Údarás
Náisiúnta Iompair
National Transport Authority

Cork Metropolitan Area Transport Strategy

Transport Options and Network Development Report

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1 Introduction

1.1 Background

The National Transport Authority (NTA) is a public body set up under statute and established in December 2009. The role and functions of the NTA are set out in three Acts of the Oireachtas; the Dublin Transport Authority Act 2008, the Public Transport Regulation Act 2009 and the Taxi Regulation Act 2013. In August 2015, the Department of Transport, Tourism and Sport (DTTaS) published its policy document *"Investing in our Transport Future - Strategic Investment Framework for Land Transport"*. Action 4 of that framework states that: *"Regional transport strategies will be prepared by the NTA and provide an input to regional spatial and economic strategies".*

Having regard to its role in relation to transport, and the action placed upon it in the DTTaS policy document, the NTA, in collaboration with Cork County and City Councils, is developing a Transport Strategy for the Cork Metropolitan Area (CMA) covering the period to 2040. The strategy will align with the over-arching vision and objectives of the emerging National Planning Framework (NPF) and will provide a framework for the planning and delivery of transport infrastructure and services in the CMA over the next two decades. It will also provide a planning policy for which other agencies can align their future policies and infrastructure investment.

1.2 Purpose of Report

The methodology for the development of the CMA Transport Strategy 2040 is undertaken on a step by step basis, from: reviewing the existing policy and transport baseline, undertaking a detailed future demand analysis, developing transport options, optimisation of land use to align with high performing transport corridors, developing the draft Strategy for public consultation and subsequently finalising the Strategy, as shown in Figure 1-1.

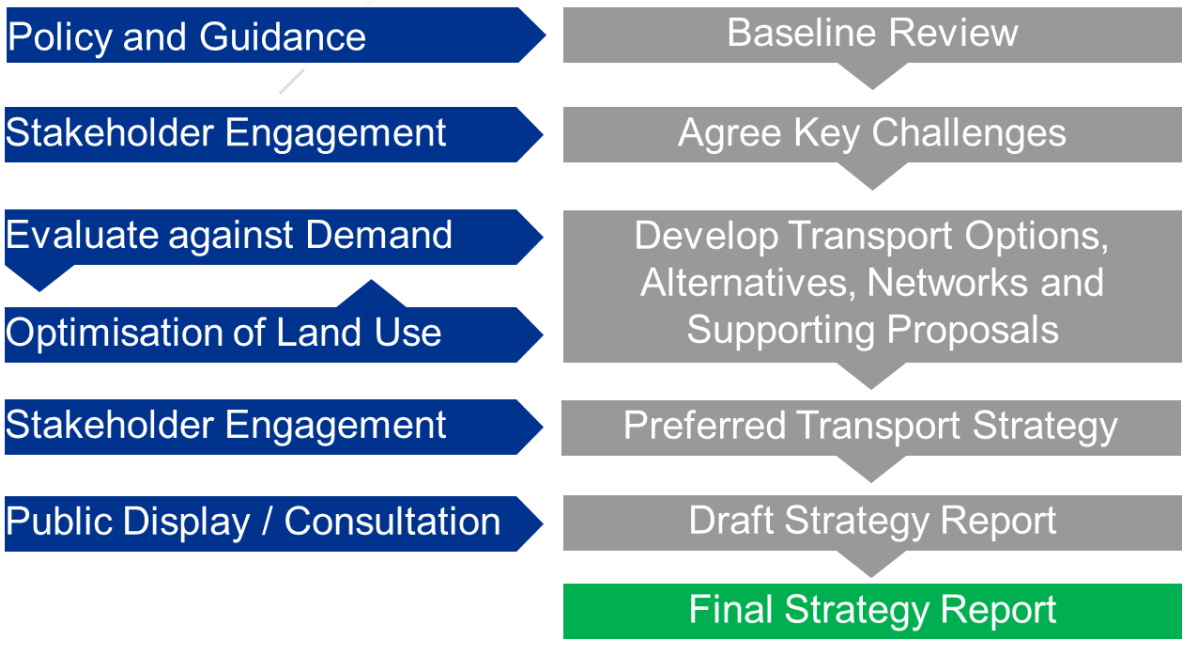


Figure 1-1: Cork Metropolitan Area Transport Strategy Methodology

Having developed the 2040 Baseline Demand in the "Demand Analysis Report", this report describes the process of developing the transport options for all modes (public transport, walking, cycling, car and freight). The principles and methodology for the development of the transport options is

described, as is the modelling and refinement of these options. the optimisation of the forecast land use scenarios to better support the efficient development of the transport network is also considered in this report.

Ultimately the report will undertake an appraisal of the competing Strategy options, utilising the South West Regional Model (SWRM) appraisal toolkit providing a quantitative appraisal that aligns the Department of Transport, Tourism and Sport (DTTAS) Common Appraisal Framework (CAF).

1.3 Report Structure

The following provides a description of the contents of each section of the report;

- **Section 2:** outlines the methodology applied tin developing the Transport Network Options for all modes.
- **Section 3:** Develops the Public Transport network options on a corridor basis for different public transport modes.
- **Section 4:** Outlines the Road Network developed.
- **Section 5:** Describes the development of the Cycling Network, based on the Cork Cycle Plan 2017 network;
- **Section 6:** Describes the objectives and proposals for the Walking Network; and
- **Section 7:** Concludes the report.

2 Transport Network Option Development Methodology

2.1 Option Development and Assessment Methodology

This report describes the process of developing the transport options for all transport modes. Figure 2-1 below outlines the methodology for the development and assessment of the strategy options. Having determined the Upper-limit public transport mode share demand from the "idealised" public transport network model run the Strategy transport options can now be developed, refined, optimised and assessed. This process is show below as an iterative process linking the development of the Strategy Options with the optimisation of the land use forecasts and undertaken runs of the SWRM. The resulting outcome of this process is the identification of an Emerging Preferred Strategy Network and a recommended land use optimisation that better supports the Strategy network.

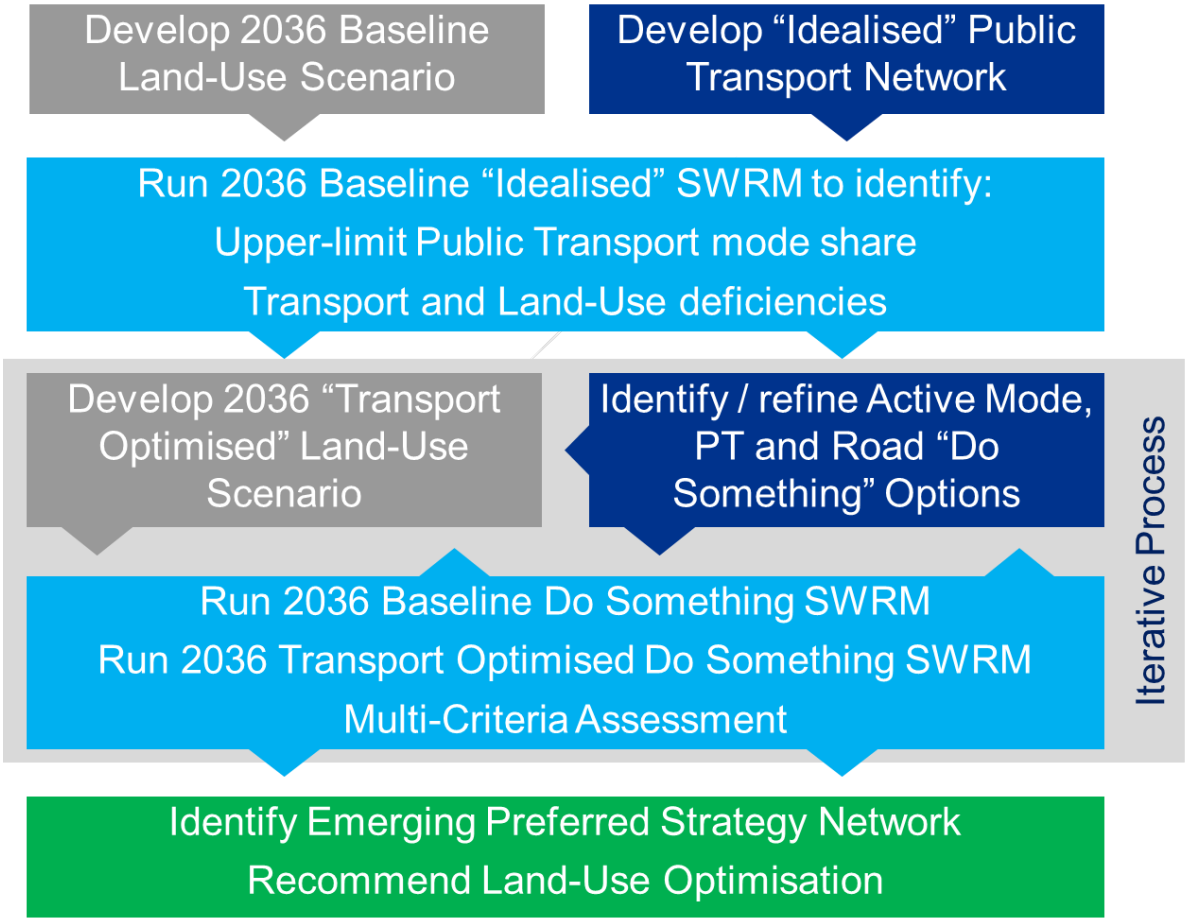


Figure 2-1: Option Development and Assessment Methodology

2.2 Network Options Development Hierarchy

The following lists the order in which the transport network has been developed. Initial stages focus on the development of the public transport network as the demand analysis has shown that the public transport mode share has the greatest potential for improvement. The road, cycling and walking networks are subsequently developed.

- Public Transport Network;
  - Development of Indicative Overall Public Transport Network;
  - Strategic Public Transport Network;

- Corridor Specific Public Transport Network Options;
- Road Network;
- Cycling Network; and
- Walking Network.

2.2.1 Development and Assessment of Transport Networks

The methodology under which the transport options have been developed and assessed is guided by the ***'Common Appraisal Framework (CAF) for Transport Projects and Programmes, March 2016'*** published by the Department of Transport, Tourism and Sport (DTTAS), which requires schemes to be appraised under the general criteria of Economy, Safety, Environment, Accessibility & Social Inclusion and Integration. All transport proposals will subsequently be required to be developed in line with TII Project Appraisal Guidelines (PAG) and DTTaS guidance for scheme appraisal including a Route Options Assessment and Business Case.

2.3 Public Transport Network

2.3.1 Development of Indicative Overall Public Transport Network

In order to shape the transport network for the CMA an indicative high level public transport network will be developed that will provide a context for the overarching transport options and proposals. It will identify key strategic public transport routes and corridors, and identify the supporting public transport requirements for the remaining areas of the CMA. Once a high level indicative network is identified, more detail analysis and specific considerations for the public transport network will be considered for the proposals at a corridor level.

2.3.2 Strategic Public Transport Network

Taking the indicative public transport network as a starting point the identified strategic corridors will be considered in greater detail. This will include the scale and type of public transport requirement on the strategic corridors, the route alignment, the level of priority required, the frequency of service, as well as the level of coverage provided by the strategy public transport proposals.

2.3.3 Corridor Specific Public Transport Network Options

For the remainder of the public transport network the proposals will be developed based on the public transport demand associated with the corridors developed in the "Demand Analysis Report". Based on the radial demand and the orbital demand the proposed route, service type, service frequency and level of priority will be developed.

2.4 Road Network

A review of the road network demand, which includes road network travel demand from beyond the CMA, will be undertaken to determine the requirement for road network improvements. National road network, regional road network and city road network will be considered. A review of currently proposed road network infrastructure will be undertaken and aligned to policy and demand needs within the CMA. The road network will also be reviewed with the aim of aligning road network provision with public transport, walking and cycling provision.

2.5 Cycle Network

The cycle network will focus on the Cork Cycle Network Plan 2017. The cycle plan will be reviewed to ensure integration and alignment with the proposals for the Public Transport, walking and road modes proposed in the strategy.

2.6 Walking Network

The walking network will focus on the Cork City Walking Strategy 2013 – 2018. The walking strategy will be reviewed to ensure integration and alignment with the proposals for the public transport, cycling and road modes proposed in the strategy.

3 Public Transport Option Development

3.1 Development of Indicative Public Transport Network

3.1.1 Typical Urban Public Transport Capacity Ranges

Figure 3-1 illustrates the range of public transport capacities, in passengers per hour per direction, that can be achieved by difference public transport models of Bus, Bus Rapid Transit (BRT), Light Rail Transit (LRT) and Metro / Heavy Rail. It can be seen that bus based public transport can cater for capacities of up to 2,000pax/hr/dir, BRT can cater for capacities between 1,000 and 4,000pax/hr/dir, LRT can cater for capacities between 3,000 and 7,000pax/hr/dir, with Metro catering for capacities above 5,000pax/hr/dir. While the values outlined in Figure 3-1 are not set in stone they do provide a good indication as to the likely public transport requirements for the strategic corridors being reviewed.

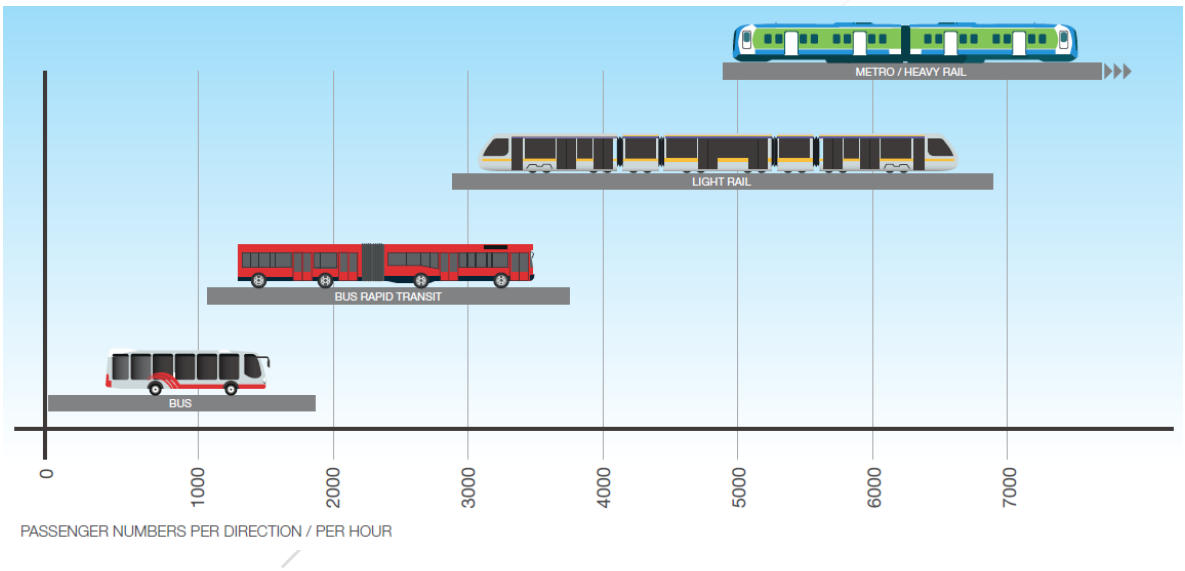


Figure 3-1: Public Transport Capacity Ranges[1]

3.1.2 Strategic High Demand Corridors

To facilitate analysis of travel demand within the CMA, the area was divided into several corridors based on the national and regional transport networks around a central city centre core. These corridors are primarily used to describe radially-based trips, which represents the most dominant trip pattern within the CMA. The corridors and the settlements within each corridor are follows:

- Corridor A: Ballyvolane, Mayfield & Montenotte;
- Corridor B: Sallybrook, Glanmire & Tivoli;
- Corridor C: Whitegate, Midleton, Carrigtwohill, Cobh, Glounthaune & Little Island;
- Corridor D: Crosshaven, Carrigaline, Ringaskiddy, Monkstown, Passage West, Rochestown, Douglas, Ballinlough, Mahon, Blackrock & Docklands;
- Corridor E: Airport, Frankfield & Togher;
- Corridor F: Ballincollig, CSIP, CIT, Bishopstown, Model Farm & UCC; and
- Corridor G: Blarney, Monard, Fairhill, Blackpool & Knocknaheeney.

[1] UITP Conference 2009 – Public Transport: Making the Right Mobility Choices

The corridors have been subdivided into smaller segments based on inner and outer sectors which allow for the greater understanding of movements along the corridor and orbital trips between corridors. The city core, sectors, corridors and segments are shown in Figure 3-2. The segments are named based on their corridor letter and sector number (i.e. Segment B1 lies with corridor B and sector 1).

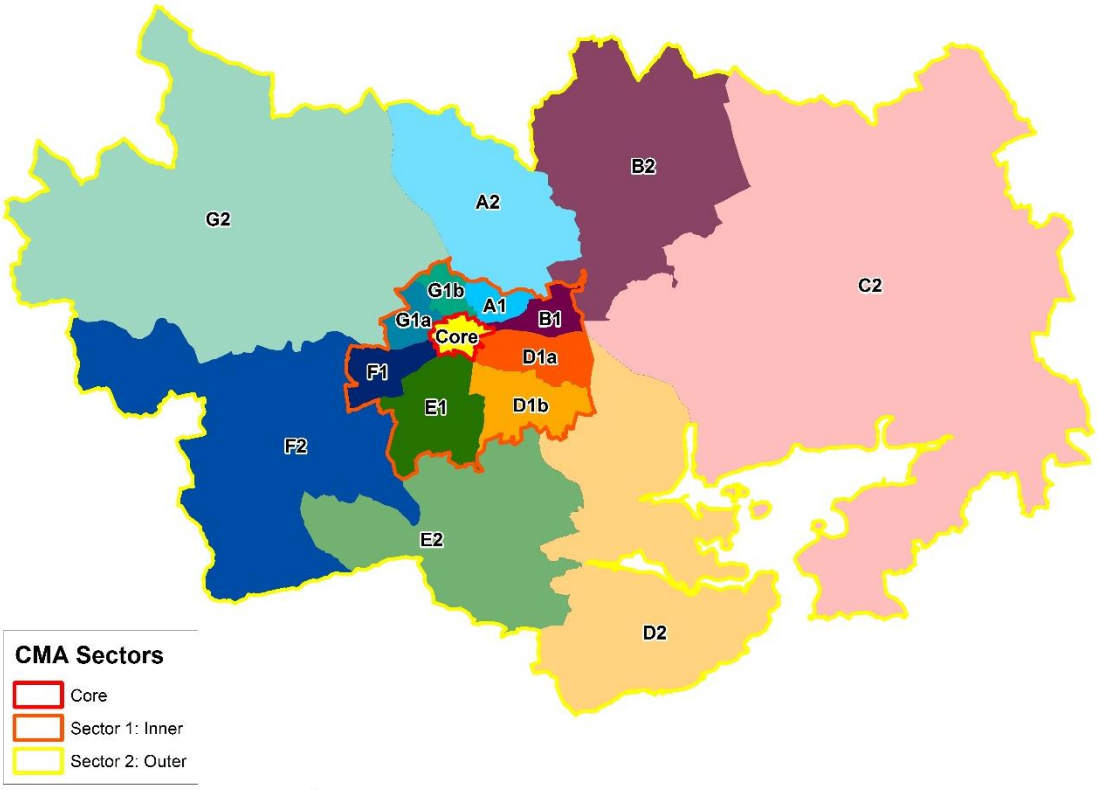


Figure 3-2 CMA Corridor & Segments

Reviewing the public transport demand developed in the "Demand Analysis Report" and the public transport capacity ranges in Figure 3-1 it is apparent that the main high demand corridors are:

- **Corridor C:** C2 > B1 > Core;
- **Corridor D1a:** D1a > Core;
- **Corridor D2:** D2 > D1b > Core;
- **Corridor F:** F2 > F1 > Core; and
- **Corridor G:** G2 > G1b > Core.

Figure 3-3 shows the AM peak hour public transport demand associated with these strategic corridors. As anticipated with the AM peak demand the inbound demand to the Core has the largest demand, with the exception of outbound demand from the Core to Corridor F. Corridor F contains University College Cork (UCC), Cork University Hospital (CUH) and Cork Institute of Technology (CIT); all significant attractors in the AM peak.

Corridor D1a has been included in the strategic corridors, as, due to its peninsular situation, it caters for only Inner Corridor Demand, but still retains a very high level of demand, catering for the highest level of Inner Corridor demand. It also has potential for further land use intensification within the South Docklands, which could potentially increase the demand levels associated with this corridor.

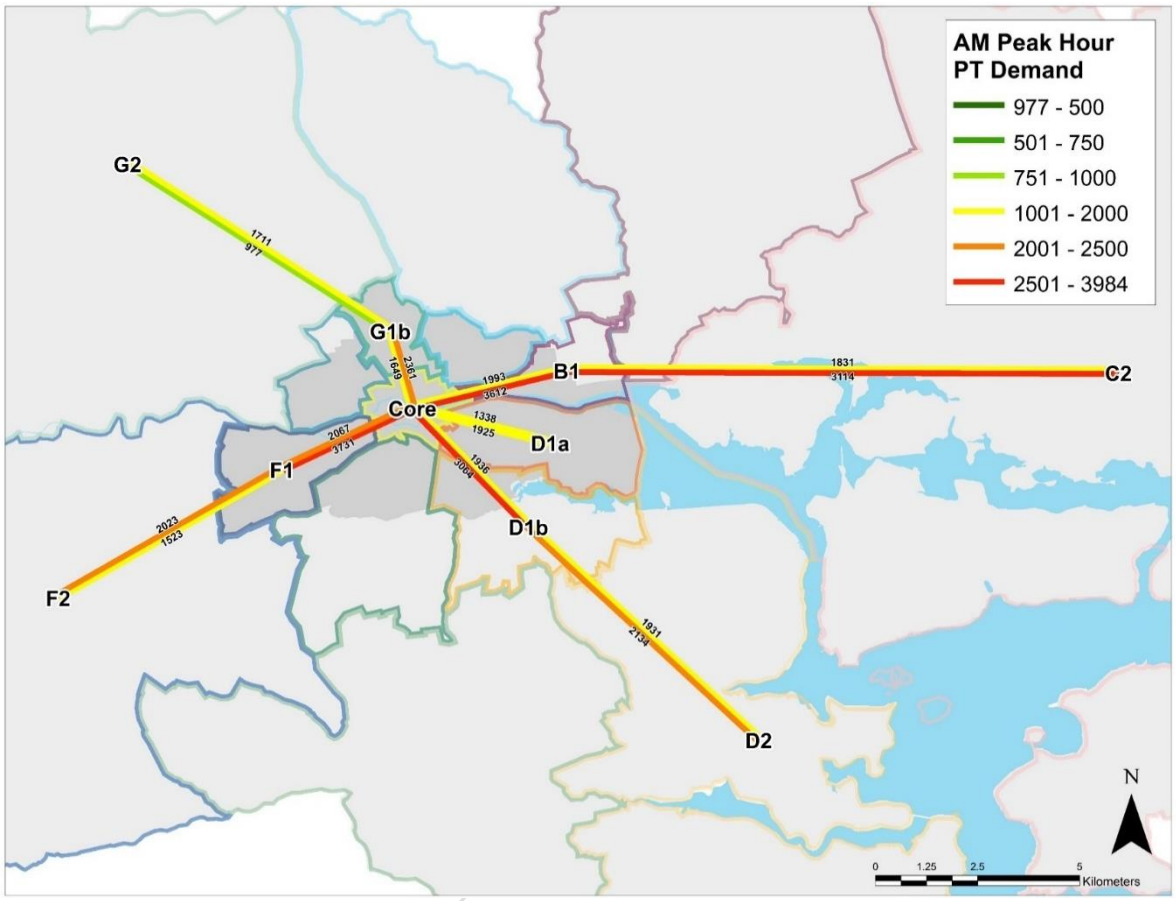


Figure 3-3: AM Peak PT Demand – High Demand Corridors

Figure 3-4 illustrates the AM peak hour public transport demand associated with the Inner corridors only. It can be seen that for Corridors B1 and G1b, the majority of the public transport demand actually originates in the Outer corridors. Whereas for Strategic Corridors F1, D1b and D1a a significant amount of the demand is associated with the Inner corridors only.

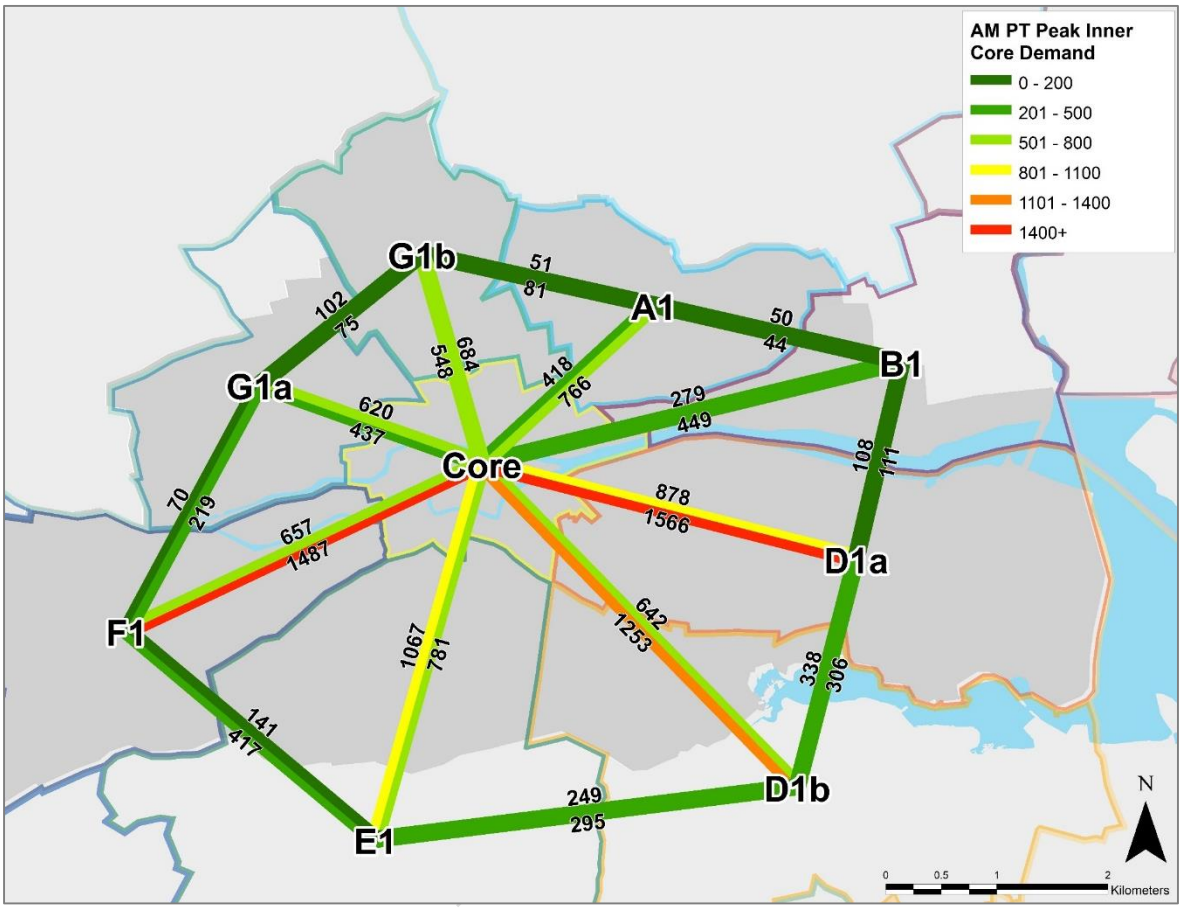


Figure 3-4: AM Peak PT Demand Spider's Web with Inner demand only

The above review of the demand indicates that the strategic public transport proposals required to cater for Corridor B, C and G will need to cater predominantly for demand outside the Cork City Environs within the CMA. It also indicates that to cater for Corridor D2 / D1b and Corridor F2 / F1 the public transport proposal is required to cater for Outer and Inner corridor demand. Corridor D1, due to its peninsular situation, caters for the highest level of Inner Corridor demand.

3.1.3 Strategic Cross City Demand

In addition to the Strategic High Demand Corridors the cross city demand of these strategic corridors has been reviewed. Reviewing the cross city demand enables the identification of what strategic routes work best as cross city routes, or what strategic routes should be catered for through interchange with other strategic routes. Table 3-1 details the two-way AM peak hour cross city public transport demand based on the 2036 Baseline scenario. Note that travel by public transport to the adjacent corridor is considered an orbital movement and not included in Table 3-1.

Table 3-1: Two-Cross City AM Peak Demand

Corridor	D1a	D1b & D2	E1 & E2	F1 & F2	G1a	G1b & G2
A1 & A2	623	771	490	833	169	216
B1, B2 & C2	1,029	596	1,030	1,962	472	1,015
D1a			819	1,272	326	712
D1b & D2				2,001	415	1,037
E1 & E2					315	716
F1 & F2						540

As shown in the table the highest cross city demand is between Corridors D & F as well as Corridors B, C & F. There is also high demand from Corridor B & C to Corridor G1b & G2 and between D1b & D2 to G1b & G2.

3.1.4 Strategic Rail Corridor

Reviewing the Outer Corridor, Inner Corridor and Cross City demand it is apparent that the existing rail line between Mallow, Midleton and Cobh serving Kent Station aligns to cater for the demand in Corridors B, C and G. Radial corridor demand from Corridor B1 and G1b to the Core is 3,612 and 2,361 persons/hr, respectively. Two-way cross city demand between these two corridors is over 1,000 persons/hr.

This rail corridor has long been identified as part of the strategic public transport network for Cork and improvements have been made to the Cork Metropolitan Rail Network in the past number of years including the reopening of the Midleton railway line. The rail line is shown below in Figure 3-5, below.

To facilitate the high demand shown in Table 3-1 travelling from the corridors along the rail line to Corridor F interchange at Kent Station will be required. The ongoing reorientation of Kent Station will facilitate the interchange of public transport services. The upgrades currently underway at Kent will create a new entrance to the station along Horgan's Key and will allow buses to stop at the station entrance.

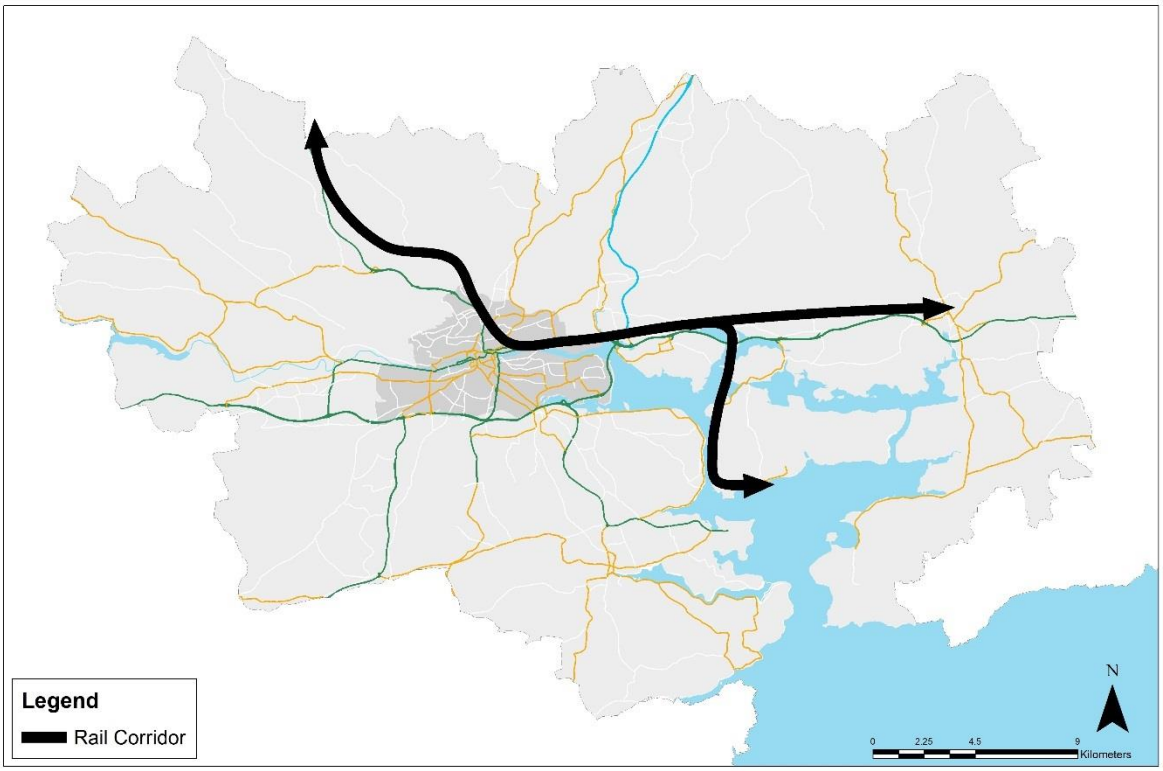


Figure 3-5: Strategic Rail Corridor with Existing and Potential Future Stations

3.1.5 Strategic Rapid Transit Corridors

The demand associated with the other identified strategic Corridors D1a, D1b / D2, and F was subsequently reviewed. The demand levels indicate that high capacity rapid public transport link is required, however, it is unclear as to which of the remaining strategic corridors this public link should cater for, Corridor D1a, D1b or F.

The following highlights a review of the remaining strategic rapid transit corridor routes in the context of determining how best to service these corridors with high capacity public transport services.

F1 & F2 Rapid Transit Corridor

Corridor F within the Inner Corridor of F1 has the highest demand of 3,731pax/hr and as such merits a high capacity rapid public transport link to cater for the demand. This demand level is comparable to that of a BRT or LRT service. Demand from Corridor F, originating with F2 is concentrated within Ballincollig which is 2km from the Cork City Environs, as shown in Figure 3-6. Thus F2 can be feasibly served by a single high capacity public transport service.

As identified earlier in order to maximise the patronage of the public transport service to Corridor F interchange with the rail services at Kent Station in required. To further maximise the patronage of the public transport services to Corridor F cross city demand should be considered to Corridor D. Table 3-1 identifies the two-way cross city demand from Corridor F to Corridor D1a as 1,272 and to Corridor D1b & D2 as 2,001.

D1b & D2 Rapid Transit Corridor

Corridor D within the Inner Corridor of D1b has a passenger demand of 3,064pax/hr and as such merits a high capacity rapid public transport link to cater for the demand. This demand level appears to be comparable to that of a BRT service. However, as shown in Figure 3-4 much of the demand originates with Corridor D2. Demand from D2 is split between several settlements including Carrigaline, Ringaskiddy, Crosshaven, Passage West and Monkstown, at a further distance of ~5km from the Inner Corridor, see Figure 3-6. As a result of the demand levels and the dispersed nature of these settlements from the South City Environs it is not feasible to run a single high capacity and frequency service to D2.

The orientation of Corridor D1b and D2 makes it difficult to provide direct, prioritised public transport routes through the south west City Centre to Kent Station in order to provide for the cross city services as a continuation of the high capacity public transport link from Corridor F. This is also reflected in the low cross city demand between Corridors D1b and B1.

Taking into account the issues identified above, Corridor D is more suited to multiple bus services and alternative routes with different terminals throughout D1b and D2, providing the required capacity and catchment to cater for the disperse demand in the Corridor. A high level of public transport priority would still be required to provide the speed, frequency and reliability of public transport within the Corridor to the Core.

