



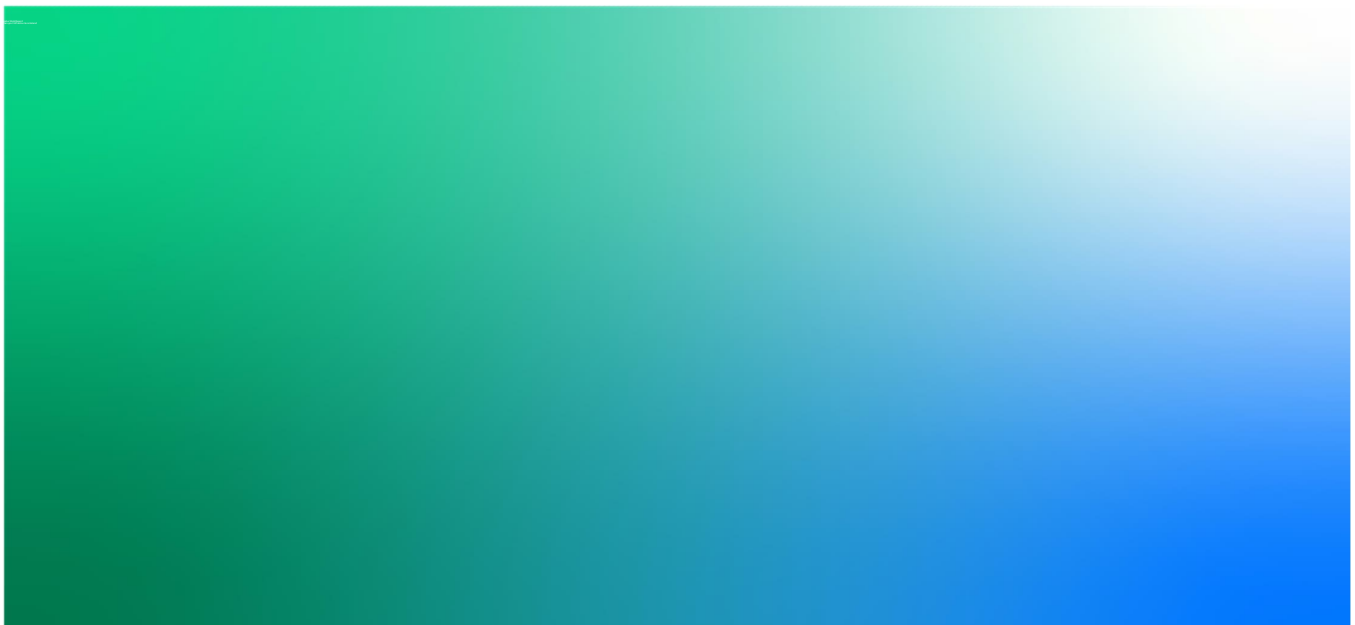
Cork Light Rail Transit - Alignment Options and Feasibility Study

City Centre Study: Alignment Option Comparison

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Executive Summary

Introduction

Jacobs Engineering Ireland Ltd. (Jacobs) has been commissioned by Transport Infrastructure Ireland (TII) to undertake an Alignment Options and Feasibility Study to determine the Emerging Preferred Route (EPR) for a new Light Rail Transit Scheme in Cork as included in the Cork Metropolitan Area Transport Strategy (CMATS). The design of the Cork Light Rail Transit scheme (hereafter referred to as the Proposed Scheme) is being undertaken by TII in collaboration with the National Transport Authority (NTA).

The Proposed Scheme is an east-west mass transit, rapid transport corridor, running from Ballincollig area to Mahon Point, which has been a long-term objective for the Cork Metropolitan Area (CMA) articulated by the joint Cork Area Strategic Plan (CASP) and the Cork City Centre Movement Strategy.

Following completion of the Step B MCA, 12 end-to-end route options were identified and brought forward to the Step C MCA for a more detailed assessment. The conclusion of the detailed MCA at Step C identified two Route Options that broadly shared an identical alignment for the Proposed Scheme, with the exception of two alignment variations (Option A and B) in the city centre section; one alignment connecting directly to Kent Station via St Patrick Street and MacCurtain Street, and another alignment that remained south of the River Lee on South Mall and the docklands, and connecting in directly to Kent Station via a pedestrian and cycle bridge. A further variation of these two city centre route alignments was also developed to determine if utilising different elements of each option within a third option (Option C) would provide any alignment enhancements through the city centre section.

The scope of this Technical Note was to comparatively assess three city centre alignment options and their form of connection through the city centre to Kent Station and the Docks, to determine which one will provide the preferred option under different criteria, including the transport interchange and the connectivity with the railway network at Kent Station. The outcome of this Technical Note is used to inform the MCA at Step C, which will determine the overall EPR.

Description of Options

The descriptions of the three options that were assessed in this technical note are as follows:

- **Option A:** Travelling eastbound, a direct connection to the station would be made from Washington Street to Grand parade, then via St Patrick's Street, crossing north of the River Lee via the existing St Patrick's Street bridge, linking with MacCurtain Street and then Alfred Street. The proposed alignment would interchange directly with Kent Station via a new LRT stop and revised external layout arrangements. A new proposed public transport bridge would link the LRT across the River Lee to Kennedy Quay, accessing Mill Street and Centre Park Road.
- **Option B:** Travelling eastbound, an in-direct connection to the station would be achieved via Grand Parade linking with South Mall, crossing south of the River Lee via the existing Parnell Place bridge. The proposed alignment would then link with Albert Quay before progressing to Kennedy Quay. It is proposed that Option B would be served by a 125m active travel bridge from an LRT stop location on Kennedy Quay linking to Penrose Quay on the northern side of the River Lee, resulting in a total distance of 270m to Kent Station for pedestrians and cyclists to the nearest stop.
- **Option C:** Travelling eastbound, a direct connection to the station would be achieved via Grand Parade linking with South Mall before then linking with Lapps Quay and transitioning to a northbound direction along Clontarf Street, crossing the River Lee via the Brian Boru Bridge and then Alfred Street. The proposed alignment would interchange directly with Kent Station via a new LRT stop and revised external layout arrangements. A new proposed public transport bridge would link the LRT across the River Lee to Kennedy Quay, accessing Mill Street and Centre Park Road.

Methodology of Options' Assessment

In order to determine which option will provide the preferred city centre route, a comparative assessment was undertaken against different criteria, which included transport interchange and the connectivity with the railway network at Kent Station. The outcomes of this technical note will also be used to inform further the MCA of the 12 end-to-end options which will ultimately determine the overall EPR for the Cork LRT Scheme.

The analysis of city centre options has been completed broadly in line with the approach and methodology utilised in the MCA of the 12 end-to-end route options, but with consideration of additional location specific information at a more disaggregated and granular level. The analysis of all three city centre options focused on the following criteria:

- Integration;
- Accessibility, Social Inclusion and Mobility;
- Environment; and
- Economy.

Similar to the MCA of the 12 end-to-end route options, the comparative assessment of the three city centre options utilises a five-point scale. The five-point scale is colour coded, whereby an option showing significant advantages over the other options graded "dark green", and an option showing significant disadvantages over other options graded "red". Orange and light green are adopted for "some" advantages/disadvantages between options, and "yellow" being used for when all options deliver comparable results.

This is deemed the most appropriate approach, as that assessment is comparing a wide range of primary and sub criteria.

Summary of Analysis

The summary of the comparative assessment between Option A, Option B and Option C is outlined in **Table 0.1** below:

Table 0.1: The summary of the comparative assessment between Options A - C

Primary Criteria	Option A	Option B	Option C
1. Integration	Dark Green	Orange	Light Green
2. Accessibility and Social Inclusion and Mobility	Light Green	Orange	Orange
3. Environment	Light Green	Orange	Orange
4. Economy	Orange	Light Green	Light Green

- **Integration:** When considering public transport, Option A and C presented optimal levels of integration through the direct interchange connection with Kent Station. Option A and C also unlocked the potential of further public transportation optimisation for Kent Station, as it migrates its configuration towards a comprehensive Multi Modal Interchange (MMI) for the city, acting as a centralised connectivity hub for all modes of travel.

Comparing options from a road and traffic integration perspective, both Option A and B were deemed the most viable, with some advantages when compared to Option C. It should be noted that Option A presented some challenges in terms of integration, safety and operation especially at the corner of St. Patrick's Street (west), Grand Parade, and Washington Street (east).

To understand these challenges with Option A, a separate high-level operational assessment was undertaken to analyse how other modes of transport could also run concurrently with LRT movements through the junction at St Patrick's Street (west). The analysis demonstrated that running 11.5m buses

or a 15m coaches concurrently with the LRT system resulted in the existing pinch points being reduced further to circa 1.8m to accommodate bus swept paths.

The recent Bus Network Redesign as part of BusConnects Cork has identified Patrick Street as being one of the main bus routes through the city centre. This means that it is unlikely that in the future all bus services could be removed from Patrick Street.

- **Accessibility, Social Inclusion and Mobility:** Options A and C connect the Proposed Scheme both north and south of the river. However Option A captures a greater number of trip attractors, which appears to increase overall accessibility or catchment when compared to Option B and C. Connecting both sides of the river would appear to provide greater levels of city-wide inclusivity on a qualitative level for Option A and coupled with its direct connection to Kent Station would provide enhanced accessibility due to optimal rail integration with LRT, with reduced requirement for wayfinding between modes.
- **Environment:** The Proposed Scheme has the potential to enhance accessibility and connectivity which can bring benefits to the population in terms of employment opportunities, economic growth and social interaction as well as direct and indirect benefits to human health. It has the potential to support reductions in energy demand from the transport sector through electrification and it can also relieve pressure on other transport infrastructure by providing an alternative means of travel within the city, improving connectivity and reducing journey times which can also result in similar benefits.

The assessment of the options for environment found that for Human Environment, Landscape Visual, and Cultural Heritage Options A and C were the preferred options due to the connectivity to the northside of Cork; the opportunity for landscape improvements to St. Patrick's Street; there are fewer RPS and NIAH sites on St Patrick's Street, newer building stock and there is potentially slightly less archaeological risk. The preference for Physical Environment would be for Option B as although both routes propose to connect Kennedy Quay and Kent Station via a new bridge, Option B proposed a pedestrian bridge which would be smaller in size and involves a less extensive construction period reducing the risk of run-off/pollution to occur during the construction of the bridge.

- **Economy:** The Economy assessment for options A, B and C focussed on the outputs from the comparative exercise on modelling, as well as a comparative capital cost build up. The modelling of the options in the strategic Southwest Regional Model provides useful insights on the Proposed Schemes performance.

Patronage on the Proposed Scheme is slightly higher in Option C due to its additional stop and its wider coverage of the north and south sides of the city, with Option B presenting the lowest patronage (Option A +3% and Option C +9% in 2035 – 24h boardings). However Option B presents better journey times compared to A and C as well as the lowest capital cost. Total economic benefits over the appraisal period for Option C are valued €1,116m, which is €117m higher than Option B (10.6% difference), and €125m higher than Option A (11.2% difference).

Recommendations

All of the three city centre options assessed present viable alignments that would work as part of an End-to-End scheme option for Luas Cork, each with comparable advantages and disadvantages. Based on the review and comparative analysis of Option A, Option B and Option C it is deemed that **Option A** would be ranked as the strongest option across the MCA Criteria, followed by Option C and then Option B.

1. Introduction

1.1 Background

Jacobs Engineering Ireland Ltd. (Jacobs) has been commissioned by Transport Infrastructure Ireland (TII) to undertake an Alignment Options and Feasibility Study to determine the Emerging Preferred Route (EPR) for a new Light Rail Transit Scheme in Cork as included in the Cork Metropolitan Area Transport Strategy (CMATS). The design of the Cork Light Rail Transit scheme (hereafter referred to as the Proposed Scheme) is being undertaken by TII in collaboration with the National Transport Authority (NTA). The design of the Proposed Scheme is being developed with full adherence to the following documents:

- National Transport Authority – Cost Management Guidelines for Public Transport Investment Projects (1 September 2020);
- National Transport Authority – Project Management Guidelines (December 2011);
- Department of Transport, Common Appraisal Framework for Transport Projects, and Programmes (March 2016, updated October 2021); and
- Department of Public Expenditure and Reform – Public Spending Code (December 2019).

The Proposed Scheme is an east-west mass transit, rapid transport corridor, running from Ballincollig area to Mahon Point, which has been a long-term objective for the Cork Metropolitan Area (CMA) articulated by the joint Cork Area Strategic Plan (CASP) and the Cork City Centre Movement Strategy.

A commitment to study the feasibility of this corridor and scheme was confirmed by the publication of both the Project Ireland 2040 National Planning Framework (NPF) and the National Development Plan (NDP) 2018-2027. The NPF envisages that Cork will become the fastest growing city region in Ireland with a projected 50% to 60% increase of its population by 2040. This projected population and associated economic growth will result in a significant increase in the demand for travel.

Following detailed analysis of projected travel demand within the CMA, CMATS determined that the East-West corridor passing through the core of the city centre and linking to the main railway station (Kent Station) is best served through the provision of a new Light Rail Transit (LRT) Scheme similar to the Dublin Luas system.

The Proposed Scheme will provide a high-speed, high-capacity, high-frequency public transport link from the eastern to the western suburbs of Cork City and will serve many significant destinations, including Ballincollig, the proposed Cork Science and Innovation Park (CSIP), Munster Technology University (MTU), Cork University Hospital (CUH), University College Cork (UCC), Cork City Centre, Kent Station/Cork North Docklands, Pairc Ui Chaoimh, Cork South Docklands, Mahon.

1.2 Previous and Ongoing Study Phases

This section provides an overview of the three stages of the Alignment Options and Feasibility Study. The study has three main stages as follows:

- **Stage 1:** Option Selection Process (current stage of study);
- **Stage 2:** Non-statutory Public Consultation; and
- **Stage 3:** Preferred Route (PR) Concept Design and Appraisal.

The study is currently at the Stage 1 Option Selection Process. As part of Stage 1, the Proposed Scheme assessment is to be sequenced over three steps, from Step A to Step C, to identify an EPR. To date both Step A and Step B have been completed, with Step C currently in progress. These Steps are defined as follows:

Step A: Preliminary Spider's Web Assessment – Step A primarily focussed on the assessment of all individual sections across the main study area, leading to the identification of Area Formation Options that could accommodate an LRT and which could be carried for a Multi-Criteria Analysis at Step B.

Step B: End-to-End Option Identification – Step B assessed the Area Formation outputs from Step A through the application of a Multi-Criteria Analysis (MCA) in line with the Common Appraisal Framework (CAF) for transport projects. The conclusion of the Step B MCA identified 12 end-to-end options for assessment at Step C.

Step C: End-to-End Option Assessment – Step C will assess the 12 end-to-end options through the application of a detailed MCA, in line with the Common Appraisal Framework (CAF) for transport projects. The output of Step C will be the identification of an Emerging Preferred Route (EPR) for the Proposed Scheme.

1.3 Scope of this Technical Note

Following completion of the Step B MCA, 12 end-to-end route options were identified and brought forward to the Step C MCA for a more detailed assessment. The conclusion of the detailed MCA at Step C identified two Route Options that broadly shared an identical alignment for the Proposed Scheme, with the exception of two alignment variations in the city centre section; one alignment connecting directly to Kent Station via St Patrick Street and MacCurtain Street, and another alignment that remained south of the River Lee on South Mall and the docklands, and connecting indirectly to Kent Station via a pedestrian and cycle bridge.

There are several considerations and decisions that will be analysed and assessed as part of this technical note. One such consideration is whether the EPR for the Proposed Scheme should directly serve Kent Station and the north side in comparison to an indirect connection via a pedestrian bridge on the south side of the river as the Proposed Scheme traverses the city centre section.

For purposes of comparison, this technical note will compare and assess Option A (associated with end-to-end Option 8), Option B (end-to-end Option 10) and Option C (which utilises a mixture of alignment sections from Option A and Option B). A description of the three City Centre alignment options is outlined below and Figure 1.1 shows their respective route connections.

- **Option A:** Travelling eastbound on Washington Street, a direct connection to the station would be via St Patrick's Street, crossing north of the River Lee via the existing St Patrick's Street bridge, linking with MacCurtain Street and then Alfred Street. The proposed alignment would interchange directly with Kent Station via a new LRT stop and revised external layout arrangements. A new proposed public transport bridge would link the LRT across the River Lee to Kennedy Quay, accessing Mill Road and Centre Park Road.
- **Option B:** Travelling eastbound on Washington Street, an indirect connection to the station would be achieved via Grand Parade linking with South Mall, crossing south of the River Lee via the existing Parnell Place bridge. The proposed alignment would then link with Albert Quay before transitioning onto Kennedy Quay. It is proposed that the indirect connection to Kent Station would be served by a 125m active travel bridge from an LRT stop location on Kennedy Quay linking to Penrose Quay on the northern side of the River Lee, resulting in a total distance of 270m to Kent Station for pedestrians and cyclists.
- **Option C:** Travelling eastbound on Washington Street, a direct connection to the station would be achieved via Grand Parade progressing to South Mall before then linking with Lapps Quay and progressing to a northbound direction along Clontarf Street, crossing the River Lee via the Brian Boru Bridge and then Alfred Street. The proposed alignment would interchange directly with Kent Station via a new LRT stop and revised external layout arrangements. A new proposed public transport bridge would link the LRT across the River Lee to Kennedy Quay, accessing Mill Street and Centre Park Road.

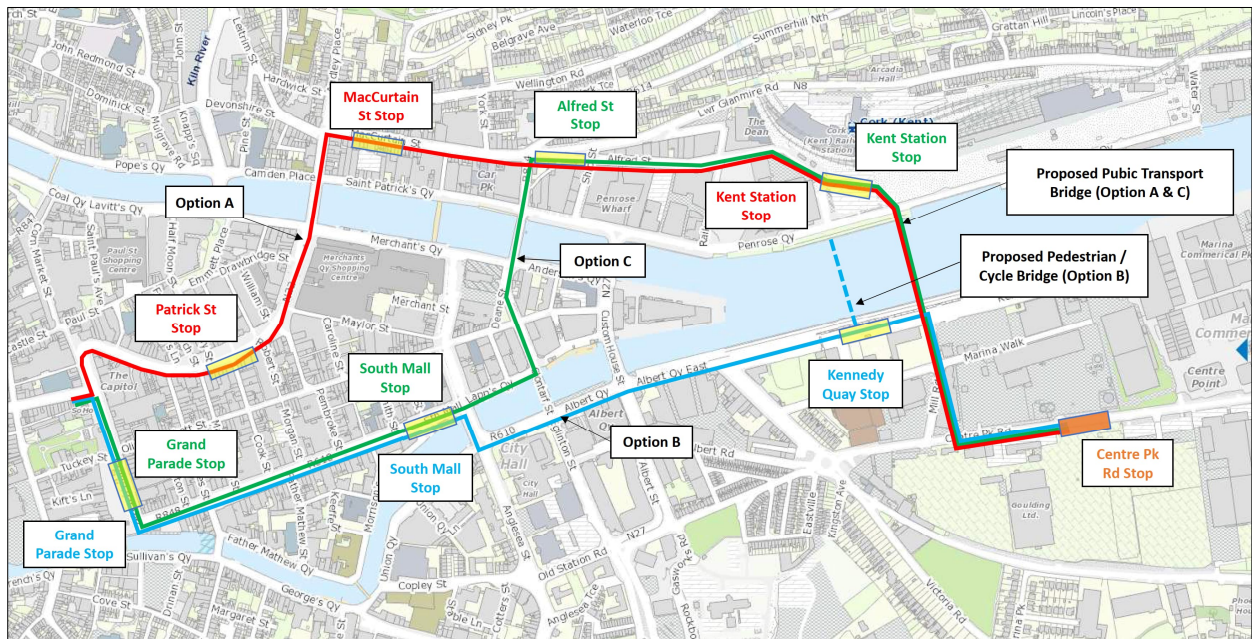


Figure 1.1 – Route of Options A, B and C Connections

The outcomes of this technical note will also be used to complete the MCA at Step C which will determine the overall EPR. This Technical Note will provide the supporting analysis, commentary and assessment, with reference to the Common Appraisal Framework for Transport Projects and Programmes (CAF) 2016 (Updated Oct 2021) guidelines for options assessment. The technical note has been configured as follows:

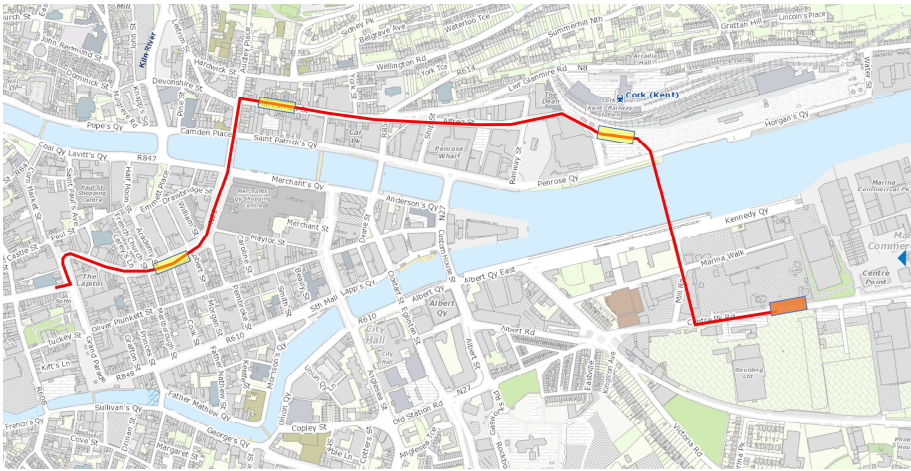
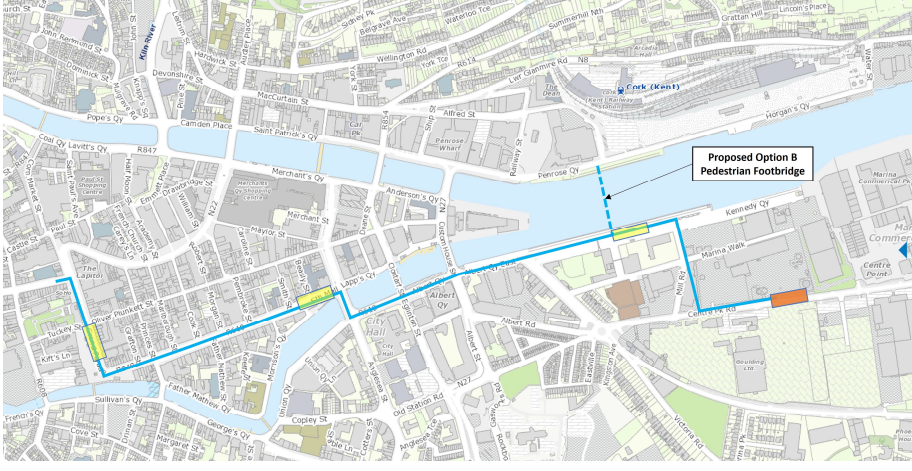
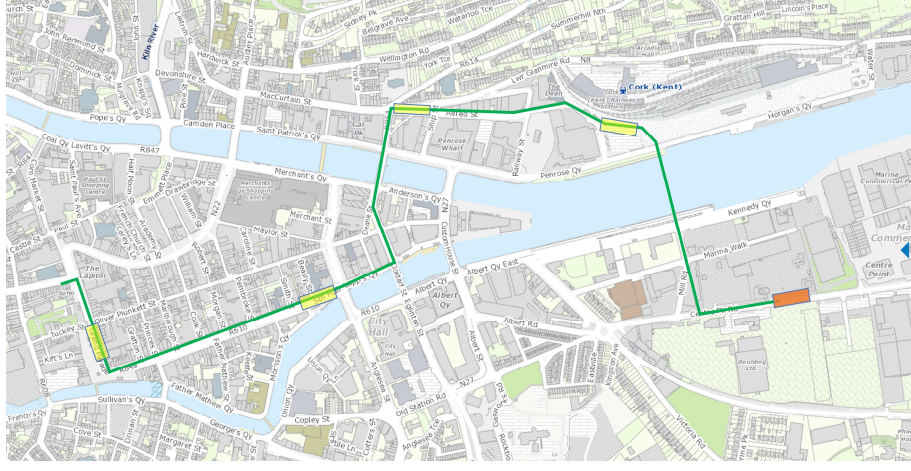
- **Description of Options**
- **Planning and Policy Overview**
- **Methodology**
- **Integration**
 - Public Transport Integration
 - Integration with Existing Streets and Traffic
- **Accessibility, Social inclusion and Mobility**
- **Environment**
 - Human Environment
 - Physical Environment
 - Landscape and Visual
 - Cultural Heritage
- **Economy:**
 - Transport Modelling
 - Capital Cost Comparison
- **Conclusions and Recommendations**

2. Description of Options

2.1 Overview of Option A, Option B and Option C

This section provides an overview of Option A, Option B and Option C connections to Kent. In summary, Option A will operate on St. Patrick's Street, MacCurtain Street and Kent Station before connecting across the River Lee via a new LRT bridge (including active mode facilities) and serving the Docklands. Option B will operate on Grand Parade, South Mall Street, Albert Quay and Kennedy Quay. For Option B, a pedestrian bridge will be constructed to connect Kent Station with Kennedy Quay. Option C will operate on Grand Parade, South Mall Street, Lapps Quay, Clontarf Street, Alfred Street and Kent Station before following the same route as Option A across the River Lee via the new LRT bridge (including active travel mode facilities). A detailed overview of each option is outlined in Table 2.1 .

