

Chapter 03
Consideration
of Reasonable
Alternatives

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3. Consideration of Reasonable Alternatives

3.1 Environmental Impact Assessment Directive Requirements

Article 5(1)(d) of Directive 2011/92/EU as amended by Directive 2014/52/EU (“the EIA Directive”) requires that an 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 EIA 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 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 Swords 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 (GDA) 2016-2035 and the new GDA Transport Strategy 2022-2042

The Transport Strategy for the Greater Dublin Area (GDA) 2022-2042 (2022 GDA Transport Strategy) (National Transport Authority (NTA) 2022) replaces the prior transport strategy for the period 2016 to 2035 (NTA 2016a).

The 2016 GDA Transport Strategy set out to contribute to the economic, social, and cultural progress of the GDA by providing for the efficient, effective, and sustainable movement of people and goods. 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 other 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 strategy included BusConnects Dublin which the Proposed Scheme is a key 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 plan, 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 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 2017. It is a multi-faceted programme comprising several elements of which the Core Bus Corridors (CBCs) 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 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 of more frequent services as required. The Proposed Scheme is a fundamental element of this ongoing work.

The challenges outlined in the GDA Transport Strategy 2016-2035 (NTA 2016a) and identified need for BusConnects Dublin as determined in the preparation of that prior strategy remain, and the evidence from the detailed corridor studies undertaken in the preparation of the prior strategy is still valid and robust. These studies are set out in Section 3.2.2.

3.2.2 GDA Transport Strategy 2016-2035

The prior GDA Transport Strategy 2016-2035 (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 GDA Transport Strategy provided a comprehensive framework to guide the development of transport across the GDA over the period of that strategy. Careful consideration was undertaken of the transport requirements across the seven counties of the GDA, and the prior GDA Transport Strategy then formulated the appropriate transport responses to those requirements.

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

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

Specifically, a Strategic Environmental Assessment (SEA) (NTA 2016b) was undertaken on the prior GDA Transport Strategy (NTA 2016a). As set out in the Environmental Report, in respect of which the SEA of the prior 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 strategy. The provisions of the prior GDA Transport Strategy (including bus-based transport modes) were evaluated for potential significant effects, and measures integrated into the prior 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 strategy preparation work, the prior GDA Transport Strategy also took into account prior reports and plans in relation to transport provision. These prior studies included, *inter alia*, the following:

- GDA Cycle Network Plan (NTA 2013a);
- Bus Rapid Transit (BRT) – Core Dublin Network Report (2012a);
- Fingal / North Dublin Transport Study (2015b);
- Review of the DART Expansion Programme (2015a);
- 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 a 2011 Draft Transport Strategy (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 formed an important element of the prior 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 the public transport infrastructure since the publication of the prior GDA Transport Strategy and is a key element of the new Transport Strategy 2022-2042 (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 that across the public transport network are 98% of pre-pandemic levels. Specifically, 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 GDA Transport Strategy 2016-2035 (NTA 2016a)). These corridors were also divided into Outer Hinterland, Outer Metropolitan, and Inner Metropolitan areas in terms of character.

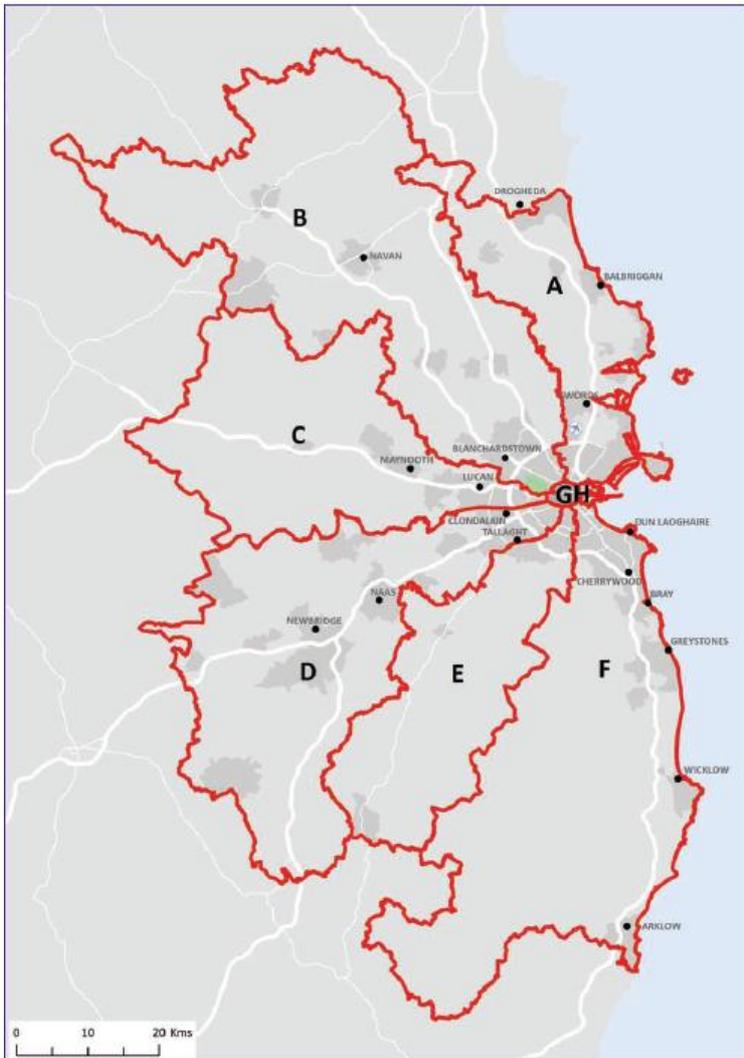


Image 3.1: Transport Strategy Corridors

The development of the prior 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 prior GDA Transport Strategy and the GDA Transport Strategy 2022-2042 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 is located in Corridor A in the GDA Transport Strategy which extends from the core City Centre area through, Drumcondra, Whitehall, Santry, Dublin Airport and north towards Swords and contains areas of further residential growth in the Fosterstown area and Swords.

Through the work undertaken in the preparation of the prior 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 prior GDA Transport Strategy was developed as the economy was emerging from the post 2008 economic downturn. In turn, the prior 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 67% and 78% of route, outbound and inbound respectively, of which significant portions of the route, particularly closer to the City Centre, are shared with cyclists, 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 to being a fully guided, fully segregated bus system.

A Bus Rapid Transit (BRT) – Core Dublin Network Report, prepared in 2012 (NTA 2012a) at feasibility study level, investigated the demand and technical, environmental, and economic feasibility of a proposed core BRT network. Following this, a Study of Transport Options for Fingal Corridors in advance of Metro North’ (NTA, 2012c) and an Integrated Implementation Plan 2013 – 2018 (NTA 2013b) study was prepared by the NTA to provide the framework for the development of a BRT system between Swords and the City Centre.

Prior to the completion of these studies, the prior GDA Transport Strategy identified the development of a number of CBCs as BRT schemes, including a BRT network linking Swords to the City Centre. These BRT routes formed part of the overall CBC network set out in the prior GDA Transport Strategy. As design and planning work progressed on the CBCs, it became clear that the level of differentiation between the BRT corridors and the other CBCs 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, all of the CBCs 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 type 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 CBCs, given the better ratio of seated to standing passengers on such vehicles.

Accordingly, it is intended that all of 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 CBCs and the advantages identified above of a unified integrated bus system.

Environmentally the BRT option compared to the CBC 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 CBC proposals, bus-priority can be achieved through short lengths at pinch-points by the use of signal controlled 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 prior 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 a higher capacity rail solutions in addition to a Metrolink.

Section 3.2.1 set out various studies undertaken for the prior GDA Transport Strategy. Arising from these studies and the specific assessment and transport modelling work undertaken for the prior Strategy, it was concluded that a bus-based transport system would be the proposed public transport solution in the corridor of the Proposed Scheme. The proposed transport solution would be supplemented by Metro, to provide more passenger capacity and enhanced interchange between the Luas Red and Green Line Services, proposed Metrolink Station at Fosterstown, Sligo/Maynooth Line Heavy Rail Services at Drumcondra Station and the Suburban Interchange between the Orbital and Radial Routes at Coolock Lane. It was considered that there would be insufficient demand to justify the provision of an additional light rail alternative beyond what is proposed above, particularly given the low to medium density nature of development in this corridor.

Similar to BRT, the light rail option would be worse for the environment in terms of construction impacts, including flora and fauna, heritage, air and noise, compared to the CBC proposal. 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 CBC proposals, bus-priority can be achieved through short lengths at pinch-points by the use of signal controlled priority.

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 prior GDA Transport Strategy (NTA 2016a) identified that a Metro solution would be economically justified within the area covered by this corridor.

Therefore, it is intended to develop the light rail Metro system along this corridor through the implementation of the following project:

- New Metro North (now MetroLink).

3.2.6.1 MetroLink

This new Metro line will provide a high-speed, high-capacity, high-frequency public transport link from the City Centre to Dublin Airport and Swords. The new Metro North (MetroLink) will serve a large number of significant destinations, including Fosterstown, Dublin Airport, Dublin City University and the Mater Hospital, and will interchange with other rail and bus services in the vicinity of Drumcondra, O'Connell Street and St. Stephen's Green.

Arising from the various studies and analysis that had been carried out, and the specific assessment and transport modelling work undertaken for the prior GDA Transport Strategy (NTA 2016a), it was concluded that a high quality bus-based transport system, supplemented by the implementation of MetroLink, would be part of the proposed public transport solution in the corridor of the Proposed Scheme. This is because 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.

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 CBC 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 demolition of buildings at pinch-points.

The appropriate locations for new heavy rail provision were carefully considered in the development of the prior GDA Transport Strategy. 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 prior GDA Transport Strategy did not consider that a new heavy rail solution would be required along this corridor and would not be economically justifiable.

In relation to underground provision, this 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.

There is no existing heavy rail route within the area covered by the Proposed Scheme for which an upgrade could be considered.

3.2.8 Demand Management Alternative

One of the primary aims of the prior GDA Transport Strategy (NTA 2016a) was to significantly reduce demand for travel by private vehicles, particularly during the commuter peaks, and to encourage use of walking, cycling and public transport. One of the mechanisms to achieve such 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 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 prior GDA Transport Strategy was 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/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 prior 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 need 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) **Feasibility and Options Report:** In early 2016, the NTA initiated plans to develop the network of CBCs identified in the GDA Transport Strategy (NTA 2016a). As part of this body of work, the Swords Core Bus Corridor Feasibility and Options Assessment Report (NTA 2018a) was prepared which identified feasible options along the corridor, assessed these options and arrived at an Emerging Preferred Route;
- 2) A first round of non-statutory **Public Consultation** was undertaken on the Emerging Preferred Route from November 2018 to May 2019;
- 3) Development of **Draft Preferred Route Option** (May 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 Emerging Preferred Route evolved with further alternatives considered;
- 4) A second round of non-statutory **Public Consultation** was undertaken on the Draft Preferred Route Option 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 Preferred Route Option** 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 Preferred Route Option from 4 November 2020 to 16 December 2020; and
- 7) Finalisation of **Preferred Route Option:** Informed by feedback from the overall public consultation process, continuing stakeholder engagement and the availability of additional design information, the Preferred Route Option, being the Proposed Scheme, was finalised.

