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, as amended by Directive 2014/52/EU (hereafter known as 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 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 the Roads Act 1993, as amended (the Roads Act) states that the EIAR shall contain the following information:

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

Section 50(2)(b)(vi) of the Roads Act also requires that '*any additional information specified in Annex IV* [as 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 Bray 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 GDA Transport Strategy 2016 – 2035 and the New GDA Transport Strategy 2022 – 2042

The Transport Strategy for the Greater Dublin Area 2022–2042 (Transport Strategy) replaces the prior transport strategy for the period 2016 to 2035.

That prior 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 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 of which the Proposed Scheme is a key component.

Under the Dublin Transport Authority Act 2008, the National Transport Authority (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 including the Core Bus Corridors (CBCs), which 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 for 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 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 was prepared by the NTA pursuant to section 12 of the Dublin Transport Authority Act 2008 (as amended) and was approved by the Minister for Transport, Tourism and Sport in 2016.

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 located in 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;
- Demand Management Study;
- Core Bus Network Study;
- Park & Ride Study;
- Transport Modelling Analysis; and
- Environmental reports.

Specifically, a Strategic Environmental Assessment (SEA) was undertaken on the prior GDA Transport Strategy (NTA 2016b). 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 Green House 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 2013);
- Bus Rapid Transit – Core Network Report (NTA 2012);
- Fingal / North Dublin Transport Study (2015);
- Review of the DART Expansion Programme (2015);
- Various prior Luas studies (including Line B2 (Bray), Line D1 (Finglas), Line F1 and F2 (Lucan and Liberties), and Line E (2008)); and
- Analysis carried out for a 2011 Draft Transport Strategy.

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. 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 show that across the public transport network numbers are 98% of pre-pandemic levels. Specifically Dublin city area bus services carried 12.7m in November 2022, compared to 12.9m 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). These corridors were also divided into Outer Hinterland, Outer Metropolitan, and Inner Metropolitan areas in terms of character.

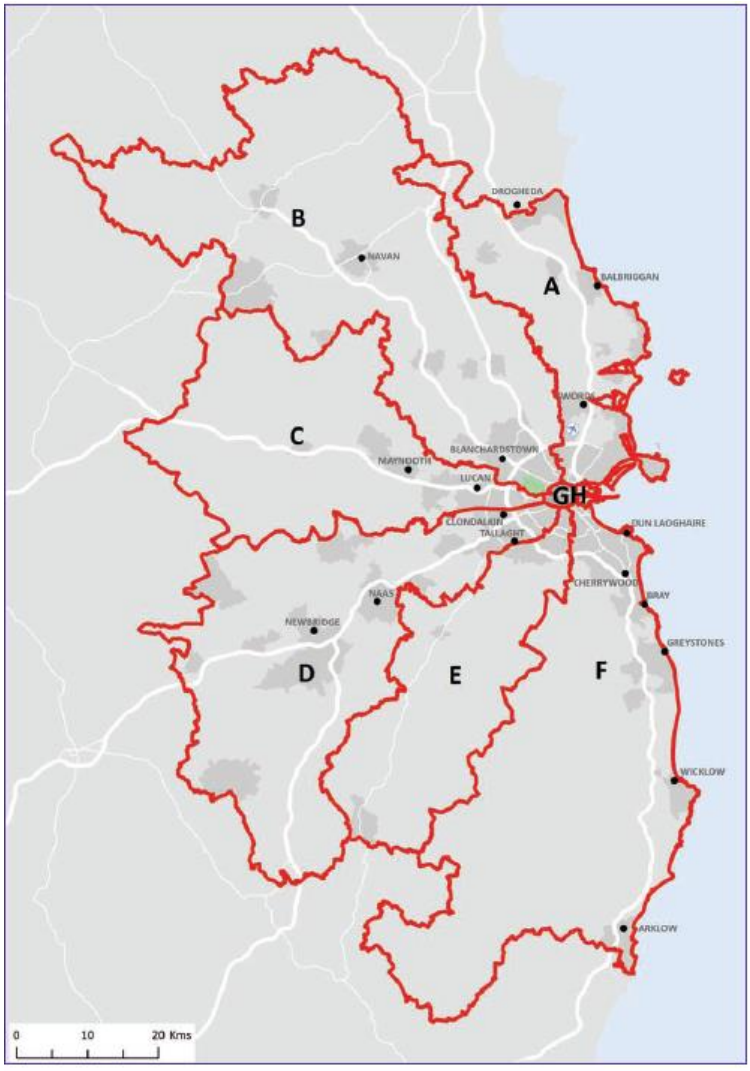

Image 3.1: Transport Strategy 2016–2035 Corridors

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 Bray to City Centre Core Bus Corridor Scheme aligns generally with Corridor F in the prior GDA Transport Strategy which extends from the core city centre area along the N11/M11 corridor as far south as Arklow in Co. Wicklow, and contains one of the region's most important future residential and commercial development areas at Cherrywood. Major urban centres are also located in this corridor in Bray, Greystones, Wicklow and Arklow. Other key areas of transport demand include Shankill, Stillorgan, University College Dublin (UCD) and Donnybrook.

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 69% and 68% 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 alternative relative to the outcomes which can be realised by the Proposed Scheme.

3.2.4 Bus Rapid Transit (BRT) Alternative

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

A BRT – Core Network Report, prepared in 2012 (NTA 2012) 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 UCD corridor and the Malahide Road (Clongriffin) to Tallaght corridor.

Prior to the completion of these studies, the prior GDA Transport Strategy identified the development of a number of CBCs as BRT schemes. 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 between the BRT option and CBCs, 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 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 bus corridors, given the better ratio of seated to standing passengers on such vehicles.

Accordingly, it is intended that all of the Core Bus Corridor 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-control priority.

Within the broader corridor two CBCs were identified to meet the transport demand. The first, along the coast, will cater for demand between Dún Laoghaire, Blackrock and Ballsbridge. The second, (the Proposed Scheme) will cater for demand along the Bray / N11 to Donnybrook corridor, via UCD.

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 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. The GDA Transport Strategy found that the demand along this corridor would require a number of solutions to accommodate the level of demand growth anticipated to 2035. This includes upgrade and extension of the light rail provision within the corridor. Therefore, it is intended to further develop the light rail network along this corridor through the implementation of a Luas extension from Bride's Glen to Bray.

The Luas Green Line extension to Bray is intended to extend from the current Luas Green Line terminus at Bride's Glen to Bray DART Station via Shankill. This will provide a high-capacity radial service from Bray to the City Centre via the key employment areas in the western parts of the corridor including Sandyford, Dundrum and Cherrywood, and provide a continuous link from Bray to Dublin Airport and Swords via the proposed MetroLink scheme.

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, it was concluded that a high quality bus-based transport system supplemented by the implementation of the Luas extension to Bray, would be part of the proposed public transport solution in the corridor of the Proposed Scheme.

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.

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

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 identified that a metro solution would form part of the strategy for this corridor. It was proposed that the Luas Green Line from the terminus in Bride's Glen to the City Centre (Charlemont) would be upgraded to Metro standard and would link into the proposed Metro North (now MetroLink) in order to provide a new north–south inland rail axis from Swords to Bray. However, as outlined in Section 3.2.5, the section of the line between Bride's Glen and Bray has not been proposed be constructed to Metro standard.

Despite the proposal to provide Metro standard rail service within the corridor, the prior GDA Transport Strategy states that this service would need to be supplemented by bus services, with the originally proposed BRT on the N11 from UCD to Blanchardstown, and the core bus radial corridors on the N11 south of UCD and on the Rock

Road all being required to meet future demand. The Bray to City Centre CBC (the Proposed Scheme) is part of the bus corridor upgrade.

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 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 prior GDA Transport Strategy considered that a heavy rail solution would be required along this corridor in the form of increasing the capacity of the South Eastern rail line through enhancements to the existing rail line, incorporating city centre re-signalling and extra rolling stock. Additionally a new rail station is proposed on the line at Woodbrook Housing Development.

The GDA Transport Strategy highlights that the DART south-eastern line, which currently has stops at Shankill and Bray, close to the Proposed Scheme, has a proposed new DART station to be located by the proposed Woodbrook development between Shankill and Bray, which will also be close to and within interactive distances with the Proposed Scheme.

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

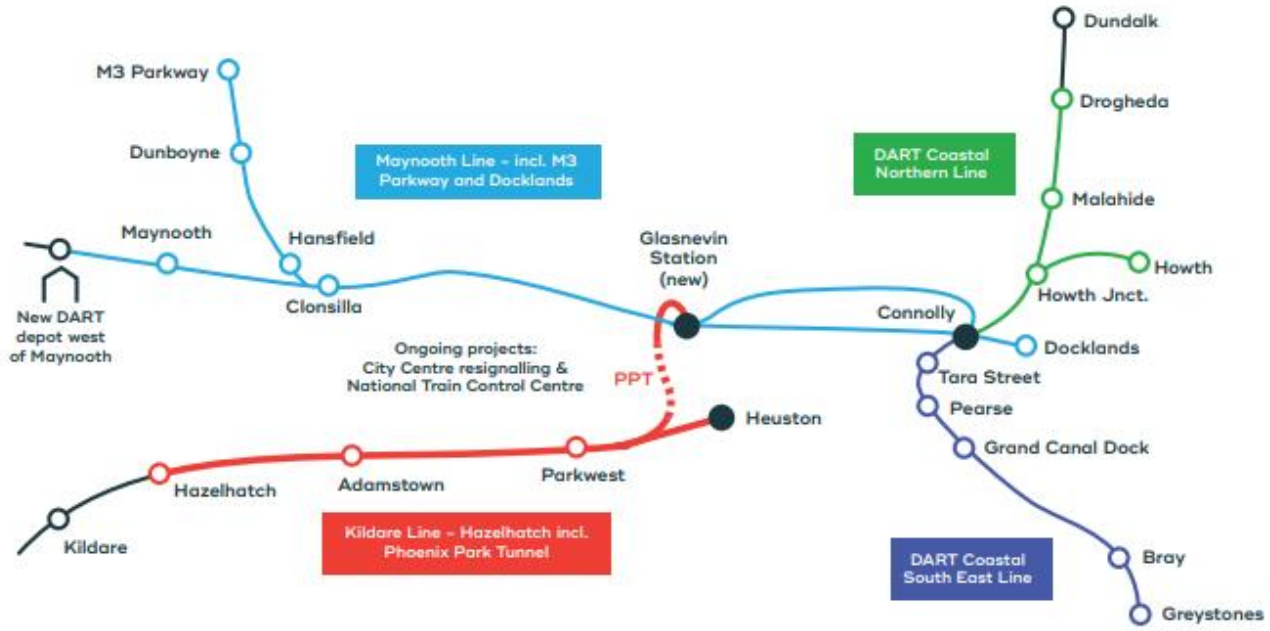

Image 3.2: DART Expansion Programme (Source: Irish Rail Website)

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, it was concluded that a high quality bus-based transport system supplemented by the improvement of the DART on the South Eastern line, as part of a phased delivery of DART Expansion (now DART+ programme), would be part of the proposed public transport solution in the corridor of the Proposed Scheme.

3.2.8 Demand Management Alternative

One of the primary aims of the prior GDA Transport Strategy 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 and 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 have 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 require to be resilient to minimize 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) **Feasibility and Options Reports** were concluded in December 2017 and March 2018 (two reports associated with the Proposed Scheme (Bray to UCD CBC in December 2017 and UCD to City Centre (St. Stephen's Green) CBC in March 2018)), setting out the initial route options and concluding with the identification of the combined Emerging Preferred Route;
2) A first round of non-statutory **Public Consultation** was undertaken on the Emerging Preferred Route from 26 February 2019 to 31 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 and community 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) 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
6) 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 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 impact 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 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 Preferred Route Option for the Proposed Scheme. Environmental specialists have been involved in the iteration of key aspects of the Proposed Scheme 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 Recorded Monuments and Protected Structures, 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 Reports identified feasible options along the corridor, assessed these options and arrived at 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 Reports 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 (summarised in Section 3.3) 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 (described in Section 3.3.2) in accordance with the Department of Transport Document 'Common Appraisal Framework for Transport Projects and Programmes'.

The study area for the corridor comprised four main sections, split across two feasibility studies. Section 1 examined feasible route options from the City Centre to UCD, Section 2 examined feasible route options from UCD to Loughlinstown, Section 3 examined feasible route options from Loughlinstown to Bray North, and Section 4 examined feasible route options from Bray North to Bray South. Further discussion on the route options assessment process is provided below.

At the start of the Stage 1 assessment, an initial 'spiders web' of potential route options that could accommodate a CBC was identified for each study area section. These are extracted from the Feasibility and Options Reports and reproduced as Image 3.3, Image 3.4, Image 3.5 and Image 3.6.

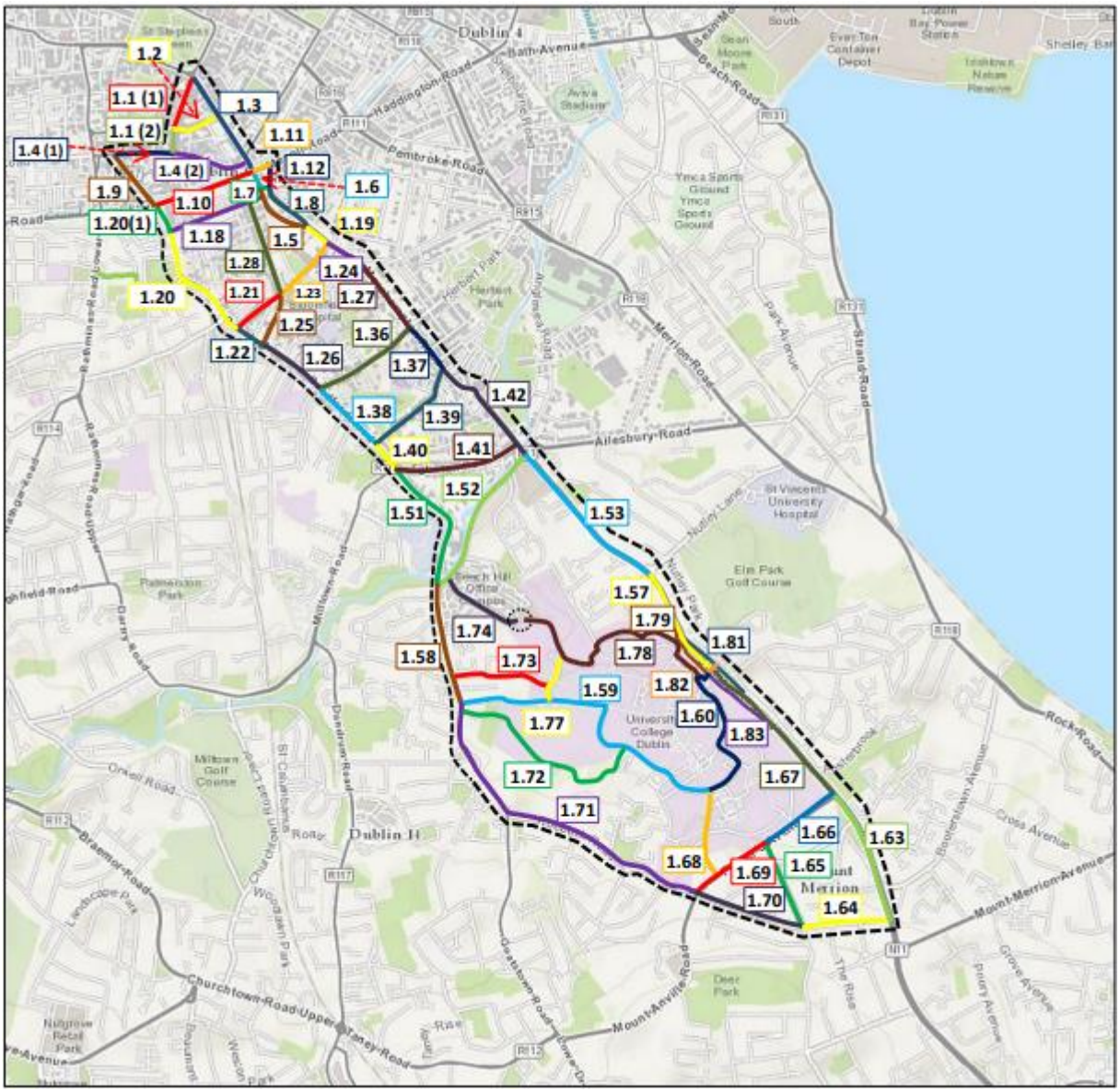

Image 3.3: Section 1 (City Centre to UCD) Spider's Web of Route Options Extracted from UCD to City Centre (St. Stephen's Green) CBC Feasibility and Options Report (NTA 2018)

