Chapter 03
Consideration of Reasonable Alternatives

Contents

3. Consideration of Reasonable Alternatives

3.1 Environmental Impact Assessment Directive Requirements

Article 5(1)(d) of Directive 2011/92/EU of the European Parliament and of the Council of 13 December 2011 on the assessment of the effects of certain public and private projects on the environment, as amended by Directive 2014/52/EU of the European Parliament and of the Council of 16 April 2014 amending Directive 2011/92/EU on the assessment of the effects of certain public and private projects on the environment (the 'EIA Directive') requires that the Environmental Impact Assessment Report (EIAR) contains '*a description of the reasonable alternatives studied by the developer, which are relevant to the project and its specific characteristics, and the main reasons for the option chosen, taking into account the effects of the project on the environment*'.

In addition, Annex IV to the EIA Directive provides that the EIAR shall include:

> '*A description of the reasonable alternatives (for example in terms of project design, technology, location, size and scale) studied by the developer, which are relevant to the proposed project and its specific characteristics, and an indication of the main reasons for selecting the chosen option, including a comparison of the environmental effects.*'

In addition, given the proposed road development for which approval is sought in this instance, Section 50(2)(b)(iv) of Number 14 of 1993 - Roads Act, 1993, as amended (hereafter referred to as the Roads Act), states that the EIAR shall contain the following information:

> '…*a description of the reasonable alternatives studied by the road authority or the Authority, as the case may be, which are relevant to the proposed road development and its specific characteristics, and an indication of the main reasons for the option chosen, taking into account the effects of the proposed road development on the environment*'.

Section 50(2)(b)(vi) of the Roads Act also requires that '*any additional information specified in Annex IV* [quoted above] *that is relevant to the specific characteristics of the particular proposed road development or type of proposed road development and to the environmental features likely to be affected*' also be included in the EIAR.

Accordingly, this Chapter of the EIAR describes the reasonable alternatives studied and the main reasons for the selection of the proposed Ringsend to City Centre Core Bus Corridor Scheme (hereafter referred to as the Proposed Scheme), taking into account the effects on the environment.

It considers the alternatives at three levels:

- Strategic Alternatives;
- Route Alternatives; and
- Design Alternatives.

The reasonable alternatives studied which are relevant to the Proposed Scheme and its specific characteristics are described in the subsequent sections of this Chapter.

3.2 Strategic Alternatives

3.2.1 Overview of the Transport Strategy for Greater Dublin Area 2016 – 2035 and the New Greater Dublin Area Transport Strategy 2022 – 2042

The National Transport Authority (NTA) Greater Dublin Area Transport Strategy 2022 – 2042 (hereafter referred to as the 2022 GDA Transport Strategy) (NTA 2022) replaces the prior Transport Strategy for the Greater Dublin Area 2016 – 2035 (hereafter referred to as the 2016 GDA Transport Strategy) (NTA 2016a).

The prior 2016 GDA Transport Strategy set out to contribute to the economic, social, and cultural progress of the Greater Dublin Area (GDA) by providing for the efficient, effective and sustainable movement of people and goods.

In other words, it was about making the Dublin region a better place for people who live and work there, and for those who visit.

It did that by providing a framework for the planning and delivery of transport infrastructure and services in the GDA. It has also provided a transport planning policy around which other agencies involved in land use planning, environmental protection and delivery of infrastructure such as housing, water, and power, could align their own investment priorities.

It has been an essential component, along with investment programmes in other sectors, for the development of the GDA which covers the counties of Dublin, Meath, Kildare and Wicklow.

Major projects provided for in the prior 2016 GDA Transport Strategy included BusConnects Dublin, which the Proposed Scheme is a component of.

Under Number 15 of 2008 - Dublin Transport Authority Act 2008, the NTA must review its transport strategy every six years. Arising from the review of the 2016 GDA Transport Strategy, an updated strategy has been developed which sets out the framework for investment in transport infrastructure and services over the next two decades to 2042.

Since the prior 2016 GDA Transport Strategy was approved by government in 2016, the NTA, along with the Councils, other transport delivery agencies and transport operators, have worked to build and develop that strategy's projects and proposals.

With respect to BusConnects Dublin, work was commenced in 2017. It is a multi-faceted programme comprising several elements of which the Core Bus Corridors will provide approximately 230km of bus priority and approximately 200km of cycle routes.

It is the largest ever investment programme on the bus network to deliver high levels of bus priority on all of the main corridors to support and significantly improve the operation of bus services now and into the future. It is proofed for resilience to enable the operation for more frequent services, as required. The Proposed Scheme is a fundamental element of this ongoing work.

The challenges outlined in the 2016 GDA Transport Strategy and the identified need for BusConnects Dublin, as determined in the preparation of the 2016 GDA Transport Strategy remain, and the evidence from the detailed corridor studies undertaken in the preparation of the prior 2016 GDA Transport Strategy is still valid and robust. These studies are set out in Section 3.2.2.

3.2.2 Transport Strategy for the Greater Dublin Area 2016 – 2035

The prior 2016 GDA Transport Strategy (NTA 2016a) was prepared by the NTA pursuant to Section 12 of Number 15 of 2008 – Dublin Transport Authority Act 2008 and approved by the Minister for Transport, Tourism and Sport in February 2016, in accordance with sub-section 12(13) of that Act.

The prior 2016 GDA Transport Strategy provided a comprehensive framework to guide the development of transport across the GDA over the period of the prior 2016 GDA Transport Strategy. Careful consideration was undertaken of the transport requirements across the seven counties located in the GDA, and the 2016 GDA Transport Strategy then formulated the appropriate transport responses to those requirements.

Various studies and reports were undertaken in the development of the prior 2016 GDA Transport Strategy, including:

- Area-based studies covering the GDA area;
- Demand Management Study;
- Core Bus Network Study;
- Park and Ride Study;
- Transport Modelling Analysis; and
- Environmental reports.

Specifically, a Strategic Environmental Assessment (SEA) was undertaken on the prior 2016 GDA Transport Strategy (NTA 2016b). As set out in the Environmental Report, in respect of which the SEA of the 2016 GDA Transport Strategy was undertaken, a number of reasonable alternative strategies were devised and assessed, taking into account the objectives and the geographical scope of the 2016 GDA Transport Strategy. The provisions of the 2016 GDA Transport Strategy (including bus-based transport modes), were evaluated for potential significant effects, and measures integrated into the 2016 GDA Transport Strategy on foot of SEA recommendations in order to ensure that potential adverse effects were mitigated. In considering the alternative modes on a corridor basis, the environmental assessment undertaken considered that bus-based projects could contribute towards facilitating the achievement of Ireland's greenhouse gas (GHG) emission targets in terms of emissions per passenger per kilometre.

In addition to direct studies and analyses undertaken as part of the 2016 GDA Transport Strategy preparation work, the 2016 GDA Transport Strategy also took into account prior reports and plans in relation to transport provision. These prior studies included, *inter alia*, the following:

- Greater Dublin Area Cycle Network Plan 2013 (hereafter referred to as the 2013 GDACNP) (NTA 2013);
- Bus Rapid Transit (BRT) Core Dublin Network Report (hereafter referred to as the BRT Core Dublin Network Report) (NTA 2012a);
- Fingal / North Dublin Transport Study (NTA 2015);
- Review of the DART Expansion Programme;
- Various prior Luas studies (including Line B2 (Bray), Line D1 (Finglas), Line F1 and F2 (Lucan and Liberties) and Line E; and
- Analysis carried out for the Greater Dublin Area Draft Transport Strategy 2011 -2030 (NTA 2012b).

Given the importance of bus transport as the main public transport mode for the overall region, the delivery of an efficient and reliable bus system forms an important element of the 2016 GDA Transport Strategy, integrated appropriately with the other transport modes. As Dublin is a low-density city with a large geographic footprint, there are few areas with the size and concentration of population necessary to support rail based public transport, and the bus system remains essential to serve the needs of much of the region.

The bus system has continued to remain an essential element of public transport infrastructure since the publication of the 2016 GDA Transport Strategy and is a key element of the new 2022 GDA Transport Strategy (NTA 2022). The bus system in the Dublin Metropolitan Area carried 159 million passengers in 2019 (the last full year before the COVID-19 pandemic), compared with 48 million passengers on Luas and 36 million passengers on the DART and rail commuter services over the same year. Converting to percentage figures, the bus system accounts for 65% of public transport passenger journeys in the Dublin Region, roughly two thirds of all public transport passengers, with Luas carrying 20% and DART and commuter rail services delivering the remaining 15%.

The most recent published figures for 2022 have shown that public transport passenger numbers are largely recovered to pre-pandemic levels. The figures presented across the public transport network are 98% of pre-pandemic levels. Specifically, the Dublin City area bus services carried 12.7 million people in November 2022, compared to 12.9 million in November 2019, representing a 99% recovery.

The area-based studies referenced above provided an appraisal of existing and future land use and travel patterns, including identifying trends and issues, within eight transport corridors as presented in Image 3.1 (Figure 3.8 in the 2016 GDA Transport Strategy). These corridors were also divided into Outer Hinterland, Outer Metropolitan, Inner Metropolitan areas in terms of character.

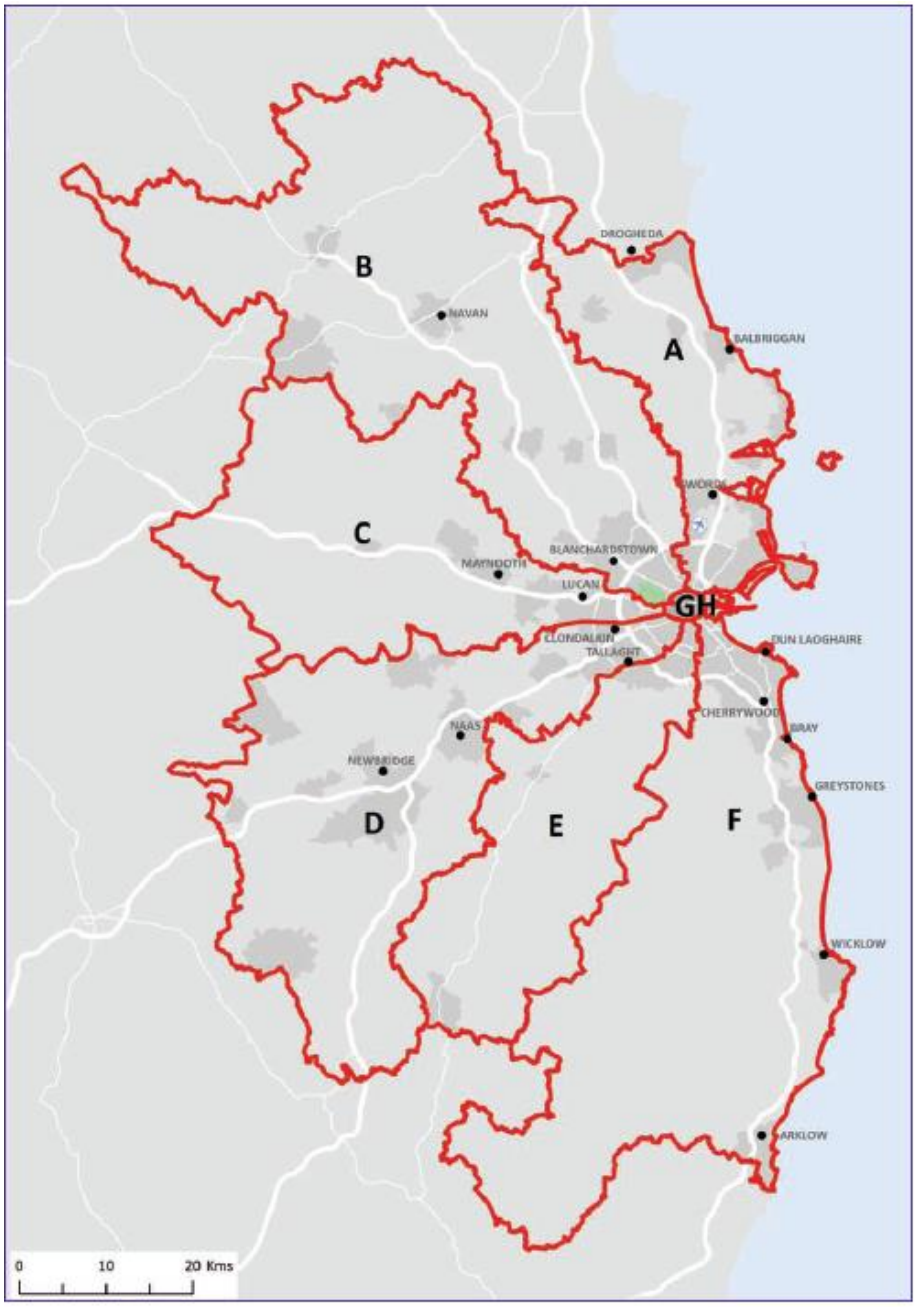

Image 3.1: GDA Transport Strategy Corridors

The development of the 2016 GDA Transport Strategy took into account the data and analysis provided through the supporting studies and background information and formulated an overall integrated transport system to serve the needs of the GDA up to 2035. In relation to public transport, the 2016 GDA Transport Strategy and the new 2022 GDA Transport Strategy set out a network of heavy rail, metro, light rail and bus proposals, with those networks combining to serve the overall public transport needs of the region.

