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 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 Kimmage 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 the 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, and Inner Metropolitan areas in terms of character.

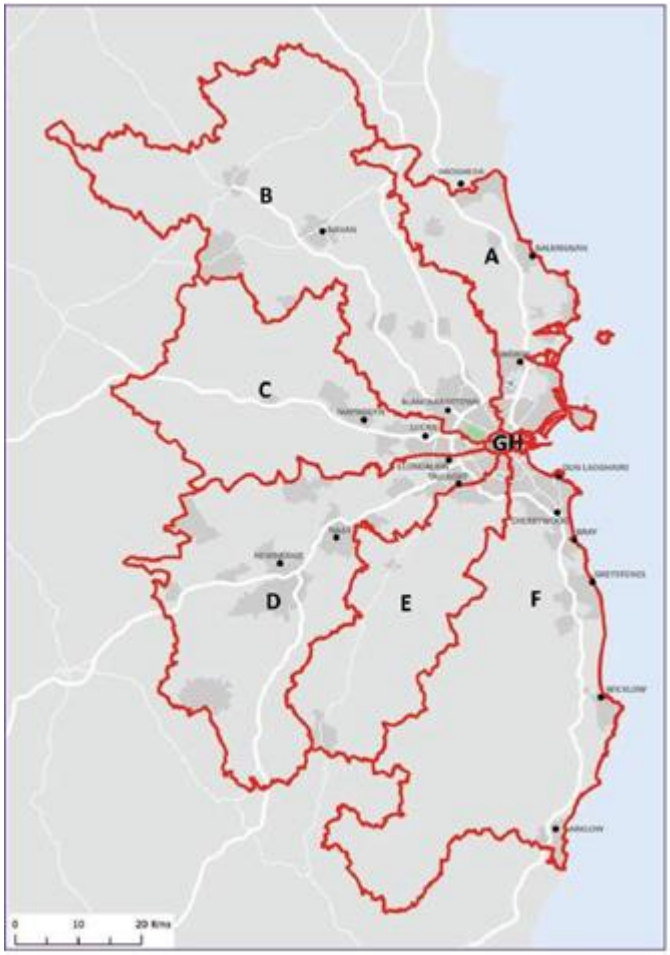

Image 3.1: 2016 GDA Transport Strategy Corridors

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 the broader Corridor E in the 2016 GDA Transport Strategy which extends from the core city centre area through to Tallaght and South County Dublin and onwards to the south west Wicklow border, within the Inner Metropolitan segment traversing through largely low density suburban areas such as Terenure, Kimmage, and Harold's Cross.

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 set 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 6.5% and 24% 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' Alterative, 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 reasonable 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.

The BRT Core Dublin 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.

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.

As part of that deliberation, the option of a light rail corridor from the City Centre (Christchurch) to Dundrum through Clanbrassil Street and Harold's Cross, which had been the subject of a feasibility study by the Railway Procurement Agency (RPA) in 2008, was considered (see Image 3.2). That feasibility study indicated a low level of potential passenger usage of the line, well below the level justifying the higher level of investment associated with a light rail scheme. In addition, the report noted that:

> *'[g]iven that development in the area is of a low density and sprawling nature, with a lack of green field or brown field sites, it would appear unlikely that the population or employment figures would experience any substantial increase over the coming years.'*

Subsequent to the completion of the Line E Feasibility Report, further transport analysis was carried out in 2010 / 2011 on the potential of developing the Rathfarnham to City Centre Luas Line. As part of the process of developing an overall transport strategy for the GDA, then called 'Vision 2030', the Luas Line to Rathfarnham was included in the transport modelling analysis undertaken in 2010. The output from the modelling work indicated that the forecast passenger demand in 2030 for the Rathfarnham to City Centre Luas Line would be between 1,235 and 1,300 passengers, depending on the overall strategy scenario being evaluated. Arising from that work, it was concluded that the level of passenger demand for this line would be low, equating to only about a quarter of the capacity of a standard light rail line.

Arising from the various studies and analysis that had been carried out, 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 public transport solution in the corridor of the Proposed Scheme and that there would be insufficient demand to justify the provision of a light rail alternative, particularly given the low-density nature of development in this corridor.

Similar to BRT, environmentally, the light rail 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. Light rail 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.