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

Key environmental aspects have been considered during the examination of reasonable alternatives in the development of the Preferred Route Option for the Proposed Scheme. Environmental specialists have been involved in the iteration of key scheme design aspects with the engineering design 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 CBC infrastructure. The assessment had regard to the Record of Monuments and Places (RMP), sites of archaeological or cultural heritage and on buildings listed on the National Inventory of Architectural Heritage adjacent to the corridor;
- **Flora and Fauna** – The provision of the CBC could have negative impacts on flora and fauna, for example through construction of new infrastructure through green field sites;
- **Soils and Geology** – Construction of infrastructure necessary for the provision of the CBC 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 CBC infrastructure may include aspects (for example structures) with the potential to impact on hydrology;
- **Landscape and Visual** – Provision of CBC 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 CBC infrastructure (e.g., the 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 (NTA 2018a) identified feasible options along the corridor, assessed these options and identified the Emerging Preferred Route, which then formed the basis of 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 Emerging Preferred Route, 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 aspects 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’s (2016) Common Appraisal Framework for Transport Projects and Programmes.

The study area for the Swords to City Centre corridor comprised three main sections:

- Section 1 (Swords South to Dublin Airport (Corballis Road South));
- Section 2 (Dublin Airport (Corballis Road South) to Royal Canal); and
- Section 3 (Royal Canal to O’Connell Street), with the area around Santry Village the subject of a focused assessment due to the number of sensitivities at this location.

At the start of the Stage 1 assessment, a ‘spider’s web’ of route options were produced that accommodated the objectives of the Proposed Scheme for each study area as shown in Image 3.2, Image 3.3 and Image 3.4 (extracted from the Feasibility and Options Assessment Report).

As part of the sifting stage, each of the route options were assessed using a high level qualitative method, based on the professional judgement and general appreciation for existing constraints and conditions with the study area that could be ascertained from available surveys and site visits.

This exercise screened and assessed technically feasible route options, based on distinct, project specific objectives. In addition to being assessed on their individual merits, routes were also screened relative to each other allowing some routes to be ruled out if more suitable alternatives existed.

This assessment stage focused on the engineering constraints together with a desk study, identifying high level environmental constraints and population catchment analysis.

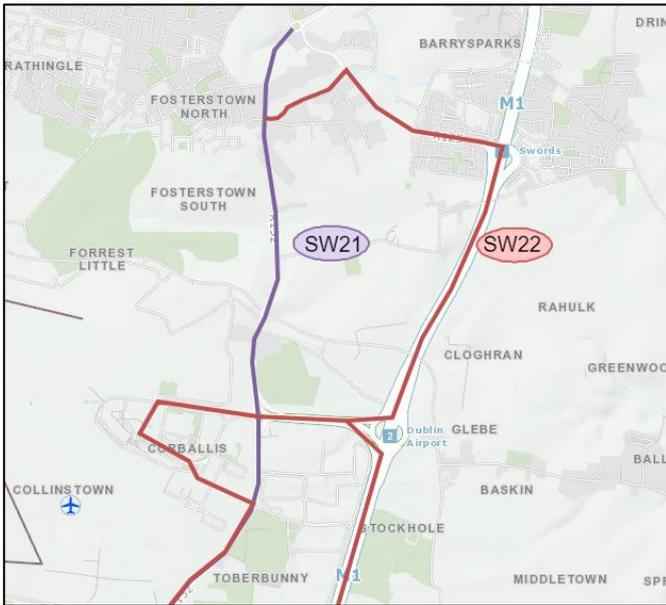


Image 3.2: Spider's Web of Route Options for Section 1

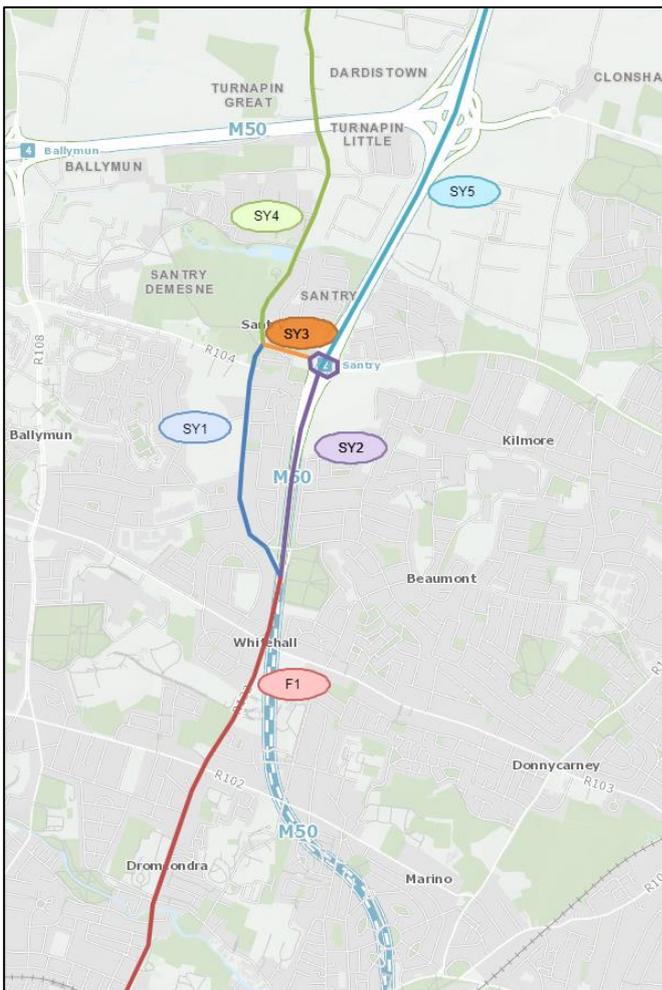


Image 3.3: Spider's Web of Route Options for Section 2

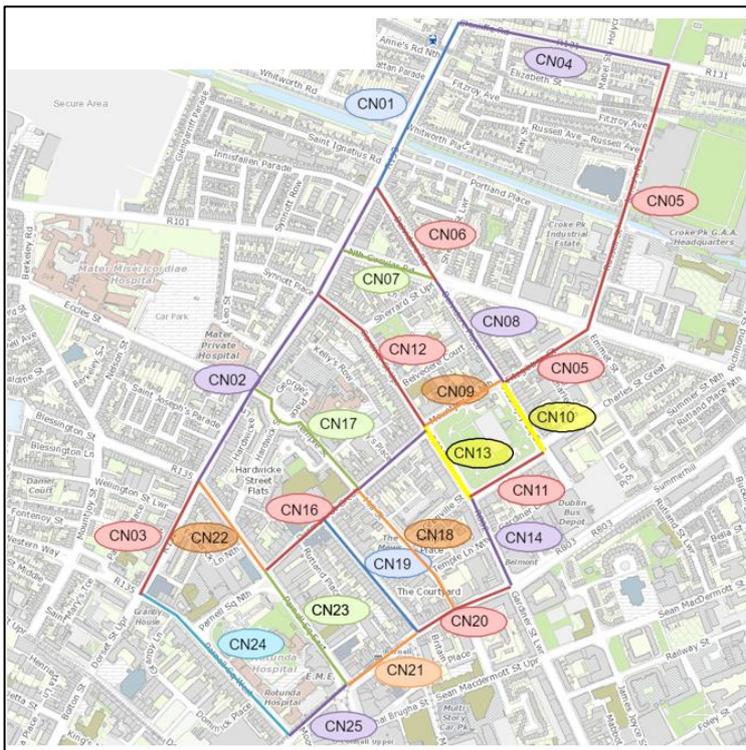


Image 3.4: Spider's Web of Route Options for Section 3

The initial 'spider's web' was 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 the following specific objectives:

- *'Deliver the on street infrastructure necessary to provide continuous priority for bus movements along the Core Bus Corridor. This will mean enhanced bus lane provision on the corridor, removing current delays in relevant locations and enabling the bus to provide a faster alternative to car traffic along the route, making bus transport a more attractive alternative for road users. It will also make the bus system more efficient, as faster bus journeys means that more people can be moved with the same level of vehicle and driver resources; and*
- *Provide any cycle facilities along the route that are required under the Greater Dublin Area Cycle Network Plan (published by the NTA, 2013) to the target Quality of Service(s) specified therein and to give consideration to further providing cycle facilities along sections of the route where they may not be expressly required under the Cycle Network Plan.'* (NTA 2016b)

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. A further assessment to the 2013 study was undertaken on route options through Santry Village as more suitable options were identified. Following Stage 1, an initial indicative scheme for each route option was determined based on the specific constraints along the route (for example, a bus lane in each direction with cycle lanes (where appropriate), a bus lane in each direction, or a bus lane in one direction only). In particularly constrained locations, a number of variant scheme options were considered and assessed as necessary. The indicative scheme for each route option was then progressed to an MCA at Stage 2.

Arising from the 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 specific sections 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 potential end-to-end options.

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 evaluated using an MCA. The Common Appraisal Framework for Transport Projects and Programmes, published by the Department of Transport, Tourism and Sport (DTTAS) (now the Department of Transport) in March 2016, requires schemes to undergo an MCA which evaluated the route options under the assessment criteria set out below:

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

Although it is noted, as set out in the Feasibility and Options Report (NTA 2018a), Physical Activity was scoped out of the MCAs 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 Emerging Preferred Route:

- **Archaeological, Architectural and Cultural Heritage** – There is the potential for impacts on archaeological, architectural and cultural heritage when providing CBC infrastructure. The assessment had regard to RMP, sites of archaeological or cultural heritage and on buildings listed on the National Inventory of Architectural Heritage adjacent to the corridor;
- **Flora and Fauna** – The provision of the CBC could have negative impacts on flora and fauna, for example, through construction of new infrastructure through green field sites;
- **Soils and Geology** – Construction of infrastructure necessary for the provision of the CBC 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 CBC infrastructure may include aspects (for example structures) with the potential to impact on hydrology;
- **Landscape and Visual** – Provision of CBC 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;
- **Air Quality** – The provision of CBC 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 CBC infrastructure (e.g., the construction activities), has the potential to negatively impact on noise, vibration and air quality along a scheme, 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 Character** – The provision of CBC 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.