The Proposed Scheme aligns generally with Corridor H (Dublin Docklands) in the 2016 GDA Transport Strategy which extends from the core City Centre area east to Dublin Docklands.

Through the work undertaken in the preparation of the 2016 GDA Transport Strategy, including its supporting studies, various alternatives to deal with the transport needs which are intended to be addressed by the Proposed Scheme were identified and considered. These are set out in the subsequent sections.

3.2.3 'Do Nothing' Alternative

The 2016 GDA Transport Strategy (NTA 2016a) was developed as the economy was emerging from the post 2008 economic downturn. In turn, the 2016 GDA Transport Strategy sets out a number of key challenges and opportunities within the GDA:

- Suburbanisation and the spread of population, employment and other land uses has continued;
- Arising from the above trend, the mode share of car use continues to increase;
- Car ownership, a key determinant of car use, is likely to increase further, up to saturation levels;
- Cycling has increased significantly in numbers and in mode share;
- Recovery is occurring in public transport use, but not in its mode share;
- Encouraging non-car use for trips to education is a significant challenge;
- There is no spare capacity on the M50 Motorway;
- Protecting and enhancing access to the ports and Dublin Airport is a strategic priority; and
- Current economic growth will mean that within the next few years, overall levels of travel demand are likely to exceed the travel demand experienced in 2006 and 2007, prior to the downturn.

Congestion throughout the GDA was particularly high with the number of cars on the road increasing and significant daily traffic delays. Without intervention, potential impacts could worsen for the region including:

- Continued growth of traffic congestion;
- Impacts on the ability of the region to grow economically due to increased congestion;
- Longer journey times and increased travel stress will diminish quality of life; and
- Environmental emissions targets will not be met.

Ultimately, few areas within the GDA have the size and concentration of population to support rail-based public transport. For most transport corridors in Dublin, bus transport represents the most appropriate transport solution.

In terms of the out-workings of a strategic 'Do Nothing' Alternative, it should be noted that, currently, the bus network is characterised by discontinuity, whereby corridors have dedicated bus lanes along less than one third of their lengths on average which means that for most of the journey, buses and cyclists are competing for space with general traffic and are negatively affected by the increasing levels of congestion. This lack of segregated space for different road users results in delayed buses and unreliable journey times for passengers. Issues related to frequency, reliability and a complex network have persisted for many years and will continue to do so without further intervention. In the absence of enhanced frequencies, journey time and reliability, the ability to attract new passengers is limited, particularly from private car and also impacts on the ability of the bus network to retain passengers and acts as a demotivator to travel by bus. Within the extents of the route of the Proposed Scheme, bus lanes are currently provided on approximately 29% and 38% of the route, outbound and inbound respectively, of which significant portions of the route are shared with cyclists and or parking lanes, which can in turn impact on bus reliability.

Adopting a Do Nothing approach to infrastructure improvements, would be likely to result in an exacerbation of the problems arising from discontinuity, such as delayed buses and unreliable journey times. The capacity and potential of the public transport system would remain restricted by the existing deficient and inconsistent provision of bus lanes and the resulting sub-standard levels of bus priority and journey-time reliability. As such, in addition to the continuation of issues relating to existing bus services, future bus services, including the Bus Network Redesign currently being implemented as part of the wider BusConnects Programme, would also suffer from the same lack of journey-time reliability. This would severely impact the attractiveness of public transport as an alternative to private car usage for those who need to travel to / from various locations along the route of the Proposed Scheme.

In addition, without the provision of safe cycling infrastructure, intended as part of the Proposed Scheme, there would also continue to be an insufficient level of safe segregated provision for cyclists who currently, and in the future, would be otherwise attracted to use the route of the Proposed Scheme. Whilst, in the 'Do Nothing' Alternative, ongoing improvements may be provided along the route of the existing corridor extents. This is likely to be piecemeal and disconnected without the wide-strategic benefits to be derived from the Proposed Scheme.

In addition, with the 'Do Nothing' Alternative, there would not be significant strategic investment in improvements to the pedestrian environment. Rather, improvements would be limited to relatively limited interventions, for example, ongoing maintenance of existing footpaths and adjacent public spaces. The 'Do Nothing' Alternative would not result in improvements to encourage more journeys generally at a local level by active travel, including connecting to and from bus stops for all pedestrians, and in particular improving facilities for the mobility and visually impaired.

For all of these reasons, and having regard to these environmental considerations in particular, a 'Do Nothing' Alternative is not considered to be a viable alternative relative to the outcomes which can be realised by the Proposed Scheme.

3.2.4 Bus Rapid Transit Alternative

BRT has emerged in recent years as an effective, cost efficient and high-quality public transport system. As BRT is a relatively new mode of transport, there are various definitions and interpretations as to what BRT comprises and there are many different forms of BRT systems in operation worldwide. Definitions of BRT range from a Quality Bus Corridor (QBC) to being a fully guided, fully segregated bus system.

A BRT Core Network Report, prepared in 2012 (NTA 2012a) at feasibility study level, investigated the demand, technical, environmental, and economic feasibility of a proposed core BRT network. The feasibility study recommended that further and more detailed work should proceed on two cross city corridors namely the Blanchardstown to University College Dublin (UCD)) corridor and the Malahide Road (Clongriffin) to Tallaght corridor. Neither of these cross-city corridors include the route of the Proposed Scheme, however.

Prior to the completion of these studies, the 2016 GDA Transport Strategy (NTA 2016a) identified the development of a number of Core Bus Corridors as BRT schemes. These BRT routes formed part of, and were a subset of, the overall Core Bus Corridor network set out in the 2016 GDA Transport Strategy. As design and planning work progressed on the Core Bus Corridors, it became clear that the level of differentiation between the BRT corridors and the other Core Bus Corridors would, ultimately, be limited, and that all the corridors should be developed to a consistent standard, providing a more integrated, legible, and coherent overall bus system.

By way of illustration of the similarities between the BRT option and Core Bus Corridors, all of the Core Bus Corridors are proposed to be developed to provide a high level of priority for the bus vehicles, which is an essential component of a BRT system. Integrated, cashless ticketing systems are planned under the overall BusConnects Programme, delivering the type of functionality often required for a BRT system. While different types of vehicles are used around the world on BRT schemes, the longer routes present in Dublin, due to the low-density nature of the city, favours the use of double deck vehicles on both BRT and conventional Core Bus Corridors, given the better ratio of seated to standing passengers on such vehicles.

Accordingly, it is intended that all of the BusConnects Dublin Core Bus Corridor Infrastructure Works (hereafter referred to as the CBC Infrastructure Works), including the Proposed Scheme, will be developed to provide a BRT level of service, rather than establishing a separate mode on some corridors. Consequently, the Proposed Scheme, as a separate BRT mode, was not progressed given the limited differentiation from the Core Bus Corridors and the advantages identified above of a unified integrated bus system.

Environmentally, the BRT option compared to the Core Bus Corridor proposal would be more impactful in terms of construction impacts, including flora and fauna, heritage, air, and noise. BRT typically requires continuous unbroken physical lane infrastructure to achieve high priority. This would involve significantly more land take and potentially involve demolition of buildings at pinch-points. In the case of the Core Bus Corridor proposals, bus-priority can be achieved through short lengths at pinch-points by the use of signal control priority.

3.2.5 Light Rail Alternative

The appropriate type of public transport provision in any particular case is predominately determined by the likely quantum of passenger demand along the particular public transport route.

For urban transport systems, bus-based transport is the appropriate public transport mode for passenger demand levels of up to 4,000 passengers per hour per direction (International Association of Public Transport (UITP 2009)). Light rail provision would generally be appropriate to cater for passenger demand of between 3,500 and about 7,000 passengers per hour per direction. Passenger demand levels above 7,000 passengers per hour per direction would generally be catered for by heavy rail or metro modes, which would usually be expected to serve a number of major origins or destinations along a particular corridor. In the case of both the bus and light rail modes, higher levels of passenger demand than the above stated figures can be accommodated under specific conditions.

The development of the 2016 GDA Transport Strategy (NTA 2016a) considered the likely public transport passenger demand levels across the region using the NTA's transport model and took into account the other studies referenced above, in addition to studies that had been carried out to investigate a potential light rail scheme within the area of this corridor. Likely passenger flows were identified to be within the capacity of bus transport, without reaching the quantum of passenger demand which would support the provision of higher capacity rail solutions.

Section 3.2.1 set out various studies undertaken for the 2016 GDA Transport Strategy. Arising from these studies and the specific assessment and transport modelling work undertaken for the 2016 GDA Transport Strategy, it was concluded that a bus-based transport system would be the proposed public transport solution in the corridor of the Proposed Scheme. This proposed transport solution would be supplemented by the development of a light rail scheme along this corridor through the implementation of the following project: Luas Red Line Extension to Poolbeg.

The Luas Red Line Extension to Poolbeg is to serve the future development area of Poolbeg, in addition to Ringsend and Irishtown. It is intended to extend the Luas Red Line south of the River Liffey at, or close to, its eastern end. Potentially, this could be achieved by crossing the River Liffey on a new bridge in the vicinity of the existing East Link Bridge. Luas services would be extended past the Point Luas stop, continuing on to the Poolbeg development area. This extended link would provide a fast and convenient connection from this area into the City Centre and westwards.

3.2.6 Metro Alternative

As highlighted above, when considering the appropriate transport systems to meet the expected transport demand, metro systems are a higher capacity form of light rail, generally designed for peak hour passenger numbers exceeding about 7,000 passengers per hour per direction, and often catering for multiples of that level.

Given the consideration of light rail provision, and the level of likely public passenger use along this overall corridor assessed in the transport modelling work, the development of the 2016 GDA Transport Strategy (NTA 2016a) identified that a metro solution would not be economically justified within the area covered by this corridor. Accordingly, the 2016 GDA Transport Strategy concluded that a high-quality bus-based solution would primarily be part of the proposed public transport solution in the corridor of the Proposed Scheme.

In addition, the development of an underground metro would not remove the need for additional infrastructure to serve the residual bus needs of the area covered by the Proposed Scheme, nor would it obviate the need to develop the cycling infrastructure required along the route of the Proposed Scheme.

Environmentally, the metro option compared to the Core Bus Corridor proposal would be more impactful in terms of construction impacts, including flora and fauna, heritage, air, and noise. Metro systems require unbroken physical lane infrastructure to achieve high priority. This would involve significantly more land take and potentially involve demolition of buildings at pinch-points. In the case of the Core Bus Corridor proposals, bus-priority can be achieved through short lengths at pinch-points by the use of signal control priority.

3.2.7 Heavy Rail Alternative

Commuter heavy rail systems are generally designed for high levels of passenger demand, usually designed to carry in excess of 10,000 passengers per hour per direction. Where a surface corridor does not already exist in a

built-up urban area, there are major challenges in creating sufficient surface space for such provision, requiring large amounts of property acquisition and building demolition.

For those reasons, new heavy rail projects running at surface level are rarely developed in built-up urban areas. Instead, underground rail links, including metro schemes, are deployed to avoid the severe impacts that would accompany a new surface rail line. Environmentally, the heavy rail option compared to the Core Bus Corridor proposal would be more impactful in terms of construction impacts, including on flora and fauna, heritage, air and noise. Heavy rail requires unbroken physical lane infrastructure to achieve high priority. This would involve significantly more land take and potentially involve the demolition of buildings at pinch-points.

The appropriate locations for new heavy rail provision were carefully considered in the development of the 2016 GDA Transport Strategy (NTA 2016a). Having regard to the level of likely public passenger use (demand) along the overall corridor of the Proposed Scheme assessed in the transport modelling work, the 2016 GDA Transport Strategy did not consider that a new heavy rail solution would be required along this corridor and it would not be economically justifiable, in addition to having severe property implications for surface provision.

In relation to underground provision, this issue was considered as part of the metro analysis, given the similarity of underground heavy rail and underground metro schemes. Similar to the metro considerations, the provision of an underground heavy rail solution would not remove the need for additional infrastructure to serve the residual bus needs of the area covered by the Proposed Scheme, nor would it obviate the need to develop the cycling infrastructure required along the route of the Proposed Scheme.

In 2015, the NTA carried out a review of the key transport infrastructure projects that were proposed to support the growth of the Greater Dublin Region. This included a review of the DART Expansion Scheme (now 'DART + Programme') which included DART Underground (DART+ Tunnel), the Fingal / North Dublin Study and a study of the orbital movements around Dublin all designed to inform the 2016 GDA Transport Strategy. Image 3.2 shows the various projects in the DART Expansion Programme.