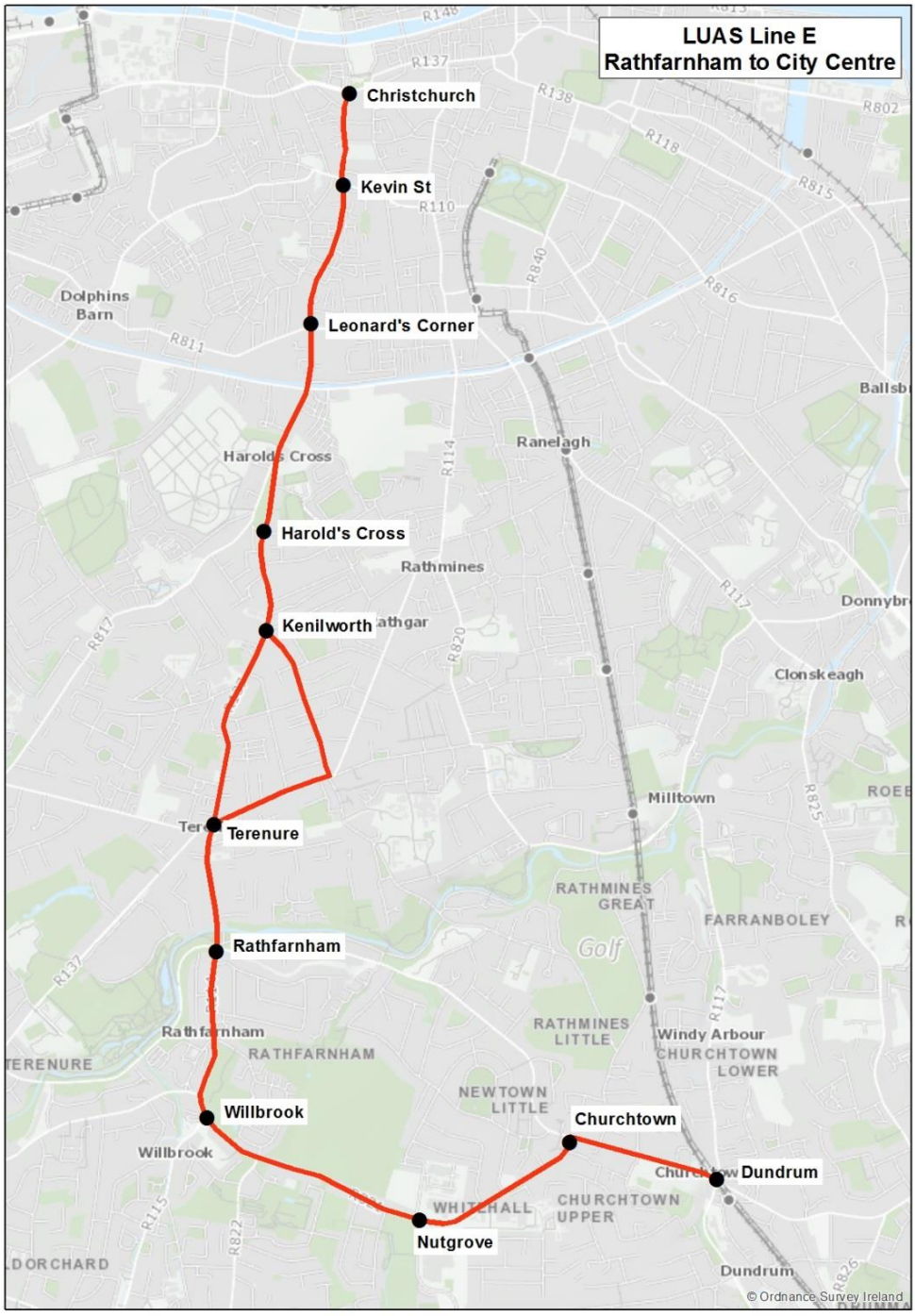

Image 3.2: Luas Line E (Feasibility) Route

3.2.6 Metro Alternatives

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 work carried out in relation to light rail assessment, 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 be part of the proposed public transport solution in the corridor of the Proposed Scheme.

A feasibility study was initiated in 2020 into an underground metro extending from the proposed MetroLink station at Charlemont through Terenure, Rathfarnham, Knocklyon and Ballycullen, as shown in Image 3.3