Table 2.1: Detailed Overview of Options A, B and C

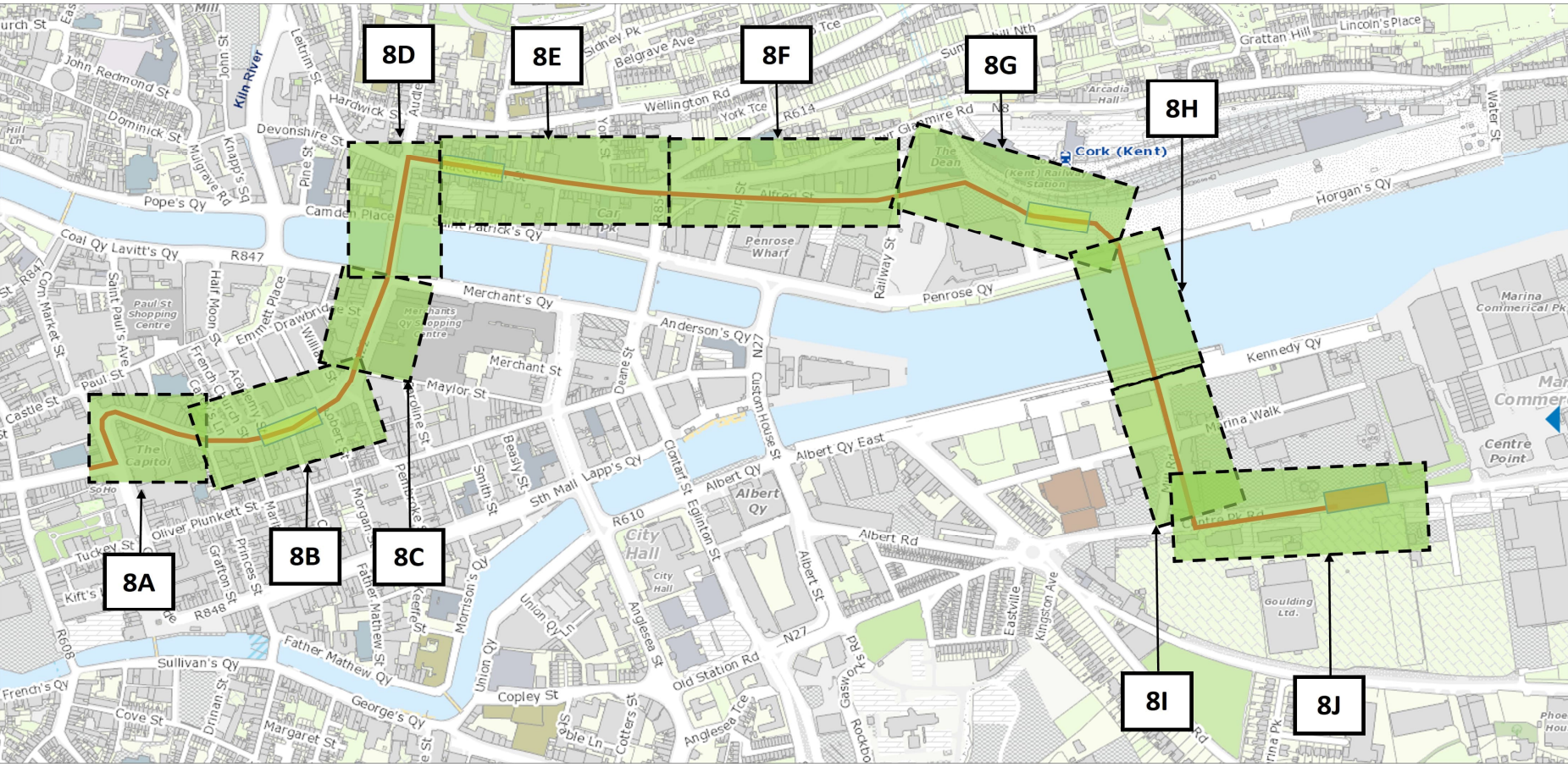
	Option A	Option B	Option C
			
Total Track Length of Option	2.31km	2.03km	2.52km
Average Line Speed	14.5kph	16.75kph	14.5kph
Average Timing	11.30 – 12mins	10 – 10.30mins	12 – 12.30mins
	The timings above show the average time it will take to travel along each alignment and the difference between Options A - C. These timing calculations have taken into account priority and delay at junctions as well as average time based on the track length and average speed.		
Number of Stops	3 stops	3 stops	4 stops
Stop Locations	Saint Patricks Street – MacCurtain Street – Kent Station	Grand Parade – South Mall – Kennedy Quay	Grand Parade - South Mall – Alfred Street – Kent Station
Distance Between Stops	Saint Patricks Street – <u>405m</u> - MacCurtain Street – <u>713m</u> - Kent Station	Grand Parade – <u>621m</u> - South Mall – <u>751m</u> - Kennedy Quay	Grand Parade – <u>621m</u> - South Mall – <u>598m</u> - Alfred Street - <u>473m</u> - Kent Station
Number of Existing Junctions	<ul style="list-style-type: none">Major Junctions (signalised): 7Minor Junctions (free flow): 15 - including delivery lanes.Signalised Crossings: 12 (7Major, 5 Minor) 40% more junctions than B.	<ul style="list-style-type: none">Major Junctions (signalised): 5Minor Junctions (free flow): 14 - including delivery lanes.Signalised Crossings: 7 (4 Major, 3 Minor) 40% less junctions than A and C.	<ul style="list-style-type: none">Major Junctions (signalised): 8Minor Junctions (free flow): 17 – including delivery lanes.Signalised Crossings: 12 (7 Major, 5 Minor) 40% more junctions than B.

New and existing bridges	<p>New Bridge – South Docks to Kent Station – heavy structure carrying light rail and active mobility bridge, 125m span, likely 15m wide. Likely to serve other Public Transport (PT) modes once constructed.</p> <p>Existing Bridge - St. Patrick's Bridge: The bridge, constructed in 1860, is a 3-span masonry arch structure with overall length of 51.8m and a maximum span of 18.4m. Arch barrel thickness noted as 750mm. In 1981, to support then HA bridge loading, the bridge was strengthened by adding saddle to the arch and reinforced concrete slab at the road surface level. The bridge was further refurbished in 2019 by repointing and repairing masonry and is expected to be in a good condition. It has limited road makeup above the later added reinforced concrete slab restricting the depth available to install trackform. Any raising of the road profile to accommodate the track will have an impact on the bridge capacity and requires further investigations. The bridge carries N8 national road with no known load restrictions. The bridge is similar to O'Connell Bridge in Dublin, which carries Luas Cross City. Therefore, the bridge should be able to carry the proposed LRT with minimum intervention works.</p>	<p>New Bridge - South Docks to Kent Station – light structure carrying active mobility only (walking & cycling), 125m span, likely 6-7m wide.</p> <p>Existing Bridge - Parnell Bridge: The bridge is a 3-span modern concrete bridge constructed in 1971 and is in good condition. The bridge carries regional road R610, leading to national road N22/N71, with no known load restrictions. The bridge should be able to carry the proposed LRT. However, the modern bridges will have limited road makeup over the structure, restricting the depth available to install trackform. Any raising of the road profile to accommodate the track will impact the bridge capacity and requires further investigations.</p>	<p>New Bridge to Kent Station – heavy structure carrying light rail and active mobility bridge, 125m span, likely 15m wide. Likely to serve other Public Transport (PT) modes once constructed.</p> <p>Existing Bridge – Brian Boru Bridge: The Brian Boru Bridge is regionally important and is a Scherzer rolling lift bascule bridge, erected 1911 and reconstructed in 1987. It is just over 70m long, it is a four span (opening span of approximately 19m) bridge resting on six concrete filled steel caissons with cast-iron parapets. The Brian Boru bridge is a well preserved Scherzer bridge having many decorative cast iron features and although no longer opening, the bridge is an important reminder of the history of the river and quays and is on the Cork City Council Record of Protected Structures Ref No. PS1126.</p>
Pedestrian distance from Kent Station	100m (adjacent, no road crossings, all covered connection).	<p>270m (The bridge crossing over the river Lee will be approximate 125m with a further 145m to the Kent Station rear entrance).</p> <p>At a walking speed of 1.2m/sec it will take approximately just under 4 minutes and at a walking speed of 1.4m/sec which is considered fast-paced walkers it will take just over 3 minutes.</p>	100m (adjacent, no road crossings, all covered connection).
	The number of junctions will impact on the LRT journey times through the city. Each junction will require new layout arrangements to ensure appropriate levels of priority are maintained for the LRT. As shown above, all Options have a similar junction count with Options C having more major and minor junctions which will contribute to longer journey time and higher capital cost.		

2.2 Detailed Description of Option A, Option B and Option C

This section provides a detailed description of each option. For ease of reading, each option has been divided into smaller sections. With reference to specific streets and links within each option, Table 2.2 and Table 2.3 will provide commentary on the Proposed Scheme arrangements, average line speeds and opportunities and constraints at each section of the route.

Table 2.2: Sectional Summary of Option A connecting St. Patrick's Street/ Kent Station

Option A					
					
Section	Street/Link	Proposed Scheme Arrangements	Proposed Average Line Speed	Opportunities	Notable Constraints
8A	Grand Parade/St Patrick's Street	Shared track with other PT modes from Grand Parade to St Patrick's Street through this section. Buses, taxis and access traffic will be held at signalised junctions on Washington Street and St Patrick's Street to allow the LRT to negotiate the tight radius. Buses and trams can run concurrently. Daunt Square will be closed to private vehicular traffic.	10kph	LRT accesses the main shopping street in Cork City. Opportunity to remove through traffic and reconfigure the streetscape with enhanced placemaking Opportunity to create a high quality, traffic-calmed, urban realm in the heart of the city for both LRT and buses.	The tight turning radius at this section presents an operational constraint, with reduced visibility and availability of space. This section presents a very operationally slow corner and may incur greater operational maintenance due to the tight radius. Due to the property boundaries and geometry of the track alignment, pinch points are created which will reduce space available for pedestrians between track and buildings. There may be an impact on adjacent property at this location.
8B	St Patrick's Street (main street)	Sharing with buses through this section and compliant provision for pedestrians. General through traffic will be restricted from this space, but provision will be made for servicing and access at	10kph	LRT accessing the main shopping street in Cork City. Opportunity to rationalise through traffic for general vehicles and reconfigure the streetscape with	This is one of the main streets in Cork City centre with existing high levels of pedestrian activity, visibility and safety may be reduced for pedestrians crossing the road if buses are laying

		restricted times. The Majority of BusConnects routes are currently proposed to use this corridor.		<p>enhanced placemaking. Priority through junction with Merchants Quay.</p> <p>Opportunity to create a high quality, traffic-calmed, urban realm in the heart of the city.</p> <p>St Patrick Street stop within a walkable distance of the bus station (approx. 500m)</p>	over within bus bays. It is proposed that Daunt Square will be closed to vehicular traffic. Cyclists should be discouraged through this junction arrangement due to tight curves.
8C	St Patrick's Street (Merchants Quay)	Shared with bus track through this section, including bi-directional cycle facilities and public realm space for pedestrians. It is proposed that general through traffic will be restricted from this space, but provision will be made for servicing and access at restricted times. LRT will have priority at a signalised junction to Merchants Quay and St Patrick's St Bridge.	12kph	<p>LRT accessing the main shopping street in Cork City. Connecting to Merchants Quay will assist in consolidating regeneration of the riverfront.</p>	<p>General through traffic will be restricted from accessing St Patrick's Street from Merchants Quay. The junction arrangement for St Patrick's Street and Merchants Quay will need appropriate consideration to allow priority movement of LRT and buses.</p> <p>Potential measures required to be considered for works on St Patricks Street to minimise/avoid impacts the Fr. Mathew monument, as it is listed on RPS.</p>
8D	St Patrick's Street Bridge	Shared LRT track with general traffic over St Patrick's Street bridge, with accommodation for dedicated footways and bi-directional cycle infrastructure. The bridge structure will need to be reviewed in line with any infrastructure interventions.	12kph	<p>Connecting across the St Patrick's Street bridge provides the optimal alignment to connect to Kent Station, allowing for straight line running from St Patrick's Street to connect to MacCurtain Street.</p> <p>Opportunity for a strong traffic-calmed, green corridor running through the city core and connecting the north and south sides of the city.</p> <p>A catenary-free system within the city core will an important factor in reducing the visual impact of a light rail system.</p>	<p>Whilst the LRT will have priority through the signalised junction at St Patrick's Street/Merchants Quay, it will need to share with buses across the bridge.</p> <p>Potential sustainable management and mitigation measures required to be considered for works on St Patricks Street Bridge as it is listed as an RPS.</p>
8E	MacCurtain Street	Shared with bus and general traffic through this section along MacCurtain Street. Currently there is approximately 17m width (building line to building line) along this section. The Proposed Scheme will provide public realm space for pedestrians. General through traffic will be permitted in both directions.	19kph	<p>The linear nature of MacCurtain Street allows the LRT vehicle to increase its line speed along this section and achieve higher levels of priority and improved journey times. The provision of an LRT stop on MacCurtain street will increase accessibility / catchment north of the River Lee.</p> <p>Opportunity for a strong traffic-calmed, green corridor running through the city core and connecting the north and south sides of the city.</p>	<p>Whilst the provision of an LRT on MacCurtain street will increase accessibility/catchment north of the River Lee, this option reduces the catchment to the south city area.</p>

8F	Alfred Street	This section will migrate to shared track (in one direction). It is anticipated general traffic will be low in volume along this section of Alfred Street, however parking enforcement measures may be required. This section will continue the bi-directional cycle facilities from MacCurtain Street, as well as footway provision on both sides of the carriageway. A signalised junction will be required at the junction with Summerhill North to main LRT priority.	19kph	Provides a linear continuation from MacCurtain Street, utilising a low traffic street to access Kent Station.	May require relocation of existing coach stop on Alfred Street to some other suitable city centre location
8G	Alfred Street (Kent Station)	Provision of LRT stop at Kent Station, along with two LRT running lanes. Provision of bi-directional cycle facilities is maintained, as well as footways either side of the carriageway.	The speed on a 25m curve will be approximately 10 kph, a more detail level of modelling will be complete at a later date.	Provision of LRT stop at Kent Station, allowing for direct rail to rail integration and interchange.	Consideration will need to be given to the layout arrangements to ensure high levels of priority are maintained at Kent Station, as there will be a number of modes competing for space, such as buses, taxis, cyclists and general vehicles.
8H	Proposed LRT Bridge	Signalised junction will be required at Horgan’s Quay to the east of Alfred Street to hold quayside traffic and allow LRT priority to the bridge. The new LRT bridge may also accommodate buses but will ensure LRT priority as well as accommodation for active travel.	19kph	Connects Kent Station and the Docklands, which will act as a significant catalyst for regeneration. New bridge will also accommodate buses and active travel, introducing greater resilience to the wider network. Opportunity to potentially enhance the public realm of Cork City with considered architectural and urban design of a new bridge for Cork City.	Consideration will need to be given to the bridge clearance and associated abutments. Consideration will need to be given to the increased levels and duration of noise and potential vibration impacts as a result of the proposed new bridge construction due to piling activities. Option A, B and C have the potential to impact water quality during the construction and operational phases. Potential impacts during construction may include silty water runoff and accidental releases of pollutants. This has the potential to impact otters and aquatic species within the watercourses through habitat fragmentation/degradation/destruction as well as and affecting prey availability. During the operational phase potential impacts would be the change in the flow regime and via potential new discharge of surface water, permanent loss/damage of riparian zone, indirect hydromorphological impacts up and down stream, potential creation of a new pathway for pollutants to enter the water body. Consideration needed on the potential visual impact of a new bridge for Cork city. Consideration to be given to the potential for organic preservation of archaeological remains being impacted by in-any water works. Bridge also need

					to be designed in line with the flood defences for the city.
8I	Mill Road	Signalised junction will be required at Centre Park Road to facilitate priority from Mill Road. This section would facilitate to segregated running lanes for LRT.	19kph	Signalised junction would allow a high priority connection through Mill Road	An LRT connection through Mill Road will require CPO and demolition of existing buildings.
8J	Centre Park Road	This section would facilitate sharing with traffic (in one direction only) Centre Park Road would accommodate bi-directional cycle facilities, with a footway on one side.	19kph	Linear running allowing maintaining of higher running speeds. Provides access to Docklands, facilitating regeneration.	General traffic will need some network rationalisation, the Proposed Scheme will need to share with traffic in one direction.

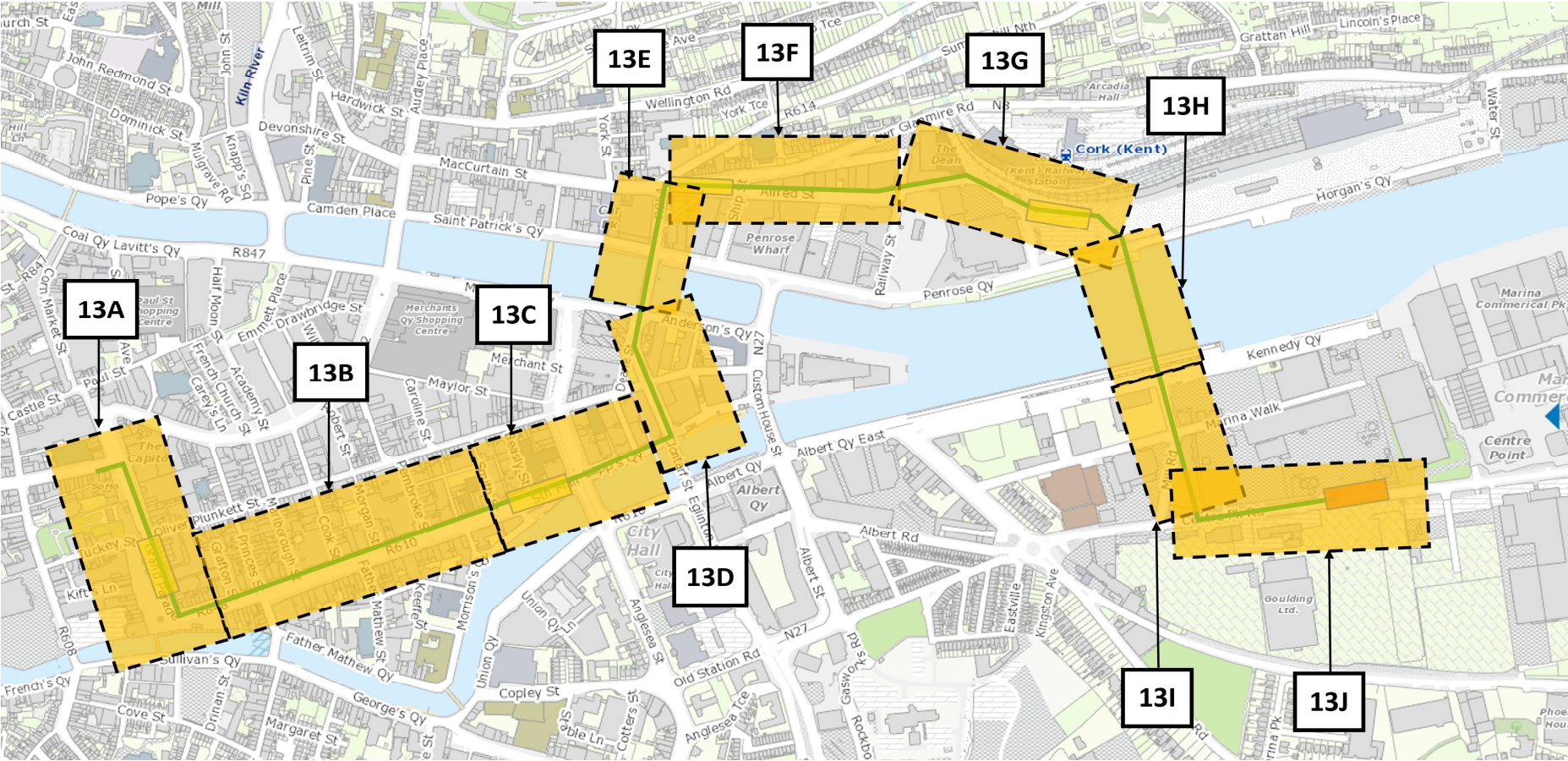
Table 2.3: Sectional Summary of Option B Connecting to Kent Station via a New Active Travel Bridge

Option B					
Section	Street	Proposed Infrastructure Arrangements	Proposed Average Line Speed	Opportunities	Notable Constraints
10A	Grand Parade	<p>The Grand Parade section presents a wide cross section and offers full LRT segregation, whilst also maintaining two-way traffic flow, separated from the LRT running lanes by a central reserve. Bi-directional cycle facilities are partially available along this section with proposed cycle diversions linking Grand Parade to Washinton Street, via Tuckey Street. This section provides an LRT stop for access to the city centre retail core.</p>	10kph	<p>Grand Parade presents a wide cross section, allowing high priority through full LRT segregation. The wide cross section allows for innovative design and placemaking .It is a nearby stop to St. Patrick's Street.</p> <p>Opportunity to create a high quality, traffic-calmed, urban realm in the heart of the city.</p> <p>A catenary-free system within the city core will an important factor in reducing the visual impact of a light rail system.</p>	<p>Traffic management will need to be considered in this section as LRT alignment will impose on current traffic flows.</p> <p>Preservation/protection of national monument in situ, to southern section of Grand Parade , required.</p> <p>Relocation of fountain required.</p>
10B	South Mall	<p>The South Mall section presents a wide cross section and offers full LRT segregation. Traffic flow changes at this point to one-way, with flows being diverted along Parliament Street. Bi-directional cycle facilities are available along this section, with a potential pinch point for cyclists between Parliament Street and Grand Parade.</p>	19kph	<p>South Mall section presents a wide cross section, allowing high priority through full LRT segregation. The wide cross section allows for innovative design and placemaking . This is a long linear link, which underpins journey time reliability.</p> <p>A catenary-free system within the city core will an important factor in reducing the visual impact of a light rail system.</p>	<p>Traffic management will need to be considered through this section as LRT alignment will impose on current traffic flows, with flows being diverted at Parliament Street.</p> <p>Consideration and mitigation need to be given to the protected view west along South Mall.</p>

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10G	Mill Road	Utilising the space that will be available from the dockland's regeneration scheme, this section will facilitate a segregated LRT with cycle lanes on either side of the alignment.	19kph	<p>Dockland's regeneration will provide a new residential area. The LRT alignment in this section will cater for all residents in the area. The cross section will prioritise cyclist with segregated cycle lanes, pedestrians with public realm and a segregated LRT.</p> <p>Opportunity to create a more sustainable urban drainage system/landscape.</p>	An LRT connection through this section will require CPO and demolition of existing buildings (South Link Tyres building).
10H	Centre Park Road	This section allows full LRT segregation on Centre Park Road and will include bi-directional cycle facilities and a footway on one side.	19kph	Linear running allowing maintaining of higher running speeds. The LRT will provide access to Docklands, facilitating with regeneration in the area.	The Proposed Scheme will need to share with traffic in one direction.
10I	Active Travel Bridge	The Active Travel Bridge will facilitate a pedestrian and cycle connection between Kent Station and Kennedy Quay/Docklands. The bridge crossing over the river Lee will be approximate 125m with a further 145m to the Kent Station rear entrance.	N/A	<p>The bridge will provide a link to Kent Station from the LRT stop on Kennedy Quay. There is an opportunity to provide a bridge that has a design focus on comfort, accessibility and place-making that will encourage passengers to walk from the Kent Station to the LRT stop on Kennedy Quay.</p> <p>Opportunity to enhance connectivity between the north and south and promote more sustainable forms of transport.</p> <p>Opportunity to potentially enhance the public realm of Cork City with considered architectural and urban design of a new bridge for Cork City.</p>	Some additional wayfinding may be required to support the integration from heavy rail to light rail. Consideration needs to be given to the increased level of noise and vibration in the immediate area during construction. Option A, B and C have the potential to impact water quality during the construction and operational phases. Potential impacts during construction may include silty water runoff and accidental releases of pollutants. This has the potential to impact otters and aquatic species within the watercourses through habitat fragmentation/degradation/destruction as well as and affecting prey availability. During the operational phase potential impacts would be the change in the flow regime and via potential new discharge of surface water, permanent loss/damage of riparian zone, indirect hydromorphological impacts up and down stream, potential creation of a new pathway for pollutants to enter the water body. Consideration needed on the potential visual impact of a new bridge for Cork City.Consideration to be given to the potential for organic preservation of archaeological remains being impacted by in-any water works. Consideration needs to made for passenger experience connecting to/from Kent Station interchange across a wide river channel, especially during inclement weather and particularly for mobility impaired passengers

Sectional Summary of Option C Connecting to Kent Station

Option C					
					
Section	Street	Proposed Infrastructure Arrangements	Proposed Average Line Speed	Opportunities	Notable Constraints
13A	Grand Parade	The Grand Parade section presents a wide cross section and offers full LRT segregation, whilst also maintaining two-way traffic flow, separated from the LRT running lanes by a central reserve. Bi-directional cycle facilities are partially available along this section with footways, with a proposed diversion linking Grand Parade to Washinton Street via Tuckey Street. This section provides an LRT stop for access to the city centre retail core.	10kph	Grand Parade presents a wide cross section, allowing high priority through full LRT segregation. The wide cross section allows for innovative design and placemaking . It is a nearby stop to St. Patrick's Street. Opportunity to create a high quality, traffic-calmed, urban realm in the heart of the city. A catenary-free system within the city core will an important factor in reducing the visual impact of a light rail system.	Traffic management will need to be considered in this section as LRT alignment will impose on current traffic flows. Preservation/protection of national monument in situ, to southern section of Grand Parade , required. Local relocation of the fountain is required.
13B	South Mall	The South Mall section presents a wide cross section and offers full LRT segregation. Traffic flow changes at this point to one-way, with flows being diverted along Parliament Street. Bi-directional cycle facilities are available along this section with a	19kph	South Mall section presents a wide cross section, allowing high priority through full LRT segregation. The wide cross section allows for innovative design, placemaking and introduction of blue green infrastructure. This is a long linear	Traffic management will need to be considered through this section as LRT alignment will impose on current traffic flows, with flows being diverted at Parliament Street.