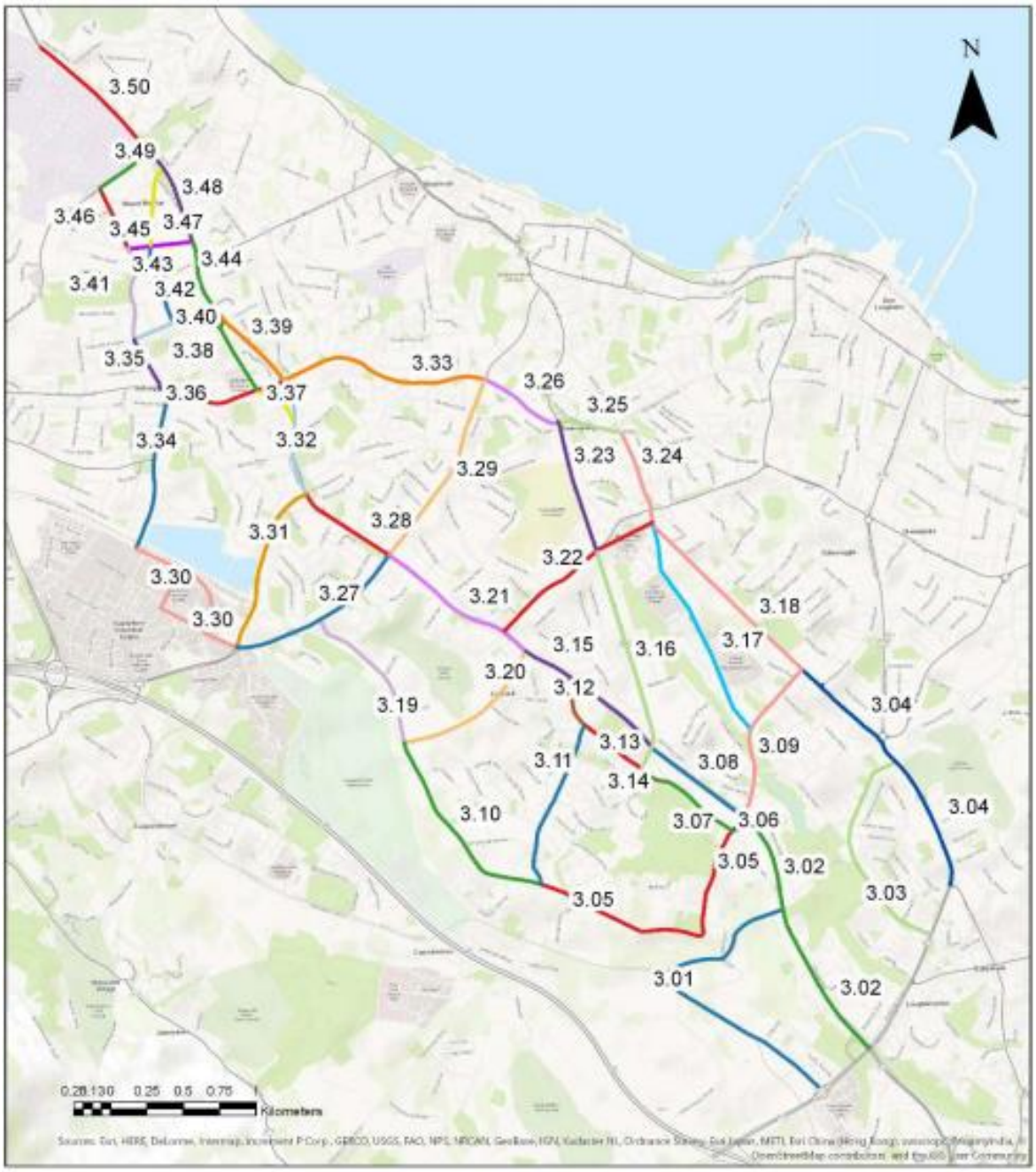

Image 3.4: Section 2 (UCD to Loughlinstown) Spider's Web of Route Options Extracted from Bray to UCD CBC Feasibility and Options Report (NTA 2017)

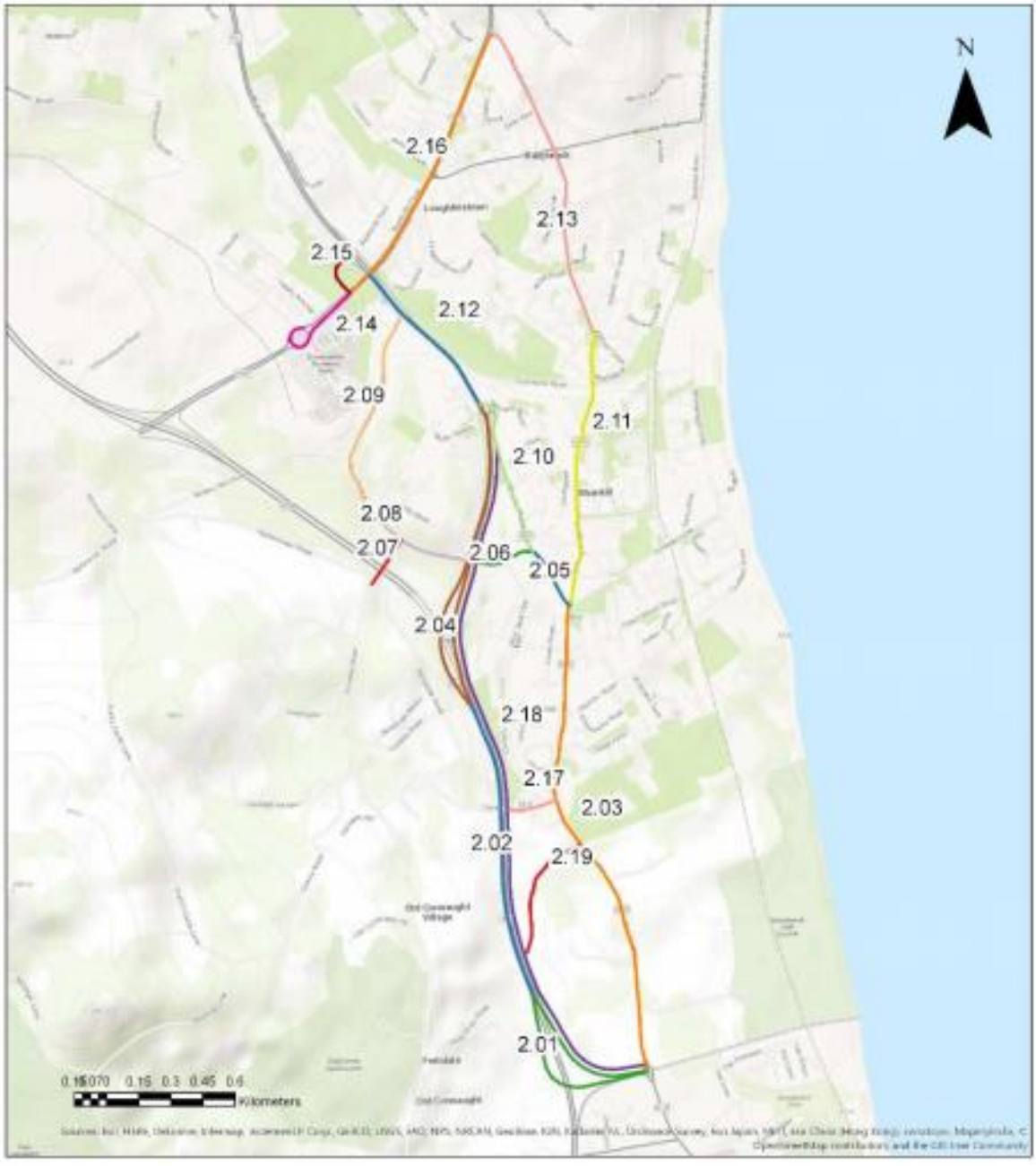

Image 3.5: Section 3 (Loughlinstown to Bray North) Spider's Web of Route Options Extracted from Bray to UCD CBC Feasibility and Options Report (NTA 2017)

Image 3.6: Section 4 (Bray North to Bray South) Spider's Web of Route Options Extracted from Bray to UCD CBC Feasibility and Options Report (NTA 2017)

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.*
- *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 2017; NTA 2018)

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, high-level environmental constraints and an analysis of population and employment 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. For example,

Section Number 1.52 along Beech Hill Road / Beaver Row from Clonskeagh Road Junction to Anglesea Road Junction. This section has a number of pinch points due to the River Dodder. There would be limited to no capacity to widen the carriageway due to the adverse impacts that would occur on the river to the west and residential properties fronting onto the road to the east. This section was therefore not considered a viable option for the Proposed Scheme.

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. These options are presented in Image 3.7 to Image 3.10.

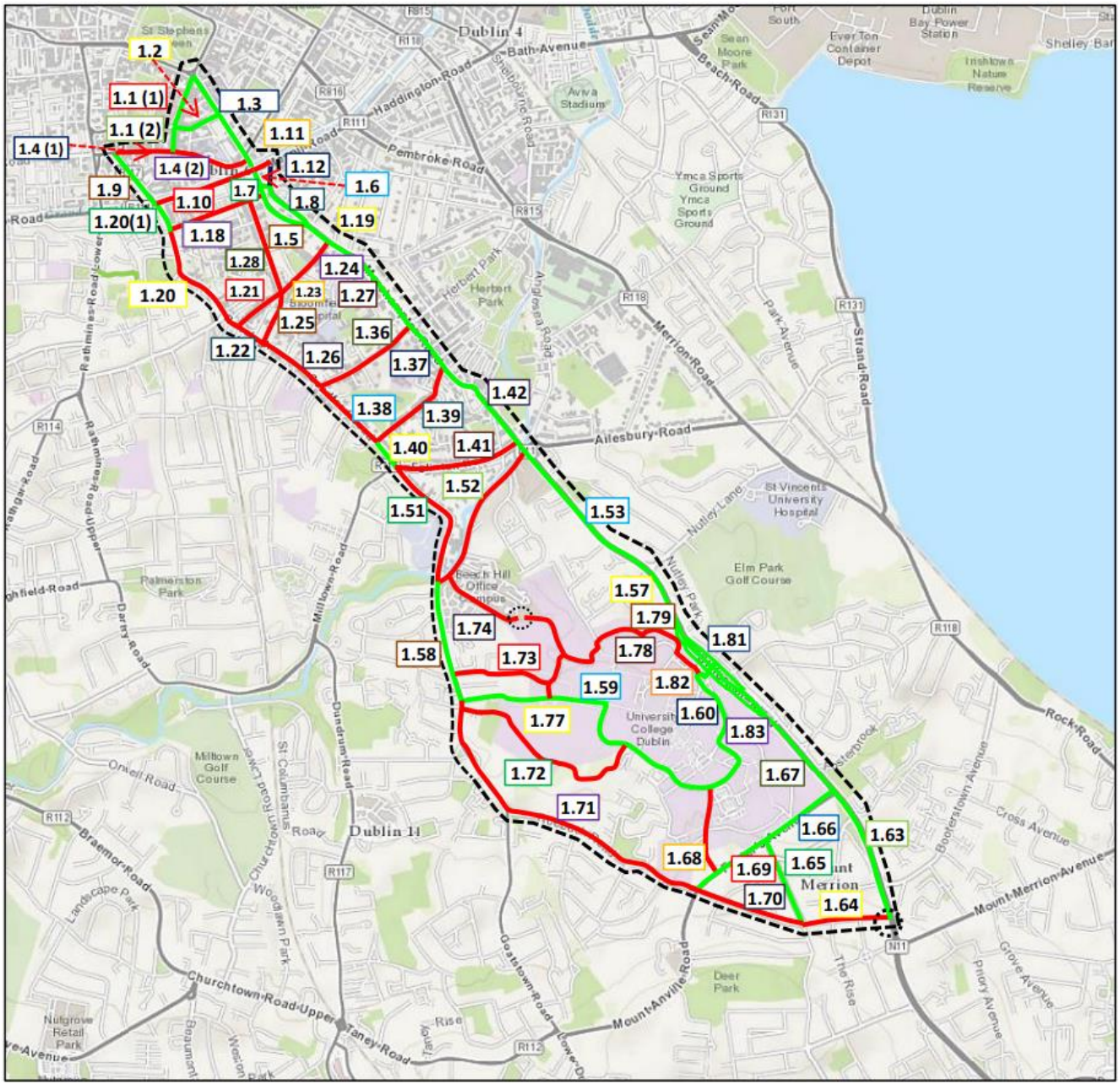

Image 3.7: Route Options from Initial Sift (City Centre to UCD Section) (UCD to City Centre (St. Stephen's Green) CBC Feasibility and Options Report (NTA 2018)) – Green Routes Passed, Red Routes Failed

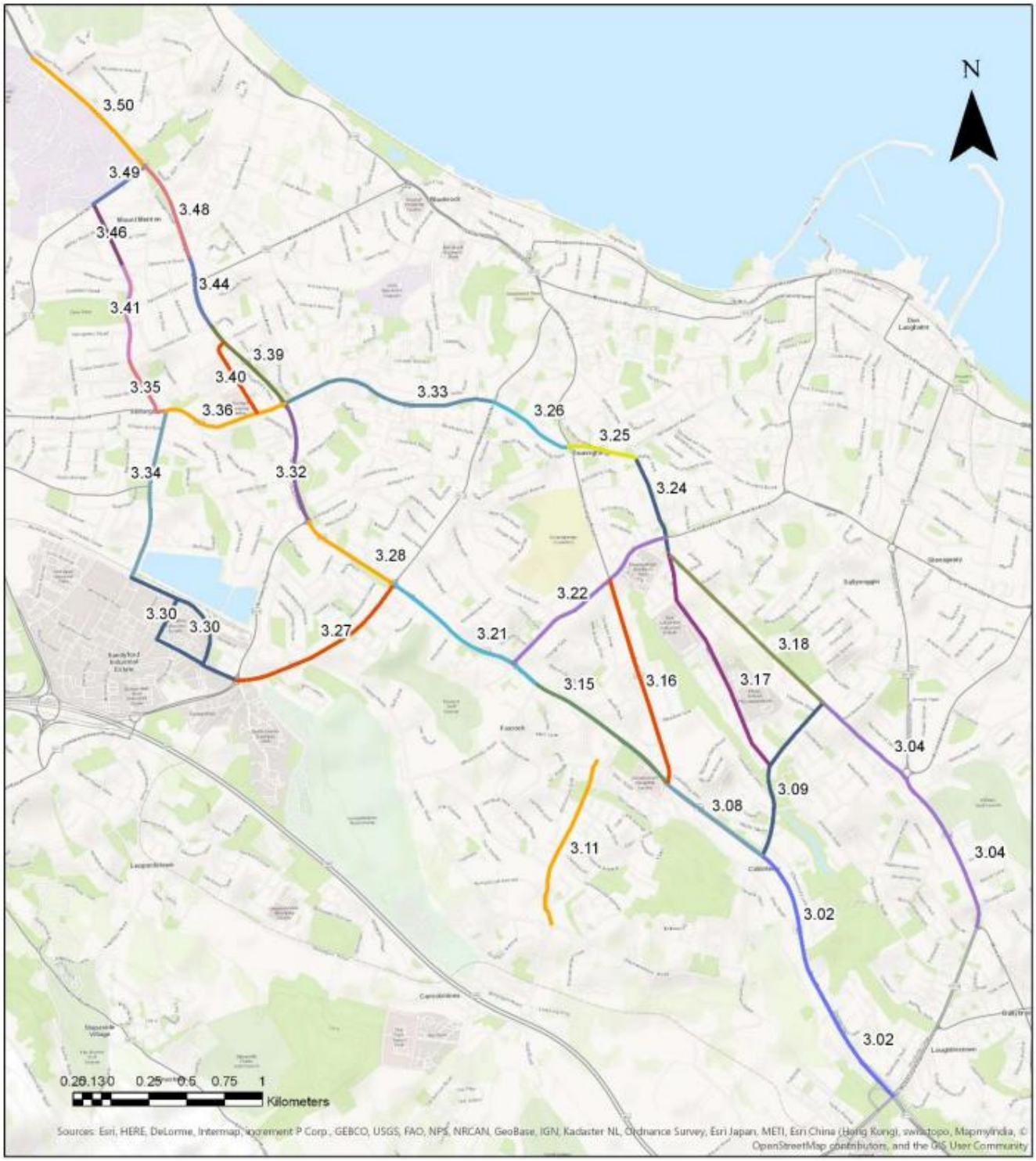

Image 3.8: Route Options from Initial Sift (UCD to Loughlinstown Section) (Bray to UCD CBC Feasibility and Options Report (NTA 2017))