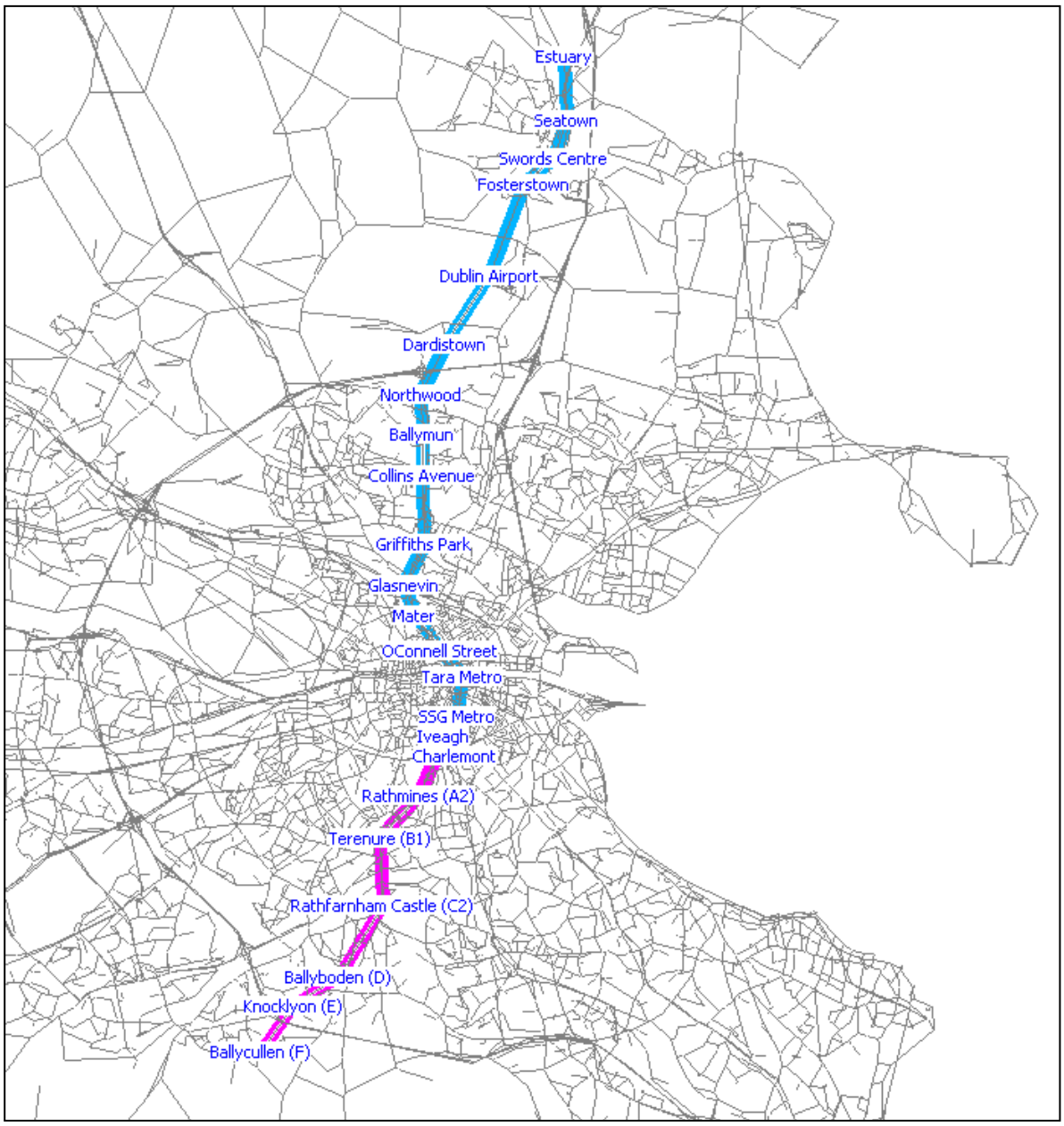

Image 3.3 Metro Knocklyon Feasibility Route

The assessment undertaken for the Metro Knocklyon Feasibility Study, indicated that the cost of the proposal would be in the region of €5 billion to €6 billion, with the anticipated benefits of the proposal being significantly less than the expected cost of the underground metro scheme (i.e. the benefit to cost ratio is well below 1:1). Overall passenger numbers were expected to be below the normal levels associated with an underground metro system, with low levels of all-day use, which is unsurprising given the absence of major destinations along the potential route.

In view of the costs of a potential underground metro scheme, and the comparatively low levels of anticipated overall usage, the provision of a metro along this corridor is not considered the appropriate public transport

solution, reinforcing the findings of the 2016 GDA Transport Strategy. 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, in comparison to the Core Bus Corridor proposal, the metro alternative 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 bus-based transport solution, 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 development of 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. This analysis concluded that a metro system would be more appropriate, and therefore, an underground heavy rail solution was not brought forward for this corridor.

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.

As mentioned previously, environmentally, the heavy rail option compared to the Core Bus Corridor proposal would be more impactful in terms of construction impacts, requiring continuous unbroken physical infrastructure and would involve significantly more land take and potentially involve demolition of buildings. 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.

3.2.8 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 was to significantly increase the capacity, and subsequent use of the public transport system, focussing on the overall BusConnects Programme in the case of the bus system, the DART+ Programme in the case of heavy rail, and the Luas / Metro 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 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 project 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 **Route Selection 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 2019 to 31 May 2019;
3) Development of the **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;
4) 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;
5) 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;
6) A third round of non-statutory **Public Consultation** was undertaken on the updated Draft PRO from 4 November 2020 to 16 December 2020; and
7) 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 information was collected and assessed. In addition, the potential for climate impacts was considered in all phases of the design process for the Proposed Scheme. As the design progressed, climate was indirectly affected in a positive way by refining the design at each stage through reducing the physical footprint of the Proposed Scheme, coupled with the inclusion of technological bus priority measures.

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 aspects of the Proposed Scheme 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 evaluation of options 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 Route Selection Report identified feasible options along the corridor, assessed these options and arrived at the EPR, which then formed the basis of the first non-statutory public consultation. A summary of the process is described below.

The Route Selection 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 that could accommodate a Core Bus Corridor was identified for each study area section, as shown in Image 3.4 (extracted from the Route Selection Report).

Image 3.4: Spider's Web of Route Options (Extracted from the Route Selection Report)

The initial 'spider's webs' were narrowed down using a high-level qualitative method based on professional judgement and a general appreciation for 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, in addition to other factors.

Arising from consideration of the various permutations possible in respect of the 'spider's web', three coherent end-to-end options were identified for further assessment. These three options are shown in Image 3.5 below.