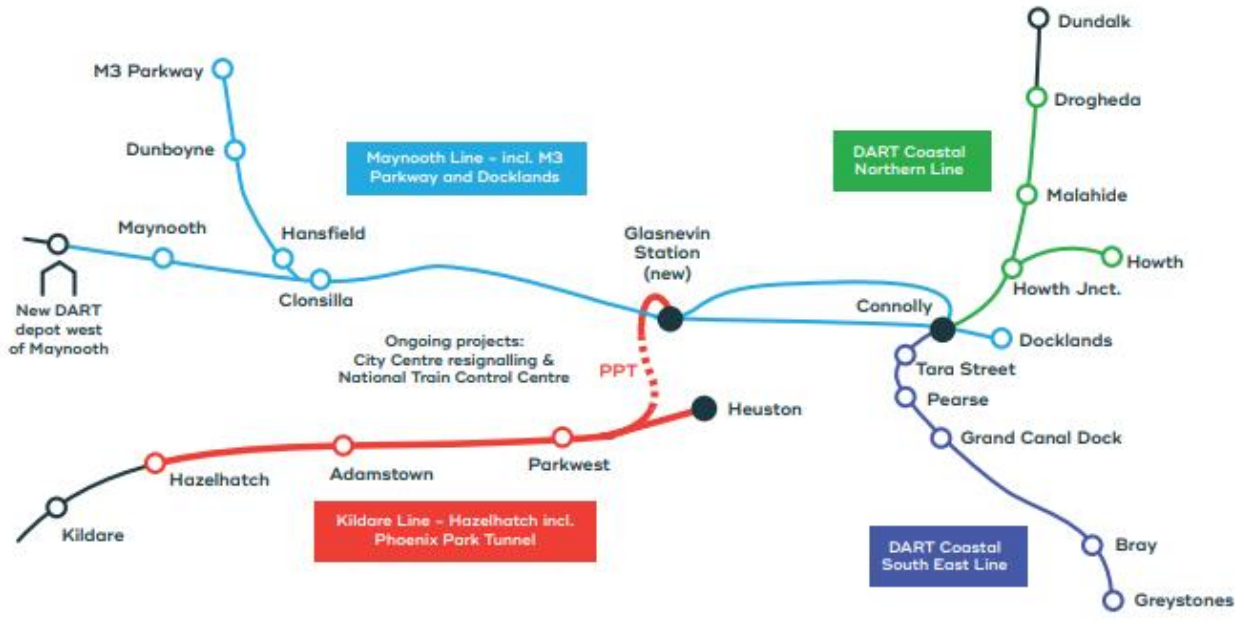

Image 3.2: DART Expansion Programme (Irish Rail)

Accordingly, the 2016 GDA Transport Strategy included for the expansion of the DART system on the Maynooth / Sligo Line to provide fast, high frequency services to Maynooth, the M3 Parkway, and Docklands as part of a phased delivery of DART Expansion (now 'DART + Programme'), and the DART Underground (now 'DART+ Tunnel') project supplemented with a higher quality bus solution along this corridor would be part of the proposed public transport solution in the corridor of the Proposed Scheme. Environmentally, the combination of a rail upgrade involving limited construction works and the Proposed Scheme to achieve high-quality bus priority and

safer cycling and walking infrastructure represents a balanced strategy by limiting the overall construction impact while enhancing the capacity for sustainable people-movement options.

3.2.8 Demand Management Alternative

One of the primary aims of the 2016 GDA Transport Strategy (NTA 2016a) was to significantly reduce demand for travel by private vehicles, particularly during the commuter peaks, and to encourage the use of walking, cycling and public transport. One of the mechanisms to achieve such a reduction of private vehicle use is the use of measures to discourage travel by car (i.e. demand management).

Demand management can take many different forms from restricting car movement or car access through regulatory signage and access prohibitions, to parking restrictions, to fiscal measures such as tolls, road pricing, congestion charging, fuel / vehicle surcharges and similar. All of these approaches discourage car use through physical means or by adding additional costs to car use such that it becomes more expensive and alternative modes become more attractive. A key success factor of demand management is greater use of alternative travel modes, in particular public transport.

However, in the case of Dublin, the existing public transport system does not currently have sufficient capacity to cater for large volumes of additional users. In the case of the bus system, the increasing levels of traffic congestion over recent years prior to the COVID-19 pandemic has added to bus delays and meant that additional bus fleet and driver resources had been utilised simply to maintain existing timetables, rather than adding overall additional capacity. The objective of the overall 2016 GDA Transport Strategy is to significantly increase the capacity, and subsequent use of the public transport system, focusing on the overall BusConnects Programme in the case of the bus system, the DART+ Programme in the case of heavy rail, and the Luas / MetroLink programme in the case of light rail.

Congestion is a significant contributor to GHG emissions, and the related negative environmental impacts associated with poor air quality, noise levels, and related health and quality of life consequences. Demand management measures need to be associated with positive environmental benefits that can be achieved when commuters change modes to high-quality public transport, walking, and cycling that can help reduce GHG emissions and bring associated health benefits. The objective of the 2016 GDA Transport Strategy to significantly increase the capacity, and subsequent use of these alternative modes requires that the necessary physical infrastructure is necessary to deliver the efficiencies to make the mode-shift attractive and environmentally beneficial.

In advance of a significant uplift in overall public transport capacity in the Dublin Metropolitan Area, the implementation of major demand management measures across that area would be unsuccessful. Effectively, constraining people from making journeys by car and requiring them to use other modes, without those modes having the necessary capacity to cater for such transfer, would not deliver an effective overall transport system. Instead, the capacity of the public transport system needs to be built up in advance of, or in conjunction with, the introduction of major demand management measures in the Dublin Metropolitan Area. This is especially true in the case of the bus system where a major increase in bus capacity through measures such as the Proposed Scheme would be required for the successful implementation of large scale demand management initiatives.

While the foregoing addresses the dependency of demand management measures on public transport capacity, it is equally correct that the provision of greatly enhanced cycling facilities will also be required to cater for the anticipated increase in cycling numbers, both in the absence of demand management measures and, even more so, with the implementation of such measures. Demand management initiatives by themselves will not deliver the level of segregated cycling infrastructure required to support the growth in that mode. Consequently, the progression of demand management proposals will not secure the enhanced safe cycling infrastructure envisaged under the Proposed Scheme.

Accordingly, the implementation of demand management measures would not remove the need for additional infrastructure to serve the bus transport needs of the corridor covered by the Proposed Scheme, nor would it obviate the need to develop the cycling infrastructure required along the route of the Proposed Scheme.

3.2.9 Technological Alternatives

Technological advances have opened-up new areas of potential in the delivery of transportation infrastructure. Driverless trains and smart highways are two examples. Some of these initiatives, such as driverless trains, are now in use. Technological advancements relating to car use have the potential to improve road safety by reducing potential for driver error, and with the use of global positioning systems (GPS), to be guided to the most efficient route. A shift to electric vehicles will help reduce GHG emission impacts, but road space is limited, and three typical cars (electric or otherwise) still take the same road space for up to 12 occupants that a typical double-deck bus requires to carry up to 90 occupants. The environmental impact of continuing to build more road space for low-occupancy vehicles is unsustainable from both the construction environmental impact and operational environmental impact perspectives. Despite advancements in road-user technology, road congestion is not reducing as populations grow, and old inner-city areas of Dublin do not have space to add more car lanes.

The shift to hybrid and ultimately electric buses will reduce both noise and air quality impacts. The evolution of bike-share schemes and advancements in electric bike technology means that cycling is increasing in attractiveness and for longer distances. This attractiveness is only for the few however, if cycling infrastructure in the form of safe segregated facilities is not available.

While road construction is costly and has a negative GHG impact there are little advancements in construction technology that present any viable alternatives when conversion of road infrastructure involves reconfiguration of lanes for bus priority, safer segregated cycle tracks and improved pedestrian facilities, or even more significantly for rail-related infrastructure. Road right-of-way space is still shared with multiple underground and overhead utilities that may require to be relocated, and road materials require to be resilient to minimise maintenance frequencies.

Ultimately, however, alternatives have to be able to accomplish the objectives of the Proposed Scheme in a satisfactory manner and should also be feasible including in terms of technology and other relevant criteria. In this context, there is no evidence that such developments will displace the need for mass transit, which is essential to the operation of a modern city. Accordingly, the need to improve the overall bus system will still remain.

Overall, while certain technological advances do provide new opportunities in the transport area, particularly in the area of information provision, they do not yet provide viable alternatives to the core need to provide for the movement of more people by non-car modes, including the provision of safe, segregated cycling facilities. Accordingly, there are no viable technological alternatives to meet the transport needs of this sector of the city.

3.3 Route Alternatives

Following on from the strategic alternatives considered earlier, this Section sets out the route alternatives which were considered as part of the process to establish the Proposed Scheme. Development of the Proposed Scheme has evolved in the following stages:

1) A **Feasibility and Options Report** was concluded in 2018, setting out the initial route options and concluding with the identification of an Emerging Preferred Route (EPR);
2) A first round of non-statutory **Public Consultation** was undertaken on the EPR from 26 February to 31 May 2019;
3) A **review** of the previous Feasibility and Options Report was undertaken making modification to the previous EPR;
4) Development of **Draft Preferred Route Option (PRO)** (April 2019 to March 2020). Informed by feedback from the first round of public consultation, stakeholder engagement and the availability of additional design information, the design of the EPR evolved with further alternatives considered;
5) A second round of non-statutory **Public Consultation** was undertaken on the Draft PRO from 4 March 2020 to 17 April 2020. Due to the introduction of COVID-19 restrictions, some planned in-person information events were cancelled, leading to a decision to hold a third consultation later in the year;
6) Further development of an updated **Draft PRO** was undertaken subsequent to the second round of public consultation, which took account of submissions received, continuing stakeholder engagement and additional design information;

7) A third round of non-statutory **Public Consultation** was undertaken on the updated Draft PRO from 4 November 2020 to 16 December 2020; and
8) Finalisation of the **PRO**. Informed by feedback from the overall public consultation process, continuing stakeholder engagement and the availability of additional design information, the PRO, being the Proposed Scheme, was finalised.

Alternative route options have been considered in a number of areas during the iterative design of the Proposed Scheme, such as the location of offline cycle routes and the road layout in constrained locations. The iterative development of the Proposed Scheme has also been informed by a review of feedback and new information received during each stage of public consultation and as data, such as topographical surveys, transport and environmental data was collected and assessed. In addition, the potential for climate impacts was considered in all phases of the design process for the Proposed Scheme.

Key environmental aspects have been considered during the examination of reasonable alternatives in the development of the PRO for the Proposed Scheme. Environmental specialists have been involved in the iteration of key scheme design aspects with the BusConnects Infrastructure team. The following key environmental aspects were considered:

- **Archaeological, Architectural and Cultural Heritage** – there is the potential for impacts on archaeological, architectural, and cultural heritage when providing Core Bus Corridor infrastructure. The assessment had regard to the Record of Monuments and Places (RMPs), sites of archaeological or cultural heritage and on buildings listed on the National Inventory of Architectural Heritage (NIAH) adjacent to the corridor;
- **Flora and Fauna** - The provision of the Core Bus Corridor could have negative impacts on flora and fauna, for example, through the construction of new infrastructure through green field sites;
- **Soils and Geology** - Construction of infrastructure necessary for the provision of the Core Bus Corridor has the potential to negatively impact on soils and geology. For example, through land acquisition and ground excavation. There is also the potential to encounter ground contamination from historical industries;
- **Hydrology** - The provision of Core Bus Corridor infrastructure may include aspects (for example structures) with the potential to impact on hydrology;
- **Landscape and Visual** - Provision of Core Bus Corridor infrastructure has the potential to negatively impact on the landscape and visual aspects of the area, for example, by the removal of front gardens or green spaces or the altering of streetscapes, character, and features;
- **Noise, Vibration and Air** - Provision of Core Bus Corridor infrastructure (e.g., construction activities), has the potential to negatively impact on noise, vibration, and air quality along a scheme, for example, through construction works;
- **Land Use and the Built Environment** - This criterion assesses the impact of each option on land use character, and measured impacts which would prevent land from achieving its intended use, for example through land acquisition, removal of parking spaces or severance of land; and
- **Climate** - Construction works involve negative GHG emissions impacts, while operational efficiencies of public transport, walking and cycling through modal shift from car usage has the potential to reduce GHG impacts.

3.3.1 Initial High Level Route Alternatives

The Feasibility and Options Report identified feasible options along the corridor, assessed these options and arrived at the EPR, which then formed the basis for the first phase of public consultation. A summary of the process is described below.

The Feasibility and Options Report used a two-stage assessment process to determine the EPR, comprising:

- Stage 1 – an initial high-level route options assessment, or ‘sifting’ process, which appraised routes in terms of ability to achieve scheme objectives and whether they could be practically delivered. The assessment included consideration of the potential high level environmental constraints as well as other indicators such as land take (particularly the impact on residential front gardens); and

- Stage 2 - Routes which passed the Stage 1 assessment were taken forward to a more detailed qualitative and quantitative assessment. All route options that progressed to this stage were compared against one another using a detailed Multi-Criteria Analysis (MCA) in accordance with the Department of Transport (DoT) document, Common Appraisal Framework for Transport Projects and Programmes (DoT 2016).

At the start of the Stage 1 assessment, an initial 'spider's web' of potential route options (consisting of in excess of 40 individual links), that could accommodate a Core Bus Corridor was identified for each study area section, as shown in Image 3.3 (extracted from the Feasibility and Options Report).