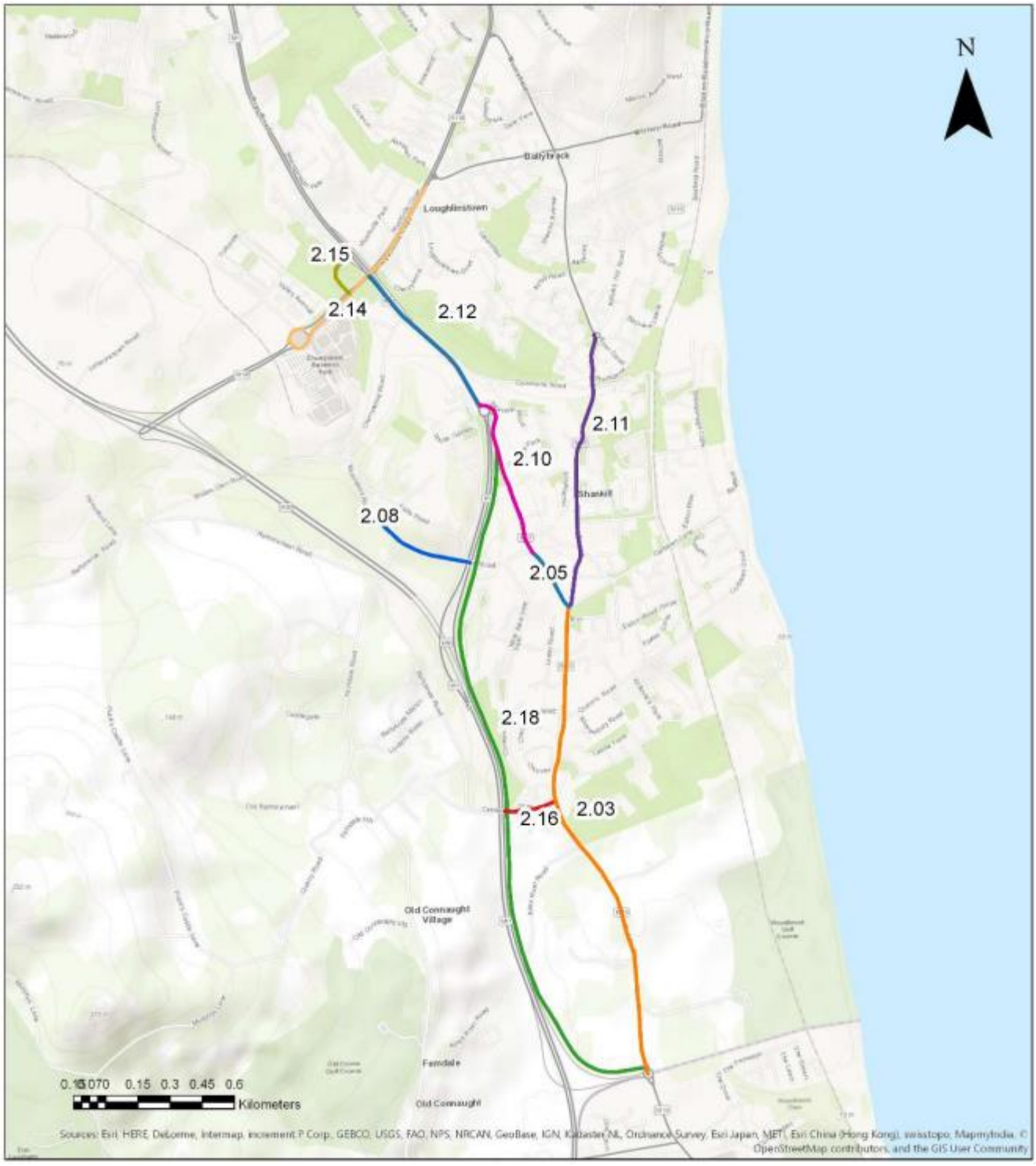

Image 3.9: Route Options from Initial Sift (Loughlinstown to Bray North Section) (Bray to UCD CBC Feasibility and Options Report (NTA 2017))

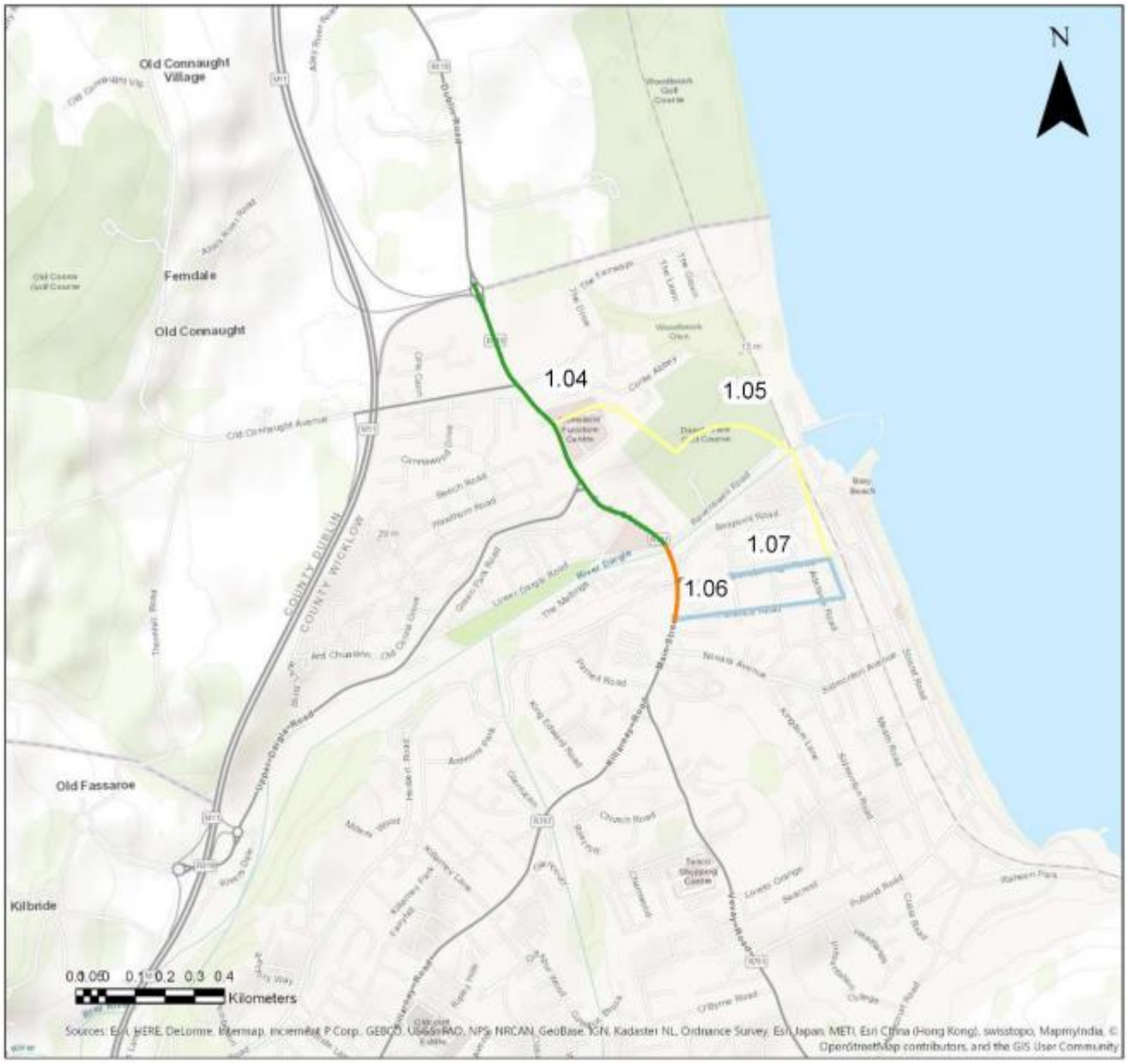

Image 3.10: Route Options from Initial Sift (Bray North to Bray South Section) (Bray to UCD CBC Feasibility and Options Report (NTA 2017))

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 a Multi-Criteria Analysis. The 'Common Appraisal Framework for Transport Projects and Programmes' published by the Department of Transport, Tourism and Sport (DTTAS), March 2016, requires schemes to undergo a Multi-Criteria Analysis (MCA) which evaluated the route options under the assessment criteria set out below:

1. Economy;
2. Integration;
3. Accessibility & Social Inclusion;
4. Safety;

5. Environment; and
6. Physical Activity.

Although it is noted, as set out in the Feasibility and Options Reports, Physical Activity was scoped out of the multi-criteria analyses 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 Recorded Monuments and Protected Structures, 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.

3.3.2.1 Section 1: Route Options Assessment

Following the Stage 1 sifting process, the remaining 34 route sections (the green sections in Image 3.7) were combined to form one cohesive route option (Route 1). At that time it was decided to not include Leeson Street Lower between St. Stephen's Green and the Grand Canal as there were already proposals to implement bus corridors to Dún Laoghaire and Rathfarnham which were originating from St. Stephen's Green and travelling via Leeson Street Lower. Therefore the starting point of this section of the Proposed Scheme was changed during Stage 1 to the Grand Canal.

This route was subdivided into five segments as listed below for further development. These segments are shown in Image 3.11, and are subsequently described.

- Section 1A (Stillorgan Road / UCD to Anglesea Bridge);
- Section 1B (Donnybrook Road / Anglesea Bridge to Rampart Lane);

- Section 1C (Donnybrook Road / Rampart Lane to Pembroke Cottages);
- Section 1D (Morehampton Road / Pembroke Cottages to Appian Way); and
- Section 1E (Leeson Street Upper / Appian Way to Grand Canal).

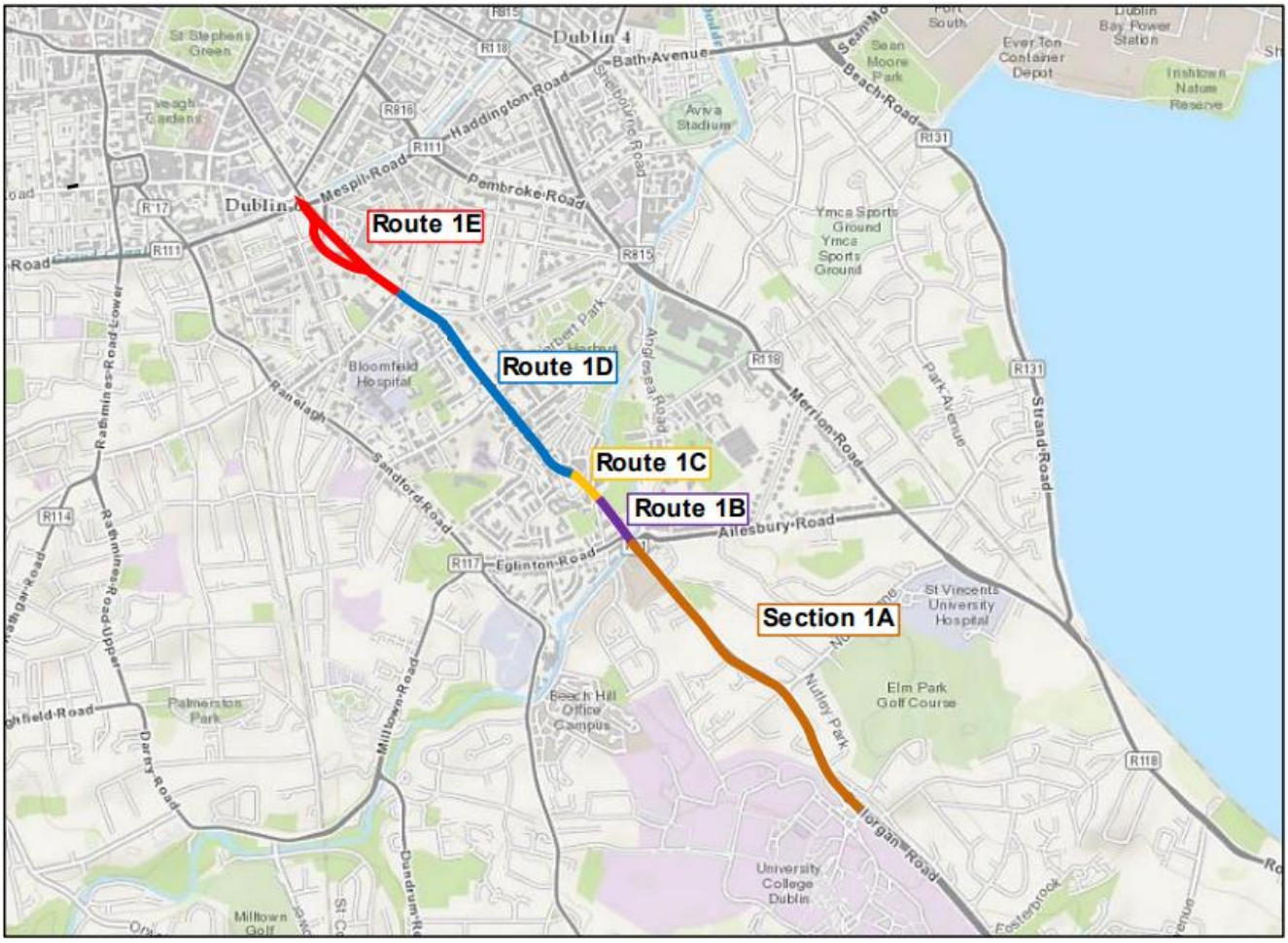

Image 3.11: Section 1 Route Options Remaining After Stage 1 Sifting (UCD to City Centre (St. Stephen's Green) CBC Feasibility and Options Report (NTA 2018))

Segment 1A runs from UCD to Anglesea Bridge along the R138 Stillorgan Road. Two scheme options were assessed for this segment, Option 1A1 and Option 1A2:

- Option 1A1 would consolidate the existing facilities along this segment, with resurfacing required and provision of segregated cycle lanes both inbound and outbound; and
- Option 1A2 would provide for a new streetscape which would increase pedestrian provision in front of Donnybrook Church by widening the footpath whilst maintaining full bus and cyclist facilities. This would be achieved through extending the outbound one lane configuration by approximately 110m past the Stillorgan Road / Beaver Row / Anglesea Road Junction.

The assessment concluded that Option 1A1 scored higher under the Traffic Network Integration sub-criterion due to the reduced traffic lanes. However, Option 1A2 scored higher under the Road Safety sub-criterion due to the widening of the footpath providing safer facilities for pedestrians and public transport users, and it also scored higher on the Landscape and Visual sub-criterion due to the improved streetscape in front of the church. Therefore Option 1A2 scored highest and was selected to form part of Route 1.

Segment 1B runs along Donnybrook Road from Anglesea Bridge to Rampart Lane. Three scheme options were assessed for this segment, Option 1B1, Option 1B2 and Option 1B3:

- Option 1B1 would include cyclists and buses sharing the bus lanes both inbound and outbound throughout the section. This would require the reduction of outbound traffic lanes from two to one;
- Option 1B2 would include segregated cycle and bus facilities on the inbound carriageway, with cyclists and buses sharing the lane on the outbound carriageway. This would also require the reduction of outbound traffic lanes from two to one, but also require land take and impact a loading bay and some parking; and
- Option 1B3 would include segregated cycle and bus facilities both inbound and outbound. This would also require the reduction of outbound traffic lanes from two to one, but also require land take and impact a loading bay and some parking.

The assessment concluded that, while Option 1B3 would be the most expensive due to the quantity of land take required, it scores higher under the Transport Reliability and Quality; Cycle Network Integration; and Road Safety sub-criteria due to the full segregation of buses and cyclists in both directions. Option 1B1 scored higher under the Flora and Fauna; Landscape and Visual; and Land Use Character sub-criteria as a result of its lesser impact on trees, footpaths and parking. Despite this, Option 1B3 scored highest and was selected to form part of Route 1.

Segment 1C runs along Donnybrook Road from Rampart Lane to Pembroke Cottages. Two scheme options were assessed for this segment, Option 1C1 and Option 1C2:

- Option 1C1 would provide adequate bus and cycle facilities through reduced carriageway design widths. This option would provide one traffic lane and one shared bus / cycle lane in each direction, avoiding the need to demolish existing footpaths and / or buildings; and
- Option 1C2 would involve full segregated bus and cycle facilities in both directions through widening of the carriageway. This option would require demolition of existing buildings.

The assessment concluded that Option 1C2 scored higher under the Transport Reliability and Quality; Cycle Network Integration; and Road Safety sub-criteria due to the provision of full bus and cycle segregation. However Option 1C1 scored higher under the Capital Cost; Land Use Integration; and Landscape and Visual sub-criteria as it does not require any demolition of the existing buildings. Therefore Option 1C1 scored highest and was selected to form part of Route 1.

Segment 1D runs along Morehampton Road from Pembroke Cottages to Appian Way. Two scheme options were assessed for this segment, Option 1D1 and Option 1D2:

- Option 1D1 would provide full bus and cycle facilities in both directions, with cycle lanes running adjacent to the carriageway. This would require the removal of the existing trees that line the carriageway, but the parking along the road would be preserved; and
- Option 1D2 would provide full bus and cycle facilities in both directions, with the cycle lanes running between the footpath and the existing trees. This would result in the preservation of more of the trees, however most parking spaces along this segment would be removed.

The assessment concluded that Option 1D2 scored higher under the Land Use Integration; Flora and Fauna; and Landscape and Visual sub-criteria due to the better preservation of the existing trees and the streetscape. Therefore, Option 1D2 scored highest and was selected to form part of Route 1.

Segment 1E runs along Leeson Street Upper from Appian Way to the Grand Canal. Three scheme options were assessed for this segment, Option 1E1, Option 1E2 and Option 1E3:

- Option 1E1 would consolidate the existing facilities. Resurfacing and provisions of segregated bus and cycle lanes would be required in both directions, affecting some existing car parking spaces;
- Option 1E2 would use Bus Gates at both ends of Sussex Road to convert either Sussex Road or Leeson Street Upper into exclusively bus and cyclist sections. Bus priority would be provided at traffic signals to provide priority for buses and cyclists through the traffic signals to facilitate them crossing in / out of the gated section. The priority movement would require stopping traffic in both directions causing significant traffic impact. Some existing car parking spaces would also be impacted; and
- Option 1E3 would extend the one-way traffic lane further in both directions before widening to two lanes, which would impact on traffic flows. Resurfacing and provision of segregated bus and cycle

lanes in both directions would be required. This option would have the least impact on existing car parking.