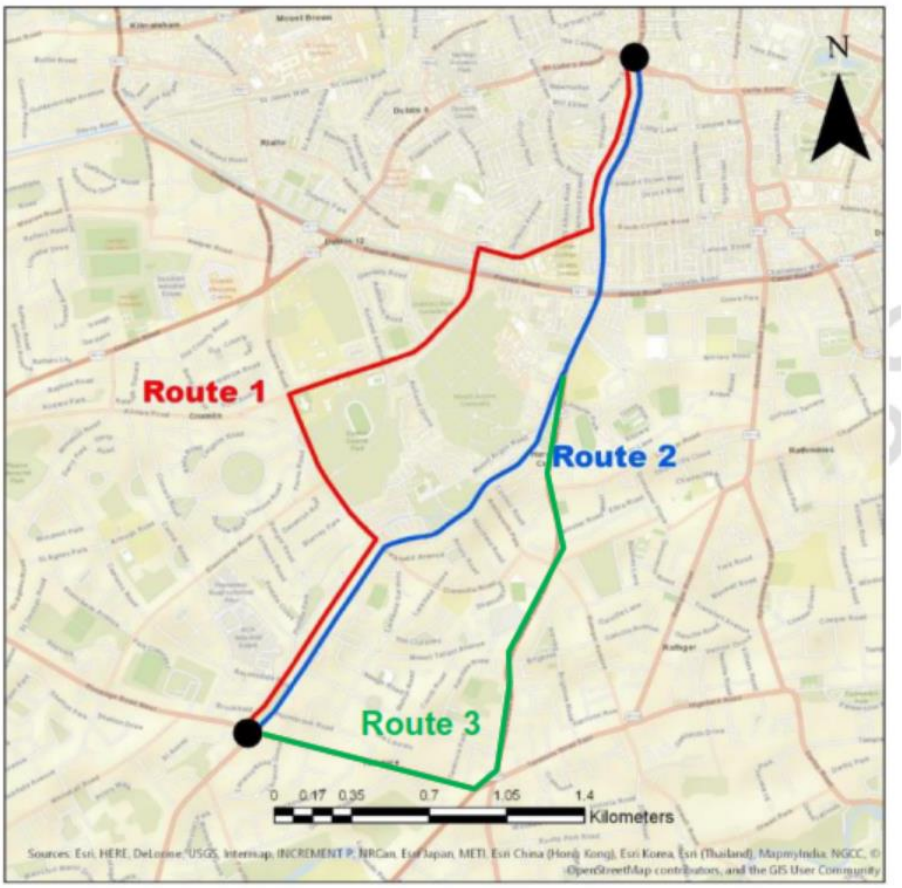

Image 3.5: Route Options from Initial Sift

3.3.2 Stage 2 - Route Options Assessment

Following completion of the Stage 1 initial appraisal, the remaining reasonable alternative 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 route options under the assessment criteria set out below:

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

Although it is noted, as set out in the Route Selection Report, Physical Activity was scoped out of the MCA at this stage. This is because all route options were considered to promote physical activity equally, and as such, it was not considered to be a key differentiator between route options.

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 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 along or adjacent to the corridor;

- Flora and Fauna - The provision of the Core Bus Corridor infrastructure could have negative impacts on flora and fauna, through construction of new infrastructure through green field sites. These impacts were compared for each scheme under this criterion;
- Soils and Geology - Construction of infrastructure necessary for the provision of the Core Bus Corridor infrastructure has the potential to impact on soils and geology. For example, through land acquisition and ground excavation. These considerations were compared for each scheme under this criterion;
- 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). Any such impacts were considered for each scheme under this criterion;
- Landscape and Visual - Provision of Core Bus Corridor infrastructure has the potential to impact on the townscape / streetscape as well as 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. Different schemes were compared and any negative effects were considered under this criterion;
- Air Quality – The provision of Core Bus Corridor infrastructure has the potential to impact the air quality along the route. These effects were compared for each scheme option under this criterion in relation to the volumes of traffic and on whether the road is moving closer to a sensitive receptor, for example, road widening or new alignment;
- Noise and Vibration - Provision of Core Bus Corridor infrastructure (e.g. the construction activities), has the potential to negatively impact on noise and vibration along a scheme. These effects were compared for each scheme option under this criterion. The impact was quantified in relation to the volumes of traffic and on whether the road is moving closer to a sensitive receptor, for example, road widening or new realignment; and
- Land Use Character – The provision of Core Bus Corridor infrastructure has the potential to impact on land use character through land take, severance or reduction of viability which prevents or reduces it from being used for its intended use.

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.

3.3.2.1.1 Route 1 Alternative

The Route 1 option is located to the west of the overall corridor area and runs along Clanbrassil Street Lower, South Circular Road, Donore Avenue, Clogher Road, Sundrive Road and Kimmage Road Lower. Extensive proposed road widening is envisaged for the provision of bus lanes along the full length of the route.