		potential pinch point for cyclists between Parliament Street and Grand Parade.		link, which underpins journey time reliability. A catenary-free system within the city core will an important factor in reducing the visual impact of a light rail system.	Consideration and mitigation need to be given to the protected view west along South Mall.
13C	South Mall / Lapp's Quay	This section maintains full LRT priority and provides an LRT stop prior to progressing to Lapps Quay. Traffic along this section of South Mall remains as one way with no vehicle entry to Lapp's Quay permitted.	19kph	<p>The South Mall section presents a wide cross section, allowing high priority through full LRT segregation. The wide cross section allows for innovative design, placemaking and introduction of blue green infrastructure.</p> <p>The Lapp's Quay section presents a fully segregated opportunity for LRT in the absence of any traffic access to Lapp's Quay with the exception of a single exit lane for traffic from Connell Street</p>	<p>Traffic management will need to be considered on South Mall as LRT alignment will impose on current traffic flows, with flows being diverted at Parliament Street.</p> <p>The proposed LRT alignment on Lapp's Quay will result in the removal of existing on-street parking in this area.</p> <p>There are a number of NIAH's along Lapp's Quay. Some possible impact on archaeology relating to 18th century quay development along Lapp's Quay, potential for impact impacts on 18th & 19th century building foundations under Clontarf St.</p> <p>Possible minor impacts on corner building at Lapp's Quay / Clontarf Street junction.</p> <p>Impact on proposed flood defense works at this location, including potential impacts to quayside wall on south side of Lapps Quay at the Clontarf Street end</p>
13D	Clontarf Street	<p>South of Lower Oliver Plunkett Street there will be segregated north and southbound LRT lanes with a single segregated southbound lane for general traffic.</p> <p>On Clontarf Street north of Oliver Plunkett Street there will be a shared southbound LRT and traffic lane with a segregated northbound LRT lane</p>	10kph	The proposed alignment presents the opportunity for a fully segregated northbound LRT lane for the length of Clontarf St and a fully segregated southbound LRT lane south of Oliver Plunkett Street	<p>General traffic capacity will be reduced on Clontarf Street from Anderson's Quay to Lapp's Quay. There is an opportunity to introduce a segregated southbound traffic lane on Clontarf Street, south of the Oliver Plunkett Street junctions, however it requires traffic to cross the northbound LRT lane at a signal-controlled junction which may impact junction efficiency.</p> <p>Further south, Clontarf Street, with one southbound traffic lane, will transition to three southbound lanes past Lapp's Quay leading to a potential unbalancing of traffic conditions and under-utilisation of Clontarf Bridge</p> <p>It is important to note that Option C impacts BusConnects proposals on Clontarf Street as part of STC H, therefore further analysis will be</p>

					required to determine if both modes can operate on Clontarf Street
13E	Brian Boru Street / Brian Boru Bridge	<p>Brian Boru Street will be reconfigured from two lanes southbound and one lane northbound for general traffic, to a shared northbound LRT/traffic lane, as well as segregated southbound LRT and general traffic lanes.</p> <p>On Brian Boru Bridge the southbound lanes will be required to transition to a shared southbound LRT/traffic lane on Brian Boru Bridge, alongside a shared northbound LRT/traffic lane.</p>	10kph	The proposed alignment presents an opportunity to run both northbound and southbound LRT lanes within the existing Bridge cross section (incorporating shared northbound and southbound lanes with general traffic)	<p>Brian Boru Street and Brian Boru Bridge currently facilitate significant traffic volumes in peak hours to and from the N8 and N20 via two southbound and one northbound traffic lane. The proposed configuration would be to move to two shared lanes. This would constrain traffic flow and cause traffic diversions in the city centre, as well as delays to LRT progression on the Bridge.</p> <p>Route traverses Brian Boru Bridge, listed on the Record of Protected Structures and NIAH.</p> <p>Whilst the proposed configuration on Brian Boru Bridge could be accommodated within the existing cross section, there would not be residual capacity on the Bridge for segregated cycling facilities.</p> <p>Brian Boru St crosses former early 19th century foundary (with significant archaeological potential).</p>
13F	Alfred Street	This section will migrate to shared track (in one direction). It is anticipated general traffic will be low in volume along this section of Alfred Street, however parking enforcement measures may be required. This section will continue the bi-directional cycle facilities from MacCurtain Street, as well as footway provision on both sides of the carriageway. A signalised junction will be required at the junction with Summerhill North to main LRT priority.	19kph	<p>Utilises a low traffic street to access Kent Station.</p> <p>Provides pedestrian access to MacCurtain Street and is a 200m walk to the Bus Station</p>	<p>The proposed alignment would have possible impacts on corner buildings at Brian Boru Street / Alfred Street.</p> <p>Impacts on regional coach set down area which will require to be relocated as it currently is located where proposed stop on Alfred Street is proposed</p>
13G	Alfred Street (Kent Station)	Provision of LRT stop at Kent Station, along with two LRT running lanes (one may need to be shared with traffic). Provision of bi-directional cycle facilities is maintained, as well as footways either side of the carriageway.	The speed on a 25m curve will be approximately 10 kph, a more detail level of modelling will be complete at a later date.	Provision of LRT stop at Kent Station, allowing for direct rail to rail integration and interchange. Bus interchange proposed at Kent Station allows for multimodal integration.	<p>Consideration will need to be given to the layout arrangements to ensure high levels of priority are maintained at Kent Station, as there will be a number of modes competing for space, such as buses, taxis, cyclists and general vehicles.</p> <p>A Luas turnback may need to be located close to the stop - track geometry and general space is limiting here.</p>
13H	Proposed LRT Bridge	Signalised junction will be required at Horgan's Quay to the east of Alfred Street to hold quayside traffic and allow LRT priority to the bridge. The new LRT bridge may also accommodate buses but will ensure LRT priority as well as accommodation for active travel.	19kph	Connects Kent Station and the Docklands, which will act as a significant catalyst for regeneration. New bridge will also accommodate buses and active travel, introducing greater resilience to the wider network.	<p>Consideration will need to be given to the bridge clearance and associated abutments.</p> <p>Consideration will need to be given to the increased levels and duration of noise and potential vibration impacts as</p>

				<p>Opportunity to potentially enhance the public realm of Cork City with considered architectural and urban design of a new bridge for Cork City.</p>	<p>a result of the proposed new bridge construction due to piling activities.</p> <p>Option A, B and C have the potential to impact water quality during the construction and operational phases. Potential impacts during construction may include silty water runoff and accidental releases of pollutants. This has the potential to impact otters and aquatic species within the watercourses through habitat fragmentation/degradation/destruction as well as and affecting prey availability. During the operational phase potential impacts would be the change in the flow regime and via potential new discharge of surface water, permanent loss/damage of riparian zone, indirect hydromorphological impacts up and down stream, potential creation of a new pathway for pollutants to enter the water body.</p> <p>Consideration needed on the potential visual impact of a new bridge for Cork city.</p> <p>Consideration to be given to the potential for organic preservation of archaeological remains being impacted by in-any water works. Flood defences will need some consideration here.</p>
13I	Mill Street	<p>Signalised junction will be required at Centre Park Road to facilitate priority from Mill Road. This section would facilitate to segregated running lanes for LRT.</p>	19kph	<p>Signalised junction would allow a high priority connection through Mill Road</p>	<p>An LRT connection through Mill Road will require CPO and demolition of existing buildings.</p> <p>Consideration needs to be given the potential impact on the streetscape of 10 RPS sites and multiple NIAH sites of regional importance. There is direct impact on the NIAH (store/warehouse, AH_2762) of regional importance site.</p>
13J	Centre Park Road	<p>This section would facilitate sharing with traffic (in one direction only) Centre Park Road would accommodate bi-directional cycle facilities, with a footway on one side.</p>	19kph	<p>Linear running allowing maintaining of higher running speeds. Provides access to Docklands, facilitating regeneration.</p>	<p>General traffic will need some network rationalisation, the Proposed Scheme will need to share with traffic in one direction.</p>

3. Planning and Policy Overview within Cork City Centre

There are a number of developments/schemes being implemented in Cork City Centre along Option A, Option B and Option C route options and strategic consideration is required with the Proposed Scheme.

Cork is Ireland's second largest city and plays a key role in driving the economic, social and cultural fabric of Ireland, in particular the southern region. Cork City is the largest urban centre in the southern region, and it is recognised by the Regional Spatial Economic Strategy as one of five Metropolitan Areas in Ireland. Cork Metropolitan Area is an international location of scale, a complement to Dublin and a primary driver of economic and population growth in the Southern Region of Ireland. CMATS states that Cork will become the fastest growing city region in Ireland, with a projected 50% increase in its population up to Year 2040 (CMATS, 2020). That scale of growth requires new approaches to traffic management systems in the city and the greater Metropolitan area. The diversion of through traffic away from the city centre, the creation of priority bus corridors leading to more reliable public transport and the facilitation of walking and cycling options are imperatives if the city is to function well and prosper. These objectives form an important part of a new and emerging vision for the city which is grounded in sustainability. Social cohesion is cultivated and enhanced through equitable access to transport, housing, jobs, and leisure. The Proposed Luas Cork Scheme has a major role to play in creating a shared civic identity and in facilitating a diversity of uses, of access and of people within the city.

The Cork City Public Transport Improvement Scheme encompasses streets on all route options. The overall objective of the scheme is to deliver a comprehensive transport strategy for the south quays and contiguous areas that are consistent with the CMATS. The scheme provides a framework for transport provision to support the development of this area in the medium and long term by implementing the re-allocation of road space on the city centre streets. This will ensure a more appropriate balance between the different transport modes that serve the city and will provide travellers to the city with a greater choice of sustainable travel modes. The management of through traffic within the central city streets will improve the environment for all users including public transport users, pedestrians and cyclists.

Option A encompasses the Public Transport Improvement Scheme at St. Patrick's Street and MacCurtain Street. The MacCurtain Street Public Transport Improvement Scheme, funded by the NTA, began in January 2022 and aims to make public transport, walking and cycling more attractive for people living in, working in and visiting the city centre, thereby supporting healthy living, to attract people to live, work and socialise in the city and economic activity. Construction was completed Q4 2023.

Cork City Council is seeking to develop a Greenway Project Lee to Sea (L2S), funded by the NTA, linking the City/county administrative boundary on the Inniscarra Road to the west through the city and re-joining the existing Greenway parallel to the Rochestown Road to the east. The Greenway will be a major contribution to Cork's 2040 Strategy and Ireland's Our Plan 2040 to significantly grow Cork City and metropolitan area. L2S is part of two specific objectives outlined in the CMAST and RSES and there was a campaign to include L2S as part of the Cork City Development Plan 2022-2028 specific objectives. The scheme is currently at the Planning and Design Stage.

Option B and Option C also involves the Public Transport Improvement Scheme. The South Quays Public Transport Improvement Scheme concentrates on the streets along the south quays and includes South Mall under phases 6 & 7. This project includes for a significant change in the current transport networks serving the study area with enhanced cycle provision proposed for both the South Quays and South Mall. Works on South Mall are now complete and works on the South Quays are now substantially complete.

The Morrison's Island Public Realm and Flood Defence Project proposes significant upgrades along Morrison's Quay and Fr Matthew Quay between Parliament Bridge and Parnell Bridge, including upgraded streetscape incorporating a wide riverside promenade, a much-improved setting for Holy Trinity Church, a plaza at the eastern end of the South Mall and a redesigned Trinity Bridge. The Morrison's Island Public Realm and Flood Defence Project had long been stalled by legal challenges, but a Supreme Court decision in December 2022 cleared the way for works to commence. It is expected that tender submissions will be assessed and approved in the first quarter of 2024, with works, which are expected to take over 20 months, anticipated to begin on site in the second quarter of 2024. The Morrison's Island Public Realm and Flood Defence Project is a Cork City Council-led public

realm scheme, with flood defence elements part-funded by the Office of Public Works (OPW) and is being pursued as a separate project to the wider Lower Lee Flood Relief Scheme (LLFRS).

Cork City Council under the 'Reimagining Cork' programme have also implemented parklets on South Mall and will incorporate seating and pollinator planting. "Re-imagining Cork City" represents an immediate response to social distancing requirements resulting from Covid-19 but also an acceleration of the City Council's vision for a city of sustainable urban growth. In addition to significant pedestrianisation in the city centre, the programme includes: the €1.5 million repair of 6 kilometres of existing cycle lanes, the installation of bollards on 4km of key cycling routes, 4.1km of new cycle lanes at Centre Park and Monahan Roads, Terence MacSwiney Quay, Horgan's Quay and Victoria Road and South Mall and the construction of 43 bike racks which can accommodate approximately 500 bikes. The programme is supported by the NTA.

Detailed design process is ongoing and revised planning documents are under review for the Cork Docklands to City Centre Road Network Improvement Scheme. The scheme proposes new road layouts and related public realm improvements to provide a high-quality environment for road users along the relevant routes between the Docklands and Cork City Centre. In order to facilitate greater movement of people it will be necessary to provide dedicated high quality sustainable transport infrastructure i.e., walking, cycling and public transportation infrastructure. The proposed project includes introduction of a northbound contra-flow bus lane on Victoria Road (North) and terminating Eglinton Street / Albert Quay and Clontarf Bridge Junction, new signalised and realignment of junctions, footpath widening, upgrade to bus stops, public realm improvements and crossing facilities for the safety of vulnerable road users.

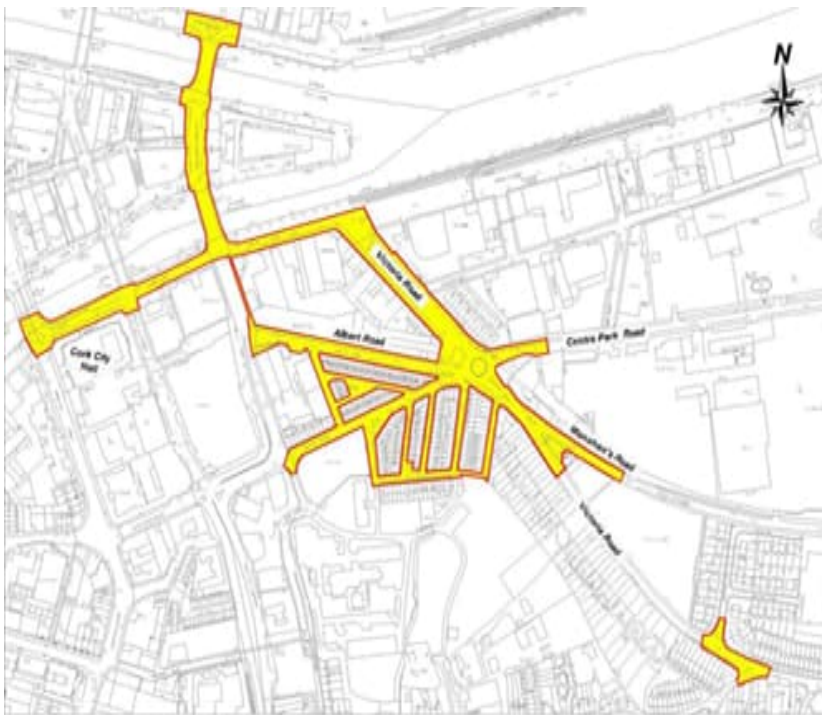


Figure 3.1 - Map showing Cork Docklands to City Centre Road Network Improvement Scheme



Figure 3.2 - Cork Docklands to City Centre Road Network Improvement Scheme

The Cork City Docklands Regeneration (see **Figure 3.3**) is the biggest regeneration project in this country and is in many ways a case study in sustainable compact living and working. It involves the mixed-use development at Kennedy Quay and was recently granted planning permission in August 2022, with construction work expected to commence in mid-2024. Ultimately, it is planned to build a 'Town within a city' housing approximately 20,000 people and 29,000 jobs, community green spaces, schools, health services, community, and cultural facilities. Another Cork City Docklands development recently received planning permission in the form of 1325 units. The COVID-19 pandemic has underlined the importance of neighborhoods and communities in determining 'quality of life' and these values will be reflected in the development of the Docklands. The Docklands to city centre project aims to provide flood protection infrastructure and immediate flood risk management along the lowest lying quay in Docklands at Albert Quay West.



Figure 3.3 - Cork City Docklands Regeneration

Cork City Council has welcomed significant investment in Cork City Docklands and the Grand Parade Quarter under Ireland 2040's Urban Regeneration and Development Fund (URDF). The URDF investment (€353.4 million) in Cork City Docklands will fund transport and mobility, public realm and flooding and drainage works.

The URDF support for the Grand Parade Quarter (€46.05 million) will regenerate the southern end of the Grand Parade. This includes the funding needed to develop Bishop Lucey Park, which was subject of an international architectural competition in 2019/2020. The redeveloped park will include improved access to the historic city

wall, a new events pavilion and plaza, improved access and seating and a new tower to mark the eastern entrance. The redevelopment of the park will serve as the centrepiece for what Cork City Council has branded the Grand Parade Quarter project which sets out to renew a vast area around the southern gateway to the medieval city, connecting the Grand Parade and a series of historic lanes, streets and Bishop Lucey Park with the south channel of the River Lee and the city centre business core. Cork's Bishop Lucey Park closed in December 2023 for enabling works to begin, with all works expected to be completed in the early part of 2025. It is proposed to develop the area with a mix of cultural activity, job creation and housing. The funding will also help progress plans to develop a new 7,700 square metres of space for the Cork City Library and 60 sq m for a public amenity space alongside 25,300 sq m of office, retail, or residential space. This quarter is adjacent to the site of the Events Centre, which will create a distinctive cultural offering in Cork City. Construction is anticipated to commence in Q1 2024 and completed by 2026.

Cork City Flood Relief Scheme when it is constructed will be the largest ever flood relief scheme undertaken in Ireland and will provide protection to 2,100 properties, including 900 homes and 1,200 businesses, extending from Inniscarra Dam to the City Centre. It is designed to best international standards to provide protection against the 1 in 100 year fluvial and one in 200-year tidal flood events. The Lower Lee (Cork City) Flood Relief Scheme aims to put the river back at the heart of the city through a series of proposed riverside walkways, cycleways, and plazas, as well as improved recreational river access. City parks will be enlarged and re-imagined with a focus on increased biodiversity, benefitting the environmental health of the city. Respectfully repairing and strengthening the quays will prevent potential collapse of these unique historic and vital infrastructure assets, as well as safeguarding historic structures that currently lay within the flood risk area.

The new City Development Plan 2022 – 2028 will represent an important step in the evolution of the strategic planning of Cork City. This City Development Plan is the key land use and strategic planning strategy to guide the development of Cork City to achieve this strategic vision. The direction of the future development of Cork City is guided by the National Planning Framework, Regional Spatial and Economic Strategy, Cork Metropolitan Area Strategic Plan, and the Cork Metropolitan Area Transport Strategy.

The Strategic Vision is for Cork City to take its place as a world class city, driving local and regional growth, embracing diversity and inclusiveness, and growing as a resilient, healthy, age-friendly, and sustainable compact city with placemaking, communities and quality of life at its heart. The development of the proposed Luas Cork project forms part of the strategic vision for Cork City.

4. Methodology

The scope of this technical note is to comparatively assess three city centre options (Option A, Option B and Option C) in order to determine which one will provide the preferred option under different criteria, including the transport interchange and the connectivity with the railway network at Kent Station. The outcome will be used to inform the MCA at Step C which will ultimately determine the overall EPR for the Cork LRT Scheme.

The analysis of the three city centre options has been completed broadly in line with the approach and methodology utilised in the Step C MCA but with further location specific information at a more disaggregated and granular level. Similar to the Step C MCA, the comparative assessment of the three city centre options utilises a five-point scale. This is deemed the most appropriate approach, as that assessment is comparing a wide range of primary and sub criteria.

For illustrative purposes, this five-point scale is colour coded as presented below in Table 4.1, with the option showing significant advantages over the other options graded "dark green", an option showing significant disadvantages over the other options graded "red", orange and light green being adopted for "some" advantages/disadvantages between the three options, and "yellow" being used for when all options deliver comparable results.

Table 4.1: Comparative MCA Scoring System

Description	Colour
Significant disadvantages over other options	Red
Some disadvantages over other options	Orange
Comparable to other options	Yellow
Some advantages over other options	Light Green
Significant advantages over other options	Dark Green

5. Integration

5.1 Introduction

This section examines the extent of how each option integrates with the transport network (future and planned), integrates with existing and planned streets and traffic, serves important trip attractors and social hubs in the vicinity of the options with particular reference to proposed stop locations. It assesses whether it has sufficient reach within the core city, capturing anticipated travel demand patterns and whether the option has the capacity to initiate positive change and opportunity as part of the EPR when determined following the completion of Step C MCA.

5.2 Public Transport Integration

5.2.1 Option A

Option A allows for seamless integration through direct 'rail to rail' interchange at Kent Station. Kent Station currently has proposals to run a high frequency service from Tivoli Docks as well as increased bus services, including regional services. A direct connection to Kent Station would optimise the integration between these modes across the inner-city network. This has the advantage of complementing and reinforcing other Government policies in relation to Modal Integration with the objective of creating a seamless transport policy. An LRT stop at Kent Station would also provide a good passenger experience for those who will interchange from 'rail to rail'. The direct 'rail to rail' interchange with Kent Station in Option A aligns with the ongoing Iarnród Éireann (IÉ) study, which seeks to develop and set out a strategic approach to establishing multi modal interchanges (MMI) across the IÉ network. An LRT stop at Kent Station could also activate and connect the residential and commercial components of Horgan's Quay and to a lesser extent may benefit some of the existing surrounding residential areas, such as St. Luke's and Summerhill.

Option A introduces opportunities for the north side of the city, notably further regeneration of MacCurtain Street and potential catchment from the Shandon area and from the established residential areas around Patrick's Hill and Wellington Road. The direct connection also traverses the core of the city, via St. Patrick's Street, presenting an opportunity to create a high quality, traffic-calmed, urban realm in the heart of the city, with high levels of integration with Busconnects.

Option A is shorter than Option C, but longer and more circuitous when compared to the Option B route for those commuters coming from Mahon, Blackrock and the South Docks. Passengers from those locations wishing to get to the city centre are less likely to use the LRT to get to into the city centre, given that it crosses the River Lee twice and travels north to return south again. It is important to note that current bus services from Blackrock serve the city centre with an approximate 20-minute journey time.

Option A provides opportunities for new trip patterns such as Kent Station, MacCurtain Street and the many large schools in and around St. Patrick's Hill which have a city-wide catchment, as well as providing access for residents on the northside to employment opportunities in the South Docks, Mahon and to all of the trip attractors at the western end of the route. However, it misses out on serving catchment to the south as well as some significant trip attractors such as UCC Music School and the new UCC Business School .

Option A, with a new bridge would provide improved access between the north and south side of the city, for active travel i.e., non-LRT users. The proposed new bridge is integrated with Cork City Council's proposal for a public transport bridge, under the Urban Regeneration and Development Fund, with respect to the Cork City Docklands Scheme. Should that scheme progress there is potential to cost share, thereby reducing the overall project cost for the bridge. Progressing and integrating both scheme plans would allow for a more efficient use of exchequer funding and reduce the assumed costs for Option A.

5.2.2 Option B

Option B has a direct, line-of-sight inter-visibility between Kennedy Quay Stop and Kent Station. The option includes a walking link on a new proposed active travel bridge crossing the River Lee. At a walking speed of 1.2m/sec it will take approximately just under 4 minutes and at a walking speed of 1.4m/sec which is considered fast-paced walkers it will take just over 3 minutes.

This option utilises the linear sections and the wide streets to introduce high levels of segregation, priority and service reliability for LRT and active modes, whilst also facilitating a redistributed traffic network.

While Option B misses the opportunity to connect to the north side of the city, including a direct connection to Kent Station, it reinforces access to areas of high catchment to the south and large trip attractors such as the Victoria Hospital.

Option B serves what is likely to be the predominant travel demand pattern from the Mahon, Blackrock, and the South Docklands, which is to reach the core city centre as simply and efficiently as possible. Connections along the Docklands, Kennedy and Albert Quay, Grand Parade and South Mall, provide more straightforward, wide, linear infrastructure, which operationally lend well to LRT in terms of levels of priority and reliability. Equally for commuters travelling from the west at Ballincollig, Option B is less attractive for trips to north city and access to Kent Station.

5.2.3 Option C

As with Option A, Option C allows for seamless integration through direct 'rail to rail' interchange at Kent Station. Kent Station currently has proposals to run a high frequency service from Tivoli Docks as well as increased bus services, including regional services. A direct connection to Kent Station would optimise the integration between these modes across the inner-city network. This has the advantage of complementing and reinforcing other Government policies in relation to Modal Integration with the objective of creating a seamless transport policy. An LRT stop at Kent Station would also provide a good passenger experience for those who will interchange from 'rail to rail'. The direct 'rail to rail' interchange with Kent Station in Option C aligns with the ongoing Iarnród Éireann (IÉ) study, which seeks to develop and set out a strategic approach to establishing multi modal interchanges (MMI) across the IÉ network. An LRT stop at Kent Station could also activate and connect the residential and commercial components of Horgan's Quay and to a lesser extent may benefit some of the existing surrounding residential areas, such as St. Luke's and Summerhill.

Whilst Option C does traverse to the north side of the City, it doesn't present the same opportunities as Option A in relation to the regeneration of MacCurtain Street and would be a less attractive option when compared with Option A in relation to potential catchment from the Shandon and Patrick's Hill area.

Within the core of the city, its progression along South Mall also misses the opportunities that Option A would present along Patrick Street. Whilst an LRT stop adjacent to the Bus Station is considered unworkable within the existing road and building constraints, the proposed stop on Alfred Street is a 200m walk from the Bus Station.

Option C also presents a similar challenge to Option A in relation to those commuters coming from Mahon, Blackrock and the South Docks. Passengers from those locations wishing to get to the city centre are less likely to use the LRT to get to into the city centre, given that it crosses the River Lee twice and travels north to return south again. It should be noted that there does not appear to be sufficient space on Clontarf Street to provide offline bus stops for both Luas and Busconnects modes to cooperate effectively. This would need some further analysis.

5.2.4 Summary - Public Transport Integration

Options A and C present the optimal levels of public transport integration through the direct interchange connection with Kent Station. Both Options also unlock the potential of further public transport optimisation for Kent Station, as it develops towards a comprehensive MMI for the city, acting as a centralised connectivity hub for all modes of travel.

For Option A it is important to note the opportunities for St Patrick's Street with BusConnects and its connectivity to Kent Station. In contrast to Option C whereby it will be more challenging for BusConnects to cooperate with Luas on Clontarf Street due to space constraints whilst regional/intercity services will require relocation on Alfred Street.

5.3 LRT Integration with Existing Streets & Traffic

This section assesses how the Proposed Scheme will be integrated into the existing streets and traffic network for Options A, B and C. This section also includes integration with traffic and the anticipated future network, bus networks including proposals for BusConnects and the proposed cycle network for the city centre.

A current study commissioned by the NTA, and Cork City Council outlines the high-level objectives for Cork City Centre in relation to public transport, traffic and cycling network. 'Transforming Cork City Centre 2030' represents a vision for how people will experience and move around the city centre in the various transport modes in 2030. It is therefore important to factor these proposals into account when assessing both LRT alignment options through the city centre core. Figure 5.1 below is an extract from draft study which broadly outlines the proposals for the various transport modes through the city centre.

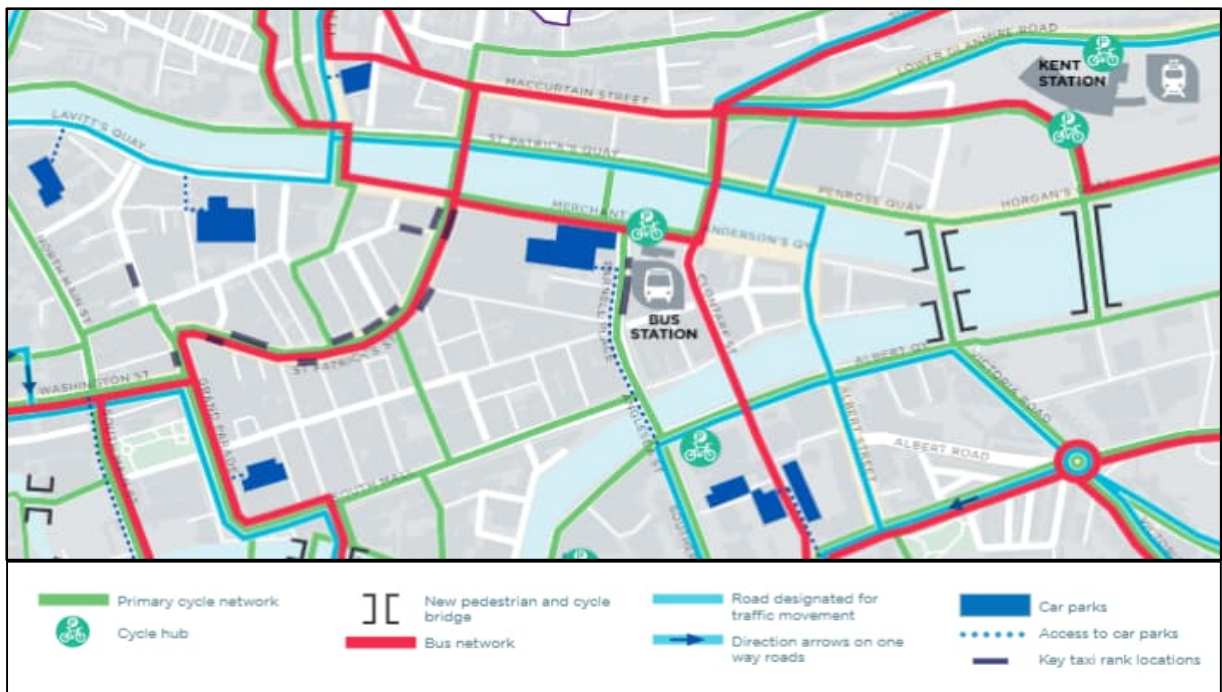


Figure 5.1 – Extract from 'Transforming Cork City Centre 2030'

The future primary bus network is currently indicated running through St. Patrick's Street. To ensure both Luas and Busconnects can operate in tandem along St Patrick Street, VISSIM modelling was undertaken to test the operational headway and indicate the potential reliability of both modes of transport. The VISSIM modelling indicated that both BusConnects and Luas could operate along this route, also with sufficient headway to expand the timetabling and frequency of both services in the future if required. The VISSIM modelling was also used to inform the design on St Patrick Street, including the sizing and provision of bus bays.