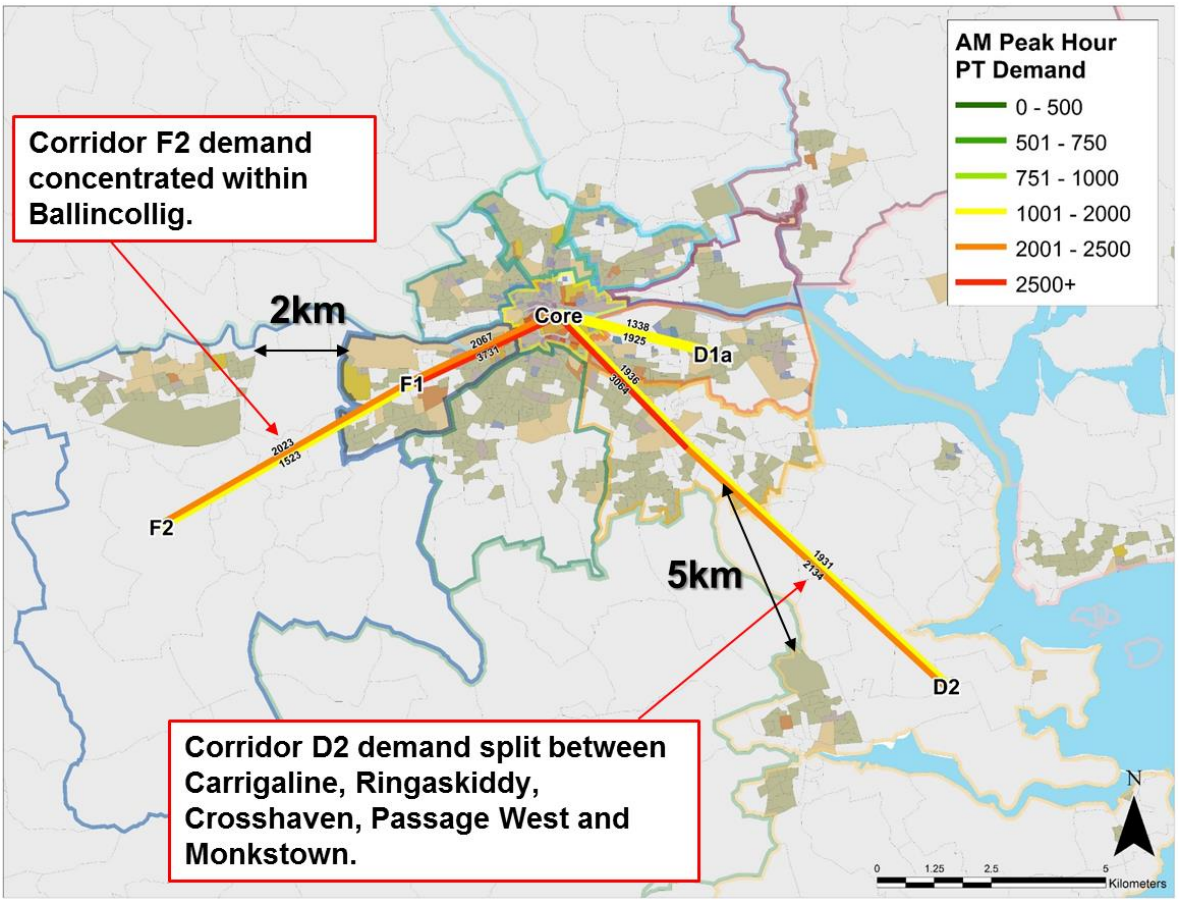


Figure 3-6: Corridor D2 and F2 Demand Concentration and Distance from Inner Corridors

D1a Rapid Transit Corridor

Corridor D1a has a passenger demand of 1,925pax/hr and as such merits a high capacity rapid public transport link to cater for the demand. This demand level appears to be comparable to that of a BRT service. As shown in Figure 3-6, the demand from corridor D1a to the Core (1,566pax/hr) is significantly higher than from D1b to the Core (1,253pax/hr), and is comparable to the demand from the Core to F1 (1,487pax/hr).

The positioning and situation of Corridor D1b directly to the east of Cork City Centre and south of the River Lee enables the provision of direct, prioritised public transport routes through the South Docklands across the River Lee to Kent Station, in order to provide for the cross city services as a continuation of the high capacity public transport link from Corridor F. Cross city demand between Corridor D1a and Corridor F is 1,272pax/hr. Interchange demand at Kent Station from Corridor D1a and Corridor B1, B2 and C2 is 1,029pax/hr.

Given that D1a has a demand of a level that requires a high capacity public transport link, can readily access Kent Station for interchange and to cater for the high cross city demand with Corridor F, and has the potential for further land use intensification within the South Docklands, to increase the demand levels further within this corridor, it is proposed that the proposed strategic corridor will run from Corridor F, serving F2 & F1, to D1a which includes the City Centre, Kent Station, South Docklands and Mahon. As outlined previously this service will ideally serve Kent Station to facilitate interchange and the high demand between Corridors B, C, D1a, F & G. The indicative strategic corridors for the CMA are shown in Figure 3-7.

This East-West Strategy Corridor has long been identified as part of the strategic public transport network for Cork since the South Docklands LAP 2008 and the Cork Area Transit Study (CATS) 2009.

This reinforces the requirement for the East-West Corridor Rapid Transit that is identified in previous National, Regional and Local Policy documents. Further analysis will be required to determine the type, scale, route alignment and frequency of the proposed East-West Strategic Rapid transit Corridor.

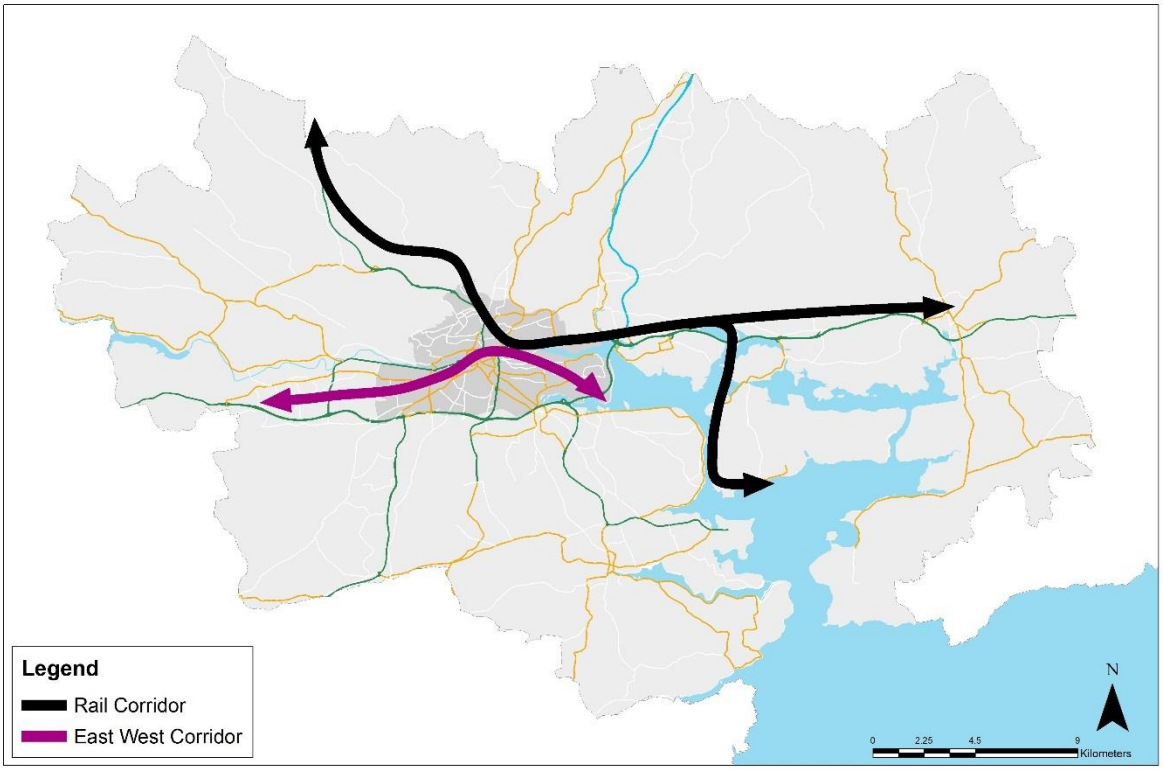


Figure 3-7: Indicative Strategic Public Transport Network

D1a to D1b & D2 Transit Corridor

Public transport demand between Corridor D1a and D1b would not efficiently be catered for by radial services to and from the Core, but would be best served by orbital public transport services. As such, a high capacity rapid public transport link that caters for D1a and D1b/D2 via the Core has not been considered.

3.1.6 Remaining Public Transport Demand

In addition to the strategic public transport services the corridors along the strategic network will require additional bus routes to accommodate demand from areas outside the catchment of the rail and east-west corridors. Though D2 cannot feasibly be served by a form of rapid transit there is considerable cross city demand between both D2 & D1b to Corridor F, B & G. A number of high frequency bus routes from Corridor D to the Core will be required to accommodate this level of demand and facilitate interchange with the proposed strategic corridors.

In addition, there is also strong demand between Corridor E and the corridors along the rail line. High frequency services will be needed between Corridor E and Kent Station to cater for this demand with services running directly from Kent Station to Cork Airport located in Corridor E. The demand from the remaining Corridors, A & G1a, is less due to the lower populations within these segments however high frequency bus routes will be required from these corridors to the city centre. There will also be a need for orbital services north and south of the city centre.

The overall indicative public transport network is shown in Figure 3-8.

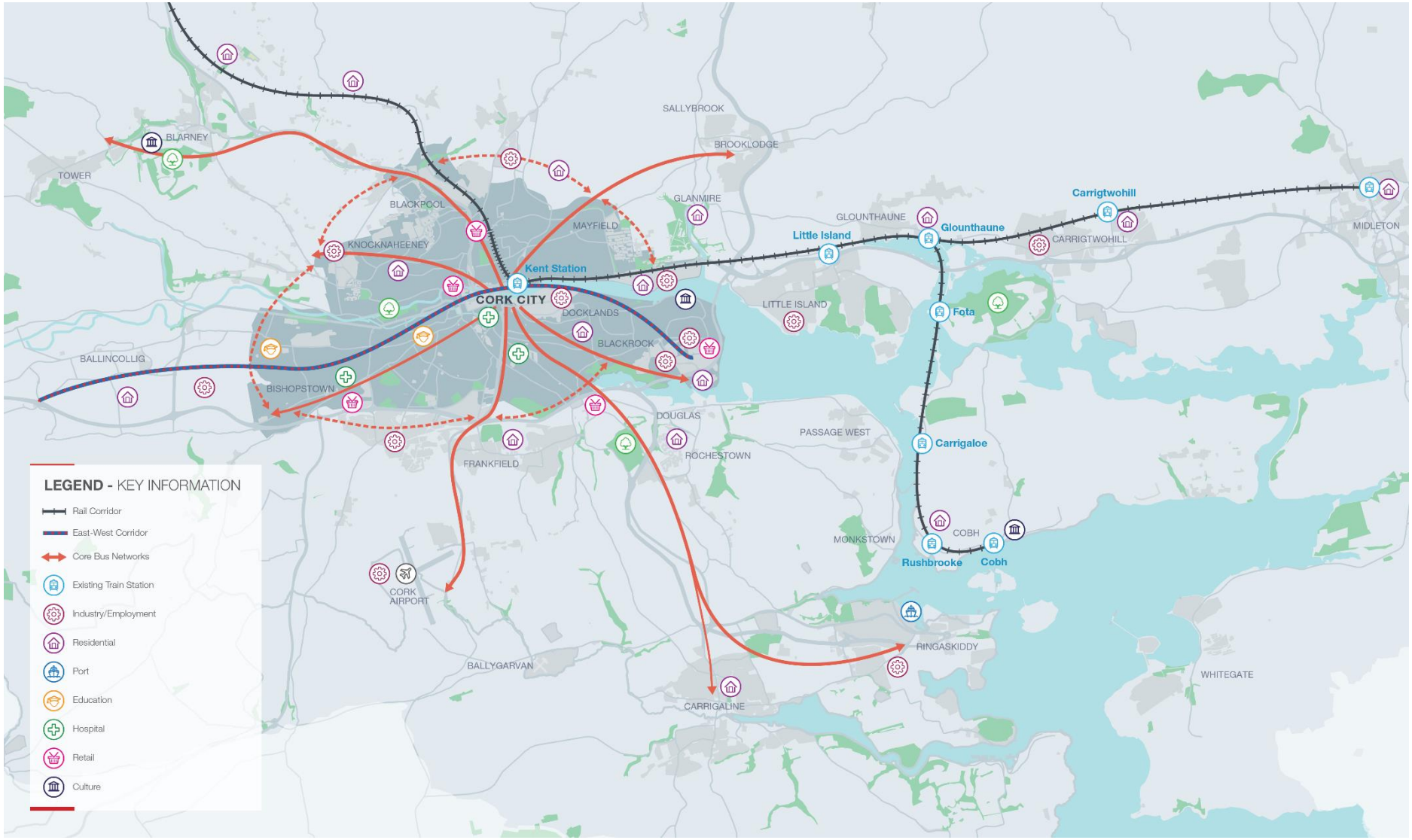


Figure 3-8: Indicative Overall Public Transport Network

3.1.7 Principles of the Idealised Public Transport Network

An indicative public transport network for the CMA has been developed that identifies the strategic rail corridor, east-west rapid transit corridor and the wider high frequency bus service network to meet the public transport demands arising from the "idealised" public transport network model run.

The "idealised" public transport network was developed based on six principles that created a network that maximises the public transport mode share. Figure 3-9 outlines the principles that underpin the performance of the "idealised" public transport network. In order to develop the CMA public transport network in more detail and to maximise the public transport mode share the principles that underpin the performance of the "idealised" network should be applied to the network options.

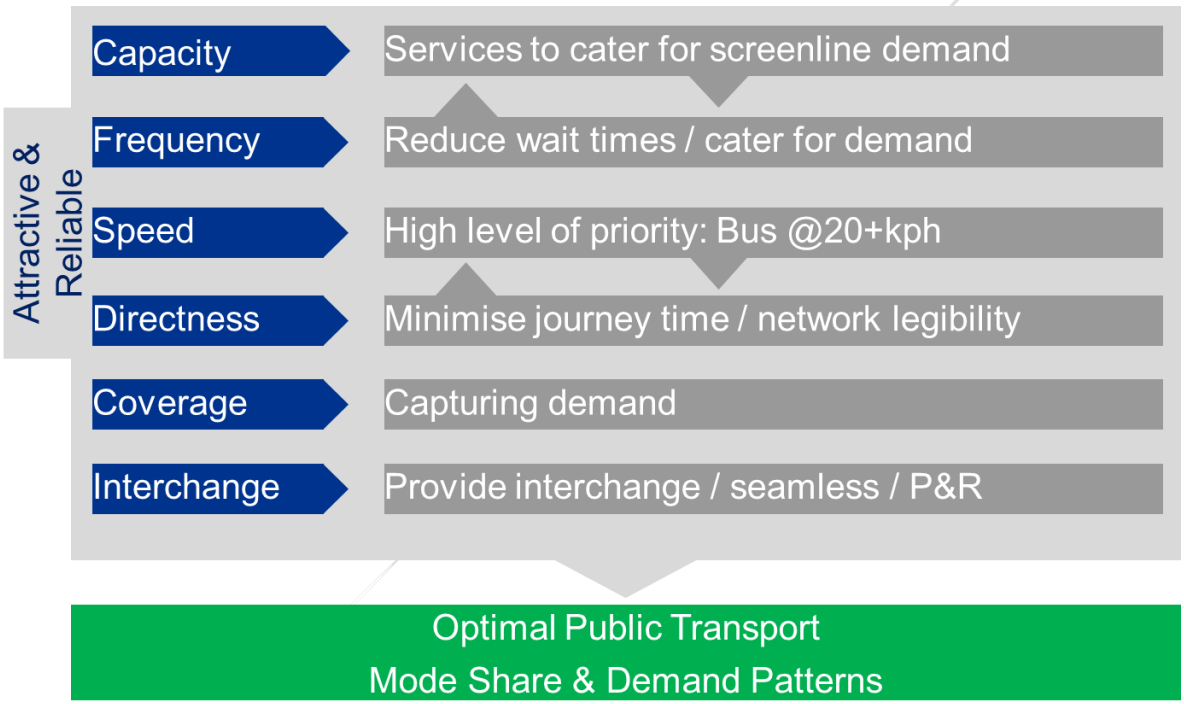


Figure 3-9: Principles of the Idealised Public Transport Network

3.2 Strategic Rail Corridor Option Development

3.2.1 Target Demand

Figure 3-10 illustrates the target demand along the Strategic Rail Corridor, with a maximum one-way demand of 3,612pax/hr/dir east of Kent Station and 2,361 pax/hr/dir north of Kent Station. The two-way Cross city demand was identified as 1,015 pax/hr.

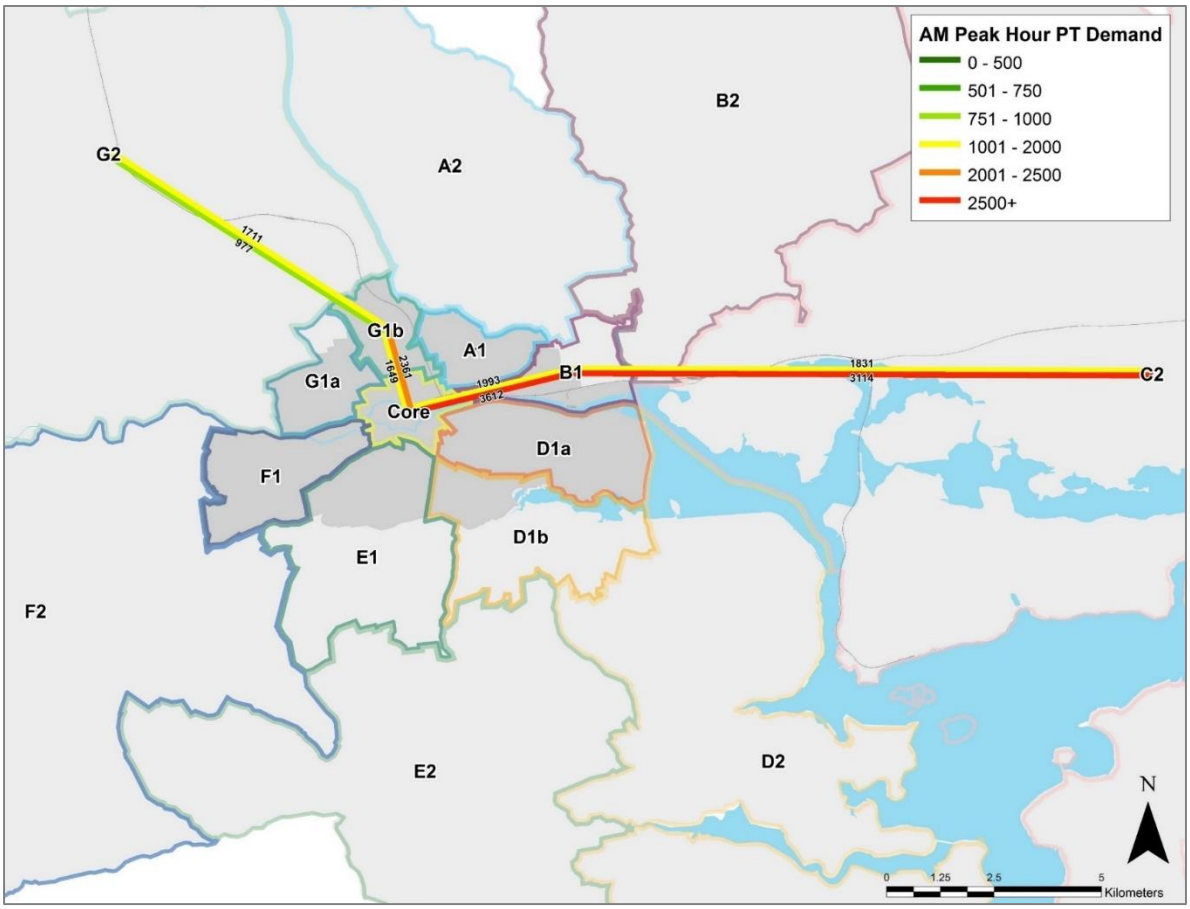


Figure 3-10: Strategic Rail Corridor Public Transport Demand

3.2.2 Consideration of Alternatives

The procedure for the assessment of these options is guided by the 'Common Appraisal Framework (CAF) for Transport Projects and Programmes, March 2016' published by the Department of Transport, Tourism and Sport (DTTAS), which requires schemes to be appraised under the general criteria of **Economy, Safety, Environment, Accessibility & Social Inclusion and Integration**. Alternative public transport provisions for the Strategic Rail Corridor have been considered to ensure that the preferred public transport meets the requirements of the CAF. It should be noted that a more detailed appraisal of the public transport schemes identified within the preferred option will be required at a later stage in the planning process, including a route option assessment and business case. The alternatives considered include the following:

- **Option 1:** Improvements to existing rail line and increase in services;
- **Option 2:** Convert rail line to pedestrian and cycle path;
- **Option 3:** Cater for demand growth by car and increased road provision;
- **Option 4:** Cater for demand growth by increased bus service provision; and
- **Option 5:** Convert rail line and services to Light Rail Transit.

Table 3-3 outlines the results of the multi-criteria assessment in line with the CAF requirements. The table describes how each of the options compares against each criteria and the cell is colour coded to indicate relative performance.

The options identified have been assessed relative to each other under the above five criteria using the following rating system outlined in Table 3-2.

Table 3-2: Assessment Rating Table

Colour	Relative Performance
	Very Good
	Good
	Neutral
	Poor
	Very Poor

From Table 3-3 below **"Option 1 Improvements to existing rail line and increase in services"** is considered to be the preferred option based on the multi-criteria assessment, providing the most benefits overall while maximising the economic benefits.

Table 3-3: Assessment of Alternative Transport Measures for Strategic Rail Corridor

	Economy	Environment	Safety	Integration	Accessibility and Social Inclusion
Option 1: Improvements to existing rail line and increase in services	Maximises investment to date. Makes best use of existing infrastructure Incremental cost increases likely to provide greater returns on investment in terms of benefit to cost ratio.	Currently suburban trains are diesel based which results in GHG emissions. These is scope for future electrification of the suburban rail line.	Rail services have very low accident and incident rates.	Builds on current integration policy. Can cater for increased development intensification around rail stations.	Enhances accessibility for rail users on existing rail lines as well as providing an attractive alternative to the private car.
Option 2: Convert rail line in East Cork to pedestrian and cycle path	Loss of investment to date. Significant cost of railway decommissioning. Not likely that walking and cycling will cater adequately for anticipated demand.	No emissions from pedestrians and cyclists on route	Segregated cycle path would provide safe route.	Does not align with current policy on integration of public transport modes.	Reduces accessibility for those who do not wish to or cannot travel on foot or on bicycle.
Option 3: Cater for demand growth by car and increased road provision	Undermines investment to date in rail network. Would require increased widening of dual carriageways. Will increase congestion on approach to and within urban areas.	Increased road traffic would increase the level of GHG emissions on the road network.	Increased traffic volumes on high speed national roads would increase number of accidents on route.	Does not integrate with current transport policy.	Increased road traffic would reduce accessibility and social inclusion for those who use other modes due to congestion.
Option 4: Cater for demand growth by car and increased bus	Undermines investment to date in rail network. Bus services would be duplicating the rail services along the same corridors.	Provision for bus traffic would lead to marginal increase in GHG compared to a growth in car usage.	Bus travel would reduce the amount of cars in use and would reduce the potential accident rate.	Better integrated bus network can connect with rail stations but journey times can be hindered by an increase in private car traffic.	An integrated bus network can improve the accessibility and social inclusion to users.

	Economy	Environment	Safety	Integration	Accessibility and Social Inclusion
service provision;					
Option 5: Convert rail line and services to Light Rail Transit	Undermines investment to date in rail network.	Low emissions rate from LRT as energy source would be electric. Noise pollution would be low.	Segregated light rail services have very low accident and incident rates.	Can cater for increased development intensification around LRT stations.	Would enhance accessibility for users as well as providing an attractive alternative to private car transport.

3.2.3 Proposed Service Improvements

In order to meet the target demand on the strategic rail corridor it is proposed to increase the service frequency between Kent Station and Midleton, and between Kent Station and Cobh from one train every 30min to one train every 10min. It is also proposed to increase the service frequency between Kent Station and Mallow from one train every 30min to one train every 10min. It is also proposed to provide through running services between Mallow and both Midleton and Cobh to cater for the identified cross city demand. The following lists the proposed Cork Suburban Rail Service Frequencies:

- Midleton – Cork: 20 min;
- Midleton – Mallow: 20 min;
- Cobh – Cork: 20 min;
- Cobh – Mallow: 20 min,
- The combined cross city services equate to:
  - Glounthaune – Cork: 5 min;
  - Cork – Mallow: 10 min; and
  - Cross City Demand: 10 min.

3.2.4 Rail Stations and Catchment

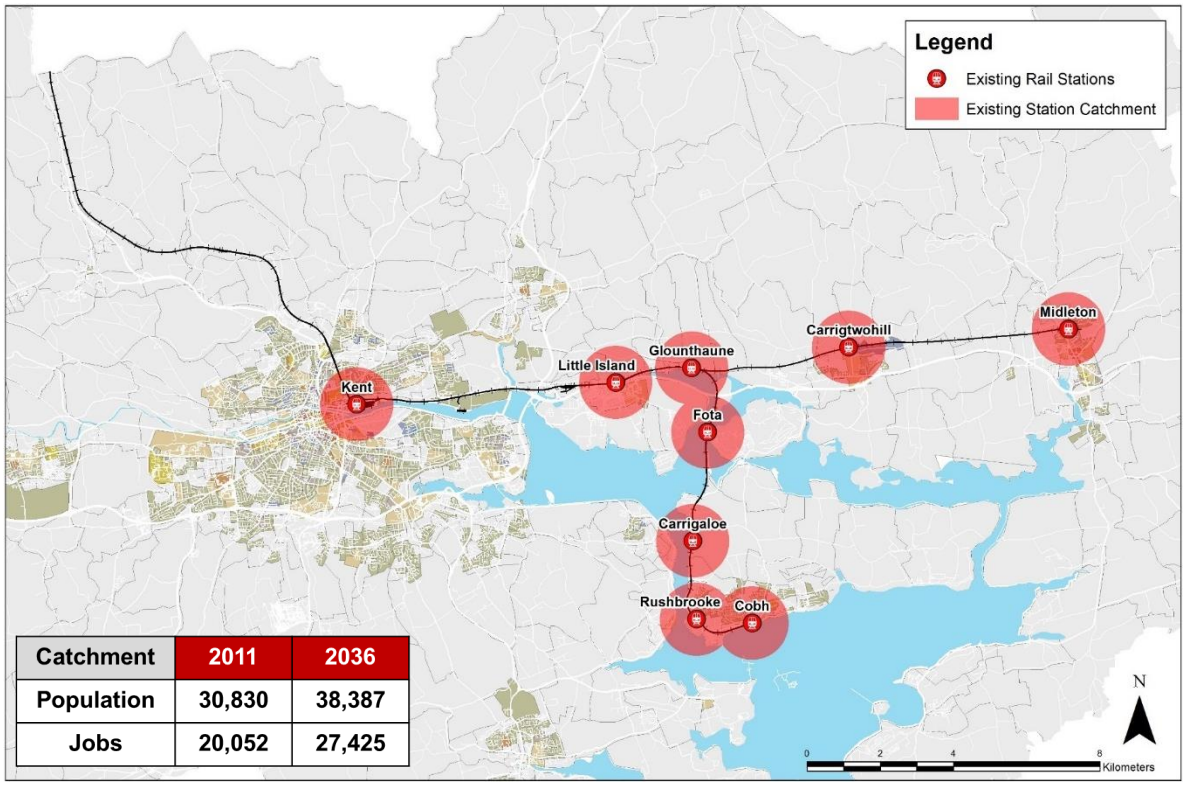
New rail stations are proposed for the Cork suburban rail network in order to increase the population and employment catchment of the rail network in catering for the demand within the strategic rail corridor. The following outlines the existing and proposed rail stations and their catchment.

Existing Stations

There are existing train stations at Cork City centre (Kent station), with suburban rail serving Little Island, Glounthaune, Fota Island, Carrigaloe, Rushbrooke; Cobh, Carrigtwohill and Midleton. These are identified in red in Figure 3-11. Additional population, employment and educational growth is ear-marked within the catchment area of many of these existing stations.

- Midleton – the East Cork Municipal District Local Area Plan (LAP) projects significant population growth. The majority of this development is envisaged for the Water-Rock Urban Expansion Area where a new rail station is planned (see below). Infill development is also possible within the town centre and to the north of the town near the existing train station at Broomfield West (Mill Road);
- Carrigtwohill – A Masterplan at Carrigtwohill North has been prepared that will look to infill housing development between the existing town centre and the railway line to approximately double the existing population;
- Cobh – The Cork County Development Plan 2014 projected a substantial increase in population on the Census 2011 levels for the municipal district area. The majority of this growth is planned for the designated Urban Expansion Area at Ballynoe Valley where a new rail station is planned (see below) with some infill development in the town centre possible;
- Glounthaune - The Cobh Municipal District LAP has an objective to encourage the development of additional housing units near the rail station at Glounthane;
- Little Island – a key employment location within the CMA. The Cobh Municipal District LAP sets a target objective for significant employment growth with some housing; and
- Kent Station, Cork – the station itself falls within the emerging Cork City Docks LAP which will replace the existing South Docks and North Docks LAP. Cork Docks will be served by national, suburban and rapid transport options widening its catchment area substantially. The Issues

paper for the City Docks LAP envisages potential for significant employment and housing growth.



Catchment	2011	2036
Population	30,830	38,387
Jobs	20,052	27,425

Figure 3-11: Existing Stations and Catchment

Proposed Stations

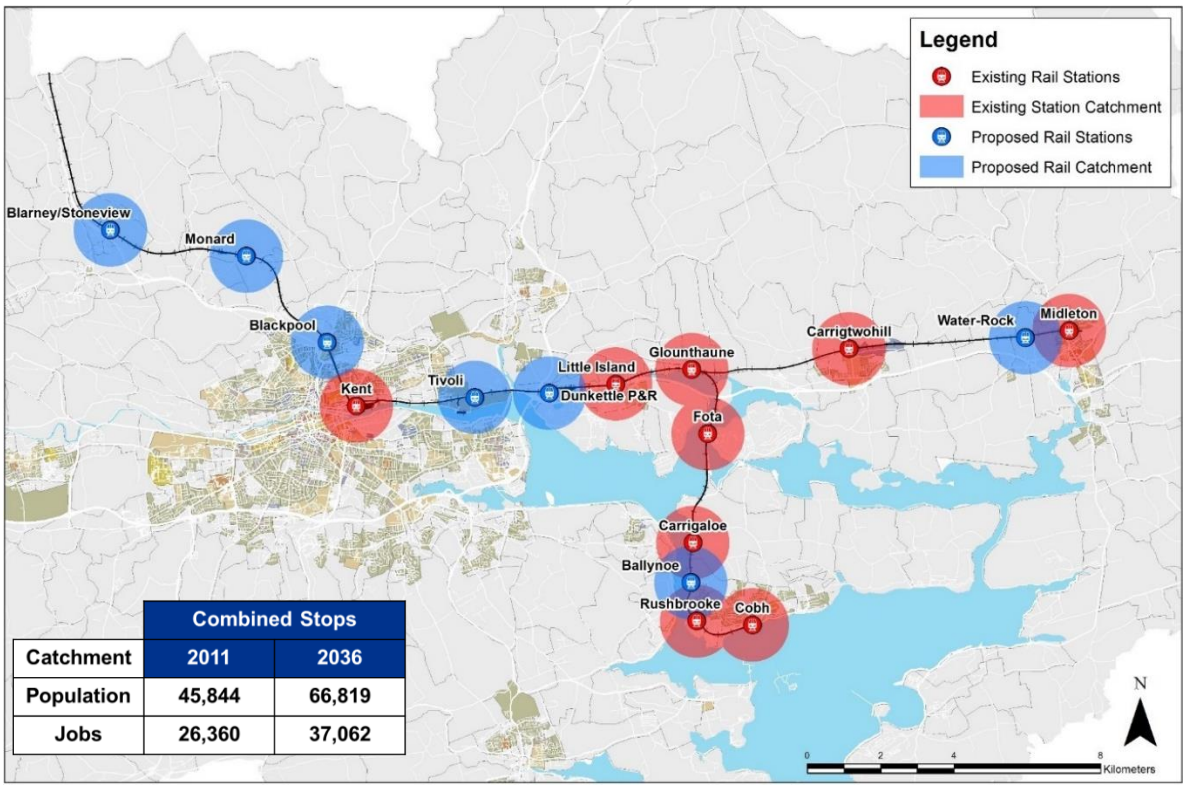
The following lists the proposed rail stations, also Illustrated in Figure 3-12, describing the catchments they will serve:

- Water-Rock - lies to the immediate west of Midleton and is a designated Urban Expansion Area in the East Cork Municipal District Local Area Plan (LAP) with estimated 160 ha of prominently greenfield land designated for development over the next ten years. Cork County Council recently received funding from the Local Infrastructure Housing Activation Fund (LIHAF) to kick-start the settlement which will encompass approximately 2,500 housing units, schools and a new neighbourhood centre. The requirement for a new station is outlined in the LAP;
- Ballynoe - An additional 72 hectares on the northern fringe of Cobh is identified for residential development in the Cobh Municipal District LAP. 700 homes and a primary school split over two phases are earmarked for development in the LAP. The requirement for a new rail station at Ballynoe is outlined in the Cobh Municipal District Local Area Plan and Cobh Masterplan;
- Dunkettle Park & Ride - new rail station located south of the Ballinglanna-Dunkettle Urban Expansion Area. The Cobh Municipal District LAP identifies a potential of 1,200 housing units to be delivered in 2 phases up to 2023 in order to facilitate the growth of the town's population to 10,585;
- Tivoli - A new rail station was proposed within the Tivoli Local Area Plan Issues Paper issued by Cork City Council in summer 2017. The issues paper envisages a minimum of 3,000 housing

units with a new rail station and pedestrian and cycle, links to the city to facilitate Tivoli's transition from port activity to a vibrant urban mixed-use quarter;

- Blackpool/Kilbarry - a designated District Centre in the Cork City Development Plan 2015-2021 and earmarked for a range of housing, employment and educational uses on existing brownfield sites at the former Sunbeam Complex and shopping centre, Old Whitechurch Road and Kilbarry Technology Park. A new rail station is supported within the CASP and the North Blackpool Local Area Plan 2011;
- Monard - Vision articulated in the Cobh LAP is for a new rail based metropolitan town between Blarney and Cork. A projected 4,750-5,850 new housing units with a new town centre based around the railway station is expected to generate a population of 13,000. 4 new primary schools and a secondary school are ear-marked for development; and
- Blarney/Stoneview - is a designated Metropolitan Town with a Blarney Municipal District LAP population target of 7533 by 2022. The majority of population, education & employment growth is envisaged to the north of the existing town at Stoneview where 2,600 new dwellings, associated community facilities, a neighbourhood centre, schools, hospital, employment uses, park and ride facility and new train station form part of a masterplan.

The introduction of additional rail stations is shown to increase the population catchment from 38,000 to 67,000 and increase employment catchment from 27,000 to 37,000 jobs in the 2036 scenario, as shown in Figure 3-12.