The assessment concluded that Option 1E1 scored highest on the Traffic Network Integration sub-criterion as it proposed to use existing bus lanes and maintain a similar traffic route to the existing, however it scored lowest on the Road Safety sub-criterion with Option 1E2 scoring the highest due to the segregation of buses and vehicular traffic. Option 1E2 scored the lowest under the Capital Cost; Traffic Network Integration; and Land Use Character sub-criteria. Option 1D2 scored highest on the Land Use Integration; Flora and Fauna; and Landscape and Visual sub-criteria due to the preservation of more trees and streetscape and better consideration of the zoning. It scored equal to Option 1E1 under the Capital Cost; and Land Use Character sub-criteria. Therefore, Option 1E3 scored highest and was selected to form part of Route 1.

3.3.2.2 Section 2: Route Options Assessment

Following the Stage 1 sifting process, four viable route options for Section 2 were taken forward for assessment and further refinement as shown in Image 3.12. These four route options were as follows:

- Route 3A would run along the N11 between Wyattville Road and Leopardstown Road before routing through Sandyford Industrial Estate, Mount Merrion and onto the N11 via Fosters Avenue to its termination at UCD;
- Route 3B would run along the N11 for the full extent between Wyattville Road and UCD;
- Route 3C would run along the N11 between Wyattville Road and Johnstown Road before routing via Pottery Road, Abbey Road, Rowanbyrn, Fleurville and Stillorgan Park Road before re-joining the N11 and continuing on the N11 to UCD; and
- Route 3D would run via Wyattville Road, Church Road, Rochestown Avenue, Abbey Road, Brookville Park, Rowanbyrn, Annaville Terrace, Fleurville and Stillorgan Park Road, before joining the N11 and continuing on the N11 to UCD.

There are a number of areas of overlap between these four route options. All four routes were proposed to follow the same route along the N11 from the Foster's Avenue junction to UCD. Routes 3A, 3B and 3C were proposed to follow the same route along the N11 from Wyattville Road junction to the Johnstown Road junction, with Route 3A and 3B continuing to overlap along the N11 from there to the Leopardstown Road junction. Route 3C and 3D overlap from the Pottery Road / Rochestown Avenue junction to UCD.

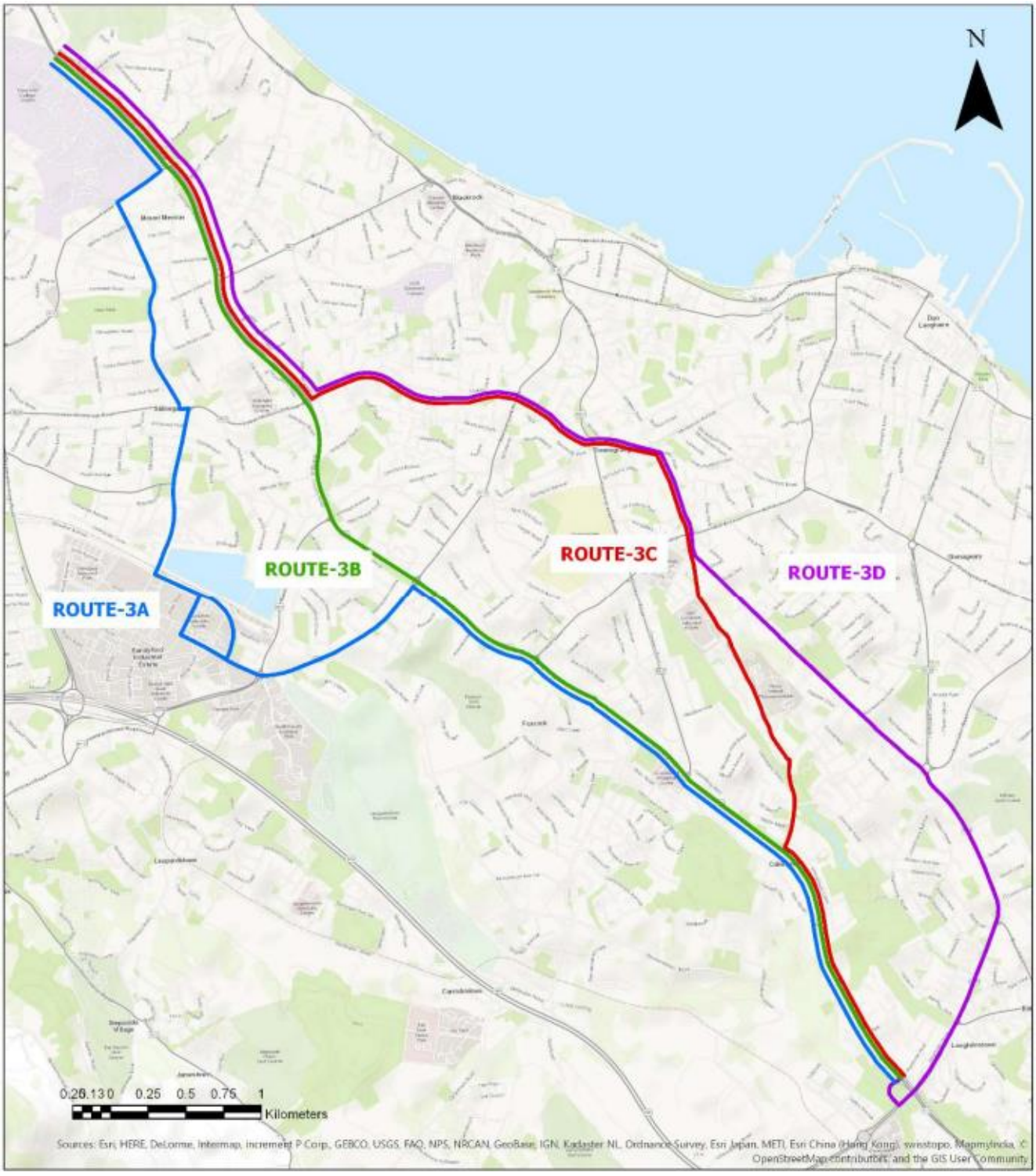

Image 3.12: Section 2 Route Options Remaining After Stage 1 Sifting (Bray to UCD CBC Feasibility and Options Report (NTA 2017))

Route Option 3A would begin at the junction of Wyattville Road and the N11, continue up the N11 for 4.8km before turning left onto Leopardstown Road. It would then continue along Burton Hall Road, Blackthorn Avenue, St. Raphael's Road, South Avenue, North Avenue and Foster's Avenue, before rejoining the N11 and terminating outside UCD. It was proposed to provide continuous footpaths and cycle tracks along the route and upgrade / enhance existing facilities where required. This would require the provision of footpaths along the N11 between Old Bray Road and Westminster Road; road widening (and associated land take) on Leopardstown Road to provide dedicated cycle and bus lanes in both directions; provision of a dedicated bus lane on Burton Hall Road;

conversion of one inbound traffic lane to a bus lane on St. Raphael's Road; road widening (and associated land take) on Kilmacud Road Upper, North Avenue and South Avenue to provide dedicated bus and cycle lanes in both directions; and removal of grass verges and trees along Foster's Avenue to provide dedicated bus and cycle lanes in both directions. As a result of the need to widen the carriageway, parking, green spaces and some front gardens would be impacted in a number of locations.

Route Option 3B would begin at the junction of Wyattville Road and the N11 and continue along the N11 for 9.2km until it terminates outside of UCD. Bus lanes are currently provided in each direction along the entirety of this route, while segregated cycle and pedestrian facilities are existing along the majority of the route. It was proposed to upgrade and enhance facilities where required, including provision of footpaths along the N11 between Old Bray Road and Westminster Road, and the Hill and Trees Road; upgrades to a number of signal controlled crossings; upgrades to some junctions; and upgrades to bus stops where required to provide shelters, recessed bus bays, and to mitigate pedestrian and cyclist conflicts. Some land take would be required to provide adequate footpaths and cycle tracks between Trees Road and Greenfield Road. Enhancements around UCD to facilitate interchange would also form part of this route option.

Route Option 3C would begin at the junction of Wyattville Road and the N11 and continue up the N11 for 2km to Johnstown Road, where it would continue along Pottery Road, Abbey Road, Brookville Park, Rowanbyrn, Annaville Terrace, Fleurville and Stillorgan Park Road before re-joining the N11, where it would continue along the N11 to UCD. Segregated bus and cycle lanes were proposed along the majority of the route, however due to space constraints, dedicated bus and cycle lanes could not be provided for a short section by Baker's Corner Junction. Land take would be required from grass verges, central medians, some front gardens and other space along Pottery Road, Abbey Road, Rowanbyrn, Annaville Terrace, Fleurville and Stillorgan Park Road in order to provide segregated bus and cycle facilities. There would also be the requirement to acquire three residential properties along the route and a building associated with Newpark School to achieve the required cross-section.

Route Option 3D would begin at the junction of Wyattville Road and the N11 and would travel along Wyattville Road and continue onto Church Road, Rochestown Avenue, Abbey Road, Brookville Park, Rowanbyrn, Annaville Terrace, Fleurville and Stillorgan Park Road before joining the N11, where it would continue along the N11 to UCD. Widening would be required along much of this route in order to accommodate segregated bus and cycle facilities. Along Wyattville Road one existing traffic lane in each direction would become a bus lane, with widening into verges / the central median to provide space for the cycle tracks. There would be localised land take from front gardens, verges, green spaces, parking and other lands to allow space for the wider cross-section along Church Road, Rochestown Avenue, Rowanbyrn, Annaville Terrace, Fleurville and Stillorgan Park Road. As with Route Option 3C, dedicated bus lanes would not be provided for a short section by Baker's Corner Junction. There would also likely be a requirement to acquire the filling station south of Pottery Road junction to provide the required cross-section, while the three residential properties and the school building as outlined in the Route Option 3C description would also need to be acquired.

As mentioned previously, each route option was evaluated using a multi-criteria assessment 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.

All four routes were considered neutral when compared against one another under the Hydrology sub-criterion. Route Options 3A and 3C were not considered more favourable under any of the Environment sub-criteria. Route Option 3D was considered more favourable under the Archaeology, Architectural and Cultural Heritage sub-criterion, while 3B was considered most favourable under the Flora and Fauna; Soils and Geology; Landscape and Visual; Noise, Vibration and Air; and Land Use and the Built Environment sub-criteria. The reason for this is that this route is entirely along the N11 and therefore would require significantly lower land take and construction works due to the existing bus lanes and road reservation.

Overall 3B was deemed to be the most advantageous route under most of the main criteria, including Environment, due to its comparatively lower cost, more reliable journey times, delivery of part of the GDA cycle network, lower impact on the environment, and better safety due to it requiring fewer bus turning movements. Therefore 3B was brought forward into the Emerging Preferred Route.

3.3.2.3 Section 3: Route Options Assessment

Following the Stage 1 sifting process, five viable route options for Section 3 were taken forward for assessment and further refinement as shown in Image 3.13. These five route options were as follows:

- Route 2A would run parallel to the M11 on a newly constructed busway from Wilford Junction through to Loughlinstown Roundabout and then along the N11 to the Wyattville Interchange;
- Route 2B would run via the Dublin Road from Wilford Junction, through Shankill and onto the N11 at Loughlinstown Roundabout to the Wyattville Interchange;
- Route 2C would run via the Dublin road and Crinken Lane, and join a newly built bus-way parallel to the M11 at Loughlinstown Roundabout, before following the existing N11 to the Wyattville Interchange;
- Route 2D would have buses follow the same route as Route 2B, but general traffic could be diverted around Shankill Village using a newly constructed road on the same alignment as that proposed for the bus route in 2C. A Bus Gate would be put in place on the Dublin Road between the Shanganagh Road and Lower Road junctions; and
- Route 2E would combine routes 2A and 2B whereby the route would run parallel to the M11 on a newly constructed busway from Wilford Junction to the intersection with Crinken Lane, then it would run along the Dublin Road from Crinken Lane to Loughlinstown Roundabout and along the N11 to the Wyattville Interchange.

There is a good deal of overlap between these five route options. All five routes were proposed to follow the same route along the N11 from the Loughlinstown Roundabout to the Wyattville Interchange. Routes 2B and 2D are almost exactly the same except for the diversion of general traffic on to a new road around Shankill Village under Route 2D. Routes 2B, 2C and 2D were proposed to take the same route along the Dublin Road from the Wilford Junction to Crinken Lane, while Routes 2A and 2E were proposed to take the alternative route along a new bus-way parallel to the M11 between Wilford Junction and Crinken Lane. Routes 2A and 2C were proposed to take the same route from Crinken Lane to the Wyattville Interchange (via a new bus-way parallel to the M11), while Routes 2B, 2D and 2E were proposed to take the same route from Crinken Lane to the Wyattville Interchange (via the Dublin Road).

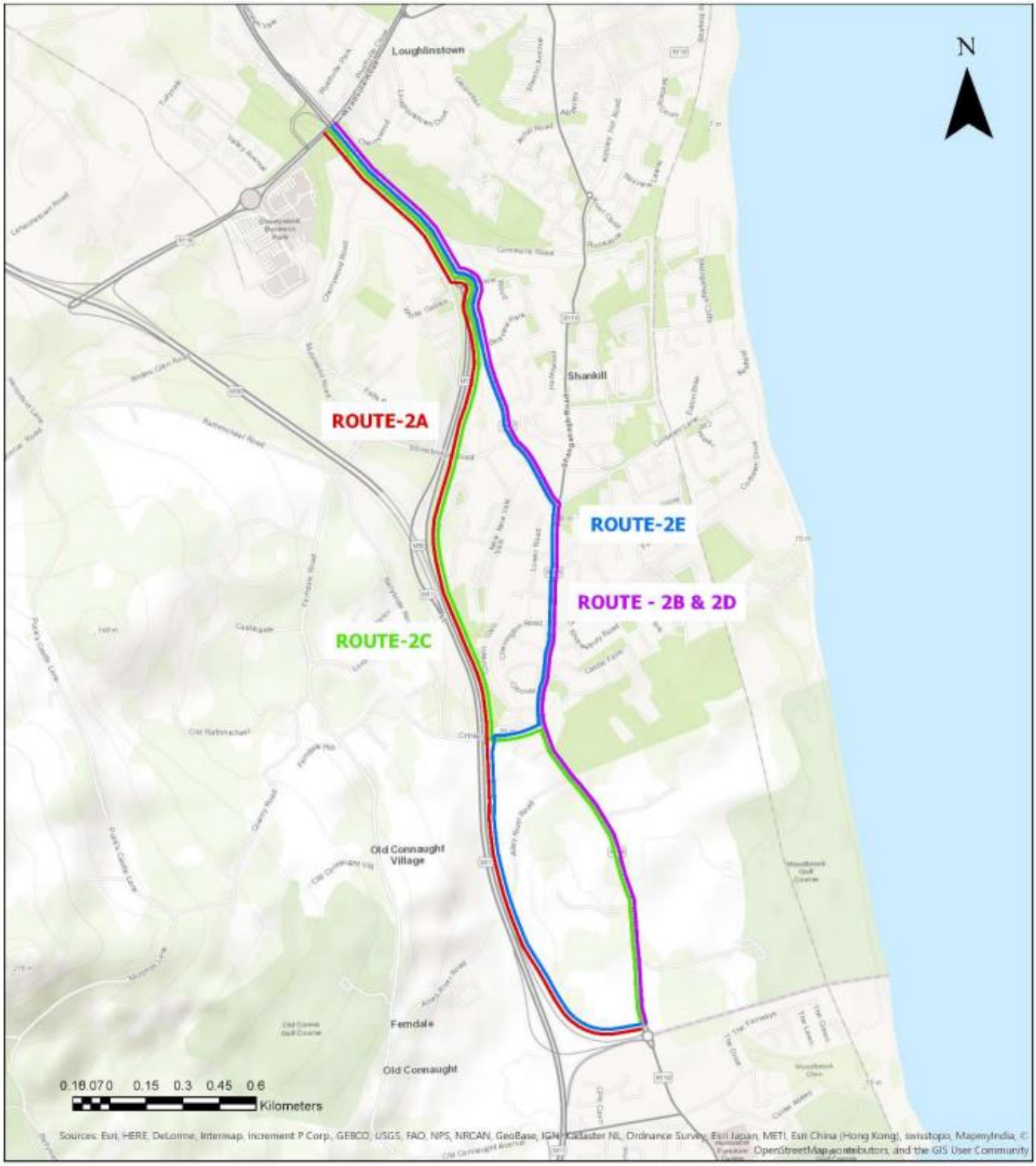

Image 3.13: Section 3 Route Options Remaining After Stage 1 Sifting (Bray to UCD CBC Feasibility and Options Report (NTA 2017))

Route Option 2A would commence at the Wilford Junction and run to the east of, and parallel to, the M11 along a dedicated bus route, passing west of Shankill Village, before joining the R837 Dublin Road south of Loughlinstown and continuing north on the N11 to the Wyattville Interchange. Wilford Roundabout would be upgraded to a signalised junction. The route would travel from there along a dedicated bus route crossing Allies River Road at grade and rising to intersect Crinken Lane at grade before continuing north to the west of Mountain View and intersecting Lordello Road footbridge and pedestrian route to the west of New Vale. It would then travel west of Stonebridge Grove before rising to intersect with Stonebridge Road at grade. The route would continue

north, parallel to the M11, before joining the R837 Dublin Road to the south of Loughlinstown Roundabout via a proposed signalised junction. This option would require land take including private lands, portions of gardens, woodland, treelines and grass verges along the entire route and would require significant earthworks and retaining structures, as well as the removal of trees and hedgerows which currently provide screening for the M11. On the southbound approach to Loughlinstown Roundabout road widening would be required to extend the bus lane to and around the eastern side of the roundabout, requiring realignment of the existing road to provide clearance for buses under the existing footbridge. There would also be a dedicated bus lane provided on the northbound approach to the Wyattville Interchange, requiring reconfiguration of the existing Cherrywood Road Junction and amendment of the existing service road running parallel to the N11 into a one-way northbound only route.