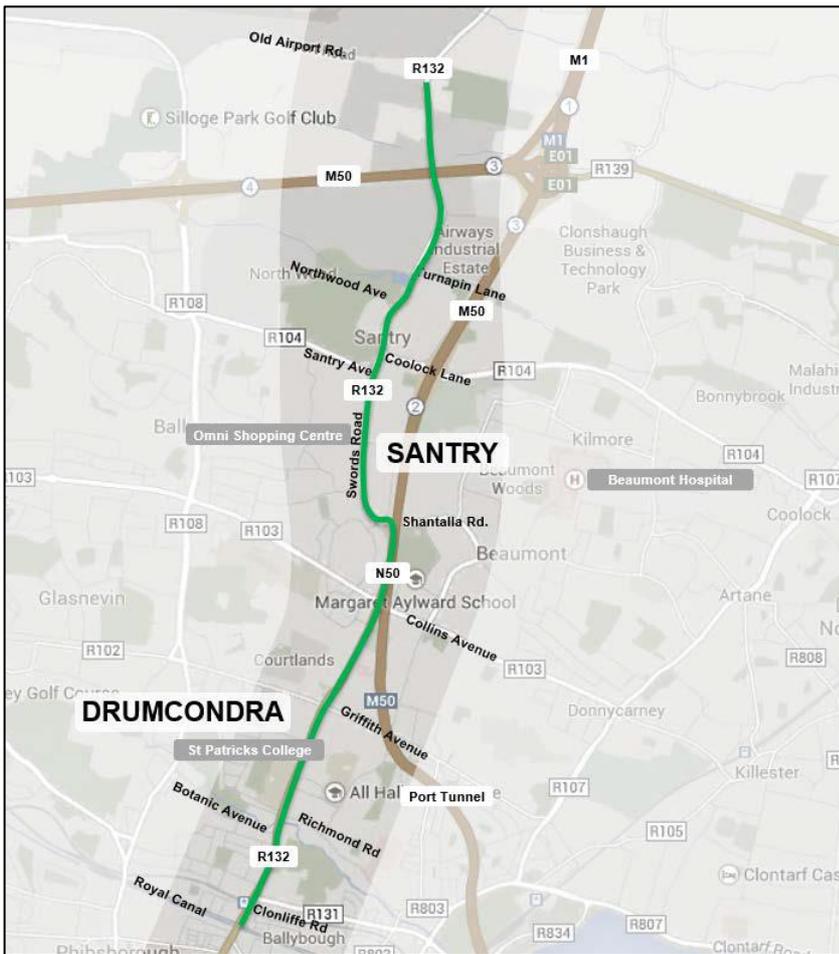


Image 3.6: Emerging Preferred Route: Section 2

3.3.2.2.1 Santry Village

Options for Santry Village were arrived at via an options assessment for the Santry area to include additional scheme options for the R132 through Santry Village. These options are listed below and were considered to be the most appropriate for bus service and cycling provision in this area. Each option was assessed against the Economy, Integration, Accessibility and Social Inclusion, Safety, and Environment criteria.

- SY1A – Bus lanes, cycle lanes, and traffic lanes in each direction through Santry Village;
- SY1B – Bus lanes and traffic lanes in each direction, off-road cycle track adjacent N50;
- SY1C – Bus lanes in each direction, traffic lane northbound between Shantalla and Omni Shopping Centre, off-road cycle track along N50; and
- SY1D – Bus lanes and cycle lanes in each direction, traffic lane northbound only between Shantalla and Omni Shopping Centre.

As stated in the Feasibility and Options Assessment (NTA 2018a), in terms of Economy, route option SY1c represents the cheapest solution as it requires only minor land take. Options SY1b and SY1d are the next cheapest with both of these options requiring some land take along the section south of Omni Shopping Centre. Options SY1a would require significant land take from a large number of properties and as such would be the most expensive option. Transport reliability is not a differentiator as all options would deliver a similar level of priority for buses.

In terms of Integration, only transport integration is considered to be a differentiator between options. Options SY1a and SY1b require no changes to the current traffic management regime in Santry, and as such perform the best under this criterion. Options SY1c and SY1d would require detours for traffic travelling to and from the north

with an origin or destination in the southern parts of Santry and people travelling south from the southern parts of Santry. For this reason, these options perform poorer under this criterion.

Under Accessibility and Social Inclusion, there is little to differentiate between route options with each option serving the same key trip attractors and deprived geographic areas. Similarly, all options are considered to perform the same in terms of 'Safety'. In terms of 'Environment', generally option SY1a, which would require a large amount of road widening along the R132 south of Omni Shopping Centre, results in greater impacts in terms of landscape and visual, air and noise, and land use character. While significant works would be required to facilitate SY1b and SY1d, comparatively these options have less impact on the environment and sensitive receptors. Option SY1c, which requires only minimal land take, would perform the best in terms of impact on the environment. As presented in the Feasibility and Options Assessment, the Emerging Preferred Route through Santry Village is detailed in Image 3.7.

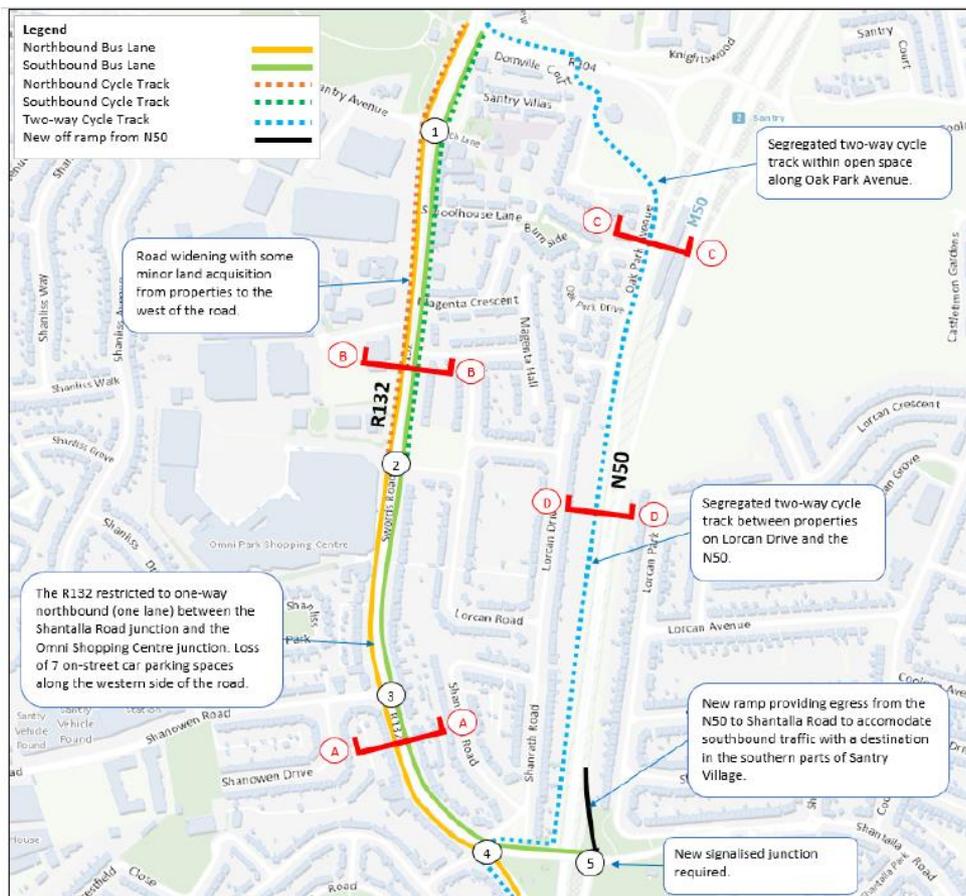


Image 3.7: Emerging Preferred Route: Santry Village

The Emerging Preferred Route removed southbound traffic between the Omni Shopping Centre and Shantalla Road, in order to accommodate dedicated bus lanes in each direction. A new slip road linking the N50 and Shantalla Road would provide for southbound traffic movements and a dedicated two-way cycle track would be implemented parallel to the N50.

3.3.2.3 Section 3: Route Options Assessment

The Emerging Preferred Route identified in the Feasibility and Options Assessment Report (NTA 2018a) along this section of the CBC corridor is presented in Image 3.8. This is unchanged from the Feasibility and Options Assessment Report. It commences at the Royal Canal and proceeds along Dorset Street as far as Parnell Square. This section of the Emerging Preferred Route Option provides for bus priority with dedicated bus lanes and cycling provision with segregated cycle tracks.

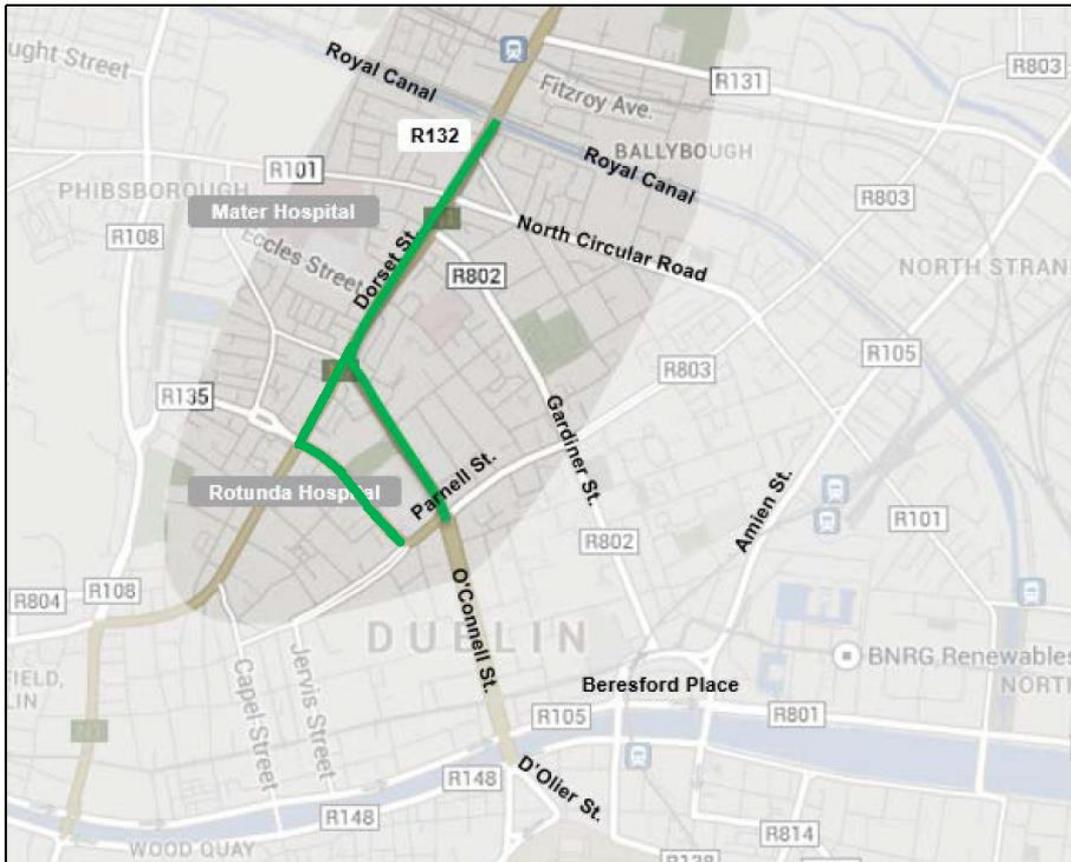


Image 3.8: Emerging Preferred Route: Section 3

3.3.3 Cycling Options

Consideration of alternative cycling route options was fundamental in the process of identifying the Emerging Preferred Route. In general, the Emerging Preferred Route proposed generally aligns with the primary routes 2A on the GDA Cycle Network Plan (NTA 2013a) which is generally routed from Swords to the City Centre via the R132.

During the Emerging Preferred Route stage, identification of alternative cycle routes separate to the CBC Emerging Preferred Route were considered appropriate for this scheme as they were proposed as part of each of the route options identified and allowed for the objectives of the Proposed Scheme, reducing land take and providing for safer cycling along the corridor.