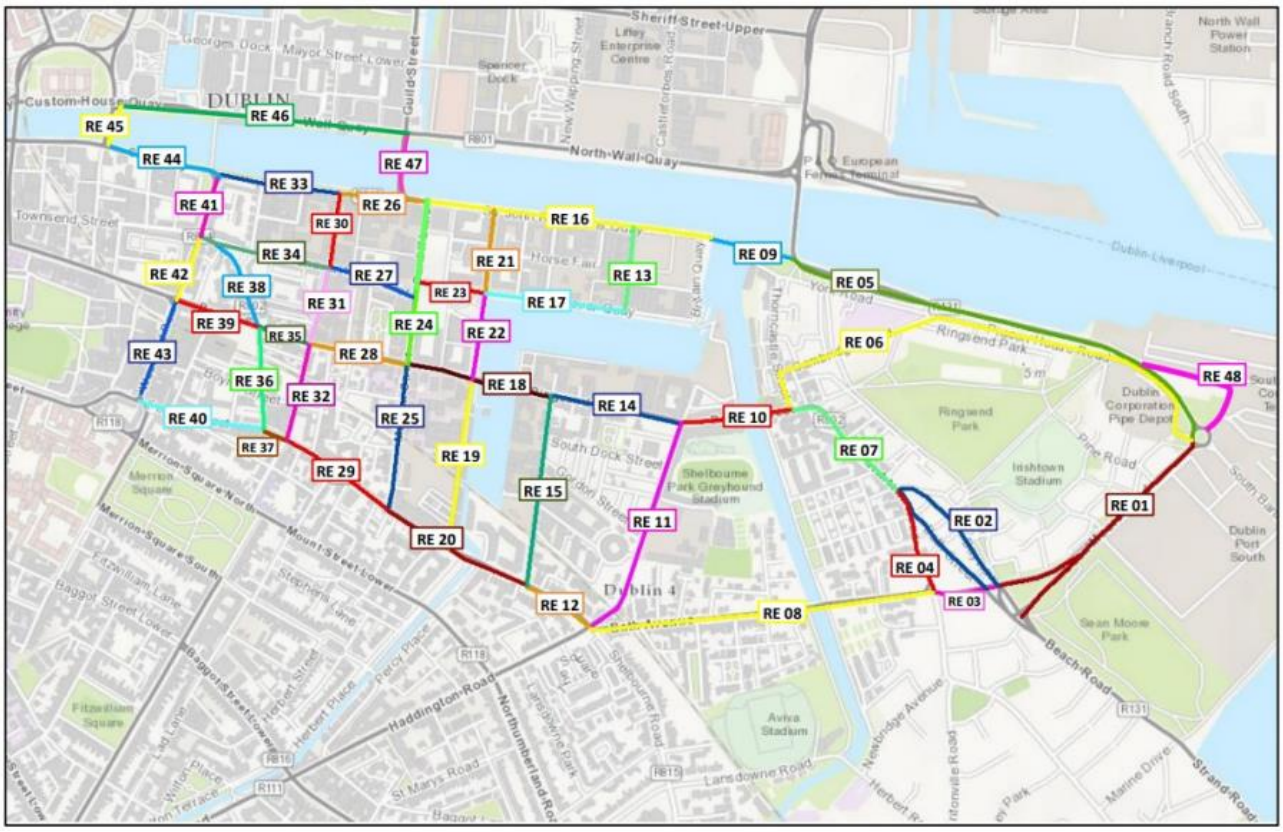

Image 3.3: Spiders Web of Route Options Extracted from Feasibility and Options Report

The initial 'spider's web' was narrowed down having considered existing physical conditions / constraints within the study area. This exercise examined and assessed technically feasible route options, based upon specific objectives. In addition to being assessed on their individual merits, routes were also assessed relative to each other enabling some routes to be ruled out if more suitable alternatives existed.

The Stage 1 assessment considered engineering constraints, identified high-level environmental constraints and an analysis of population catchments. Numerous links forming part of the 'spider's web' were not brought forward to the Stage 2 assessment due to space constraints, lack of appropriate adjacent linkages to form a coherent end-to-end route, unsuitability of particular routes, the need for significant land take from residential properties and related construction GHG impacts.

Arising from consideration of the various permutations possible in respect of the 'spider's web', a reduced number of coherent end-to-end options were identified for further assessment. In arriving at these options, those links which failed the initial sifting stage were removed as well as those links that were disconnected and could not clearly form part of the end-to-end options. These options are presented in Image 3.4.

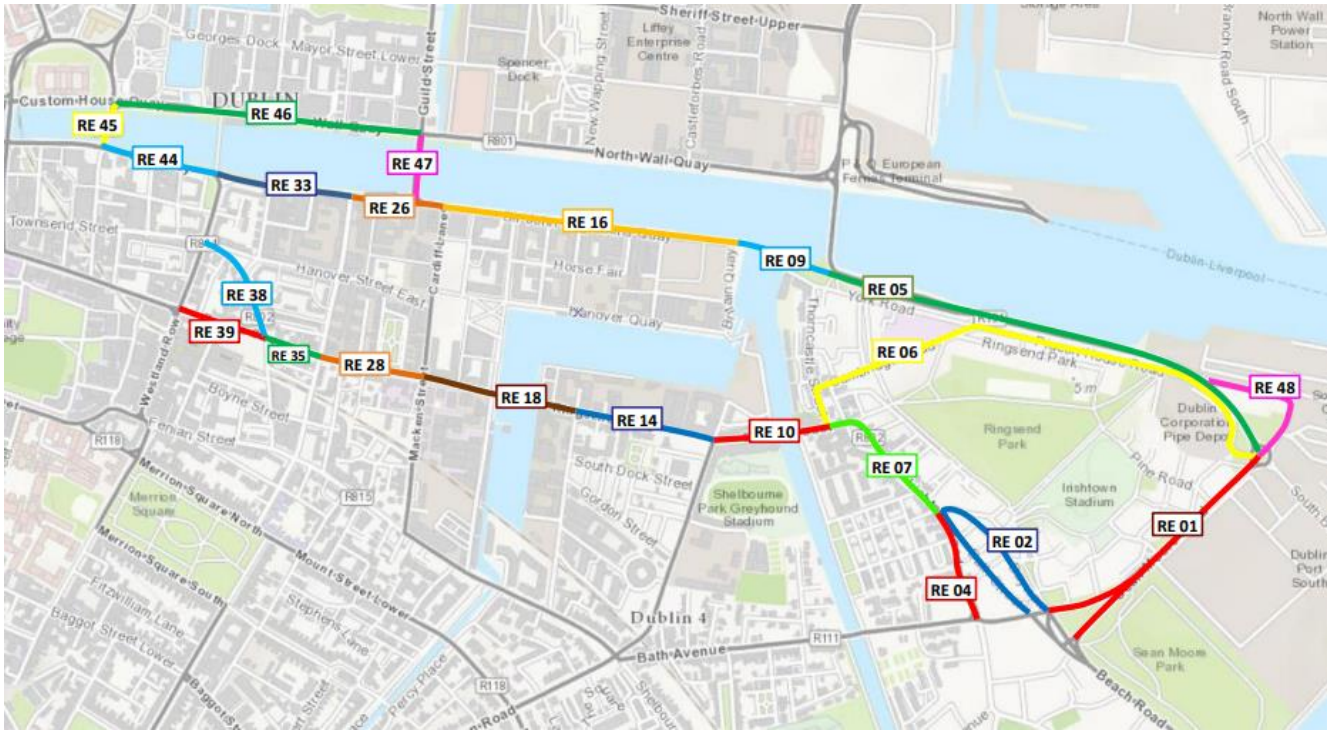

Image 3.4: Route Options from Initial Sift

3.3.2 Stage 2 – Route Option Assessment

Following completion of the Stage 1 initial appraisal, the remaining reasonable alternatives options were progressed to Stage 2 of the assessment process. This process involved a more detailed qualitative and quantitative assessment using criteria established to compare the route options.

The indicative scheme for each route option was then progressed to a MCA. The Common Appraisal Framework for Transport Projects and Programmes (DoT 2016), requires schemes to undergo a MCA which evaluated the route options under the assessment criteria set out below:

1. Economy;
2. Safety;
3. Integration;
4. Accessibility and Social Inclusion; and
5. Environment.

Under each headline criterion, a set of sub-criteria were used to comparatively evaluate the options. For the Environment criterion the following sub-criteria were considered in the assessment to inform the EPR:

- **Archaeological, Architectural and Cultural Heritage** – there is the potential for impacts on archaeological, architectural, and cultural heritage environment when providing Core Bus Corridor infrastructure. The assessment had regard to RMPs, sites of archaeological or cultural heritage and on buildings listed on the NIAH adjacent to the corridor;
- **Flora and Fauna** - The provision of the Core Bus Corridor infrastructure could have negative impacts on flora and fauna, for example, through the construction of new infrastructure through green field sites;
- **Soils and Geology** - Construction of infrastructure necessary for the provision of the Core Bus Corridor infrastructure has the potential to negatively impact on soils and geology. For example, through land acquisition and ground excavation. There is also the potential to encounter ground contamination from historical industries;
- **Hydrology** - The provision of Core Bus Corridor infrastructure has the potential to impact on surface water bodies as a result of land take (with particular emphasis on floodplains and flood zones);

- **Landscape and Visual** - Provision of Core Bus Corridor infrastructure has the potential to negatively impact on the landscape and visual aspects of the area, for example, by the removal of front gardens or green spaces or the altering of streetscapes, character, and features;
- **Noise, Vibration and Air** - Provision of Core Bus Corridor infrastructure (e.g., construction activities), has the potential to negatively impact on noise, vibration, and air quality along a route. For example, through construction works. The impact was quantified on whether the road is moving closer to a sensitive receptor, for example road widening or new realignment; and
- **Land Use and the Built Environment** – The provision of Core Bus Corridor infrastructure has the potential to impact on land use (character) and the built environment and measured impacts which would prevent land from achieving its intended use, for example, through land acquisition, the removal of parking spaces or severance of land.

Route options were compared based on a five-point scale, ranging from having significant advantages to having significant disadvantages over other route options. Route options could also be considered neutral when no apparent advantages or disadvantages are identified across all scheme options.

Following the Stage 1 sifting process, three viable route options were taken forward for assessment and further refinement as follows (refer to Image 3.5):

- R1: A route option along Bath Street / Bayview. Irishtown Road, Bridge Street, Ringsend Road and Pearse Street;
- R2: A route option along Sean Moore Road, Pigeon House Road, the East Link Road, Cambridge Road, Bridge Street, Ringsend Road and Pearse Street; and
- R3: A route option along Sean Moore Road, Pigeon House Road, the East Link Road, Sir John Rogerson's Quay and a one-way loop between the Samuel Beckett Bridge, the north quays, Talbot Memorial Bridge and back along the south quays to Sir John Rogerson's Quay.

Two scheme options were developed for each of the three route options, representing minor alternatives from one another in respect to minimising impacts on existing traffic and land acquisition where possible.

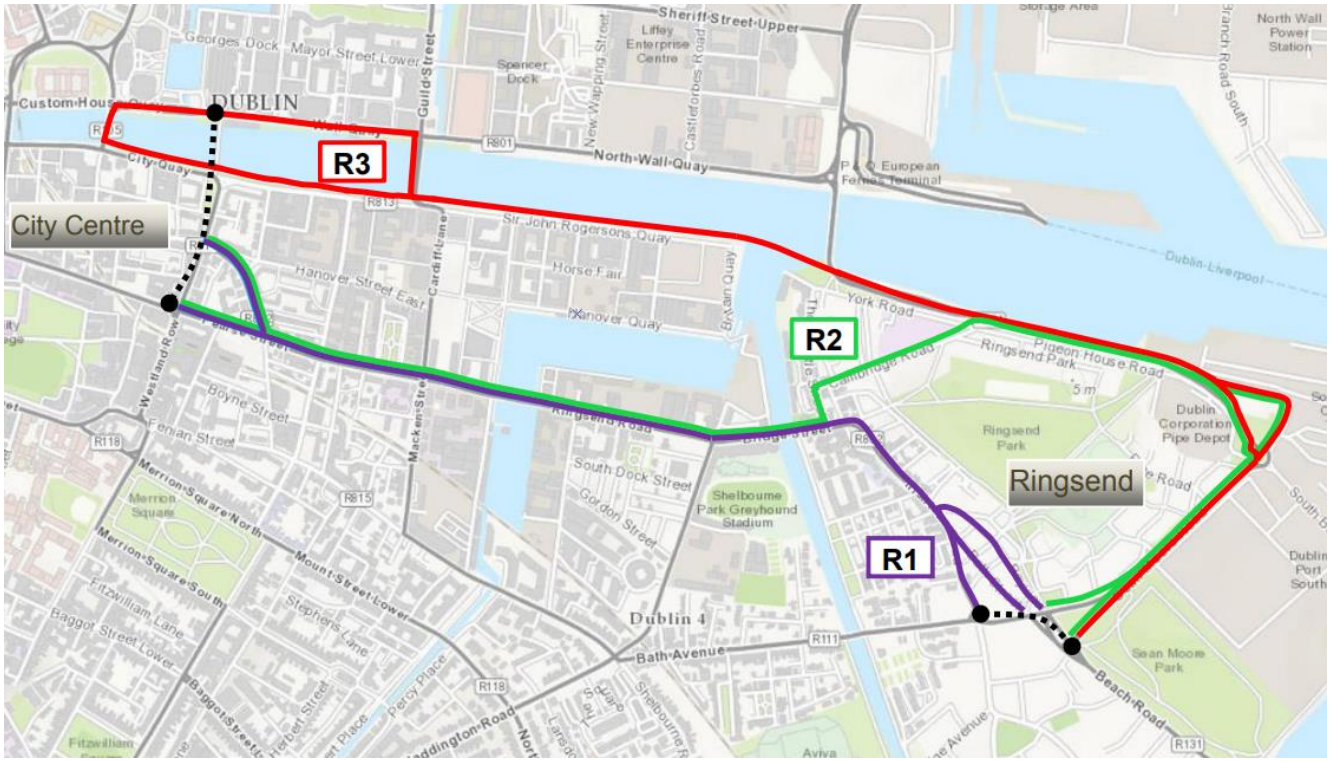

Image 3.5: Stage 2 Route Options

As mentioned previously, each route option was evaluated using a MCA with one of the primary criteria being 'Environment', under which there was a number of sub-criteria which each route option was considered against comparatively.