	Combined Stops	
Catchment	2011	2036
Population	45,844	66,819
Jobs	26,360	37,062

Figure 3-12: Proposed Stations and Catchment

3.2.5 New Infrastructure and Supporting Proposals

In order to enable the increase in service numbers and cross city services the following infrastructure and supporting proposals are required:

- Signalling improvements;
- New platform at Kent on bypass line for northbound through running;

- 2nd track between Glounthaune and Midleton;
- 2nd platform at Cobh station;
- Passing loops at all new stations north of Kent to mitigate impact on InterCity services;
- Additional platform or infrastructure at Mallow;
- Additional rolling stock & staff; and
- New or increased capacity rail depot.

3.2.6 Alignment with Public Transport Network Development Principles

Table 3-4 outlines the alignment of the proposed Strategic Rail proposals with the public transport network development guiding principles.

Table 3-4: Alignment of Strategic Rail Proposals with Public Transport Network Development Principles

Principles	Alignment of Strategic Rail Proposals with Public Transport Network Development Principles
Capacity	Provides adequate service capacity to cater for forecast demand.
Frequency	Provides for very high frequency rail services, which reduce wait times at rail stations. 10minute headway between both Midleton / Cobh and Kent Station. 5minute headway between Glounthaune and Kent Station. 10minute headway between Mallow and Kent Station.
Speed	Provides fully segregated services with full priority achieving high speeds on the rail line. The combination of low wait times and high speeds increase the competitiveness of the rail service against car based travel.
Directness	Provides a direct, fully segregated service between the existing stations, proposed stations and associated development lands and Cork City Centre. Cross city services enable direct linkage between areas to the north and east of Cork City.
Coverage	The proposed new rail stations increase the coverage significantly on all routes. Cross city services widen the coverage and catchment for direct linkage between areas to the north and east of Cork City.
Interchange	Reorientation of Kent Station will facilitate seamless interchange of rail with bus services and the east-west rapid transit corridor, as well as improved pedestrian and cycle access to the City Centre and South Docklands. Rail station Park & Ride sites proposed at Dunkettle, Stoneview will cater for interchange between car travel and rail on the M8, N25 and N20. Increased frequency will improve interchange for trips between Cobh and Midleton at Glounthaune station.

	The proposed Blackpool rail station provides interchange opportunity with the Northern Orbital bus service and the proposed Park & Ride for interchange between car travel and rail on the N20.

3.3 Strategic East-West Corridor Option Development

3.3.1 Target Demand

Table 3-13Figure 3-13 illustrates the target demand along the Strategic Rail Corridor, with a maximum one-way demand of 3,731pax/hr/dir between Cork City Centre and Corridor F at University College Cork and 1,925pax/hr/dir between Cork City Centre and the Corridor D1 at Cork South Docklands. The two-way cross city demand is identified as 1,272 pax/hr.

The two-way interchange demand with strategic rail at Kent Station shows 1,962pax/hr between Corridor F and B, and 1,029 between Corridor D1 and B, with a further 1,200 interchange demand between the Combined East-West Corridor and Corridor G.

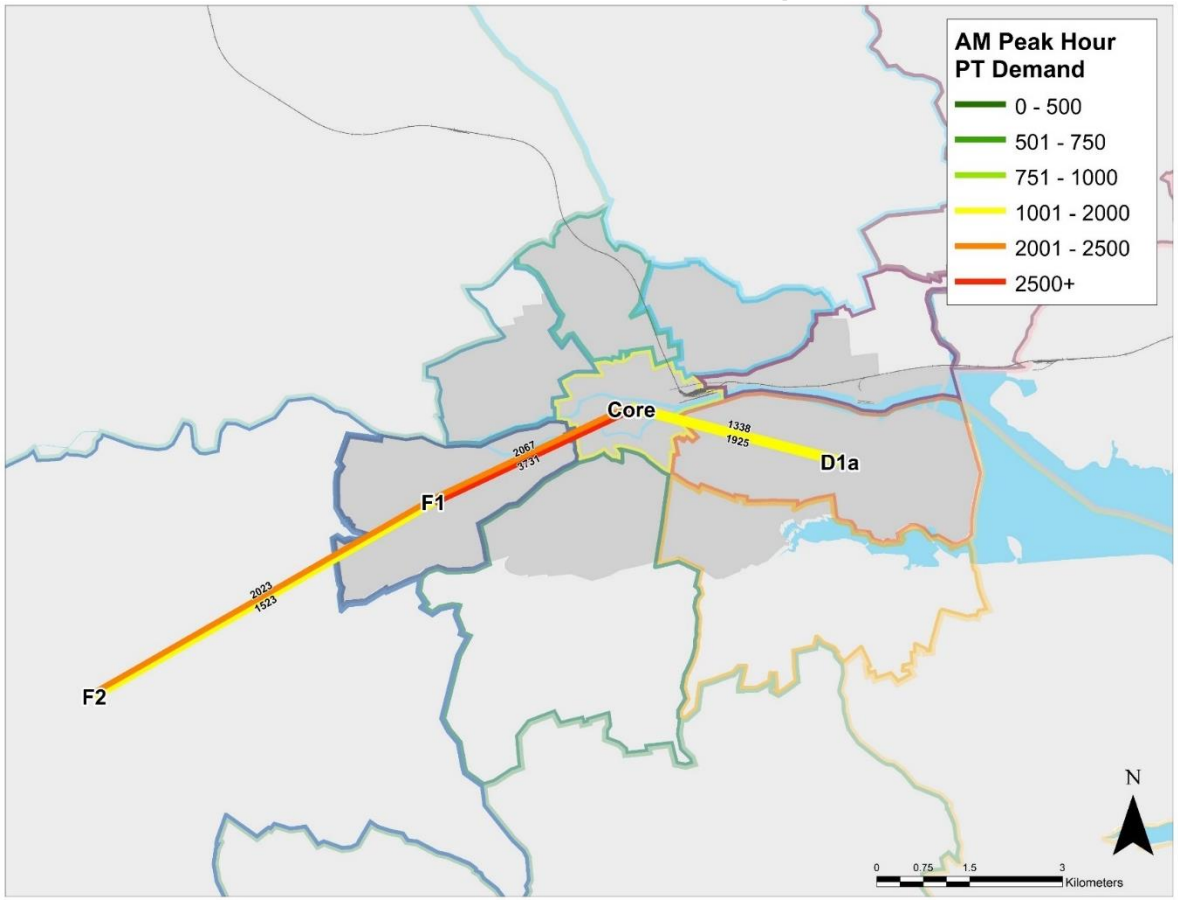


Figure 3-13: East – West Strategic Rapid Transit Corridor Public Transport Demand

3.3.2 Consideration of Alternatives

The procedure for the assessment of these options is guided by the 'Common Appraisal Framework (CAF) for Transport Projects and Programmes, March 2016' published by the Department of Transport, Tourism and Sport (DTTAS), which requires schemes to be appraised under the general criteria of **Economy, Safety, Environment, Accessibility & Social Inclusion and Integration**. Alternative public transport provisions for the Strategic East-West Corridor have been considered to ensure that the preferred public transport meets the requirements of the CAF. It should be noted

that a more detailed appraisal of the public transport schemes identified within the preferred option will be required at a later stage in the planning process. The alternatives considered include the following:

- **Option 1:** Bus services;
- **Option 2:** Bus Rapid Transit;
- **Option 3:** Light Rail Transit;
- **Option 4:** Suburban Rail; and
- **Option 5:** Metro.

Table 3-6 outlines the results of the multi-criteria assessment in line with the CAF requirements. The table describes how each of the options compares against each criteria and the cell is colour coded to indicate relative performance.

The options identified have been assessed relative to each other under the above five criteria using the following rating system outlined in Table 3-5.

Table 3-5: Assessment Rating Table

Colour	Relative Performance
	Very Good
	Good
	Neutral
	Poor
	Very Poor

From Table 3-6 below both **"Option 2 Bus Rapid Transit"** and **"Option 3 Light Rail Transit"** rank well based on the multi-criteria assessment, with "Option 3 Light Rail Transit" coming out highest across all criteria. On this basis the **"Option 3 Light Rail Transit"** is considered the preferred option, however, this would ultimately require further demand and patronage analysis, and cost benefit analysis to confirm this.

Table 3-6: Assessment of Alternative Transport Measures for Strategic East-West Corridor

	Economy	Environment	Safety	Integration	Accessibility and Social Inclusion
Option 1: Bus services;	Bus services not likely to accommodate forecast demand.	Produce less GHG than private transport. Options available for different fuel sources.	Bus travel would reduce the amount of cars in use and would reduce the potential accident rate.	Better integrated bus network can connect with rail stations but journey times can be hindered by private car traffic, if not prioritised appropriately.	An integrated bus network can improve the accessibility and social inclusion to users.
Option 2: Bus Rapid Transit;	BRT can accommodate the level of demand associated with the M2F2 forecast levels to 2040. However, it is not likely to have adequate capacity available to cater for growth beyond M2F2 levels.	Produce less GHG than private transport. Options available for different fuel sources.	Higher safety rate than car mode due to dedicated infrastructure segregating from other road users.	Can cater for increased development intensification along East-West Corridor.	Enhances accessibility for bus users on existing routes as well as providing an attractive alternative to the private car.
Option 3: Light Rail Transit;	LRT is more expensive than BRT. Has better travel times, reliability and can cater for larger demand beyond M2F2 levels.	Low emissions rate from LRT as energy source would be electric. Noise pollution would be low.	Higher safety rate than car mode due to dedicated infrastructure segregating from other road users.	Can cater for increased development intensification along East-West Corridor	Light rail typically has a wider catchment than bus or BRT type services therefore increasing accessibility.
Option 4: Suburban Rail; and	Not feasible due to travel demand likely to reach a level where a new suburban rail line through the City Centre would provide value for money. Significant costs associated with construction and operation.	Not feasible due to significant environmental impacts in terms of wholesale impact on city centre, including knocking of buildings.			
Option 5: Metro.	Not feasible due to Travel demand not likely to reach a level where a metro would provide value for money.				

	Economy	Environment	Safety	Integration	Accessibility and Social Inclusion
	Significant costs associated with construction and operation.				

3.3.3 East-West Corridor Route Alignment

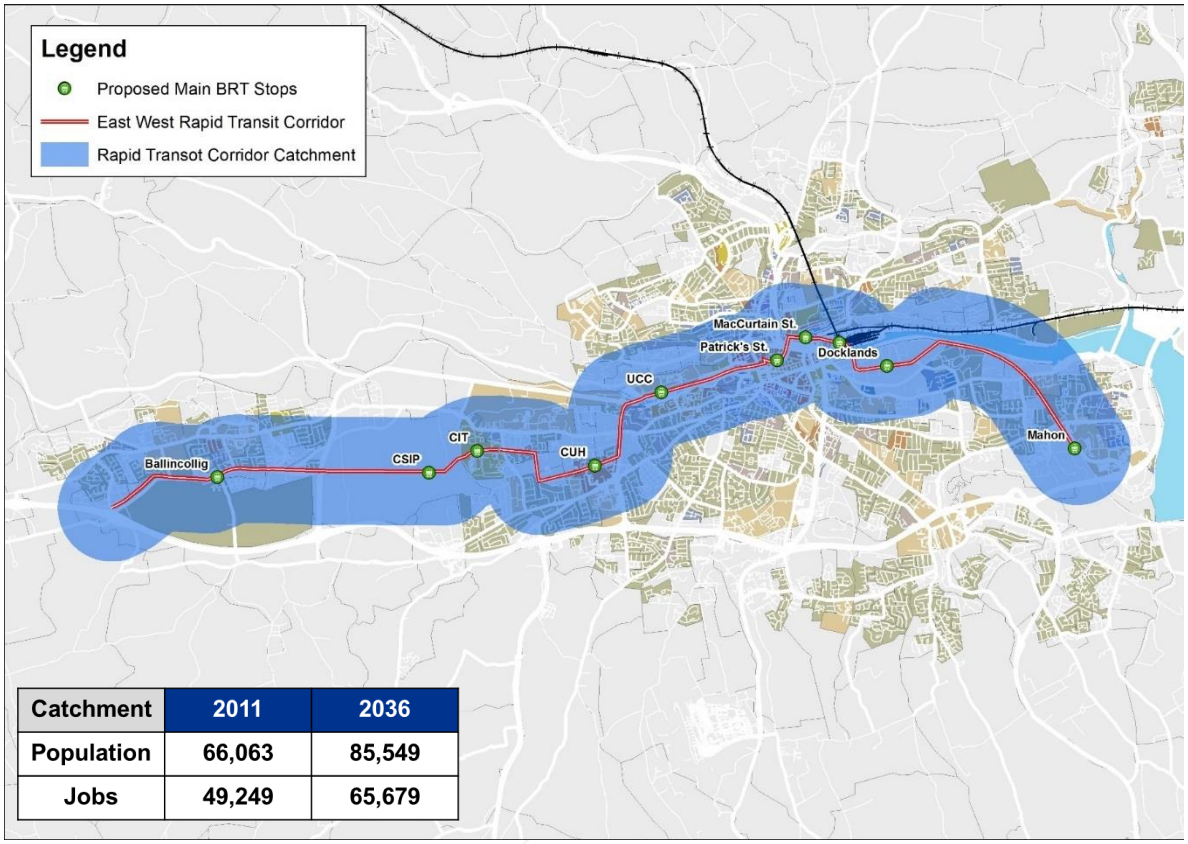
In order to develop an indicative route alignment for the proposed East-West Rapid Transit Corridor a review was undertaken of key origins, destinations and interchange locations within the East-West Corridor. The following key origins, destinations and interchange locations were identified and an indicative alignment was developed in order to provide access to as many of these key areas as possible within the 1km catchment, see Figure 3-14.

- Mahon Point Shopping Centre and Retail Park;
- Loughmahon Technical Park;
- Páirc Uí Chaoimh;
- South Docklands;
- Kent Station;
- Parnell Place Bus Station;
- Cork City Centre;
- University College Cork;
- Cork University Hospital;
- Wilton Shopping Centre;
- Model Farm Road;
- Cork Institute of Technology;
- Cork Science and Innovation Park;
- Ballincollig Town Centre; and
- Ballincollig Urban Expansion Area.

Given Cork City's constrained street network consideration was given to utilising wider streets where possible in order to navigate within the City Centre. Street such as Western Road, Washington Street, St. Patrick's Street, Grand Parade, South Mall, MacCurtain Street were considered above the narrower street network permeating Cork City Centre. The identified indicative East-West Corridor Route utilises Western Road, Washington Street, Grand Parade, St. Patrick's Street, MacCurtain Street and Alfred Street between Cork University Hospital and Kent Station.

A multi-modal link between the North and South Docklands is proposed to cater for the East-West Corridor, with Centre Park Road providing the alignment within the South Docklands. To the east of Cork City, the disused railway is proposed as the direct and segregated alignment between Cork South Docklands and Mahon Point.

To the west of Cork University Hospital, the indicative alignment utilises the available space within the Highfield area to Cork Institute of Technology and further west utilises the current greenfield site of the proposed Cork Science and Innovation Park to provide direct access to Ballincollig. The indicative alignment in Ballincollig routes along the link road between Ballincollig Town Centre and the Ballincollig Urban Expansion Area, to maximise the catchment.



Catchment	2011	2036
Population	66,063	85,549
Jobs	49,249	65,679

Figure 3-14: Strategic East-West Rapid Transit Corridor Catchment

Figure 3-15: Strategic East-West Corridor Route Alignment

3.3.4 Alignment with Public Transport Network Development Principles

Table 3-7 outlines the alignment of the East-West Rapid Transit Corridor proposals with the public transport network development guiding principles.

Table 3-7: Alignment of East-West Rapid Transit Corridor with Public Transport Network Development Principles

Principles	Alignment of Heavy Rail Proposals with Public Transport Network Development Principles
Capacity	Provides adequate service capacity to cater for forecast demand.
Frequency	Provides for very high frequency services, which reduce wait times at stop along corridor. 3 to 5 minute headways proposed.
Speed	Provides partially segregated services with high levels of priority at all junctions, achieving high speeds on the rapid transit line. The combination of very low wait times and high speeds increase the competitiveness of service against car based travel.
Directness	Provides a direct, partially segregated service key origins, destinations and interchange locations across Cork City. New Link Roads from Ballincollig to CIT & CIT to CUH facilitate a more direct route into the City from the west. Use of the disused railway line and new Docklands Bridge provides a direct route to the east of Cork City Centre. Directness of service provided, even working within the tight Cork City network constraints.
Coverage	The proposed East-West Rapid Transit Corridor will cover a population catchment of 85,000 persons and an employment catchment of 65,000 jobs.
Interchange	Interchange between East-West Corridor and Strategic Rail essential to the delivery of an efficient and effective public transport service. Re-orientation of Kent Station will facilitate seamless interchange of rail the East-West Rapid Transit Corridor. Multiple locations along corridor to interchange with orbital and radial bus services. Proposed Park & Ride at Ballincollig West and at Poulavone will cater for interchange between car travel and the Rapid Transit Corridor on the N22.

3.4 Public Transport Corridors Mode Capacities and Route Alignment Considerations

This section considers the remaining radial and orbital corridors not services by the East-West Rapid Transit corridor and the Strategic Rail corridor.

3.4.1 Consideration of Alternatives

The procedure for the assessment of these options is guided by the 'Common Appraisal Framework (CAF) for Transport Projects and Programmes, March 2016' published by the Department of Transport, Tourism and Sport (DTTAS), which requires schemes to be appraised under the general criteria of **Economy, Safety, Environment, Accessibility & Social Inclusion and Integration**. Alternative public transport provisions for the Public Transport Corridors have been considered to ensure that the preferred public transport meets the requirements of the CAF. It should be noted that a more detailed appraisal of the public transport schemes identified within the preferred option will be required at a later stage in the planning process. The alternatives considered include the following:

- **Option 1:** Bus services;
- **Option 2:** Bus Rapid Transit; and
- **Option 3:** Light Rail Transit.

Table 3-9 outlines the results of the multi-criteria assessment in line the CAF requirements. The table describes how each of the options compares against each criteria and the cell is colour coded to indicate relative performance.

The options identified have been assessed relative to each other under the above five criteria using the following rating system outlined in Table 3-8.

Table 3-8: Assessment Rating Table

Colour	Relative Performance
	Very Good
	Good
	Neutral
	Poor
	Very Poor

From Table 3-9 below **"Option 1 Bus Services"** are considered to be the preferential options based on the multi-criteria assessment.

option based on the multi-criteria assessment, providing the most benefits overall while maximising the economic benefits.

Both provide consistent benefits in general. The difference between the two however, can only really be determined through further demand and patronage analysis and cost benefit analysis.

Table 3-9: Assessment of Alternative Transport Measures for Public Transport Corridors

	Economy	Environment	Safety	Integration	Accessibility and Social Inclusion
Option 1: Bus services;	Makes best use of investment in current network and could provide greater returns on investment in terms of benefit to cost ratio.	Produces less GHG than private Car alternative. Options available for different fuel sources.	Bus travel would reduce the amount of cars in use and would reduce the potential accident rate.	Better integrated bus network can connect with rail stations but journey times can be hindered by private car traffic, if not prioritised appropriately.	An integrated bus network can improve the accessibility and social inclusion to users.
Option 2: Bus Rapid Transit;	Demand levels do not indicate that a BRT would provide value for money, based on significant cost associated with introduction of BRT.	Produce less GHG than private transport. Options available for different fuel sources.	Higher safety rate than car mode due to dedicated infrastructure segregating from other road users.	Better integrated bus network can connect with rail stations but journey times can be hindered by private car traffic, if not prioritised appropriately	Enhances accessibility for bus users on existing routes as well as providing an attractive alternative to the private car.
Option 3: Light Rail Transit;	Not feasible due to travel demand not likely to reach a level where Light Rail would provide value for money. Significant costs associated with construction and operation.				

3.4.2 Route Alignment Considerations

The route option alignments for the bus routes in each of the corridors have been developed taking into account the six principles that underpin the performance of the "idealised" public transport network. The six principles were defined in chapter 3 and relate to capacity; frequency; speed; directness; coverage; and interchange possibilities. These were taken into account in order to provide a comprehensive network that maximises the public transport mode share.

In order to ensure that the route option alignment and the proposed priority measures can be accommodated, a review was undertaken in the context of determining potential route alignments that meet these six principles. This review included:

- Transport Network;
- Population;
- Employment and Education distribution;
- Network Constraints; and
- Public Transport Service Catchment.

Table 3-10: Public Transport Design Capacity and Frequency

Capacity Assumptions	Seating Capacity	Crush Capacity	Design Capacity	
Commuter	285	412	350	
Light Rail	70	305	259	
Bus Rapid Transit	60	120	102	
Double Decker Bus	74	88	75	
City Coach Bus	58	82	70	
Intercity Bus	50	53	50	
Shuttle Bus	30	30	30	
Assumed Design Capacity reduction factor of	**85%**	**or 100% of seated capacity, whichever is larger**		

1 Hour Peak Design Capacity	Commuter	LRT	BRT	DDB	CB	ICB	SB
Design Capacity per Service Vehicle/Train	350	259	102	75	70	50	30
Frequency	**Capacity**						
60 min	350	259	102	75	70	50	30
40 min	525	389	153	112	105	75	45
30 min	700	519	204	150	139	100	60
20 min	1,051	778	306	224	209	150	90
15 min	1,401	1,037	408	299	279	200	120
12 min	1,751	1,296	510	374	349	250	150
10 min	2,101	1,556	612	449	418	300	180
9 min	2,335	1,728	680	499	465	333	200
8 min	2,627	1,944	765	561	523	375	225
7 min	3,002	2,222	874	641	597	429	257
6 min	3,502	2,593	1,020	748	697	500	300
5 min	4,202	3,111	1,224	898	836	600	360
4 min	5,253	3,889	1,530	1,122	1,046	750	450
3 min	7,004	5,185	2,040	1,496	1,394	1,000	600
2 min	10,506	7,778	3,060	2,244	2,091	1,500	900

3.5 Corridor A

3.5.1 Option Development

Target Demand

Based on the public transport demand identified in the Demand Report based on the "Idealised" public transport network, the "Target Demand" can be identified. Table 3-11 shows the two-way Corridor A screenline demand on the radial movements, highlighting the largest demand as the "Target Demand" for each movement.

Table 3-11: Identifying Maximum Demand to Develop Public Transport Options

Service Type	Outer Radial (A2 – A1)	Inner Radial (A1 – Core)
Inbound	1,100	1,850
Outbound	800	1,200

Development of Proposed Options

The indicative transport network for the CMA identifies a high frequency bus service to cater for this area of the network. As such the number of bus routes and frequency of these services were reviewed to meet the target demand. Table 3-12 below shows an example of the methodology applied in determining potential public transport options to cater for the maximum target demand (between A1 and Cork City Core). It shows that to cater for the target demand five bus routes are required, with three running at a 10minute headway and two running at a 20-minute headway.

It shows the breakdown of the number of routes per service type are applied to frequency of service to determine whether or not the Option caters for the target demand. It can be seen that the Design Capacity caters for the target demand, with any unmet demand being catered for by the Standing Capacity where required. It is apparent that in general the maximum screenline target demand in Corridor A is of a scale that would require high frequency bus services across multiple routes.

Table 3-12: Option Development to Cater for Maximum Screenline Demand

Max Demand: 1,850 Service Type	Design Capacity	Option 1 – Double Deck Bus Routes + City Coach Bus Services
Commuter Rail	350	Blackpool Rail Station
Double Deck Bus	75	3 routes X 10 min freq
City Coach Bus	70	2 routes X 20 min freq
Design Capacity		**1,755**
Standing Capacity		**2,062**

Route Option Alignments

The route option alignments have been developed taking into account the six principles that underpin the performance of the "idealised" public transport network, were taken into account in order to provide a comprehensive network that maximises the public transport mode share. In order to ensure that the route option alignment and the proposed priority measures can be accommodated a review was undertaken in the context of determining potential route alignments that meet the six principles. The review included: Transport Network; Population, Employment and Education distribution; Network Constraints; and Public Transport Service Catchment. Five main routes were identified in order to cater for the proposed public transport options. Figure 3-16 illustrates the proposed Public Transport Options for Corridor A, outlining how the options have been developed to align with the six principles as much as feasibly possible.

Blackpool Rail Station

A new station is proposed on the main Cork to Mallow line at Blackpool. The proposed Blackpool rail station sits within Corridor G however it will provide increased transport benefits to the western side of Corridor A1.

Bus Route 1

Bus Route 1 has been identified to run from the new Urban Expansion Area in Ballyvolane, down Ballyhooly Road, Ballyvolane Cross, St Luke's and into the City Centre.

Bus Route 2

Bus Route 2 has been identified to run from Glanmire, Old Youghal Road (R615), Ballyvolane Urban Expansion Area, Old Youghal Road, St Luke's and into the City Centre. Variations of this route could include serving the Ballyvolane Urban Expansion Area more directly which would benefit future residents of Ballyvolane.

Bus Route 3

Bus Route 3 has been identified to run from Lotabeg onto Murmount Avenue (route alignment at this point similar to the 209), Middle Glanmire Road and towards St Lukes and the City Centre. Variations of this route allow for physical constraints, additional catchment and improved journey times directly serving the City Centre.

Bus Route 4

Route 4 has been identified from previous work undertaken for the LAPs for Ballinglanna-Dunkettle development lands. The service originates in Glanmire, routing on the Old Youghal Road (R615), proposed Ballyvolane road network, Kilbarry, Dublin Hill, Blackpool and entering the city at the North City Gateway. The rail line presents a constraint to the operation of double decker services due to the rail bridge at Dublin Hill Lower.

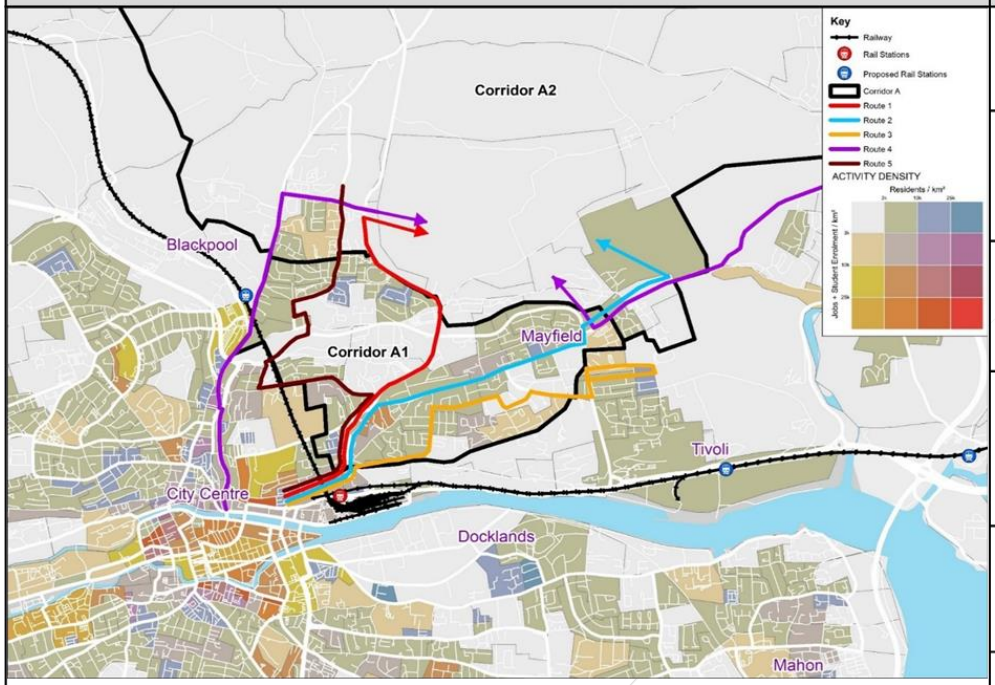
Bus Route 5

Bus Route 5 has been identified to run from Ballincollie Road, Glenheights Road, North Ring Road, Glen Avenue, Ballyhooly Road, St Lukes and the City Centre.

Route Option Priority Measures

In order to achieve high speed, high frequency, reliable public transport services proposed within Corridor A increased public transport priority and provision is required, above and beyond the existing bus lane provision. The main focus of the improvements to public transport speeds and priority will be focussed on Ballyhooly Road, Ballyvolane Cross, Dublin Hill, Old Youghal Road, Middle Glanmire Road, and Summerhill North. The supporting priority measures are illustrated in Figure 3-17.

Corridor A



Guiding Principles Table	
Capacity	The 'Idealised' demand (A1-Core) is 1,850 and the service capacity is 2,100 = 114%
Frequency	Combined Bus headway of 2.5 mins across Corridor A. Rail station at Blackpool – 5 min frequency
Speed	Provision of bus lanes will facilitate high bus speeds on Routes 1, 2 & 4 targeting speeds of 20kph+
Coverage	23,362 population and 4,397 jobs within walking catchment. Covering for 85% and 81% of Corridor A's total population and Jobs.
Interchange	5 points for interchange opportunities on North Orbital bus service. Further interchange at City Centre. Connections to Rail
Directness	3 of the high frequency routes are as direct as possible with remaining routes covering remainder of catchment.

Route / Service	Headway	Priority	Capacity
Route 1	10 min		449
Route 2	10 min		449
Route 3	20 min		224
Route 4	10 min		418
Route 5	20 min		209

Figure 3-16: Corridor A – Route Alignment Options

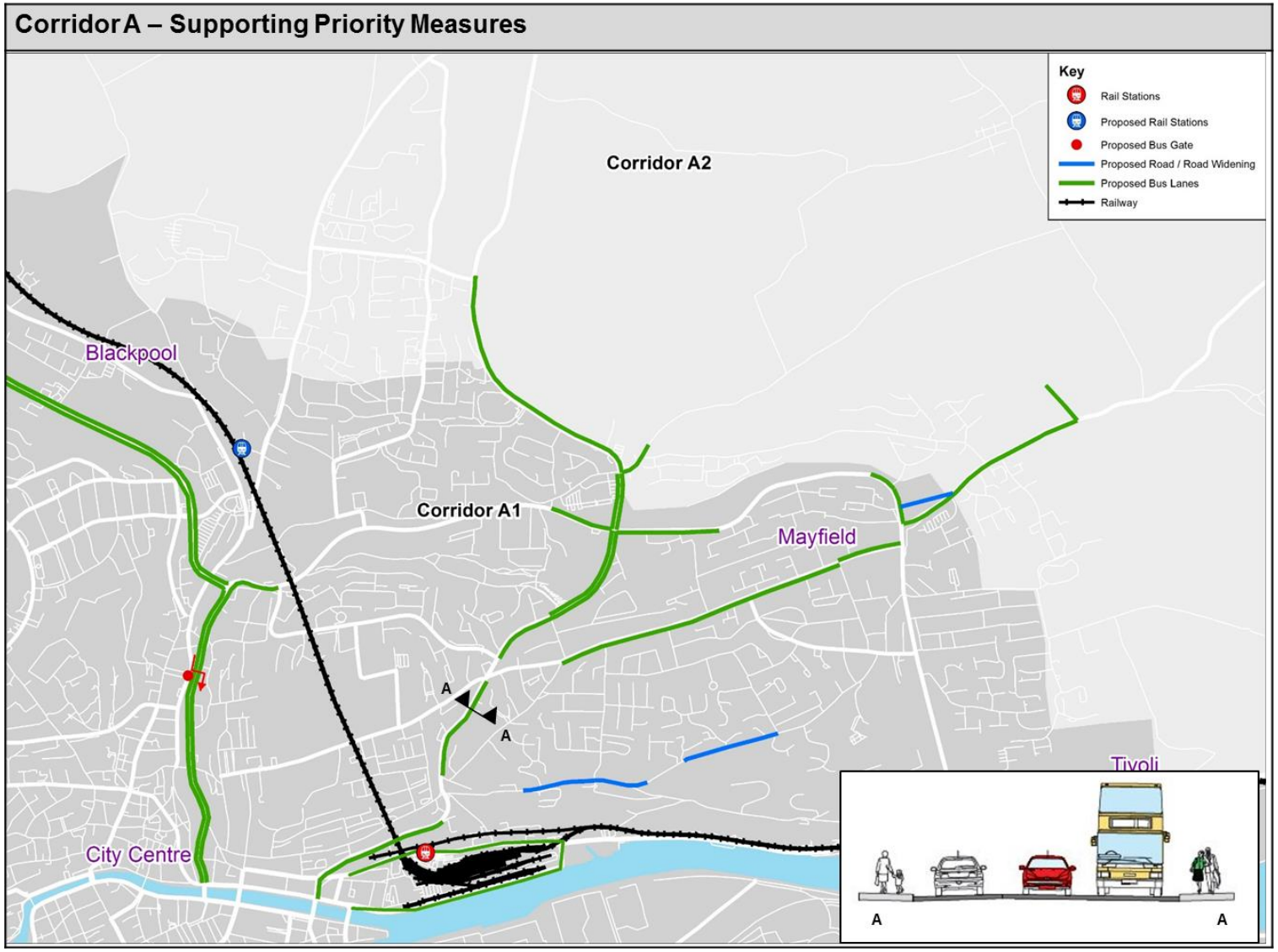


Figure 3-17: Corridor A – Supporting Priority Measures

3.6 Corridor B

3.6.1 Option Development

Target Demand

Based on the public transport demand identified in the Demand Report based on the "Idealised" public transport network, the "Target Demand" can be identified. Table 3-13 shows the two-way Corridor B and C screenline demand on the radial and orbital movements, highlighting the largest demand as the "Target Demand" for each movement.

Table 3-13: Identifying Maximum Demand to Develop Public Transport Options

Service Type	Outer Radial (B2 – B1)	Outer Radial (C2 – B1)	Inner Radial (B1 – Core)
Inbound	1200	3100	3600
Outbound	750	1850	2000

Development of Proposed Options

Table 3-14 shows the analysis of each public transport option against the service Design and Crush Capacity. It is beneficial to cross reference the service frequency analysis back against the public transport mode capacities illustration in Figure 3-1. The public transport mode capacity diagram shows that demand approaching circa 4,000 passengers is best served by high frequencies and high capacity buses and the service frequency analysis reinforces this provision through the recommended service frequencies. For Corridor B two options were proposed. It can be seen that for the majority of routes that the Design Capacity caters for the target demand, with any unmet demand being catered for by the Crush Capacity where required. It is apparent that in general the maximum screenline target demand in Corridors B&C is of a scale that would require high frequency bus services across multiple routes.

Table 3-14: Option Development to Cater for Maximum Screenline Demand

Max Demand: 3,600 Service Type	Design Capacity	Option 1 – Double Deck Bus Routes + City Coach Bus Services + Commuter Rail Services
Commuter Rail	350	Tivoli Rail Station
Double Deck Bus	75	2 routes X 10- 20 min freq
City Coach Bus	70	route X 10 min freq
Design Capacity		**5,366**

Route Option Alignments

Bus Route 1

Route 1 has been identified from previous work undertaken for the LAPs for Ballinglanna-Dunkettle development lands. The service originates in Glanmire, routing on the Old Youghal Road (R615),

proposed Ballyvolane road network and towards the city centre via the N20. The rail line presents a constraint to the operation of double decker services due to the rail bridge at Dublin Hill Lower.

Bus Route 2

Bus Route 2 has been identified to run from Glanmire, Tivoli and the City Centre.

Bus Route 2 Variation

A variation of bus route 2 was developed in order to provide a connection between Glanmire and Dunkettle Rail Station. Another potential variation is that the proposed bus route would utilise new infrastructure at East Gateway Bridge in approaching the city centre.

Bus Route 3

Bus Route 3 has been identified to run from Glanmire, Old Youghal Road (R615), Ballyvolane Urban Expansion Area, Old Youghal Road, St Luke's and into the City Centre. Variations of this route could include serving the Ballyvolane Urban Expansion Area more directly which would benefit future residents of Ballyvolane.