3.3.4 Emerging Preferred Route

Informed by the appraisal of options as set out earlier, the Emerging Preferred Route was identified. The Emerging Preferred Route is summarised as follows:

'Describing from north to south, the emerging preferred route starts on the R132 at the Pinnock Hill junction and continues along this road passing Airside and onwards to the Airport. At the Airport, the CBC would stay on the R132 past the airport (it is noted that bus services will continue to serve the Airport terminals directly). From the airport, the preferred route follows the R132 towards Santry where the route passes through Santry Village. To the south of Santry, the route turns off Shantalla Road onto the R132 and onwards to Collins Avenue junction close to Dublin City University. The route continues along the R132 Swords Road passing Griffith Avenue, DCU St. Patricks College, Drumcondra Village and Drumcondra rail station. South of the Royal Canal, the emerging preferred route continues southwards along Dorset Street. From Dorset Street, the preferred route turns onto North Frederick Street and continues onto Parnell Square East.'

A public consultation on this Emerging Preferred Route was undertaken from 14 November 2018 to 29 March 2019, providing valuable feedback which was then carefully considered in the further development of the Proposed Scheme.

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 Emerging Preferred Route, various amendments were made to the Proposed Scheme 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 Preferred Route Option.

This additional design development took account of:

- New and updated topographical survey information;
- Output from engagement and consultation activities on the Emerging Preferred Route and Draft Preferred Route Option proposals;
- Further design development and options assessment; and
- Changes in the extent of the Proposed Scheme.

Where substantial revisions had been made to the design since the publication of the Emerging Preferred Route, options were assessed using MCA to determine the Draft Preferred Route Option. The MCA assessed any newly developed options against the previously identified Emerging Preferred Route. 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 Emerging Preferred Route.

3.4.1.1 Alternatives Considered at the Draft Preferred Route Option Stage.

3.4.1.1.1 Options Considered at Santry Village

Further design development and assessment work was carried out at the Draft Preferred Route Option stage on this section of the Proposed Scheme. Consultation feedback from statutory consultees and landowners, as well as feedback received from members of the public following the first non-statutory public consultations held from the 14 November 2018 to 29 March 2019, also formed the need to review this route option during the design process.

One of the principal issues reviewed was the proposed one-way system for general traffic in Santry Village. It became apparent that the one-way proposal for general traffic might affect the existing access/egress arrangements for residents along the Lorcan and Shanrath Roads and impact on commercial deliveries and local business.

The Feasibility and Options Assessment Report (NTA 2018a) found that the most appropriate route was along the route of SY1, through Santry Village. In that report a number of alternative options were developed, and SY1C was considered the most desirable option following an MCA. SY1C comprised a one-way system for general traffic northbound between Shantalla Road and Omni Shopping Centre, which had bus lanes in each direction, one traffic lane northbound between Shantalla Road and Omni Shopping Centre and an off-road cycle track. Southbound traffic would travel along the N50(Santry Bypass) and re-join Shantalla Road via a new slip road.

As well as Option SY1C, the Feasibility and Options Assessment Report considered a two-way option, Option SY1B, which maintained two-way traffic and bus lanes in each direction throughout Santry from Shantallah Road to Coolock Lane. The review carried out reassessed options for the cycling and traffic routing through an MCA, which is discussed further below.

3.4.1.1.2 Cycle Route Options

Both of the options described above diverted commuting cyclists away from Santry Village via a parallel two-way cycle track which would be provided along Coolock Lane, Oak Park Avenue and the N50 as shown in Image 3.9.

The feedback from the first non-statutory public consultation considered it an unattractive route for cyclists as there is little to no passive surveillance. Security and safety concerns were raised regarding the opening onto the N50 from Oak Park Avenue and also the vertical height differences which would result in steep gradients for cyclists.

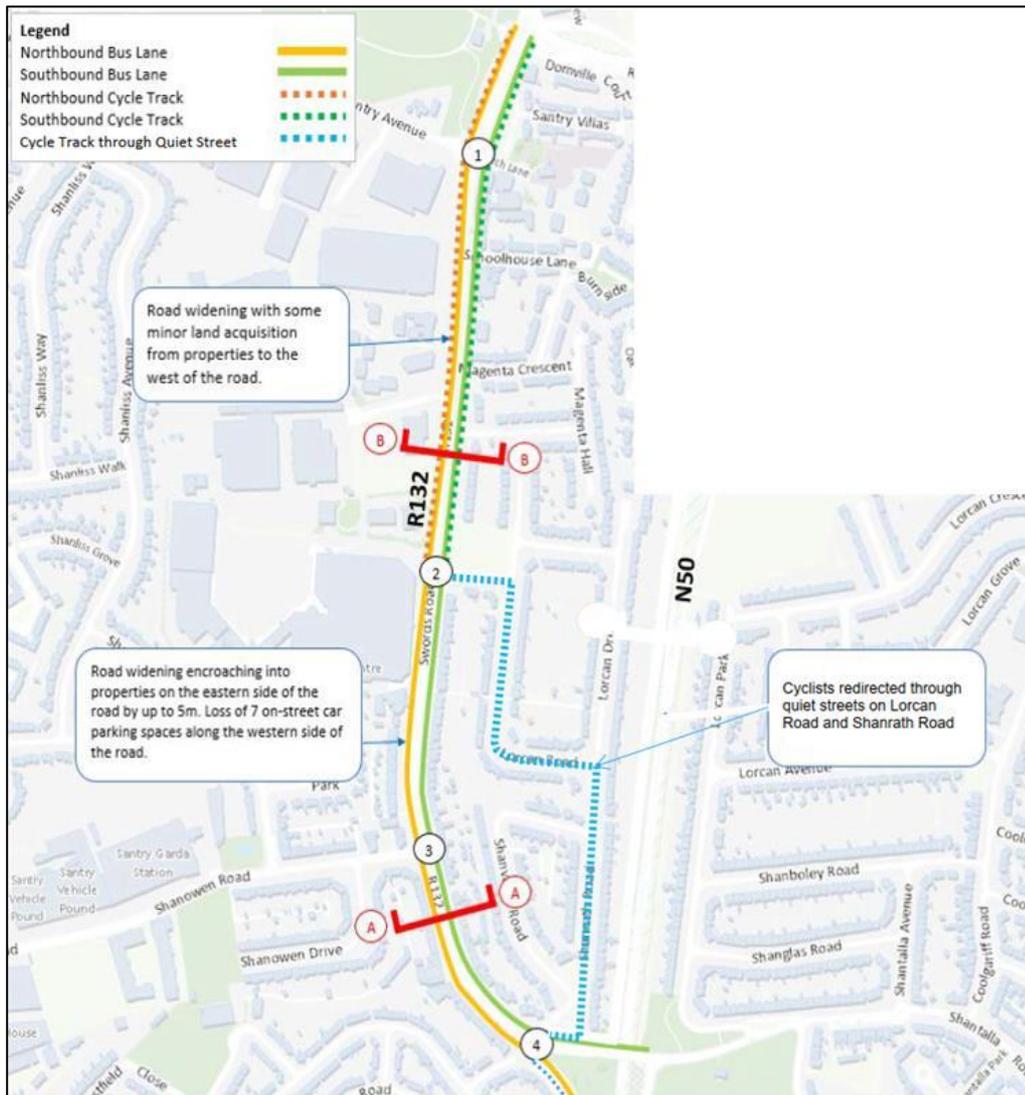


Image 3.10: Route Option SY1B

As with the selection of the Emerging Preferred Route options, each route option was evaluated using an 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. Based on the MCA undertaken, Cycle Route Option 2 was selected, as it offers more benefits over Option 1, for example:

- The length of new cycle track required is a roughly half that required for Option 1;
- It more closely aligns with the route of Primary Route 2A from the GDA Cycle Network;
- It is a less significant diversion from the main street and is more likely to be used by cyclist compared to Option 1; and
- Fewer trees are required to be removed.

Routing the cyclists through Lorcan Road and Shanrath Road is a change from the Emerging Preferred Route.

3.4.1.1.3 Route Options

Two route options through Santry Village described in the Feasibility and Options Assessment Report (NTA 2018a), SY1B and SY1C, are reproduced in Image 3.11, but with Cycle Route Option 2 instead of Cycle Route Option 1.

3.4.1.1.3.1 Route Option SY1B – Two-Way Option

Image 3.11 illustrates the indicative scheme design Route Option SY1B.

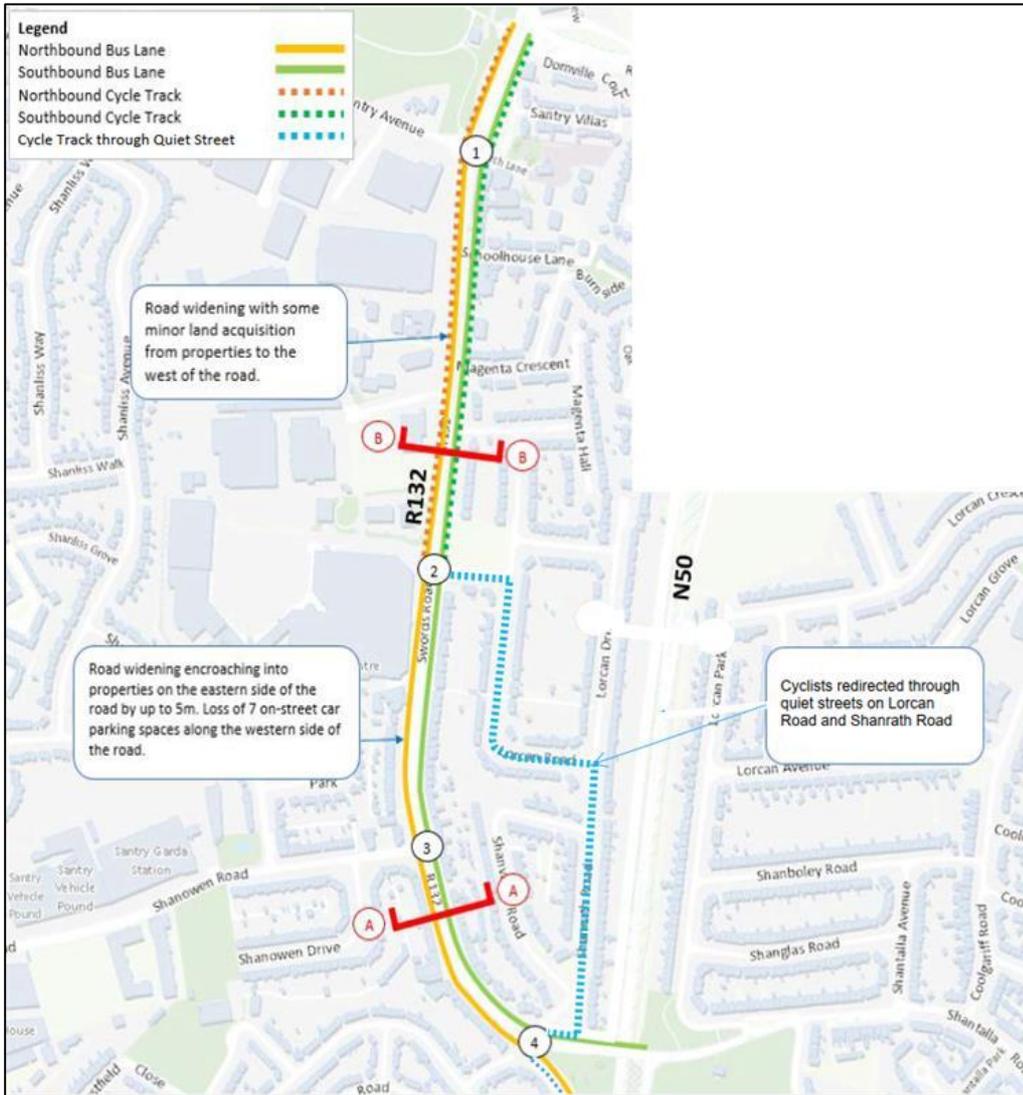


Image 3.11: Route Option SY1B

Between Santry Avenue and the Omni Shopping Centre, some road widening would be required to incorporate the proposed cross-section, facilitating bus lanes and cycle lanes in each direction. This is mostly achievable within the road reserve, but some land take is required from adjoining lands which is primarily open space and commercial in nature. A cross-section of Swords Road between Santry Avenue and the Omni Shopping Centre for this scheme option is presented in Image 3.12.