In terms of potential archaeological and cultural heritage impacts, all proposed route options were considered equal to one another as they all transect Zones of Archaeological Potential, primarily Dublin City (RMP DU018-020) and Ringsend (DU018-053).

In regard to architectural heritage, R1 and R2 (including both their sub-options) were considered to be preferential to R3 given the location of fewer receptors of architectural interest along these two routes.

For flora and fauna (biodiversity), it was considered that R1 (including its sub-options) performed better than the other route options due to fewer ecological constraints situated immediately adjacent to it (i.e., it largely avoids the River Liffey (which leads downstream to further protected sites in Dublin Bay) and only crosses over the River Dodder and Grand Canal Basin at short intervals).

All proposed Route Options (including respective sub-options) performed equally in respect to soils and geology and hydrology given that each of the route options pass the same constraints for each of these environmental criteria.

Regarding, landscape and visual, R1 (and its sub-options) performed the worst of the three proposed route options given its proximity to more residential areas than R2 and R3. R2 and R3 were considered to be equal to each other, however, as they pass a similar number of residential areas.

Lastly, in regard to air quality, noise and vibration and land use character, R3 (including its sub-options) performed the best with respect to these three environmental criteria given that this route is aligned along an existing bus corridor and so the existing environment in respect to air quality, noise and vibration and land use character would not change significantly.

With regard to the consideration of the Environment criterion, R3 was considered to have some advantages when compared to the other options as it was considered to have the least potential to impact on landscape and visual,

air quality, noise and vibration and land use character largely due to the significantly lower land take and construction works that would be required because of the existing bus lanes and wide road reservation. R3 was therefore brought forward into the EPR as the preferred option.

In tandem with the selection of R3 as the preferred option, the original feasibility report also considered an extension of the alignment along the north quays to include the entire length of the north quays to the junction of North Wall Quay / East Wall Road / Tom Clarke East Link Bridge (see Image 3.6), as the revised bus service network plan identifies Spine G as far as New Wapping Street and other bus services further east of this point. In addition, other services connecting to Dublin Airport in Swords, and a variety of other northern destinations via the Dublin Port Tunnel also use this route. Therefore, the EPR comprised of a bus priority corridor along both sides of the River Liffey between Talbot Memorial Bridge and Tom Clarke East Link Bridge.

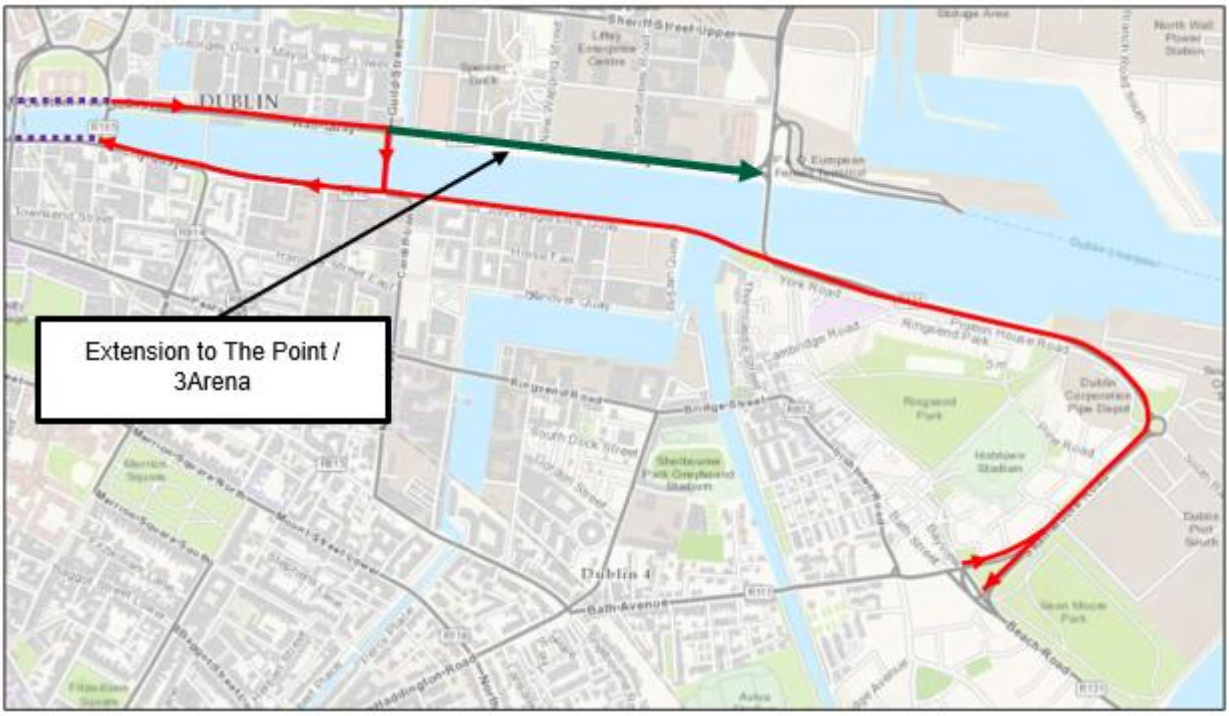

Image 3.6: R3 (EPR) With Extension Along the North Quays to The Point / 3Arena from Earlier Feasibility and Options Assessment Study

3.3.2.1 Cycling Options

The feasibility report proposed the provision of new segregated cycle lanes along the north and south quays, Pigeon House Road / East Link grass verge and Sean Moore Road. However, the final EPR proposed that instead of using Sean Moore Road, the cycle way would take a more direct route along the western edge of Ringsend Park. The existing footpath in the park will be widened to allow for shared use by cyclists as far as Strand Street in Irishtown from where a two-way cycle track will link to the East Coast Trail at the Sean Moore Road Junction.

3.3.3 Emerging Preferred Route

Informed by the appraisal of options, as set out in earlier sections, the EPR was identified. The EPR is summarised as follows:

> '*The Ringsend to City Centre Core Bus Corridor (CBC) commences at Talbot Memorial Bridge. The scheme encompasses bus lane and cycle infrastructure on both north and south quays linking the city centre with the Docklands and onto Ringsend and Irishtown. The scheme will involve works on existing streets and new road links.*'

A public consultation on the EPR was undertaken from 26 February 2019 to 31 May 2019, providing valuable feedback which was then carefully considered in the further development of the scheme proposal. Following the EPR consultation, the design of the Proposed Scheme was further developed through to the draft PRO. This process is described in Section 3.4.

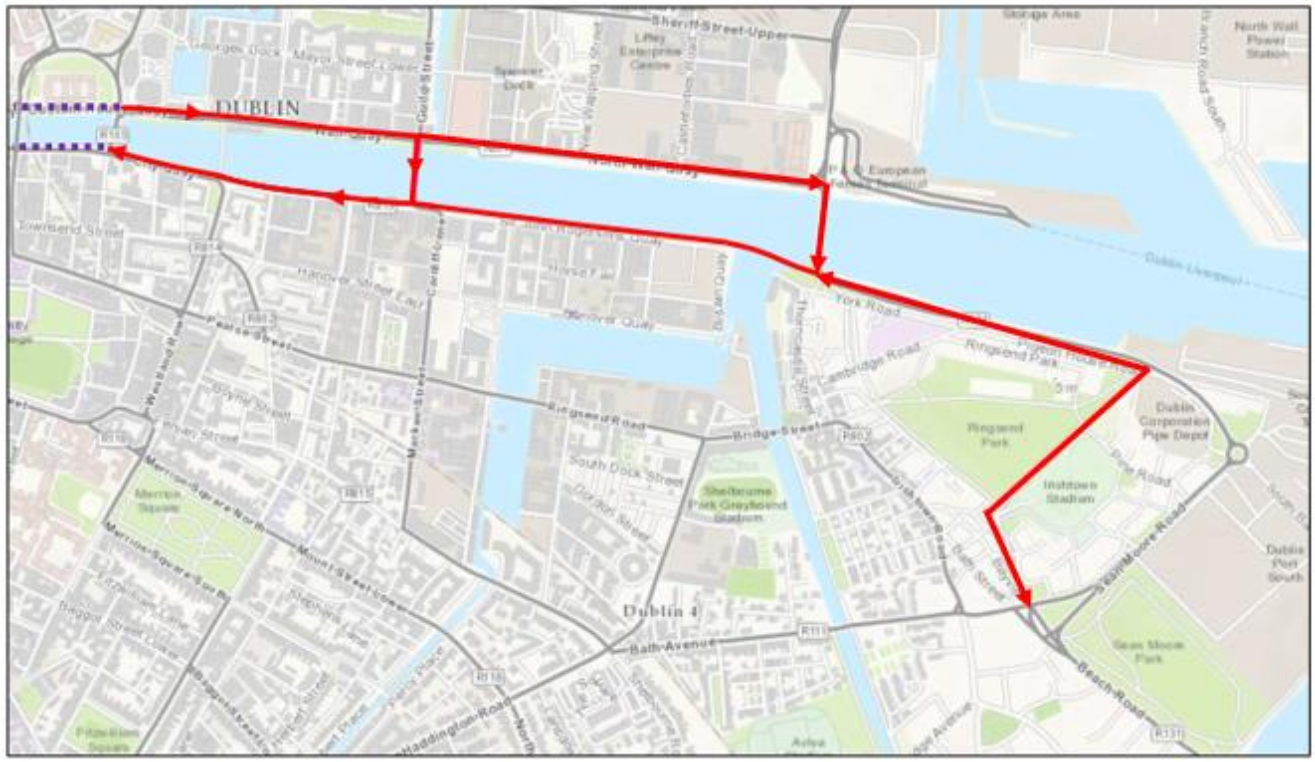

Image 3.7: EPR

3.4 Design Alternatives

3.4.1 Development of the Draft Preferred Route Option

Following the completion of the public consultation process in relation to the EPR, various amendments were made to the scheme proposals to address a number of the issues raised in submissions, including incorporating suggestions and recommendations from local residents, community groups and stakeholders, and / or arising from the availability of additional information. These amendments were incorporated into the designs and informed a Draft PRO.

This additional design development took account of:

- New and updated topographical survey information;
- Output from engagement and consultation activities on the EPR and Draft PRO proposals;
- Clarifications to the previous assessment in the EPR Feasibility Study and Options Assessment Report;
- Further design development and options assessment; and
- Changes in the extent of the scheme.

The inclusion of the entirety of the north quays in the Proposed Scheme also necessitated reappraisal including the proposed bus priority provision on the quays, as outlined in Section 3.4.1.1.1 and Section 3.4.1.1.4.

Where substantial revisions had been made to the design since the publication of the EPR, options were assessed using a MCA to determine the PRO. The MCA assessed any newly developed options against the previously identified EPR. The methodology and MCA used were consistent with that carried out during the initial route

optioneering work (including consideration of the relevant environmental aspects), which informed the identification of the EPR.

Following this design development process, the Draft PRO was identified. For ease of reference, the Draft PRO has been divided into three 'sections':

- Section 1 – Talbot Memorial Bridge to Tom Clarke East Link Bridge;
- Section 2 – Dodder Public Transport Opening Bridge (DPTOB); and
- Section 3 – Tom Clarke East Link Bridge to Sean Moore Road.

The main alternatives considered within the three sections during the development of the draft PRO are set out in the following sections.

3.4.1.1 Section 1 – Talbot Memorial Bridge to Tom Clarke East Link Bridge

3.4.1.1.1 Section 1 Bus Priority Options – North Quays

The EPR proposed the removal of the inbound bus lane on the north quays and its relocation to the south quays. This would require the provision of a right-turn facility for buses, taxis and coaches coming from East Wall Road towards the City Centre from either the Tom Clarke East Link Bridge or the Samuel Beckett Bridge, or both. The widening of the Tom Clarke East Link Bridge for the provision of a right-turn lane has not progressed and the future timing of this is unknown. The provision of a right-turn lane for buses from the Samuel Beckett Bridge would be difficult to accommodate geometrically and would also require buses to make a difficult left-turn from North Wall Quay onto the bridge. Therefore, alternative options were reappraised, including:

- Option A - Continuous bus lanes in both directions on North Wall Quay and Custom House Quay;
- Option B - EPR proposal with split routing via the north and south quays with a right-turn from Tom Clarke East Link Bridge;
- Option C - EPR proposal with split routing via the north and south quays with a right-turn from Samuel Beckett Bridge;
- Option D - EPR proposal with split routing via the north and south quays with right-turns from both Tom Clarke East Link Bridge and Samuel Beckett Bridge;
- Option E - Bus lanes in both directions on North Wall Quay and Custom House Quay with general traffic westbound only;
- Option F - Bus lanes in both directions on North Wall Quay and Custom House Quay with general traffic eastbound only; and
- Option G - Public transport only on North Wall Quay and Custom House Quay.