5.3.1 Option A

5.3.1.1 St Patrick Street

The option of running the Proposed Scheme to Kent Station via St Patrick's Street and MacCurtain Street offers opportunities for development of the city centre however also includes significant challenges from an alignment

and transport integration perspective. The recent Bus Network Redesign as part of BusConnects Cork has identified St Patrick Street as being one of the main bus routes through the city centre.

To understand operational capacity to accommodate both Luas and Busconnects on Option A, a separate high-level operational VISSIM assessment was undertaken. This analysed the frequency of services and informed the design layouts required for the 'S curve' and for the configuration and length of operational bus bays needed in St Patrick Street. The modelling outlined that Luas will take approximately 1minute to negotiate the 'S curve' junction, and is operationally the slowest part of Option A. This significantly reduces traffic signal green time, and therefore capacity, for other modes at this junction.

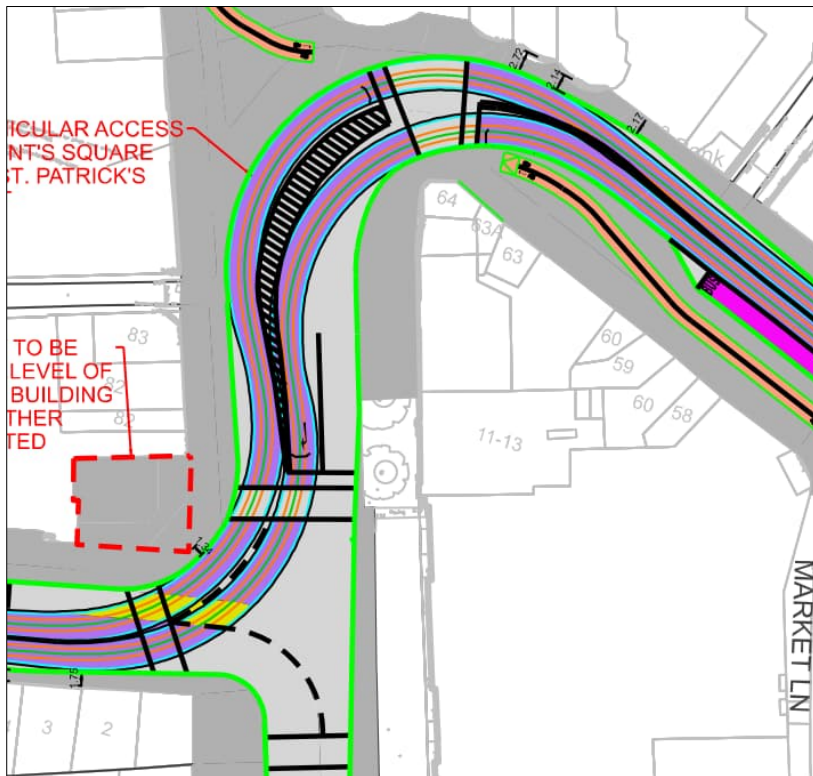


Figure 5.2 – Grand Parade & St. Patrick's Street (West) Potential Junction Layout

Approximately 30-40 buses per hour pass through this junction in each direction with a general traffic observed count from 2016 indicating around 450 vehicles travel northbound on Grand Parade and 500 eastbound on Washington Street towards the junction. The modelled configuration of this junction, including ten trams per hour in each direction, can accommodate these volumes without significant queues developing. With the assumption that St Patrick Street is downgraded to 'access only' status, with general traffic removed, the VISSIM exercise concluded that both Luas and Busconnects can operate concurrently with sufficient operational headway to ensure reliability of both modes. It should be noted that the proposed junction arrangements presented in figure 5.2 would require closure of Daunts Square to private vehicles and would also prohibit cyclists from this section.

5.3.1.2 St Patrick's Hill / MacCurtain Street Junction

The turning radii for trams at the St Patrick's Hill / MacCurtain Street junction is constrained and LRT speeds through this turn will be slow, reducing capacity. In addition, MacCurtain Street was previously eastbound only and there is now a need to cater for westbound bus and tram movements to St Patrick's Bridge. Counter to this, demand is reduced at this junction with St Patrick's Hill becoming northbound only and Coburg Street bus only eastbound.



The movement from St Patrick's Hill is now banned, but for the purposes of the modelling assessment it was still assumed that approximately 550 vehicles per hour would travel eastbound on MacCurtain Street. The positioning of the eastbound tram stop on MacCurtain Street could result in queues propagating back through the St Patrick's Hill / MacCurtain Street junction. However, the likelihood of this occurring can be mitigated. Due to the banned movements there is greater flexibility with the traffic signal staging: eastbound and westbound tram can operate at the same time if LRT vehicles are anticipated to arrive at the junction at the same time or westbound LRT vehicles can operate at the same time as eastbound buses from Coburg Street. Similarly, general traffic from St Patrick's Hill can be staged before eastbound tram in the traffic signal cycle to reduce the volume of traffic stacking behind stationary trams at the stop. Cyclists may be constrained at this corner of MacCurtain Street due to requirements for sufficient levels of priority.

5.3.1.3 Kent Station Interchange

Option A that poses some integration challenges at Alfred Street/Kent Station interchange where the Proposed Scheme stop is located. Alfred Street runs adjacent to the Kent Station underpass and is an optimal location for transport interchange between rail, light rail and bus patronage. However, a southbound bus lane currently runs along Alfred Street (maintained in future BusConnects proposals) and an existing bus interchange is also located at the southern end of Alfred Street. The Proposed Scheme stop is located Kent Station car park area to provide optimal interchange opportunity and due to space constraints, will require shared running with southbound buses. This may result in time penalties for both transport modes and may lead to congestion in the vicinity of the stop. A multi-modal interchange study is being carried out to assess the optimal layout for LRT, BusConnects and other modes.

Further analysis will be required on pedestrian and cyclist movements in the area which may require additional land take/infrastructure or amendments to existing infrastructure, which is outside the scope of this initial assessment.

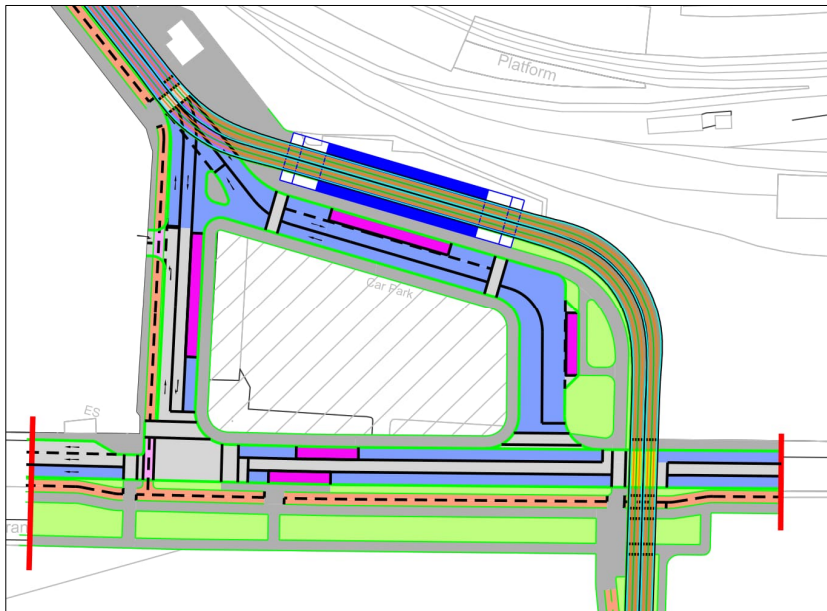


Figure 5.3 – Potential Kent Station Layout

5.3.2 Option B

5.3.2.1 Grand Parade

Integrating this option with other transport modes such as buses, private traffic and active modes of travel appears to be viable as the route streetscape is wide and presents opportunities for modal share and successful integration. The high-level modelling assessment of Option B identified a number of potential constraints. Starting in the west of the route, trams traversing the Washington Street / Grand Parade / St Patrick's Street junction are anticipated to be slow and the number of conflicting movements will reduce capacity. As with Option A, the junction layout under Option B was assessed in the model assuming 30-40 buses per hour pass through this junction in each direction in addition to, approximately 450 vehicles travelling northbound on Grand Parade (south) and 500 vehicles eastbound on Washington Street.

Modelling of these traffic volumes suggests junction throughput will be slightly less than it is currently. Furthermore, eastbound general traffic on Washington Street operates in the same traffic lane as the Luas. There is a potential risk of queues developing and delaying Luas run times. However, extending traffic signal green time on this arm would allow the queue to clear but this would have a knock-on impact on northbound and/or southbound queues on Grand Parade at this junction.

5.3.2.2 Parnell Bridge

One area that may pose an integration challenge is the proposed crossing of Parnell Bridge whereby the Proposed Scheme contains back-to-back curves first turning southbound from South Mall on to Parnell Bridge and from Parnell Bridge eastbound on to Anglesea Street. The Luas would take approximately 1 minute to navigate through this junction.

The existing bridge carriageway is approximately 14.5m from kerbline to kerbline whilst the overall bridge width is approximately 25m. A high-level assessment indicates the Proposed Scheme alignment along with one traffic lane in each direction can be accommodated between the existing kerblines. Furthermore, it is proposed that there is sufficient space to integrate pedestrian and cyclist facilities both sides of the kerbline. Parnell Bridge is one of the main arteries linking both sides of the River Lee and is identified as a primary cycle link on the 'Transforming

Cork City Centre 2030' study. **Figure 5.4** shows an indicative layout of the Parnell Bridge with LRT alignment and provision for traffic.

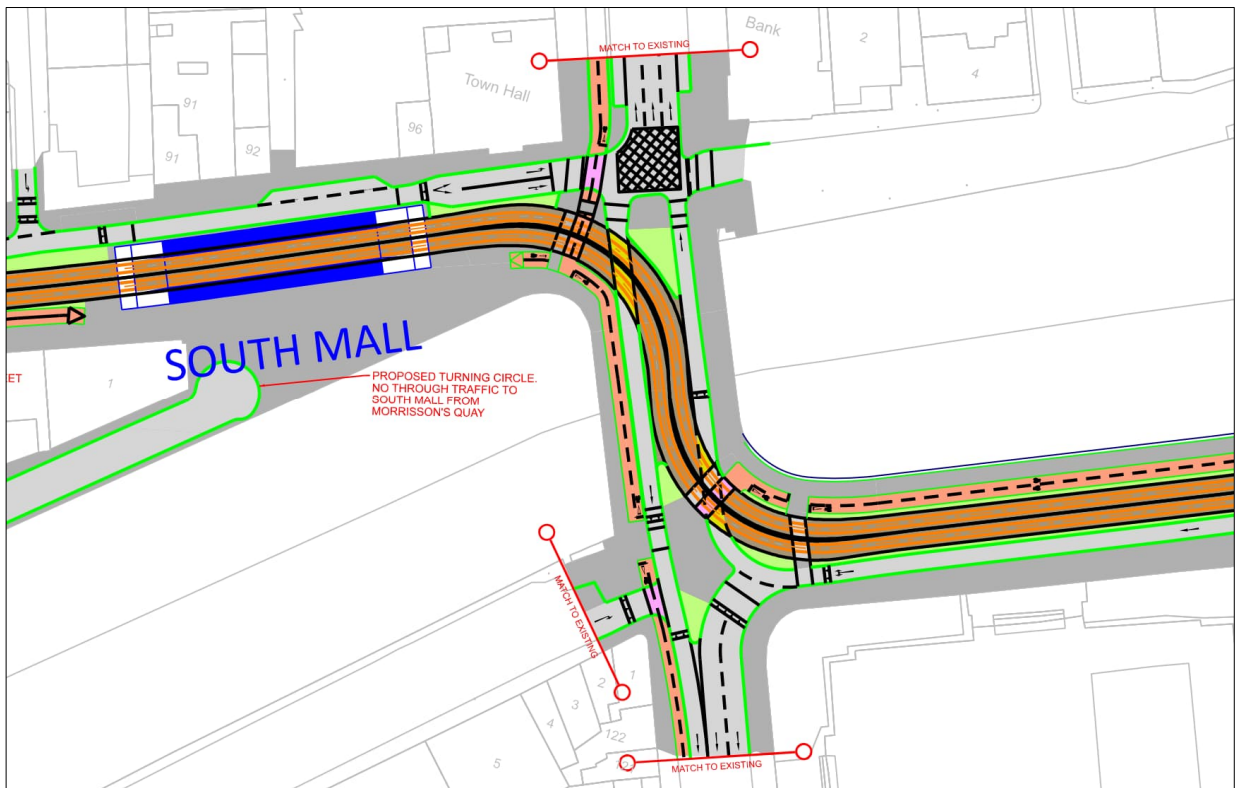


Figure 5.4 – Potential LRT Alignment over Parnell Bridge

As the LRT alignment on the Parnell Bridge does not contain a straight long enough to accommodate a stationary tram without impacting on other traffic lanes, it will result in the tram having to navigate the bridge junction in one continuous phase and result in a longer intergreen phase for other transport modes. VISSIM modelling of Option B indicates that the S curve on Parnell Bridge results in approximately 1 minute of delay to the Luas operation. Further traffic modelling will be required to understand the impact the wider road network outside of the vicinity of the city centre.

One way to optimise alternative transport modes on the bridge is to only allow public transport, pedestrians and cyclists to cross Parnell Bridge with private traffic being diverted to one of two bridges further east. A high-level assessment indicates this is a viable option although further investigation would be required during the future design development phases. Such an approach would broadly align with 'Transforming Cork City Centre Study 2030' which shows the existing bridge being a primary cycle network as well as making access to car parks only for private traffic.

The LRT alignment will be required to cross 2 additional major junctions when travelling from east to west however this does not appear to be problematic as there is sufficient space between junctions to facilitate a stationary tram without impacting other transport modes. This coupled with the wide streetscape along Albert Quay and Kennedy Quay will assist in the integration of the LRT with other transport modes.

5.3.3 Option C

Integrating Option C with other transport modes such as buses, private traffic and active travel modes appears to be viable in the vicinity of Grand Parade and South Mall (where the alignment is the same as Option B). The option of running Proposed Scheme to Kent Station via Lapp's Quay and Brian Boru Bridge does present challenges from an alignment and transport integration perspective.

At the junction of Lapp's Quay and Clontarf Street, shown in **Figure 5.5**, there is the opportunity to introduce a segregated southbound traffic lane on Clontarf Street, south of Oliver Plunkett Street, however it requires traffic to cross the northbound Luas lane at a signal-controlled junction which may impact junction efficiency. Clontarf Street with one southbound lane with transition to southbound lane configuration past Lapps Quay leading to a potential unbalancing of traffic conditions and underutilization of Clontarf Bridge. LRT speeds through the junction would be slow, requiring extended green time and reducing general traffic capacity. There is the potential for impacts on corner building at the junction due to the tight turning radii. Due to the limited widths available along Lapps Quay, there is also the potential for pedestrian footway widths to be adversely impacted.

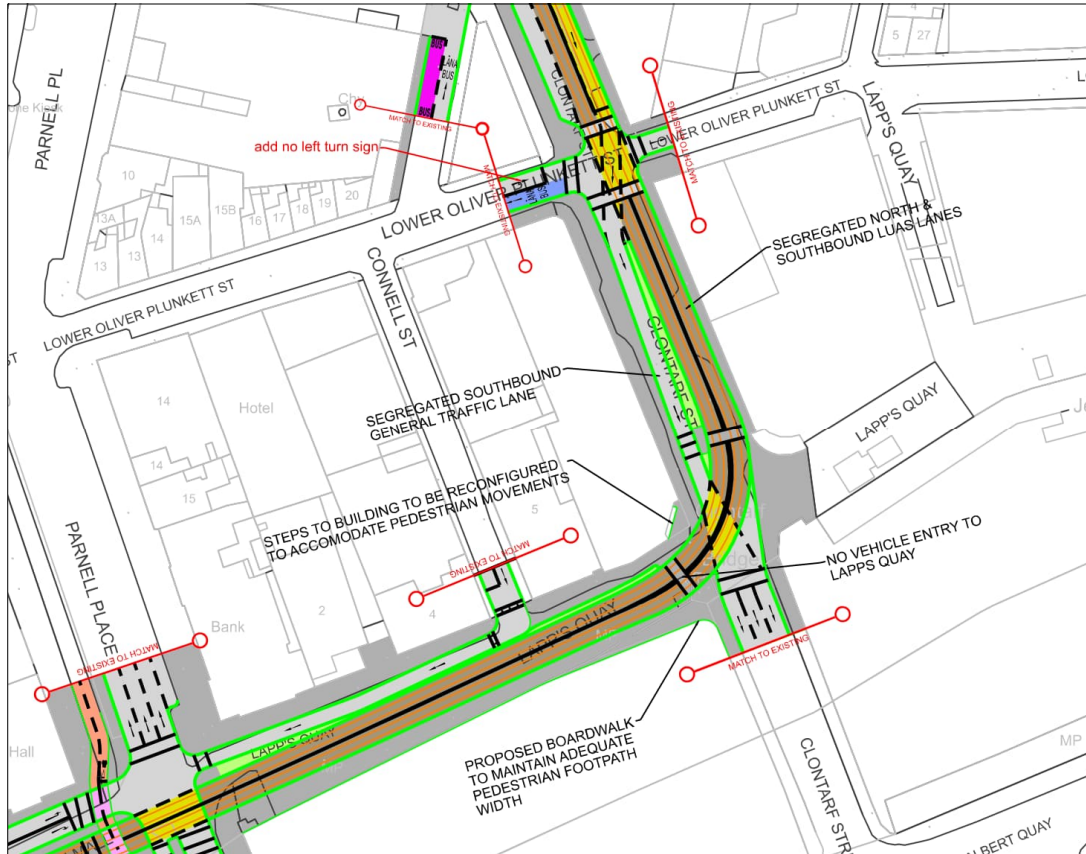


Figure 5.5 – Potential LRT Alignment at Lapps Quay and Clontarf Street

The major constraint on this route is southbound on Brian Boru Bridge. On Brian Boru Bridge, the configuration would change from two southbound traffic lanes and a single northbound lane at present (as illustrated in

Figure 5.6) to a proposed two lane arrangement with shared LRT and traffic lanes in both the northbound and southbound directions (as illustrated in **Figure 5.7**). Fewer lanes not only reduces capacity but also decreases stacking space leading to increased risk of queuing propagating back through adjacent junctions. Brian Boru Bridge is approximately 60m in long which equates to 10 cars (assuming an average car length plus gap of 6m) or one tram and three cars.

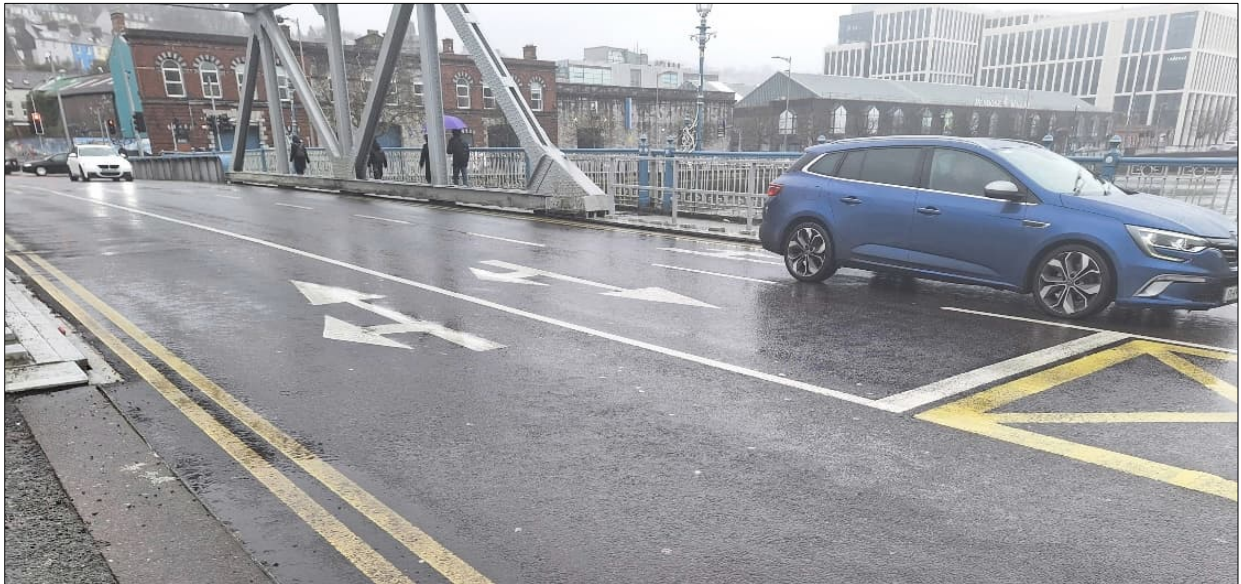


Figure 5.6 – Brian Boru Bridge – Existing Configuration

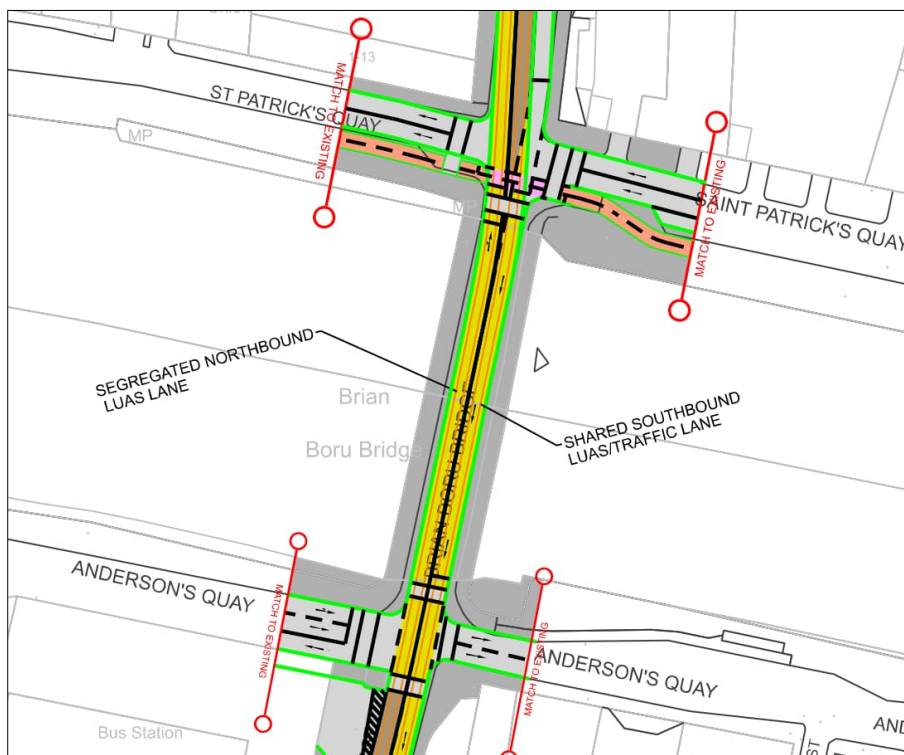


Figure 5.7 – Brian Boru Bridge – Proposed Alignment

Brian Boru Bridge is considered a major traffic artery accommodating access to and from the city centre via the N8, N20 and Summerhill direction. In order to gauge the impacts of reconfiguration of the bridge as part of Option C, additional VISSIM modelling was undertaken which showed that maintaining both north and southbound movements on this link across the river is important for the wider general traffic network in its current configuration. Reduction of the southbound capacity on the bridge will reduce capacity levels by approximately

50%. Current general traffic demand levels may result in some queuing along the bridge, which would impact on the priority of the southbound Luas movements across the bridge.

Due to the nature of the bridge structure, it cannot be widened. Any proposed widening at this link would require reconstruction of the bridge structure and would be subject to further assessment.

Further north at the junction of Brian Boru Street and Alfred Street there are possible impacts on the building at the corner of the junction (see **Figure 5.8**), however the proposed stop on Alfred Street presents the opportunity for a stop in a less constrained space whilst providing access to MacCurtain Street and the Bus Station (circa 200m walk)

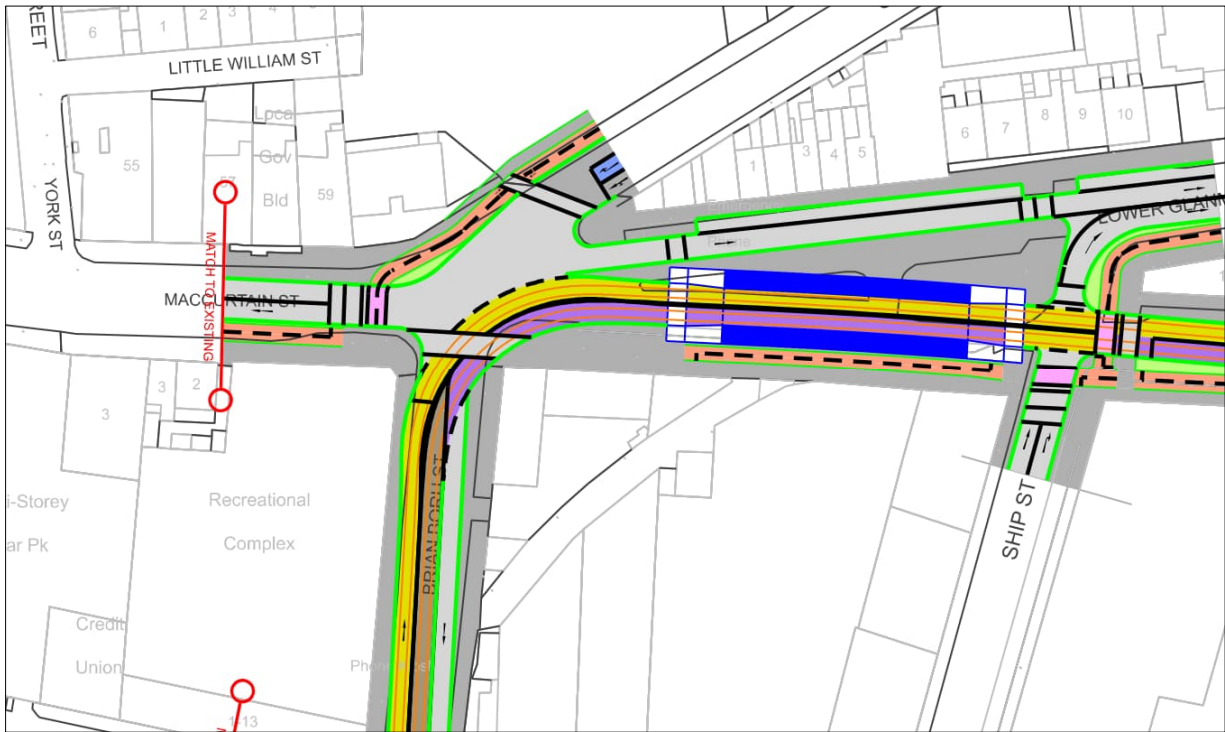


Figure 5.8 – Alfred Street – Proposed Alignment

The remainder of the Option C alignment is the same as Option A and is therefore subject to the same considerations presented previously for Option A along Alfred Street and around Kent Station.