Bus Route 4

Bus Route 4 has been identified to run from Lotabeg onto Murmount Avenue (route alignment at this point similar to the 209), Middle Glanmire Road and towards St Lukes and the City Centre. Variations of this route allow for physical constraints, additional catchment and improved journey times directly serving the City Centre.

Bus Route 5

Bus Route 5 has been identified as a Radial Service to run from Ballyvolane Urban Expansion Area, Ballyvolane Cross, North Ring towards the R635 towards the City Centre.

Bus Route 6

Bus Route 6 has been identified as a Radial Service to run from Lotabeg, R635, Lower Glanmire Road towards the city centre.

Dunkettle Rail Station

A new station is proposed on the main Cork to Midleton line between Little Island and the M8. The proposed Dunkettle rail station sits within Corridor C however it will provide increased transport benefits to the south of Corridor B2.

Tivoli Rail Station

A new station is proposed on the main Cork to Mallow line at Tivoli. The proposed Tivoli rail station sits within Corridor B1 and will provide excellent connectivity to the city centre.

Regional Bus Services

Existing Regional Bus services are retained and an additional Cobh bus service is proposed in order to cater for the demand between Corridor C and the city centre. The alignment options are illustrated in Figure 3-18.

Route Option Priority Measures

In order to achieve high speed, high frequency, reliable public transport services proposed within Corridor B, increased public transport priority and provision is required, above and beyond the existing bus lane provision. The main focus of the improvements to public transport speeds and priority will be focussed on the N8, road network within the LAP area of Tivoli and the quays, North Ring Road, R635, Lower Glanmire Road, Old Youghal Road, R639 and Glanmire Village. The

introduction of rail stations at Tivoli and Dunkettle will play a significant role in addressing the demand. Supporting Priority Measures are presented in Figure 3-19.

Bus Route 1

For Bus Route 1, the ability to provide bus lanes along this route within Corridor B is limited due to narrow carriageway widths. Improved bus priority can be accommodated through junction upgrades in Glanmire and Little Island. There is opportunity for significant junction upgrade on the Old Youghal Road / North Ring Road where bus lanes can be facilitated on the approaches to the junction.

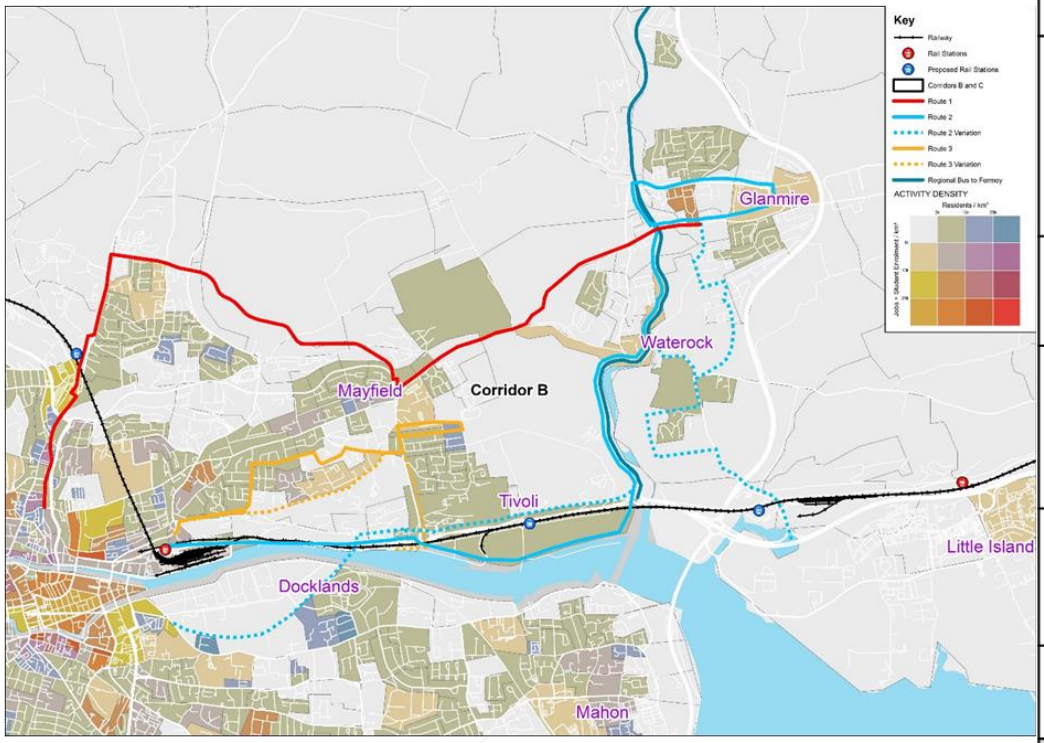
Bus Route 2

For Bus Route 2, bus lanes can be facilitated at the R639, Horgan's Quay and the N8 (adjacent to Tivoli LAP area). The provision of these measures would provide public transport priority that would makes buses an attractive alternative to the car. The internal road network within the Tivoli LAP lands

Bus Route 3

For Bus Route 3, the ability to provide bus lanes along this route within Corridor B is limited due to narrow carriageway widths. It is important that the new road network through the Ballyvolane Urban Expansion Area can complement direct bus services through Ballyvolane and towards the City Centre. A junction upgrade at Old Youghal Road / North Ring Road with accompanying bus lanes on the approaches would offer quality bus priority. Bus lanes on the Old Youghal Road on the approaches to junctions at Tinkers Cross and at Glanmire village should be investigated.

Corridor B – Option 1



Guiding Principles Table	
Capacity	The 'Idealised' demand (B1-Core) is 3,600 and the service capacity is 4876 = 135%
Frequency	Rail Services every 5min from Tivoli. Bus every 5min from Glanmire to City Centre via Routes 1 & 2. Service passing from Corridor B into City Core every 3 minutes.
Speed	Full Priority on Rail Line. Bus Priority along sections of Route 1 & 2 targeting 20 kph.
Coverage	17,321 population and 4,434 jobs within walking catchment. Covering for 77% and 74.5% of Corridor B's total population and Jobs.
Interchange	Interchange available at Kent Station for rail trips from Tivoli and interchange opportunities with Northern Orbital Bus Route.
Directness	Route 2 and the Rail provide direct links into the city.

Route / Service	Headway	Priority	Capacity
Rail	5 min		4200
Route 1	10 min		418
Route 2	10 min		449
Route 3	20 min		299

Figure 3-18: Corridor B – Route Alignment Options

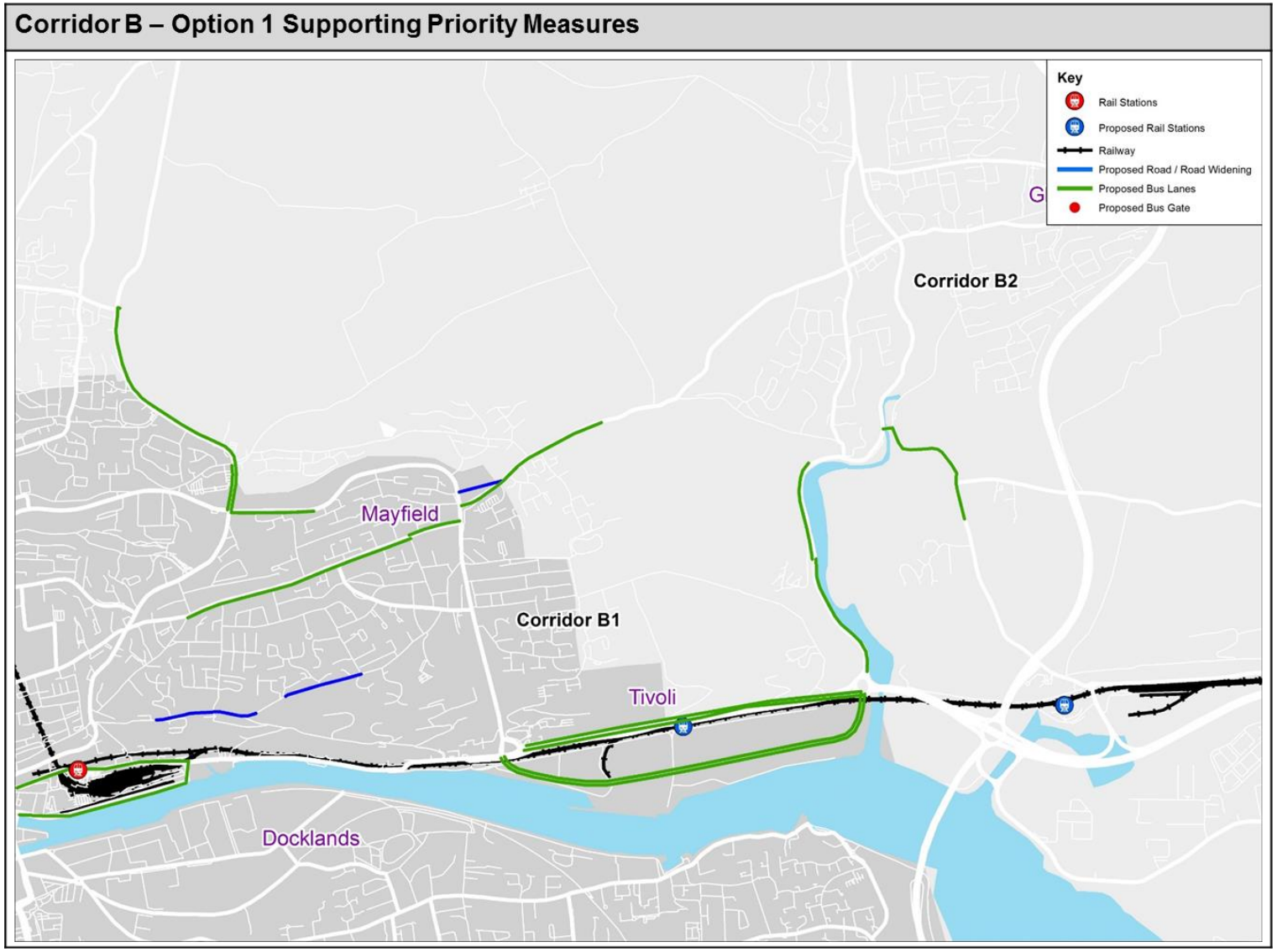


Figure 3-19: Corridor B – Supporting Priority Measures

3.7 Corridor C

Target Demand

Based on the public transport demand identified in the Demand Report based on the "Idealised" public transport network, the "Target Demand" can be identified. Table 3-15 shows the Corridor C screenline demand on the radial and orbital movements, highlighting the largest demand as the "Target Demand" for each movement.

Table 3-15: Identifying Maximum Demand to Develop Public Transport Options

Service Type	Outer Radial (B2 – B1)	Outer Radial (C2 – B1)	Inner Radial (B1 – Core)
Inbound	1200	3100	3600
Outbound	750	1850	2000

Development of Proposed Options

Table 3-16 shows the detailed analysis of each public transport option against the service Design and Crush Capacity. It is beneficial to cross reference the service frequency analysis back against the public transport mode capacities illustration in Figure 3-1. The public transport mode capacity diagram shows that demand approaching circa 4,000 passengers is best served by high frequencies rail services and high capacity buses and the service frequency analysis reinforces this provision through the recommended service frequencies. For Corridor B two options were proposed. It can be seen that for the majority of routes that the Design Capacity caters for the target demand, with any unmet demand being catered for by the Crush Capacity where required. It is apparent that in general the maximum screenline target demand in Corridor C is of a scale that would require high frequency rail services on the Cork suburban rail network between the central station of Kent and suburban destinations of Cobh and Midleton.

Table 3-16: Option Development to Cater for Maximum Screenline Demand

Max Demand: 3,100 Service Type	Design Capacity	Option 1 – Intercity Bus Routes + Commuter Rail Services
Commuter Rail	4200	Tivoli Rail Station
InterCity Bus	75	5 routes X 30 min freq
Design Capacity		**4,950**
Standing Capacity		

Route Option Alignments

Bus Route 1

Route 1 has been identified from previous work undertaken for the LAPs for Ballinglanna-Dunkettle development lands. The service originates in Glanmire, routing on the Old Youghal Road (R615), proposed Ballyvolane road network and towards the city centre via the N20. The rail line presents a constraint to the operation of double decker services due to the rail bridge at Dublin Hill Lower.

Bus Route 2

Bus Route 2 has been identified to run from Glanmire, Tivoli and the City Centre.

Bus Route 2 Variation

A variation of bus route 2 was developed in order to provide a connection between Glanmire and Dunkettle Rail Station. Another potential variation is that the proposed bus route would utilise new infrastructure at East Gateway Bridge in approaching the city centre.

Bus Route 3

Bus Route 3 has been identified to run from Glanmire, Old Youghal Road (R615), Ballyvolane Urban Expansion Area, Old Youghal Road, St Luke's and into the City Centre. Variations of this route could include serving the Ballyvolane Urban Expansion Area more directly which would benefit future residents of Ballyvolane.

Bus Route 4

Bus Route 4 has been identified to run from Lotabeg onto Murmount Avenue (route alignment at this point similar to the 209), Middle Glanmire Road and towards St Lukes and the City Centre. Variations of this route allow for physical constraints, additional catchment and improved journey times directly serving the City Centre.

Bus Route 5

Bus Route 5 has been identified as a Radial Service to run from Ballyvolane Urban Expansion Area, Ballyvolane Cross, North Ring towards the R635 towards the City Centre.

Inner and North Orbital Bus Routes

Regional Bus Services

The capacity for proposed bus routes using Corridor C will be reduced by external demand on regional bus services.

Improvements to Suburban Rail services

It is important that rail services in the suburban area receive full priority and make it an attractive option to other modes of transport, such as the private car. A frequency will operate between Cork city centre to Midleton and Cobh every 10 minutes. From the station at Glounthaune to the city centre, trains will operate with a frequency of 5 minutes.

Dunkettle Rail Station

A new station is proposed on the main Cork to Midleton line between Little Island and the M8. The proposed Dunkettle rail station sits within Corridor C

Tivoli Rail Station

A new station is proposed on the main Cork to Mallow line at Tivoli. The proposed Tivoli rail station sits within Corridor B1 and will provide excellent connectivity to the city centre.

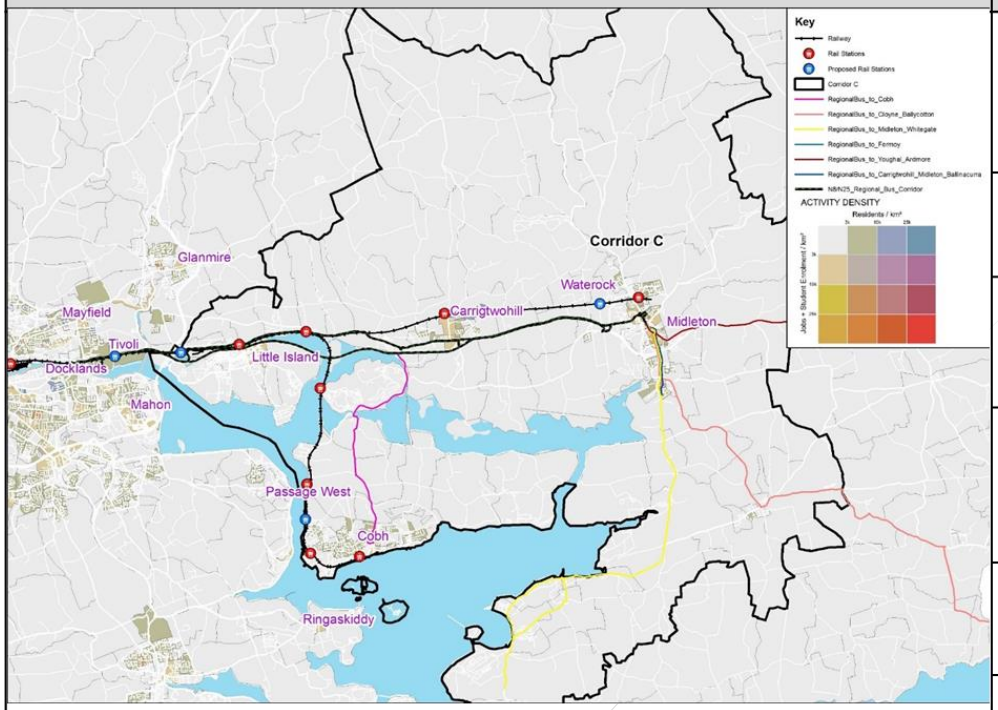
Interchange with BRT lines

It is proposed to have an interchange located at Cork Kent Station. This will connect suburban and national rail services with the East to West BRT lines. Another option is to locate an interchange at the proposed rail station at Tivoli on the Cork to Midleton suburban line to connect with the Northern Orbital route. The alignment options are illustrated in Figure 3-20.

Route Priority Measures

It is proposed to fully prioritise the suburban rail service to ensure reliable and frequent services in this corridor. It is also expected that bus services will experience some delays on the national network. These are illustrated in Figure 3-21.

Corridor C – Option 1



Guiding Principles Table	
Capacity	The 'Idealised' demand is 3,100 (C2-B1) and the service capacity is 4,700 = 152% (Capacity will be reduced by external demand on regional services)
Frequency	Rail service every 10 min on Midleton & Cobh Lines. 5 Min from Glounthaune to City.
Speed	Full Priority Rail service. Bus Services will still experience some delays on national network.
Coverage	37,098 population and 13,265 jobs within walking catchment. Covering for 67% and 64% of Corridor C's total population and Jobs.
Interchange	Interchange at Kent Station with East-West BRT or at Tivoli for Northern Orbital Route.
Directness	Direct Rail Service to City Centre.

Route / Service	Headway	Priority	Capacity
Rail	5 min		4200
Route 1	30 min		100
Route 2	30 min		100
Route 3	30 min		100
Route 4	30 min		100
Route 5	30 min		100

Figure 3-20: Corridor C – Route Alignment Options

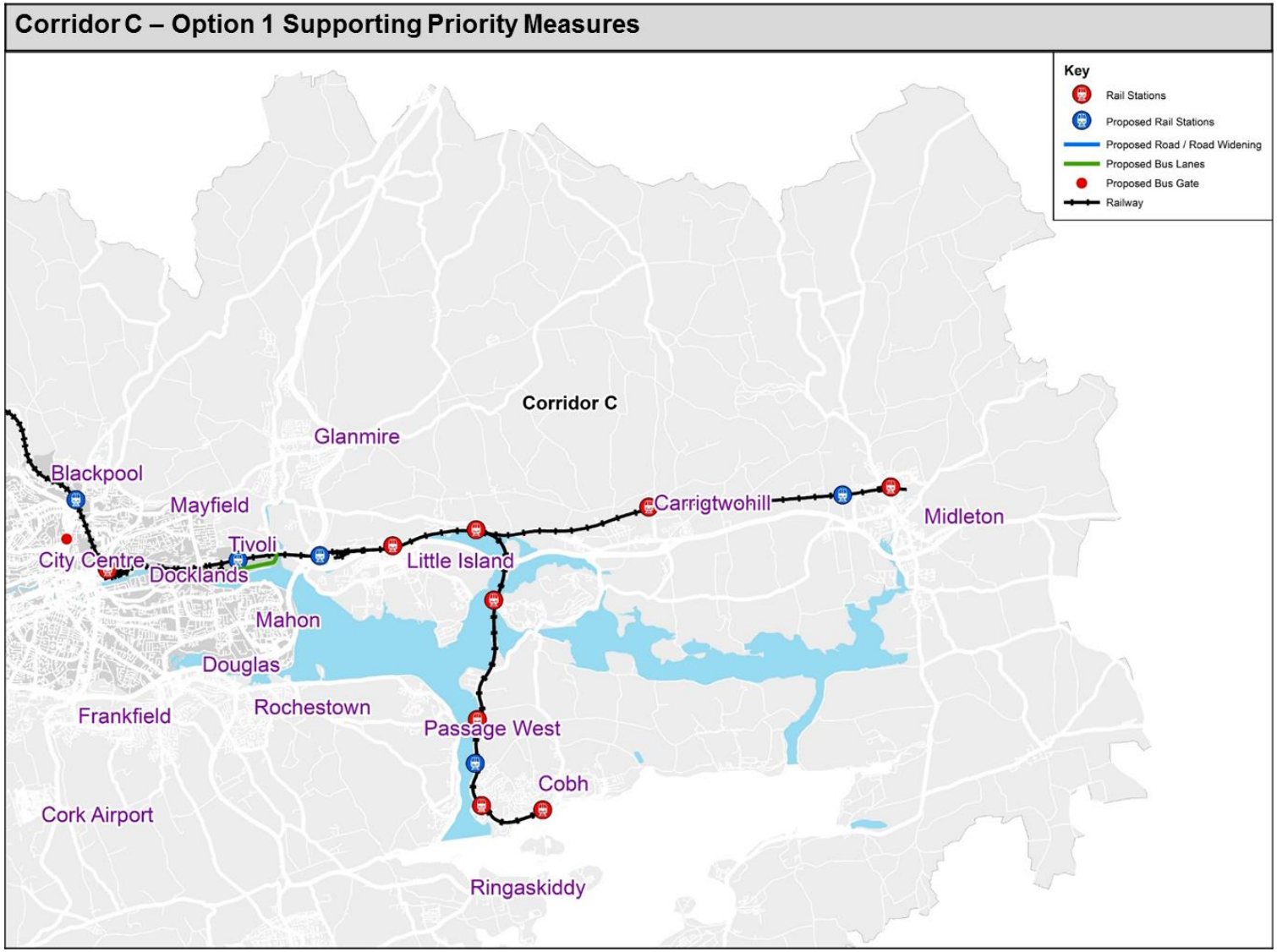


Figure 3-21: Corridor C – Supporting Priority Measures

3.8 Corridor D

Corridor D has been separated into two adjacent Corridors, each with their own specific demand patterns and travel characteristics. The corridors are split into D1 and D2. Corridor D1 serving the area from the Docklands to Mahon in the west. Corridor D2 serves the area west of Corridor D1, which covers the areas between Rochestown and Passage West. These corridors are further split into D1a and D1b. The options for Corridor D include the proposal for new bus priority lanes to allow for high frequency and BRT routes from Corridor D to the city centre core.

3.8.1 Corridor D1 Option Development

Target Demand

Based on the public transport demand identified in the Demand Report based on the "Idealised" public transport network, the "Target Demand" can be identified. Table 3-17 shows the two-way Corridor D screenline demand on the radial and orbital movements, highlighting the largest demand as the "Target Demand" for each movement.

Table 3-17: Identifying Maximum Demand to Develop Public Transport Options

Service Type	Outer Radial (D2 – D1b)	Inner Radial (D1b – Core)	Inner Radial (D1a – Core)
Inbound	2,100	3,100	1,950
Outbound	1,950	1,950	1,350

Development of Proposed Options

Table 3-18 shows the detailed analysis of each public transport option against the service Design and Crush Capacity. It is beneficial to cross reference the service frequency analysis back against the public transport mode capacities illustration in Figure 3-1. The public transport mode capacity diagram shows that demand approaching circa 3,000 passengers is best served by a light rail service or high capacity buses and the service frequency analysis reinforces this provision though the recommended service frequencies. For Corridor D four options were proposed and are listed below:

- Mahon BRT + High Frequency Buses;
- Douglas BRT + High Frequency Buses;
- Mahon LRT + High Frequency Buses; and
- Douglas LRT + High Frequency Buses.

It can be seen that for the majority of routes that the Design Capacity caters for the target demand, with any unmet demand being catered for by the Crush Capacity where required. It is apparent that in general the maximum screenline target demand in Corridor D is of a scale that would require a rapid transport service and high frequency bus services across multiple routes.

Table 3-18: Option Development to Cater for Maximum Screenline Demand

Max Demand: 1,950 Service Type	Design Capacity	Option 1 – Double Deck Bus Routes + City Coach Bus Services
Double Deck Bus	75	3 routes X 10 min freq
City Coach Bus	70	2 routes X 20 min freq
Design Capacity		**1,755**
Standing Capacity		**2,062**

Route Alignment Options

Rapid Transit Corridor

The demand analysis demonstrated that there is a significant demand from Corridor D1b (Douglas Road and South Douglas Road Corridor) and Corridor D1a (Mahon). A rapid transit route was identified to run from Mahon, Docklands and the city centre. Variations of this route was identified in order to provide alternative routing options. An additional corridor was identified from Douglas to the city centre. The Douglas Corridor was identified resulting from the significant demand from D1b to the city centre. The alignment options are illustrated in Figure 3-22.

Cork Kent Interchange

The proposed BRT interchange at Cork Kent Rail station will allow BRT services from Corridor D1 to interchange with suburban and national rail services.

Bus Route 1

Bus Route 1 has been identified to run from Mahon, Blackrock, Ballintemple and the City Centre. Variations of this route allow for physical constraints, additional catchment and improved journey times directly serving the City Centre.

Bus Route 2

Bus Route 2 has been identified to run from Mahon, Boreenmanna Road and the City Centre. Variations of this route allow for physical constraints, additional catchment and improved journey times directly serving the City Centre.

Bus Route 3

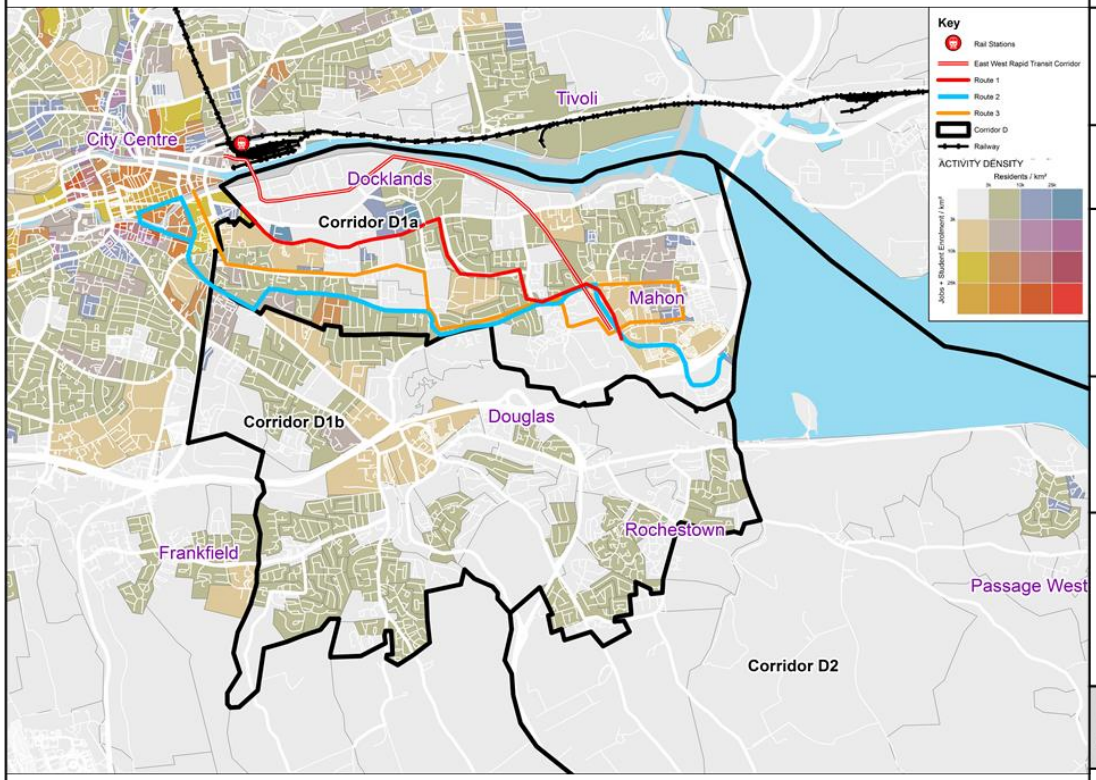
Bus Route 3 has been identified to run on a similar alignment with Route 2 serving Boreenmanna Road and the City Centre from Mahon Shopping Centre with a termination at Parnell Place.

Route Option Priority Measures

In order to achieve high speed, high frequency, reliable public transport services proposed within Corridor D, increased public transport priority and provision is required, above and beyond the existing bus lane provision. Improvements will be focused primarily on the introduction of bus priority lanes for the use of routes 1, 2 and 3 travelling in eastbound-westbound directions between Mahon and the core city area. This will facilitate a frequent and reliable service and will provide for headways depending on route of 10 – 20 minutes for bus routes 1, 2 and 3 to the south of the

corridor and a 5-minute headway for BRT operations to the north of the corridor. These are illustrated in Figure 3-23.

Corridor D1a – Option 1



Guiding Principles Table	
Capacity	The 'Idealised' demand is 1,950 (D1a-Core) and the service capacity is 2,122 = 108%
Frequency	BRT every 5 min to the North of the Corridor and 10 min high frequency bus to the south.
Speed	Full priority on BRT Line. Inbound priority on Route 3.
Coverage	26,958 population and 12,537 jobs within walking catchment. Covering 91% and 94% of Corridor D1b's total population and Jobs.
Interchange	BRT interchange at Kent Station with Rail services to Midleton, Cobh and Midleton. Interchange with Inner orbital services
Directness	Direct BRT Route into City Core. Route 1 & 3 are direct from Mahon to City Centre. Route 2 loops around Mahon to capture remainder of catchment.

Route / Service	Headway	Priority	Capacity
BRT	5 min		1224
Route 1	20 min		224
Route 2	20 min		224
Route 3	10 min		449

Figure 3-22: Corridor D1a - Route Alignment Options

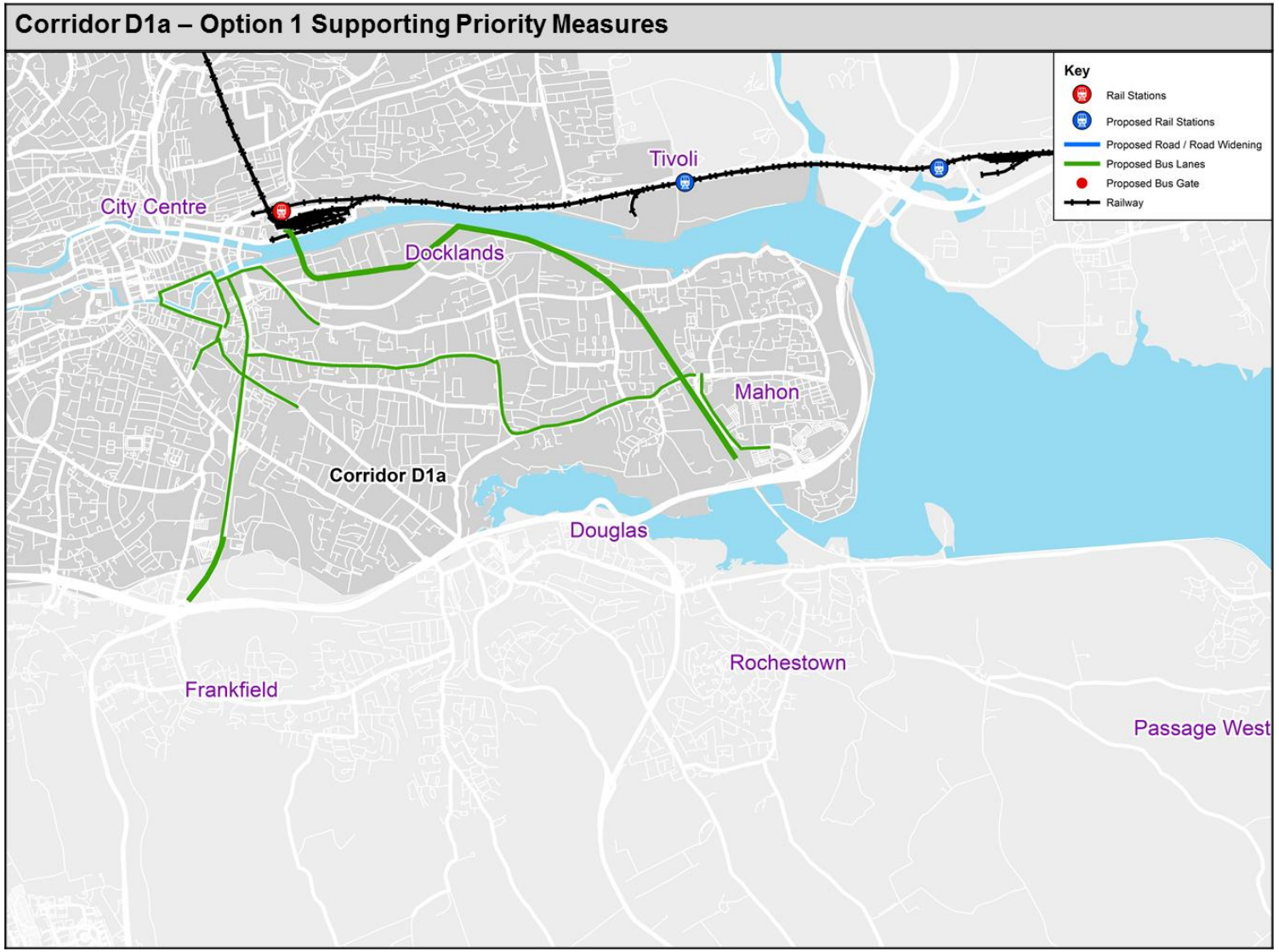


Figure 3-23: Corridor D1a - Supporting Priority Measures

3.8.2 Corridor D2 and D1b Option Development

Target Demand

Based on the public transport demand identified in the Demand Report based on the "Idealised" public transport network, the "Target Demand" can be identified. Table 3-19 shows the two-way Corridor D screenline demand on the radial and orbital movements, highlighting the largest demand as the "Target Demand" for each movement.

Table 3-19: Identifying Maximum Demand to Develop Public Transport Options

Service Type	Outer Radial (D2 – D1b)	Inner Radial (D1b – Core)	Inner Radial (D1a – Core)	Orbital between D1a & D1b	Orbital East	Orbital West
Inbound	2,100	3,100	1,950	600	400 NB	450 NB
Outbound	1,950	1,950	1,350	600	500 SB	550 SB

Development of Proposed Options

Insert corridor specific text

Table 3-20 shows the detailed analysis of each public transport option against the service Design and Crush Capacity. It is beneficial to cross reference the service frequency analysis back against the public transport mode capacities illustration in Figure 3-1. The public transport mode capacity diagram shows that demand approaching circa 3,000 passengers is best served by a light rail service or high capacity buses and the service frequency analysis reinforces this provision though the recommended service frequencies. For Corridor D four options were proposed and are listed below:

- Mahon BRT + High Frequency Buses;
- Douglas BRT + High Frequency Buses;
- Mahon LRT + High Frequency Buses; and
- Douglas LRT + High Frequency Buses.

It can be seen that for the majority of routes that the Design Capacity caters for the target demand, with any unmet demand being catered for by the Crush Capacity where required. It is apparent that in general the maximum screenline target demand in Corridor D2 is of a scale that would require a rapid transport service and high frequency bus services across multiple routes.

Table 3-20: Option Development to Cater for Maximum Screenline Demand

Max Demand: 3,100 Service Type	Design Capacity	Option 1 – Double Deck Bus Routes + City Coach Bus Services + Rail Service
Commuter Rail	350	Blackpool Rail Station
Double Deck Bus	75	5 routes X 5-20 min freq
City Coach Bus	70	1 route X 10 min freq
Design Capacity		**2,662**

Route Option Alignments

Bus Route 3

Bus Route 3 has been identified to run from Douglas Village via Douglas Road to the City Centre.

Bus Route 4

Bus Route 4 has been identified to run from Ringaskiddy, Carrigaline, N28 and the City Centre. Variations of this route allow for physical constraints, additional catchment and improved journey times directly serving the City Centre.