The options assessment concluded that it is preferable to provide continuous bus lanes along North Wall Quay (Option A). Options B and D would require the widening of the Tom Clarke East Link Bridge to provide a right-turn lane, which would have significant cost and potential environmental implications in relation to ecology, soils and geology, and landscape and visual. Option C would not cater for the other bus services along the northern side of the River Liffey east of Samuel Beckett Bridge. Options E, F and G, while offering advantages for public transport and bicycles along the north quays, have the potential for impacts as a result of traffic displacement (air, noise and human health) and reducing the accessibility of Dublin Port and the Dublin Port Tunnel and these were not considered further.

Therefore, Option A was selected as the preferred option and this option performed positively in terms of Economy, Integration and Safety. Overall, in terms of the sub-criteria under the Environment criterion, the preferred option (Option A) performed positively (in terms of ecology, soils and geology, human beings and material assets, and landscape and visual) and was more advantageous than Options B, E, F and G (which performed poorly in respect to human beings and material assets, air quality and noise and vibration) and the same as Option C.

3.4.1.1.2 Section 1 – Options for Scherzer Bridges

The two protected structures, namely the Scherzer Bridges along Custom House Quay and North Wall Quay, at the entrances to George's Dock in the Irish Financial Services Centre (IFSC) and the Royal Canal at Spencer Dock respectively, posed a potential barrier to bus priority in the EPR. In particular, the pair of bridges at Spencer Dock are considered to compromise the operation of the Samuel Beckett Bridge / Guild Street junction. The options reviewed were:

- Option A - Retain bridges in-situ;
- Option B - Retain bridges at George's Dock only;
- Option C - Retain bridges at Spencer Dock only;
- Option D - Retain eastbound bridges only in-situ (i.e. one of the pair of the protected structure would be retained over one half of the road);
- Option E - Retain westbound bridges only in-situ (i.e. one of the pair of the protected structure would be retained over one half of the road);
- Option F - Replace all bridges. This would involve the demolition and removal of the existing bridges and their replacement with a simple concrete bridge structure; and
- Option G - Relocate and replace all bridges. This would involve the careful deconstruction of the protected structures and their reinstatement adjacent to the roadway to carry pedestrian and cycle traffic. New four lane concrete bridges would be constructed in between the relocated Scherzer Bridges to carry the road carriageway.

The conclusion of the options assessment was that the most appropriate option was Option G. This option would allow for better bus priority and other traffic issues to be resolved. Option G performed positively in terms of Economy, Integration and Safety. In terms of the sub-criteria under the Environment criterion, the preferred option (Option G) performed better that Options B, C, D, E and F and the same as Option A. Whilst it was identified that there would be an impact on the protected structures, there would also be advantages associated with the relocation of the structures into more prominent locations along the Campshires.

Please see Section 3.4.4, and Appendix A3.1 in Volume 4 of this EIAR, for information on the more detailed study undertaken into the various sub-options explored in removing and relocating both pairs of the Scherzer Bridges.

3.4.1.1.3 Section 1 – Access and Servicing Arrangements on the North Quays

Following a review of the EPR, the effect of right-turns along the north quays was considered further. Such right-turns would have to be accommodated either with dedicated turning lanes, or with turning from the traffic lane, which would result in through-traffic entering the bus lane to pass the turning vehicles. These could have operational impacts on the bus lanes and general traffic lanes. Alternative access is generally available via Sheriff Street from East Wall Road or from Guild Street, except at one or two locations. Therefore, the potential to remove the right-turns was explored:

- Option A - Retain right-turning provisions as existing with the provision of right-turn lanes;
- Option B - Retain right-turning provisions as existing without the provision of right-turn lanes;
- Option C - Remove all right-turns; and
- Option D - Retain right-turns, where required for essential access or public transport movements only (i.e., Commons Street, Park Lane, and New Wapping Street).

The assessment indicated that the complete removal of right-turns (Option C), would adversely impact on public transport services. Therefore, it is preferable to provide for right-turns for public transport vehicles which need to make such manoeuvres (as well as for access). The retention of other right-turning provisions was not recommended, and these movements should be redirected via Sheriff Street. Option D was selected as the preferred option and this option performed positively in terms of Economy and Safety. Overall, in terms of the sub-criteria under the Environment criterion, the preferred option (Option D) performed positively (in terms of heritage (architecture and archaeological)), and more advantageous than Option A, and the same as Options B and C.

3.4.1.1.4 Section 1 Bus Priority Options – South Quays

In the context of retaining bus lanes on the north quays, the proposed introduction of bus priority on the south quays was reviewed. The possible options considered were as follows:

- Option A - No priority west of the Samuel Beckett Bridge with all bus movements via the north quays;
- Option B - Westbound priority as per the EPR with eastbound movements via the north quays and the Samuel Beckett Bridge;
- Option C - Westbound priority as per the EPR with eastbound movements via Townsend Street. This would be a slight revision to the EPR, with eastbound bus movements routed via Townsend Street rather than the north quays, thereby avoiding a complicated right-turn movement at the Samuel Beckett Bridge / Guild Street Junction; and
- Option D - Limited westbound priority at the western end only. This would involve the introduction of a westbound bus lane on City Quay between Talbot Memorial Bridge and Lombard Street. The existing traffic circulation arrangements would be maintained east of this point, with traffic continuing to access the Lime Street / Windmill Lane area as it does at present.

The options assessment concluded that a more localised intervention at City Quay can achieve the same westbound bus priority, and that the more extensive measures proposed in the EPR were unnecessary. A second viable alternative is maintaining two-way bus movements on the north quays only. However, the inclusion of an inbound bus lane on the south quays will create additional capacity and resilience in the system. A further possible alternative would be to route the eastbound bus movements via Townsend Street and Hanover Street east to avoid a difficult right-turn onto the Samuel Beckett Bridge. Further analysis confirmed that the right-turn onto the Samuel Beckett Bridge could be managed through the bus-based automatic vehicle location system and signal controlled priority. Therefore Option D was chosen as the preferred option. Option D performed positively in terms of Economy, Integration and Safety. In terms of the sub-criteria under the Environment criterion, the preferred option performed the same as all other options.

3.4.1.1.5 Section 1 Access and Servicing Arrangements - South Quays

General traffic access and circulation along Sir John Rogerson's Quay (and adjacent areas) was also considered as part of establishing the PRO. The area is a de-facto cul-de-sac for general traffic. However, buses, pedestrians and cyclists will be able to continue onward to Ringsend on completion of the DPTOB. Several options were considered to manage access and circulation issues:

- Option A – No bus priority;
- Option B - Two-way bus lanes between Cardiff Lane and Forbes Street;
- Option C - Eastbound bus lane only between Cardiff Lane and Forbes Street;
- Option D - Westbound bus lane only between Forbes Street and Cardiff Lane;
- Option E - Eastbound bus lane only between Cardiff Lane and Forbes Street with westbound bus access via Misery Hill; and
- Option F - Westbound bus lane only between Forbes Street and Cardiff Lane with eastbound bus access via Misery Hill.

For options where the westbound bus lane is omitted, there would be a vulnerability in both reliability and journey times to bus services in the event of congestion on Cardiff Lane / Samuel Beckett Bridge, since vehicles unable to join the northbound or southbound traffic streams would, in turn, obstruct westbound buses. There is no scope for congestion eastbound since there is no obstacle to traffic flow to the east. The options assessment has indicated that westbound bus priority is essential. This can be achieved by the provision of a bus lane westbound on Sir John Rogerson's Quay between Forbes Street and Cardiff Lane. There is no advantage to discommoding traffic for the provision of eastbound bus priority at this location since there is no catalyst for congestion to the east on Sir John Rogerson's Quay Extension. Therefore, Option D providing a westbound bus lane only is preferred. Option D performed positively in terms of Economy and Integration. In terms of the sub-criteria under the Environment criterion, the preferred option performed the same as all other options.

3.4.1.1.6 Section 1 – Cycling Facilities on Samuel Becket Bridge

There is an existing two-way cycle track beside the footpath on the eastern side of Samuel Beckett Bridge. Comments were received during the first public consultation about the limited space for pedestrians and cyclists on Samuel Beckett Bridge. The options on the bridge were as follows:

- Option A - EPR proposal to remove northbound cycle track on the eastern side;
- Option B - No change to existing pending completion of new pedestrian / cycling bridge across the River Liffey at Forbes Street / Blood Stoney Road. Dublin City Council (DCC) proposes to develop a new pedestrian / cycle bridge between Forbes Street and Park Lane or between Blood Stoney Road and New Wapping Street to relieve pressure on Samuel Beckett Bridge;
- Option C – Remove the southbound bus lane and provide the cycle track on road with a wider footpath.

The EPR design proposal is considered to be inappropriate as the link between the Grand Canal Premium Cycle Route and the Royal Canal Premium Cycle Route runs along the east side of Samuel Beckett Bridge. It would pose a considerable inconvenience to northbound cyclists to have to cross the road twice to continue their journey. The future provision of a downstream pedestrian / cycle bridge by DCC will improve the situation for pedestrians and cyclists further. The conclusion of the options assessment was that the Proposed Scheme should retain the two-way cycle track on the eastern side of Samuel Beckett Bridge, with no change at the south-east corner of the bridge because of the severe constraints posed by the bridge opening mechanism and mechanical barriers. Therefore, Option B was selected as the preferred option. Option B performed positively in terms of Economy, and Integration. In terms of the sub-criteria under the Environment criterion, the preferred option performed the same as all other options.

3.4.1.2 Section 2 – Dodder Public Transport Opening Bridge (DPTOB)

3.4.1.2.1 Options for the Dodder Public Transport Opening Bridge (DPTOB)

The following five bridge options were assessed for the DPTOB. All options were assessed using the MCA process (with the exception of Option 2 which was determined not to be feasible):

- **Option 1 – Fixed Bridge**: This was the only fixed (non-opening) bridge option assessed. This option was not deemed feasible at an early stage of the assessment as Waterways Ireland advised that an opening mechanism would be required for a bridge in this location to facilitate the passage of taller vessels (DCC 2019);
- **Option 2 – Swing Bridge**: This was the only swing bridge option assessed. The swing bridge would operate by swinging horizontally on the river pier, swinging north and south over the River Dodder and the River Liffey. Option 2 would include a 19m wide navigation clearance and would have an unrestricted vertical clearance in its opened position for the passage of tall ships. This option was not deemed to be feasible as the opening mechanism itself, along with the ship impact protection system that would be required to accompany it, would be too intrusive for this site, as it would physically impinge too greatly on the watercourses and would have implications for navigation. As this option was considered inappropriate for the location, it was ruled out prior to the MCA process;
- **Option 3 – Bascule Bridge (Rolling Leaf Type)**: Option 3 would include an opening span of a rolling leaf bascule with the pivot and opening mechanisms located on the land side of the west quay wall. This option would include a 19m wide navigation clearance for the passage of tall ships. Option 3 was deemed to be less favourable as it would require deep excavations and significant temporary works in close proximity to the protected quay walls;
- **Option 4A – Bascule Bridge (Trunnion Type with Counter-Weight at Shore)**: Option 4A would include an opening span of a single leaf bascule (fixed trunnion type) with the pivot and opening mechanisms located on the land side of the west quay wall. This option would include a 19m wide navigation clearance for the passage of tall ships. Option 4A was deemed to be less favourable as it would require deep excavations which would result in high levels of noise and significant temporary works (including the greatest volumes of pavement to be broken) in close proximity to the protected quay walls; and
- **Option 4B – Bascule Bridge (Trunnion Type with Counter-Weight in River Pier)**: Option 4B would include an opening span of a single leaf bascule (fixed trunnion type). The pivot and opening

mechanisms would be incorporated into the west pier within the river. This option would include a 19m wide navigation clearance for the passage of tall ships.

Option 4B (Bascule Bridge (Trunnion Type with Counter-Weight in River Pier)) was assessed to be the preferred bridge option for the DPTOB, when compared against the other options, as it was deemed more favourable in terms of:

- Buildability and construction, as it would limit the risks associated with excavation in proximity to the existing quay walls by positioning the largest pier within the river itself;
- Financial costs; and
- Project / programme risks, as it would minimise the amount of construction required behind the western quay walls.

The relative potential environmental impacts of the bridge options were considered under the following headings:

- Population and human health;
- Biodiversity;
- Soils, geology, and hydrogeology;
- Hydrology;
- Air quality and climate;
- Noise and vibration;
- Material assets and land;
- Cultural heritage; and
- Landscape and visual amenity.

