infrastructure requirements to deliver 1 train per direction per hour BEMU will be investigated in more detail as part of Phases 1 and 2 of this study – Concept, Feasibility & Option Selection Phase. This will include the production of concept designs and feasibility working cost estimates.

11.4.17 The approach development process will determine the preferred approach for delivery of the scheme whilst considering realistic alternatives. All proposed design approaches will have a product approval. The design development approach will focus on delivering a cost- effective solution that avoids/minimises land acquisition insofar as practicably possible.

12. CONCLUSION

12.1.1 In accordance with the Scope of Services for this commission, 1 train per hour per direction BEMU is emerging as the preferred approach for enhancing services between Wicklow and the City Centre.

12.1.2 This need for the service enhancement is supported by National, Regional and Local policy objectives.

12.1.3 An indicative Capex Cost of €56m inclusive of direct and indirect costs is identified to deliver the infrastructure associated with 1 train per direction per hour BEMU. This excludes landtake and rolling stock costs.

12.1.4 Key objectives of the scheme include:

- to cater for increased passenger demand expected at Wicklow and Kilcoole Stations
- to support decarbonisation of rail services
- to provide value for money in delivering service enhancements

12.1.5 A multi-criteria assessment was used to identify the preferred approach for service enhancement. The assessment took account of:

- Service Performance
- Deliverability
- Decarbonisation

12.1.6 1 train per hour per direction BEMU delivers scheme objectives to cater for passenger demand expected at Wicklow and Kilcoole Stations and support decarbonisation of rail services in the short to medium term. It provides the most cost-effective solution to both cater for demand and support decarbonisation of rail services; aligning with NIFTI investment hierarchy to 'maintain', 'optimise' and 'improve' over 'new' as well as NIFTI investment priority to decarbonise.

12.1.7 Customers served by Wicklow and Kilcoole Stations will benefit from a significant uplift in services throughout the day from 1 train per hour per direction between Wicklow and the City Centre. Post DART+, the DMU Gorey/Rosslare services serving Wicklow and Kilcoole Stations will terminate at Greystones, requiring passengers to interchange to travel to and from the City Centre.

12.1.8 Crowding analysis was carried out for the morning peak periods of 2027 and 2040. The analysis assumed an existing DART service is extended to Wicklow, resulting in overall additional passenger capacity of 1,100 serving Wicklow and Kilcoole Stations, 408 of which is seated. The results of the analysis are described below.

12.1.9 In the 2027 morning peak:

- 1tphpd, there is 74% capacity remaining between DART+ and DMU services arriving at Greystones travelling northbound.
- 2tphpd, there is 78% capacity remaining between DART+ and DMU services arriving at Greystones travelling northbound.

The results indicate the 1tphpd approach provides capacity to meet demand when overall capacity is considered. It is noted regular service frequency to and from Wicklow will help spread demand across the morning peak periods.

12.1.10 In the 2040 morning peak:

- 1tphpd, there is 63% capacity remaining between DART+ and DMU services arriving at Greystones travelling northbound.
- 2tphpd, there is 76% capacity remaining between DART+ and DMU services arriving at Greystones travelling northbound.

The results indicate the 1tphpd approach provides capacity to meet demand when overall capacity is considered. It is noted regular service frequency to and from Wicklow will help spread demand across the morning peak periods.

12.1.11 In advance of DART+ Coastal South enhancements there is potential for instances of localised overcrowding north of Greystones. This would be on a short-term basis prior to the capacity benefits of DART+ Coastal South being realised.

12.1.12 1tphpd BEMU enables the integration of Wicklow to City Centre services into the existing timetable and future DART+ Train Service Specification with allowance for service perturbation.

12.1.13 The optimum approach to timetabling and service operations will be identified as part of a subsequent phase of the project, including consideration of the wider rollout and operation of DART+ Fleet, particularly the 2nd Fleet Order of 90 battery-electric carriages. It is envisaged the optimum timetabling solution for Wicklow to City Centre Services will be developed and modelled to take cognisance of timetabling pre and post DART+, possible crowding effects on the corridor, as well as other operational planning studies that may influence preferred timetable operations.

12.1.14 The infrastructure requirements to deliver 1 train per hour per direction BEMU will be investigated in more detail as part of the Concept, Feasibility & Approach Selection Phase. This will include the production of concept designs and feasibility working cost estimates that enable a cost-effective solution which avoids/minimises land acquisition insofar as practicably possible.