City Bus Services

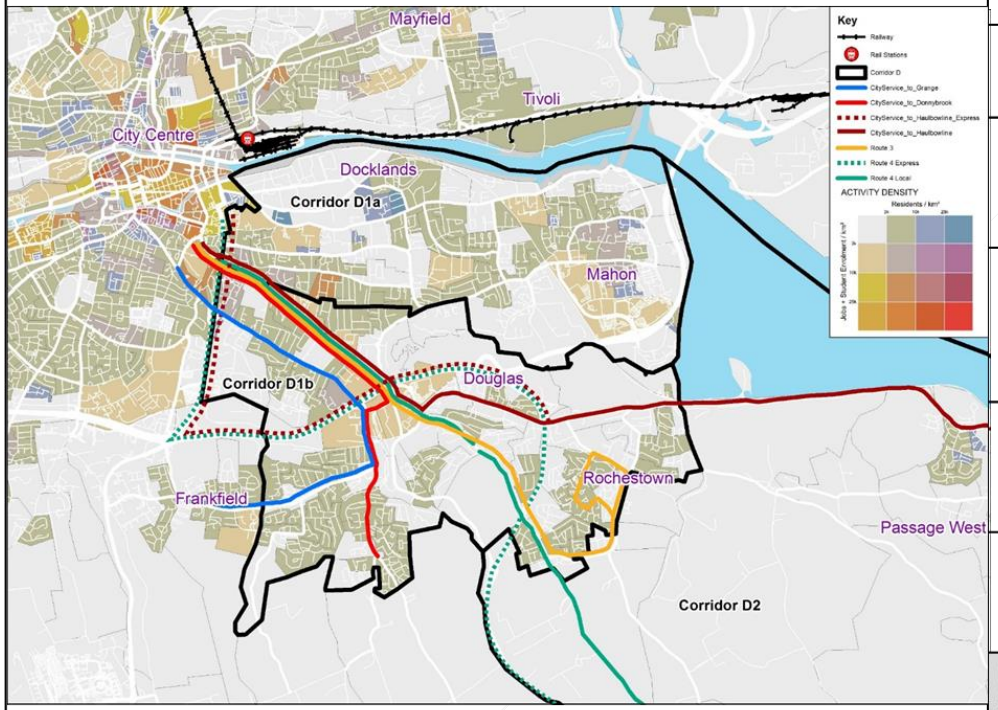
The existing City Bus Services 206 (to Grange), 207 (to Donnybrook) and 223 (to Haulbowline) are retained and serve established residential areas from the southern suburbs to the city centre. These services route along the Douglas Corridor on the South Douglas Road and Douglas Road. The alignment options are illustrated in Figure 3-24.

Route Option Priority Measures

In order to achieve high speed, high frequency, reliable public transport services proposed within Corridor D2, increased public transport priority and provision is required, above and beyond the existing bus lane provision. The main focus of the improvements to public transport speeds and priority for Corridor D2 will be focused on a public transport corridor serving Douglas. Examples to be assessed could include the following options listed below and presented in Figure 3-25.

- **Option 1** – Removing a lane of car traffic and providing a dedicated bus lane on South Douglas Road and Douglas Road;
- **Option 2** – Removing car traffic on Douglas Road and providing two dedicated bus lanes;
- **Option 3 –** Removing car traffic on South Douglas Road and providing two dedicated bus lanes;

Corridor D2 & D1b – Option 1



Guiding Principles Table	
Capacity	The 'Idealised' demand is 3,100 (D1b-Core) demand and the crush service capacity is 3,132 = 101%
Frequency	Bus Service every 2 min on the Douglas Road Corridor.
Speed	3 options for inbound and outbound bus lanes along the Douglas Corridors targeting speeds of 20kph.
Coverage	37,154 population and 9,282 jobs within walking catchment. Covering 62% and 70% of Corridor D1a & D2's total population and Jobs.
Interchange	All Routes interchange with southern orbitals to Bishopstown, Little Island & Togher.
Directness	Direct Routes along the Douglas and South Douglas Road with options for express services.

Route / Service	Headway	Priority	Capacity
Route 3	5 min		898
Route 4 X	20 min		224
Route 4 Lo	20 min		224
to Grange	10 min		449
Donnybrook	10 min		449
Haulbowline	10 min		418

Figure 3-24: Corridor D2 - Route Alignment Options

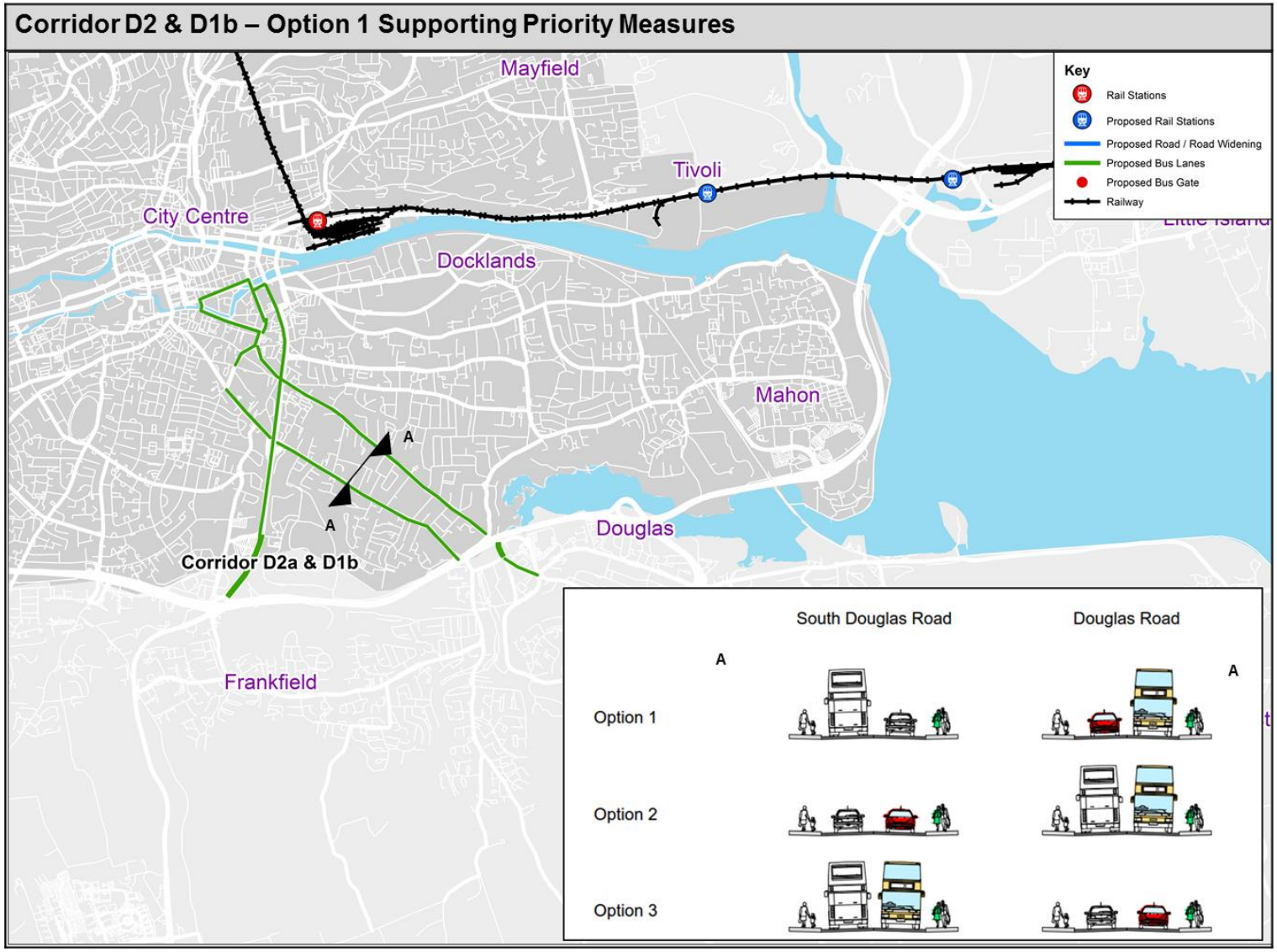


Figure 3-25: Corridor D2 - Supporting Priority Measures

3.9 Corridor E

3.9.1 Option Development

Target Demand

Based on the public transport demand identified in the Demand Report based on the "Idealised" public transport network, the "Target Demand" can be identified. Table 3-21 shows the two-way Corridor E screenline demand on the radial and orbital movements, highlighting the largest demand as the "Target Demand" for each movement.

Table 3-21: Identifying Maximum Demand to Develop Public Transport Options

Service Type	Outer Radial (E2 – E1)	Inner Radial (E1 – Core)	Orbital East	Orbital West
Inbound	400	1,500	550	300
Outbound	200	1,500	450	600

Development of Proposed Options

Table 3-22 shows the detailed analysis of each public transport option against the service Design and Crush Capacity. It is beneficial to cross reference the service frequency analysis back against the public transport mode capacities illustration in Figure 2 3. The public transport mode capacity diagram shows that demand approaching circa 1,500 passengers is best served by high frequencies and high capacity buses and the service frequency analysis reinforces this provision through the recommended service frequencies. For Corridor E one option is proposed, the rationale for determining only one option was based on the identified bus routes achieving wide coverage within the corridor and option 1 frequencies were optimised well to meet the demand. It can be seen that for the majority of routes that the Design Capacity caters for the target demand, with any unmet demand being catered for by the Crush Capacity where required.

Table 3-22: Option Development to Cater for Maximum Screenline Demand

Max Demand: 1,500 Service Type	Design Capacity	Option 1 – Double Deck Bus Routes + City Coach Bus Services
Double Deck Bus	75	5 routes X 10 - 20 min freq
City Coach Bus	70	1 route X 20 min freq
Design Capacity		**1,779**

Route Option Alignments

Four main routes (with sub-options and variations), retaining Kinsale Regional Bus service, and a dedicated Airport to rail station bus service were identified in order to cater for the proposed public transport options. Figure 3-27 shows the proposed Public Transport Options for Corridor E.

Bus Route 1

Bus Route 1 has been identified to run from Ballygarvan, Airport, N27 and the City Centre. Variations of this route allow for physical constraints, additional catchment and improved journey times directly serving the City Centre.

Bus Route 2

Bus Route 2 has been identified to run on the Pouladuff Road and Togher/Lough Road corridor. The corridor will operate as a one-way bus service inbound on Pouladuff Road and outbound on Togher/Lough Road. The preferred routing of Bus Route 2 is not finalised and an alternative routing will be considered in order to achieve the most effective bus service along this corridor.

Bus Route 3

Bus Route 3 has been identified to run from Douglas, Grange, Frankfield, Kinsale Road, Evergreen Road and Summerhill South and the City Centre. Variations of this route allow for physical constraints, additional catchment and improved journey times directly serving the City Centre.

Bus Route 4 – Airport to Kent Station Bus Route

A dedicated bus service has been developed to cater for movements between Cork Airport, Blackashe P&R, Cork Bus Station and Kent Rail Station.

Bus Route 6

Bus route 6 is to operate to the core city centre area from Togher Road via Pouladuff.

City Services – City Coach Bus

The existing City Service 226 is retained and will run between Cork and Kinsale calling at Cork Airport, Fivemilebridge, Riverstick and Belgooly.

Inner Orbital

The Inner Orbital service is to run from Little Island, Mahon, Douglas, Turners Cross, Ballyphehane, Wilton and CIT. Variations of this route allow for physical constraints, additional catchment and improved journey times directly serving the City Centre.

Outer Orbital

The Outer Orbital service is to run from Passage West, Rochestown, Grange, Frankfield, Togher, Wilton and CUH. Variations of this route allow for physical constraints, additional catchment and improved journey times directly serving the City Centre.

Route Option Priority Measures

In order to achieve high speed, high frequency, reliable public transport services proposed within Corridor E, increased public transport priority and provision is required, above and beyond the existing provision. The main focus of the improvements to public transport speeds and priority for Corridor E will be focused on a public transport corridor on the N27 serving south of the City Centre. Examples to be assessed could include the following options listed below and presented in Figure 3-28:

- Option 1 – Removing a lane of car traffic and providing a dedicated bus lane on Togher Road and Pouladuff Road;
- Option 2 – Removing car traffic on Pouladuff Road and providing two dedicated bus lanes; and
- Option 3 – Removing car traffic on Togher Road and providing two dedicated bus lanes.

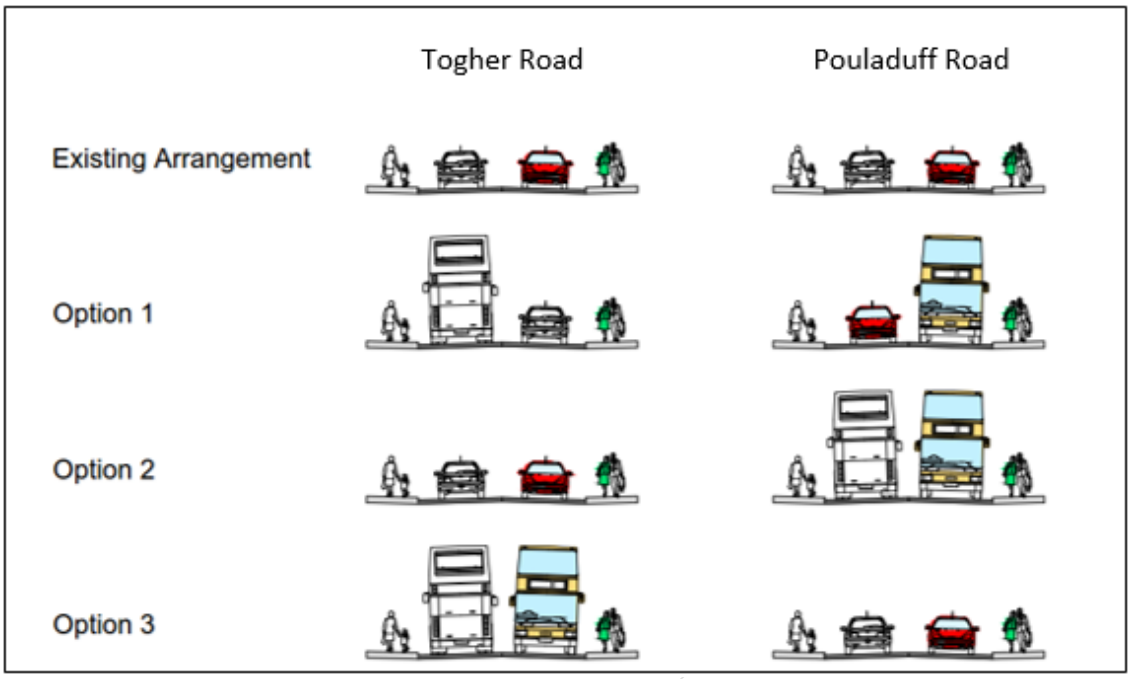


Figure 3-26: City Centre N27 Corridor Options

Achieving public transport priority routes in Corridor E requires exploring the options above in order to appropriately cater for demand. It is important to note that the provision of bus lanes on the N27 is essential to deliver a strong performing bus corridor along the N27 road. The "Cork City South West & South Central Strategic Corridors" report reiterates that the delivery of a strategic transport corridor is important for the future bus network.

The provision of new roads / infrastructure in Corridor E have the potential to deliver / unlock public transport benefits to existing and future residents in addition to improving journey time speeds. The new road links / infrastructure identified include:

- N27 Bus Lanes;
- New link road connecting N27 to Pouladuff Road;
- Junction Improvements at
  - Bandon Road / Lough Road; and
  - Evergreen Road / Summerhill South.
- Grange Road to Tramore Valley Park Pedestrian / Cycle Link (Inc. N40 Overbridge)

Bus Route 1

For Bus Route 1, bus lanes are to be provided on the N27. The provision of bus lanes on the N27 will facilitate bus priority towards the city and the airport.

Bus Route 2

Bus Route 2 is routed on the Togher Road and Pouladuff Road Corridors. The preferred routing arrangements of these corridors will determine the level of bus priority required for Bus Route 2. These options are presented in **Error! Reference source not found.Error! Reference source not fo und.**.

Bus Route 3

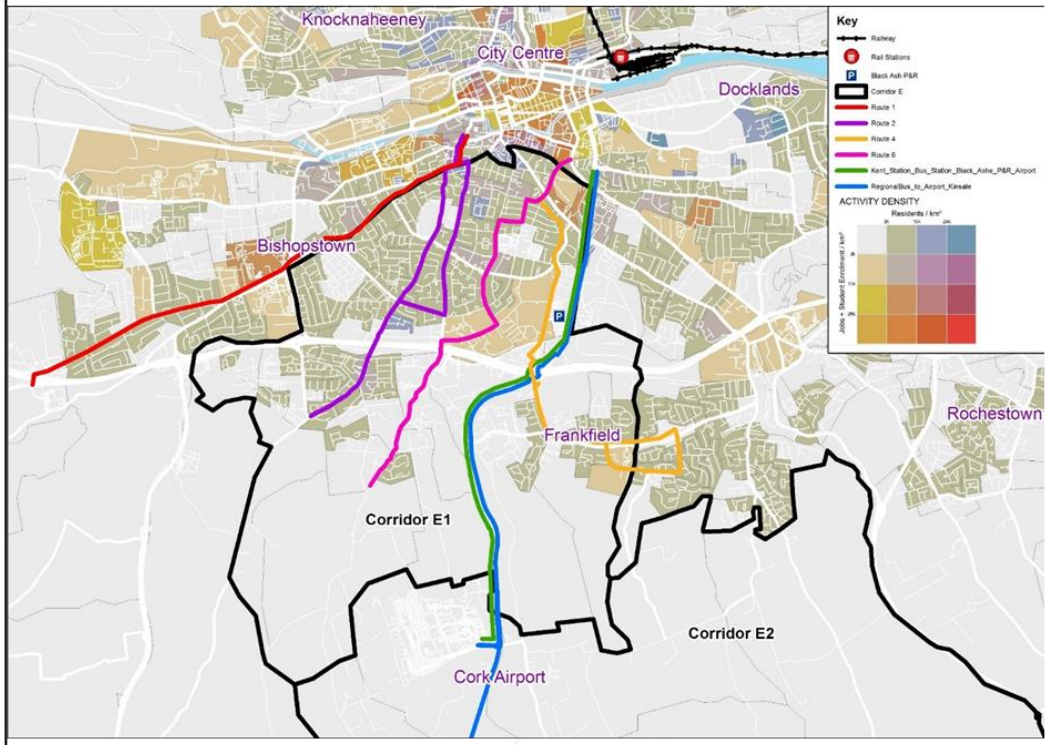
For Bus Route 3, discontinuous bus lanes exist within Corridor E1 on Grange Road towards the Kinsale Road Roundabout. Improved bus lane provision should be reviewed to provide more joined up bus lanes on Grange Road. Junction improvements at Evergreen Road / Summerhill South to facilitate bus priority should be reviewed with bus lanes in an inbound direction on Summerhill South would facilitate improved bus journey speeds to the city centre.

Bus Route 4

For Bus Route 4, the bus route alignment is similar to the existing 209a. Bus priority improvements can be achieved from Summerhill South towards the city centre as outlined in Bus Route 3.

With the improvements proposed to each Route listed above, it is anticipated that a bus will travel from Corridor E into the core city area every 3 minutes providing a high frequency service as well as achieving a good speed and attractive journey time.

Corridor E – Option 1



Guiding Principles Table	
Capacity	The 'Idealised' demand is 1,500 (E1-Core) and the service capacity is 1,780 = 119%
Frequency	Bus crossing from Corridor E into Core every 3 minutes.
Speed	Priority measures along Togher Road/Pouladuff Road and N27.
Coverage	26,364 population and 8,680 jobs within walking catchment. Covering 77% and 64% of Corridor E's total population and Jobs.
Interchange	Interchange with southern orbital routes across south environs and to Little Island.
Directness	All services run directly into city centre, options for express services along the N27.

Route / Service	Headway	Priority	Capacity
Route 1	10 min		449
Route 2	10 min		449
Route 4	20 min		224
Route 6	20 min		224
Kent Station to Airport	20 min		224
to Kinsale	20 min		209

Figure 3-27: Corridor E – Route Alignment Options

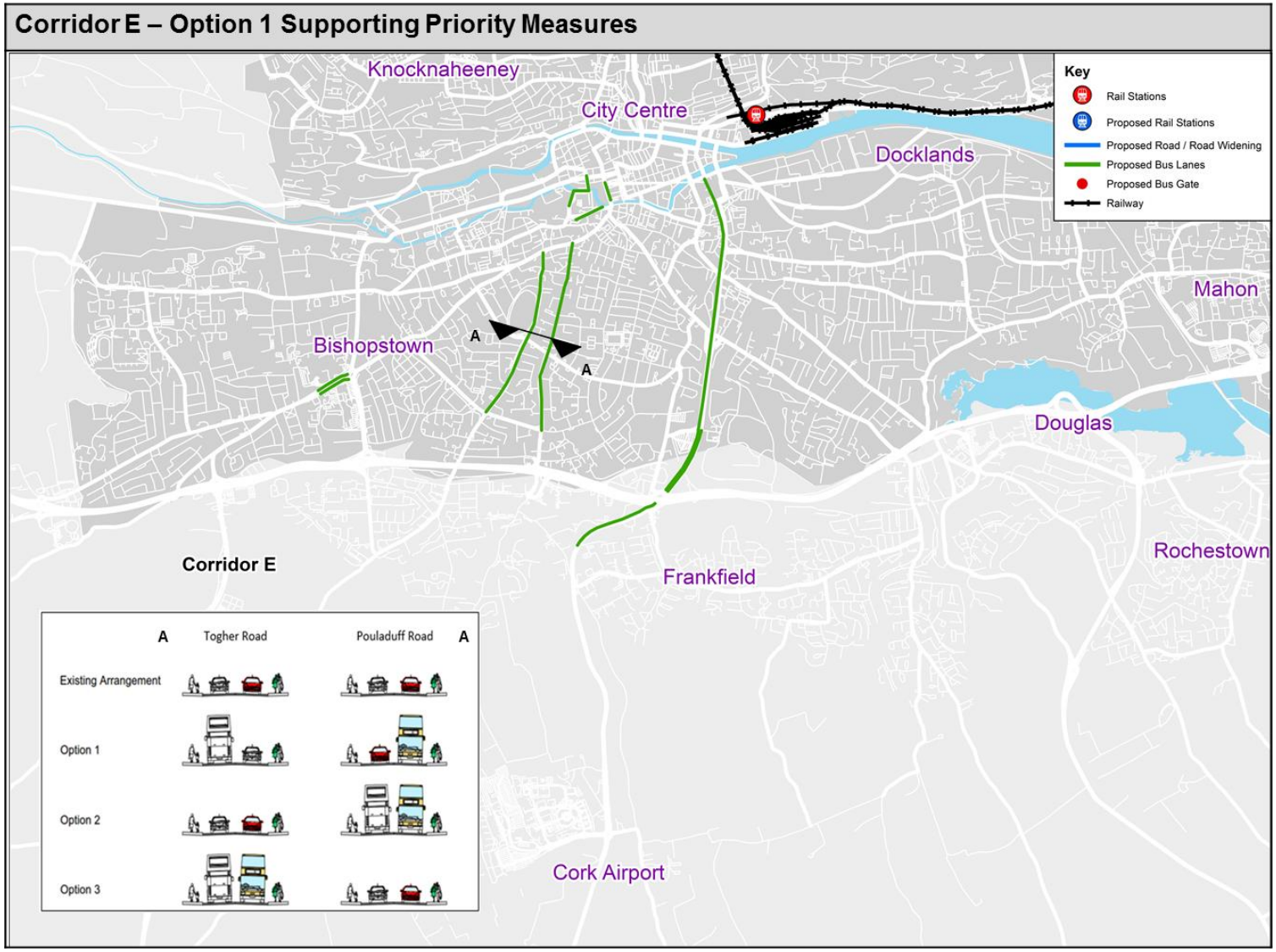


Figure 3-28: Corridor E - Supporting Priority Measures

3.10 Corridor F

3.10.1 Option Development

Target Demand

Based on the public transport demand identified in the Demand Report based on the "Idealised" public transport network, the "Target Demand" can be identified. Table 3-23 shows the two-way Corridor F screenline demand on the radial and orbital movements, highlighting the largest demand as the "Target Demand" for each movement.

Table 3-23: Identifying Maximum Demand to Develop Public Transport Options

Service Type	Outer Radial (F2 – F1)	Inner Radial (F1 – Core)	Orbital North	Orbital South
Inbound	2,000	2,100	150	600
Outbound	1,500	3,700	150	300

Development of Proposed Options

Table 3-24 shows the detailed analysis of each public transport option against the service Design and Crush Capacity. It is beneficial to cross reference the service frequency analysis back against the public transport mode capacities illustration in **Error! Reference source not found.**. The public t ransport mode capacity diagram shows that demand approaching circa 3,700 passengers is best served by a light rail service or high capacity buses and the service frequency analysis reinforces this provision though the recommended service frequencies. For Corridor F two options were proposed and are listed below:

- Ballincollig LRT + High Frequency Buses;
- Ballincollig BRT + High Frequency Buses;

It can be seen that for the majority of routes that the Design Capacity caters for the target demand, with any unmet demand being catered for by the Crush Capacity where required. It is apparent that in general the maximum screenline target demand in Corridor F is of a scale that would require a rapid transport service and high frequency bus services across multiple routes.

Table 3-24: Option Development to Cater for Maximum Screenline Demand

Max Demand: 3,700 Service Type	Design Capacity	Option 1 – Double Deck Bus Routes + BRT
Bus Rapid Transit	102	1 route x 5 min freq
Double Deck Bus	75	3 routes X 5 - 10 min freq
Design Capacity		**3,469**

Route Options

Figure 3-29 illustrates the proposed Public Transport Options for Corridor F with population, job and combined activity densities for the corridor.

Three main routes (with sub-options and variations) were identified in order to cater for the proposed public transport options.

Rapid Transit Corridor

From the matching of public transport services to target demand, it became apparent the maximum screenline target demand in Corridor F is of a scale that would require a high quality rapid transit corridor. It has been identified to run from Cork City Core via the Western Road Corridor, along Western Road, University College Cork (UCC), through Victoria Cross, Dennehy's Cross, Wilton Road, Cork University Hospital (CUH), Wilton Shopping Centre, Bishopstown Road, Melbourne Road, Cork Institute of Technology (CIT), linking through greenfield to the proposed zoned development to the south of Ballincollig. Variations to this route could include Model Farm Road, local routing between CUH and CIT, and tying into existing network and development in Ballincollig.

Bus Route 1a and 1b

Bus Route 1a has been identified to share the Rapid Transit Corridor route along Western Road, Victoria Cross and Dennehy's Cross, diverging at Model Farm Road and continuing through Ballincollig Main Street on the R608. Supplementary variations of this route include Bus Route 1b and this will route on the Carrigrohane Road, as a potential express route from Ballincollig to the City Centre, and also via College Road to cater more directly for UCC students and staff.

Bus Route 2

Bus Route 2 has been identified to run from the City Core, via the St. Finbarr's Gateway via Bandon Road, Glasheen Road, Bishopstown Road and Curraheen Road. A variation is shown using Waterfall Road instead of Curraheen Road.

Route Option Priority Measures

In order to achieve high speed, high frequency, reliable public transport services proposed within Corridor F increased public transport priority and provision is required, above and beyond the existing bus lane provision. The main focus of the improvements to public transport speeds and priority will be focussed on the Rapid Transit Corridor.

Rapid Transport Corridor

For the Rapid Transit Corridor, it is proposed that an uninterrupted public transport lane be provided for the entire length of the corridor. For LRT these lanes would be fully segregated from traffic, whereas with BRT or bus services the lanes would be segregated as much as possible. Junctions such as the Wilton Roundabout, Dennehy's Cross, Victoria Cross, etc. will require upgrading to signalised junctions with public transport priority.

Bus Route 1

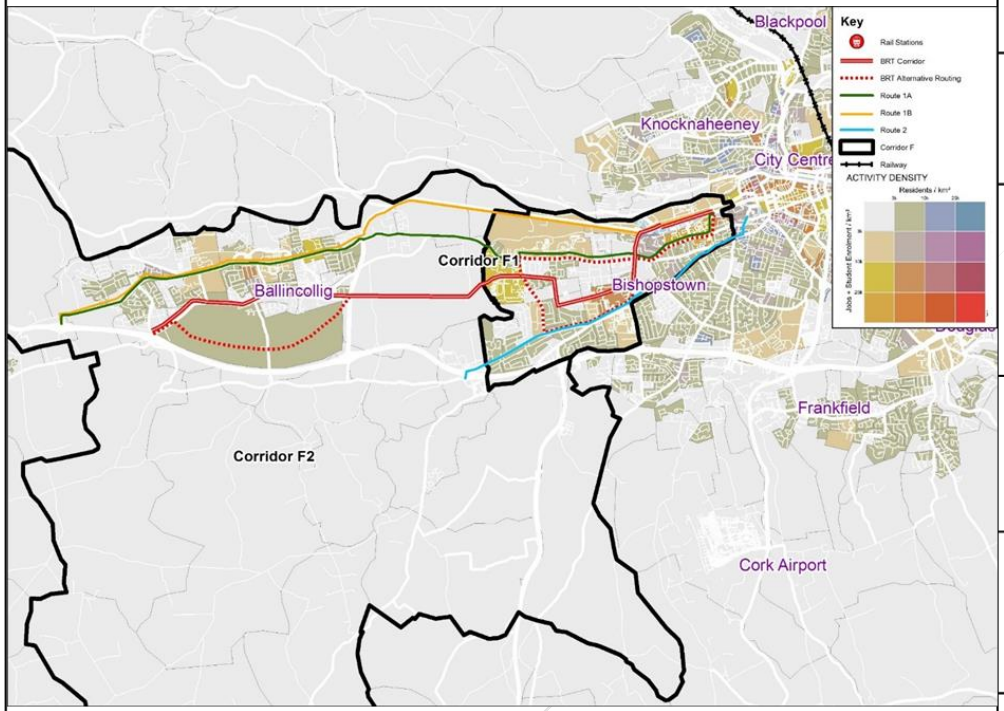
For Bus Route 1, the ability to provide bus lanes on Model Farm Road should be investigated. The Route 1 variation along the Carrigrohane Road can extend the existing bus lane to provide increased priority for the potential expressway service. This would provide benefits in the context of increased queued traffic resulting from loss of road network availability associated with the Rapid Transit Corridor between Victoria Cross and Mardyke Junction.

Bus Route 2

For Bus Route 2 improved bus lane provision should be investigated on Bishopstown Road, combined with an upgrade of the Wilton Roundabout to a signalised junction with public transport priority provision. There is limited scope to provide bus lane priority on Glasheen Road until the route enters the St. Finbarr's Gateway.

These measures are illustrated in Figure 3-30. Speed improvements can result from a scenario of full bus priority along BRT routes with additional priority along the N22 and along short sections of Curraheen and Bishopstown Road targeting speeds of 20kph +. There is also an opportunity to facilitate an interchange at Kent station between BRT services and suburban and national rail services.

Corridor F – Option 1



Guiding Principles Table	
Capacity	The 'Idealised' demand is 3,700 (Core-F1) and the crush service capacity is 4,080 = 110%
Frequency	BRT every 5 min along with high frequency bus services. Bus passing from F1-Core every 1.5 minutes.
Speed	Full priority along BRT with additional priority along the N22 and along short sections of Curraheen and Bishopstown Road targeting speeds of 20+ kph
Coverage	35,463 population and 23,468 jobs within walking catchment. Covering 79% and 85% of Corridor F's total population and Jobs.
Interchange	Interchange opportunity with both the Northern & Southern Orbital Routes. Further interchanges at Kent Station between BRT and Rail.
Directness	Direct radial services to City Centre.

Route / Service	Headway	Priority	Capacity
BRT	5 min		1224
Route 1a	5 min		898
Route 1b	10 min		449
Route 2	5 min		898

Figure 3-29: Corridor F - Route Alignment Options

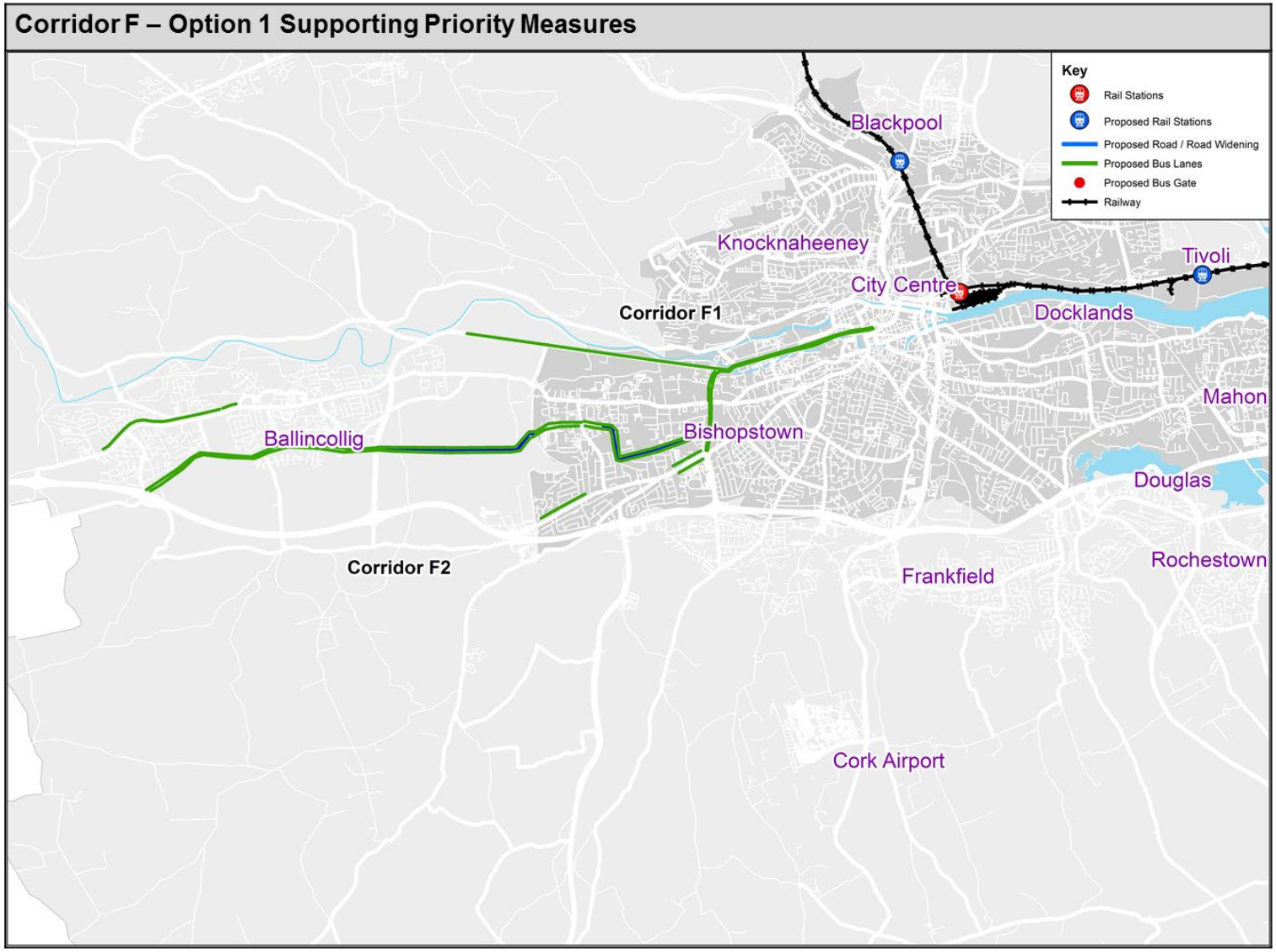


Figure 3-30: Corridor F – Supporting Priority Measures

3.11 Corridor G

3.11.1 Option Development

Target Demand

Based on the public transport demand identified in the Demand Report based on the "Idealised" public transport network, the "Target Demand" can be identified. Table 3-25 shows the two-way Corridor G screenline demand on the radial and orbital movements, highlighting the largest demand as the "Target Demand" for each movement.