The options considered did not differ significantly in terms of their potential to result in negative environmental impacts. However, a number of differences were identified, as summarised below:

- The bridge options were assessed as being similar in terms of their potential for impacts in respect of soils, geology, hydrogeology, air quality, climate, material assets and land;
- In terms of population and human health, Option 1 was considered to be the least preferred, in that it would result in restrictions on navigation in the River Dodder and Grand Canal Basin. The other options were considered to be similar in this respect;
- In terms of biodiversity, Option 4B was considered to be the least preferred, in that it featured the largest river pier of all options, potentially resulting in greatest impacts on the river and associated habitats and species during construction and operation. Otherwise, the options were considered to be similar in terms of their potential for ecological impacts;
- For the same reason, Option 4B was considered to be the least preferred option in respect of hydrology. The other options were considered to be similar in this respect;
- In terms of noise and vibration, all options were considered to be similar in terms of their potential for impacts during the Operational Phase. During the Construction Phase, Options 3 and 4A would require the greatest volumes of pavement to be broken out, as well noisy excavation behind the wall of Britain Quay, and piling, resulting in the greatest generation of noise and vibration;
- Option 4B would require the greatest number of piles to facilitate the construction of the river pier, making it intermediate in this respect. Option 1 was assessed as being the preferred option in this respect;
- In terms of cultural heritage, bridge options were rated in terms of their potential to impact negatively upon the adjacent quay walls and unrecorded subsurface artefacts / remains. Option 1 was assessed as being the preferred option in this respect, having two foundation locations within the river (of minimal size), and two onshore foundations (also of minimal size). Option 4B was considered to be intermediate in this respect, having two foundation locations within the river, with its west pier being the largest of all options (11m width). Options 3 and 4A were considered to be the least preferred options in this respect, having two foundation locations within the river (of minimal size) and two onshore foundations, necessitating substantial excavations behind the wall of Britain Quay, likely interfering with buried artefacts / older historic quay walls. Of Options 3 and 4A, the latter was considered to be somewhat less preferred, in that it featured the largest foundation behind Britain Quay;

- In terms of the visual impacts of the bridge options, Option 1 was considered to offer the least visually intrusive but also the least aesthetically creative solution. Option 3 was considered to offer the most aesthetically pleasing option, with its 'eye' at the pivot point, and vertical extension of the rolling bascule span. Options 4A and 4B were assessed as being intermediate and equivalent to each other in this respect, offering simple forms in their closed positions, with some dramatic effect during opening; and
- Integration of the above-listed considerations resulted in the following order of preference under the heading of 'environmental impacts' (from most to least preferred): Option 1 > Option 3 = Option 4A > Option 4B.

3.4.1.2.2 St. Patrick's Rowing Club (SPRC) and DPTOB Control Room

At the proposed location for the DPTOB on the east bank of the River Dodder, there is a small area of public open space on the south-east corner of the confluence of the River Dodder and the River Liffey, as shown in Image 3.8. The proposed public transport link road and cycleway to connect from the proposed DPTOB will extend across this open space to connect from Sir John Rogerson's Quay on the western side to the R131 East Link Road on the eastern side, as shown by the dashed red line on Image 3.8. Some land reclamation from the river is needed for the road alignment and tie-ins to the R131 East Link Road on the eastern side of the DPTOB, to facilitate access to the jetty, a new public slipway and for services relocations arising from the Liffey Services Tunnel. The reclaimed area will also provide compensatory public open space to replace the area lost under the new road.

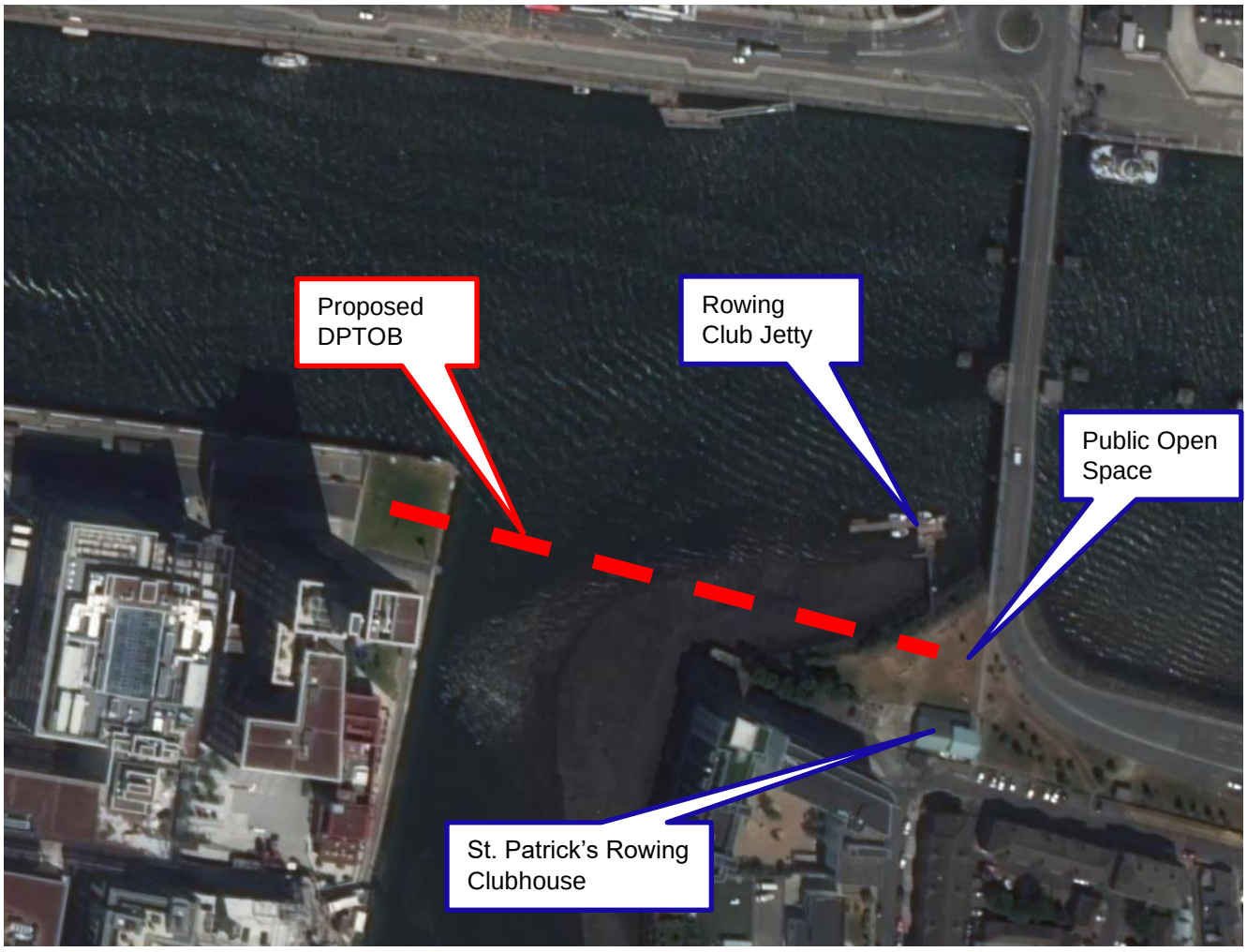

Image 3.8: Location of the Proposed DPTOB

The SPRC is also located at the south-east corner of the confluence with the River Liffey and the River Dodder. There is a clubhouse on Thorncastle Street on the southern side of the public open space, and the jetty for access

to the River Liffey is located on the northern side of the public open space area adjacent to Tom Clarke East Link Bridge. The proposed link road to the DPTOB will pass between the clubhouse and the jetty which will impact on the operations of the rowing club by causing severance of the direct access to the river for the launching of boats that are stored in the clubhouse.

The following options were considered to address this situation, as follows:

- Retain the existing rowing club facilities in their current positions: This was ruled out due to health and safety concerns about the need to cross a potentially busy road junction with large bulky equipment (21ft boats, etc.);
- Retain the existing clubhouse and relocate the jetty and pontoon into the River Dodder to the south of the proposed bridge: This option was not considered feasible because the River Dodder is too shallow in this location and could not provide a suitable launch location for boats at low tide conditions;
- Retain the existing boat club facilities in their existing positions and provide an underpass connection from the clubhouse to the jetty: This is not considered feasible due to flood risk at high tides; and
- Relocate the clubhouse to the north of the new link road nearer the River Liffey and jetty. This option is satisfactory for the operation of the boat club and avoids severance by the new road.

The preferred option is therefore to relocate the SPRC building to a new location within the reclaimed land north of the proposed new public transport link road for the DPTOB as it provides a clubhouse for the SPRC and also ensures that there is direct access between the clubhouse and the jetty.

A control room is required for the operation of the proposed DPTOB, and this needs to be located in a position with clear visibility of both the proposed DPTOB and the approach path for vessels passing through the nearby Tom Clarke East Link Bridge. The proposed location for the control room has been selected to meet this operational requirement and will be positioned to the north-east of the eastern end of the DPTOB. It will be located immediately adjoining the proposed location for the new clubhouse for the SPRC at the western end of the clubhouse so that there is a clear sightline to the Tom Clarke East Link Bridge (see drawing BCIDD-ROT-STR_ZZ-0016_XX_00-DR-SS-0016 and BCIDD-ROT-STR_ZZ-0016_XX_00-DR-SS-0017 in Volume 3 of this EIAR).

3.4.1.3 **Section 3 – Tom Clarke East Link Bridge to Sean Moore Road.**

3.4.1.3.1 Section 3 Cycling Facilities through Ringsend and Irishtown

On foot of significant local opposition to the proposed cycle track along Pigeon House Road as part of the EPR, a number of alternative options were considered:

- Option A – EPR proposal for a cycle track along the verge at York Road and Pigeon House Road and along the eastern edge of Ringsend Park (see Section 3.3.3);
- Option B – Shared running on-road on Pigeon House Road;
- Option C – Alternative routing via the western side of Ringsend Park; and
- Option D – Combination of Option B and Option C.

The assessment has concluded that there are more attractive, lower impact solutions than that indicated on the EPR. The combination of Options B and C offers the best solution for cyclists as it is considerably more direct (1km compared to 1.5km long) and will avoid impacting on the green area in front of the houses on Pigeon House Road, thereby addressing a significant concern that arose during the first round of public consultation. It is noted that Pigeon House Road has been closed to through-traffic since this consultation, so the concerns that arose previously about through-traffic and trucks no longer arise. A wider shared use path through Ringsend Park comprises part of the preferred solution, and this can be achieved with minimal impact on the trees. Therefore, Option D is considered the preferred option. Option D performed positively in terms of Economy, Integration and Safety. In terms of the sub-criteria under the Environment criterion, the preferred option (Option D) performed better that Option A (in terms of heritage (architecture and archaeological), human beings and material assets, and landscape and visual), and the same as Option C, and worse than Option B.

3.4.1.3.2 Section 3 Cycling Facilities at Irishtown

Concerns were raised by the public about impacts of the proposal at the south-eastern corner of Ringsend Park, on the historic quay wall, on trees and on parking. Four alternative designs were devised to avoid these impacts, and these have been compared with the EPR:

- Option A - EPR proposal (see Section 3.3.3);
- Option B - via Kerlogue Road.;
- Option C - Modified option along the verge at Strand Street and Pembroke Street, avoiding the EPR route impacts;
- Option D - via Bremen Road. This option would start similarly to Option B but would connect to the proposed Poolbeg SDZ site rather than connecting directly towards Beach Road; and
- Option E - Combination of Options C and D.

The review indicated that there are lower impact schemes that achieve much the same level of cycle facility provision as had been proposed in the EPR. Option E is the preferred arrangement, within which Option C should be combined with Option D, since Option C is preferred over Option B. The revised scheme involves no direct impacts on trees. The preferred solution involves a split routing at the south-eastern end, maximising connectivity to both the East Coast Trail and the proposed Poolbeg SDZ development. Option E was selected as the preferred option and this option performed positively in terms of Economy, Integration and Safety. Overall, in terms of the sub-criteria under the Environment criterion, the preferred option (Option E) performed better (in terms of ecology, heritage (architecture and archaeological), human beings and material assets, and landscape and visual) than Option A, the same as Options B and C and less positive than Option D.

3.4.2 Consideration following Draft Preferred Route Option Consultation (March 2020)

The Draft PRO was published in March 2020 and a second round of public consultation occurred between 4 March 2020 to 17 April 2020. Due to COVID-19 restrictions in mid-March 2020, the planned Public Information Events were impacted. There were a total of seven submissions received during this second round of public consultation.

A number of changes to the design were made based on feedback received during the second round of public consultation and dialogue with stakeholders. However, the changes made to the Draft PRO were relatively small scale and no further options assessments using the MCA described in Section 3.3.1 were required.

Key changes for the Proposed Scheme implemented in the design of the Draft PRO include:

- Improved cycle facilities to link Samuel Beckett Bridge to Cardiff Lane and Sir John Rogerson's Quay; and
- Modifications to bus stop locations, with some bus stops relocated or removed to achieve better spacing between stops, while also ensuring that each stop is sited in the best location to serve the surrounding neighbourhoods. These modifications will also ensure a more efficient bus network operation.

3.4.3 Further Consideration Following Draft Preferred Route Option Consultation (November 2020)

This third round of public consultation on the Draft PRO took place from 4 November to 16 December 2020 and was held virtually due to the continuing effect of the COVID-19 pandemic and associated restrictions.

A total of three submissions were received during this third round of public consultation relating to the updated draft PRO. These submissions were individual submissions from a local resident, commuter, and local representative.

While a variety of matters were raised in the submissions, the key issues identified during the consultation were as follows:

- Environment – Request that impacts on trees be avoided;
- Public Transport Routes – Queries in relation to bus routing on the east side of the proposed DPTOB;
- Programme – why can't the East Link Footbridge be delivered at the same time; and
- General feedback on the design of bus and cycle facilities.

These key issues were considered and accommodated in the draft PRO, where applicable, or responded to specifically in the Preferred Route Option Report for the Proposed Scheme.

3.4.4 Scheme Design Alternatives

3.4.4.1 Configuration Options for the Scherzer Bridges at George's Dock and Spencer Dock

The options for the Scherzer Bridges in terms of the PRO are discussed in Section 3.4.1.1.2. A more detailed study of the options for the Scherzer Bridges was undertaken and this detailed report is included in Appendix A3.1 (Scherzer Bridges Options Report) in Volume 4 of this EIAR.