On a comparative basis with Route 2, large sections of the two routes are common (i.e. along Clanbrassil Street Lower and along the section of Kimmage Road Lower south of Sundrive Road). However, from the junction of Clanbrassil Street Lower and South Circular Road to the junction of Sundrive Road and Kimmage Road Lower, the two routes deviate onto different streets. Along these divergent sections, Route 1 at 2.6 km in length is considerably longer than the more direct Route 2 which is about 2 km in length. Given the additional length and less direct path of Route 1, this option was not selected as the EPR option.

3.3.2.1.2 Route 2 Alternative

Of the three identified options shown in Image 3.5, Route 2 is the shortest and most direct route. In addition, it is reasonably centrally located within the sector between the Tallaght / Clondalkin and the Templeogue / Rathfarnham corridors. This option proposed some road widening for the provision of bus lanes along the southern section of Kimmage Road Lower only.

Along the northern section of Kimmage Road Lower it was not proposed to widen the road for provision of bus lanes due to the constraints of houses with very small front gardens and significant level differences above road level in places. Instead, various traffic management options were considered such as one-way operations in certain directions or Bus Gates for bus-only access arrangements.

Route 2 was selected as the EPR option and is described in Section 3.4.4.

3.3.2.1.3 Route 3 Alternative

The Route 3 option is an additional option beyond those considered in the Route Selection Report, located to the east of the overall corridor area, that diverts from Route 2 at Harold's Cross and runs along Harold's Cross Road, Terenure Road North and Terenure Road West. Extensive proposed road widening is envisaged for the provision of bus lanes along the full length of the route. It is the least direct of the three options, considerably longer than the more direct Route 2 along Kimmage Road Lower, but only slightly longer than Route 1.

Of particular relevance in the route selection process is the spatial relationship with the other parallel Core Bus Corridors and the compatibility between their 500m catchment areas. This corridor fits between the Tallaght / Clondalkin corridor to the west and the Templeogue / Rathfarnham corridor to the east.

In the Kimmage area, Route 2 along Kimmage Road Lower is reasonably centrally located within the 3.4km wide gap between the Tallaght / Clondalkin and the Templeogue / Rathfarnham corridors in the Kimmage area. This gap narrows as the routes converge towards the City Centre. If the selected option were to be routed through Terenure, its catchment would overlap directly with the Templeogue / Rathfarnham corridor but would leave a wide gap of up to 2.8km on the western side to the Tallaght / Clondalkin corridor at Crumlin Road.

In terms of accessibility to bus services on the Core Bus Corridor network, routing this corridor along Terenure Road North and Terenure Road West would leave an excessively wide gap in the catchment areas of the services. As a result of this large coverage gap, coupled with the longer length of this option and its less direct route versus Route 2, this alternative was not selected as the EPR option.

3.3.3 Cycling Options

The Route Selection Report considered potential cycle route options along the Kimmage corridor in the context of the objective for better bus facilities. There are existing part-time advisory cycle lanes along Kimmage Road Lower, but these only operate for limited hours in the peak periods inbound in the morning and outbound in the evening. At other times, the cycle lanes are not in operation to accommodate parking in front of residences without driveways. From Harold's Cross, northwards, cyclists mainly share the existing bus lanes, with some lengths of part-time advisory cycle lanes where there are gaps in the bus lanes. These intermittent arrangements are not satisfactory for cyclists, nor for buses that are delayed behind slow cyclists.

The route options considered in the Route Selection Report included road widening for bus lanes on the southern half of Kimmage Road Lower, but not to provide cycle tracks alongside the bus lanes north of Hazelbrook Road. This was to limit the extent of land take from small gardens, which would become too short for parking on driveways if an additional 2m were taken for cycle tracks. Instead, it was proposed to direct cyclists along a quiet route through the residential streets close by to the east.

North of Sundrive Cross, road widening for bus lanes is not feasible due to the very short front gardens, many of which are higher than the road. In this section, it was proposed to provide a pair of Bus Gates at each end of the northern section of Kimmage Road Lower to exclude through-traffic, thereby eliminating delays for buses. The existing advisory cycle lanes would continue to be available for cyclists in this section. In addition, the proposed quiet street cycle route to the east of the corridor would continue northwards about half-way along this section as far as Priory Road. Cyclists would then travel along Kimmage Road Lower within the Bus Gate section from Priory Road to the northern end of Harold's Cross Park.

At Harold's Cross, it was proposed to divert cyclists a short distance to the west of the bus corridor on Harold's Cross Road, onto a new cycle route through the grounds of Our Lady's Hospice and then along Greenmount Lane, a narrow and quiet side street to the Grand Canal at Parnell Road.

From the Grand Canal, northwards, there is a major constraint on Clanbrassil Street over Robert Emmet Bridge at the Grand Canal and through Leonard's Corner, where the street is too narrow for both bus lanes and cycle tracks in both directions. Instead, the cycle route was proposed to follow Parnell Road and Grove Road along the southern bank of the canal, to a proposed new footbridge over the canal to link into the Portobello area at Kingsland Parade on the northern side. The cycle route would then follow quiet streets northwards through the

Portobello area to the junction of Kevin Street and Bride Street, with a traffic plug between Heytesbury Street and New Bride Street to ensure only very low traffic flows. In addition, on the wider section of Clanbrassil Street Lower and New Street South, cycle tracks would be provided beside the bus lanes, which would accommodate those cyclists who chose to remain on the direct route and to share the bus lanes over the length of 500m from the Grand Canal through Leonard's Corner to Lombard Street West.