6. Accessibility, Social Inclusion and Mobility

Accessibility and mobility are important components of a public transport proposal as it ensures that trip attractors, deprived areas, public realm, transport interchange and accessible usage is examined throughout the option selection process.

Accessibility and mobility combine all areas to ensure maximum usage of the Proposed Scheme is obtained by serving majority of key trip attractors in the study area. It also ensures that deprived areas are considered along the Proposed Scheme and that they may also get a positive impact from Proposed Scheme as a regeneration catalyst. Accessibility and mobility are an important component in shaping the associated public realm, as areas are upgraded to provide people-friendly spaces around the city, that efficient barrier free and physically accessible transport interchanges and stations are created which will produce a more attractive and inclusive network. An accessible network also ensures that people have improved access to jobs and better social and recreational opportunities for vulnerable groups.

6.1.1 Option A

Option A is more favourable option when compared with Option B and Option C in terms of Accessibility, Social Inclusion and Mobility, with transport interchanges and trip attractors north of the River Lee. A key trip attractor and interchange is Kent Station, serving this location would create a seamless interchange between heavy and light rail while also catering for regional rail commuters coming or going from the city.

Option A will serve St. Patrick's Street directly, which is a key trip attractor and the main retail street in the city centre. This section would need careful design consideration to ensure the public realm provision reflects the heavy pedestrian footfall driven by the surrounding trip attractors.

6.1.2 Option B

Option B addresses the need to serve Kent via direct line of sight active travel bridge from Kennedy Quay to Kent Station. As well as the required walking distances, the inclement weather on a wintery evening could possibly be a deterrent, even with a covered bridge structure. Option B is the more favourable option for trip attractors south of the river.

Whilst Option B does penetrate the core of the city and - combined with the Walkable City Proposals set out in the Cork City Development Plan – represents a strong and simple east-west alignment running through and connecting the city, its alignment remains south of the river, reducing accessibility from the areas to the north. All options will provide compliant and user-friendly accessible stops and interchanges, however the additional distance to access Kent Station would be less convenient for people with mobility impairments.

6.1.3 Option C

Option C is comparable with Option B, with some disadvantages when compared to Option A in terms of Accessibility, Social Inclusion, with transport interchanges and trip attractors north of the River Lee. A key trip attractor and interchange is Kent Station, serving this location would create a seamless interchange between heavy and light rail while also catering for regional rail commuters coming or going from the city.

Option C will serve South Mall and Grand Parade directly and main central business district, but misses the main retail street in Cork City (St. Patrick Street).

6.1.4 Summary – Accessibility and Social Inclusion

Options A and C connect the Proposed Scheme both north and south of the river. However Option A captures a greater number of trip attractors, which appears to increase overall accessibility or catchment when compared to Option B and C. Connecting both sides of the river would appear to provide greater levels of city-wide inclusivity on a qualitative level for Option A and coupled with its direct connection to Kent Station would provide the optimal rail integration with LRT, with reduced requirement for wayfinding between modes.

7. Environmental Assessment

7.1 Human Environment

Option A follows Grand Parade, Patrick's Street, crossing the River Lee at St Patrick Bridge and continues on to Bridge Street, MacCurtain Street and Alfred Street and on to Kent Station and involves a bridge to be built from Kent station to the Docklands at Kennedy Quay. Patrick's Street is considered the main shopping street of the city of Cork, while MacCurtain street consists of a number of residential and commercial properties, restaurants and bars. Option A has the potential to provide employment access for many residents of the north inner city to employment opportunities in the Docklands and Mahon areas and to leisure activities associated with the river, such as the Marina and Pairc Ui Chaoimh. Option A connects users on the south-eastern side to employment nodes around the N20 historic Shandon area, as well as to the cultural and educational amenities of the north inner city.

Option B follows Grand Parade, South Mall, the route traverses Parnell Bridge, Terence MacSweeney Quay/Albert Quay East/Kennedy Quay/South Docklands. South Mall consists of mostly 3-4 story Georgian terraced building that are now part of the commercial core of the City. Albert Quay/Eglinton St/Albert St have 6 to 16 story residential, retail & commercial blocks adjacent to Option B. South Mall is the premier business street in Cork where many of the city's financial and insurance businesses are located. South Mall has a different characteristic from many of Cork's city centre streets as there is no retail activity with most buildings serving either employment or commercial services (i.e., auctioneers/insurance brokers, etc.) However, there is a great mix of café's, bars, restaurants and independent retailers on all the side streets off South Mall. Option B plays a role in connecting the city but to a lesser degree than Option A. Cork is a walkable city and although the north inner city is still within the broad catchment of the route, this option misses an opportunity to unify and connect with the northside. Option B and Option C has the potential to provide employment access for opportunities in the Docklands and Mahon areas. All Options provide similar engagement to leisure activities associated with the river, such as the Marina and Pairc Ui Caoimhe

Option C follows the same route as Option B above, passing through Grand Parade and South Mall, before it then links with Lapps Quay and transitioning to a northbound direction along Clontarf Street. The Option C route crosses the River Lee via the protected Brian Boru Bridge turning onto Alfred Street before connecting into Kent Station. There are two Scherzer rolling lift bascule bridges in Cork, one is the Clontarf Bridge and the other is the Brian Boru bridge. These bridges are unique in the city's history, as they were built to accommodate four different forms of transport namely; goods and passenger trains; vehicular traffic, pedestrian traffic and finally to lift into an upright position to accommodate the passage of shipping. The proposed alignment would interchange directly with Kent Station via a new LRT stop and revised external layout arrangements. A new proposed LRT bridge, at the same location as proposed for route Option A, would link the Proposed Scheme across the River Lee to Kennedy Quay, accessing Mill Street and Centre Park Road.

7.1.1 Air Quality

Air pollution and noise is a key public health issue related to transport and the biggest contributors in Ireland are vehicle emissions. The Proposed Scheme supports mass transit and provides a sustainable travel option compared to more polluting forms of transport, such as private vehicle trips. It is expected that overall road traffic vehicle kilometres will reduce for all options during the operational phase and result in a reduction in associated greenhouse gas emissions. The Proposed Scheme aligns with the main goals of the Cork City Council Climate Change Adaption Strategy 2019- 2024, 'to make Cork city as climate-resilient as possible, reducing the impacts of current and future climate change-related conditions and events and to pro-actively engage with all citizens on the subject of climate action, such as climate change, climate change adaptation and climate change mitigation and aligns with the National Climate Action Plan 2024. The lower air and noise emissions are critical to support residential amenity of new development consolidated around the railway corridor. Air quality sensitive receptors are locations where members of the public are likely to be regularly present. Designated ecological habitats must also be considered. Cork Harbour SPA is the only ecologically designated area sensitive to air quality is located approximately 2.1km to the south-east of the Proposed Scheme at its closest. There are no EPA Air Quality monitoring sites on either Option A, Option B or Option C, all routes are in the Air Zone B Cork Conurbation, are in Cork City Air Quality Region 2 and classified as Good Air Quality. The noise sensitive receptors will be similar on

Options A, B and C. The EPA Air Quality Monitoring site Station 104. Cork Lower Glanmire Road is in close proximity to Option C.

7.1.2 Noise and Vibration

The EPA Round 3 strategic noise mapping identified road noise as the dominant noise source within the study area with areas near main roads experiencing the highest traffic noise levels. As expected, areas near main roads experience the highest traffic noise levels.

Option A passes through high noise levels from road traffic ranging between 70-74dB and 60-62dB, with the lowest levels experienced along MacCurtain Street in the east. A small area of noise associated with railways is present approximately 50m to the north of Albert Street at Kent Station. Option B also passes through high noise levels from road traffic ranging between 70-74dB and 60-62dB, with little to no noise along the docklands (Kennedy Quay).

Noise sensitive receptors along all route options comprise of dwellings, educational establishments, medical facilities, amenity areas, historic buildings and places of worship. Within the European Union, the Environmental Noise Directive (END; 2002/49/EC) identifies a number of Quiet Areas within Ireland. They are currently no END Quiet Areas within Cork.

Potential noise impacts may arise from plant equipment, machinery, piling activities at bridge crossings and increased construction traffic along the proposed Option A, Option B and Option C routes. Potential noise and vibration impacts are expected to be temporary. Option A and Option C noise and vibration impacts are expected to be greatest at the location of the proposed new bridge at the River Lee where piling is required. Noise impacts and potentially vibration will occur over a longer period of time. It should be noted that where vibratory piling activities are required, noise and vibration sensitive receptors beyond 100m could be affected.

On Option A the tight turning radius at Grand Parade and St. Patrick's Street has the potential to increase noise in the area during the operational phase from wheel/rail squeal. During the operational phase, significant maintenance of track would be required at this location with the potential to increase in noise and disruption to traffic in the area.

In September 2023 Round 4 noise maps were published by the EPA as a requirement of the Environmental Noise Directive. The Round 4 mapping now includes industry noise within the agglomerations. Round 4 noise maps have been reviewed and they show that road noise is the dominant noise source in the area of the Proposed Scheme option A, B and C with some rail noise in proximity of Kent Station. There is no airport or industry noise mapping close to any of the route options. All route options go through similar city centre areas with similar numbers and types of receptors affected. Also, the number of curves is similar between the three route options.

7.1.3 Seveso sites

The Seveso III Directive and the COMAH Regulations outline the legal obligations for operators of industrial establishments where dangerous substances are stored. These establishments are referred to as Seveso sites and are classified as Upper Tier or Lower Tier establishments. Goulding Chemicals Ltd Upper Tier site is located along Centre Park Road, located approximately 85m to the south of the route options. Listed in the CCDP under 'Objective 10.46 Tivoli Seveso sites decontamination and remediation,' Cork city are actively seeking relocation of Seveso III facilities/activities to suitable alternatives sites outside the city particularly with respect to Docklands and Tivoli. No differential between the route Option, A, B or C.

7.1.4 Summary – Human Environment

Assessment of the proposed Option A, Option B and Option C for Human Environment found that Option A and Option C would be the preferred over Option B due to the connectivity to the northside of Cork and the direct connection to Kent Station. Option A connects users on the south-eastern side to employment nodes around the N20 historic Shandon area, as well as to the cultural and educational amenities of the north inner city and provides an opportunity for public realm upgrades to Patricks Street, which is the main shopping street in Cork. Option C

also connects via traversing South Mall and Brian Boru bridge before connecting directly to Kent Station. Option B plays a role in connecting the city, particularly the South Quays but to a lesser degree than the other route Options. The South Mall stop incorporated along Option B and Option C will serve the UCC Music School and the new UCC Business School to the south of this stop. All options have the potential to support reductions in energy demand from the transport sector through electrification and can bring benefits to the population in terms of employment opportunities, economic growth, and social interaction as well as direct and indirect benefits to human health.

7.2 Physical Environment

7.2.1 Biodiversity

There are no ecologically designated sites within or directly adjacent to the Options A, B and C. The nearest designated site is the Cork Harbour SPA located approximately 2.1km to the southeast of the Proposed Scheme at its closest. Cork Harbour SPA is designated for various wetland and waterbird species (NPWS, 2014a). Habitats within all the route Options comprise of semi-natural and artificial habitats. The River Lee is hydrologically connected to designated sites of Cork Harbour SPA and Great Island Channel SAC.

There were areas of mature trees throughout the study area which were noted to have moderate to high bat roost potential (BRP). Trees with moderate – high BRP are those with the potential to support regular roosts to important bat roosts (BCT, 2016). There are no protected trees along present along either Options A, B or C. Mature trees are present on Option B and Option C along South Mall.

7.2.2 Hydrology and Flood Risk

The River Lee (Cork)_090 (River Lee) is the main watercourse within the study area. The River Lee drains an area of approximately 1250km² and flows in an easterly direction. The River Lee is a designated protected salmonid water body. It is of Moderate WFD Status, and its risk status is currently 'under review'. There are records of otter along all watercourses in the study area and all provide suitable commuting and foraging habitat. No signs or suitable resting places for otter were identified along the three options during previous site walkovers.

Option A proposes to cross the River Lee Estuary Upper at St Patrick's Bridge and involves the construction of a new bridge LRT from Kent Station to Kennedy Quay across the River Lee Estuary Lower. The construction of a new bridge has the potential to impact on noise and vibration (i.e piling) on the River Lee. Bride_020 is located approx. 150m to the west of Bridge Street along Option A. Bride_020 has a Moderate WFD Status and is currently At Risk of not achieving Good water quality standard.

Option B proposes to cross the River Lee using the existing Parnell Place Bridge and it is proposed that a pedestrian bridge would connect Kent Station to Kennedy Quay.

Option C to cross the River Lee using the existing Brian Boru Bridge and involves the construction of a new LRT bridge from Kent Station to Kennedy Quay across the River Lee Estuary Lower. The construction of a new bridge has the potential to impact on noise and vibration (i.e piling) on the River Lee. Bride_020 is located approx. 150m to the west of Bridge Street along Option C. Bride_020 has a Moderate WFD Status and is currently At Risk of not achieving Good water quality standard. Some flood mitigation may be required on Brian Boru Bridge and Lapps Quay, adding to space constraints / complexity. St Patricks Street bridge is not anticipated to require flood mitigation works.

All route options have the potential to impact water quality during the construction and operational phases. Potential impacts during the construction phase may include silty water runoff and accidental releases of pollutants such as cement washings and hydrocarbons. This has the potential to impact otters and aquatic species within the watercourses through habitat fragmentation/degradation/destruction as well as and affecting prey availability. During the operational phase potential impacts could include a change in the flow regime as a result of the bridges and via potential new discharge of surface water, permanent loss / damage of riparian zone, indirect hydromorphological impacts up and down stream and potential creation of a new pathway for pollutants to enter

the water body. In-stream works associated with the development of both the pedestrian bridge proposed for Option B and the LRT bridge proposed for Option A and Option C will be mitigated to prevent environmental impact however there is still potential for run-off / pollution to occur during the construction of the bridges.

Due to its location and elevation, Cork has a long history of flooding from both fluvial and coastal sources, primarily from the River Lee. The OPW and Cork City Council are progressing the Lower Lee (Cork City) Flood Relief Scheme. This scheme extends from the River Lee/River View Confluence to Cork city centre, just downstream of the north and south channel confluence. When complete, the scheme will protect Cork from flooding from the River Lee from the 1% AEP fluvial and 0.5% AEP coastal floods. The scheme is now at Stage II 'Tender, Construction and Handover of the Works'.

There is a high potential for flooding along each option. A large portion of Option A, Option B and Option C is located within CFRAMS River Flood extent scenarios for low and high probability, with the exception of MacCurtain Street which is located outside of any CFRAMS or National Flood Hazard modelled maps. A desktop review of flood water for Option C highlights the potential for flooding to occur on Lapps quay, flood risk management should be considered throughout this section and is proposed works are included in the Lower Lee (Cork City) Flood Relief Scheme for Lapps Quay. All three are within CFRAM Coastal Flood Extent present day scenarios, high and low probability.

7.2.3 Soils, Geology and Groundwater

The topography of the Cork region is dictated by the underlying geological structure of the folded Devonian and Carboniferous sedimentary rocks and is dominated by the elongated, relatively flat lying lands surrounding the River Lee. A small number of localised, steeper gradients are evident in close proximity, or immediately adjacent, to the River Lee in the extreme west and northern central portions of the site as highlighted on. The majority of all options are underlain by limestone and the underlying limestone aquifers have been classified as Karstified. It should be noted that karst environments contribute large volumes of water to river baseflow and are often important sources of water supply. They can also contain cave systems.

Option A and Option C land use comprises of artificial surfaces associated with continuous urban fabric in the west and associated with industrial, commercial and transport units (seaports) in the east, crossing a water body associated with marine waters at Kent Station.

The majority of Option A is underlain by a locally important aquifer, bedrock which is moderately productive only in local zones. The majority of the route is located over a moderately vulnerability aquifer at or near the surface, extreme vulnerability and high vulnerability along Bridge Street, MacCurtain Street and Alfred Street. There are no geological heritage sites with importance on a regional or national scale on the GSI database along Option A.

Option B land use also comprises of artificial surfaces associated with continuous urban fabric in the west and associated with industrial, commercial and transport units (seaports) in the east with a small area associated with industrial and commercial units along Albert Quay.

Option B is underlain by a mix of regionally important aquifer which is karstified (diffuse) and a locally important aquifer, bedrock which is moderately productive only in local zones. The majority of the western section of the route (Grand Parade) are underlain by a LI aquifer. The route along South Mall, river crossing, and the eastern section is mainly underlain by RI aquifer with some areas of LI located along Albert Quay, Kennedy Quay, and the off-road section. The route is located over a moderately vulnerable aquifer. There are no geological heritage sites with importance on a regional or national scale on the GSI database along Option B.

Option C is underlain by a mix of regionally important aquifer and a locally important aquifer, bedrock which is moderately productive only in local zones. Similar to Option B the majority of the western section of the route (Grand Parade) are underlain by a LI aquifer. There are no geological heritage sites with importance on a regional or national scale on the GSI database along Option C.

Due to the similar topography and land use along all route options, potential impacts are similar. Construction is largely at-grade and significant earthworks are not anticipated. In addition, superficial deposits do not have any

designated geological or heritage significance. Potential impacts on soils that may occur during construction include soil compaction, soil erosion and soil sealing.

Options A, B and C are located within Cork City Centre. The majority of the extent of the route options are located within existing roads. There are a couple of off-road sections, along each option.

7.2.4 Summary – Physical Environment

Physical Environment found that Option B is the preferred option as the proposed pedestrian bridge is smaller in size resulting in a reduction of potential risk of impacts to water quality during the construction and operational phases as a result of potential silty water runoff and accidental releases of pollutants, reducing the risk to aquatic species through habitat fragmentation / degradation / destruction and potential change in the flow regime. Significant flood remediation works are planned along all route Options. There is a high potential for flooding along all route options as they are within the CFRAM Coastal Flood Extent present day scenarios with high and low probability of flooding.

7.3 Landscape and Visual

Option A

This option traverses the core of the city, along Grand Parade via St. Patrick's Street, presenting an opportunity to create a high quality, traffic-calmed, urban realm in the heart of the city. Originally a curving channel of the River Lee, the main shopping street of modern Cork city and a popular meeting place, dates back to 18th Century when it was reclaimed from marshland. It was redeveloped in 2004 to be more "pedestrian-friendly", running in a curve from Daunt Square to the recently restored St Patrick's Bridge. St Patrick Street has wide pavements and plazas in high quality materials, granite and limestone in contemporary design patterns and contemporary lighting columns. St. Patrick's Street is rich in cultural heritage with elegant 19th Century mainly four-story buildings. The street was served by the Cork Electric Tramways and Lighting Company from 1898, until 1931 when it closed due to increasing popularity of bus services. Former home to Munster Arcade and Grant's department store, lost during the Irish War of Independence during the "Burning of Cork" event in 1920. A monument dating from 1864 to Fr. Theobald Mathew, known as Father Mathew, stands at the northern end of the street facing St. Patrick's Bridge over the River Lee. St. Patrick's Street is the main commercial and cultural heart of the city. An important architectural and urban design set-piece of strategic importance to the city's long-term regeneration and development. Images of St. Patrick's Street are shown in Figure 7.1 which illustrate its commercial properties.



Figure 7.1 - St Patricks Street

Option A is compatible with the City Council's urban realm objectives with respect to MacCurtain Street and St. Patrick's Street, which is for traffic-calmed, high-quality streetscapes which encourage people to live in, work in and enjoy the city centre. The engineering constraint associated with the Grand Parade/St. Patrick's Street corner is potentially significant and traffic management and bus diversions should be considered. There is potential for direct impact or modification to Finns corner which is an NIAH site, within ACA, which will be further assessed at the next stage of project development.

MacCurtain street or Cork's Victorian district is an attractive and important street on Cork's North side best known for its lively culture of music, entertainment, restaurants and trendy bars and small businesses illustrated in Figure 7.2. St Patrick's Bridge is the gateway to the Victorian Quarter, connecting the neighbourhood with Patricks Street and beyond. The adjacent hillside residential areas of Patricks Hill, Wellington Road are also of note, as are the schools St Angela's, CBS and Scoil Mhuire which have city-wide catchment. Shandon and the industrial hubs around Murphy's Brewery are also within walking distance.



Figure 7.2 - Trams on MacCurtain Street in the 1890's versus Present Day (pre public realm improvements)

Cork City Council as part of the next phase in the transition to a more sustainable transport system in Cork have progressed the MacCurtain Street Public Transport Improvement Scheme illustrated in Figure 7.3. The Scheme aimed to support economic activity and enhance access to the city centre through significantly improved options for walking, cycling and public transport. Under the scheme, the public realm offer was improved, and new traffic arrangements were put in place on MacCurtain Street, the city Quays, and adjoining streets to make the area more accommodating for shoppers, pedestrians, and cyclists. The MacCurtain Street Public Transport Improvement Scheme, funded by the NTA, began in January 2022 and construction was completed in Q4 2023. There is potential for impact to the scheme as a result of the Proposed Development, however this will be further assessed during the next stage and reinstatement will occur or mitigation implemented as required. There is the potential to extend this improvement scheme westwards onto Alfred Street linking to Kent Station.

The Cork City Development Plan 2022-2028 (CCC 2022) proposes to include MacCurtain Street ACA run between Bridge Street to the West and Brant Boru Bridge to the east and between the North Channel of the River Lee and the rear of the properties along MacCurtain Street where they abut the escarpment on the south of Wellington Road.



Figure 7.3 - MacCurtain Street Public Transport Improvement Scheme

The Victorian Quarter stretches north from Kent Station down to the banks of Lee by St Patrick's Bridge and includes historic MacCurtain Street at its heart. Early to mid-19th Century terraced houses in Lower Glanmire Road and high stone walls. Landmarks include The Metropole Hotel and The Everyman theatre, the Trinity Presbyterian Church's "Crooked Spire", St Patrick's Catholic Church and the red terraced buildings facing a small plaza in Lower Glanmire Road east of Summerhill North, at Coliseum corner where the trams used to pass by. The city's industrial legacy is still visible in chimney stacks and cast-iron details throughout the neighborhood. Residential development extends up the steep slopes to the north and is set amid greenery. Kent Station and its surrounding environment is illustrated in Figure 7.4.



Figure 7.4 - Kent Station and Summerhill North / Clarence Terrace

Kent Station sits on the north side of the city within the established hillside neighbourhoods of Lower Glanmire Road, Summerhill and Saint Luke's and functions as Cork's main railway station. Mostly redeveloped north city docks with significant height variation, contrasting with isolated historic buildings such as Penrose House, built in 1824. High quality public realm and contemporary architecture of the office buildings and hotels of up to 8 storeys as well as home to 19th Century Kent railway station. A pleasant plaza with trees and bicycle parking is located in Lower Glanmire Road east of Summerhill North. The quay is frequented by tall ships. The busy N8, running along the waterfront as well as Lower Glanmire Road, is one of the main routes into the city from the east. Landmark buildings include the redbrick railway terminal and the modern, black-clad hotel with sloping roof, The Dean. Terraced commercial buildings, some in poor condition, in Alfred Street.

Option A introduces potential opportunities for the north side of the city, by connecting MacCurtain Street and potential catchment from the Shandon area, from businesses such as Murphy's Brewery on the N20 and from the established residential areas around Patrick's Hill and Wellington Road. Option A presents an opportunity for a strong traffic-calmed, green corridor running through the city core and connecting the north and south sides of the city. It opens walking linkages to the residential hills to the north and to the historic Shandon area. Cork City is prone to flooding; the design should deploy landscape solutions to flood and water management and utilise best practice in sustainable urban drainage.

The proposed bridge at Kent Station is in a particularly sensitive location on the river, at the mouth of the old Port of Cork. It will be the first time a bridge has been constructed east of the north and south channels of the Lee and the potential visual impact on the approach to Cork City, as a result of the unique topography of the city and rising vistas of the northside should not be underestimated and considered architectural and urban design would be required to mitigate the visual impact with the opportunity to potentially enhance the public realm of Cork City.

Option B

Option B has significant waterfrontage along Kennedy Quay, Albert Quay, the crossing of Parnell Bridge and along South Mall. This presents an opportunity to radically 'Green' the waterfront and create an attractive riverside setting with significantly reduced traffic and more appropriate riverside uses. It introduces the possibility for landscape solutions to be applied to flood and water management and to utilise best practice in Sustainable Urban Drainage. Option B has direct, line-of-sight inter-visibility between Kennedy Quay Stop and Kent Station and a direct walking link over a bridge which would comprise of an attractive river crossing.

Grand Parade was reclaimed from the river by the start of 19th Century and is now one of the main streets of the modern Cork City. Retail use dominates the northern end while office use takes precedence at the southern end. A wide plaza with contemporary seating and kiosks is located all along the western side of Grand Parade. Lines of trees with year-round interest, some of them mature, others semi-mature are present on either side of the busy road. High quality paving materials, such as granite and red limestone, have been laid in design patterns. Landmarks include the renowned mid-19th Century English Market, mid-19th Berwick Fountain commemorating Walter Berwick and is a protected structure. Bishop Lucey Park is sandwiched between the buildings on the western side of Grand Parade and contains a fragment of medieval city walls. The double archway at the entrance was originally the entrance of the former corn market in Anglesea Street. Scheduled for large-scale redevelopment as "Grand Parade Quarter" project which includes public realm and Bishop Lucey Park redesign and the development of a state-of-the-art new city public library. There is a CCDP Protected Linear View to Landmark Buildings from Grand Parade (nr junction with Oliver Plunkett St.) to St Nicholas Church.

South Mall (See Figure 7.5) is a European city street with views west to St Fin Barre's Cathedral, it is a busy street with traffic and road signage clutter. Buildings consist of mostly 3-4 story Georgian terraced merchant or residential uses, now part of the commercial core of the city. The area includes colourful buildings, some ornate in Italianate or Romanesque style, some with Cork features, such as slate-hanging, bay fronts, bow-fronts, as well as steps to the fronts of former merchant houses to provide access to former waterways. Mature street trees soften the views. Cork City Council plan to introduce the transport measures outlined in Cork Metropolitan Area Transport Strategy (CMATS) and detailed in the City Centre Movement Strategy (CCMS) in a phased manner, Phases 6 & 7 include South Mall, Albert Street, and surrounding areas. South Mall has a different characteristic from many of Cork's city centre streets as there is no retail activity with most buildings serving either employment or retail services (i.e., auctioneers/ insurance brokers, etc.). This project includes for a significant change in the current transport networks serving the study area with enhanced cycle provision proposed for both the South Quays and South Mall. In addition, dedicated bus priority measures are envisaged for South Mall, which currently acts as major termination point in the city and along South Terrace and George's Quay and is covered in the Cork City Development Plan (CCDP) Objective 13.15 Priority Public Realm Improvement Projects (CCC 2022).



Figure 7.5 - South Mall

South Mall is the former route of electric tram and the CCDP (CCC 2022) lists Landscape and Townscape View LT12 from Montenotte/Tivoli Ridge to South Mall and also the Protected Linear View SFC1 from South Mall to St Fin Barre's Cathedral landmark building.