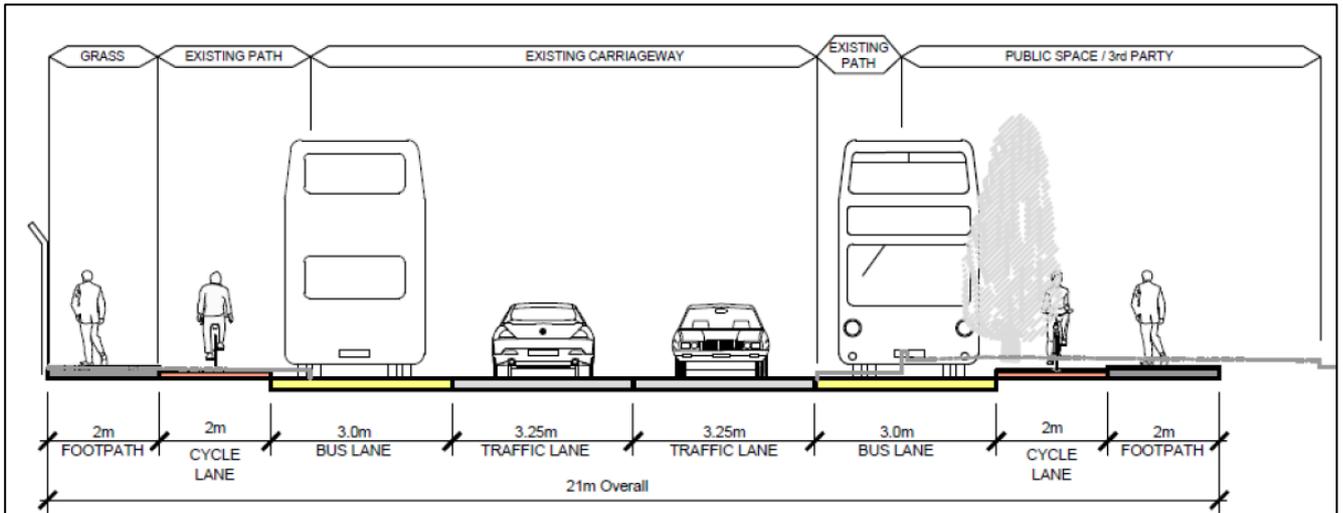


Image 3.12: SY1B Cross-Section B-B Swords Road between Santry Avenue and the Omni Shopping Centre

On the Swords Road, south of the Omni Park entrance, road widening would be required to facilitate a bus lane and traffic lane in each direction. This would require land acquisition from adjacent properties by up to approximately 5m. There would be a loss of seven on-street parking spaces to facilitate this option.

As no dedicated cycle facilities are provided with this option, any cyclists originating in the local area and wishing to travel south (or vice versa) would share with the bus lane. A cross-section on Swords Road for this scheme option is illustrated in Image 3.13.

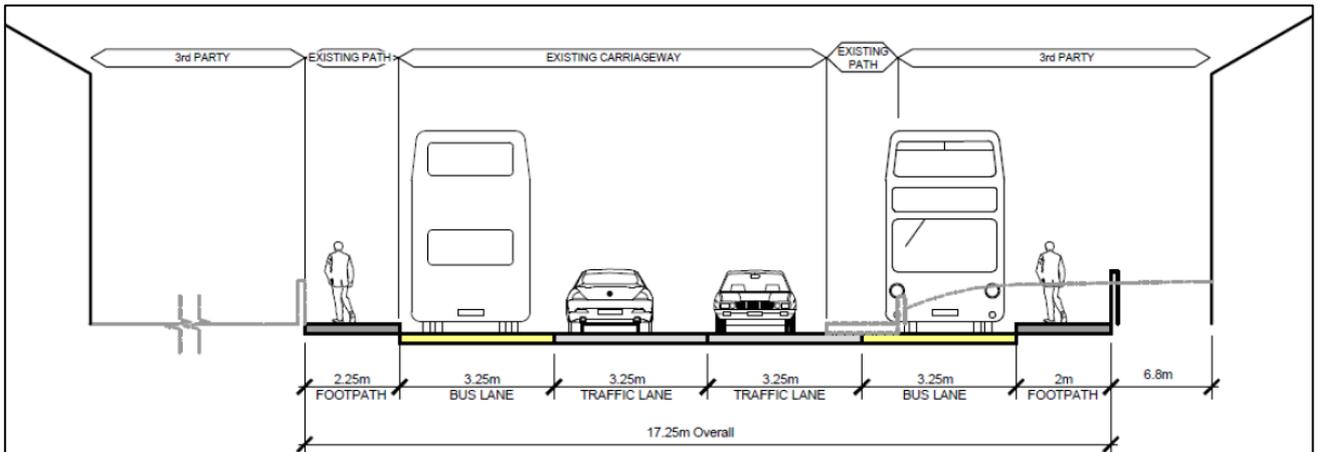


Image 3.13: SY1B Cross-Section A-A Swords Road South of Omni Shopping Centre

3.4.1.1.3.2 Route Option SY1C – One-Way Option (Emerging Preferred Route)

Image 3.14 and Image 3.15 illustrate the indicative scheme design for Route Option SY1C, which was the Emerging Preferred Route Option.

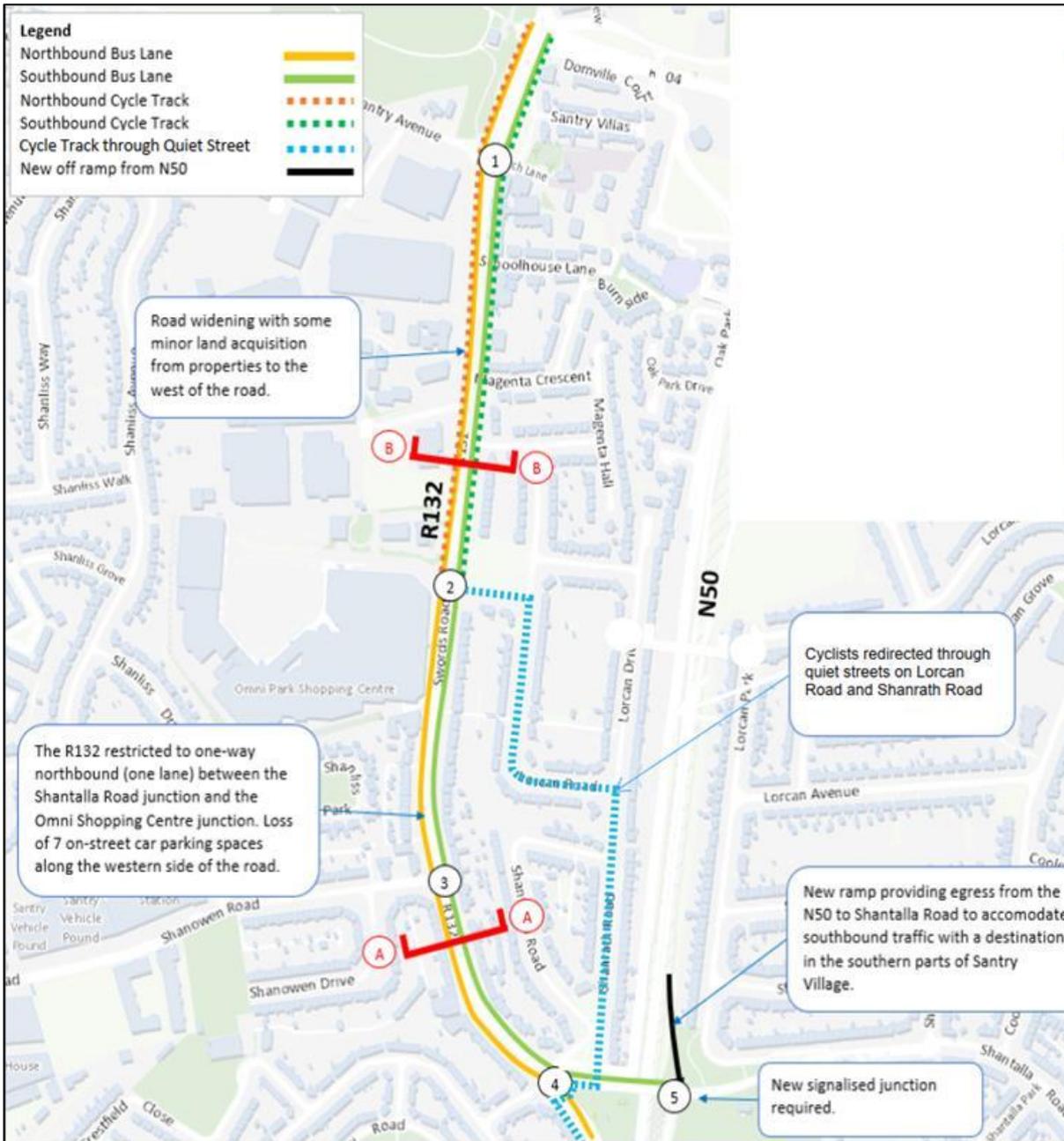


Image 3.14: Route Option SY1C

This option is similar to Route Option SY1B from Coolock Lane to Omni Shopping Centre.

This option removes southbound traffic between Omni Shopping Centre and Shantalla Road. To minimise land acquisition on Swords Road for this section of the Proposed Scheme, a bus lane would be provided in each direction but only one traffic lane (northbound) would be maintained for general traffic.

Combined with the proposal to redirect cyclists through Lorcan Road and Shanrath Road, this option would negate the need for any land acquisition along this section of the Proposed Scheme.

To allow access from the north to properties in the south of Santry Village, this option would require the construction of a new southbound slip road off the N50 at Shantalla Road. The new slip road would join the Shantalla Road via a new signalised junction.

A cross-section on Swords Road for this scheme option is illustrated in Image 3.15.