Table 3-25: Identifying Maximum Demand to Develop Public Transport Options

Service Type	Outer Radial (G2 – G1b)	Inner Radial (G1b – Core)	Inner Radial (G1a – Core)	Orbital East	Orbital West
Inbound	1,700	2,400	850	150	150
Outbound	1,000	1,650	650	200	200

Development of Proposed Options

Table 3-26 shows the detailed analysis of each public transport option against the service Design and Crush Capacity. It is beneficial to cross reference the service frequency analysis back against the public transport mode capacities illustration in Figure 3-1. The public transport mode capacity diagram shows that demand approaching circa 2,400 passengers is best served either a rapid transit service or by high frequency bus services and the service frequency analysis reinforces this provision though the recommended service frequencies. A rapid transit service was not explored for Corridor G due to the physical constraints namely the topography and the narrow road network in the corridor.

Table 3-26: Option Development to Cater for Maximum Screenline Demand

Max Demand: 2,400 Service Type	Design Capacity	Option 1 – Double Deck Bus Routes + City Coach Bus Services
Commuter Rail	350	Blackpool Rail Station
Double Deck Bus	75	4 routes X 15 - 20 min freq
City Coach Bus	70	1 route X 30 min freq
InterCity Bus	50	1 route x 30 min freq
Design Capacity		**1,755**

Route Option Alignments

Option 1

The proposed Blackpool rail station sits within Corridor G1b and will provide increased connectivity to the city centre. The proposed Monard and Blarney rail stations sit within Corridor G2 and will also will provide increased public transport provision. The Screenline demand analysis does capture the benefits of increased patronage from the proposed rail stations. It is acknowledged that the public transport demand at adjacent Corridor A will benefit from the proposed Blackpool rail station and this is represented in the Demand Analysis. The rail frequencies provided in Corridors A, B, C and G are consistent, at 10 minute frequencies, which would facilitate through running rail trips at Kent Station.

Option 1 comprises of high frequency bus services and rail provision. The North Orbital bus route overlap with Corridor A, B and F. The frequency of the North Orbital bus route is consistent with Corridor A, B and F. As previously mentioned all bus routes identified are utilised in Option 1 with the public transport passenger demand being met by the design capacity of the public transport services.

Option 2

Rail provision remains unchanged. Option 2 comprises of high frequency bus services and rail provision. Option 1 utilised all the bus routes identified with the exception of Bus Route 2 and Bus Route 6b. The removal was determined based on the low catchment and the nearby rail station at Blackpool offering an attractive alternative thus making Bus Route 2 a less feasible offer. Bus Route 6b was removed as Route 5 provides a good level of service in that area. Similar to Option 1 the public transport passenger demand is met by the design capacity of the public transport services.

Route Option Alignments

Figure 3-31 illustrates the proposed Public Transport Options for Corridor G with population, job and combined activity densities for the corridor. As well as this, it also illustrates the frequencies of services. Six main routes (with sub-options and variations) were identified in order to cater for the proposed public transport options.

Blackpool Rail Station

A new station is proposed on the main Cork to Mallow line at Blackpool. The proposed Blackpool rail station sits within Corridor G1b however it will also provide increased transport benefits to the western side of Corridor A1.

Monard Rail Station

A new station is proposed on the main Cork to Mallow line at Monard. The proposed Monard rail station sits within Corridor G2 and will provide excellent connectivity to the city centre. The proposed rail station at Monard sits within the An Bord Pleanala approved Strategic Development Zone.

Blarney Rail Station

A new station is proposed on the main Cork to Mallow line at Blarney. The proposed Blarney rail station sits within Corridor G2 and will provide excellent connectivity to the city centre.

Bus Route 1

Bus Route 1 has been identified to run from Blarney, Monard, N20, Blackpool and the N20 Corridor towards the City Centre. Variations of this route allow for physical constraints, additional catchment and improved journey times directly serving the City Centre.

Bus Route 2

Bus Route 2 has been identified to run from Tower, Blarney, N20, Blackpool and the N20 Corridor towards the City Centre. Variations of this route allow for physical constraints, additional catchment and improved journey times directly serving the City Centre.

Bus Route 3

Bus Route 3 has been identified to run from Little Island, Glanmire, Ballyvolane, Kilbarry, Dublin Hill, Blackpool and the N20 Corridor towards the City Centre.

Bus Route 4a and 4b

Bus Route 4a has been identified to run from Hollyhill, Knocknaheeny and the City Centre. This route would be similar to the existing 202 bus service which is one of the most frequented city bus services. This route could operate as a two-way loop or be split into two routes retaining the existing popular 202 bus service. Bus Route 4b captures demand in Sundays Well and the Lee Road. The provision of this route requires new road infrastructure and facilitates additional catchment areas and has the capacity to improve journey times to the City Centre.

Bus Route 5

Bus Route 5 has been identified to run from Fairhill, Faranree and the N20 Corridor towards the City Centre.

Bus Route 6a and 6b

Bus Route 6a captures demand at Hollyhill, Kilmore Road, Fair Hill and the city centre. Bus Route 6b is a variation that can complement the 6a service and has been identified to additional serve Upper Fair Hill.

North Orbital

The North Orbital bus route is an orbital service and has been identified to run from Tivoli, Mayfield, St Lukes, Ballyvolane, Blackpool, Farranree, Knocknaheeny and CIT.

Route Option Priority Measures

The main focus of the improvements to public transport speeds and priority will be focussed on the N20 Corridor and a new link road to support Bus Route 4b. The introduction of rail stations at Blackpool, Monard and Blarney will play a significant role in addressing the demand. Bus priority locations are identified within Corridor G and presented in Figure 3-32. The provision of new roads / infrastructure in Corridor G have the potential to deliver / unlock public transport benefits to existing and future residents in addition to improving journey time speeds. The new road links / infrastructure identified include:

- New link road connecting new Apple Distributor Road with Blarney Road and Lee Road;
- Junction Improvements at pinch points identified at:
  - Blarney Street (between Blair's Hill and Shandon Street; and
  - Sunday's Well Road (between St Vincent's Church and the North Mall); and
- Bus Lanes on the N20 Corridor.

Bus Route 1

For Bus Route 1, public transport priority should be ensured through the Monard SDZ connecting to the N20. The ability to provide bus lanes on the N20 on approach along the N20 Corridor should be implemented. Bus Route 1 variation along the new Monard SDZ Road can facilitate bus priority. Bus lanes are necessary along the N20 Corridor and inbound bus lanes are proposed within the Northern Strategic Transport Corridor study.

Bus Route 2

Similar to Bus Route 1, for Bus Route 2 improved bus lane provision should be implemented on the N20 approach to the City Centre. Bus Route 2 variation would facilitate bus services interchanging with the proposed rail station at Blackpool.

Bus Route 3

Bus priority measures concerning Bus Route 3 in Corridor G would seek to improve bus speeds on Dublin Hill. The existing rail bridge results in limiting bus service provision to single deck bus services. Implement Dublin Hill improvements identified in the Northern Strategic Corridor Study, the recommendations included that parking to be regulated along Dublin Hill and the road to be widened to provide a consistent carriageway width of 6m for the length of Dublin Hill.

Bus Route 4a and 4b

The provision of new link roads is required as part of the delivery of Bus Route 4a and Bus Route 4b. Bus Route 4a would require a new link road connecting the new Apple Campus distributor road to Blarney Road. Bus Route 4b would require the continuation of the new link road to extend to Lee Road. The provision of this road and bus movements on these roads would facilitate improved journey times on the north side of the city to the major employer in the area.

Bus Route 5

Bus priority opportunities on Upper Fairhill due to available greenspace either side of carriageway for a bus lane on approach to junctions. Similar to Bus Route 1 and 2 improved bus lane provision should be implemented on the N20 approach to the City Centre.

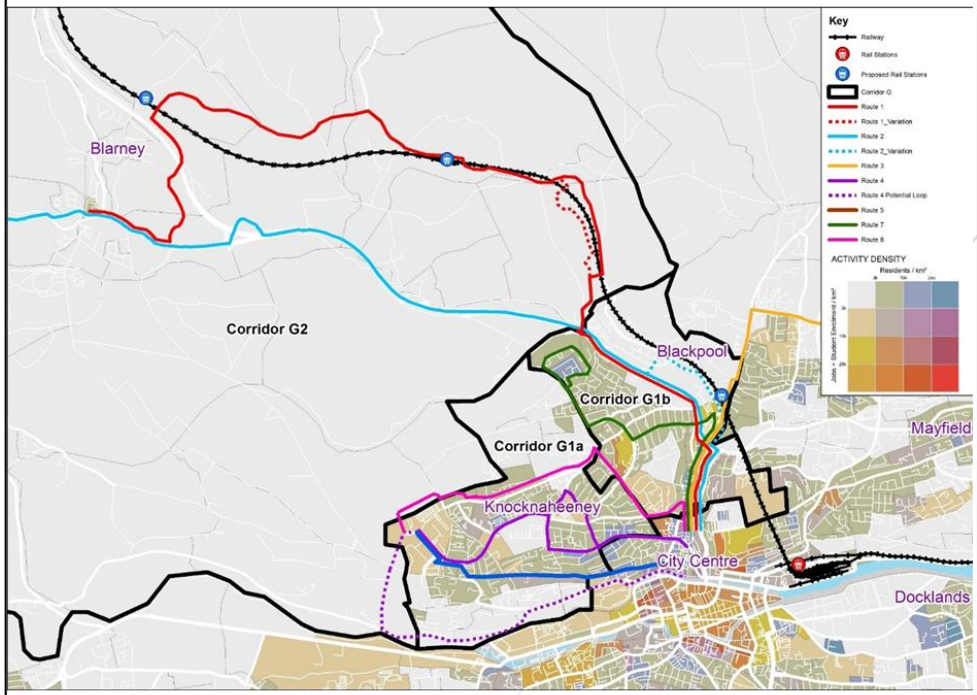
Bus Route 6a and 6b

Wide carriageway widths and adjacent greenspace next to the carriageway could facilitate bus lanes at Kilmore Road however the main bus priority measures should seek to support the provision of bus services on Fair Hill. On street parking would need to be reallocated in order to allow buses to run on Fair Hill. It is acknowledged that this route is constrained due to topography issues and narrow carriageway widths.

North Orbital

Bus priority measures concerning the North Orbital in Corridor G would seek to improve the orbital movements on Fairfield Avenue, Kilmore Heights, Blarney Street, Shanakiel Road and Sundays Well Road. These locations are constrained by narrow streets, on street parking and hilly topography. Bus priority measures at these locations should be investigated.

Corridor G – Option 1



Guiding Principles Table	
Capacity	The 'Idealised' demand is 2,400 (G1b-Core) demand and the crush service capacity is 2,859 = 119%
Frequency	Rail service every 10min combined with bus services results in a service into core every 2.1 mins. Every 6 mins from G1b and every 3.3 mins from G1b.
Speed	Full priority rail service. Bus lanes along the N20 into the city for routes 1,2, 3 & 4. Potential new link road from Apple to Lee Rd and inbound bus lanes from Knocknaheeney for Route 4.
Coverage	35,449 population and 12,443 jobs within walking catchment. Covering 69% and 82% of Corridor G's total population and Jobs.
Interchange	Interchange from Route 1 for rail services at Stoneview and Monard. Interchange with northern orbital services.
Directness	Direct radial services to City.

Route / Service	Headway	Priority	Capacity
Rail	10 min		2100
Route 1	30 min		100
Route 2	30 min		100
Route 3	15 min		279
Route 4	15 min		449
Route 6	20 min		224
Route 7	15 min		418
Route 8	20 min		224

Figure 3-31: Corridor G - Route Alignment Options

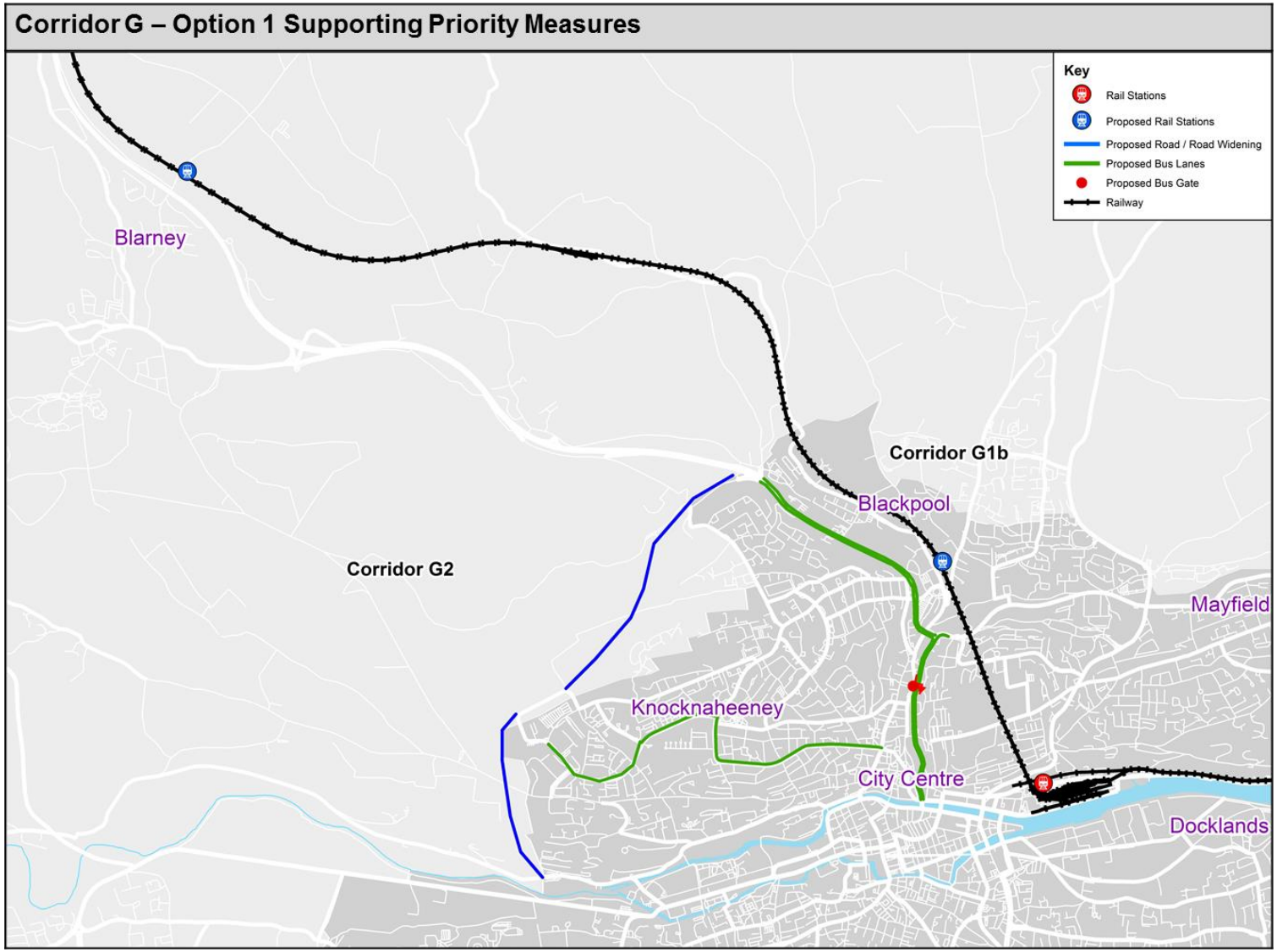


Figure 3-32: Corridor G – Supporting Priority Measures

3.12 Orbital Services

3.12.1 Option Development

Target Demand

Based on the public transport demand identified in the Demand Report based on the "Idealised" public transport network, the "Target Demand" can be identified. Table 3-27 shows the two-way Corridor A screenline demand on the radial movements, highlighting the largest demand as the "Target Demand" for each movement.

Table 3-27: Identifying Maximum Demand to Develop Public Transport Options

Service Type	Orbital East	Orbital West
Inbound	150	150
Outbound	200	200

Development of Proposed Options

The indicative transport network for the CMA identifies a high frequency bus service to cater for this area of the network. As such the number of bus routes and frequency of these services were reviewed to meet the target demand. Table 3-28 below shows an example of the methodology applied in determining potential public transport options to cater for the maximum target demand. It shows that to cater for the target demand, two bus routes are required, operating with a headway of 20-minutes.

It shows the breakdown of the number of routes per service type are applied to frequency of service to determine whether or not the Option caters for the target demand. It can be seen that the Design Capacity caters for the target demand, with any unmet demand being catered for by the Standing Capacity where required. It is apparent that in general the maximum screenline target demand in Corridor A is of a scale that would require high frequency bus services across multiple routes.

Table 3-28: Option Development to Cater for Maximum Screenline Demand

Max Demand: 1,850 Service Type	Design Capacity	Option 1 – Double Deck Bus Routes + City Coach Bus Services + Commuter Rail Services
Commuter Rail	350	Blackpool/Tivoli Rail Station
City Coach Bus	70	2 routes X 20 min freq
Design Capacity		**420**

Route Option Alignments

The route option alignments have been developed taking into account the six principles that underpin the performance of the "idealised" public transport network, were taken into account in order to provide a comprehensive network that maximises the public transport mode share. In order to ensure that the route option alignment and the proposed priority measures can be accommodated a review was undertaken in the context of determining potential route alignments that meet the six principles. The review included: Transport Network; Population, Employment and Education distribution; Network Constraints; and Public Transport Service Catchment. Five main routes were identified in order to cater for the proposed public transport options. Figure 3-33 illustrates the proposed Public Transport Options for the Northern Orbital route, outlining how the options have been developed to align with the six principles as much as feasibly possible.

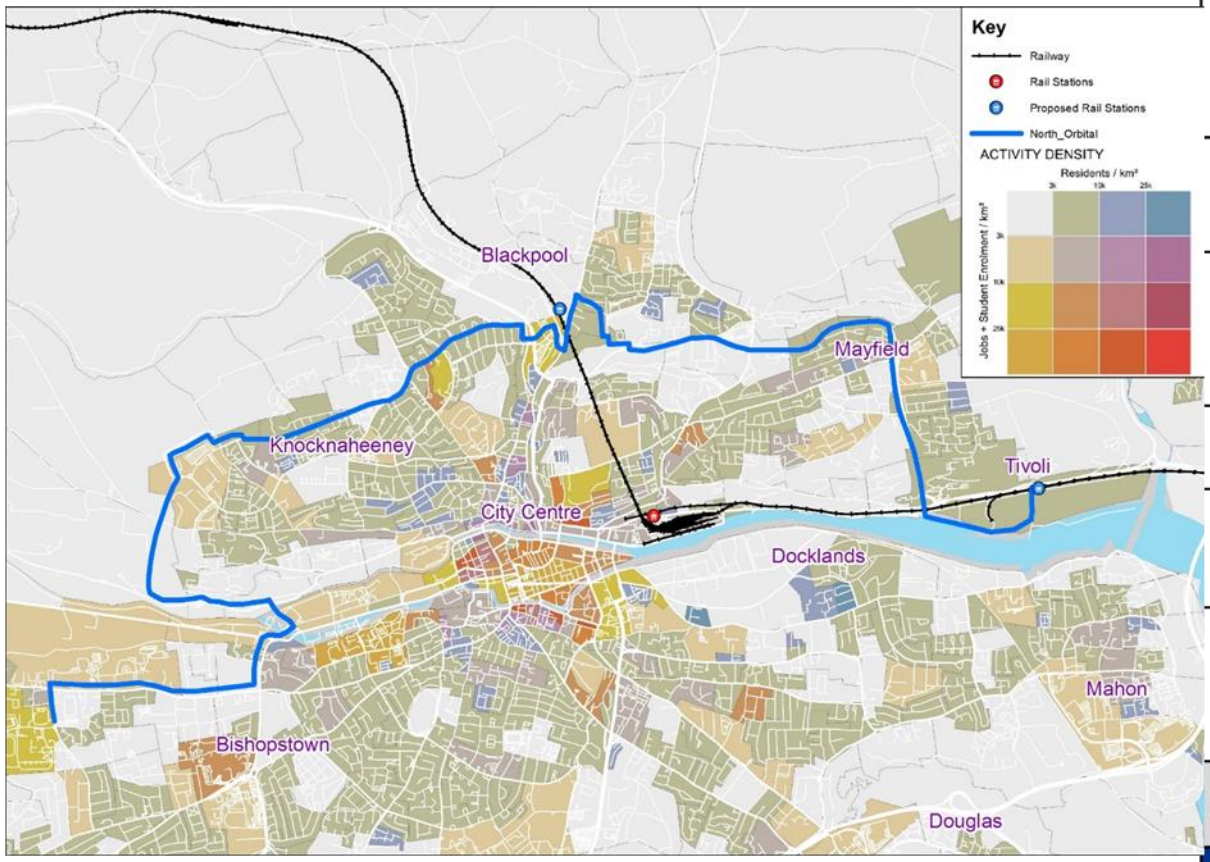
Northern Orbital

The proposed Northern orbital route will travel between the proposed new rail station at Tivoli and terminate on the campus of Cork Institute of Technology while serving the northern suburbs of Knocknaheeny, Mayfield and Blackpool where it will interchange with suburban rail services at the proposed new rail station beside the Blackpool shopping centre.

Route Option Priority Measures

In order to achieve high speed, high frequency, reliable public transport services proposed within Corridor A increased public transport priority and provision is required, above and beyond the existing bus lane provision. The main focus of the improvements to public transport speeds and priority will be focused on The North Ring Road, Kilmore Road Lower, Blarney Street, Victoria Cross, and Model Farm Road. The supporting priority measures are illustrated in Figure 3-34.

Northern Orbital



Guiding Principles Table	
Capacity	The 'Idealised' Orbital demand (North of City) is 259 and the service capacity is 418 = 135% 250
Frequency	Bus travelling orbitally north of city centre every 10 minutes.
Speed	Bus lane provision on North Ring Road (R635), Victoria Cross. Bus priority on new link road - Apple to Lee Road.
Coverage	30,857 population and 16,264 jobs within walking catchment.
Interchange	Interchange with Rail line at Tivoli and Blackpool. Interchange with BRT at Victoria Cross.
Directness	Most direct orbital route across the north of the city. New link road (Apple to Lee Road) enhances orbital provision

Route / Service	Headway	Priority	Capacity
NOR	10 min		418

Figure 3-33: Northern Orbital – Route Alignment Options

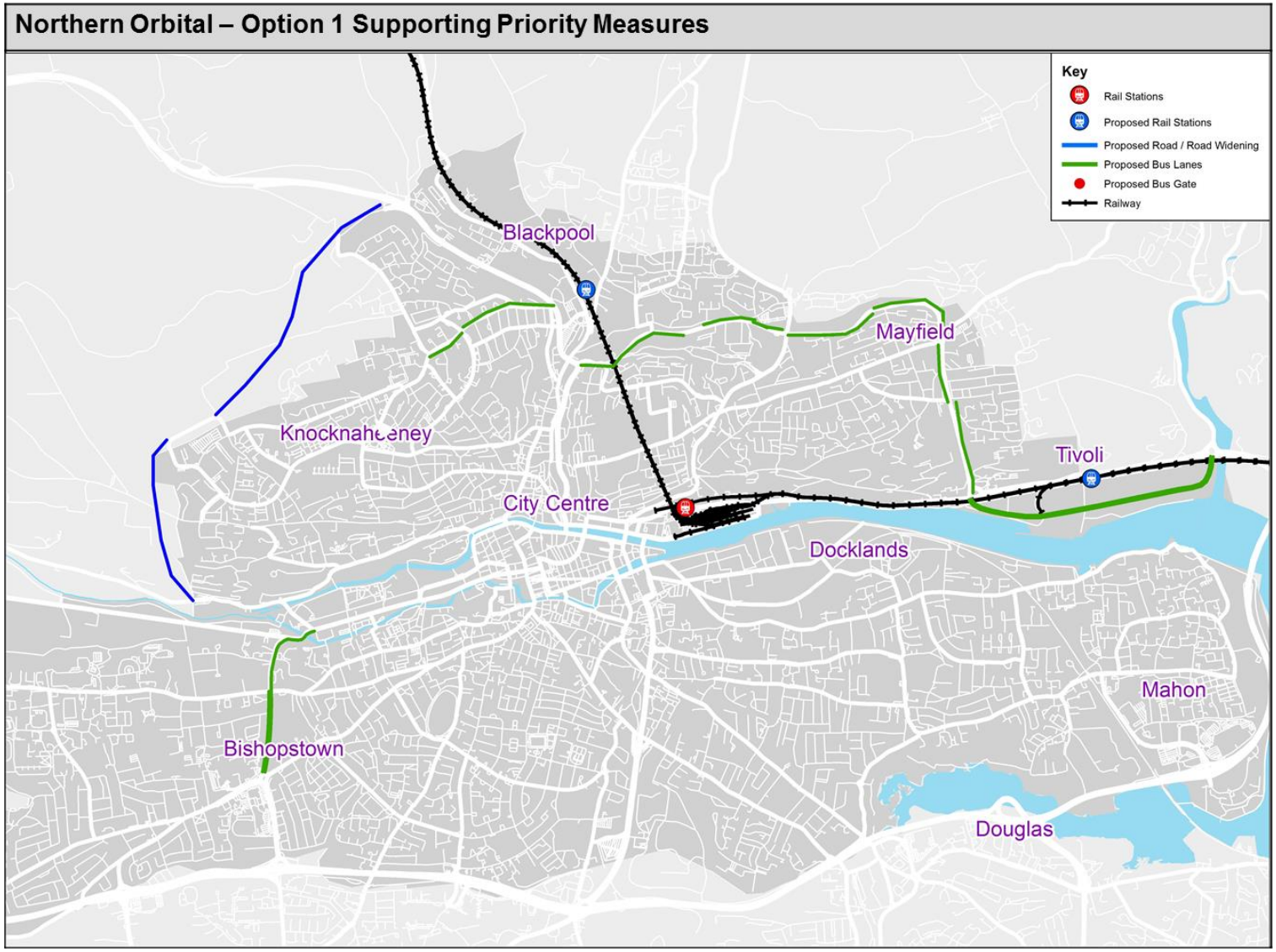


Figure 3-34: Northern Orbital– Supporting Priority Measures

3.12.2 Southern Orbital

Target Demand

Based on the public transport demand identified in the Demand Report based on the "Idealised" public transport network, the "Target Demand" can be identified. Table 3-29 shows the two-way Southern Orbitals screenline demand on the radial and orbital movements, highlighting the largest demand as the "Target Demand" for each movement.

Table 3-29: Identifying Maximum Demand to Develop Public Transport Options

Service Type	Orbital East	Orbital West
Inbound	150	150
Outbound	200	200

Development of Proposed Options

The indicative transport network for the CMA identifies a high frequency bus service to cater for this area of the network. As such the number of bus routes and frequency of these services were reviewed to meet the target demand. Table 3-30 below shows an example of the methodology applied in determining potential public transport options to cater for the maximum target demand. It shows that to cater for the target demand two bus routes are required with one running at a 10-minute headway and another running at a 20-minute headway.

It shows the breakdown of the number of routes per service type are applied to frequency of service to determine whether or not the Option caters for the target demand. It can be seen that the Design Capacity caters for the target demand, with any unmet demand being catered for by the Standing Capacity where required. It is apparent that in general the maximum screenline target demand in Corridor A is of a scale that would require high frequency bus services across multiple routes.

Table 3-30: Option Development to Cater for Maximum Screenline Demand

Max Demand: 2,400 Service Type	Design Capacity	Option 1 – Double Deck Bus Routes
Commuter Rail	350	Little Island
Double Deck Bus	75	2 routes X 10 - 20 min freq
Design Capacity		**675**

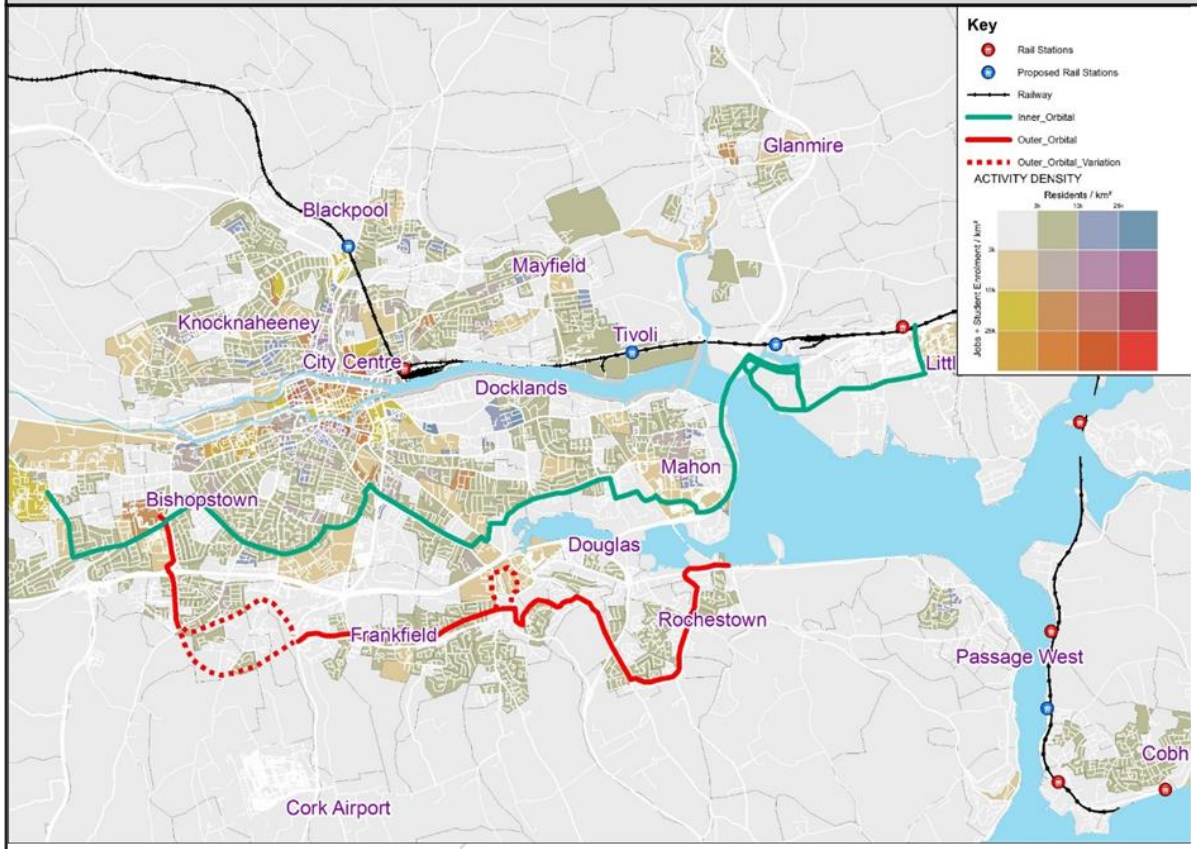
Southern Orbitals

The proposed southern orbitals will serve the southern suburbs of Cork while travelling on different alignments. The outer orbital will begin at Bishopstown serving Frankfield, Maryborough with route variations and finally terminating on the Rochestown Road. The inner orbital route will begin at Cork Institute of Technology. These are illustrated in Figure 3-35.

Route Option Priority Measures

In order to achieve high speed, high frequency, reliable public transport services proposed within the Southern Orbital routes, increased public transport priority and provision is required, above and beyond the existing bus lane provision. The main focus of the improvements to public transport speeds and priority will be focussed on the N40, Bishopstown Road, Curragh Road, South Douglas Road, Rochestown Road, Maryborough Hill and Grange Road. The supporting priority measures are illustrated in Figure 3-36.

Southern Orbitals



Guiding Principles Table	
Capacity	The maximum 'Idealised' Orbital demand (South of City) is 620 and the service capacity is 673 = 108.5%
Frequency	Southern Inner Orbital – 10min frequency. Southern Outer Orbital – 20min frequency.
Speed	Good bus lane provision along Inner route – South Douglas Road, Connolly / Clashduv Road, Bishopstown Road.
Coverage	53,183 population and 26,039 jobs within walking catchment.
Interchange	Interchange with Rail line at Little Island. Both interchange with BRT at Bishopstown and inner at Mahon. Good interchange opportunities with high frequency Douglas corridor.
Directness	Most direct orbital routes across the south of the city. New link road (N27 to Sarsfield Road) enhances orbital provision

Route / Service	Headway	Priority	Capacity
Inner	10 min		449
Outer	20 min		224

Figure 3-35: Southern Orbitals – Route Alignment Options

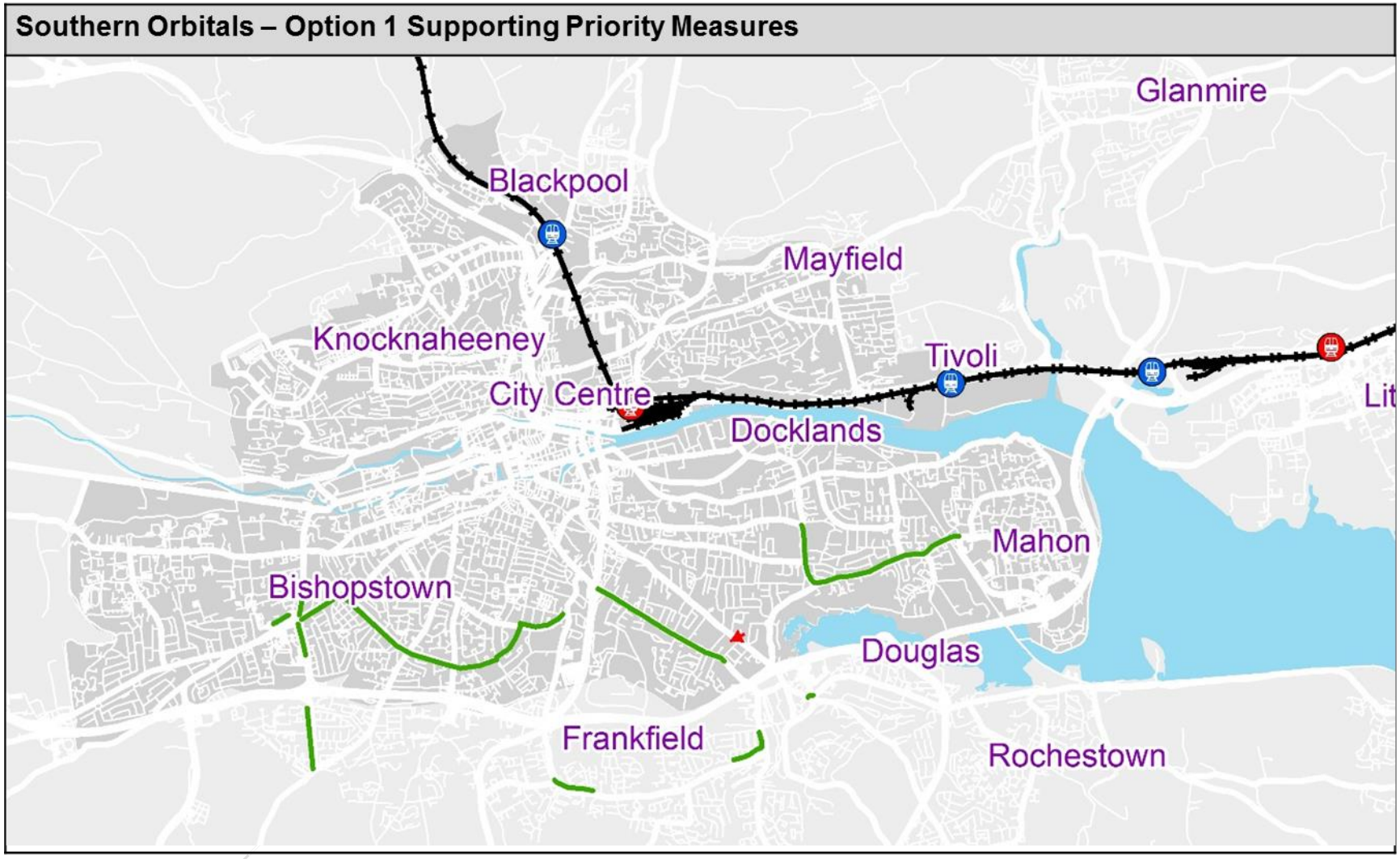


Figure 3-36: Southern Orbitals – Supporting Priority Measure

3.13 Cross City Public Transport Services

3.13.1 Methodology

The Public Transport corridor assessment has developed radial public transport services and applied service frequencies and headways to each radial route. Cross City linkage between these radial routes can help to further increase the efficiency and effectiveness of the public transport routes by widening the catchment of the radial routes and providing connectivity between areas external to the City Centre.