South Mall and Grand Parade are highly sensitive landscape areas. Both streets have historic building facades softened by a large number of mature trees. In terms of visual effects, the view west along South Mall is a protected linear view from St Fin Barre's Cathedral and the moving trams are likely to obscure or restrict this view intermittently. A catenary-free system within the city core will be an important factor in reducing the visual impact of a light rail system. Catenary-free systems have the multiple benefit of removing visual and actual impact on buildings and streetscapes, of avoiding the need for poles and their foundations and of allowing dense greenery to be planted close to the alignment. The light rail could also be a catalyst for positive change on South Mall, which is currently dominated by its one-way, multi-lane traffic arrangement. Widened footpaths, significant tree planting, radically reduced traffic and a high-quality, catenary-free light rail could enhance this important and historic street. Walking links which are already developed as pedestrian priority routes by Cork City Council allow for permeability and connectivity through the city.

Option B utilises existing bridge infrastructure by crossing at Parnell Bridge and has the potential to positively displace private cars within the city core and allows for a very simple and paired-back pedestrian river crossing to Kent Station at Kennedy Quay, lessening the visual impact on the city at this important location. The proposed pedestrian bridge linking Kent Station to Kennedy Quay, as mentioned above, is in a particularly sensitive location on the river and potential visual impact on the approach to Cork city need to be considered architectural and urban design would be required to mitigate the visual impact. There is an opportunity to potentially enhance the public realm of Cork City with a statement bridge design.

Albert Quay is south of the southern channel of River Lee with views to Custom House and the hilly Victorian Quarter to the north. A complex area with large scale contemporary buildings on Albert Quay contrasting with the active quay side and the low rise, mainly one to two story buildings on Victoria Road with a mix of commercial and residential uses. Some vacant, painted plastered and brick buildings of the former CBP Railway, some large scale former industrial and warehouse buildings with stone facades, street art, protected trees (according to CCDP), views towards R & H Hall silo along Marina Walk and Albert Quay. CCDP identifies the northern edge of this LCA as a Quayside Amenity Area with an objective of ensuring access to the general public, visitors and tourists via a walkway/cycleway from Albert Quay West to the Marina Walk at Shandon Boat Club. CCDP Protected Linear View TP3 from Victoria Road towards Trinity Presbyterian Church Landmark Building. A new boardwalk and floating pontoon as well as wider footpaths, protected bi-directional cycle facilities, new trees and new bus lanes are to be built on Albert Quay to allow the area to act as a gateway to the Cork Docklands as part of the Docklands to City centre Road Network Improvement Scheme. Planning permission has also been granted for what will be Cork City's tallest office block, a 16-storey building facing the River Lee, with a plaza and redeveloped former railway buildings, on Albert Quay and Albert Street.

The South City Docks is currently a flat brownfield site on the southern bank of the River Lee, reclaimed from the river, dominated by the R & H Hall grain store building on Kennedy Quay, which has been a feature of Cork skyline since mid-20th Century. The now decommissioned mid-20th Century ESB Marina steam powered station occupies a commanding position along the Lee waterfront further east. The tractor plant, a protected structure PS1135, is the oldest structure on the site built between 1917 and 1919. It is of international historical, industrial archaeological, technical, and architectural significance as one of the first single-story reinforced-concrete vehicle assembly plants in the world. The later structures on the site, of historical, architectural, and industrial archaeological significance, reflect the evolution of industrial architectural design.

The present character of extensive low-rise structures set in an orthogonal arrangement in a flat industrial landscape will change as the area is redeveloped and the uses are intensified. Identified in CCDP as a key development area and part of the large Cork City Docklands regeneration project over the next two decades which includes development of thousands of homes and the creation of a new urban centre for international investment and gateway into the city as part of City centre expansion eastwards. CCDP identifies the northern edge of this LCA as a Quayside Amenity Area with a general presumption against development and an objective of ensuring access to the general public, visitors and tourists via a walkway/cycleway from Albert Quay West to the Marina Walk at Shandon Boat Club.

Option C

Option C traverses the city via Grand Parade, South Mall, Clontarf Street / Brian Ború Street and Kent Station. Option C, similar in part to Option B has some waterfrontage and this presents an opportunity to create an attractive riverside setting and introduces the possibility for landscape solutions to be applied to flood and water management and to utilise best practice in Sustainable Urban Drainage. The Grand Parade Quarter project plans for substantial public realm improvements along with Bishop Lucey Park redesign and includes the development of a new city public library. There is a CCDP Protected Linear View to Landmark Buildings from Grand Parade (nr junction with Oliver Plunkett St.) to St Nicholas Church. Option C then turns southwards from Grand Parade towards South Mall which is a highly sensitive landscape area. As listed under Option B above South Mall is the former route of electric tram and has a number of protected Landscape and Townscape views on the street including the Protected Linear View SFC1 from South Mall to St Fin Barre's Cathedral landmark building and Protected Linear View TP3 as well as the potential impact to the view from and to Trinity Presbyterian Church as Option C proposes to cross the river using Brian Boru Bridge.

From South Mall the route travels down Lapps Quay where a new boardwalk will be constructed, before turning northwards onto Clontarf Street. There is the potential for impacts on corner building at the junction due to the tight turning radii. Some flood mitigation may be required on Brian Boru Bridge and Lapps Quay, adding to space constraints / complexity. After crossing the river, the route then turns eastwards onto Alfred Street, where it shares with buses in an eastbound direction as far as Kent Station. The route then travels southwards on a new public transport bridge from Horgan's Quay to the south docklands at Kennedy Quay and Mill Road. The proposed bridge linking Kent Station to Kennedy Quay, is in a sensitive location on the river and potential visual impact on the approach to Cork city needs to be considered architectural and urban design would be required to mitigate the visual impact.

The Cork City Development Plan 2022-2028 proposes to include a new Architectural Conservation Area called ACA Oliver Plunkett Street, which all three-route options traverse and the ACA South Channel which route Options B and C propose to traverse along Grande Parade. The 1.5km stretch of river forming this ACA begins at Clarke Bridge to the West and ends at Kennedy Quay. Infrastructure along the river is of significant importance to the urban landscape of this part of the city, iron railings, carved railing piers, limestone steps, slips, and moorings help explain the connection to the industrial and maritime history of 19th and 20th Century Cork. The Morrisons Island Public Realm and Flood Protection Project will have no detrimental impact on the ACA and will in fact adhere to and compliment the ACA objectives.

There are a number of areas with protected views, viewpoints, landmarks, and buildings located in Cork. The protected views relevant to the options can be found in Volume 2- Mapped Objectives in the CCDP an extract is shown below in **Figure 7.6**.

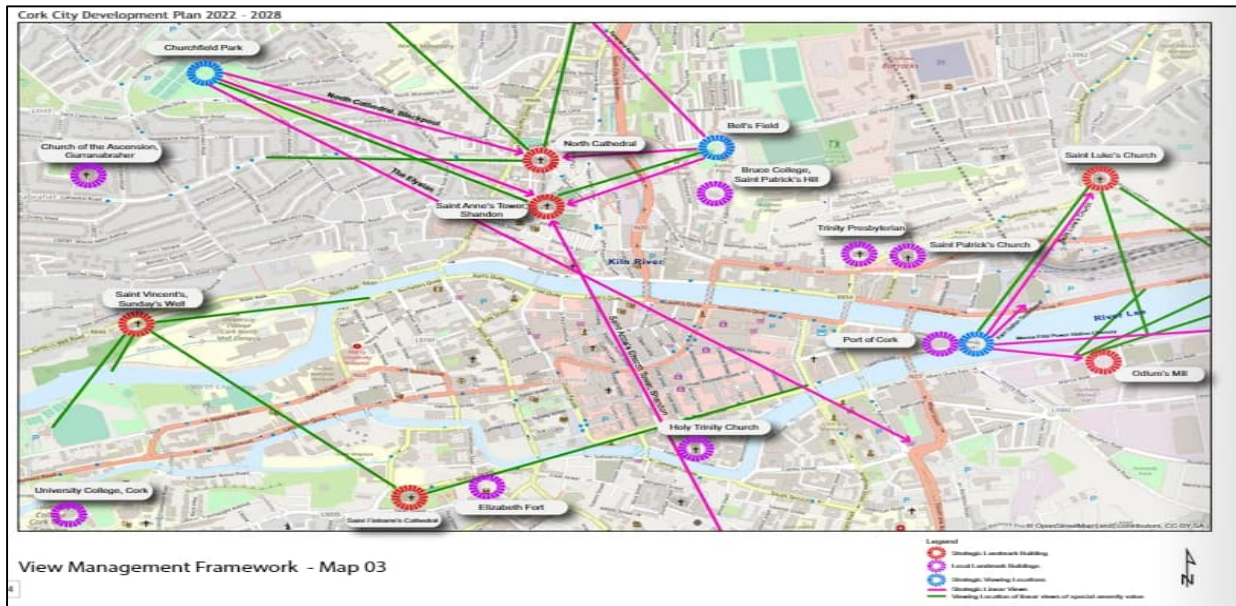


Figure 7.6 - Protected views and visual receptors relevant to the options

7.3.1 Summary – Landscape and Visual

All the options have the potential to significantly improve the urban landscape of Cork city, in addition to introduce the opportunity to utilise landscape solutions for the development of Sustainable Urban Drainage for flood risk and water management.

The differences between the options centre on how those urban landscape improvements could be implemented within the different characters of the streets and spaces which the route options pass through.

Option A provides an opportunity to create a high quality, traffic-calmed, urban realm in the retail heart of the city on Patrick Street and extend the recent improvements on MacCurtain Street westwards along Alfred Street to Kent Station before crossing the river. The delivery of Option A will have a localised adverse impact at Finn's Corner. Further detailed assessment is required at Finns corner to develop elevational treatments to the retained adjacent buildings to mitigate any potential impacts to the building. Option A still remains comparable to the other options as it connects the places where people tend to gather and thus would provide urban realm opportunities unique to this option.

Option B sits within the grander, set piece streets of Grand Parade and South Mall where the urban landscape would improve the civic setting, before crossing the river and be part of the more modern architecture of riverside landscape and connecting to the proposed dockland development area and likely more contemporary design. The vehicle river crossing would not be required.

Option C follows significant parts of Option A and C; the Georgian Grand Parade and South Mall and the improvement opportunities of Alfred Street before re-crossing the river. The short section on Clontarf Street could just be seen as a linking street characterised by through traffic with more limited opportunities for urban landscape improvements.

From a landscape perspective, as described above, the opportunities for urban landscape improvements could be achieved across all three options, but different in response to the distinct characters of the streets and spaces. As a result, the route options are considered to be comparable.

7.4 Cultural Heritage

The Irish Government's published *Framework and Principles for the Protection of the Archaeological Heritage* affirms the general principle that 'the archaeological heritage is a non-renewable resource' and that, as such, 'there should always be a presumption in favour of avoiding developmental impacts on the archaeological heritage'. (Note, in this instance, use of the term 'archaeological heritage' can be taken to equate to the more general term 'Cultural Heritage'.)

The Irish Government's published *Common Appraisal Framework* advised that effects on cultural heritage can be considered in terms of impacts on:

- Below ground archaeological remains;
- Historic buildings (individual and areas); and
- Historic landscapes and parks.

7.4.1 Below Ground Archaeological Remains

The quantum of below ground archaeological remains within the study area is unknown. The Lee valley was originally a broad swath of marshland, drained by a network of meandering watercourses, most notably the River Lee and its tributaries. The area is known to have attracted human activity since earliest prehistoric times.

There are areas, however, where historical records, cartographic evidence and previous archaeological investigations confirm higher concentrations of archaeological potential, namely in the historic core of Cork City where early ecclesiastical foundations emerged with related settlement. This was followed by Viking settlement that was more formally fortified and expanded upon in the Anglo-Norman period. The archaeology of the city since then relates to the incremental development of the city outward beyond its medieval core.

East from where the routes diverge on Grand Parade (the location that formed a moat outside the medieval city walls illustrated in Figure 7.7), there are no other recorded monuments directly impacted by either route. Therefore, in terms of below ground archaeological remains, all route Options can only be broadly assessed in terms of archaeological potential, potential that may or may not be realized at construction stage.



Figure 7.7 – Culvert Under Grand Parade (at St. Patrick's Street end) Exposed in 2005

Left image: (after Crowley et al. *Atlas of Cork City*, p28, fig. 1.27) Right Image: (<https://corkorigins.ie/corks-landscape-archaeology/articles-and-thoughts/>)

The difficulty with considering potential for below ground archaeological remains is that the true potential cannot be realized without more detailed investigation nor, ultimately, until the ground is exposed.

All three routes have pros and cons. The most significant impact effect is likely to be within the largely 18th/19th century footprint of the city centre. Here, Option A (Grand Parade/ Patrick's Street) may have a slightly less archaeological risk over Option B, but more significantly less so than Option C.

In terms of river crossings and the remainder of both routes, Option B likely carries marginally less risk.

Overall, for Options A and B, it is difficult to distinguish between the routes in terms of likely on below ground archaeological remains, but Option A might prove to have marginally less archaeological impact. Option C would seem to pose the most risk in terms of below ground archaeological remains.

7.4.2 Historical Buildings (Individual and Areas)

The quantum of historic buildings (individual and areas) within the Study Area is more clearly established by virtue of the Record of Protected Structures (RPS) and the National Inventory of Architectural Heritage (NIAH).

In terms of direct impacts, Option A's potential impact on the Father Mathew Monument (RPS site) is somewhat counter-balanced by Option B's and Option C's likely impact on the Berwick Fountain RPS. However, there may be design scope to avoid the Father Mathew Monument, should Option A proceed. There appears less design scope to avoid directly impacting the Berwick Fountain should either Options B or C proceed. In addition, both Option A and Option C will each directly impact (by crossing over) a bridge listed on the RPS: St. Patrick's Bridge, in the case of Option A, and Brian Ború Bridge, in the case of Option C.

Detailed design consideration of pedestrian path widths at the location of Finns Corner (Option A) may potentially result in some degree of impact or modification to the Finns Corner building. In terms of the option's net impact, this potential impact on Finns Corner may be somewhat off-set if there is design cope to avoid impacting the Father Mathew Monument on St. Patrick's Street. Option C will likely have a direct impact on structure of Brian Boru Bridge, a Protected Structure.

The remaining impacts on the architectural heritage (along all routes) are confined largely to the streetscape settings of designated historic buildings. The impact on individual historic buildings may ultimately prove to be Slight to Not Significant. All three routes have pros and cons. Architecturally, Option A (along Grand Parade/Patrick St) is deemed marginally advantageous for new transport development over Options B & C along Grand parade/South Mall; traversing the streetscape of fewer RPS and NIAH sites, with South Mall having a notably older building stock. That said, were Option A to be selected this would likely drive more cars onto the South Mall, likely degrading its streetscape character. Clontarf Street and Brian Boru Street, along Option C, has the newest building stock, but the Option remains marginally less favorable to Option A based on its likely direct impact on the structure of Brian Boru Bridge.

In addition, Option A at Grand Parade/St. Patrick's Street junction, the swept-path will be less than 1.8m from the building face in 3 locations, and this proximity is not replicated in Option B or Option C. Exiting the historic core of the city, preference might justifiably (if marginally) swing to Option B, simply by virtue of it passing through more open, less sensitive dockland environments and generally more recent building stock.

7.4.3 Historic Lands and Parks

The historic landscape of the city, as it relates to all three route Options, falls into two broad categories: the historic medieval core bounded to the east by the Grand Parade. East of this the historic landscape derives from the incremental development of the city, starting in the 17th century, eastwards beyond its medieval core. The current building stock in this area is largely 19th and 20th century with some 18th century elements.

Impacts to all three routes are confined to an appraisal of how sympathetic the development would be on historic landscapes and parks. Along The Grand Parade all routes traverse the same historical landscape, albeit Option A over a shorter distance. Option A is more firmly favorable along St. Patrick's Street, being a more esthetic, naturally meandering thoroughfare, with better existing public realm, best suited to traffic reduction. From here the preference swings very marginally to Option B by virtue of Terence MacSweeney Quay/ Albert Quay East/ Kennedy Quay having the more recent development history. All three route Options require bridge crossings (LRT bridge [Option A and Option C]/footbridge [Option B]) at a similar location, east of the channel diversion, and with similar implications. (In terms of historical transport landscapes, it is noteworthy that, in the 19th century, tramways serviced almost the entirety of both Option A, Option B and Option C.)

On balance, no option would seem to dominate in terms of preference from a historic landscapes and parks perspective. However, Option A might justifiably be marginally more favorable involving the more appropriate landscape improvements to Patrick's Street.

7.4.4 Cultural Heritage Summary

In relation to Cultural Heritage assessment of Option A, Option B and Option C, all options have a comparable level of impact. In the city centre area, Option A is preferable, with Option B more preferable leading west from the city core.

- ***Below ground archaeological remains*** – The true potential for below ground archaeological remains cannot be realized without more detailed investigation nor, ultimately, until the ground is exposed. The greatest tangible impact on cultural heritage is likely to be with respect to potential impacts on below ground archaeological remains. On balance, Option A is marginally favoured.
- **Historic buildings (individual and areas)** – Option B marginally favoured. Option A's potential impact on Father Mathew Monument RPS is somewhat counter-balanced by Option B's and Option C's likely impact on the Berwick Fountain RPS. Option B also crosses a modern bridge not on the RPS nor the NIAH, unlike the bridges traversed by Options A and C. Other impacts on the architectural heritage along all routes are confined largely to the streetscape settings of designated historic buildings. In the city centre, Option A along Grand parade/Street traverses the streetscape of fewer RPS and NIAH sites than Option B or Option C and South Mall having a notably older building stock. Option B more favourable heading east.
- **Historic landscapes and parks** – Option A marginally favoured. Option A is more firmly favorable along Patrick's Street, being a more esthetic, naturally meandering thoroughfare with better existing public realm, best suited to traffic reduction. Further east, preference swings only very marginally to Option B. In terms of historical transport landscapes, it is noteworthy that, in the 19th century, tramways serviced almost the entirety of both Option A and Option B. The addition of a new bridge — either Option A (bridge) or Option B (pedestrian bridge) — will present a significant riverine landscape change for the City.

Emerging preferred city centre route from an overall Cultural Heritage perspective:

On balance, there is relatively little to differentiate the city centre options in terms of potential impacts on Historic Buildings and on Historic Landscapes and Parks. However, the greatest tangible impact on cultural heritage is likely to be with respect to potential impacts on below ground archaeological remains. As such, Option A is considered the preferred city centre route from an overall Cultural Heritage perspective.

8. Economy

8.1 Introduction

This chapter will provide an economic assessment of Option A, Option B and Option C with a focus on the Transport Modelling economic parameters, Benefits Assessment, as well the Capital Cost comparison. This section is structured as follows:

- Transport Modelling:
 - Model Approach;
 - Modelling Assumptions;
 - Mode Shares;
 - Patronage;
 - Journey Times;
 - Public Transport Integration; and
 - Economic Benefits.
- Capital Cost Comparison:
 - Costing breakdown; and
 - Costing Summary.

8.2 Transport Modelling Methodology

The transport modelling comparison of Option A, Option B and Option C was undertaken using the NTA Southwest Regional Model (SWRM). This chapter focuses solely on the transport modelling of these three options and the results extracted from the SWRM. More details on the transport modelling work completed on the Proposed Scheme can be found in the Cork LRT Feasibility: Option Selection Report Modelling Approach.

8.2.1 Future Year Assumptions

Modelling was kept consistent with work previously completed in the assessment of the 12 end to end routes, as such assumptions made during the previous modelling work has been retained. These assumptions are detailed in Chapter 4 of the Modelling Report but are summarised in the sections below.

8.2.1.1 Planning Data

Assumptions on population growth are shown in **Table 8.1** below.

Table 8.1: Population Growth

	2016	2035	2016-2035 Difference (%)	2050	2016-2050 Difference (%)
Ireland	4,761,865	5,545,490	+783,625 (+16%)	6,164,141	+1,402,276 (+29%)
Cork County	541,856	648,746	+106,890 (+20%)	733,733	+191,877 (+35%)
Cork Metropolitan	305,406	399,991	+94,585 (+31%)	475,442	+170,036 (+56%)
Cork City	130,644	182,890	+52,246 (+40%)	223,298	+92,654 (+71%)

8.2.2 LRT Coding Scenarios

Option A and Option B have previously been tested as part of the ETE8 and ETE10 routes respectively, as such only Option C was modelled as ETE13. It should be noted that where the MacCurtain Street stop is referred to in relation to Option C, this aligns with the Alfred Street stop.

8.2.3 City Centre Speeds

Speeds for the City Centre Options were taken from ETE8 and ETE10, providing speeds for Option A, Option B and Option C between Grand Parade and South Mall, and Kent Station and Marquee Road. For the Option C section between South Mall and MacCurtain Street speeds were taken based on the speed definitions used in the modelling of the end-to-end routes shown in **Table 8.2** below.

Table 8.2: Operational Speed Categories

LRT section type	Category	LRT Speed (kph)	Description
1	Non-segregated or Mixed on-street	10	Several junctions - mixed with car, walk & cycle
2	Segregated on-street	19	Segregated from the traffic with some junction crossing
3	Off street	26	Fully segregated - No junction crossing for the entire section

Between South Mall and MacCurtain Street speed type 2 was applied for Option C. This results in journey times as shown in Table 8.3 below.

Table 8.3: Run Times

Between Washington Street / Grand Parade junction and Mill Road	Run Time (Minutes)
Option A	11.30 – 12.00
Option B	10.00 – 10.30
Option C	12.00 – 12.30

8.3 Results

This section presents the results of the City Centre options tests. These results align with those presented in the modelling report in section 5.3 and as such only the options tested for the City Centre are presented in this section. All results are for 2035.

8.3.1 Mode share

The forecast mode shares for the three city centre alignment options are presented below in **Figure 8.1**. These figures are aggregated to a 24hr level. Modal shares are very similar across the 3 options with little to differentiate the option performance.

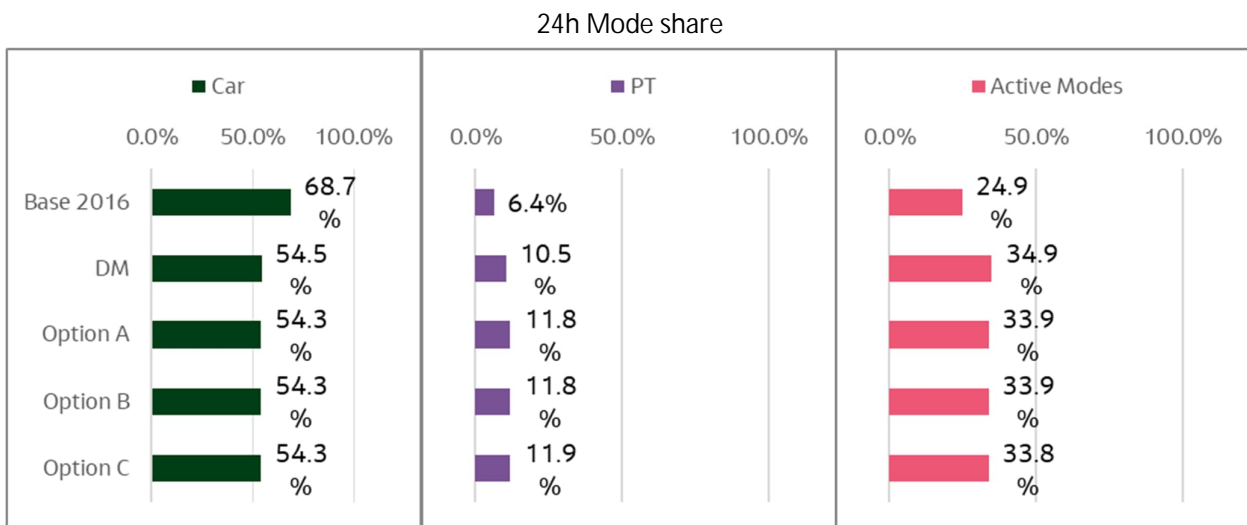


Figure 8.1 – 24h mode share in Cork City

8.3.2 PT boardings

8.3.2.1 Public Transport Boardings Summary

Forecast public transport boardings are presented below for the 3 ETE 2035 scenarios. Option C provides a higher overall boarding across the day with approx. 2.5% more PT trips across the 24hr period than Option A and Option B. This equates to 6.0% and 9.1% more boardings on Light Rail than Option A and Option B respectively with reductions in Heavy Rail, -1.1% and -1.6% for Option A and Option B respectively. Bus boardings are almost the same between Option B and C, while there is an increase of 1.5% in Option C against Option A.

Table 8.4: 24h Public Transport boardings by mode - 2035

Boardings/Mode	24H			
	DART & Irish rail	Luas	Urban & Other Buses	TOTAL
Base2016	9,561	0	66,245	75,806
DM	22,801	0	114,122	136,923
Option A	23,922	51,978	81,690	157,591
Option B	23,807	50,480	83,027	157,315
Option C	23,539	55,071	82,939	161,549

8.3.2.2 City Centre Boardings

Boarding and Alighting data for the three options has been aggregated for the city centre is displayed below for 3 groupings of stations;

- City Centre – Including Grand Parade, Patrick Street and South Mall;

- North of the River – Including MacCurtain Street and Kent Station; and
- Docklands – Including Kennedy Quay, Centre Park Road, and Marquee Road.

8.3.2.3 AM Boardings

Table 8.5 below shows the aggregate boarding data for each direction in AM.

Table 8.5: Boarding and Alightings AM

Westbound	Boarding			Alighting		
Area	A	B	C	A	B	C
City Centre	368	954	632	434	870	786
North of River	1,131	0	1,138	553	0	413
Docklands	538	1,038	500	309	312	251
Eastbound	Boarding			Alighting		
Area	A	B	C	A	B	C
City Centre	162	513	333	352	648	503
North of River	733	0	930	395	0	386
Docklands	173	376	129	846	880	1,069

Figure 8.2 and **Figure 8.3** show the boardings and alightings in at the city centre stops for each of the three options during the AM peak.