Route Option 2B would commence at the Wilford Junction and run via the Dublin Road through Shankill Village to Loughlinstown Roundabout and north to the Wyattville Interchange. Due to particular constraints along this route, particularly around Shankill Village, the route was broken down into a number of sub-sections with separate options assessments undertaken for each. The following lists the sub-sections and their individual options, with the chosen option indicated:

- Wilford Roundabout to Crinken Lane:
  - **Option 1 – providing parallel bus lanes, cycle tracks and footpaths in a 20m cross-section. Southbound footpath to run through Shanganagh Park** (chosen option); and
  - Option 2 – providing dedicated bus lanes and footpaths with a section of off-line cycle tracks running to the east of the Dublin Road.
- Crinken Lane to St. Anne's Church Junction:
  - Cycling – as it is not possible to provide continuous dedicated bus lanes and cycle tracks along this section, four options were considered for alternative cycle routes (refer to Section 3.3.3 of this Chapter for further details);
  - Option 1 – a northbound bus lane between Crinken Lane and Quinn's Road, with a section of northbound bus lane through Shankill Village between Stonebridge Close and Lower Road, and a southbound bus lane between Stonebridge Close and Crinken Lane;
  - Option 2 – bus lanes in both directions between Crinken Lane and Quinn's Road, and a southbound bus lane between Lower Road and Crinken Lane; and
  - **Option 3 – a northbound bus lane between Crinken Lane and Quinn's Road, with a section of northbound bus lane through Shankill Village between Stonebridge Close and Lower Road, and a southbound bus lane between Lower Road and Crinken Lane** (chosen option). This section does not have segregated cycle tracks as cycling options were evaluated separately through this section as discussed under Section 3.3.3.
- St. Anne's Junction to Loughlinstown:
  - **Option 1 – bus lanes in both directions between St. Anne's Church Roundabout and Loughlinstown Roundabout, with a two-way cycle track on the western side of the Dublin Road between St. Anne's Church Roundabout and the Resource Centre, and a two-way cycle track on the eastern side of the Dublin Road between Seaview Park and Loughlinstown Roundabout** (chosen option); and
  - Option 2 – bus lanes in both directions between St. Anne's Church Roundabout and Loughlinstown Roundabout, with an alternative cycle route provided linking Loughlinstown Roundabout to Shanganagh Road and St. Anne's Church Roundabout via Seaview Wood and Seaview Park.

Pulling all of those individual options together, Route Option 2B would commence at the Wilford Roundabout which would be upgraded to a signalised junction to provide bus priority. Bus and cycle lanes would be provided in both directions to Crinken Lane. Bus lanes in both directions would be provided from Crinken Lane to Quinn's Road Roundabout, which would be upgraded to a signalised junction. An offline cycle track would be provided to the west of Shankill Village along Beech Road, Mountain View, Assumpta Park / Stonebridge Close and Lower Road. Through Shankill Village a continuous southbound and only a section of northbound bus lane would be provided due to space constraints. North of the village is an old bridge which constrains the carriageway width, requiring the buses to merge with general traffic. Bus lanes would be provided in both directions between the St. Anne's Church Junction and Loughlinstown Roundabout, with some segregated cycle tracks and some shared footpath / cycle paths proposed. Land acquisition of agricultural lands, amenity lands and portions of gardens, as

well as removal of a number of trees, throughout this section would be required in order to accommodate the proposed road widening. From Loughlinstown Roundabout it would be the same as Route Option 2A.

Route Option 2C would commence at the Wilford Junction and follow the R119 Dublin Road to Crinken Lane, and then run east of and parallel to the M11 along a dedicated bus route, passing to the west of Shankill Village, before joining the R837 Dublin Road south of Loughlinstown Roundabout and continuing north on the N11 to the Wyattville Interchange. This route option matches the proposals for Route Option 2B from Wilford Junction to Crinken Lane. From Crinken Lane, buses would divert on to a dedicated bus route running parallel to the M11, following the route as described for Route Option 2A from Crinken Lane to Wyattville Interchange.

Route Option 2D would commence at the Wilford Junction and run via the Dublin Road through Shankill Village to Loughlinstown Roundabout and north to Wyattville interchange. A Bus Gate would be provided at Shankill Village with general traffic routed to the west of the village via a new link road. This route option matches the proposals for Route Options 2B and 2C between Wilford Junction and Crinken Lane. Road widening would be required between Crinken Lane and Quinn's Road to provide bus lanes in both directions. A Bus Gate would be provided between the Lower Road and St. Anne's Church Roundabout and through traffic would be diverted onto a new link road to the west of Shankill, therefore it was assumed that separate cycle facilities and bus lanes would not be required through the village. St. Anne's Church Roundabout would be upgraded to a signalized junction which would facilitate a Bus Gate immediately to the south and improve pedestrian and cyclist provision. From St. Anne's Church Roundabout to Wyattville Interchange the proposals match those of Route Option 2B. The alternative link road for general traffic would run parallel to the M11 running to the west of Mountain View, following approximately the same route as the proposed alternative bus route as described in Option 2B and 2C.

Route Option 2E would commence at the Wilford Junction and run east of and parallel to the M11 along a dedicated bus route, turning onto Crinken Lane to join the Dublin road and continue north through Shankill Village to the Loughlinstown Roundabout, continuing north to the junction with Wyattville Road. This route option proposal starts in the same way as Route Option 2A between Wilford Junction and Crinken Lane. From that point, Crinken Lane would be widened to accommodate bus lanes in both directions. From the Crinken Lane junction on the Dublin Road to Wyattville Interchange, the route matches Route Option 2B, including the offline cycle route to the west of Shankill Village.

As mentioned previously, each route option was evaluated using a multi-criteria assessment 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.

Route Option 2C was considered most favourable under the Archaeological, Architectural and Cultural Heritage sub-criterion, while Route Option 2A was considered most favourable under the Landscape and Visual; and the Land Use and Built Environment sub-criteria. Route Options 2A and 2E were considered equally favourable under the Flora and Fauna sub-criterion; Route Options 2B, 2C and 2E were considered equally favourable under the Soils and Geology sub-criterion; and Route Options 2A, 2C and 2E were considered equally favourable under the Noise, Vibration and Air sub-criterion. Overall, Route Option 2A was deemed to be the most advantageous under the Environment criteria as the loss of immature woodland along the M11 is considered to be less significant when compared to the loss of stone boundary walls, tree lines, hedgerows and mature trees along the Dublin Road. Route Option 2A also required land take from lower amenity land than that required for the other options as it avoids Shankill Village.

Overall 2B was deemed to be the most advantageous route, even though it was not the most advantageous under the Environment criterion. This is due to its comparatively lower cost; significant benefits in terms of integration, accessibility and social inclusion as it serves the catchment of Shankill, integrates with the DART and provides continuous cycle facilities; and it would deliver a high level of service for bus passengers. Therefore 2B was brought forward into the Emerging Preferred Route.

3.3.2.3.1 Loughlinstown Roundabout Options Assessment

In addition to the development of options for the route of this section of the Proposed Scheme, there were also three options assessed for Loughlinstown Roundabout. These options were:

- Option 1 – retaining the priority controlled roundabout configuration (as existing) and providing a dedicated southbound bus lane running on the eastern side of the roundabout;
- Option 2 – as per Option 1, with the addition of a signalised pedestrian crossing of the N11 to the north of the roundabout; and
- Option 3 – upgrading the priority controlled roundabout to a signal controlled roundabout, with the exception of the minor Rathmichael Manor arm which would be retained as a priority controlled arm.

As with the route options, these roundabout design options were evaluated using the same multi-criteria assessment. All three were considered neutral for all of the environmental sub-criteria. Option 3 was brought forward into the Emerging Preferred Route as it would be preferrable in terms of journey-time reliability and transport network integration. It also scored highest under the Safety criterion.

3.3.2.4 Section 4: Route Options Assessment

Following the Stage 1 sifting process, two viable route options for Section 4 were taken forward for assessment and further refinement as shown in Image 3.14. These two route options were as follows:

- Route 1A would run via Castle Street and Dublin Road to Wilford Roundabout; and
- Route 1B would run via Quinsborough Road (northbound direction) / Florence Road (southbound direction), parallel to the DART line across the River Dargle via a new bridge, through the old Bray Golf Club lands onto Dublin Road to Wilford Roundabout.

Both routes overlap at their start and end points. The Florence Road junction with Main Street is the terminus for both routes, with the inbound route of Option 1B overlapping with the start of Option 1A between the Florence Road and Quinsborough Road junctions on Main Street. Both options also overlap on the Dublin Road from approximately Chapel Lane to Wilford Roundabout.

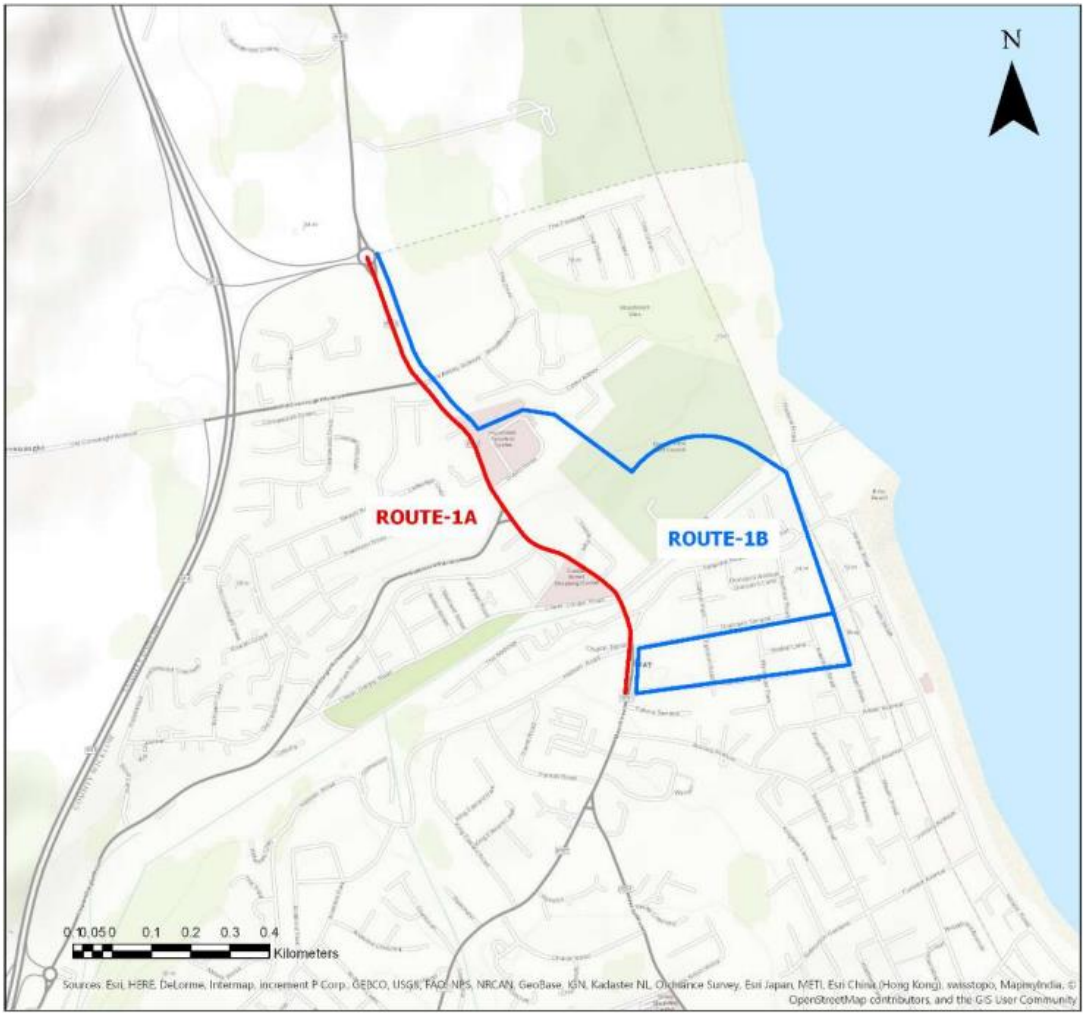

Image 3.14: Section 4 Route Options Remaining After Stage 1 Sifting (Bray to UCD CBC Feasibility and Options Report (NTA 2017))

Route Option 1A would commence on Bray Main Street, continue north on Fran O'Toole Bridge over the River Dargle and then travel north along Castle Street and Dublin Road to Wilford Roundabout. Dedicated bus lanes would not be practical for the short section of the route on Main Street but traffic management measures could be used to provide bus priority in this area. Pedestrian bridges would be provided at either side of the existing bridge allowing space for a southbound bus lane as far as the Seapoint Road Junction, and dedicated cycle facilities in both directions. There are existing bus lanes in both directions on Castle Street, but this option proposed to widen the street to accommodate both segregated bus and cycle lanes in each direction. Land take would be required in order to accommodate this, including portions of gardens, school grounds and commercial areas. As part of this land take a tree in the grounds of Ravenswell which is subject to a Tree Preservation Order would need to be removed. The Dublin Road would also need to be widened to accommodate bus and cycle lanes in each direction for its full length from Castle Street to the Wilford Roundabout. This would require land take along the length, including acquisition of a protected structure (Woodbrook Side Lodge), a petrol station, some car parking and front gardens.

Route Option 1B (inbound) would commence on Main Street and take a right-turn onto Quinsborough Road. The route would turn left immediately before the DART station and continue along a new road running parallel to the DART line. This new road would cross Seapoint Road and the River Dargle via new bridges, continuing through the Old Bray Golf Club lands to join the Dublin Road north of the Bray Yarns complex. From there it would follow the same route as Route Option 1A. In the outbound direction it would be the same, except that instead of using Quinsborough Road, it travels down Florence Road towards the terminus on the Main Street. An inbound bus lane would be added on Quinsborough Road between Galtrim Park and the railway line through the removal of on-street parking. A new road would be required parallel to the railway line requiring land acquisition associated

with parking and services ancillary to the railway and pumping station. New bridges would be required over Seapoint Road and the River Dargle. These bridges would be designed to provide bus, cycle and pedestrian facilities, and may also need to be designed to accommodate a proposed future Luas line. The route would continue along a new link road through the Old Bray Golf Club lands, around the Bray Yarns complex, joining the Dublin Road and continuing as described in Route Option 1A.

As mentioned previously, each route option was evaluated using a multi-criteria assessment 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.

Route Option 1A was considered most favourable under the Archaeological, Architectural and Cultural Heritage; Flora and Fauna; Soils and Geology; Landscape and Visual; and Land Use and Built Environment sub-criteria, while Route Option 1B was only considered most favourable under the Noise and Vibration sub-criterion. Neither was considered more advantageous with respect to the Hydrology sub-criterion. Route Option 1B would have a comparatively greater environmental impact due to the route running through greenfield areas and requiring construction of new bridges.

Overall 1A was deemed to be the most advantageous route. This is due to its significantly lower cost; the likelihood of less impact on the environment; and it was the preferred option under the Safety criterion. Therefore 1A was brought forward into the Emerging Preferred Route.

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 12/12a on the Greater Dublin Area Cycle Network Plan which is generally routed from Bray North to the City Centre via Shankill, the N11 Bray Road, the N11/R138 Stillorgan Road and the R138 Donnybrook Road / Morehampton Road / Leeson Street. The end of the scheme in Bray aligns with the B1 primary route which runs north / south through Bray from the Vevay Road / Southern Cross Roundabout to the Wilford Roundabout.

During the Emerging Preferred Route stage, identification of alternative cycle routes separate to the Core Bus Corridor Emerging Preferred Route were considered in Shankill due to the constraints through the village. There were four options assessed as part of the Route 2B assessment between Crinken Lane and St. Anne's Roundabout (Image 3.15). The options assessed were:

- Option 1 – shared road space with general traffic on Beech Road, Mountain View, Stonebridge Close and Lower Road before using a newly constructed ramp to climb to the Dublin Road;
- Option 2 – two-way cycle track through Shanganagh Park, then shared road space with general traffic on St. Anne's Park before taking a ramp to a newly constructed cycle track along the old railway line, connecting back to the Dublin Road at St. Anne's Roundabout;
- Option 3 – two-way cycle track through Shanganagh Park, then shared road space with general traffic on St. Anne's Park before taking a ramp to a newly constructed cycle track along the old railway line, before connecting to Dorney Court and link via a cycle track through a green space to Dublin Road at St. Anne's Roundabout; and
- Option 4 – two-way cycle track through Shanganagh Park, then shared road space with general traffic on St. Anne's Park, Foxes Grove, Eaton Wood Green and Dorney Court and link via a cycle track through a green space to Dublin Road at St. Anne's Roundabout.