The following outlines the methodology applied to determining the Cross city services, and also the route alignment that is taken through the City Centre:

- Determine cross city public transport demand;
- Identify radial services frequencies;
- Match radial services with high cross city demand and similar service frequencies;
- Identify public transport route entry points to City Centre;
- Align routes with future Cork City Centre street network;
- Maximise use of two-way streets to avoid splitting services into one-way routes (if possible); and
- Target key interchange locations within the City Centre.

3.13.2 Determine Cross City Demand

As outlined in the Demand Analysis Report, and earlier in this report, the two-way cross city demand between the Corridors was determined. This two-way cross city demand is shown in Figure 3-37.

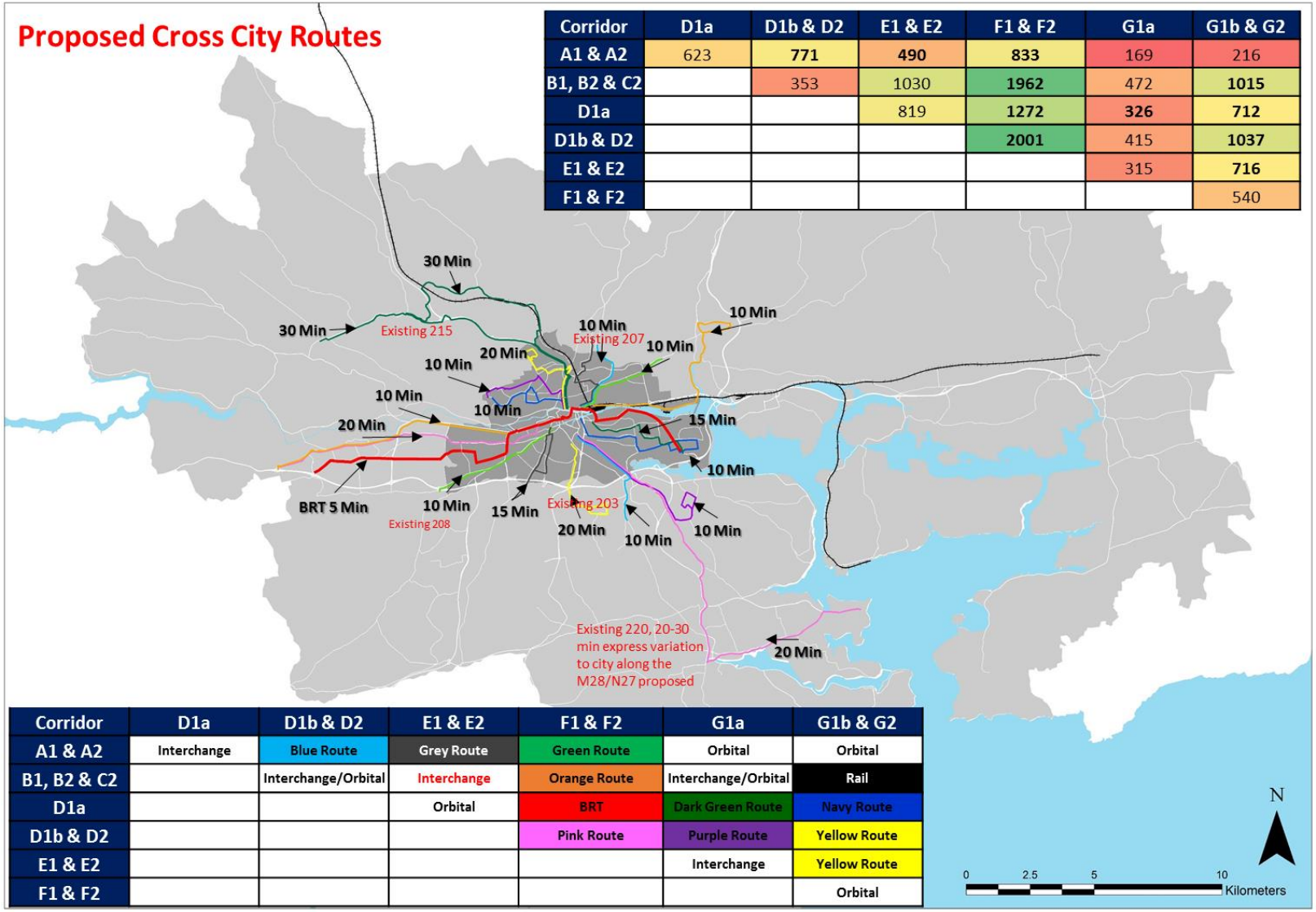
AM Peak Hour 2-Way Cross City Public Transport Demand							
	Original	D1a	D1b	E1	F1	G1a	G1b
	A1	623	771	490	833	169	216
	B1		353	1030	1962	472	1015
	D1a			819	1272	326	712
	D1b				2001	415	1037
	E1					315	716
	F1						540

Figure 3-37: Cross City Two-Way Demand

3.13.3 Matching Cross City Services

To determine the cross city services a route matching exercise was undertaken. This route matching exercise involves identifying proposed public transport services that have a high cross city demand and also have similar service frequencies. Figure 3-38 illustrates the process and results of cross city public transport service matching, with the proposed matched services colour coded on the route map and also identified in the matrix to align with the cross city demand matrix.

It should be noted that some of the proposed cross city routes align closely with existing cross city routes such as: 202 Knocknaheeny to Mahon; 207 Ballyvolane to Donnybrook; 215 Blarney to Mahon.



Corridor	D1a	D1b & D2	E1 & E2	F1 & F2	G1a	G1b & G2
A1 & A2	623	771	490	833	169	216
B1, B2 & C2		353	1030	1962	472	1015
D1a			819	1272	326	712
D1b & D2				2001	415	1037
E1 & E2					315	716
F1 & F2						540

Corridor	D1a	D1b & D2	E1 & E2	F1 & F2	G1a	G1b & G2
A1 & A2	Interchange	Blue Route	Grey Route	Green Route	Orbital	Orbital
B1, B2 & C2		Interchange/Orbital	Interchange	Orange Route	Interchange/Orbital	Rail
D1a			Orbital	BRT	Dark Green Route	Navy Route
D1b & D2				Pink Route	Purple Route	Yellow Route
E1 & E2					Interchange	Yellow Route
F1 & F2						Orbital

Figure 3-38: Matching Cross City Demand with Proposed Radial Services

3.13.4 Aligning Cross City Services with City Centre Movement Strategy Street Network

Having identified the cross city public transport services, it is necessary to route these services through Cork City Centre, taking into account the existing and proposed street network going forward. The Cork City Centre Movement Strategy (CCMS) was developed by Cork City Council to re-allocate road-space on the city centre streets to ensure a more appropriate balance between the different transport modes serving the city and provide travellers to the city with a greater choice of travel mode, and to manage through traffic within the central city streets, improving the environment for all users including public transport users, pedestrians and cyclists. A key element of the CCMS is making St. Patrick's Street a public transport and sustainable modes priority street, through barring of general traffic.

Figure 3-39 illustrates the outcome of the CCMS. The CCMS is currently being implemented on site in a phased basis by Cork City Council.

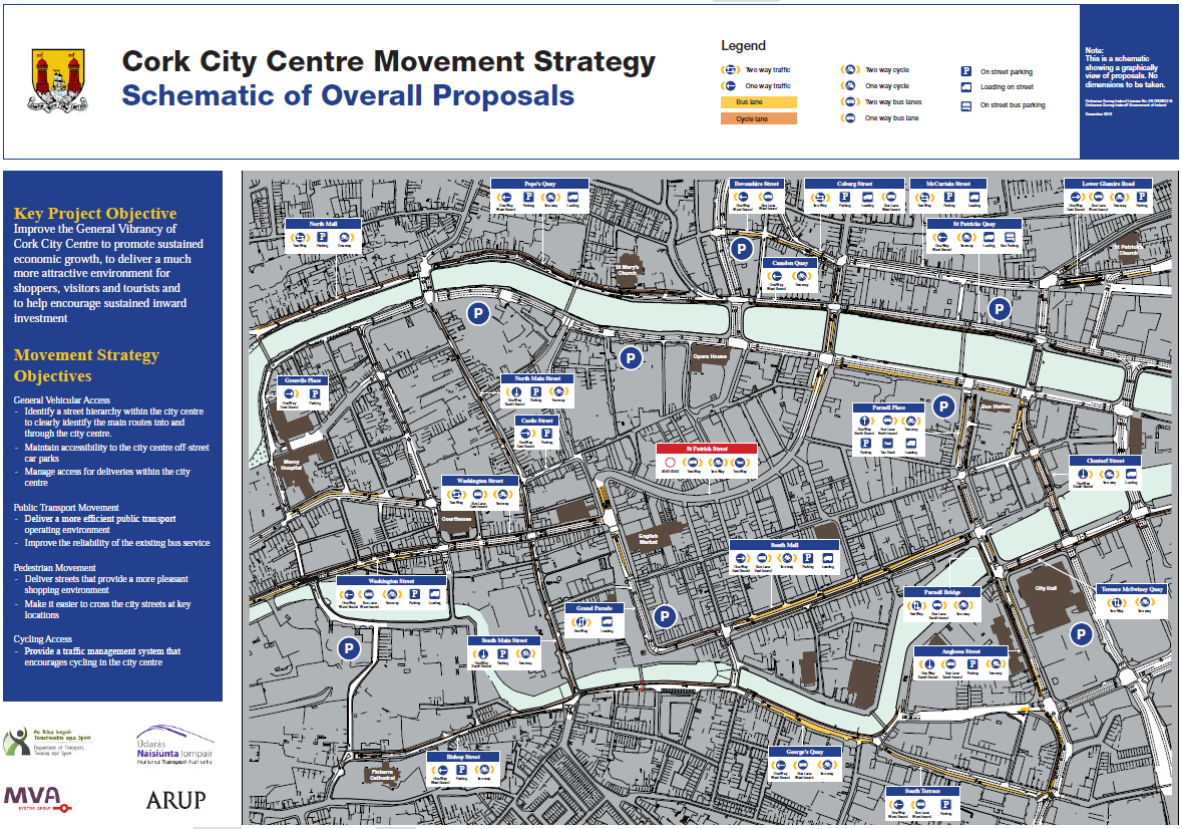


Figure 3-39: Cork City Centre Movement Strategy

3.13.5 Public Transport Gateway Entry Points to Cork City Centre

As the public transport routes converge on Cork City Centre they combine and group into roads and streets approaching the City Centre. The following lists these Gateway entry point streets that are proposed to cater for multiple public transport routes:

- N20 Mallow Road;
- Summerhill North;
- N8 Lower Glanmire Road;
- Albert Quay / Albert Street / Eglinton Street;
- Infirmary Road;
- Sharman Crawford Street / Proby's Quay;
- Western Road; and
- St. John Redmond Street.

3.13.6 Alignment of Proposed Public Transport Network with City Centre Movement Strategy

The cross city public transport routes have taken into account the proposed CCMS street network. Interchanges such as St. Patrick's Street, Grand Parade, South Mall and Parnell Place Bus Station have been identified as key target points for the route alignments. MacCurtain Street has been identified as a potential two-way bus route and interchange location to cater for bus routes to / from Summerhill North and the N8 Lower Glanmire Road, rather than the one-way street on St. Patrick's Quay and the one-way bus lane on Merchant's Quay.

The South Mall / Anglesea Street / South Terrace / George's Quay one-way system has been retained in line with the CCMS, and the associated bus routes from the Douglas Corridor and Kinsale Road have been routed in line with this one-way system.

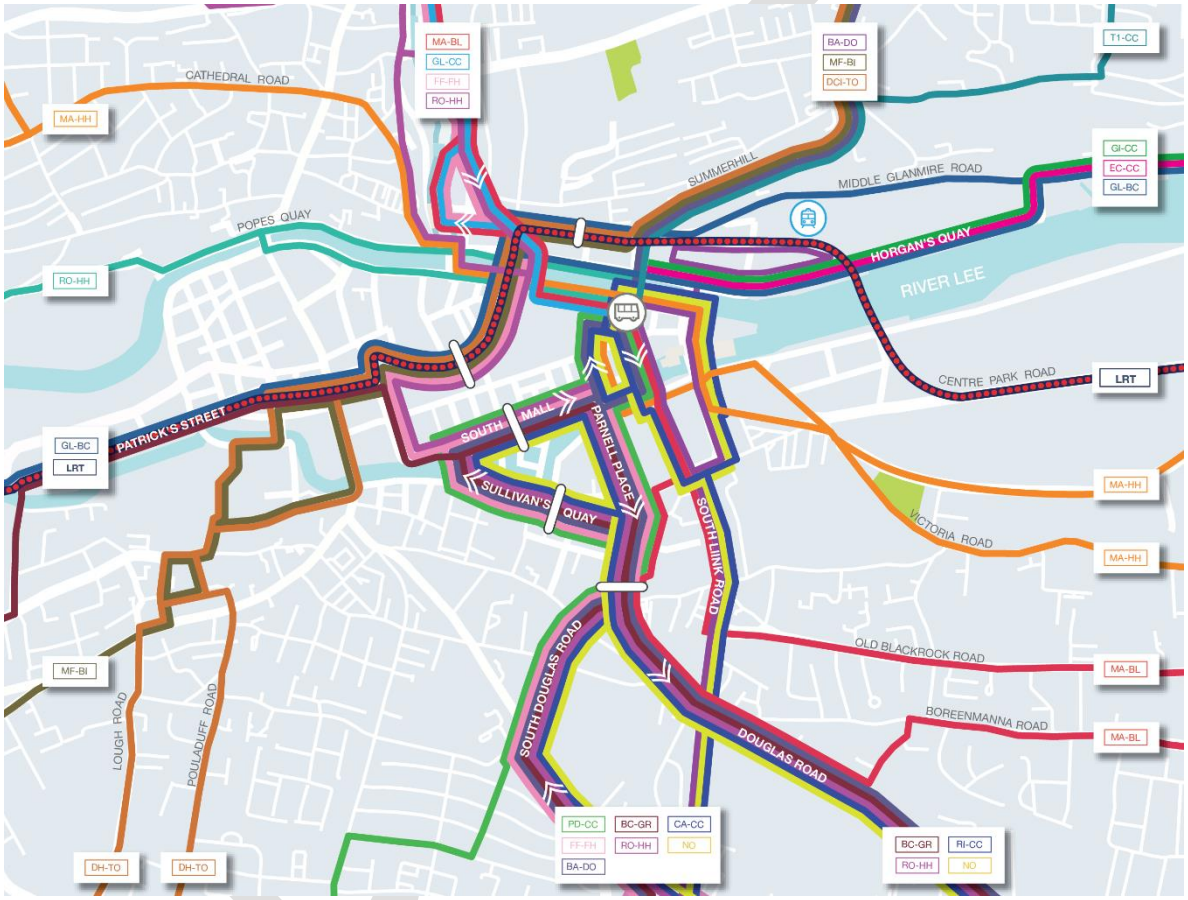


Figure 3-40: Proposed Cross City Route Alignments

Further Improvements to City Centre Public Transport Priority

The CCMS, while providing for a level of public transport priority, does not provide as far reaching public transport priority that the CMATS requires.

Essential to providing public transport priority on all approaches was to provide bus lanes on the Gateway entry points, enabling public transport to efficiently bypass any traffic congestion on the network. In order to improve on the proposed public transport priority proposals within the City Centre, in particular St. Patrick's Street and South Mall, significant further increases to bus lanes are proposed to underpin the cross city public transport efficiency needed to meet the guiding principles for public transport services. Another key difference is the inclusion of two-way public transport priority on MacCurtain Street in addition to the two-way traffic. This will provide for high levels of

public transport priority on MacCurtain Street and support the inclusion of the Eat-West Corridor indicative alignment.

Figure 3-41 illustrates the proposed bus lane and public transport priority measures envisaged for the CMATS to ensure high public transport speeds, high frequency and reliable services.

Figure 3-41: Proposed Public Transport Priority Measures within Cork City Centre

3.14 Park and Ride

3.14.1 Function of Park and Ride

Park and Ride involves providing car parking spaces at public transport interchanges to provide access to the City Centre and key destinations via public transport with managed secure parking. Park and Ride as a component of the CMATS is a means of increasing the accessibility of the transport network to a population that might not otherwise access the network through modes such as walking, cycling or public transport transfer.

3.14.2 Location of Park and Ride

The location of Park and Ride sites is key to achieving the desired benefits of private car reductions. Park and Ride sites need to be situated where they can provide a competitive advantage against car based travel in terms of journey time to destination, security of parking, and cost of parking. Park and Ride sites are proposed at key locations around the periphery of Cork City within the CMA in order to widen the catchment and maximise the use of the proposed public transport network.

3.14.3 Proposed Park and Ride Sites

The following lists the proposed Park and Ride sites and the network catchment it is intended to capture:

- Dunkettle: M8 and N25 catchment. Interchange with rail and bus based public transport;
- Jacob's Island: M8, N25 and N40 catchment: Light Rail and Bus;
- Carr's Hill: M28 and Carrigaline catchment. Interchange with bus based public transport;
- Cork Airport: N27 and Kinsale catchment. Interchange with bus based public transport. Strategic linkage with Black Ash Park and Ride and Kent Rail Station;
- Bandon Road: N71 Catchment. Interchange with bus based public transport;
- Woodberry: N22 Catchment. Light Rail based public transport;
- Carrigrohane Straight: N22 and Ballincollig catchment. Interchange with bus based public transport;
- Blarney / Stoneview: N20 and Blarney catchment. Interchange with rail and bus based public transport;
- Blackpool: N20 and Blackpool catchment. Interchange with rail and bus based public transport; and
- Ballyvolane: Ballyvolane and Glanmire catchment. Interchange with bus based public transport.

Figure 3-42 illustrates the proposed Park and Ride locations on the proposed public transport network.

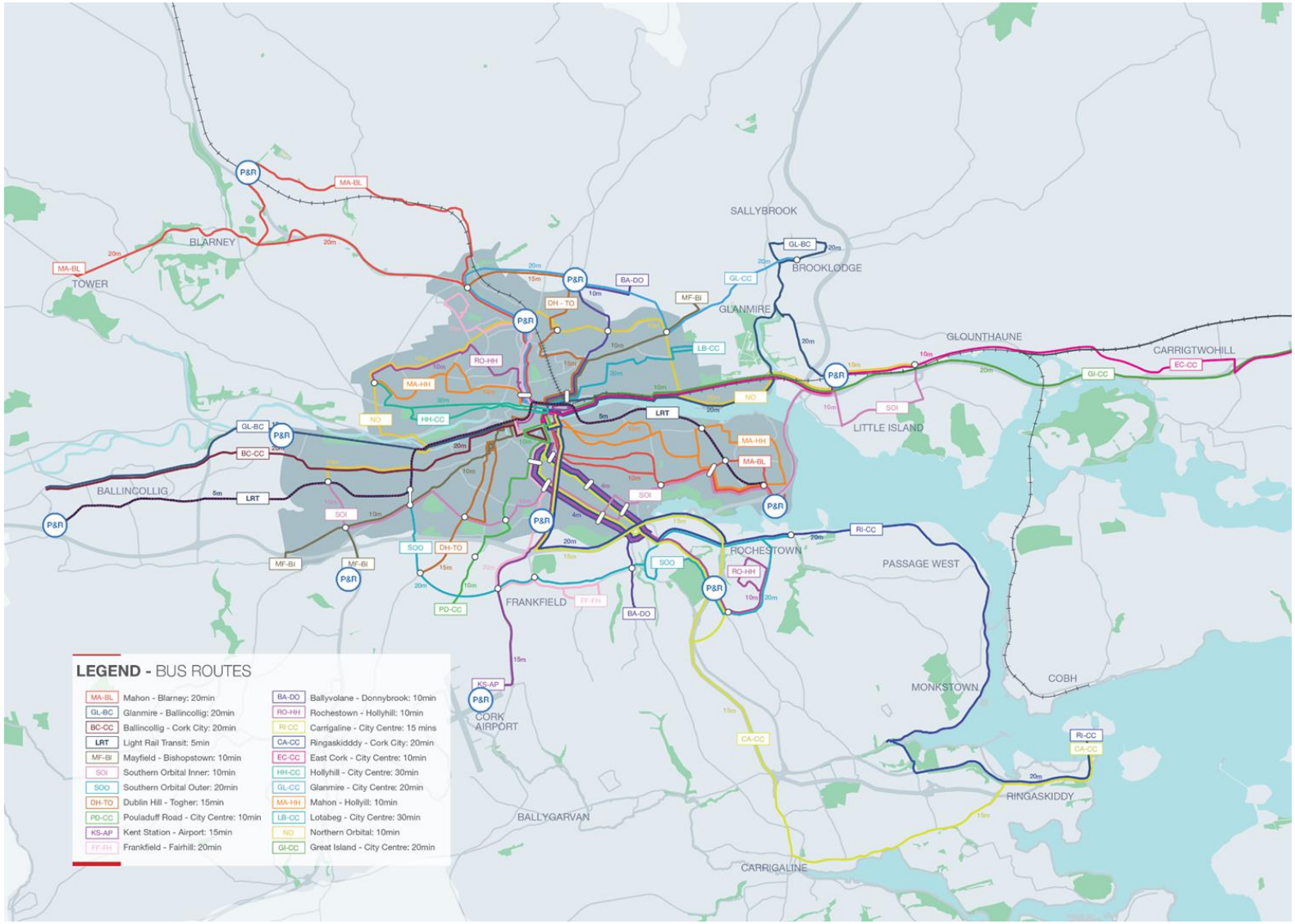


Figure 3-42: Proposed Public Transport Network

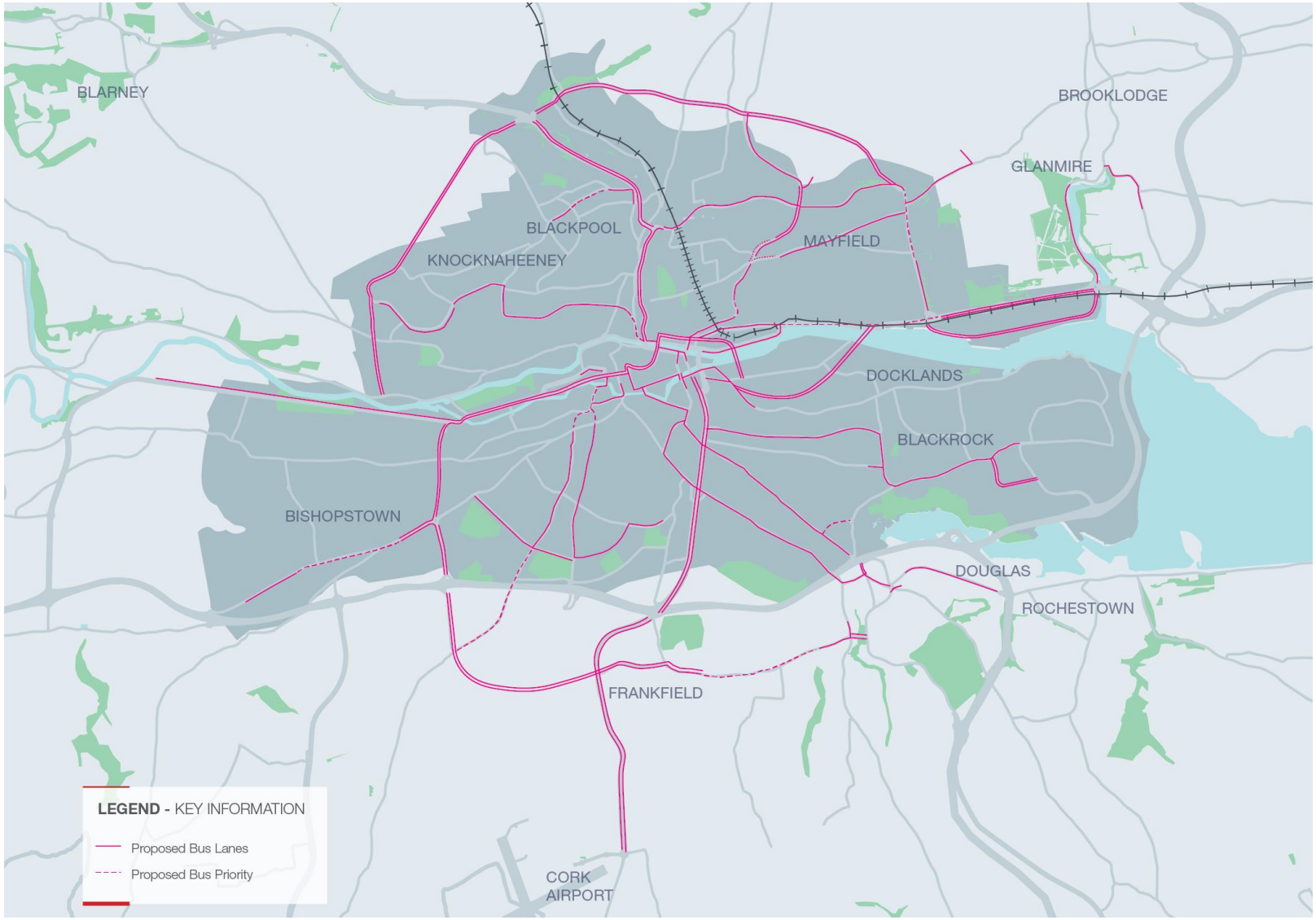


Figure 3-43: Proposed Bus Priority Measures

4 Road Network Options

4.1 National Road Network

This section outlines the National Road network infrastructure proposed as part of the CMATS. It takes into consideration European and National policy in the context of Spatial Planning and National Roads[2], the National Development Plan (NPD), and TII's National Roads Programme 2018 – 2027.

4.1.1 Review of Spatial Planning and National Roads

The Spatial Planning and National Roads guidelines set out planning policy considerations relating to development affecting National Primary and National Secondary Roads, including motorways and associated junctions. The following key extracts from the guidelines are important considerations for determining the function of the National Roads in the context of the CMATS Strategy:

Function of National Roads

"National roads play a key role within Ireland's overall transport system and in the country's economic, social and physical development. The primary purpose of the national road network is to provide strategic transport links between the main centres of population and employment, including key international gateways such as the main ports and airports, and to provide access between all regions. Better national roads improve access to the regions, enhancing their attractiveness for inward investment and new employment opportunities and contribute to enhanced competitiveness by reducing transport costs. However, in recent years, increasing population and car ownership rates, changes in lifestyle and employment, and improvements in the quality of the road network have also contributed to the unsustainable outward expansion of urban areas."

Strategic Traffic

"Strategic traffic, in the context of national roads, primarily comprises major interurban and inter-regional traffic, whether HGV, car, public transport bus services or other public service vehicles, which contributes to socio-economic development, the transportation of goods and products, especially traffic to/from the main ports and airports, both freight and passenger related. In particular, any local transport function of national road bypasses and relief roads in respect of the urban areas they pass through is, and must continue to be, secondary to the role of these roads in catering for strategic traffic."

4.1.2 Proposed National Road Network

The following sections identify proposed infrastructure improvements for the national road network within the CMA, that are required for the delivery of the CMATS.

4.1.3 Dunkettle Interchange Upgrade

The Dunkettle Interchange defines the start point of the N40 at its most eastern location, where it ties in with the N8, M8 and the N25. The interchange consists of a signalised roundabout at its lower level, with a flyover in the east-west direction at its upper level, as such it is grade separated in an east-west direction (N8 – N25), but at-grade in a north-south direction (M8 – N40). The existing junction currently experiences significant levels of traffic congestion, with extensive queuing and delay experienced on all approaches.

[2] Spatial Planning and National Roads, Guidelines for Planning Authorities, January 2012, Department of Environment, Community and Local Government.

The proposed Dunkettle Interchange Upgrade to a free-flow, grade separated interchange received planning permission in May 2013 and is shown in Figure 4-1. It is currently at the tender process for a contractor to work with TII to develop the detailed design. Construction is anticipated to commence in 2019 and is expected to last for 3 years.

Figure 4-1: Proposed Dunkettle Interchange Upgrade

4.1.4 N40 South Ring Road

Background

The N40 is part of the Trans European (TEN-T) Core Network and provides connectivity to the majority of National Roads in Cork including the following: M8, N8, N22, N25, N27, N28 and N71. Along its 14km length the N40 has 11 junctions, which provide access to regional and local roads, diluting its strategic function. Significant congestion and delays are experienced on the N40 at peak periods.

The N40 is a prime example of the unsustainable outward expansion attracted to National Road corridors as outlined above. Zoning of retail, residential, commercial, industrial along the corridor since its introduction has led to unsustainable development relying on private car travel using the N40 SRR as main route between origins and destinations.

“Transport Infrastructure Ireland (TII) will undertake traffic management and improvement studies focussed on the N40 to assess current capacity constraints and to identify potential future improvements to the operational safety of this key strategic route. These studies include the following:

- N40 TEN-T Feasibility Study;
- N40 Dunkettle ITS Feasibility Study

In addition, the upgrade of the N40 South Ring Road to motorway status and a number of local road improvements have been identified in CMATS which will assist in providing alternative complementary routes to the N40 while also improve local accessibility and permeability for all transport users.

N40 Demand Management Study

In order to address the issues associated with the N40, TII have undertaken a demand management study for the N40 Cork South Ring Road, whose main objective was to improve the efficiency of the N40 through the active allocation and management of demand for road space to those users who maximise benefit and minimise adverse impact with a view to the N40 being managed to support economic growth. Other objectives aligned with the Common Appraisal Framework (CAF) criteria of: Economic; Environmental; Accessibility and Social Inclusion; Integration; Safety.

The following outlines the proposed N40 Demand Management Scheme measures, indicating the phasing of the measures:

- **Phase 0:** Integrated Land Use & Transportation;
  - Travel Planning;
  - Area travel Planning;
  - Public Transport Improvements;
- **Phase 1:** Targeted Improvements;
  - Upgrade to Motorway Status;
  - Junction Improvements;
- **Phase 2:** SMART Motorway Interventions;
  - Variable Message Signage;
  - Variable Mandatory Speed Limits;
  - Incident Detection;
  - Control Centre;
  - CCTV;
  - Response Unit;
- **Phase 3:** Alternative Complementary Measures;
  - Grange Road – Carrigaline Road Link;
  - Alternative link to Cork Airport;
- **Phase 4:** Fiscal Measures; and
  - Multi-Point Toll.

4.1.5 M28 Cork – Ringaskiddy

Improving strategic road access to the Ringaskiddy Port is of national economic priority with its importance recently underscored in the final National Planning Framework. The proposed upgrade of the N28 (to become the M28) is a long-term strategic objective for both Cork City and County Councils and a mainstay of regional planning frameworks including the Southwest Regional Planning Guidelines, the Cork Area Strategic Plan and the Cork County Development Plan. The M28 will serve a number of strategic purposes including enabling the relocation of the Port of Cork's activities from the City Docks to Ringaskiddy and providing Ringaskiddy Port with the capacity to handle increased freight activity associated with Brexit. The N28 is identified as a part of the Ten-T Core network.

Cork County Council is sponsoring the project with funding support from TII. Planning for the M28 is at an advanced stage with a preferred Route Alignment recently subject to an Oral Hearing in November 2017. If approved, it will run from the existing N28 N40 Bloomfield Interchange on the South Ring Road to Ringaskiddy village. The new M28 will utilise the existing N28 from the Bloomfield Interchange to Carr's Hill and from there will form a new road to the west of the existing N28 passing between the existing Shannonpark roundabout and Carrigaline. From there the route will pass to the south of Shanbally and Ringaskiddy villages where it will terminate at the new Port

of Cork facility at Ringaskiddy. Figure 4-2 outlines the proposed M28 route in red with the existing N28 represented by a dark line.

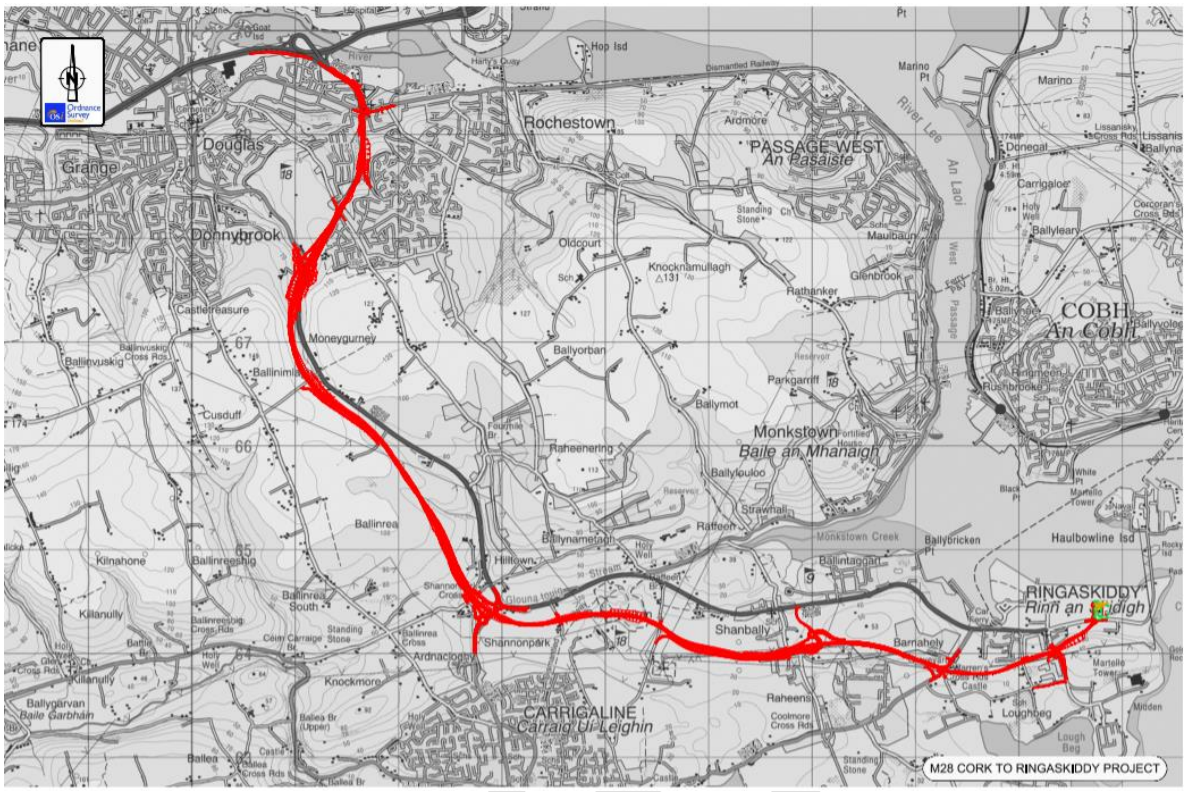


Figure 4-2: Proposed M28 Cork – Ringaskiddy

4.1.6 N27 Cork – Cork Airport

Cork Airport is part of the Ten-T Core network which is served by the N27. Between the Kinsale Road Interchange and Cork Airport it is a single carriageway road, with a northbound bus lane at the northern end approaching the Kinsale Road Interchange. A two-way continuous bus lane is proposed under CMATS to improve Public Transport priority between Cork Airport and Cork City Centre.