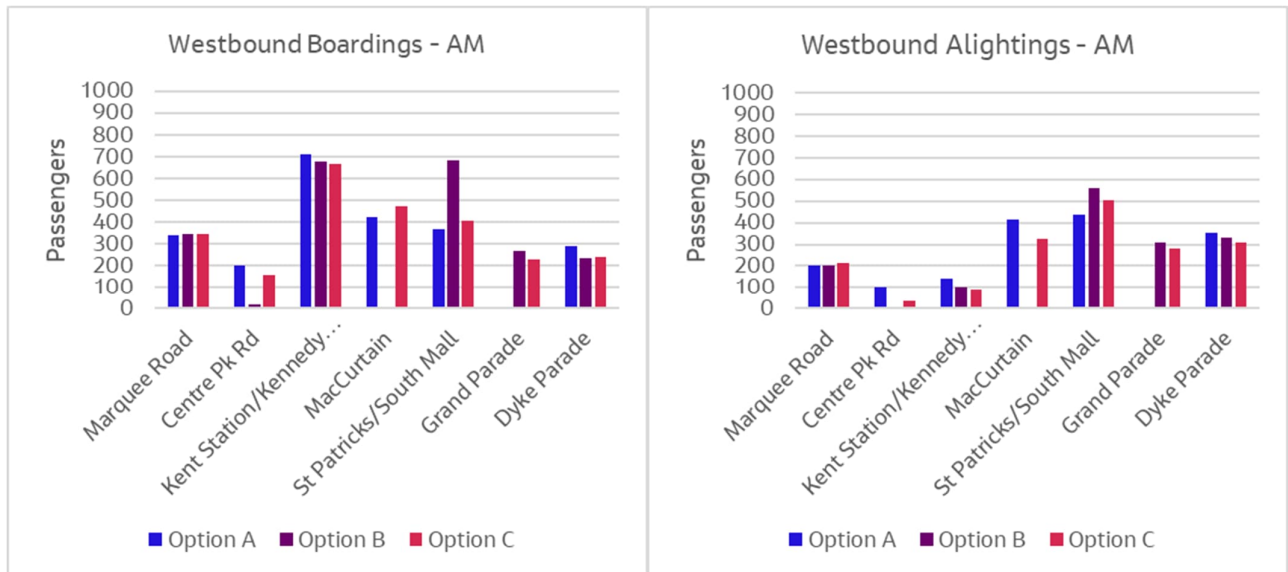


Figure 8.2 – Westbound AM

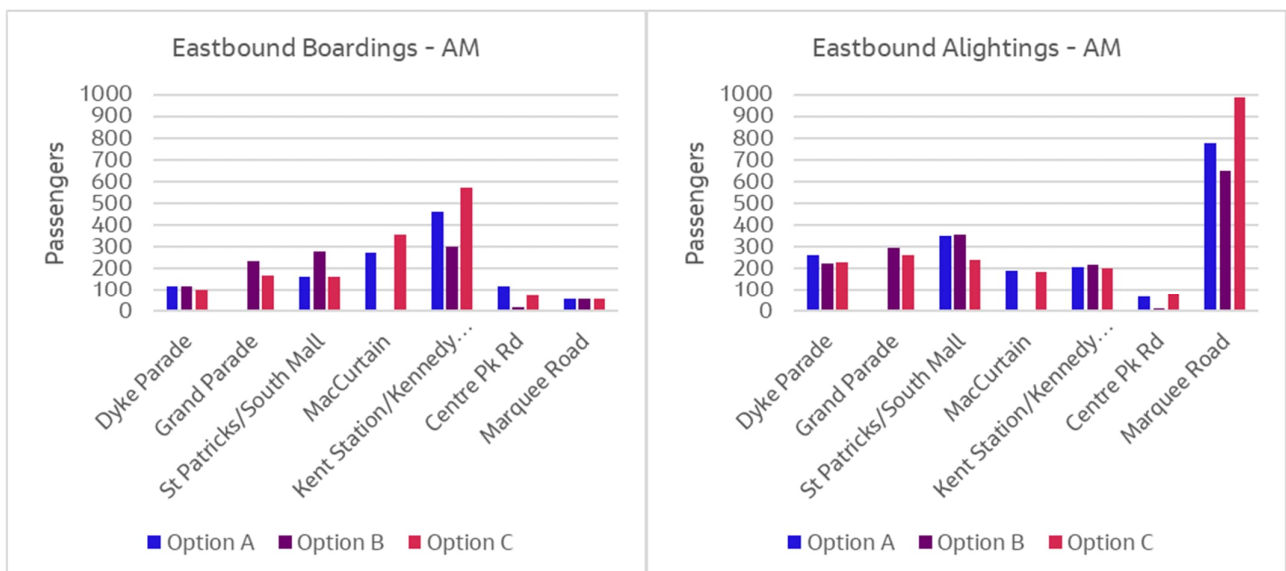


Figure 8.3 – Eastbound AM

8.3.2.4 PM Boardings

Table 8.6 below shows the aggregate boarding data for each direction in PM.

Table 8.6: Boardings and Alightings PM

Westbound	Boarding			Alighting		
Area	A	B	C	A	B	C
City Centre	322	564	443	134	554	358
North of River	300	0	318	672	0	804
Docklands	645	712	871	115	272	72
Eastbound	Boarding			Alighting		
Area	A	B	C	A	B	C
City Centre	328	495	528	294	768	562
North of River	290	0	241	1,072	0	1,023
Docklands	206	203	177	306	857	301

Figure 8.4 and **Figure 8.5** show the boardings and alightings in at the city centre stops for each of the three options during the PM peak.

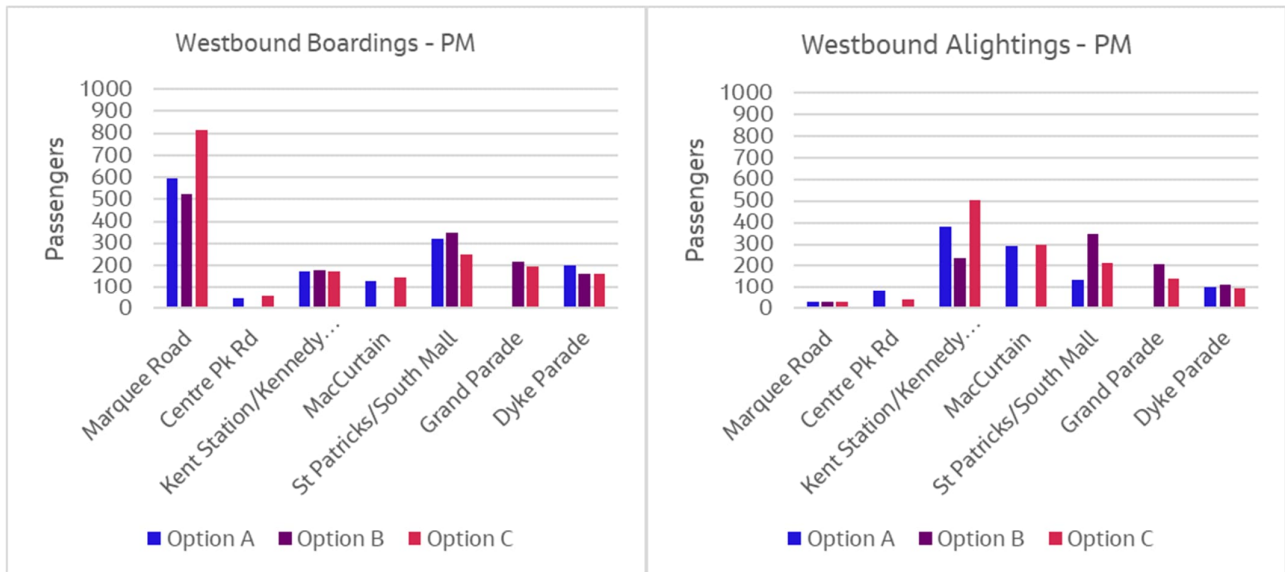


Figure 8.4 – Westbound PM

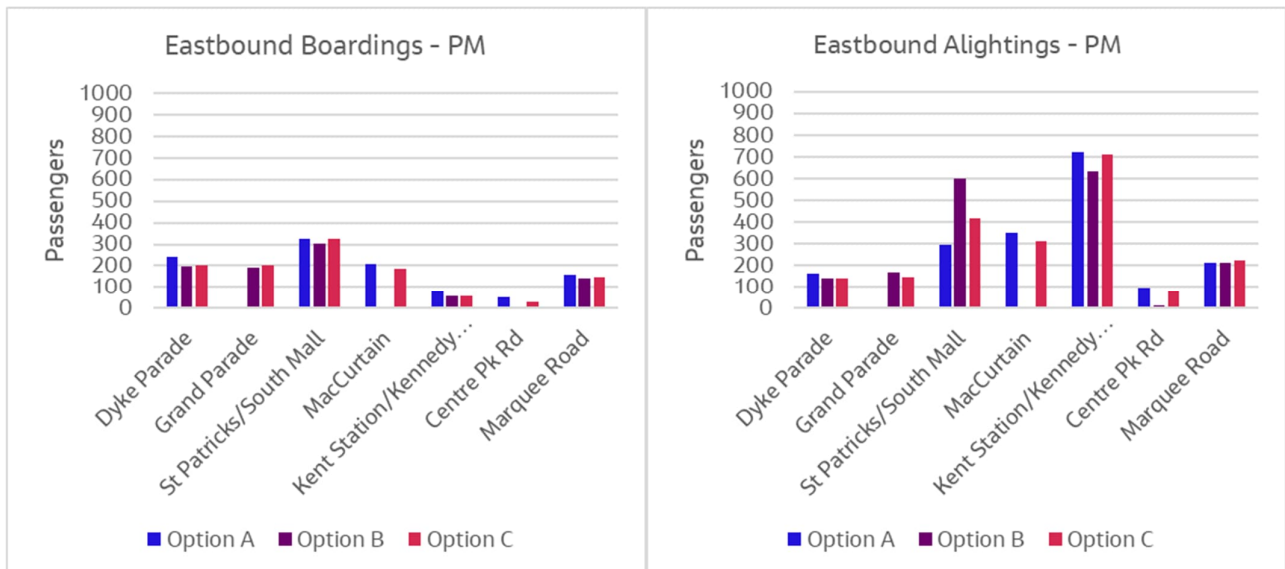


Figure 8.5 – Eastbound PM

In both directions, Option B has the highest boarding and alighting in the City Centre of the three options. Options B and C both have two stops in the City Centre, however City Centre demand is not split across the stops with South Mall stop alone being more attractive than St Patrick Street, this results in both Options B and C having higher boarding and alighting than Option A within the City Centre sections (South Mall / St Patrick Street stops).

The higher attractiveness of South Mall in Option C can be explained by the location of the station relative to the distribution of population and employment. Figure 8.6 and Figure 8.7 below show the distribution of Jobs and Population, with South Mall located closer to higher Employment and Jobs Attractions.

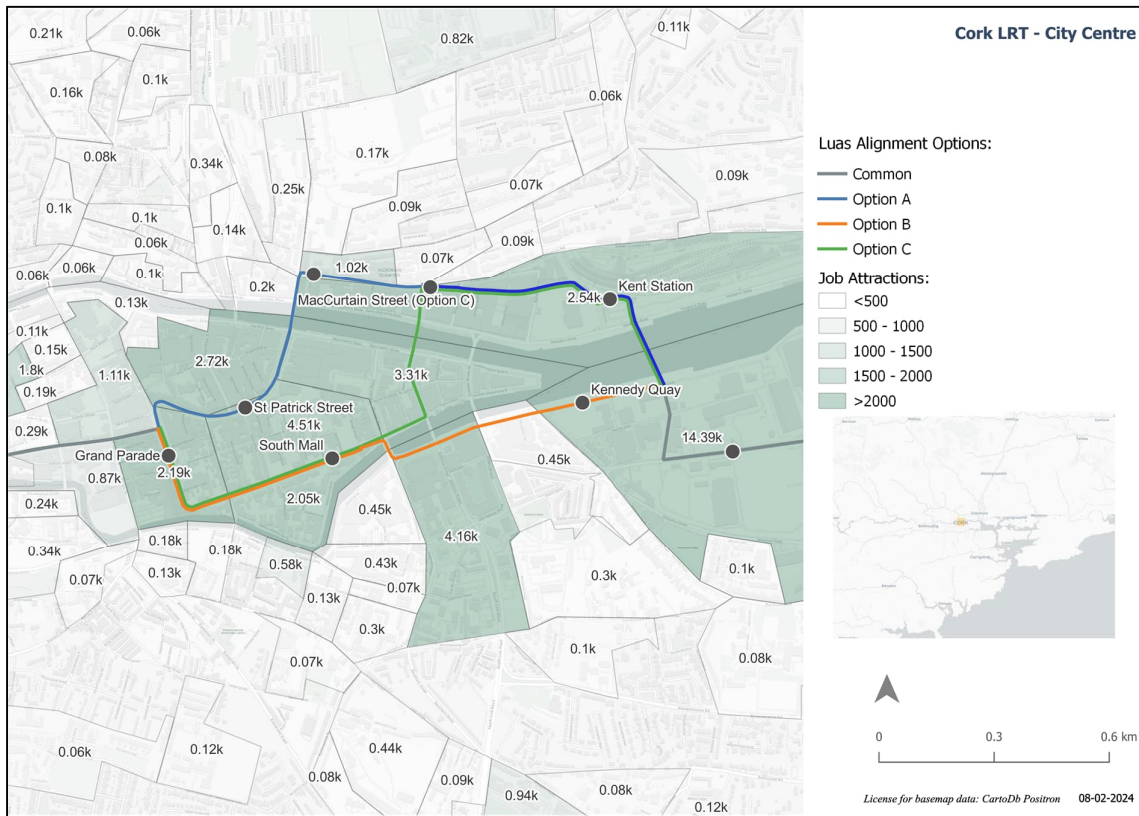


Figure 8.6 – Jobs Attractions 2035

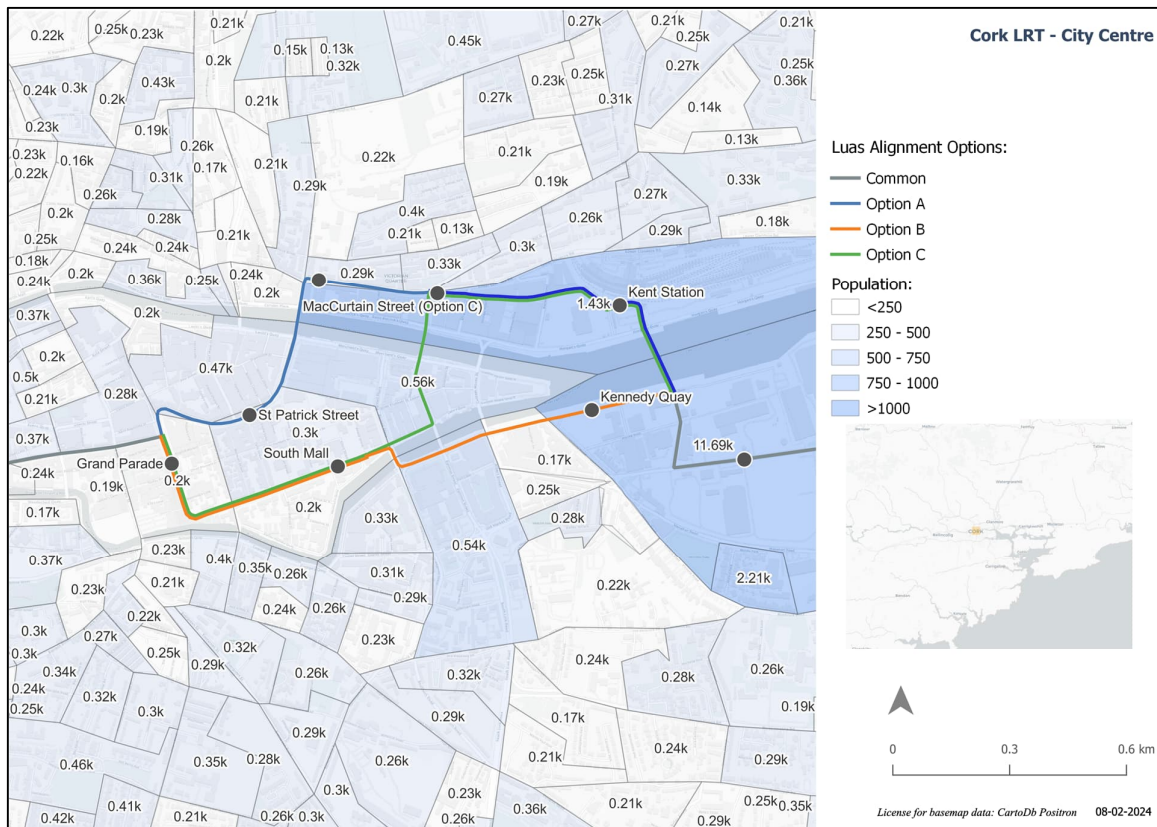


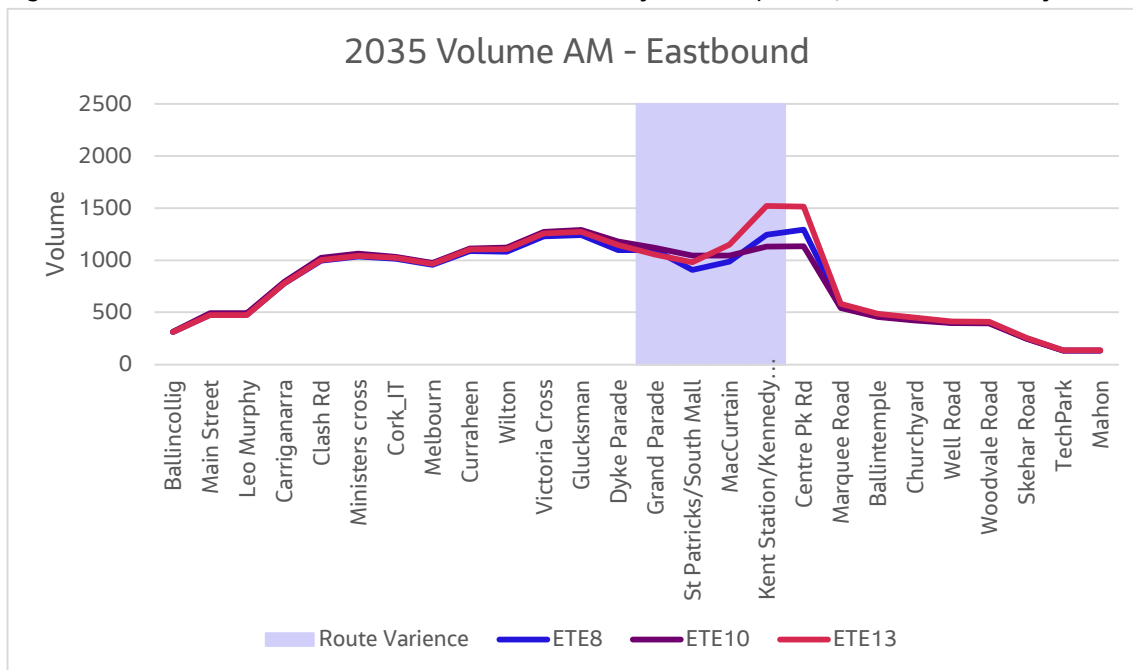
Figure 8.7 – Population 2035

North of the river, aggregate boarding and alightings are similar between Option A and Option C, however, the location of MacCurtain in Option C is more attractive as a station than the position in Option A. This, as with the city centre, is related to the distribution of population and employment with MacCurtain and South Mall stops either side of the large employment and population zone in the west of the City Centre.

In the Docklands, alighting at Marquee Road is highest in Option C in the AM Eastbound, with the same pattern in Westbound boardings in the PM, approx. 200 passengers higher than Option A. This corresponds with the approx. 200 additional passengers boarding and alighting at Kent Station and MacCurtain suggesting a strong demand for trips between the Docklands and the stations north of the river.

8.3.3 End-to-End Line profiles

Forecast line profiles showing volumes across the route for the 2035 AM peak hour are shown in Figure 8.8 and Figure 8.9 below. It should be noted that ETE 8 utilises City Centre Option A; ETE 10 utilises City Centre Option B



and ETE 13 utilises City Centre Option C.

Figure 8.8 – Eastbound Volumes AM

It should be noted that, in order to provide a side-by-side comparison of the three options in a single graph, certain stops have been included that are only in some options. For example: The MacCurtain stop considers the patronage at MacCurtain Street in Option A and at Alfred Steet in Option C, while Option B does not include this stop. Also the Grand Parade stop is considered in Option B and C but not in Option A.

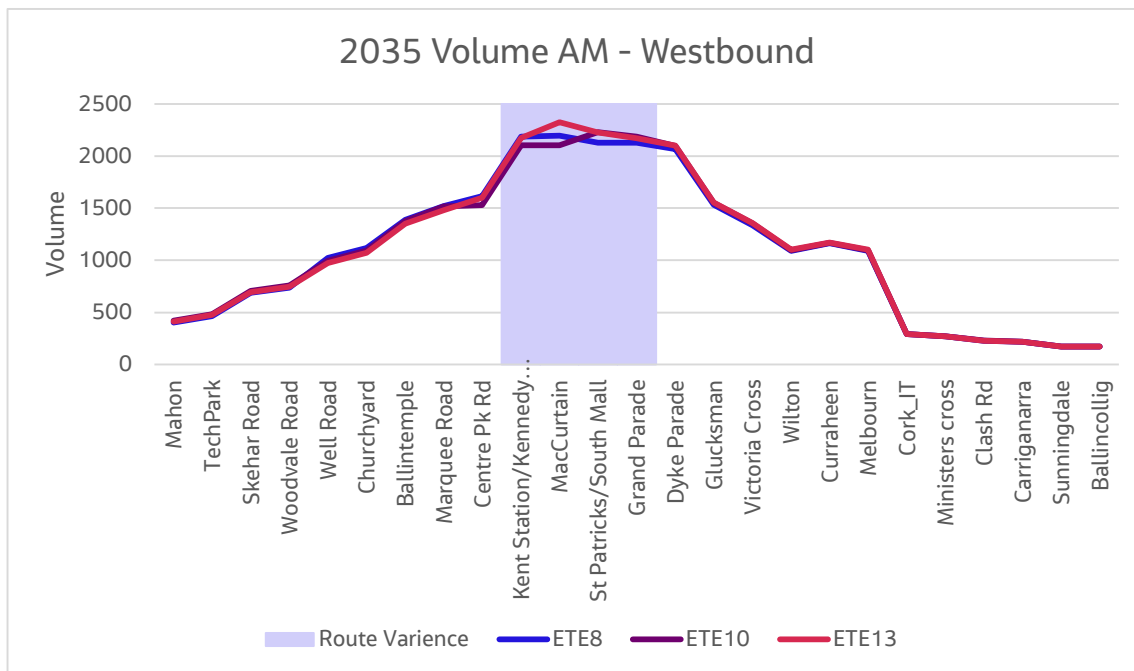


Figure 8.9 – Westbound Volumes AM

In the AM eastbound, Option C has the highest peak volume following a similar profile of Option A, peaking at MacCurtain and Kent Station and dropping back to a similar level to the other options at Marquee Road.

This higher peak in Option C is driven by additional boarders in the City Centre at Grand Parade and South Mall compared to St Patrick Street boardings for Option A.

Forecast line profiles showing volumes across the route for the PM peak hour are shown in **Figure 8.10** and **Figure 8.11** below.

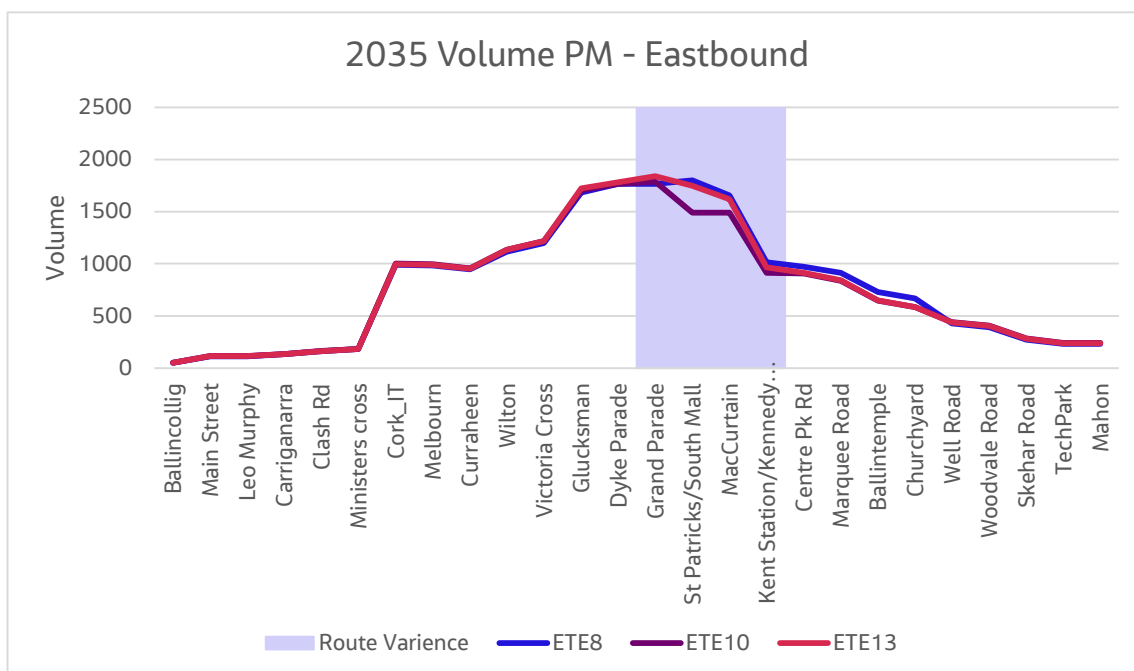


Figure 8.10 – Eastbound Volumes PM

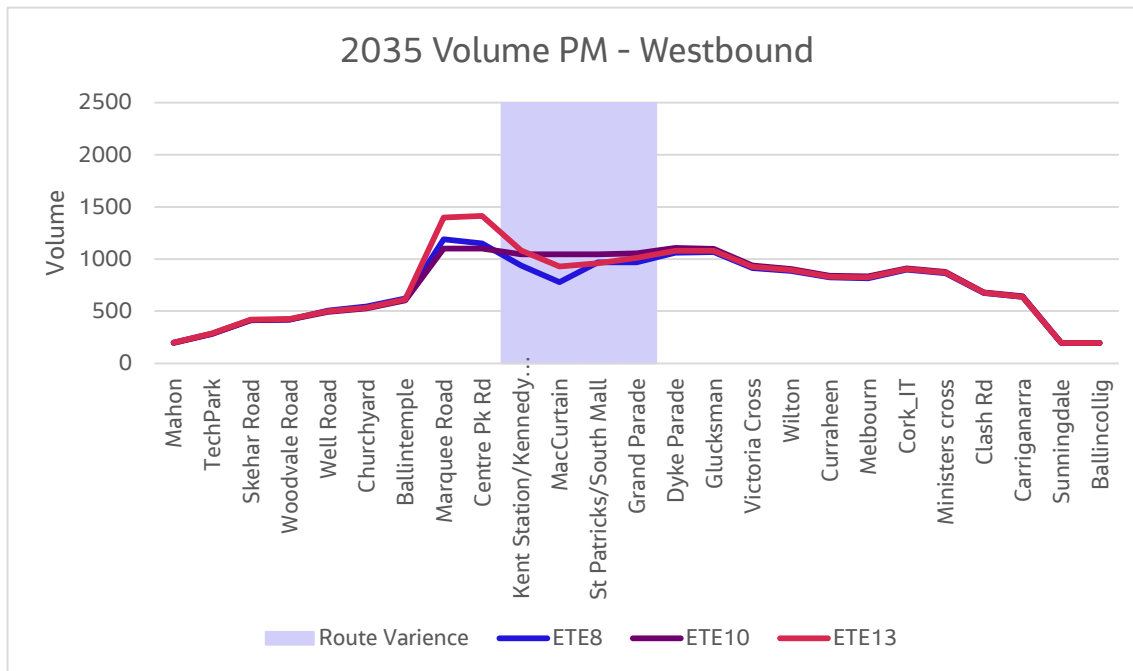


Figure 8.11 – Westbound Volumes PM

In the PM the patterns seen in the AM are mostly reversed with a similar trip profile with Option A and C following a similar profile but with Option C having a higher peak volume Westbound due to boardings at Marquee Road.

8.4 Modelling Results – Economic Benefits

The Irish version of Transport User Benefit Appraisal (TUBA) software was used to calculate economic benefits for the three options. The two modelled forecast years were included in the calculations, over a 60-year period: 30 year appraisal period plus 30 year residual period.

As shown in **Table 8.7** below, the economic benefits are close between Options A and B, with over €116m of further benefits for Option C. Most of the economic benefits are coming from the Public Transport users, which is expected for a PT scheme.