3.3.4 Emerging Preferred Route

Informed by the appraisal of options as set out in earlier section, the EPR was identified and is summarised as follows:

> *'The Kimmage to City Centre Core Bus Corridor commences on the R817 Kimmage Road Lower at the junction with Terenure Road West and Fortfield Road and is routed via the R817 along Kimmage Road Lower to R137 Harold's Cross Road, Clanbrassil Street Upper & Lower and New Street South where it will join the Tallaght / Clondalkin Core Bus Corridor at Kevin Street Upper junction. Priority for buses is provided along the entire route, consisting primarily of dedicated bus lanes in both directions, with alternative measures proposed at particularly constrained locations along Kimmage Road Lower. Due to constraints throughout, an alternative route along the same corridor is proposed for the cycle tracks.'*

A public consultation on this EPR Option 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.

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 in the Route Selection Report;
- Further design development and options assessment; and
- Changes in the extent of the scheme.

Where substantial revisions had been made to the design since the publication of the EPR, options were assessed using MCA to determine the PRO. The MCA assessed any newly developed options (as discussed below) 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 - Lower Kimmage Road from its junction with Terenure Road West to its junction with Harold's Cross Road;
- Section 2 - Harold's Cross Road from Harold's Cross Park to the Grand Canal; and
- Section 3 - Clanbrassil Street Upper and Lower and New Street South from the Grand Canal to the Patrick Street junction.

3.4.1.1 Section 1 - Lower Kimmage Road from Kimmage Cross-Roads to the Junction with Harold's Cross Road

3.4.1.1.1 Bus Priority Options

There were two options for bus priority considered in Section 1, as follows:

- **Option A** - Bus Gate north of Sundrive Cross, as included in the EPR; and
- **Option B** - Bus Gate at Ravensdale Park, 250m north of Kimmage Cross Roads with a northbound bus lane to enable buses to bypass any traffic queue.

The EPR proposed to provide Bus Gates at two locations on the northern section of Kimmage Road Lower, between Harold's Cross and Sundrive Cross, and to widen the road south of Sundrive Cross to provide bus lanes on the southern section of Kimmage Road Lower. This arrangement would require northbound traffic at Sundrive Cross to divert westward onto Sundrive Road or eastward onto Larkfield Avenue, Larkfield Park and Clareville Road (Option A).

Based on feedback from the public consultation process and engagement with stakeholders, an alternative option was identified for the provision of bus priority along this section through extending the Bus Gate-controlled road section further southward (Option B). This would avoid the need for road widening for bus lanes along this section of Kimmage Road Lower and would also not lead to through-traffic diversions at Sundrive Cross. To retain access from the south to the KCR Industrial Estate on Ravensdale Park and the business park at Cashel Road / Stannaway Road on the western side of the corridor, it was identified that a suitable alternative location for the southern Bus Gate would be at the junction of Ravensdale Park, approximately 250m north of Kimmage Cross Roads. This alternative option was identified as it would achieve the desired bus priority without the need for road widening over a 0.7km length of Kimmage Road Lower, and it would distribute displaced through-traffic more appropriately across a wider route network further south.

The assessment concluded that Option B for the southern Bus Gate to be located near the Kimmage Cross Roads was the preferred option. Option B would not require encroachment to gardens, and the reduced traffic would allow scope to improve the streetscape. In addition, there would be reduced noise and air impacts due to reduced traffic. Therefore, overall, in terms of the sub-criteria under the Environment criterion, the preferred option (Option B) was more advantageous than Option A in terms landscape and visual, and air and noise. Other environmental sub-criteria were not a determining factor.

3.4.1.1.2 Cycling Options

The EPR had not included segregated facilities for cyclists along this section of the route, as it was proposed that cyclists could either share the proposed bus lanes or use an alternative indirect 'quiet route' through the residential area to the east in the Kimmage area, and on the western side in Harold's Cross. Feedback from the first round of public consultation from members of the public sought segregated cycling facilities along the most direct route rather than directing cyclists along the indirect alternative route. From this, three potential options were considered to facilitate cyclists along this section of the Proposed Scheme:

- **Option A** - Bus Gate with low traffic flows, 30 km/h (kilometres per hour) speed limit and existing advisory cycle lanes retained;
- **Option B** - Cycle Tracks along Kimmage Road Lower;
- **Option C** - Alternative (or Complementary) Cycle Routes via:
  - C1 - Quiet street route via Hazelbrook and Larkfield parallel on the eastern side; or
  - C2 - River Poddle Greenway Cycle Route parallel on western side.
- **Options D -** Combination of Cycle Routes A, C1 and C2.