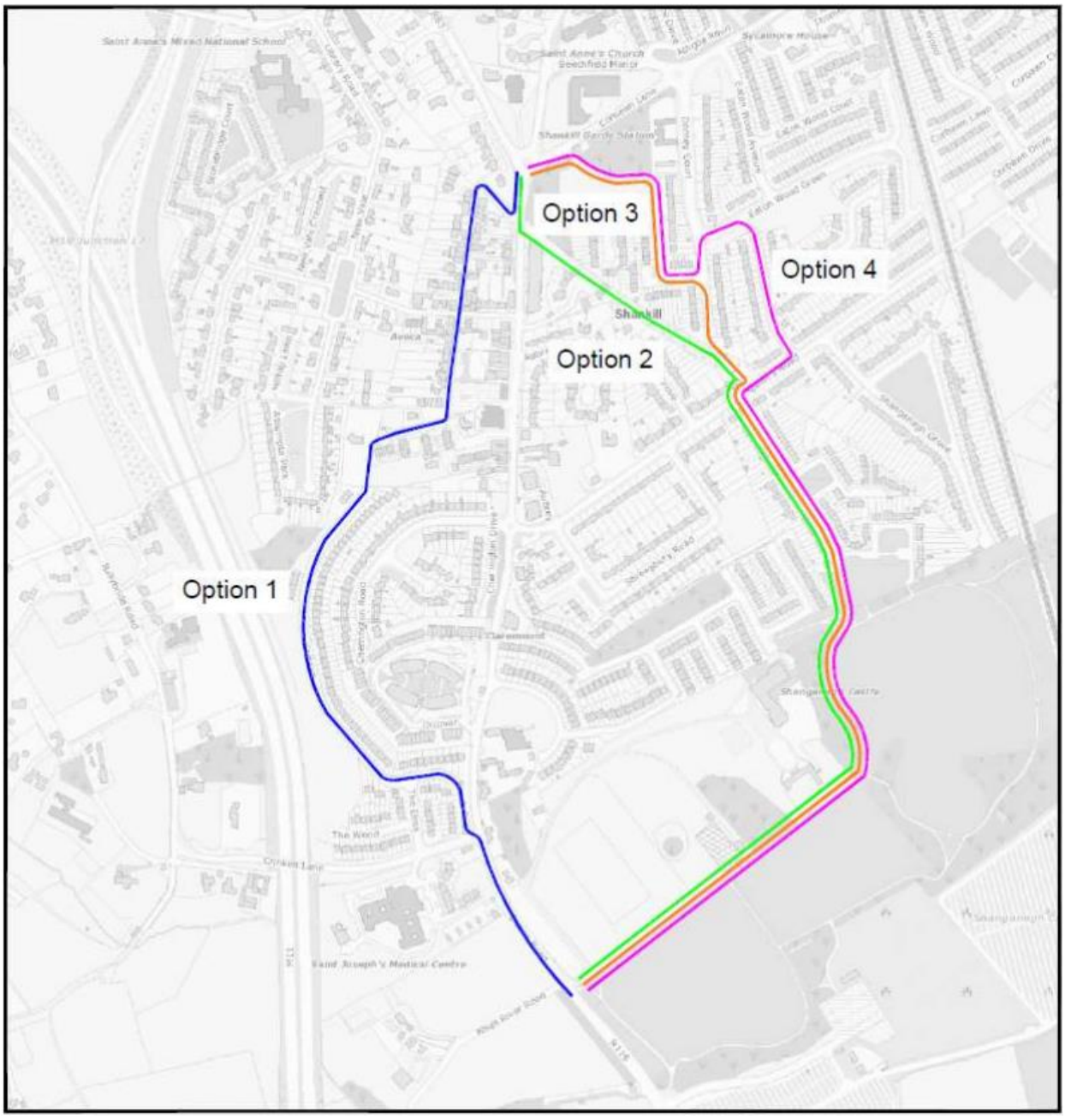

Image 3.15: Alternative Cycle Route Options Through Shankill (Bray to UCD CBC Feasibility and Options Report (NTA 2017))

The assessment concluded that both Option 2 and Option 3 would require extensive land take and the resultant route would be circuitous, while Option 4 would result in a circuitous route which would be difficult for cyclists due to the many turning movements required. Therefore, the assessment concluded that Option 1 was the only viable option, given that it was the shortest and most direct route; it provided a number of opportunities for connections to the village; and it would improve pedestrian and cyclist connectivity and permeability between the residential areas to the south of the village and the schools to the north-east. Therefore Option 1 was brought forward into the Emerging Preferred Route.

3.3.4 Emerging Preferred Route

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

'*The Bray Core Bus Corridor (CBC) commences at Nassau Street and progresses through Kildare Street to St. Stephen's Green North and East, turning south on Leeson Street Lower. The corridor runs along Leeson Street Lower and Upper including the existing oneway system on Sussex Road. It continues on Morehampton Road and Donnybrook Road through Donnybrook Village, and on to the Stillorgan Road, intersecting with the UCD to City Centre Core Bus Corridor at Nutley Lane and the Belfield Interchange entrance to University College Dublin (UCD). It continues south on Stillorgan / Bray Road as far as the Loughlinstown Roundabout. The route then proceeds along the R837 Dublin Road through Shankill and on to the R119 Dublin Road. The route continues along R119 through the M11 access roundabout and onto the R761 Dublin Road north of Bray. The route terminates at the Dargle River Crossing and ties into Bray Main Street current road layout.*'

A public consultation on the Emerging Preferred Route was undertaken from 26 February to 31 May 2019, providing feedback which was then meaningfully 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 in relation to the Emerging Preferred Route, 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 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 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 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.

Following this design development process, the draft Preferred Route Option was identified. For ease of reference, the draft Preferred Route Option has been divided into four 'sections':

- Section 1 – St. Stephen's Green to UCD;
- Section 2 – UCD to Loughlinstown;
- Section 3 – Loughlinstown to Bray North; and
- Section 4 – Bray North to Bray South.

3.4.1.1 Section 1 – St. Stephen's Green to UCD

The starting point for Section 1 in the Emerging Preferred Route was Nassau Street. The Proposed Scheme Section 1 study area start point was changed to the junction of Leeson Street Lower with St. Stephen's Green and Earlsfort Terrace. It was not considered necessary to extend the study area beyond this point due to the extent and quality of current transport infrastructure from this point northwards, and to avoid any interactions with other scheme study areas.

In addition to the change in starting point, three areas of Section 1 were identified for re-examination as follows:

- Section 1A – Stillorgan Road / UCD to Anglesea Bridge;

- Section 1C – Eglinton Terrace to Belmont Avenue; and
- The UCD Interchange.

3.4.1.1.1 Section 1A – Stillorgan Road / UCD to Anglesea Bridge

In addition to the Emerging Preferred Route option (1A2), there was one new option considered (1A3) for this section of the Proposed Scheme. This additional option follows the same route as the Emerging Preferred Route.

Route Option 1A3 would provide a single southbound general traffic lane and a bus lane from Donnybrook Road to the junction with Eglinton Road, however between Eglinton Road and Anglesea Road junction this option would have two outbound and one inbound general traffic lanes. It would also have a single combined inbound straight ahead and left-turn general traffic lane, with the remaining inbound general traffic space reallocated to bus and cycle traffic. This additional outbound general traffic lane would create additional stacking space for outbound and left-turning traffic between Eglinton Road and Anglesea Road compared to the Emerging Preferred Route option. South of the junction there are also two inbound general traffic lanes and a bus lane, with one inbound lane becoming a dedicated right-turn lane to Anglesea Road. There is no requirement for land take immediately south of the Anglesea Road junction at the church under this option.

As with the selection of the Emerging Preferred Route options, each route option was evaluated using a multi-criteria assessment 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.

Both options were assessed as performing the same under the Environment criteria, as well as under the Economy, and Accessibility and Social Inclusion criteria.

Overall Option 1A3 was deemed to be the most advantageous option. This is due to it offering more benefits in terms of reliability of journey times for buses and cyclists, better management of traffic through the Anglesea Road Junction and it provides a safer Nutley Lane Junction due to enhanced cycle design. Therefore 1A3 was brought forward into the Preferred Route Option.

3.4.1.1.2 Section 1C – Eglinton Terrace to Belmont Avenue

In addition to the Emerging Preferred Route option (1C1), there were four new options considered (1C3, 1C4, 1C5 and 1C6). All of these follow the same route as the Emerging Preferred Route.

Route Option 1C3 (northbound bus lane with southbound queue relocation) would include a northbound bus lane for the entire section with no junction at Eglinton Terrace, only a pedestrian crossing. For southbound buses there would be a Signal Controlled Bus Priority junction at Belmont Avenue as the cross-section width only allows for one outbound lane. There would be cycle lanes included in both directions but they may need to reduce to 1.8m at pinch points.

Route Option 1C4 (queue relocation each side) would provide no dedicated north or southbound bus lanes through the section. Buses would receive Signal Controlled Priority from junctions at Belmont Avenue (southbound) and Eglinton Terrace (northbound). Full 2m cycle provision would be possible through the section.

Route Option 1C5 (southbound bus lane with northbound merge of bus lane) would provide a continuous southbound bus lane, while the northbound bus lane would merge with the northbound general traffic to pass the pinch point. This would require buses and general traffic to merge before progressing through the narrow section before the bus lane would restart past The Crescent. This option would provide a segregated northbound cycle track after The Crescent, and no segregated southbound cycle track, with cyclists having to share the bus lane.

Route Option 1C6 (southbound bus lane with northbound queue relocation) would have a continuation of the southbound bus lane through the midway bend, with a single general traffic lane only in the northbound direction between Eglinton Road and The Crescent. Northbound bus priority would be provided through a Signal Controlled Bus Priority junction at Eglinton Terrace. Segregated cycle tracks would be provided in both directions.

As with the selection of the Emerging Preferred Route options, each route option was evaluated using a multi-criteria assessment 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.

All five options were assessed as performing the same under the Environment criteria, as well as under the Accessibility and Social Inclusion criteria.

Both Option 1C3 and 1C6 scored the highest across the assessment criteria, with both options including a full bus lane in one direction and Signal Controlled Priority in the other. Due to the alignment and the land available, an overall greater length of bus lane can be achieved in Option 1C6, as the northbound bus lane can restart sooner than the southbound bus lane could under Signal Controlled Priority. Therefore 1C6 was brought forward into the Preferred Route Option.

3.4.1.1.3 UCD Interchange

The Emerging Preferred Route UCD Interchange proposals were mainly limited to interchange bus stops at the on-slip and off-slip roads at the Stillorgan Road flyover bridge. The Emerging Preferred Route interchange provision is shown in Image 3.16.

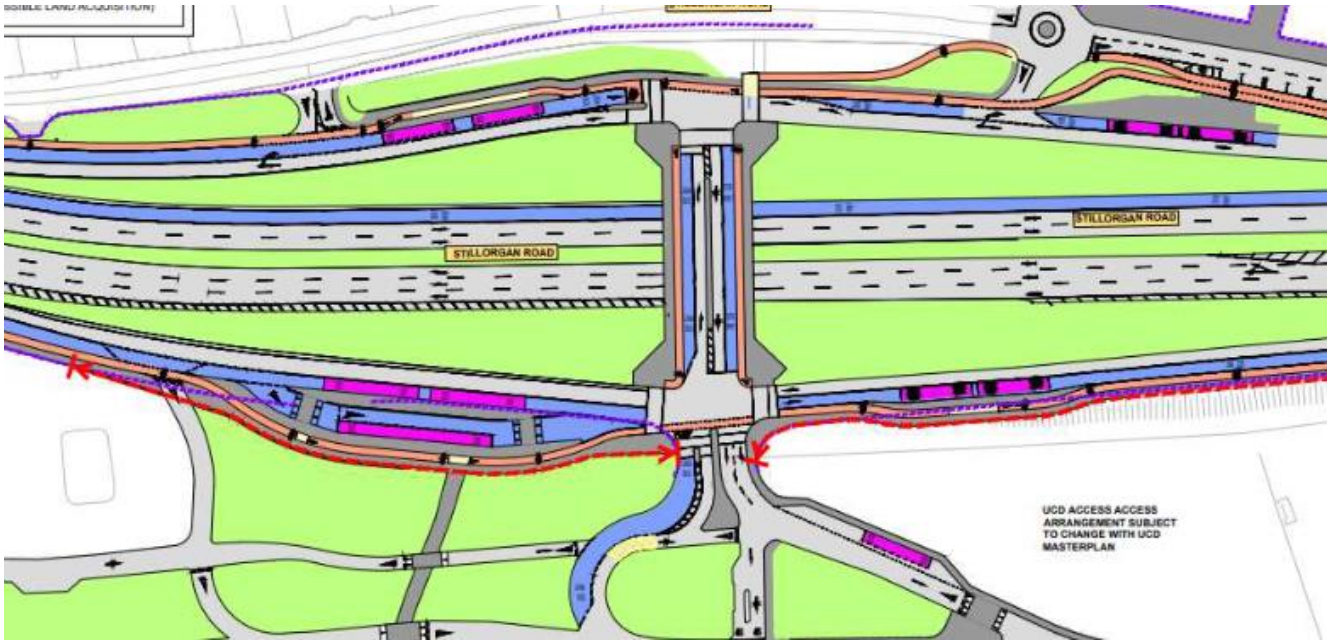

Image 3.16: UCD Interchange (Emerging Preferred Route)

Following publication of the Emerging Preferred Route, the design of the UCD bus interchange facility was further developed. It became apparent that additional bus interchange capacity would be required at UCD. Detailed liaison with UCD has taken place to develop an interchange facility that serves the Proposed Scheme requirements while also supporting UCD's sustainable transport objectives and to ensure tie-in with the UCD Future Campus Masterplan. The proposed facility will be located adjacent to UCD's proposed arrival plaza at the Stillorgan Road entrance and will act as a gateway for pedestrian and cyclist access to the campus. The redesigned interchange facility in the Preferred Route Option is shown in Image 3.17.

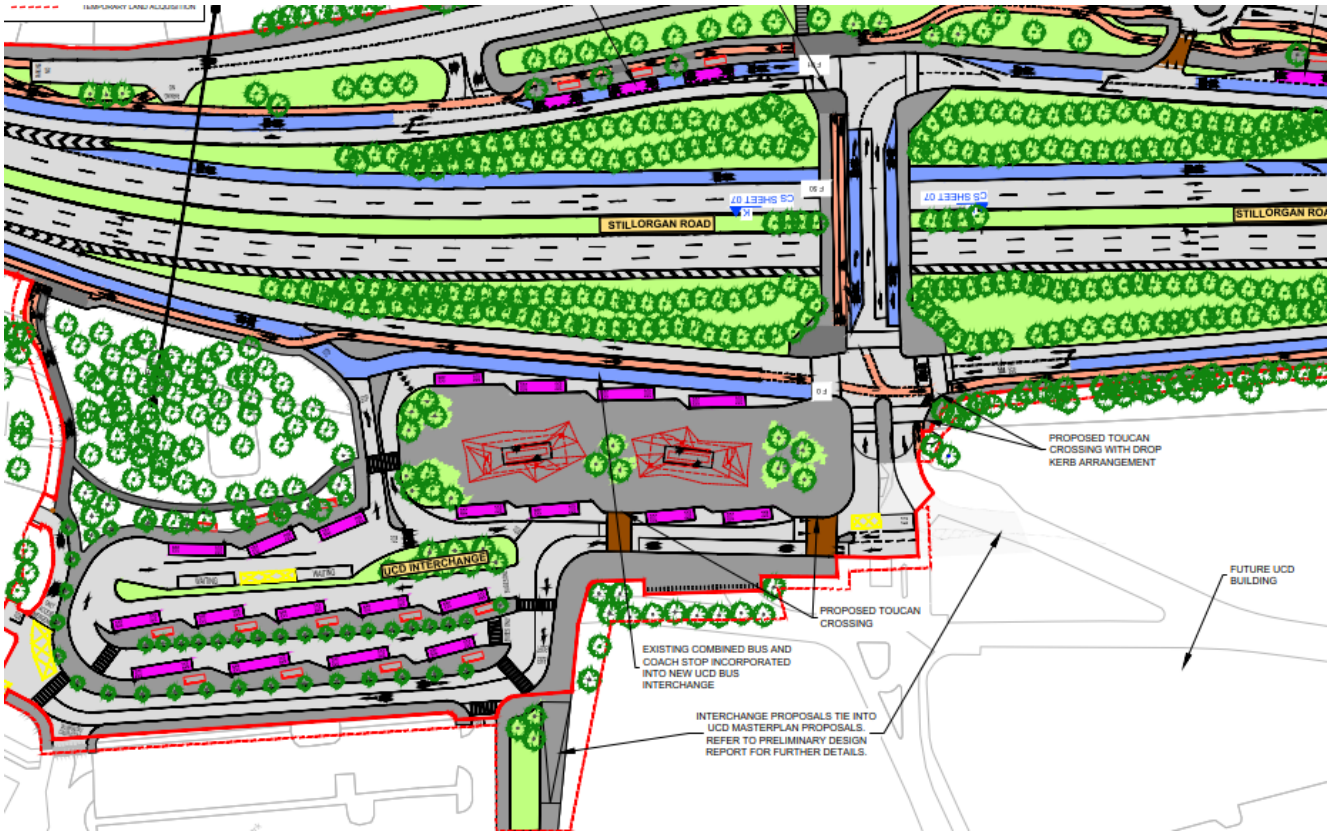

Image 3.17: UCD Interchange (Preferred Route Option)

3.4.1.1.4 Other Design Development in Section 1

A fully segregated cycle track was proposed on the northbound approach to St. Stephen's Green Junction along Leeson Street Lower to improve cycling facility. However, this would have an impact on the existing heritage kerbs and footpath and was further evaluated and developed as discussed in Section 3.4.2.1.1.