Table 8.7: TUBA Economic Benefits (k€)

	Option A (€'000)	Option B (€'000)	Option C (€'000)
Economic Efficiency: Consumer Users (Commuting)	299,489	282,485	326,831
Economic Efficiency: Consumer Users (Other)	376,541	398,154	442,832
Economic Efficiency: Business Users and Providers	341,259	343,033	374,897
Wider Public Finances (Indirect Taxation Revenues)	-25,986	-24,684	-27,965
Present Value of Benefits (PVB)	991,343	999,032	1,116,652

Total economic benefits over the appraisal period for option C are valued €1,116m, which is €117m higher than option B (10.6% difference), and €125m higher than Option A (11.2% difference).

8.5 Capital Cost Comparison

Costs presented are not representative of the capital cost for the full route length. Due to scope uncertainty and lack of preliminary design, the costs presented in this report are not to be used as feasibility working costs for any of the three city centre route options. Nor should the cost information be used to determine full or approximate project capital costs, budgets, outline scheme target cost or scheme base cost. The included costs do not have the required level of accuracy to produce a feasibility working cost, and are merely included to compare one route option against another route option using a common standard.

Comparative costs for Option A, Option B and Option C have been developed based on the metrics for route alignments for end-to-end options 8, 10. The costs presented in this chapter are for the sections where the Option A, B and C differ, (city centre section only) to provide an estimate of the additional cost associated with routing via Kent Station.

8.5.1 Costing Breakdown

The estimate includes an allowance for inflation. This has been calculated from the base date of pricing (2Q 2022) to the midpoint of construction (4Q 2032). Inflation has been estimated based on the BCIS Civil Engineering Tender Price Index up to 2Q 2027 as no further forecasts are available beyond this date. An inflation rate of 3.5% per annum has been included from 3Q 2027 to 4Q 2032. Figure 8.12 below shows the detail of the comparative costs of the three options to demonstrate the additional cost associated with routing via Kent Station

Ref	Description	Km	Light Rail Works		
			OPTION A	OPTION B	OPTION HYBRID
			2.31	2.03	2.52
	Construction Works (Including Preliminaries and Traffic Management)		€150,839,705	€119,000,894	€155,374,137
	Land Acquisition and Injurious Affection Costs		Excluded	Excluded	Excluded
	Rolling Stock		Excluded	Excluded	Excluded
	Project / Design Team and Other Project Costs	25%	€37,709,925	€29,750,223	€38,843,534
	Design Risk / Contingency				
	Construction Works & Land	59%	€111,244,283	€87,763,160	€114,588,426
	Rolling Stock	20%	Excluded	Excluded	Excluded
	Inflation				
	Inflation from 2Q2022 to 2Q2030	31%	€92,936,113	€73,319,426	€95,729,890
	Inflation from 2Q2030 to 4Q2032	9%	€35,345,702	€27,885,033	€36,408,239
	Total Cost Including Inflation (Ex VAT)		€428,076,000	€337,719,000	€440,944,000

Figure 8.12 Summary of Capital Cost Comparison for Option A, Option B and Option C Connections to Kent Station

As outlined in table 8.12, Option B has the lowest cost estimate of the three options, with a delta to Option A of +€90.3m and a delta to Option C of +€103.2m.

8.5.2 Summary - Economy

In relation to the overall Economy summary, Option B and C would present some advantages when compared to Option A. As outlined in the sections above, Option C has the highest patronage and levels of benefits of the three options. Option B presents some advantages over Option A and C in relation to the lowest journey time for the city centre alignment as well as the lowest costs of the three options. Option A and C would require a new 125m long LRT bridge to connect from Kent Station to Kennedy Quay as well as highly likely structural interventions/strengthening on the existing St Patrick's Street bridge and Brian Boru Bridge respectively. Option

B would require a new 125m long pedestrian bridge and would unlikely require any strengthening of the Parnell Bridge, which is a modern concrete structure built in 1971.

9. Conclusions and Recommendations

As demonstrated in the comparative analysis in **Table 9.1** and the summary in **Table 9.2** below there is significant parity between the two analysed core city centre options.

Table 9.1: Comparative Assessment of Option A – C

Primary Criteria	Sub Criteria	Option A	Option B	Option C
1. Integration	Integration with Streets and Traffic			
	Public Transport Integration			
2. Accessibility and Social Inclusion	Catchment and Key Trip Attractors			
3. Environment	Human Environment			
	Physical Environment			
	Landscape and Visual			
	Cultural Heritage			
4. Economy	Patronage			
	Journey Times			
	Benefits			
	Costs			

Table 9.2: Comparative summary table showing the primary criteria for Option A – C

Primary Criteria	Option A	Option B	Option C
Integration			
Accessibility and Social Inclusion and Mobility			
Environment			
Economy			

9.1.1 Summary of Comparative Analysis Integration

In relation to overall Integration, Option A is deemed the most viable. Whilst there are some challenges in terms of integration with existing streets and traffic in the vicinity of St. Patrick Street (west), Grand Parade and Washington Street, analysis has demonstrated that these can be accommodated and the provision of longer bus bays, as well taxi and loading set downs allow for BusConnects and Luas Cork to co-function on St Patrick Street. The direct connection with Kent Station in Option A also provides a distinct advantage over Option B in relation to public transport integration. Whilst Option C shares the same connection proposal to Kent Station as Option A, analysis has shown that there are greater challenges from a traffic perspective in relation to the reduction of capacity on Brian Boru Bridge which is a major traffic artery for the city. Options C is constrained by Lapps Quay and would require construction of additional infrastructure to accommodate pedestrian movements. Option C faces some constraints in relation to successful integration with BusConnects on Clontarf St and intercity services on Alfred Street.

All options will provide cycle and walking infrastructure to add to the city centre network, enhancing sustainable travel access to the main shopping district in Cork City. It should also be noted that all options would require careful consideration of cycle integration, in the context of a constrained and historic streetscape. Cycle permeability and safety needs to co-exist with the Luas network, whether through segregated infrastructure, viable diversions or adjacent alternative routes

The linear alignment for Option B allows higher average running speeds and a shorter journey time when compared to Option A. The sequential network of streets along Grand Parade, South Mall, Albert Quay and Kennedy Quay have sufficient width to accommodate full LRT segregation along this section lending well to high reliability of the service.

9.1.2 Accessibility

Options A and C connect the Proposed Scheme both north and south of the river. However Option A captures a greater number of trip attractors, which appears to increase overall accessibility or catchment when compared to Option B and C. Connecting both sides of the river would appear to provide greater levels of city-wide inclusivity on a qualitative level for Option A and coupled with its direct connection to Kent Station would provide the optimal rail integration with LRT, with reduced requirement for wayfinding between modes.

9.1.3 Environment

The Proposed Scheme has the potential to enhance accessibility and connectivity which can bring benefits to the population in terms of employment opportunities, economic growth and social interaction as well as direct and indirect benefits to human health. It has the potential to support reductions in energy demand from the transport sector though electrification and it can also relieve pressure on other transport infrastructure by providing an alternative means of travel within the city, improving connectivity and reducing journey times which can also result in similar benefits.

The assessment of Option A, Option B and Option C for environment found that for Cultural Heritage Option A is the preferred option as there are fewer RPS and NIAH sites on St Patrick's Street, newer building stock and there is potential for less archaeological risk. For Landscape the opportunities for urban landscape improvements could be achieved across all three route options, but different in response to the distinct characters of the streets and spaces. As a result, the route options are considered to be comparable. The preference for Physical Environment would be for Option B as although both routes propose to connect Kennedy Quay and Kent Station via a new bridge, Option B proposes a pedestrian bridge which would be smaller in size and involves a less extensive construction period reducing the risk of run-off/pollution to occur during the construction of the bridge.

9.1.4 Economy

The Economy assessment for options A, B and C focussed on the outputs from the comparative exercise on modelling, as well as a comparative capital cost build up. The modelling of the options in the strategic Southwest Regional Model provides useful insights on the Proposed Schemes performance. Patronage on the Proposed

Scheme is slightly higher in Option C due to its additional stop and its wider coverage of the north and south sides of the city, with Option B presenting the lowest patronage (Option A+3% and Option C +9% in 2035 – 24h boardings).

Total economic benefits over the appraisal period for Option C are valued €1,116m, which is €117m higher than Option B (10.6% difference), and €125m higher than Option A (11.2% difference).

9.2 Summary of Benefits for Options A, B and C

Option A is considered to offer the following benefits:

- The significant benefit of providing rail-based public transport connectivity at Kent, offering a legible, fully accessible and integrated multi-modal interchange.
- The potential benefit of serving the main thoroughfare of the city centre, St. Patrick Street, through the centre of the island catchment, which is also identified in CMATS and the Cork City Development Plan (2022-2028).
- Option A is compatible with Cork City Council's proposal for a public transport bridge, funding for which has been approved under the Urban Regeneration and Development Fund, with respect to the Cork City Docklands Scheme. Should that scheme progress there will be opportunities to cost share and thereby reduce the overall project cost for the bridge, which is currently assumed as a full project cost to the Proposed Scheme. Progressing and integrating both scheme plans would allow for a more efficient use of exchequer funding, and reduce the assumed costs for Option A, as well as being of benefit to non-LRT users;
- Option A serves all the identified trip attractors, the city centre main street and social hubs and has a broader reach within the city. As such, it can facilitate both anticipated and less obvious travel patterns and open latent demand, generating diagonal connectivity between the northside of the city and the Docklands and Blackrock to the east and Curragheen and Bishopstown to the west.

Option B is considered to offer the following benefits:

- The alignment is simple and direct and satisfies many of the project criteria.
- It serves the city core in an uncomplicated manner for people travelling from both the west and the east of the city.
- The pedestrian bridge connection to Kent, although less than ideal in terms of mobility and accessibility, offers an active travel link north and south of the Lee; and
- There are opportunities for riverside regeneration associated with this option, along Kennedy Quay, Lapps Quay, and South Mall, which would benefit the city.
- The availability of space along the cross-section of Option B allows for greater flexibility for space allocation, with potential for less disruption to the existing modes along this route.
- Option B has the lowest journey time, is cheaper than Option A and C whilst achieving similar patronage and benefits.

Option C is considered to offer the following benefits:

- The significant benefit of providing rail-based public transport connectivity at Kent, offering a legible, fully accessible and integrated multi-modal interchange.
- Option C is compatible with Cork City Council's proposal for a public transport bridge, funding for which has been approved under the Urban Regeneration and Development Fund, with respect to the Cork City Docklands Scheme. Should that scheme progress there will be opportunities to cost share and thereby reduce the overall project cost for the bridge, which is currently assumed as a full project cost to the Proposed Scheme. Progressing and integrating both scheme plans would allow for a more efficient use of exchequer funding, and reduce the assumed costs for Option C, as well as being of benefit to non-LRT users;

- Option C serves a high number of trip attractors and social hubs and has a broader reach within the city. As such, it can facilitate both anticipated and less obvious travel patterns and open latent demand, generating diagonal connectivity between the northside of the city and the Docklands and Blackrock to the east and Curragheen and Bishopstown to the west.

9.3 Recommendations

All of the three city centre options assessed present viable alignments that would work as part of an End-to-End scheme option for Luas Cork, each with comparable advantages and disadvantages. Based on the review and comparative analysis of Option A, Option B and Option C it is deemed that Option A would be ranked as the strongest option across the MCA Criteria, followed by Option C and then Option B.

10. Appendix

10.1 Detailed Cultural Heritage Assessment Tables

Table 10.1: Assessment of Option A, Option B and Option C with Respect to Potential impacts on Below Ground Archaeological Remains

Option A		Option B		Option C		Preference
A. Grand Parade	<p>(i) <i>Segment Distance:</i> c. 69m.</p> <p>(ii) <i>Archaeological potential:</i> Area located immediately outside medieval city walls in area of former city moat, formed by a former (diverted?) river channel. Quay-side development in the 17th century. 18th-century reclamation and culverting, but across a much more limited footprint. Correspondingly reduced potential for artefacts and ecofacts. Some structural (culvert/bridge/quay side) remains expected. Potential for organic preservation. Late medieval archaeology possible.</p>	Grand Parade	<p>(i) <i>Segment Distance:</i> c. 220m.</p> <p>(ii) <i>Archaeological potential:</i> Same archaeological setting/ environment, but with a much larger footprint impacted and correspondingly greater potential for artefacts and ecofacts. 18th-century reclamation and culverting very likely. Some structural (culvert/bridge/ quay side) remains expected. Potential for organic preservation. Late medieval archaeology possible.</p>	Grand Parade	<p>(i) <i>Segment Distance:</i> Same as Option B</p> <p>(ii) <i>Archaeological potential:</i> Same as Option B</p>	Option A (firmly) - <i>Rationale:</i> Has greatly reduced archaeological potential by virtue of it being the significantly shorter segment, despite crossing similar historical environment to Option B and Option C segments
B. St. Patrick's Street	<p>(i) <i>Segment Distance:</i> c. c.500m.</p> <p>(ii) <i>Archaeological potential:</i> Former natural river channel, encroached in 17th century by quayside development. Culverted/ reclaimed in the late 18th century. High potential for artefacts and ecofacts. Some structural (culverts/quay side) remains expected.</p>	South Mall	<p>(i) <i>Segment Distance:</i> c. c.530m.</p> <p>(ii) <i>Archaeological potential:</i> Very similar historical environment: former marshland, canalized with quayside development in the 17th century. Culverted/ reclaimed in the 18th and 19th century. High potential for artefacts and ecofacts. Some structural (culverts/quay side) remains expected.</p>	South Mall	<p>(i) <i>Segment Distance:</i> Same as Option B</p> <p>(ii) <i>Archaeological potential:</i> Same as Option B</p>	Route Option A (marginally) - <i>Rationale:</i> Little to distinguish between routes as all route segments share similar historical environments, so similar archeology possible. Options B&C are only slightly longer.
C. River crossings	<ul style="list-style-type: none"> <i>Existing structures:</i> Route traverses St. Patrick's Bridge, listed on the Record of Protected Structures. <i>New structures:</i> Route will also require a new bridge crossing further east, down river. Related quay side and bridge pier works have clear archaeological potential. Potential (which may or may not materialise) for considerable cost/ programme implications were underwater archaeology found to be present/ impacted. Route segment crosses at right angle, minimising riverine environment impacted. 	River crossings	<ul style="list-style-type: none"> <i>Existing structures:</i> Route traverses Parnell Bridge, a modern bridge not listed on the Record of Protected Structures or the NIAH. <i>New structures:</i> Route will also require a new pedestrian bridge at broadly similar location to new bridge requirement for Option A/ Option C, albeit with a smaller footprint likely. Similar archaeological risk. 	River Crossings	<ul style="list-style-type: none"> <i>Existing structures:</i> Route traverses Brian Ború Bridge listed on the Record of Protected Structures. Structural elements of bridge may be impacted. <i>New structures:</i> Will require similar new bridge as Option A 	Route Option B - <i>Rationale:</i> Reduced archaeological risk from likely smaller comparative footprint of pedestrian bridge.

D. Bridge St/ MacCurtain St/ Alfred St / Kent Station/ Horgan's Quay / Kennedy Quay (to where options join)	<p>(i) Combined segment distance: c. 1049 m.</p> <p>(ii) <i>Archaeological potential:</i> Bridge St. a former docking area. Likely an urban streetscape since c. late 18th century. MacCurtain St is earlier and Alfred St later. Route passes historic footprint of Kent Station (formerly Glanmire Road Station) complex, the site of a former large pond in M19th century. Crosses Horgan's Quay and Kennedy Quay perpendicularly. Several undesignated sites of cultural heritage potential also impacted.</p>	Terence MacSweeney Quay/ Albert Quay East/ Kennedy Quay (to where options join)	<p>(i) Combined segment distance: c. 791 m.</p> <p>(ii) <i>Archaeological potential:</i> MacSweeney Quay/ Albert Quay/Albert Quay East former marshland up to late 18th century, developed as a quay by mid-19th century. Kennedy Quay originated as 'The New Wall' in the L18th century.</p>	Lapp's Quay/ Clontarf St/ Brian Boru St/ Alfred St/ Kent Station/ Horgan's Quay / Kennedy Quay (to where options join)	<p>(i) Combined segment distance: c. 1041 m.</p> <p>(ii) <i>Archaeological potential:</i> Some possible impact on archaeology relating to 18th century quay development along Lapp's Quay, significant potential for impacts on 18th & 19th century building foundations under Clontarf St. Brian Boru St crosses former early 19th century foundry (with significant archaeological potential). Potential archaeological impact from Alfred St onwards is same as Option A</p>	<p><u>Route Option B, (marginally over Option A, more so over Option C).</u> -Rationale: Option B has a more recent development history Option A, reducing potential for archaeological remains - albeit has greater potential for organic preservation in quays area.</p>
Option likely to have least impact effects on Below Ground Archaeological Remains						
<p>The difficulty with considering potential for below ground archaeological remains is that the true potential cannot be realized without more detailed investigation nor, ultimately, until the ground is exposed.</p> <p>All three routes have pros and cons. The most potential for significant impacts on Below Ground Archaeological Remains is likely to occur with respect to the medieval levels along the Grand Parade and within the mostly 18th/19th century footprint of the commercial city centre. Here, the Option A (Grand Parade/Patrick Street) poses the slightly less archaeological risk. Option C (Grand Parade/South Mall/Lapp's Quay, Clontarf Street) will likely have the greatest impact on Below Ground Archaeological Remains.</p> <p>In terms of river crossings and the remainder of all routes leading eastwards away from the city historic core, Option B likely carries marginally less risk.</p> <p>Overall, it is difficult to distinguish between the Options A and B in terms of likely effects on below ground archaeological remains, but Option A might prove to have marginally less archaeological impact.</p> <p>Assessment outcome: Option A, marginally over Option B. Option C is the clear least preferred.</p>						

Table 10.2: Assessment of Option A, Option B and Option C with Respect to Potential Impact on Historic Buildings (individual and areas)

Option A		Option B		Option C		Preference
A. Grand Parade	<i>Potential impact on Historic buildings:</i> Potential for some degree of direct impact or modification to Finns Corner (NIAH site, within ACA). Proximity to one RPS (post-box) and several NIAH sites of regional importance. Traverses Oliver Plunket St. ACA.	Grand Parade	<i>Potential impact on Historic buildings:</i> Direct impact on one RPS (Berwick Fountain), with design scope to avoid monument unlikely. Close proximity to two other RPS sites and on streetscape of a further 5 RPS sites. On streetscape of several NIAH sites of regional importance. Traverses Oliver Plunket St. ACA.	Grand Parade	<i>Potential impact on Historic buildings:</i> Same potential as Option B	Option A - <i>Rationale:</i> Fewer RPS sites on/adjacent to route. Would avoid impact on Berwick Fountain RPS.
B. St. Patrick's Street	The route will impact directly on one RPS site (Father Mathew Monument), albeit with potential design scope to avoid structure likely. Route impacts on streetscape of 10 RPS sites and multiple NIAH sites of regional importance. Runs along fringe of Oliver Plunket Street ACA.	South Mall	Potential direct impact on RPS site (post-box), albeit with potential design scope to avoid structure likely. Impacts on streetscape of 36 RPS sites and multiple NIAH sites of regional importance. Traverses South Channel ACA	South Mall	<i>Potential impact on Historic buildings:</i> Same potential as Option B	No clear preference - <i>Rationale:</i> Option A, ostensibly, would directly impact on Father Mathew Monument RPS, albeit with strong potential design scope to avoid it. Options B and C are flanked by a significantly higher number of RPS structures and would potentially directly impact on a PRS site (post box), albeit, with potential design scope to avoid it.
C. River crossings	Route traverses St. Patrick's Bridge, listed on the Record of Protected Structures and NIAH. Potential structural impacts.	River crossings	Route traverses Parnell Bridge, a modern bridge not listed on the Record of Protected Structures or NIAH.	River Crossings	Route traverses Brian Ború Bridge, listed on the Record of Protected Structures and NIAH. Potential structural impacts, more so due to superstructure.	Option B - <i>Rationale:</i> Route crosses modern bridge only (not listed on the RPS nor NIAH)
D. Bridge St/ MacCurtain St/ Alfred St / Horgan's Quay / Kennedy Quay (to where options join)	Impacts on streetscape of 13 RPS sites and multiple NIAH sites of regional importance. Traverses Coburg St and St. Patrick's Hill ACA. Traverses MacCurtain St ACA	Terence MacSweeney Quay/ Albert Quay East/ Kennedy Quay (to where options join)	Impacts on streetscape of 3 RPS sites and several NIAH sites of regional importance. Traverses Albert Quay, Albert St, Victoria Rd Proposed ACA	Lapp's Quay/ Clontarf St/ Brian Boru St/ Alfred St/ Kent Station/ Horgan's Quay Kennedy Quay (to where options join)	Potential direct impacts on a NIAH site (mooring posts) of regional importance. Impacts on streetscape of 7 RPS sites and multiple NIAH sites of regional importance.	Option B (marginally) - <i>Rationale:</i> Fewer RPS/NIAH sites on/adjacent to route. No direct impacts on NIAH sites
Likely to have least impact effects on historic buildings						

In terms of direct impacts, Option A's potential impact on Father Mathew Monument RPS is somewhat counter-balanced by Option B's and Option C's likely impact on the Berwick Fountain RPS. Option A may potentially result in some degree of impact or modification to Finns Corner. The remaining impacts on the architectural heritage (along all routes) are confined largely to the streetscape settings of designated historic buildings. The effects of indirect impacts on individual historic buildings may ultimately prove to be Slight to Not Significant. All routes have pros and cons. Architecturally, Option A along Grand Parade / Patrick St is deemed marginally advantageous for new transport development along Grand Parade / South Mall (Option B and Option C), traversing the streetscape of fewer RPS and NIAH sites and given The South Mall having a notably older building stock. That said, were Option A to be selected this would likely drive more cars onto the South Mall, likely degrading its streetscape character. In addition, Option A at Grand Parade / St. Patrick's Street junction, the swept-path will be less than 1.8m from the building face in 3 locations, and this proximity is not replicated in Option B or C. Exiting the historic core of the city, preference might justifiably (if marginally) swing to Option B, simply by virtue of it passing through more open, less sensitive dockland environments and generally more recent building stock. Option B also crosses a modern bridge not on the RPS nor the NIAH, unlike the bridges traversed by Options A and C.

Assessment outcome: Option B (marginally)

Table 10.3: Assessment of Option A and Option B with Respect to Potential Impact on Historic Landscapes and Parks

Option A		Option B		Hybrid Route Option		Preference
A. Grand Parade	<i>Potential impact on historic landscapes and parks:</i> Historic landscape is characterized by it being a former watercourse / moat, outside the medieval city walls, later developed with a quay side and ultimately culverted and infilled in 18 th century. Former open landscape area maintained by current boulevard and public realms.	Grand Parade	<i>Potential impact on historic landscapes and parks:</i> Shares same / similar historic landscape as Option A segment.	Grand Parade	<i>Potential impact on historic landscapes and parks:</i> Same as Route Option B.	Option A (marginally)- <i>Rationale:</i> Where impacts are measurable, these occur on a shorter section.
B. Patrick's Street	<i>Potential impact on historic landscapes and parks:</i> Historic landscape is characterized by it being a former watercourse, originally existing at the rear of the expanded 17 th century city. As city developed, it served as a key shipping dock/quayside. Culverted and infilled in late 18 th century. Open area maintained by current naturally meandering thoroughfare and public realms.	South Mall	Historic landscape is characterized by it being a former canalized watercourse with quayside development in the 17 th century. Culverted/ reclaimed in the 18 th and 19 th centuries. Open area (former canalized watercourse) maintained by hardline of long linear boulevard. Has an inferior public realm to Patrick St.	South Mall	<i>Potential impact on historic landscapes and parks:</i> Same as Route Option B.	<u>Option A -</u> <i>Rationale:</i> Has a more esthetic, naturally meandering thoroughfare and better existing public realm. Traffic reduction would augment space.
C. River crossings	<ul style="list-style-type: none"> <i>Existing:</i> Route traverses St. Patrick's Bridge, listed on the Record of Protected Structures and NIAH, but structure will 	River crossings	<ul style="list-style-type: none"> <i>Existing:</i> Route traverses Parnell Bridge, a modern bridge not listed on the Record 	River crossings	<ul style="list-style-type: none"> Route traverses Brian Boru Bridge, listed on the Record of Protected Structures and NIAH. 	No clear preference <i>Rationale:</i> Historic landscape change most influenced by addition (by each

	<p>remain a mixed modal transport crossing.</p> <ul style="list-style-type: none"> <i>New:</i> Route would also add a bridge over the River Lee before (in terms of the approach to the city) the channel splits into the N & S channels. This would be a first and would represent a significant landscape change. Albeit, a positive would be a new vista on diverging channels. 		<p>of Protected Structures or NIAH.</p> <ul style="list-style-type: none"> <i>New:</i> Would introduce a new pedestrian bridge at similar location to Option A LRT bridge, with similar implications. 		<ul style="list-style-type: none"> <i>New:</i> Route would also add a bridge over the River Lee (in terms of the approach to the city) the channel splits into the N & S channels. This would be a first and would represent a significant landscape change. Albeit, a positive would be a new vista on diverging channels. 	<p>route) of new bridge at similar location east of channel diversion.</p>
D. Bridge St/ MacCurtain St/ Alfred St / Kennedy Quay/ Centre Park Rd (to where options join)	<p>Western portion (to end of MacCurtain St.) is urban / with eastern end being a more industrial landscape. Area has mid-18th century origins.</p>	Terence MacSweeney Quay/ Albert Quay East / Kennedy Quay / Millroad	<p>Passes through Albert Quay / Albert Street / Victoria Road ACA proposal. Largely undeveloped until the early 19th century. The wharf area originated as a navigation wall in the late 18th century before an intensive period of river and berth deepening, and quay and wharf building from the early 19th.</p>	Lapp's Quay/ Clontarf St/ Brian Boru St/Alfred St/ Kent Station/ Horgan's Quay	<p>Lapp's Quay linked with maritime trading from mid-18th century. Clontarf St and Brian Boru St are modern intrusions across former urban/industrial areas. Eastern end of route is mostly 19th century development dominated by the railway development.</p>	<p>Option C <i>Significant portion of route (Clontarf Street and Brian Boru street) is a modern intrusion</i></p>
<p>Likely to have least impact on historic landscapes and parks</p> <p>Impacts of all three routes are confined to an appraisal of how sympathetic the development would be on historic landscapes and parks. Along The Grand Parade all routes traverse the same historical landscape, albeit Option A over a shorter distance. Option A is more firmly favourable along Patrick's Street, being a more esthetic, naturally meandering thoroughfare, with better existing public realm, best suited to traffic reduction. From here the preference swings clearly to the Hybrid Route Option as a significant portion of it (Clontarf Street and Brian Boru Street) is a modern intrusion. All routes require bridge crossings—a new bridge [for R Option A & Option C] and a pedestrian footbridge (Option B) at a similar location—all east of the channel diversion, and with similar landscape change implications.</p> <p>(In terms of historical transport landscapes, it is noteworthy that, in the 19th century, tramways serviced most of Option A and Option B and marginally less so of Option C.)</p> <p>On balance, no option would seem to dominate in terms of preference from a historic landscapes and parks perspective. However, Option A might justifiably be marginally more favourable than the others Option involving the more appropriate landscape improvements to Patrick's Street, befitting its current status as the principal street of the city.</p> <p>Assessment outcome: Option A (marginally)</p>						