Following a review of these options, the optimum arrangement for Section 1 was identified as the provision of a Bus Gate and shared use of the road with low traffic flows and speeds, in combination with parallel quiet street cycle routes (Option D). Overall, in terms of the sub-criteria under the Environment criterion, the preferred option (Option D) was more advantageous than Option B as there would be no encroachment on gardens (the same as

Option C2) and less advantageous than Option A and Option C1 in terms landscape and visual due to potential impacts to the Stone Boat feature. Other environmental sub-criteria were not a determining factor.

3.4.1.2 Section 2 - Harold's Cross Road from Harold's Cross Park to the Grand Canal

3.4.1.2.1 Cycling Options

Two potential options were considered to facilitate cyclists along this section of the Proposed Scheme:

- **Option A -** Cycleway at Greenmount; and
- **Option B -** Cycle Tracks on Harold's Cross Road.

Responses to the first round of public consultation from members of the public expressed a preference for a direct cycle route along Harold's Cross Road (Option B) rather than an indirect route via Greenmount Lane and Our Lady's Hospice (Option A). A review of the potential for the inclusion of cycle tracks along Harold's Cross Road was undertaken. As outlined in Section 3.3.3, this review concluded that it was preferable for cycle tracks to be included along Harold's Cross Road with some limited land acquisition. Overall, in terms of the sub-criteria under the Environment criterion, the preferred option (Option B) was less advantageous than Option A in terms landscape and visual due to the requirement to impact on gardens to accommodate the road widening required to construct segregated cycle facilities. Other environmental sub-criteria were not a determining factor.

3.4.1.3 Section 3 - Clanbrassil Street Upper and Lower and New Street South from the Grand Canal to the Patrick Street Junction.

3.4.1.3.1 Cycling Options

Two potential options were considered to facilitate cyclists along this section of the Proposed Scheme:

- **Option A -** Quiet Street Cycle Route through Portobello; and
- **Option B -** Cycle Tracks on Cycle Tracks on Clanbrassil Street and New Street.

The EPR proposed to provide a cycle track along quiet streets through the Portobello area to the east of Clanbrassil Street (Option A). This cycle route turned east at Robert Emmet Bridge on the Grand Canal, at first running along the southern bank of the Grand Canal at Grove Road before crossing over the canal via a new bridge at a location parallel to Martin Street before proceeding north to Heytesbury Street and finally terminating at the junction of New Bride Street with Kevin Street.

It was clear from consultation submissions on the EPR that the public preferred for cycling facilities to be provided along the most direct route, insofar as possible, and with this in mind, an options assessment of this proposal was carried out. This options assessment concluded that with the use of bus priority signals at the Leonard's Corner Junction with South Circular Road it was possible for cycle tracks to be included along Clanbrassil Street and New Street South, and this arrangement (Option B) was brought forward for inclusion in the PRO.

Overall, in terms of the sub-criteria under the Environment criterion, the preferred option (Option B) performed the same as Option A, and therefore, was not a determining factor in choosing the preferred option.

3.4.1.3.2 Bridge Options to Accommodate Cycling Provision

Robert Emmet Bridge over the Grand Canal represents a constraint to the possibility of accommodating cycle tracks along the most direct route of the Core Bus Corridor. The existing layout on the bridge is narrow and does not currently accommodate bus lanes, while cycle lanes are advisory only. Road carriageway widening on the bridge is required to provide for bus lanes alongside two traffic lanes, a pair of cycle tracks (including necessary cyclist turning facilities) as well as footpaths. For cultural heritage reasons it was desirable not to directly affect the structure of Robert Emmet Bridge by widening, and accordingly, only options for parallel footbridges were considered. To facilitate these provisions, a number of options at this location were considered:

- **Option A** – Western footbridge: A footbridge 6m wide on the western side of Robert Emmet Bridge that would accommodate a 2m wide footpath and a 3m wide northbound cycle track (incorporating a 1.5m wide right-turning cycle track) with two 0.5m widths for parapets. The existing 2m wide

footpath on the western side of the bridge would be removed to make way for the required bus and traffic lanes. The existing footpath and cycle track on the eastern side of the bridge would remain, although their width would be 0.7m less than optimal cross section;

- **Option B** - Bridge Widening: Widening of the existing concrete arch bridge by 7m, from 15m to 22m wide, to accommodate the required street layout; and
- **Option C -** Footbridges on both sides of the bridge: The same as Option A on the western side, however, an additional 2.5m wide footbridge would be provided on the eastern side for pedestrians. The existing bridge would accommodate a wider 2.5m wide southbound cycle track alongside the 12m wide roadway. This wider cycle track would incorporate a double line of cyclists and shorten queue length at signals.

The options assessment concluded that Option C (footbridges on both sides of the bridge) was the best performing option, given its better overall functionality for pedestrians and cyclists, albeit with visual impacts on both sides of the existing bridge. Accordingly, Options A and B above were not selected on the basis that, comparatively, they provide a lower level of functionality when measured against Option C. In terms of the sub-criteria under the Environment criterion, all of the options will have some potential visual impact for existing Robert Emmet Bridge which would be addressed through careful design of the new structures with transparent parapets.