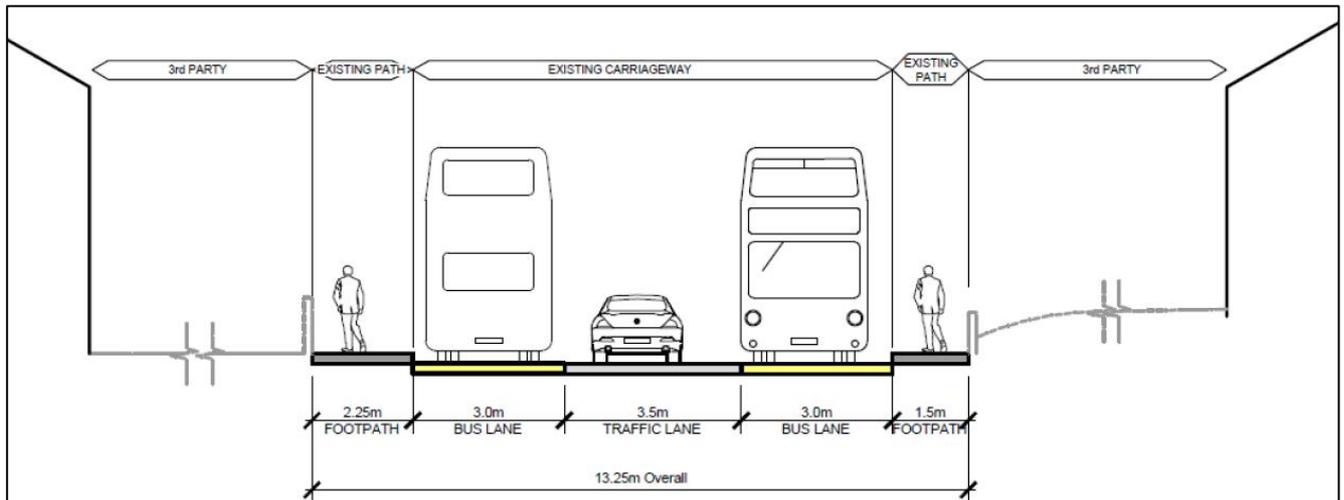


Image 3.15: SY1C Cross-Section A-A Swords Road South of Omni Shopping Centre

The proposed traffic management changes would have a direct impact on traffic routes to, from and through the southern part of Santry Village.

As with the selection of the Emerging Preferred Route options, each route option was evaluated using an 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. Based on the following key findings from the MCA, Route Option SY1B was the preferred option in Santry Village for the following reasons:

- It performs more favourably under the Integration criterion because this option requires no changes to the current traffic management regime in Santry. Route Option SY1C would require detours and increased journey times for traffic travelling to and from the north with an origin or destination in the southern parts of Santry and people travelling south from the southern parts of Santry; and
- It performs more favourably under the Accessibility and Social Inclusion criterion because, under Option SY1C, journey times of the regular trips made by local residents living between the Omni Park Shopping Centre and Shantalla Road/Swords Road Roundabout would be increased.

Signal-controlled bus priority (whereby only one bus lane is provided, similar to the layout adopted at Santry Demesne) was also considered as an option through Santry Village, in order to reduce the impact on land take. . For signal-controlled bus priority to operate successfully, queue lengths from the next junction cannot be allowed to develop on the shared bus/traffic lane portion, as this would result in delays to the bus service. Junction modelling of this option through Santry Village showed extensive queuing at the Lorcan Road/Omni Park Shopping Centre, Shanowen Road and Shanrath Road junctions, which are in close proximity to each other (300m between the Lorcan Road/Omni Park and Shanowen Road junctions and 250m between the Shanowen Road and Shanrath Road junctions). On this basis, signal-controlled bus priority was discounted as a feasible option through Santry Village.

3.4.1.2 Options Considered at Dorset Street Lower

There are presently two general traffic lanes in each direction along Drumcondra Road Lower and Dorset Street Lower between Clonliffe Road and Eccles Street/Hardwicke Place. A two metre wide, tree-lined central reserve separates inbound and outbound traffic between St Anne's Road and Eccles Street/Hardwicke Place.

Under the Emerging Preferred Route presented in the first Non-Statutory Public Consultation, continuous bus lanes and cycle lane/tracks were to be accommodated in each direction by the removal of one inbound and one outbound general traffic lane.

The Emerging Preferred Route layout required removal of the tree-lined central reserve between Whitworth Road/Whitworth Place and Belvedere Road/Innisfallen Parade as shown in Image 3.1. This was necessary to introduce bus and cycle provision in each direction, while accommodating the volume of left-turn movements onto Whitworth Road and Belvedere Road.

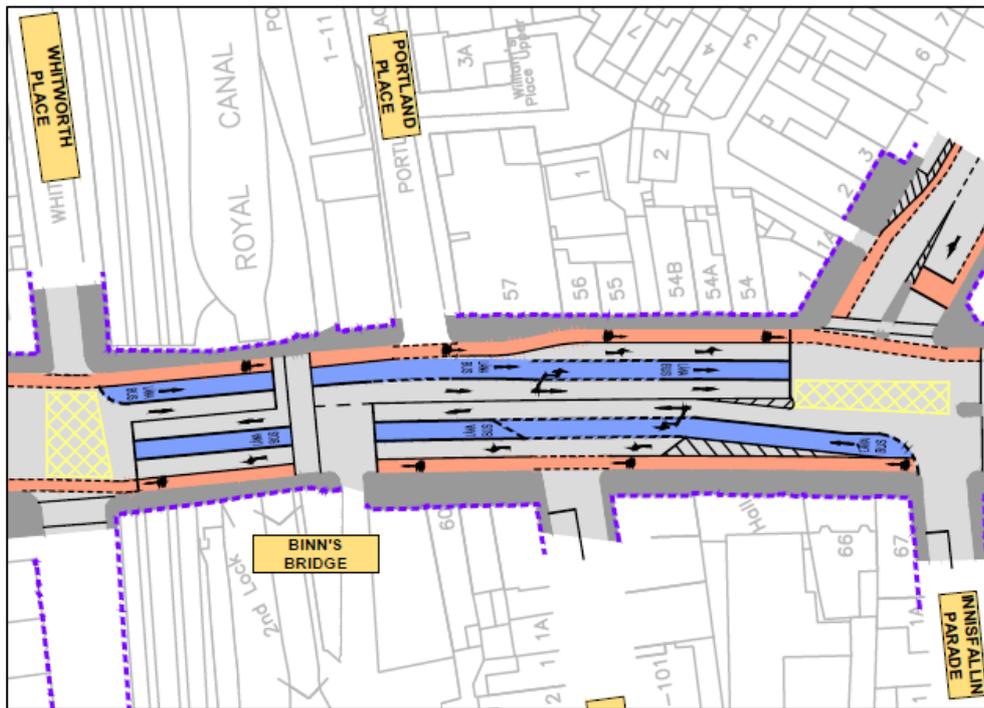


Image 3.16: Whitworth Road/Whitworth Place to Belvedere Road/Innisfallen Parade

The central reserve was also proposed to be removed between Gardiner Street Upper/Synott Place and Hardwicke Place/Eccles Street, as shown in Image 3.17.

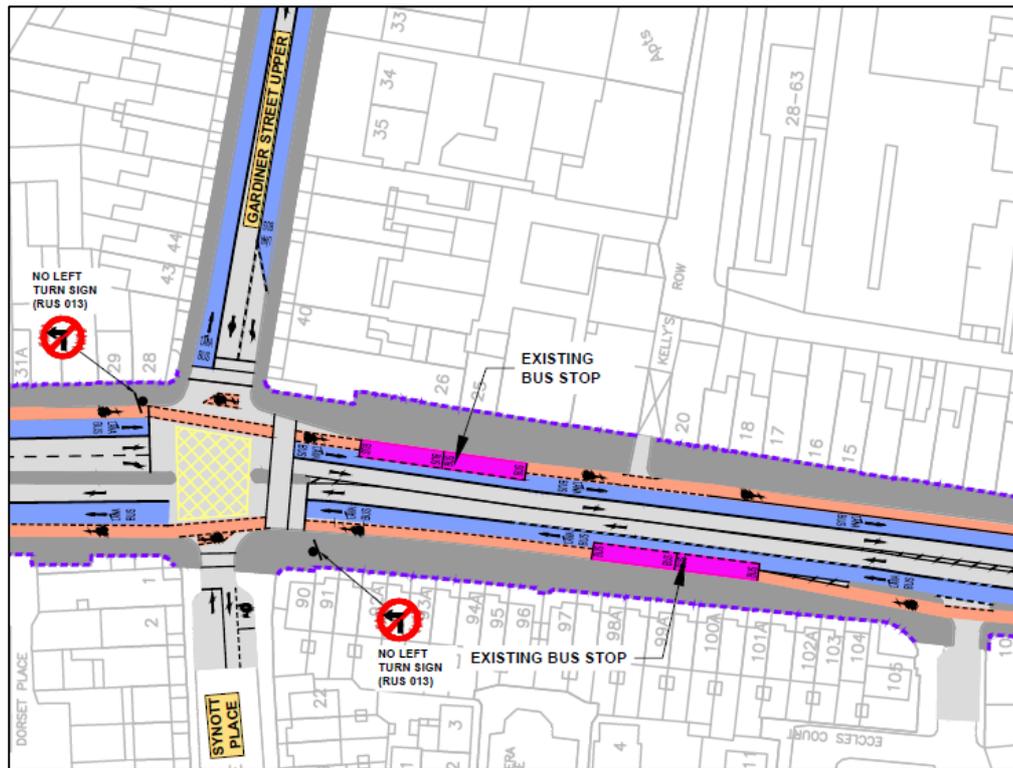


Image 3.17: Gardiner Street Upper/Synott Place to Hardwicke Place/Eccles Street

Elsewhere, the remaining sections of tree-lined central reserve were maintained as part of the Emerging Preferred Route layout.

Following receipt of submissions from the first non-statutory public consultation and assessment of full topographical survey information, removal of the central reserve in order to accommodate the cycle tracks and widen the footpaths on either side was considered.

The topographical survey allowed more detailed design of the corridor to be undertaken for development of the Draft Preferred Route Option. With the removal of one traffic lane in each direction between Clonliffe Road and Eccles Street, adequate space was available to meet the BusConnects desirable minimum requirements for 3m wide bus lanes, minimum 2m wide footpaths and fully segregated, 2m wide cycle tracks, without the necessity to remove the tree-lined central reserve between Gardiner Street Upper/Synott Place and Hardwicke Place/Eccles Street, as shown in Image 3.18.

In line with the government's Climate Action Plan, reducing the construction carbon footprint has been a key consideration in the layout development of the Proposed Scheme. The removal of the existing tree-lined central reserve along Dorset Street Lower (involving trees and paving that would otherwise be unaffected by the works) was considered unnecessarily disruptive and undesirable.