3.4.1.2 Section 2 – UCD to Loughlinstown

This section of the Proposed Scheme was re-evaluated and the route options selected for the Emerging Preferred Route are still considered valid. No major changes were proposed in Section 2. However, a number of changes to cross-sections and lane provision were developed for the Preferred Route Option as outlined below:

- Further design development to coordinate with the UCD Nova Development, the future Brewery Road Safety Improvement Scheme, and the Cherrywood SDZ Development; and
- Removal of the proposed footpath along the N11 between Cornelscourt and Kilbogget junction as it was considered a non-desired pedestrian link, with alternative walking routes available on adjacent quieter roads.

3.4.1.3 Section 3 – Loughlinstown to Bray North

Following a review of the Emerging Preferred Route in this section of the Proposed Scheme, four areas of Section 3 were identified for re-examination as follows:

- Section 3.2B – Wilford Roundabout to Crinken Lane;
- Section 3.2C – Cycle Provision between Crinken Lane and Loughlinstown Roundabout;
- Section 3.2D – Crinken Lane to St. Anne's Roundabout; and
- Section 3.2E – St. Anne's Church to Loughlinstown Roundabout.

3.4.1.3.1 Section 3.2B – Wilford Roundabout to Crinken Lane

The Emerging Preferred Route in this section proposed footpaths, segregated cycle tracks, a dedicated bus lane and a general traffic lane in both directions. The design in this section was reviewed as part of the development of the Preferred Route Option with a view to minimising the impacts while maintaining the necessary level of bus priority and cycle segregation.

Further development was undertaken following completion of additional topographical surveys and responses to public consultation submissions which outlined concerns about impacts on roadside trees and heritage walls. Signal controlled bus priority was applied for northbound buses from Wilford Roundabout to enable a reduction in impact on properties and significant mature trees by locally shortening bus lane extents and widening on the east side, which was further developed for the Preferred Route Option. Signal priority measures through Shankill Village were extended for southbound buses as far as Shanganagh Castle grounds to reduce impact on properties.

Sections of cycle tracks and / or footpaths have been brought behind the roadside treeline where suitable between Quinn's Road and Wilford Junction, to maintain roadside tree canopy. To optimise the protection of the roadside trees in front of Shanganagh Cemetery and Shanganagh Park, a section of the southbound cycle track has been routed behind the roadside trees at Shanganagh Cemetery, and Shanganagh Park. The northbound cycle track follows the Dublin Road. The cycle track along this section was further evaluated and developed to a two-way cycle track routed through the Shanganagh Park and Shanganagh Cemetery; this is discussed further in Section 3.4.2.3.

The above design development has enabled a reduction in impact on adjacent heritage walls, properties and trees that was evident as a result of the updated topographical survey and tree survey in the area, while maintaining the proposed bus priority infrastructure.

The design has also been coordinated with proposed entrances for recently approved housing developments at Shanganagh Castle and Woodbrook.

3.4.1.3.2 Section 3.2C – Cycle Provision Between Crinken Lane and Loughlinstown Roundabout

Due to the number of submissions received during public consultation on the cycle provision along this section, the design for this section was further investigated. The section was split into two sub-sections, with alternative options assessed against the Emerging Preferred Route for each as outlined:

- Subsection 1 between Loughlinstown Roundabout and Stonebridge Road:
  - New Option 3.2C1 (M11 Cycle Track): would consist of a new cycle track constructed to the east of the M11, requiring clearance and construction along the grassed verge including additional vehicle restraints, retaining walls and earthworks to provide sufficient width. It would also require a ramp to be constructed from the M11 to Stonebridge Road due to the level difference;
  - New Option 3.2C2 (Dublin Road Cycle Route): would not provide segregated cycle tracks between Loughlinstown Roundabout and Stonebridge Road, requiring cyclists to share bus lanes or general traffic lanes along this length. It would provide a more direct route for cyclists and tie in with the GDA Cycle Network Plan Primary Route; and
  - The assessment concluded that New Option 3.2C2 was to be taken forward due to the potential impacts associated with constructing New Option 3.2C1.
- Subsection 2 between Stonebridge Road and Crinken Lane:
  - New Option 3.2C3 (M11 Cycle Track): would be a continuation of the M11 cycle track from Option 3.2C1. The cycle track would go from Stonebridge Road, along Stonebridge Grove and then along the M11 verge to Lordello Road Bridge. It would then go under the bridge and along the green space to Mountain View, continuing to the Elms on to Crinken Lane, eventually rejoining the Dublin Road;
  - New Option 3.2C4 (Library Road to Stonebridge Close): would bring advisory cycle lanes and quiet street treatment along Stonebridge Road to Library Road and New Vale, continuing along the laneway by Assumpta Park up to Lower Road. The cycle lanes would then pass

through an existing wall on to Stonebridge Close and onto the Dublin Road, where they would share road space with other vehicles and buses until Crinken Lane;

- New Option 3.2C5 (Library Road / Assumpta Park / Mountain View): would be the same as Option 3.2C4 as far as the laneway at Assumpta Park, where it would then turn onto the lane to the rear of the houses on Assumpta Park continue on to Mountain View, The Elms and Crinken Lane, until rejoining the Dublin Road at the end of Crinken Lane;
- New Option 3.2C6 (Dublin Road Cycle Route): would be a continuation of Option 3.2C2 along the Dublin Road. It would not provide any segregated cycle infrastructure, with cyclists sharing bus and general traffic lanes. A speed limit of 30km/h would be in place between Stonebridge Road and the Signal Controlled Bus Priority south of Shankill Village;
- New Option 3.2C7 (Corbawn Lane to Stonebridge Road): would provide a short section of segregated two-way cycle track to link the junction at Corbawn Lane to Stonebridge Road. A Toucan Crossing would be provided to bring cyclists across the Dublin Road on the northern side of Stonebridge Road. This would provide cycle infrastructure along the GDA Cycle Network Plan Inter Urban Route D4. Between Crinken Lane and the junction at St. Anne's Church, cyclists would share the carriageway with general traffic or buses where bus lanes are provided. As with Option 3.2C6 a 30km/h speed limit would be in place; and
- The assessment concluded that New Option 3.2C7 was to be taken forward. Although it would not provide segregated cycling along the entire length, the impact associated with segregated cycling infrastructure on properties and planted areas would be considerable, and this option would provide safer cycling between residential areas and schools on Stonebridge Road, and maintains the viability of the primary cycling route through Shankill through reducing the speed limit to 30km/h.

A combination of Options 3.2C2 and 3.2C7 were brought forward for the Proposed Route Option as they provide safe cycling provision along the GDA Cycle Network Plan Primary Route in this area; minimise the impact on the environment; and respond to input from the local community.

3.4.1.3.3 Section 3.2D – Crinken Lane to St. Anne's Roundabout

The Emerging Preferred Route for this section would have provided a northbound bus lane between Crinken Lane and Quinn's Road, with a section of northbound bus lane through Shankill between Stonebridge Close and Lower Road, and a southbound bus lane between Lower Road and Crinken Lane. The design in this section was reviewed as part of the development of the Preferred Route Option following consultation feedback, a new topographical survey and a tree survey. Three additional options were assessed as described in the following.

Route Option 3.2D4 would maintain two traffic lanes for buses and general traffic to share through Shankill Village, with Signal Controlled Bus Priority in place at either side of the village. A northbound bus lane would run from Crinken Lane to a Signal Controlled Bus Priority junction located on approach to Shankill Village, while the southbound bus lane would commence further south. Cycle lanes through Shankill Village would provide segregated cycle facilities between Stonebridge Close and Lower Road, outside which cyclists would share the carriageway with buses and general traffic.

Route Option 3.2D5 would maintain two general traffic lanes through Shankill Village, with a northbound bus lane provided between Stonebridge Close and Lower Road, and Signal Controlled Bus Priority introduced either side of the village to provide bus priority through this section.

Route Option 3.2D6 would maintain two general traffic lanes through Shankill Village, with Signal Controlled Bus Priority systems in place on the approach either side of the village. Signal Controlled Bus Priority would be provided at St. Anne's Church Junction for southbound buses. A northbound bus lane would be provided from Crinken Lane to a Signal Controlled Bus Priority system on approach to Shankill Village, while the southbound bus lane would recommence at Shanganagh Castle. A 30km/h speed limit would be in place for the village to enhance safety in this shared section of road.

As with the selection of the Emerging Preferred Route options, each route option was evaluated using a multi-criteria assessment 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.

With respect to the Environment criterion, the three new options performed equally well with respect to the Archaeology and Cultural Heritage; Architectural Heritage; and Flora and Fauna sub-criteria. Options 3.2D4 and 3.2D6 performed equally well under the Noise and Vibration sub-criteria. Option 3.2D6 performed the best under the Landscape and Visual, and the Land Use Character sub-criteria.

Overall Option 3.2D6 was deemed to be the most advantageous option. This is due to it minimising the impact to the visual identity of Shankill Village, and maintaining existing footpath widths through the village, with a reduced speed limit providing improved safety. Therefore 3.2D6 was brought forward into the Preferred Route Option.

In addition to the changes through Shankill Village, Signal Control Priority measures which commenced through Shankill Village were extended for southbound buses as far as the Shanganagh Castle grounds (from Quinn's Road Junction to after Crinken Lane Junction) to reduce impact on properties and trees.

3.4.1.3.4 Section 3.2E – St. Anne's Church to Loughlinstown Roundabout

The Emerging Preferred Route for this section would have provided a full suite of two footpaths, two segregated cycle tracks, two bus lanes and two general traffic lanes from St. Anne's Church Roundabout to Loughlinstown Roundabout. The design in this section was reviewed as part of the development of the Preferred Route Option following consultation feedback, updated topographical survey information and a tree survey. Options were assessed for combinations of Signal Controlled Bus Priority in order to reduce the impact on adjacent properties and trees.

Following the first Non-Statutory Public Consultation, taking comments from the public and local community feedback into account, the cycle tracks on this section were removed from the design due to the additional impact that the 4m of cross-section had on adjacent lands and properties. The proposed cycle route required cyclists to share bus lanes between Loughlinstown Roundabout and Stonebridge Road. Cycle track options are discussed in more detail in Section 3.4.1.3.2 and Section 3.4.1.3.3 above as Options 3.2C and 3.2D.

The design was amended to provide continuous bus lanes where possible, with Signal Controlled Bus Priority proposed between St. Anne's Church Junction and Rathmichael Woods in the northbound direction.

A two-way cycle track is proposed between the new Dublin Road / Shanganagh Road Junction and Stonebridge Road to link Corbawn Lane to the two schools on the Stonebridge Road as described in Section 3.4.1.3.2.

The closure to the Corbawn Lane as proposed in the Emerging Preferred Route, was revised to provide exit only onto Shanganagh Road. A dedicated right-turn was proposed from Shanganagh Road onto Beechfield Manor.

From the Dublin Road / Shanganagh Road Junction to the Dublin Road / Stonebridge Road Junction, the necessary widening is entirely to the east of the carriageway. From the Dublin Road / Stonebridge Road Junction to the Loughlinstown Roundabout, the necessary widening is entirely to the west of the carriageway.

3.4.1.4 Section 4 – Bray North to Bray South

The end point for the Emerging Preferred Route was at the south side of Fran O'Toole Bridge on Bray Main Street. In developing the Preferred Route Option, this end point was changed to the northern side of the bridge where it would be designed to tie into the proposed Bray Bridge Improvement Scheme.

The design was further developed between Ravenswell Road and Dwyer Park to provide for continuous cycle lanes and bus lanes while minimising the impact on properties and the heritage wall at Belton Terrace. The design was further developed as part of the Preferred Option as discussed in Section 3.4.2.

3.4.1.4.1 Woodbrook Side Lodge

Alternatives to the design of the Proposed Scheme in the vicinity of the Woodbrook Side Lodge (a residential dwelling and a Protected Structure) at the northern end of Section 4 were also considered. Given the impact to a Protected Structure at this location, further assessment was carried out to examine whether there were any viable alternative options which would avoid the impact to the Protected Structure. Further details on the Woodbrook Side Lodge and its status as a Protected Structure are provided in Chapter 16 (Architectural Heritage).

The EPR proposal at the location of Woodbrook Side Lodge was for the existing carriageway to be widened to include for the full BusConnects cross-section (i.e. a footpath, cycle track, bus lane and general traffic lane in each direction). In order to accommodate the road widening at this location, it would be necessary to demolish Woodbrook Side Lodge. It is proposed to build a replacement of the residential property at a new location east of its current location at the southern end of the Woodbrook estate. This option allows sustainable transport modes to achieve priority and safety. The EPR option requires the full widening to occur on the eastern side of the existing carriageway.

The following alternative options were assessed:

- **EPR Option** – as described above;
- **Do Minimum Option:** retain existing cross-section at this location, and use signal-controlled bus priority. Signal-controlled bus priority (whereby traffic signals are used to enable buses to get priority ahead of other traffic on single lane road sections) was considered between Wilford Junction and Old Connaught Avenue in order to reduce the impact on land take and avoid the demolition of Woodbrook Side Lodge, as well as land take impacts to other properties along Dublin Road. For signal-controlled bus priority to operate successfully, queues cannot be allowed to develop on the shared bus / traffic lane portion, as this will result in delays on the bus service. The Wilford junction is strategically important, with high traffic volumes associated with it to gain access to and exit from the M11. Sufficient traffic signal green time for general traffic is required to avoid queues backing up on the M11. In addition, sufficient traffic signal green time for buses along the Proposed Scheme is required to provide bus priority and improve bus journey times. Junction modelling of this option showed queuing at all arms of the junction, resulting in delays to bus services and excessive queues on the M11 off-slip;
- **Alternative Option 1 – Full BusConnects Cross-Section, Widening to the West:** As per the EPR option, but with the widening to occur exclusively on the western side of the carriageway, instead of the eastern side. This option would avoid impact on the Protected Structure, however it would result in other environmental impacts including significant impacts as a result of land take on the Circle K petrol station which would likely impact the viability of the business, and on front gardens for more residential properties on the western side of the Dublin Road than would be impacted on the eastern side of the road, including the need to realign the boundary of Rathmore (identified in Chapter 16 (Architectural Heritage) as a heritage feature);
- **Alternative Option 2 – Full BusConnects Cross-Section, Balanced Widening on Both Sides:** As per the EPR option, but with the widening to be shared across both sides of the carriageway. This option would still impact on the Woodbrook Side Lodge given its current proximity to the road, as well as on the Circle K petrol station, and on properties on both sides of the Dublin Road as a result of the land take required on both sides.
- **Alternative Option 3 – Reduced Cross-Section (Shared Bus / Cycle Lane):** A reduced cross section, whereby there would be a footpath, bus lane and general traffic lane in each direction, with the cyclists required to share the bus lane. This reduced cross-section would reduce the total extent of the land-take required, however would still require widening in order to accommodate the two new bus lanes. Under this alternative option, three sub-options were assessed:
    - Sub-Option 3a (Widening to the east) – Impact on the properties on the eastern side of the Dublin Road, including Woodbrook Side Lodge;
    - Sub-Option 3b (Widening to the west) – Avoids impact on the Woodbrook Side Lodge, however as with Alternative Option 1, would still result in land-take at the Circle K petrol station and the residential front gardens along the western side of the Dublin Road; and
    - Sub-Option 3c (Balanced widening on both sides) – As with Alternative Option 2, but with a reduced cross-section. Again, this option would impact on more properties than either Sub-Option 3a or 3b, while also still impacting on the Woodbrook Side Lodge and the Circle K petrol station.

In terms of impact on the Woodbrook Side Lodge, the only alternative options that would avoid impact are the Do Minimum Option, Alternative Option 1 and Alternative Option 3b. All other alternative options would still impact on the Woodbrook Side Lodge given its existing location in close proximity to the road.

The Do Minimum Option would result in additional queuing on all arms of the nearby Wilford junction and result in delays to bus services and lack of segregated cycling infrastructure. This route is identified as a Primary Cycle

Route within the 2022 Greater Dublin Area Cycle Network Plan, therefore the lack of segregated cycling infrastructure does not meet the BusConnects objectives.

Alternative Option 1 would result in more environmental impacts including more land take impacts on commercial and residential property above that of the EPR Option, including potentially impacting on the viability of the Circle K petrol station business and impacting the curtilage of Rathmore (identified in Chapter 16 (Architectural Heritage) as a heritage feature). Alternative Option 3b would similarly impact on the same properties as Alternative Option 2, albeit with slightly reduced land take required.