3.4.1.3.3 Consideration of Street Trees

The EPR had proposed the removal of the existing median and street trees along Clanbrassil Street Lower and New Street South, but this has been avoided through refinement of the design. The streets along this section were widened to a dual carriageway with wide traffic lanes in the 1980s, and the footpaths are unusually wide (c. 4m to 5m) or wider in places. The PRO generally provides for 3m wide bus and traffic lanes, and as such, there is surplus road width available, which allows for the retention of the median with the provision of cycle tracks segregated from the bus lanes that will encroach by 0.5m into the adjoining wide footpaths. This design refinement has allowed the retention of the median island and the street trees.

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 commenced on 4 March 2020 to 17 April 2020. Due to COVID-19 restrictions in mid-March 2020, the planned Public Information Events were impacted. There was a total of 22 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 option assessments using the MCA described in Section 3.3 were required.

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

- The section of two-way cycleway in Poddle Park was shortened by half to provide earlier transition onto the road north of the Kimmage Road West / Kimmage Road Lower / Terenure Road West Junction. This would reduce impact in the park area by reducing the length of new cycleway construction;
- To assist with the existing shortage of parking and loading facilities for the residents (as raised during consultations), an additional parking bay was proposed with four spaces on the eastern side of Harold's Cross Road, south of Mount Drummond Avenue;
- Adjustment of the design proposals on Clanbrassil Street Lower avoided the need for land acquisition; 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 non-statutory 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.

There were a total of 353 submissions received during this third round of public consultation, ranging from individual submissions by residents, commuters, and local representatives to detailed proposals from various associations.

Arising from the feedback received during this consultation process, a number of design amendments were identified and incorporated into the scheme proposals. The key changes included in the updated design of the Draft PRO include the following:

- The shortened section of two-way cycle way in Poddle Park was replaced by a continuation of the on-street cycle track (northbound) along Kimmage Road Lower until the junction with Ravensdale Park. This removed all impacts for the park area;
- The proposed Poddle Cycleway was shortened at Mount Argus, which avoided encroachment into the grounds of Mount Argus Church and impact on that property;
- Additional public parking with 22 spaces was included at the entrance to Our Lady's Hospice in Harold's Cross; and
- An alternative access route arrangement was adopted for Gordon's Fuels (adjacent to Robert Emmet Bridge on Clanbrassil Street Upper), which reduced the need for encroachment into the property with a new access ramp, albeit with the demolition of the dwelling house. This revised arrangement was preferred by the property owner.

3.4.4 Scheme Design Alternatives

Following confirmation of the PRO, the scheme design was developed further in more detail, during which a number of refinements were made, as described from south to north:

1. At the southern end of Kimmage Road Lower, it had been proposed to provide a cycle track through Poddle Park towards the River Poddle Cycleway route. However, to reduce impact on this small public park, cycle tracks will instead be provided on the public roads outside of the park, which removed all impacts for the park;
2. At Sundrive Cross, the junction will be modified to provide protected cycle tracks with an east-west cycle route from Larkfield Avenue to Sundrive Road as part of the future planned orbital cycle route to provide additional safety for cyclists;
3. To avoid operational impacts in the church grounds, the proposed Poddle Way cycle route will no longer cross Mount Argus Park and the grounds of Mount Argus Church, and instead it will re-join Kimmage Road Lower at Mount Argus View;
4. The proposed Bus Gate at the northern end of Harold's Cross Park will only operate in the morning peak period from 6am to 10am in the northbound direction, which will facilitate traffic to exit from Mount Argus Cemetery after funerals, thereby minimising impacts on this importance community facility;
5. Following consideration of several possible locations, proposals for a small public car park at Our Lady's Hospice were confirmed, with the location selected at the front of the site nearest Harold's Cross Road. This location has the least impact for the future development and operation of the hospice, while compensating for the loss of some existing public parking on the street nearby;
6. The junction of Mount Drummond Avenue on Harold's Cross Road will be narrowed with additional street trees and four more parking spaces provided, which will benefit pedestrian safety and comfort when crossing the side street, improve the street landscape, and provide a little more parking for the local community which is in short supply;
7. Access for Gordon's Fuels at the Grand Canal on Clanbrassil Street Upper was modified to provide a shared laneway from the north beside the Mullen Scrap premises, instead of a new ramp beside

the canal, which would have encroached into the premises to a much greater degree and reduce the operational yard area for the business, and potential for future development; and

8. The layout of the junction at Leonard's Corner was revised to provide upstream bus priority signals on South Circular Road for the orbital bus route. This enables provision of protected cycle tracks on all four approaches and at the corners of the junction.

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, local authorities and other interested 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 appropriate stages.

It is considered that the examination of alternatives presented in this Chapter meets and exceeds the requirements of the EIA Directive and Section 50(1)(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).

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3.6 References

DoT (2016). Common Appraisal Framework for Transport Projects and Programmes

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

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

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

NTA (2015). Fingal / North Dublin Transport Study

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

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

NTA (2022). Greater Dublin Area Transport Strategy 2022 – 2042

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

Number 14 of 1993 - Roads Act, 1993

Number 15 of 2008 – Dublin Transport Authority Act 2008