4.1.7 M20 Cork – Limerick

The National Development Plan (NDP) 2018-2027, identifies the M20 Cork – Limerick road to be completed by 2027, subject to appraisal, planning and procurement, and cost of approx. €900million. The N20 Cork – Limerick is part of the Ten-T Comprehensive network. The NDP states the following:

"Cork and Limerick are Ireland's second and third largest cities located in the southwest and mid-west respectively. The two cities are approximately 100 km apart yet at present the economic interaction and inter-relationships between the cities is limited with poor transport connectivity being a factor. An opportunity exists to provide better connectivity between the two cities by improving the quality of the transport network which will address road safety issues associated with the existing N20 route and provide for safer and more efficient journey times. The solution for the M20 corridor will be identified through the appraisal process by the development of a business case for the scheme."

While included in the NDP, the M20 Cork – Limerick road falls outside of the scope of CMATS due to its Inter-Regional function and requirement.

4.2 Road Network to the North of Cork City

The Cork Metropolitan Area Transport Strategy is a multi-modal strategy that seeks to integrate the proposed transport network with the forecast land use distribution.

In line with the requirements of the NDP, the requirement for a Cork Northern Ring Road (CNNR) has been considered and assessed as part of CMATS, taking account of all public transport and demand management proposals within the Strategy.

The analysis indicates that an orbital route is critically required to facilitate the development of lands on the northern side of the CMA providing local traffic connectivity and multi-modal transport needs**.** CMATS requires additional network infrastructure on the north side of Cork City to cater for access to development lands, walking and cycling linkage, access to public transport routes, orbital public transport provision, and the removal of strategic traffic form Cork City Centre. This means that the NRR network for the CMATS is required to provide both a strategic and local function, in addition to the public transport, walking and cycling functions.

In the first instance, the Cork Northern Distributor Road (CNDR) has, therefore, been recommended for inclusion in the Strategy.

4.2.1 The Cork Northern Distributor Road (CNDR)

Reviewing policy guidance and the potential options available for the North Ring Road in the context of the CMATS we would recommend the local distributor type NRR catering for the North East and North West quadrants of Cork City. This NRR would provide for local transport needs, multi-modal requirements, the accommodation of strategic traffic away from Cork City Centre.

The analysis undertaken also indicates that based on the demand projections and in the absence of the N/M20 Cork-Limerick Scheme, the CNDR single lane carriageway distributor arterial road (with additional bus lanes) can cater for the multi-modal traffic and transport needs of orbital movements in the northern CMA, including the redistribution of strategic traffic away from the core city area in accordance with principles set out in DTTS's Design Manual for Urban Roads and Streets and appropriate project appraisal reflecting the nature of the route.

The Cork Northern Distributor Road (CNDR) is a short term objective and a 'critical enabler' for CMATS as it:

- Facilitates the introduction of a HGV ban within the City Centre;
- Serves the requirements of local traffic demand in the northern CMA:
- Facilitates the rollout of sustainable transport measures including public transport services for the North Cork Metropolitan City area;
- Creates opportunities for sustainable development of existing land banks in the Northern Cork Metropolitan area; and
- Allows for the downgrading of national routes entering Cork City, which can therefore allow for the prioritisation of sustainable modes on these routes.

The proposed CNDR will cater for the demand for movements between the N20 corridor and the wider national roads network up to 2040 in conjunction with other elements of CMATS.

The operation and performance of the CNDR will be monitored as part of the on-going implementation of the CMATS and the N/M20 Cork to Limerick Improvement Scheme. If demand for access to the wider national roads network exceeds the capacity of the NDR, then the implementation of the CNRR will need to be brought forward.

4.2.2 Strategic Cork North Ring Road (CNRR)

The NDP indicates that the Cork North Ring Road is a complementary but independent scheme to the N/M20 corridor scheme. However, its requirements, scale (based on demand levels) and justification will be considered and assessed as part of the appraisal process for the overall M20 scheme.

In line with the NDP, CMATS recommends that the requirement for a future CNRR will be determined in line with DTTAS Guidance for scheme appraisal and TII Project Appraisal Guidelines for National Roads (PAG) including a Route Options Assessment and Business Case.

In terms of the requirements of the CNRR within CMATS, it is recommended that, no junctions should be provided to access regional or local roads from this national road link.

Subject to the appraisal outcomes of the N/M20 Cork to Limerick Road Improvement Scheme, it is expected that the CNNR project will be planned for implementation during the period of the Strategy. The finalisation of a route corridor and its protection from development intrusion is an objective of CMATS to allow for changing circumstances including potentially an earlier project delivery requirement.

4.2.3 Proposed North Ring Road Arrangement

Figure 4-3 illustrates the recommended configuration of the North Ring Road in the context of the Cork Metropolitan Area Transport Strategy.

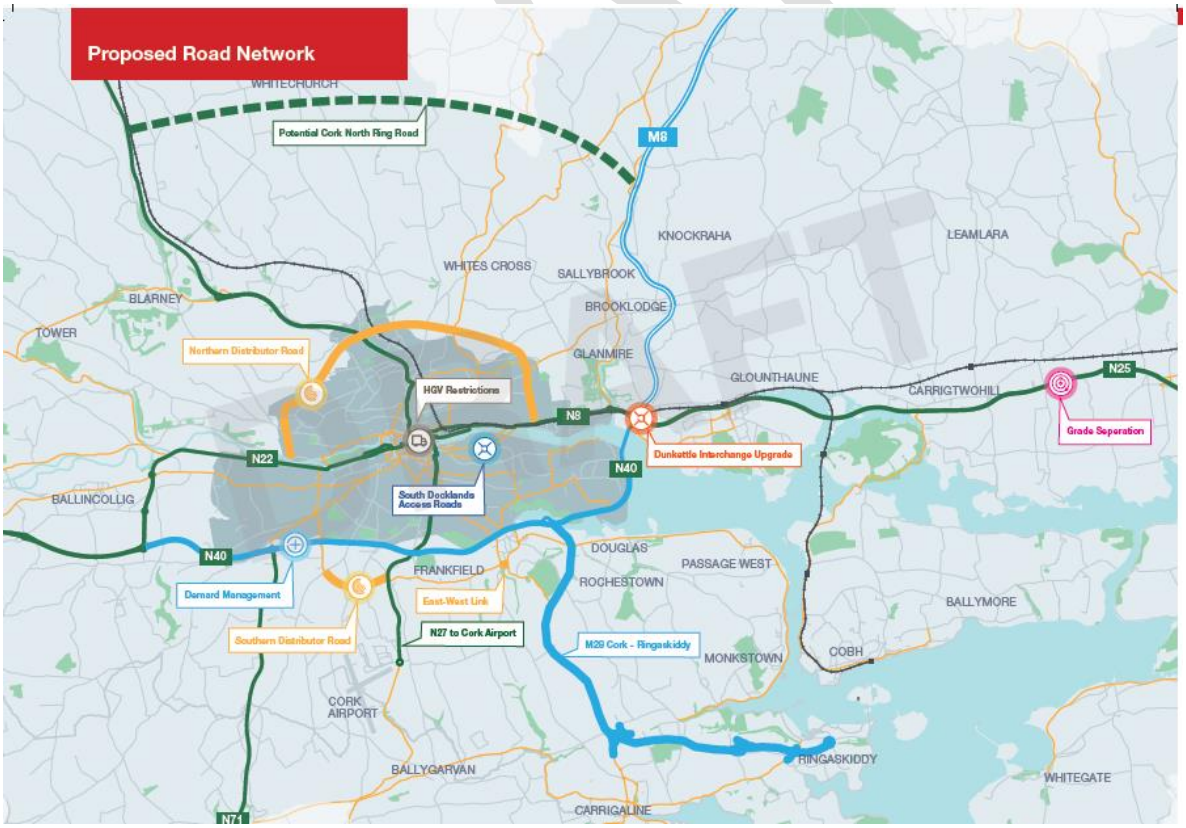


Figure 4-3: Proposed Cork North Ring Road Configuration and Alignment

4.3 Regional Road Network

Additional regional road network provision needs to undertake a multi-modal function, catering for public transport, walking and cycling in addition to car traffic. The regional road network provision is required to cater for the following:

- Provide access to development lands;
- Cater for walking and cycling linkage;
- Provide access to public transport routes;
- Cater for orbital public transport provision;
- Removal of strategic traffic form Cork City Centre; and
- Removal of local traffic from strategic road routes.

To achieve this the cross section of these roads should cater equally for active modes, public transport and car traffic as follows:

- Footpath and Cycle lane provision – 33% of cross section;
- Bus lane and priority provision – 33% of cross section; and
- Road traffic lane – 33% of cross section.

The following outlines the additional regional road network provisions for CMATS.

4.3.1 Alternative Complementary Measures

As part of the N40 Demand Management Study, Phase 3 outlined the introduction of Alternative Complementary Measures. These alternative complementary measures should provide the multi-modal function as outlined above. These alternative complementary measures include the following:

- Grange Road – Carrigaline Road Link; and
- Alternative link to Cork Airport.

4.3.2 N27 to Sarsfield Road Link

As part of the public transport network development the potential for a road link between the N27 at Forge Hill and the R849 Sarsfield Road was identified to cater for the proposed Southern Outer Orbital bus route. The existing road network has steep topography, narrow carriageways, no pedestrian provision and lacks direct route connections.

Providing a link between the N27 and Sarsfield road would provide local transport access, pedestrian provision, cycle provision, public transport provision and priority, and support the strategic function of the national road network by removing local movements from the N40.

This link provides a similar function and orbital road arrangement to the Airport to N71 link proposed in N40 demand management Study. There is potential to integrate and align these proposals into one cohesive scheme.

4.3.3 Cork County Urban Expansion Area Road Proposals

The provision of road network infrastructure within the Urban Expansion Areas (UEAs) in Cork County is required to support the development of these areas. As outlined above these road proposals and improvements should cater for walking, cycling and public transport provision and priority as a minimum. The following lists the road improvements required for the UEAs:

- Midleton road improvements;
- Carrigtwohill road improvements;
- Great Island road improvements including Belvelly new bridge (potentially bus only);

- Carrigaline road improvements;
- Ballincollig road improvements;
- Dunkettle / Ballinglanna road improvements;
- Monard road improvements; and
- Stoneview road improvements.

4.4 City Road Network

The road network will be reviewed with the aim of aligning road network provision with public transport, walking and cycling provision. As part of the strategy objectives, it is aimed to create a more attractive experience for walkers and cyclists while still allowing access into off-street car parks and designating driving routes into and through the city.

4.4.1 City Centre Movement Strategy

The Cork City Centre Movement Strategy outlines objectives to improve the vibrancy of Cork City Centre to promote sustained economic growth, to deliver a much more attractive environment for shoppers, visitors and tourists and to help encourage sustained inward investment. The strategy is illustrated in Figure 4-4.

Traffic management will be important to manage the flow of vehicles into the city centre area. As part of this, strategic objectives will include the identification of a street hierarchy within the city centre to clearly identify the main routes into a through the city centre. To maintain accessibility to the city centre off-street car parks and to manage access for deliveries within the city centre.

The objectives also include to deliver a more efficient public transport system and to improve the reliability of the existing bus service.

The objectives also relate to pedestrians and cyclists where streets will be developed to provide a more pleasant and attractive shopping experience and a traffic management system that encourages cycling in the city centre.

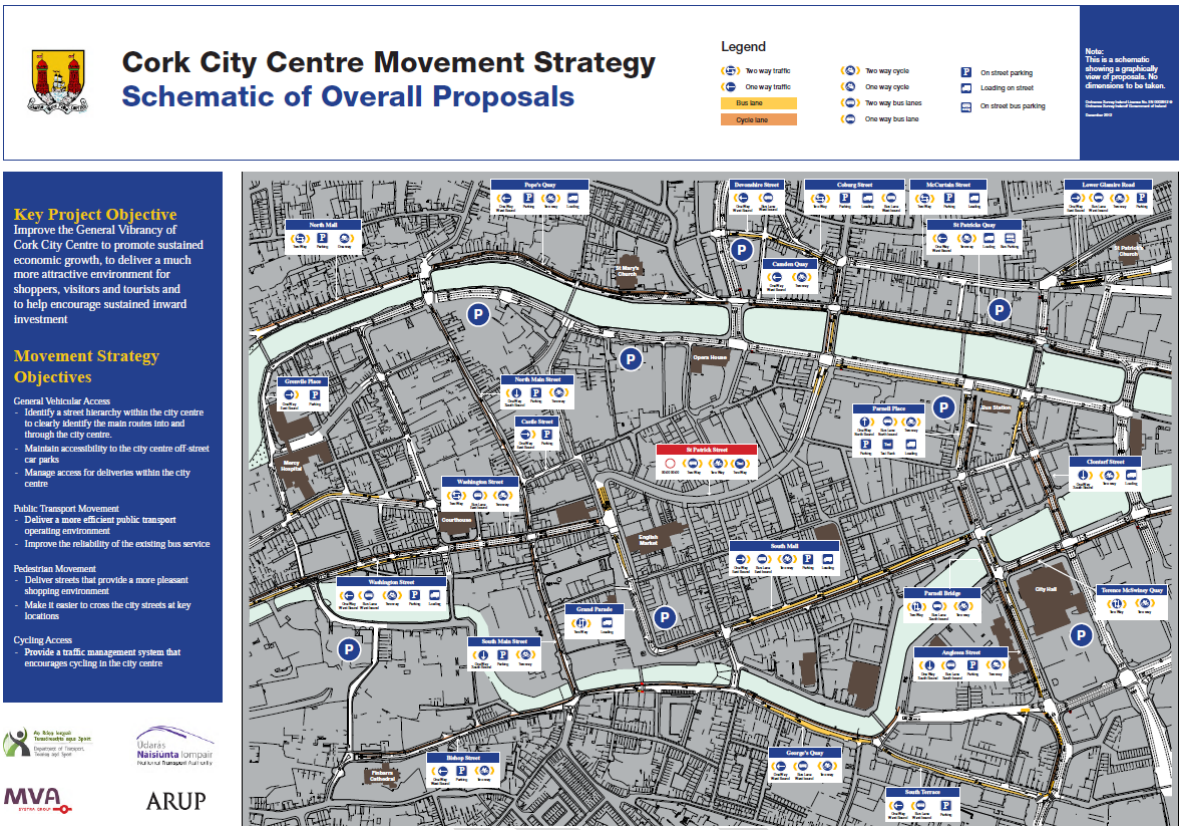


Figure 4-4: Cork City Centre Movement Strategy

4.4.2 Cork Docklands and Tivoli Docks Bridge and Road Infrastructure

Improved road and bridge connectivity to the Cork North and South Docklands, and the Tivoli Docklands is required to support the development of these areas. The road and bridge network infrastructure will need to provide for multi-modal priority and movements for pedestrians, cycling and public transport, in addition to the road access requirements.

A more detailed analysis as part of the LAP process will be required to determine the appropriate level of bridge infrastructure required.

Docklands Bridge Infrastructure

Cork City Council have proposed the following infrastructure projects to connect the North and South Docklands area while providing access to marine traffic:

- South Docklands Eastern Gateway Bridge;
- Water Street Bridge; and
- Mill Road Bridge.

South Docklands Road Infrastructure

The key roads within the South Docklands area are Centre Park Road and Monahan's Road. Both roads will need to be upgraded to accommodate increased demand. Bus lanes are proposed for Monahan's Road and segregated Light Rail transit is proposed on Centre Park Road. Discreet access points will be required from Monahan's Road. The number and form of these arrangements will be determined as part of the LAP process.

North Docklands Road Infrastructure

It has been proposed to realign Horgan's Quay in the North Docklands area to remove traffic from the quays to open up quays frontage for development and to better tie-in with the new link to the reoriented Kent Station on Alfred Street. It would also tie in with a proposed bridge at Mill Road to link directly to Kent Station.

Tivoli Access

Access to Tivoli by road, for car traffic, pedestrians and cyclists will need to be improved to further develop the Tivoli Docks site, pending the relocation of Port of Cork to Ringaskiddy. A more detailed analysis as part of the LAP process will be required to determine the appropriate level of bridge infrastructure required.

4.4.3 Constraints and Pinch Point Improvements

There are a number of areas in Cork where constraints and pinch points exist. This is common due to the topographical nature of Cork as the Northern part of the city is elevated with a steep gradient. The medieval nature of Cork also leads to pinch points where narrow streets can cause congestion.

Where constraints and pinch points are impeding the movement of people and goods through Cork City investigation into removing the constraints through design or purchase should be considered.

4.5 Freight and Heavy Goods Vehicles

4.5.1 Port of Cork Relocation

It has been proposed to relocate the port of Cork's industries and container terminal from the Tivoli Docks area to Ringaskiddy located to the south of the city. The aim is to relieve traffic congestion around Little Island from port traffic and to provide a location that can handle the continued growth of the Port into the future.

4.5.2 Heavy Goods Vehicles Restrictions

The layout of cork city is of cultural and historical importance to its people and economy. In the city centre area, streets can become narrow and bordered either side by historical architecture and amenities. Street widths can restrict the flow of heavy goods vehicles. It is important for a traffic management system to be implemented to manage the delivery of goods to businesses by Heavy Goods Vehicles.

It is proposed to implement HGV restrictions within the N40 South Ring Road and proposed Northern Distributor Road.

The restrictions will be modelled as similar to HGV restrictions in Dublin City. However, the type and form of HGV restriction when implemented will depend on local requirements.

5 Cycling Network

The proposed cycle network for the CMATS is based on the Cork Cycle Network Plan 2017, which developed a comprehensive cycle network for Metropolitan Cork. Additional cycle links have been proposed to align with the CMATS proposed transport networks. The network is illustrated in Figure 5-1.

5.1 Cork Cycle Network Plan 2017

The proposed network has been developed on the basis of all of the following:

- Transport and land use proposals set out in the policies and plans for the area;
- Assessment of existing cycling infrastructure within the area;
- Guidelines set out in the National Cycle Manual;
- Agreed targets for mode share; and
- Detailed assessment of travel demand within the area using outputs from the cycling model.

Key priorities for development of the Cycle Network Plan are as follows:

- Designating a coherent network of east-west and north-south cycle routes across the area which will provide access to all major trip generators;
- The first priority in terms of access will be employment areas and third level education followed by schools. These priorities have been established to support proposed modal shift targets. Cycle links to new development areas have also been prioritised;
- Providing the highest possible Level of Service on identified corridors of high demand;
- Identifying and maximising opportunities for high quality greenways
- Responding to feedback from key stakeholders and the public. Based on the recommendations within the National Cycle Manual a number of different infrastructure types are proposed at various locations within the network, including:
- Cycle Lanes: Incorporates a dedicated space adjacent to the kerb or car parking and can take the form of mandatory or advisory cycle lanes;
- Mixed Streets: Suitable in low traffic environments where the cyclist shares the road space with motorists;
- Cycling and Bus Lanes: Cycle lanes can be provided alongside the bus lane or cyclists can cycle with the buses within the bus lane;
- Cycle Tracks: Cycle tracks are different from cycle lanes in that they are physically segregated from motorised traffic in some way whether by a barrier or through a level change;
- Cycle Trails or Greenways: Roads and paths through green areas and parks that are segregated from vehicular roads.

5.1.1 Primary Network

Primary routes have been designated as such because they experience the highest level of demand. These routes are supplemented by secondary routes which may provide access to residential catchments.

5.1.2 Interurban Network

The Inter Urban Cycle Network has been developed to indicate possible connections from the Metropolitan Towns to Cork City. In this instance, it was sought to designate the route with least possible traffic conflicts while maintaining the importance of direct and convenient access.

5.1.3 Secondary Network

Secondary routes will have the function of linking between principal cycling routes on the Primary network and zones, such as residential and zones with schools and amenities.

5.1.4 Greenways

A greenway network for completely (or almost) traffic free cycling has been proposed. This has been developed on the basis of a considerable existing network of greenway routes and the upgrade of existing paths to provide a comprehensive greenway route network.

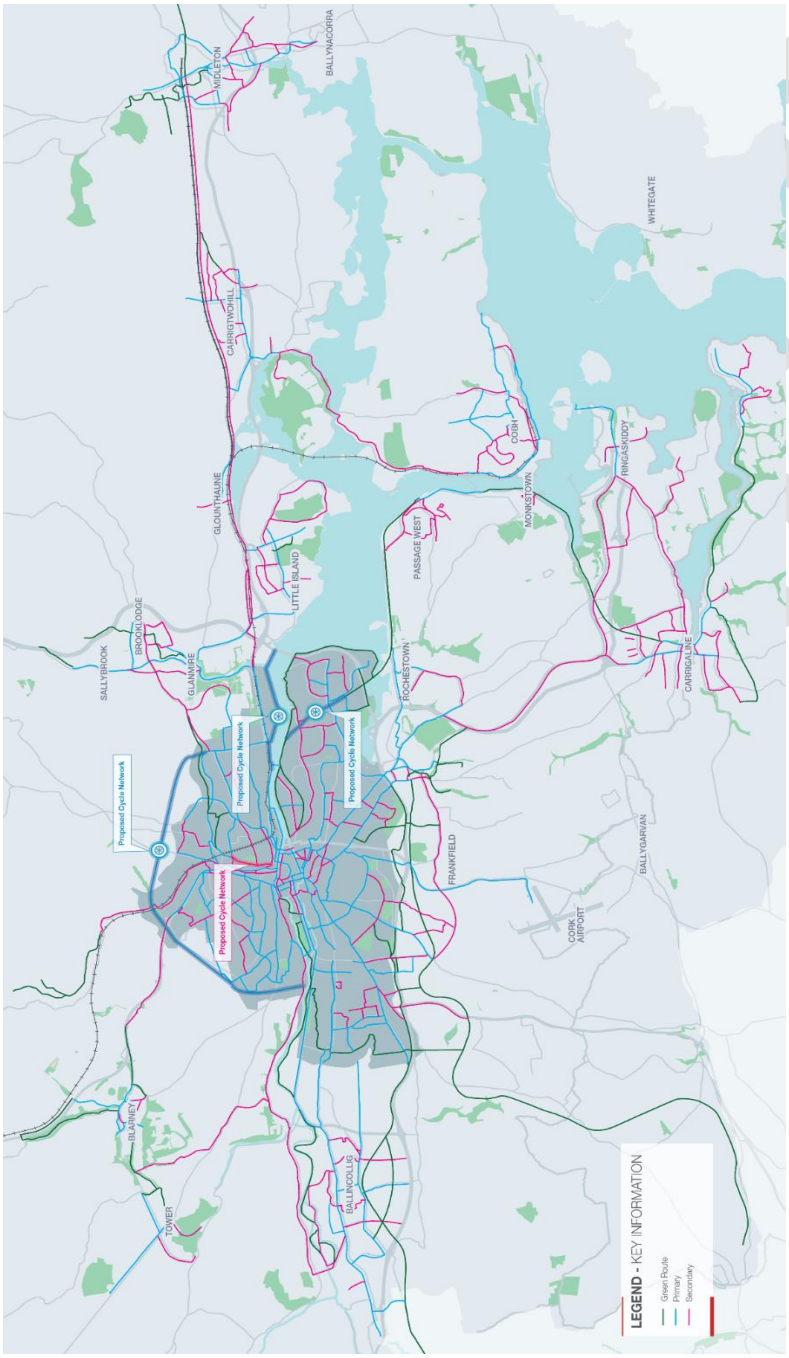


Figure 5-1: Cork Cycle Network Plan

6 Walking Network

6.1 General Objectives

The following outlines the general walking network outcomes for CMA;

- An increase in walking levels for work, education and leisure across the CMA, particularly for short journeys (less than 2km);
- Addressing the safety issues and barriers that prevent citizens and visitors from walking more in Cork;
- Supporting a high quality and fully accessible environment for all abilities and ages by continuing to develop a safe, legible and attractive public realm;
- Facilitate walking's role as part of linked trips, particularly with rail and bus journeys; and
- Promote a far higher standard of urban design in new developments, and in highway design, in a fashion that consistently prioritises pedestrian movement and safety over that of the private car.

In order to achieve the above outcomes, the following key actions need to be addressed.

- Radial routes to City Centre need improvement.
- Pedestrian priority areas to be expanded, enhanced and de-cluttered.
- Widening and upgrading of footpaths; greater enforcement of parked cars encroaching on footpaths.
- Upgrade walking provision in tandem with Bus Connects corridor improvements and Cycle Network implementation
- Future Land Use:
    - Ensuring that the design and layout for new development provides connectivity to the existing street network and is fully permeable for walking and cycling;
    - Quality of walking routes to public transport stations and stops needs careful consideration and priority;
    - New carriageway layouts and junctions to be consistent with Design Manual for Urban Roads and Streets (DMURS) standards and principles and pedestrian priority across local junctions;
    - No "cul-de sac" design;
    - Walking accessibility to schools from local catchments, a prime consideration.

6.2 Cork City Walking Strategy 2013 to 2018

The Cork Walking Strategy 2013-2018 provides a clear vision and implementation plan for increasing the modal share of walking for commuting within Cork City's suburbs. The Walking Strategy supported the development of a walking network that connects neighbourhoods, origins and destinations, increases the permeability of the built environment, and creates an attractive, safe environment that prompts more people choosing to walk, resulting in a healthier population, a more attractive and sustainable city, and stronger communities.

Much of the focus areas for improvement identified in the Walking Strategy remain relevant and have been adapted here for the purposes of the wider metropolitan area and the longer-term horizon of the CMATS:

- Network Development of the primary pedestrian network throughout the city;

- Neighbourhood Infrastructure to enhance neighbourhoods and walking safety;
- Behavioural Change initiatives that promote walking;
- Collaboration between stakeholders;
- Upgrade walking provision in tandem with BusConnects corridor improvements and Cycle Network Implementation; and
- Upgrading pedestrian improvements in tandem with those proposed for cycling including minimising conflicts in shared spaces areas such as greenway

The Cork Walking Strategy considers the strategic corridors that lead to and from the City Centre. Extensive use is made of mobility pattern data available from Census 2011, as well as statistics available from previous Census Reports to identify trends in modal share. As a walking strategy, it principally considers journeys less than 2km in length, however, longer journeys that can be undertaken by walking in conjunction with public transport or cycling are also considered. A separate Movement Strategy has already been prepared for the City Centre, and a Walking and Cycling Strategy is being prepared by Cork County Council. This Walking Strategy will connect to the routes emerging from these studies.

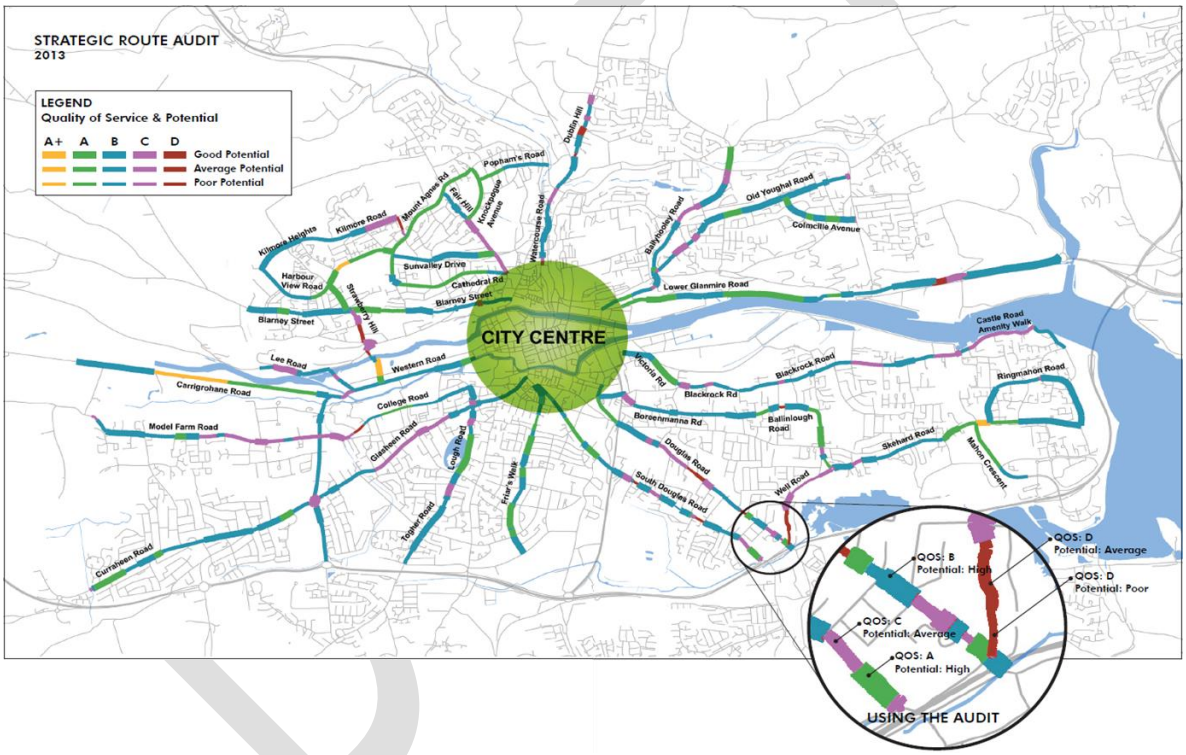


Figure 5-2: 2013 Cork City Strategic Route Audit

6.3 Strategic Routes

The strategic routes include, clockwise from the north, Old Youghal Road, Colmcille Avenue, Blackrock Road, Ringmahon Road, Skehard Road, Curraheen Road, Carrigrohane Road, Blarney Street, Strawberry Hill, Harbour View Road, Kilmore Heights and Kilmore Road.

6.2.1 Strategic Route Objectives

- **Dublin Hill** – to support the planned regeneration of Blackpool and opening of the Blackpool/Kilbarry rail station;

- **Ballyhooley Road** – to support on-going regeneration in the Ballyvolane area and access to increased bus services;
- **Old Youghal Road** - Upgrade the pedestrian route through Mayfield and connecting into St. Lukes, Dillon's Cross and to the City.
- **Colmcille Avenue -** Reinforce the pedestrian network from the residential areas south of Mayfield into Mayfield.
- **Blackrock Road** - Upgrade the pedestrian route along the Blackrock Road to serve the communities on either side, as a local facility and as an alternative and more direct route to the city.
- **Ringmahon Road -** Upgrade the pedestrian loop at Mahon that serves the local community, links to the amenity routes and also to the Skehard Road towards Douglas.
- **Skehard Road -** Upgrade the Skehard Road to provide a strong east west link from Mahon to both the City Centre and Douglas via the Boreenmanagh and Well Roads respectively.
- **Curraheen Road -** Complete the western part of the Curraheen Road to facilitate the residents that towards the western outskirts of the city.
- **Carrigrohane Road -** Upgrade pedestrian facilities as an alternative to the Lee Fields amenity route, to include vehicular speed reduction, possible modal segregation and crossing points.
- **Blarney Street -** Upgrade the pedestrian infrastructure to provide safe walking facilities, in conjunction with vehicular speed reduction measures, for the residences and workers located at the western city boundary.
- **Strawberry Hill -** Upgrade the pedestrian facility of Strawberry Hill, including opportunities to improve accessibility and safety so as to strengthen the appeal of this link to Sunday's Well and the Mardyke.
- **Harbour View Road -** Continue to build up the pedestrian facilities within the Kilmore Heights Knocknaheeny area to better serve walkers in and around Kilmore Road, the area itself and to external destinations.

6.4 Urban Expansion Areas

Within the Metropolitan areas, UAEs are subject to the development of Masterplans by Cork County Council. Areas targeted for pedestrian priority improvements should include the town centres themselves, their adjoining residential areas and schools. The quality of the pedestrian environment linking these areas to the improved public transport network is critical to the success of CMATS.

6.5 Age Friendly Town Centres

Changes to age-profiles of the CMA will require that the public realm and transport network will need to adapt to consider the needs of older people, those with mobility, visual or hearing impairments and those with buggies.

Improvements include further re-allocation of road space in favour of pedestrians in the city and town centres, quayside areas, matching crossing facilities with pedestrian desire lines and re-timing of signals to reduce pedestrian wait times.

6.6 Amenity Routes

The Walking Strategy proposes to enhance the primary pedestrian network by increasing the permeability to existing and proposed amenity routes by better integrating them into strategic walking routes. Many of these are located in areas immediately adjacent to rivers and are proposed

as Greenways in the Cycle Network Plan and include areas north of Ballincollig town centre, areas near the Old Passage line and the Lee Fields.

6.7 Heritage Routes

Heritage routes relate to walking routes that link to or take in the historical and cultural aspects of the city. The development of such walking routes can bring benefits in community development, participation and involvement. Existing routes focus mainly on the core city centre area and take in sites such as FitzGerald's park, Elizabeth Fort, Red Abbey Tower, The Franciscan Brewery and The Cork Public Museum.

6.8 District and Neighbourhood Walking Network

The Cork Walking Strategy provides a clear vision and plan for increasing the modal share of walking for commuting within Cork City's suburbs, and sets out targets to be achieved by 2018.

By developing a walking network that connects neighbourhoods, origins and destinations, increases the permeability of the built environment, and creates attractive, safe and sustainable alternatives to private transport, more people will choose to walk, resulting in a healthier population, a more attractive and sustainable city, and stronger communities.

The main focuses as part of the walking strategy for districts and neighbourhoods are:

- Network Development of the primary pedestrian network throughout the city
- Neighbourhood Infrastructure to enhance neighbourhoods and walking safety
- Behavioural Change initiatives that promote walking
- Collaboration between stakeholders
- Upgrade walking provision in tandem with Bus Connects corridor improvements and Cycle Network Implementation

6.9 Improved Permeability

In order to develop active transport modes as an attractive and sustainable option to private based transport, it has been proposed to develop cycling facilities and infrastructure to promote this mode, as well as improving and connecting existing and proposed walking routes with strategic walking routes as part of the City Walking Strategy.

- Sydney Park – Old Youghal Road – Glen Avenue
- Skehard Road – Blackrock Road (via Ursuline Lands)
- North city Gateway
- South Terrace Gateway

7 Conclusions

Building on the detailed Baseline Review and the Demand Analysis of forecast development growth a multi-modal transport options and network development exercise has been undertaken. This transport options and network development assessment has resulted in a transport network that:

- Will cater for future demand to 2040;
- Enables Cork's development in line with National Planning Framework to 2040 and beyond;
- Meets strategic and local transport needs;
- Provides strategic public transport corridors along which to focus future development;
- Prioritises public transport, walking and cycling;
- Is scalable and flexible to changes in demand levels; and
- Can adapt public transport level of service to meeting demand requirements.