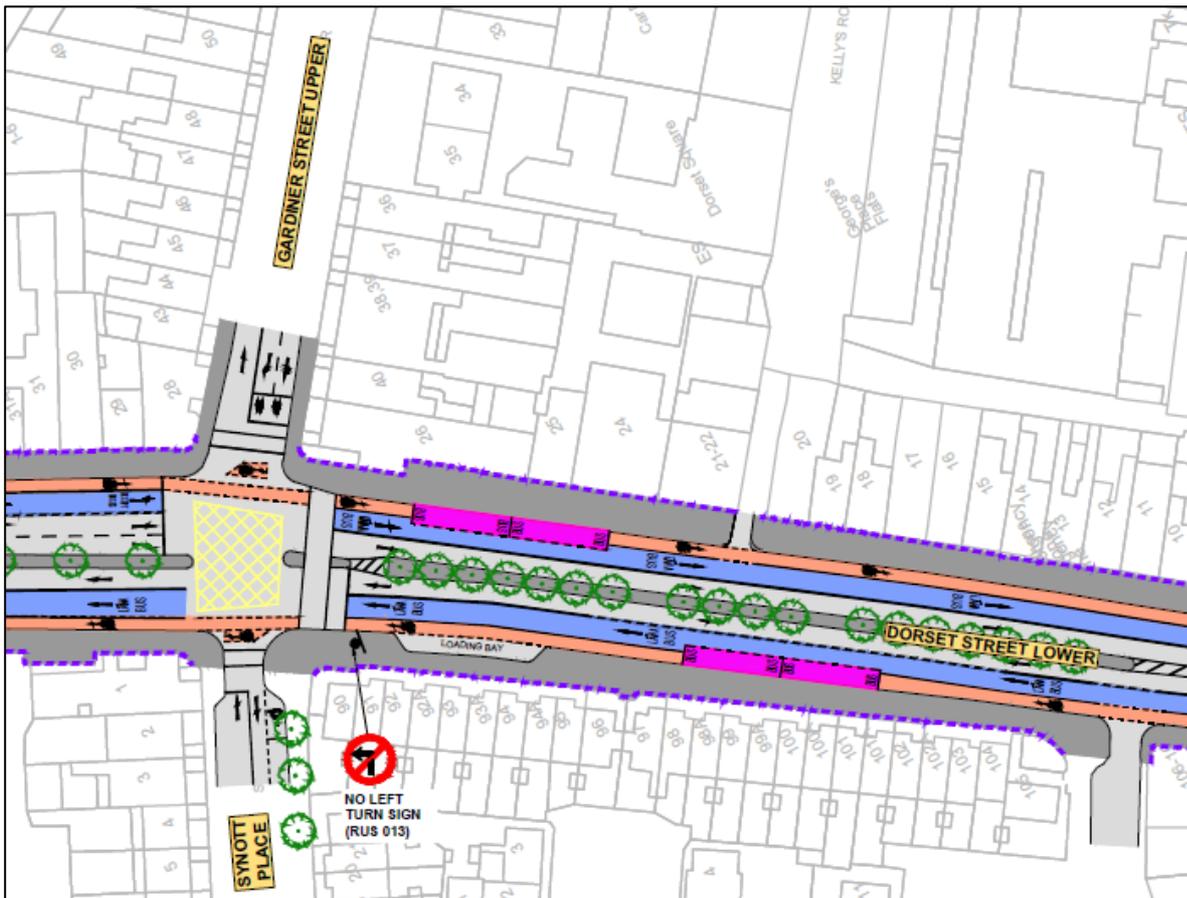


Image 3.18: Gardiner Street Upper/Synott Place to Hardwicke Place/Eccles Street

Replacement of trees from the central reserve with new trees in the footpaths is not straightforward. It was evident from the available utilities information that the footpaths on both sides of the carriageway are very significantly congested with services, particularly in comparison with the central reserves.

It was considered that removal of the central reserve and trees and the disruption of the existing footpaths that are generally in good condition would have a negative impact on the urban realm and carbon footprint of the Proposed Scheme. The design strategy adopted was to retain the existing kerb lines and drainage regimes, where possible. This has been accomplished everywhere, apart from bus stop locations, where the footpaths will be widened out to accommodate Shared Landing Area bus stops. In this way, the depth of excavation required, and the waste generated, is minimised. Most of the construction required will involve raising carriageway levels and installation of segregating kerbs or flexible bollards.

Under the Draft Preferred Route Option, the central reserve was retained everywhere apart from the section between Whitworth Road/Whitworth Place and Belvedere Road/Innisfallen Parade.

3.4.1.3 Options Considered at Gardiner Street Upper

Under the Emerging Preferred Route Option, it was proposed to apply a left-turn ban onto Gardiner Street Upper from Dorset Street Lower, rendering Gardiner Street Upper one-way to vehicular traffic between Dorset Street Lower and Mountjoy Square North. In addition, much of the existing on-street parking on Gardiner Street Upper and Lower was to be removed and the junction between Gardiner Place and Gardiner Street Upper was to be upgraded to a fully signalised junction with new pedestrian facilities. The Emerging Preferred Route Option required alternative traffic routes to utilise Belvedere Road, Belvedere Place, Mountjoy Square North and Sherrard Street.

The purpose of this layout was to facilitate all of the A-Spine routes on Gardiner Street Upper, Middle and Lower by implementation of a two - way bus layout as far as Beresford Place under the 2018 Dublin Area Bus Network Redesign.

Under the Revised Bus Network published by the NTA in 2019, high frequency services (A-Spine) were removed from Gardiner Street and it was considered that introduction of two bus lanes over the full length of Gardiner Street was no longer necessary. Consequently changes to Gardiner Street and Mountjoy Square did not form part of the Draft Preferred Route Option.

3.4.1.4 Other Key Changes for the Proposed Scheme Implemented in the Design of the Draft Preferred Route Option

The following are key changes from the Proposed Scheme as identified and assessed through the Draft Preferred Route Option development:

- Protected junctions for cyclists were introduced at Airside, Cloghran, Turnapin, Coolock Lane and Griffith Avenue junctions;
- Segregation between pedestrians and cyclists was introduced to the existing shared cycle track and footway between the airport roundabout and Old Airport Road;
- Improvements to the pedestrian crossings at the Omni Park Shopping Centre junction were introduced;
- Provision of off-street parking was proposed for some residences in Santry Village, to offset loss of on-street parking;
- The existing bus stop 85 near Home Farm Road was restored, and;
- A number of bus stops along the route were redesigned as island bus stops where space allowed.

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

The Draft Preferred Route Option was published in March 2020 and a second round of public consultation occurred between 4 March 2020 to 17 April 2020. A public information event relating to the CBC was held in the Bonnington Hotel on Wednesday 11 March 2020. Due to COVID-19 restrictions in mid-March, the further planned Public Information Events were impacted. There was a total of 31 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.

Key changes for the Proposed Scheme implemented in the design of the Draft Preferred Route Option include:

- Changes at Santry Demesne to reduce impacts to the proposed Natural Heritage Area (pNHA) and the curtilage wall of Santry Demese;
- Changes at the Frank Flood Bridge (River Tolka Crossing) to provide two-way bus and traffic lanes while also providing pedestrian and cycle provision.

3.4.2.1 Santry Demesne

The cross-section in the Emerging Preferred Route which was published for the first Non-Statutory Public Consultation incorporated footpaths, cycle lanes, bus lanes and traffic lanes in each direction between Northwood Avenue and Coolock Lane. As the cross-section of the R132 from Morton Stadium as far as Coolock Lane is at most three lanes wide at present (two lanes southbound, one lane northbound), encroachment into Santry Demesne and private properties on the opposite side of the road was required, along with removal of much of the historic Santry Demesne boundary wall as far as the Coolock Lane junction.

Following development of a traffic local area model it was ascertained that, given the distance (approximately 600m) between the Northwood Avenue and Coolock Lane junctions, queueing traffic in each direction on the approaches to those junctions was unlikely to extend as far as the proposed midpoint pedestrian crossing at the

main entrance to Morton Stadium. Accordingly, it was concluded that the bus lane from each junction to this midpoint pedestrian crossing could be omitted, to be replaced by signal-controlled bus priority, whereby buses are given priority over general traffic exiting the junctions until the bus lane commences at the midpoint pedestrian crossing.

The Updated Draft Preferred Route Option, which was published for the third Non-Statutory Public Consultation, incorporated this arrangement. In an effort to reduce (and in the case of the Santry Demesne pNHA completely avoid) impacts on the Santry Demesne boundary wall, the width of the southbound cycle track was reduced to 1.5m locally at Morton Stadium and a 2m wide northbound cycle track was alternatively proposed behind the Santry Demesne wall through Santry Park and Morton Stadium.

This was determined through an MCA. The MCA states under the 'Environment' sub-criteria that the proposed layout of 'a northbound bus lane from Morton Stadium to Northwood Avenue and a southbound bus lane from Morton Stadium to Coolock Lane. The northbound and southbound cycle tracks are online but reduced to 1.5m minimum widths' scores highest for a number criteria, namely: there will be no ecological impacts, with landscape, streetscape and architectural heritage performing highest compared to the Emerging Preferred Route and Draft Preferred Route Option as there will be no impact on the Santry Demesne boundary wall.

3.4.2.2 Options Considered at the River Tolka Bridge in Drumcondra

The existing road layout on the River Tolka bridge consists of two traffic lanes each way, widening out to include a separate right-turn lane at the approaches to Richmond Road and Botanic Avenue.

The Emerging Preferred Route which was issued as part of the first Non-Statutory Public Consultation required widening of the bridge to the west of the structure to accommodate the CBC Infrastructure Works as shown in Image 3.19.

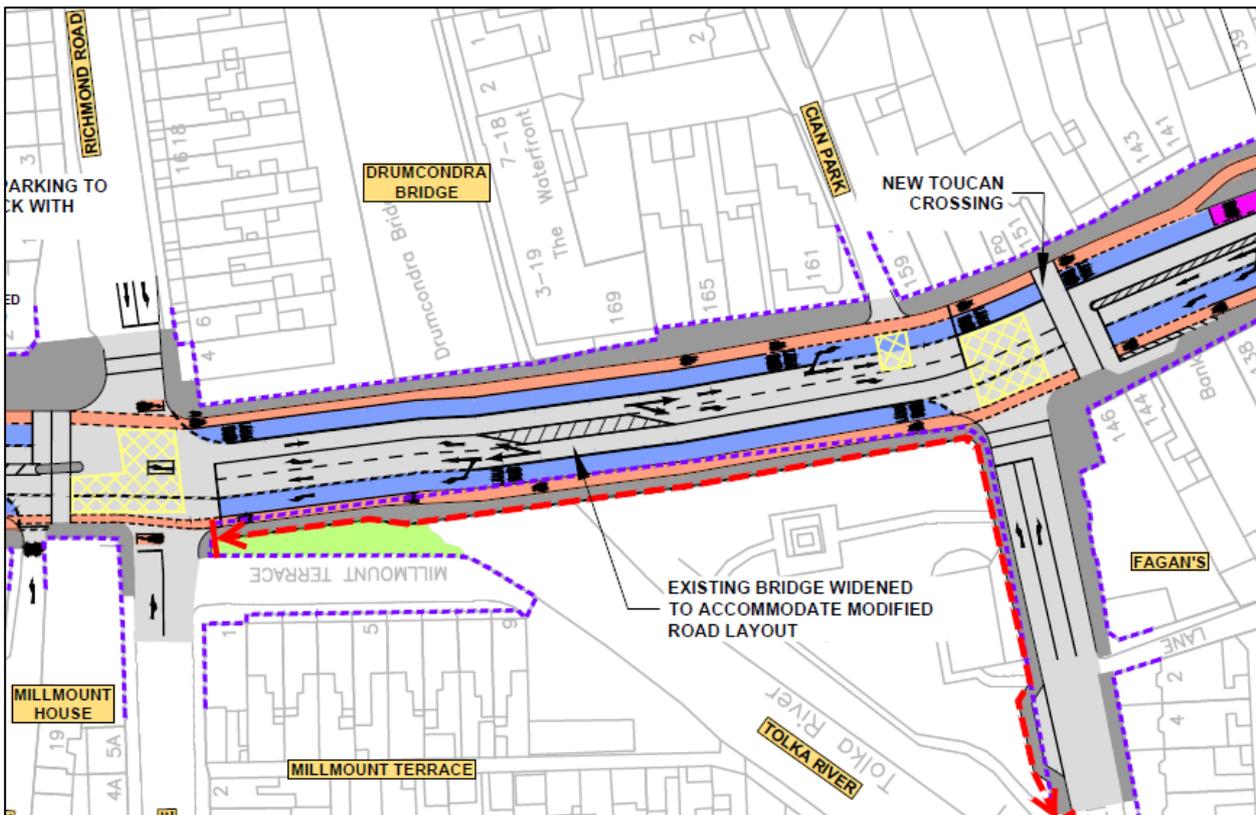


Image 3.19: Emerging Preferred Route Layout – River Tolka Bridge

The widening would require removal and reconstruction of the masonry parapet in order to locate the outbound bus lane in the existing footpath on the west side.