Alternative Option 3 provides for journey time reliability for the buses, however these sub-options do not provide segregated cycling infrastructure in this section of the Proposed Scheme, which is identified as a Primary Cycle Route as outlined above. The cyclists would have to share the bus lane on a proposed Primary Cycle Route and therefore it will not meet the BusConnects objectives and would impact the safety of the cyclists in particular on the immediate approaches to a significant junction accessing the M11. The EPR Option performs better than Alternative Option 3 in terms of integration with the transport network and safety.

Following the consideration of the above alternative options, the EPR option is considered to more benefits win comparison to other options. The EPR Option is therefore the PRO for this section for the following reasons:

- It provides journey time reliability for buses and cyclists;
- It performs well with respect to integration and road safety;
- While it impacts on the Woodbrook Side Lodge (Protected Structure), it is considered to have less environmental impacts, particularly with regard to land take from other private properties and businesses.

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. Due to COVID-19 restrictions in mid-March 2020, the planned Public Information Events were impacted. There was a total of 40 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 as outlined below. The scheme sections were subsequently amended to the following sections:

- Section 1: Leeson Street to Donnybrook (Anglesea Road Junction);
- Section 2: Donnybrook (Anglesea Road Junction) to Loughlinstown Roundabout;
- Section 3: Loughlinstown Roundabout to Bray North (Wilford Roundabout); and
- Section 4: Bray North (Wilford Roundabout) to Bray South (Fran O'Toole Bridge).

3.4.2.1 Section 1 – Leeson Street to Donnybrook (Anglesea Road Junction)

Key changes for the Proposed Scheme implemented in the design of the draft Preferred Route Option for Section 1 include:

- Leeson Street Lower: there was a new option considered for the length between Hatch Street Lower / Pembroke Street Upper Junction and St. Stephen's Green for which a new multi-criteria analysis was undertaken. Cross-sections along Leeson Street Lower were assessed to minimise impact on the heritage kerbs and to provide improved safety for cyclists, which led to the inclusion of a Bus Gate and associated general traffic diversion along Hatch Street. This is further detailed in Section 3.4.2.1.1;
- The design has been further developed to co-ordinate with the proposed Dodder Greenway scheme interface at Eglinton Road. A Toucan Crossing has been provided at the tie-in with the Dodder Greenway which tie-ins with the cycle tracks along the Eglinton Road to facilitate continued cyclist movement;

- The design has been further developed to co-ordinate with the proposed Fitzwilliam Cycle scheme at Fitzwilliam Place and the urban realm regeneration at the Kiosk corner;
- Relocation of bus stops on Leeson Street Lower. Removal of inbound bus stop at the Donnybrook Bus Depot;
- At the Grand Canal Junction with Wilton Terrance, alternate options were evaluated to provide improved cycle and footpath connections from the Canal towpath to the main road Toucan Crossing. It is proposed to maintain the existing arrangement at the Canal towpath and shared space at the Toucan Crossing, without impacting the lock wall which is part of Eustace Bridge parapet designated as protected structure, while the Grand Canal, the lock, and the towpath in this area have a number of heritage designations including the industrial heritage record. The alternative proposals would have required changes to the bridge parapet, and land take at 56 Adelaide Road would have impacted the existing parking and access to the commercial business; and
- The existing combined coach and local stop near the Morehampton Hotel has been retained as a combined stop with island bus stop arrangement due to various constraints including preserving the trees and the road geometry.

3.4.2.1.1 Leeson Street Lower

In addition to the Emerging Preferred Route option (1F1), there was one new option considered (1F2) for this section of the Proposed Scheme. This additional option follows the same route as the Emerging Preferred Route, but includes a diversion for inbound general traffic along Hatch Street and Earlsfort Terrace.

Route Option 1F2 would provide continuous segregated cycle tracks and bus lanes in both directions, while also maintaining the heritage granite kerbs and retaining the existing footpath widths. To achieve the necessary widths between the existing kerbs for bus lanes and cycle tracks, a Bus Gate would be placed to the north of the Leeson Lane Junction on Leeson Street Lower. This would limit the general traffic between the Hatch Street Lower / Pembroke Street Upper Junction and Leeson Lane to local access only along this section of road. General northbound traffic would be diverted on to Hatch Street Lower, and then on to Earlsfort Terrace, where it would travel east to the Earlsfort Terrace / St. Stephen's Green Junction. This would require the introduction of two-way general traffic on Earlsfort Terrace eastwards from the Hatch Street Lower Junction.

With respect to the Environment criterion in the multi-criteria assessment, Option 1F2 performed better with respect to the Architectural Heritage; Landscape and Visual; and Air Quality sub-criteria, while both schemes performed the same against the rest of the Environment sub-criteria.

Overall Option 1F2 was deemed to be the most advantageous option. This is due to it providing more journey time reliability at the Leeson Street Lower / St. Stephen's Green Junction; providing a safer environment with more space for pedestrians and cyclists; and allowing for the retention of heritage granite kerbs along Leeson Street Lower. Therefore 1F2 was brought forward into the Preferred Route Option.

3.4.2.2 Section 2 – Donnybrook (Anglesea Road Junction) to Loughlinstown Roundabout

Key changes for the Proposed Scheme implemented in the design of the draft Preferred Route Option for Section 2 include:

- Cycle Facilities at St. Brigid's Church Road: the option previously designed would require the relocation of a retaining wall, which following surveys, was no longer considered to be preferred due to unmoveable utilities in the area. Therefore an alternative arrangement was developed which brought the cycle track behind the proposed bus stop island, along St. Brigid's Church Road, to bypass the N11 pinch point alongside the retaining wall. In order to make space and retain the existing trees in the verge, pedestrian provision along St. Brigid's Church Road would be reconfigured and improved. This change would remove the need for large-scale structural or utility interventions, while providing a safer route for cyclists;
- The Hill / N11 Junction: it was considered appropriate to provide a safer layout for cyclists by closing the off-slip from the N11 and providing a continuous segregated cycle track by removing the uncontrolled left-turn which cuts across the mainline cycle lane;
- The island bus stop at South Hill Church was revised to a shared landing bus stop to reduce impact to the Church following feedback from public consultation;

- At Merrion Grove / The Rise Junction along N11, a two-way cycle track to the Coláiste Eoin School was evaluated for the safety of the school-going cyclists and providing a more direct route for northbound cyclists from the School and improved southbound cyclist access to the N11. This was further developed post the draft Preferred Route Option;
- Further design development to coordinate with the UCD Nova Development, the future Brewery Road Safety Improvement Scheme, and the Cherrywood SDZ Development;
- Further design development to coordinate with the Stillorgan Movement Plan in particular location of bus stops and Toucan Crossings;
- At Patrician Villas / St. Laurence Park, the widening of the pedestrian subway and the footpath connection along the N11 was value engineered from the Emerging Preferred Route option and it is now proposed to lengthen the subway on one side (east) and new footpaths and cycle tracks will run parallel to the N11 mainline in both directions;
- Change of the pedestrian link to South Park to move it closer to the junction with Old Bray Road to improve pedestrian movement and access to the bus stop;
- Alternative options were evaluated to provide desirable cycle track width at the N11 Farmleigh Junction Northbound (parallel to Glenalbyn Road). The cycle track width has been reduced at the pinch point near the bus stop running along the low wall, due to existing constraints for road geometry, wall and utilities;
- Alternative design options were evaluated to provide for additional Toucan Crossing between Loughlinstown Roundabout and Cherrywood Road to serve the St. Columcille's Hospital. Pedestrian modelling demonstrated that the existing St. Columcille Footbridge and the existing Toucan Crossing at Cherrywood Road would suffice with pedestrian demand and desire line;
- The service road was retained as two-way between Old Cherrywood Road Junction and Loughlinstown Roundabout, following change from one-way road under the Emerging Preferred Route option. The design was further developed after the draft Preferred Route Option; and
- At the Loughlinstown Roundabout it is proposed to signalise the existing roundabout on three arms and to provide a continuous bus lane southbound through the junction towards Shankill. The northbound bus lane through the roundabout is curtailed and bus priority is provided through signal control. Alternatives were considered to signalise the fourth arm to Rathmichael Manor and St. Columcille's Hospital, however the traffic modelling demonstrated that the existing infrastructure / arrangement would suffice.

3.4.2.3 Section 3 – Loughlinstown Roundabout to Bray North (Wilford Roundabout)

Key changes for the Proposed Scheme implemented in the design of the draft Preferred Route Option for Section 3 include:

- From the Dublin Road / Stonebridge Road Junction north to the Loughlinstown Roundabout, the necessary widening is entirely to the west of the carriageway to minimise impact to properties and trees;
- South of the Shankill Main Street, the design was revised to move the northbound Signal Control Priority from Quinn's Road / Cherrington Drive Junction to a new location between Cherrington Drive and Castle Farm. The design was further developed after the draft Preferred Route Option for provision of right-turning lane at Olcovar and signalisation of Olcovar Junction;
- The proposal to introduce a lower speed limit of 30km/h through the village (from Olcovar Junction to St. Anne's Church) helping to reduce speed of through traffic and improve safety;
- At Shanganagh Park and Cemetery, the design was further developed to move both northbound and southbound cycle track into the Shanganagh Park and along the Shanganagh Cemetery boundary along with the southbound footpath, which allowed protection of the roadside trees in front of Shanganagh Park and Shanganagh Cemetery in addition to reduced impact on the Shanganagh Park play area. The design was co-ordinated and integrated with the Shanganagh Park Masterplan;
- The route alignment was further developed taking into consideration other third-party developments, refined bus stops and bus priority provisions for the section of the route that runs from Shankill Village and Wilford Junction;
- Signal Controlled Bus Priority was applied for northbound buses from Wilford Roundabout to near Woodbrook College to enable a reduction in impact on properties and significant mature trees

immediately north of the junction by locally shortening the bus lane extents here. In this section widening has been provided in the east side; and

- Inclusion and further development of new junctions at proposed and approved housing development sites south of Shankill at Shanganagh Castle and Woodbrook Strategic Housing Development and associated bus stops.

3.4.2.4 Section 4 – Bray North (Wilford Roundabout) to Bray South (Fran O'Toole Bridge)

Key changes for the Proposed Scheme implemented in the design of the draft Preferred Route Option for Section 4 include:

- The design was also further developed between Ravenswell Road and Dwyer Park to provide for continuous cycle lanes and bus lanes while minimising the impact on properties and the heritage wall at Belton Terrace. Alternative options were evaluated which included no widening either side of the Dublin Road, which would mean compromise to the bus lane and cycle track. It is proposed to apply widening on the west side into the Castle Street Shopping Centre car park;
- The road alignment at the Upper Dargle Road Junction in Bray was further reviewed and updated to avoid impact to the pine tree under preservation (Tree Preservation Order). The road geometry has been revised to provide minimum road width at the junction. A two-way cycle track connection was provided from the junction to tie-in to the existing two-way cycle track through the grounds; and
- The design at the end of the Proposed Scheme tie-in with the Fran O'Toole Bridge Improvement Scheme proposals designed by others was co-ordinated. It is proposed to provide a southbound bus lane only and two general traffic lanes on the immediate Castle Street approach to the Fran O'Toole Bridge and southbound cycle track tie-in to the Bray Bridge Improvement Scheme proposals of cantilever cycle bridge and northbound cycle track will run through the bridge cross-section.

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 582 submissions received 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 scheme proposals. The key changes included in the updated design of the draft Preferred Route Option include the following:

- The extent of the Brookvale Road and Eglinton Road has not been included as part of the Proposed Scheme as it was deemed that the existing infrastructure suffice;
- Further design development undertaken to minimise impact to the Cellars and Private Landings along Lesson Street Lower, Lesson Street Upper, Morehampton Road and through Donnybrook Village;
- The design has been co-ordinated with the proposed Belfield / Blackrock to City Centre CBC at the Nutley Lane Junction. The co-ordinated design will have a two-way cycle track at Nutley Lane along with two-way cycle track crossing at the N11 Southern arm. In an independent scenario, the Proposed Scheme will tie-in to the existing infrastructure at the Nutley Lane Junction with one-way cycle track in both direction along the Nutley Lane;
- The design at the RTÉ junction has been further refined to tie-in to existing infrastructure within the RTÉ grounds;
- The design for the proposed UCD Bus Interchange was revised and updated following consultation with UCD. Following further traffic modelling and assessment of bus delays and pedestrian safety, the two uncontrolled pedestrian crossings within the main plaza interchange are updated to provide for raised signalised crossings;
- The proposed coach stop at the Talbot Hotel has been moved further south to remove the impact to the Talbot Hotel forecourt following feedback from the public consultation;

- At Galloping Green, the southbound segregated cycle track along the N11 was diverted along Belmont Terrace, to improve cycle track safety and allowing for the relocation of a bus stop, and retention of as much side road parking as possible. The updated design would redirect a standard 2m cycle track onto Belmont Terrace to run alongside the current footpath. It would pass the junction with Belmont Green and the adjacent private hospital, and then rejoin the N11 past Belmont Terrace Junction;
- Further development with the addition of a two-way cycle track connection along the N11 Merrion Grove Junction to the Coláiste Eoin School to provide a more direct connection to the northbound school-going cyclists and improved southbound connection from the school will improve overall safety for cyclists. Various alternative options were evaluated for the two-way cycle track connection within the School premises and the Proposed Scheme includes two-way cycle track that tie-in to the existing cycling arrangement within the School premises;
- Further design development to retain the service road as two-way between Old Cherrywood Road Junction and Loughlinstown Roundabout, following change to a one-way road under the Emerging Preferred Route. The service road north of the Old Cherrywood Road is retained as existing shared street;
- The design has been co-ordinated with proposed entrances for recently approved housing developments at Shanganagh Castle and Woodbrook. These developments have been considered when assessing the most appropriate local alignment, bus priority and bus stops while taking into consideration retention of significant mature trees. The junction with the proposed Woodbrook Strategic Housing Development was further developed after the draft Preferred Route Option;
- The layout of the proposed St. Anne's Church Junction (Corbawn Lane) was reviewed and revised through a number of iterations to take on board public concerns around traffic movement. The junction is proposed to be signalised as part of the Proposed Scheme;
- South of the Shankill Main Street, the design was revised to move the northbound Signal Control Priority from Quinn's Road / Cherrington Drive Junction to a new location at Olcovar Junction to reduce impact on properties and trees. It also includes provision for a right-turning lane at, and signalisation of, the Olcovar Junction;
- Rebuilding of the Woodbrook Side Lodge residential property at a new location east of its current location at the southern end of the Woodbrook estate, following its demolition to accommodate the road widening in North Bray is included as part of the Proposed Scheme;
- The design has been further developed between Ravensdale Park and Dwyer Park to provide for continuous cycle lane and bus lane while minimising the impact to properties and the heritage wall on the east side at Belton Terrace. Design options were evaluated to minimise impact to the Castle Street Shopping Centre car park which includes an alternative to remove the bus lane for a short section and replace with Signal Control Priority. The Proposed Scheme provides for continuous bus lane, cycle track and footpath with the northbound bus lane commencing further north of the Bray Bridge to reduce impact to the Shopping Centre car park entrance from the Lower Dargle Road and cycle track reduced to minimum at this constraint point. The entrance to the shopping centre from the Lower Dargle Road is proposed as one-way entry only. The pedestrian crossing has been moved closer to the shopping centre entrance and the bus stop to facilitate the pedestrian desire line;
- The junction layouts were modified over the course of the design process to provide more protection for cyclists along the length of the route, including the addition of separately signalised stages for cyclists at large junctions;
- The layout of all bus stops along the route have been enhanced to the latest design guidance;
- Some bus stop locations have been optimised to allow better connectivity for bus passengers; and
- Cycle facilities have been updated to the latest design guidance.

3.5 Conclusion

The Proposed Scheme has been the subject of a systematic and comprehensive assessment of reasonable alternatives during the course of its development, informed by extensive engagement with residents, businesses, the local authority and other 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(2)(b)(iv) of the Roads Act (as amended), which states that an EIAR must contain '*a description of the reasonable alternatives studied by the road authority or the Authority, as the case may be, which are relevant to the proposed road development and its specific characteristics, and an indication of the main reasons for the option chosen, taking into account the effects of the proposed road development on the environment*'.

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

3.6 References

Department of Transport, Tourism and Sport (DTTAS) (2016). Common Appraisal Framework for Projects and Programmes

National Transport Authority (NTA) (2012). Bus Rapid Transit (BRT) Core Dublin Network

NTA (2013). Greater Dublin Area Cycle Network Plan

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

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

NTA (2017). Bray to UCD CBC Feasibility and Options Report

NTA (2018). UCD to City Centre (St. Stephen's Green) CBC

NTA (2019). Bray to City Centre Core Bus Corridor Emerging Preferred Route. Public Consultation February 2019

NTA (2020a). Bray to City Centre Core Bus Corridor Preferred Route. Public Consultation March 2020

NTA (2020b). Bray to City Centre Core Bus Corridor Preferred Route. Third Round of Public Consultation November 2020

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

UITP (The International Association of Public Transport) (2009). Public Transport: making the right mobility choices

Directives and legislation

Directive 2011/92/EU 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 (as amended)

Number 15 of 2008 - Dublin Transport Authority Act 2008 (as amended)