Along Dublin's north quays, between Talbot Memorial Bridge and Tom Clarke East Link Bridge, are two pairs of Scherzer Bridges located at George's Dock and the Royal Canal. Both pairs comprise of wrought iron bascule bridges constructed of riveted wrought-iron with box-like structures crossing carriageways rising from curved sections with corresponding tread plates at carriageway level. The Scherzer Bridges at the Royal Canal are the oldest of the two pairs having been erected in 1911 to 1912, and although still capable of operation to facilitate maritime access to the sea lock at the end of the Royal Canal, their spans have been temporarily clamped shut and are now rarely, if ever opened. The Scherzer Bridges at George's Dock were constructed around 1935, however, unlike the Royal Canal Scherzer Bridges, the spans of the bridges have been permanently clamped shut since 2001 and the pair of bridges are no longer capable of operation.

Other potential configurations explored for each pair of Scherzer Bridges are outlined, as follows:

- **Retention of one set in-situ with modifications to the other set only** - consideration was given to relocating the Scherzer Bridges at the Royal Canal only, given their immediate proximity to the major junction of the north quays and the Samuel Beckett Bridge / Guild Street Junction. However, it was felt that the retention of the second set of bridges at George's Dock would potentially undermine the operation of the bus network, as public transport vehicles would be required to mix with general traffic through the retained Scherzer Bridges. This would regularly result in queues back to downstream junctions as a result of priority reassignment from general traffic to more sustainable modes (i.e. pedestrians, cyclists and buses), thereby compromising public transport priority. This was of particular concern due to the number of coaches, taxis, and buses along the north quays. In addition, it was felt that it would be visually incongruous to retain one set in its original configuration while making modifications to the second set. This option was therefore discounted;
- **Retention of one bridge in-situ with the second bridge to be relocated** - this option was explored to allow a bus lane in one direction to cross one of the existing bridges, most likely the outbound lane given the proximity to nearby buildings, with a new concrete bridge to carry the other three lanes (2 traffic lanes and a bus lane). This configuration would not have allowed the re-erection of the second of the Scherzer Bridges outside the new concrete bridge at either location, requiring it to be moved elsewhere, and breaking the connection with its twin. On that basis, this option was not preferred;
- **Orientation of bridges** - it was considered that it would be visually incongruous and historically insensitive that each bridge wouldn't have the same orientation as its twin. However, options were explored for changing the orientation of the pair at each location. It is proposed to change the orientation of the pair of Scherzer Bridges at George's Dock, since the relocation of the outbound bridge northward would otherwise restrict daylight to the adjacent office building. The relocated bridge would also be hidden from public view by the building, whereas it is intended that it will be a feature along the route of the Proposed Scheme. There is no physical constraint to the reorientation of the bridges at this location and it was felt they would sit better in the landscape. It was proposed initially to reorientate the second pair of bridges at the Royal Canal to match the configuration at George's Dock. However, upon further consideration by the BusConnects Infrastructure team, it was decided that it was preferable for the Scherzer Bridges at the Royal Canal to remain in their

original orientation unless absolutely necessary to reorientate. On that basis, the preferred option was that the original orientation would be retained at this location;

- **Raise bridges at Royal Canal by various heights** - various permutations were explored for lifting the bridges at the Royal Canal but were found to make no meaningful difference when compared with the Proposed Scheme, which is preferred since it best meets Waterways Ireland's requirements. A variant was considered at the Royal Canal whereby the Scherzer Bridges would not be raised, and an opening bridge would be installed in between them. While it is proposed to recondition the Scherzer Bridges to be openable in any event, it was not felt to be appropriate to rely on an opening road bridge for canal traffic for three reasons:
    - Firstly, it would be very disruptive to bus traffic during operation, which is likely to become more regular over time as usage of the reconditioned canal increases;
    - Secondly, the opening mechanism would be used irregularly for the first number of years causing the mechanisms to degrade; and
    - Thirdly, the underground chambers required for the mechanisms would be flood prone, expensive and would have extensive service diversion requirements. On that basis, this variant option was not preferred.

The preferred option for the Scherzer Bridges at George's Dock was to carefully dismantle, restore and re-erect the Scherzer Bridges on either side of the existing road to accommodate a new four-lane carriageway (bridge) and reserve the Scherzer Bridges for pedestrian and cycle traffic only. This preferred option also included that the two Scherzer Bridges be re-orientated by 180º (degrees) so that the impact on the immediately adjacent Trinity College Dublin Stack B building is reduced, which would otherwise not be the case should the northernmost Scherzer Bridge at George's Dock simply be pushed back in its current orientation. In respect to the Scherzer Bridges at the Royal Canal, the preferred option was to dismantle, restore and re-erect them on either side of the existing road to accommodate a new four-lane carriageway (bridge) and reserve the Scherzer Bridges for pedestrian and cycle traffic only. To ensure future-proofing and their sustainability in the long-term (from a structural perspective), it was determined that the preferred option would be to remove the necessity for the Scherzer Bridges to carry general traffic but carry cyclists and pedestrian traffic instead. However, following consultation with Waterways Ireland about the continued navigability of the Royal Canal at this location (noting the scheme proposals as well as sea level rise (the River Liffey is tidal at this location)), the Scherzer Bridges, their approaches and surrounds are to be raised approximately 1m above the existing road level. The preferred option at both locations will minimise the loss of the physical fabric of the bridges and adjacent heritage features, when compared to other alternative options that continued the requirement for the Scherzer Bridges to carry general traffic whilst creating an opportunity to enhance the public's appreciation and understanding of the Scherzer Bridges through urban realm improvements.

No other major scheme design alternatives were considered to the Proposed Scheme following the period of public consultation on the draft PRO.

3.4.4.2 Alternative Options for Construction Phasing of Works at the Scherzer Bridges

It was recognised that the works associated with the relocation and reinstatement of the Scherzer Bridges, coupled with the construction of new bridge structures, had the potential to give rise to traffic management issues on the north quays. An appraisal was undertaken to identify the most appropriate construction approach to undertake the works required to the bridges, so as to minimise Construction Phase impacts, where practicable. This appraisal applied to both sets of Scherzer Bridges, at George's Dock and at Spencer Dock. Three construction phasing options were evaluated. The estimated construction programme for carrying out the works associated with the Scherzer Bridges is considered to be the same (24 months) for each of the options.

The three construction options considered, were as follows:

Option 1:

In summary, this option allows for the Scherzer Bridges to be dismantled and reinstated in one phase towards the end of the proposed 24-month programme. This option would require a single traffic lane to operate under the control of traffic lights for a period of 20 months. The proposed phasing for this option is:

1) Divert westbound general traffic from the north quays to Sheriff Street Upper;

2) Deconstruct the northern Scherzer Bridge but maintain eastbound traffic and westbound public transport on the southern Scherzer Bridge. This will be a single lane, under the control of traffic lights;
3) Construct the northern half of the new bridge and, once this half is complete, divert eastbound traffic and westbound public transport onto this new bridge section. Again, this will be a single lane, under the control of traffic lights;
4) Remove the southern Scherzer Bridge;
5) Complete the southern half of the new bridge, and once complete, open the new bridge to two-way traffic (single lane in each direction) along the north quays;
6) Re-instate the Scherzer Bridge structures in their new locations following off-site refurbishment; and
7) Open to two lanes of traffic in each direction.

Option 2:

In summary, this option allows for the Scherzer Bridges to be dismantled and reinstated in a phased manner, with early installation of the northern Scherzer Bridge deck. This would require a single traffic lane operating under the control of traffic lights for a period of 12 months. The phasing for this option is:

1) Divert westbound general traffic from the north quays to Sheriff Street Upper;
2) Deconstruct the northern Scherzer Bridge but maintain eastbound traffic and westbound public transport on the southern Scherzer Bridge, with a single lane, under the control of traffic lights;
3) Construct northern half of new bridge and, in parallel, reconstruct the deck of the northern Scherzer Bridge in its new location. Once these tasks are complete, there would be a temporary diversion of eastbound traffic onto the Scherzer Bridge and westbound public transport onto the newly constructed section of the new bridge;
4) Remove the southern Scherzer Bridge;
5) Complete the southern half of the new bridge, and once complete, remove eastbound traffic from the northern Scherzer Bridge and divert over the new bridge, thus opening the new bridge to two-way traffic (single lane in each direction) along the north quays;
6) Reconstruct the remainder of the northern Scherzer Bridge and the southern Scherzer Bridge structures in their new locations following off site refurbishment; and
7) Open to two lanes of traffic in each direction.

Option 3:

This option is similar to Option 2, except a temporary bridge would be utilised, instead of the relocated northern Scherzer deck, to provide two lanes of traffic after 12 months.

A qualitative MCA was undertaken to evaluate the options for the construction works associated with the relocation and reinstatement of the Scherzer Bridges using the following criteria:

- Risk;
- Cost;
- Programme;
- Traffic Impacts;
- Constructability; and
- Environment.

With regard to the Environment criteria, the following were considered to be the key environmental aspects which could be affected by the proposed options:

- Architectural Heritage; and
- Landscape and Visual.

The works associated with the Scherzer Bridges have the potential to give rise to both architectural heritage and landscape and visual impacts.

The inclusion of other environmental aspects were also considered (e.g., archaeology and cultural heritage, hydrology, soils and geology, flora and fauna, air quality and noise). However, these aspects were not considered to be key determining factors in the consideration of the options being assessed.

Options 1 and 2 are considered to be the most robust in terms of construction programme, when compared to Option 3. Option 1 is also considered to have some advantages in terms of the risk criteria, when compared to the other options. It is considered to be a more straightforward option to construct as it removes the risk of the potential unforeseen delays associated with the deck of the northern Scherzer Bridges (e.g. delays due to unknown ground conditions, possible archaeological finds, potential issues in determining the structural soundness of the relocated Scherzer Bridges for road traffic). In terms of the environmental aspects, all the options will give rise to comparable architectural heritage and landscape and visual impacts. While Option 1 is considered to have some disadvantages in terms of traffic impacts in comparison to the other options, it is considered that on balance, Option 1 provides the most advantages of the three evaluated.

It is therefore concluded that, Option 1 is the preferred option for the undertaking of the works associated with the Scherzer Bridges.

3.5 Conclusion

The Proposed Scheme has been the subject of a systematic and comprehensive assessment of reasonable alternatives during the course of its development, informed by extensive engagement with residents, businesses, the local authority and other stakeholders, public representatives, and the general public.

As described in this Chapter, a significant range of alternatives have been considered at three levels:

- Strategic alternatives, particularly with regard to the GDA Transport Strategy;
- Route alternatives; and
- Design alternatives, incorporating detailed local level design development.

The assessment of alternatives took account of environmental impacts, alongside other relevant factors including the economy, safety, and accessibility, at all stages of the process.

It is considered that the examination of alternatives presented in this Chapter meets and exceeds the requirements of the EIA Directive and Section 50(2)(b)(iv) of the Roads Act (as amended), which states that an EIAR must contain '*a description of the reasonable alternatives studied by the road authority or the Authority, as the case may be, which are relevant to the proposed road development and its specific characteristics, and an indication of the main reasons for the option chosen, taking into account the effects of the proposed road development on the environment*'.

The Proposed Scheme is described in full in Chapter 4 (Proposed Scheme Description).

3.6 References

DCC (2019). Poolbeg West Planning Scheme

NTA (2012a). Bus Rapid Transit (BRT) – Core Bus Network Report.

NTA (2012b). Greater Dublin Area Draft Transport Strategy 2011 -2030

NTA (2013). Greater Dublin Area. Cycle Network Plan

NTA (2016a). Transport Strategy for the Greater Dublin Area 2016 – 2035.

NTA (2016b). Strategic Environmental Assessment of the Transport Strategy for the Greater Dublin Area 2016 – 2035

NTA (2017). Ringsend to City Centre Core Bus Corridor Feasibility Study and Options Assessment Report [Online] Available from: https://busconnects.ie/media/1559/20171221_ringsendtocc_report.pdf

NTA (2019). Ringsend to City Centre Core Bus Corridor Emerging Preferred Route. Public Consultation February 2019 [Online] Available from: https://busconnects.ie/media/1477/16-busconnects-cbc-ringsend-to-city-centre-070319-fa-web.pdf

NTA (2020a). Ringsend to City Centre Core Bus Corridor Preferred Route. Public Consultation March 2020 [Online] Available from: https://busconnects.ie/media/1815/16-ringsend-to-cc-preferred-route-200220-fa-web.pdf

NTA (2020b). Ringsend to City Centre Core Bus Corridor Preferred Route. Public Consultation November 2020 [Online] Available from: https://busconnects.ie/media/2102/16-ringsend-to-cc-preferred-route-301020-fa-web.pdf

UITP (2009). Public Transport: Making the right mobility choices.

Directives and Legislation

Directive 2011/92/EU of the European Parliament and of the Council of 13 December 2011 on the assessment of the effects of certain public and private projects on the environment

Directive 2014/52/EU of the European Parliament and of the Council of 16 April 2014 amending Directive 2011/92/EU on the assessment of the effects of certain public and private projects on the environment

S.I. No. 279/2019 - European Union (Roads Act 1993) (Environmental Impact Assessment) (Amendment) Regulations 2019

S.I. No. 296/2018 – European Union (Planning and Development) (Environmental Impact Assessment) Regulations 2018