During further design development, the records of the existing services that are in the footpaths and attached to the west side of the structure were obtained and assessed. It was concluded that the existing services could not be adequately accommodated in a cantilevered structure. A number of road layout options were considered in order to avoid the necessity to widen the the bridge. These options included:

- Reductions in the lengths of the right-turn lanes;
- Right-turn bans onto Richmond Road and Botanic Avenue; and
- Bus lane drop through signal-controlled bus priority.

Each of these options were considered to result in unacceptable impacts on bus travel times or result in unacceptable traffic redistribution. Therefore, an independent structure, separate from the existing bridge, was presented in the Updated Draft Preferred Route Option, as illustrated in Image 3.20.

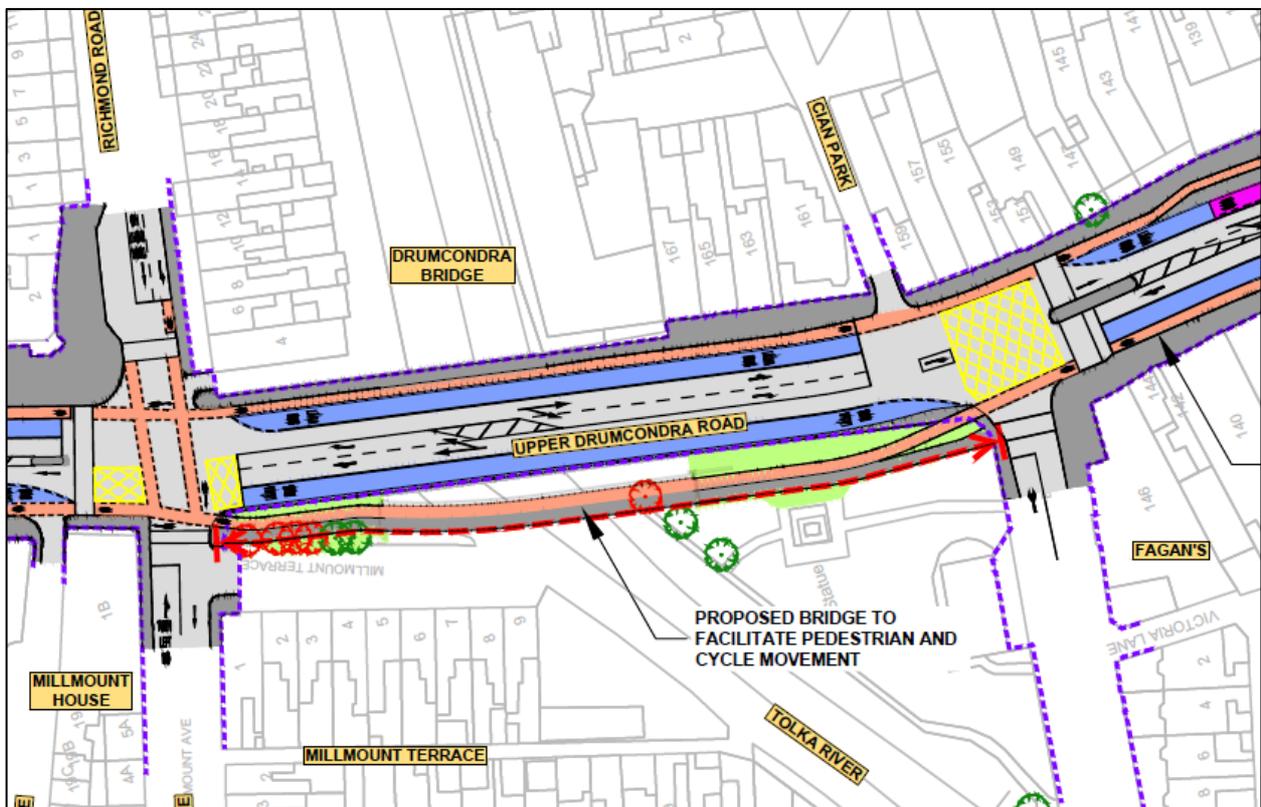


Image 3.20: Updated Draft Preferred Route Option Layout – River Tolka Bridge

Other key changes for the Proposed Scheme implemented in the design of the Updated Draft Preferred Route Option include:

- Alternative access arrangements to the Veterinary Clinic at Pinnock Hill;
- Reduction in the number of traffic lanes between the Pinnock Hill and Airside junctions;
- Signalisation of the junction of Kettles Lane and the R132 to permit right-turning traffic movements;
- Continuation of the two-way cycle track adjacent to the northbound carriageway from the Green Long Term Car Park junction to the South Corballis Road junction;
- Connection with the Santry Greenway at Northwood junction;
- An alternative layout of the northbound diverge ramp after Whitehall Church to avoid impacts on the adjacent green area;
- Provision of a new pedestrian crossing at the junction between Drumcondra Road Upper and Millmount Avenue;
- General introduction of BusConnects protected junction layouts to improve safety for non-motorised users; and

- General rationalisation of bus stop locations, with some bus stops relocated or removed to achieve a better spacing between stops, while also ensuring that each stop is sited in the best location to serve surrounding neighbourhoods.

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

The third round of public consultation on the Updated Draft Preferred Route Option 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 was a total of 65 submissions received specific to the Proposed Scheme during this round of public consultation.

Arising from the feedback received during this consultation process, a number of design amendments were identified and incorporated into the Proposed Scheme.

3.4.3.1 Options Considered at Santry Demesne

Consultation feedback from statutory consultees, landowners and members of the public following the third Public Consultation highlighted safety, security and environmental issues that would arise out of positioning the northbound cycle track within Santry Park and Morton Stadium. Consequently, the cycle tracks in each direction are maintained online in the final Preferred Route Option but reduced to 1.5m in width (appropriate for single file cycling under the National Cycle Manual) over a distance of approximately 300m.

Based on the assessment undertaken, the Preferred Route Option layout offers more benefits over the Emerging Preferred Route and Draft Preferred Route Option layouts:

- No land take is required from public or private lands;
- The Santry Demesne pNHA is unaffected. No trees in Santry Park or Morton Stadium are impacted;
- The operations of Morton Stadium are not impacted;
- The two cycle tracks (northbound and southbound) remain online; and
- There is no need to remove any of the Santry Demesne boundary wall.

3.4.3.2 Other Key Changes Included in the Updated Design of the Final Preferred Route Option

Other key changes included in the updated design of the final Preferred Route Option include the following:

- Minor reconfiguration of the proposed north and south approaches to the Airport roundabout;
- Provision of a new pedestrian crossing at Santry Close, near the Northwood junction;
- Provision a terminus for the D4 Route in the green space at the junction of Coolock Lane and the Swords Road;
- Provision of a dedicated left-turn lane from Santry Avenue;
- More detailed provision of off-street parking in Santry Village, to offset loss of on-street parking;
- Provision of a new pedestrian crossing adjacent to the Comet bar in Santry;
- Reduction in cycle track width in the vicinity of Plunkett College and Highfield Hospital, to reduce impacts on adjacent mature trees;
- Further development of the Griffith Avenue junction layout, to tie in with the Griffith Avenue Cycle Scheme;
- Segregation between pedestrians and cyclists on the new bridge over the River Tolka;
- Provision of a new segregated cycle track outbound between St Alphonsus Road Lower and Hollybank Road in order to avoid conflict with pedestrians;
- Further optimisation of parking and loading bay provision along Drumcondra Road Lower;
- Provision of a two-way cycle track on the west side of Parnell Square East in order to avoid interface with pedestrians and buses at the bus stops along the east side of Parnell Square East; and

- Further rationalisation of bus stop locations, with some bus stops relocated or removed to achieve a better spacing between stops, while also ensuring that each stop is sited in the best location to serve surrounding neighbourhoods.

3.5 Conclusion

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

3.6 References

- Department of the Environment, Climate and Communications (2022). Climate Action Plan 2023.
- Department of Transport (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 (2012c). Study of Transport Options for Fingal Corridors in advance of Metro North.
- NTA (2013a). Greater Dublin Area Cycle Network Plan 2013.
- NTA (2013b). Integrated Implementation Plan 2013 – 2018.
- NTA (2015a). Dart Expansion Programme 2015.
- NTA (2015b). Fingal / North Dublin Transport Study.
- NTA (2016a). Transport Strategy for the Greater Dublin Area 2016-2035.
- NTA (2016b). Strategic Environmental Assessment for the Transport Strategy for the Greater Dublin Area 2016-2035.
- NTA (2018a). Swords Core Bus Corridor Feasibility and Options Assessment Report [Online] Available from: <https://busconnects.ie/wp-content/uploads/2022/03/swords-cbc-feasibility-and-options-assessment-issue-1.pdf>
- NTA (2018b). Swords to City Centre Core Bus Corridor Emerging Preferred Route. Public Consultation November 2018 [Online] Available from: <https://busconnects.ie/wp-content/uploads/2022/02/busconnects-cbc2-swords-to-city-centre-final-for-web-med-res-1.pdf>
- NTA (2020a). Swords to City Centre Core Bus Corridor Preferred Route. Public Consultation March 2020 [Online] Available from: <https://busconnects.ie/wp-content/uploads/2022/03/02-swords-to-city-centre-preferred-route-110320-fa-web.pdf>
- NTA (2020b). Swords to City Centre Core Bus Corridor Preferred Route. Third Round of Public Consultation November 2020 [Online] Available from: <https://busconnects.ie/wp-content/uploads/2022/02/02-swords-to-city-centre-preferred-route-121120-fa-web.pdf>
- 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
- 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

Number 15 of 2008 – Dublin Transport Authority Act 2008.