



Ballsbridge to UCD bus corridor

Route Options Assessment

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Quality information

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Glossary of Terms

- **DTTAS:** Department of Transport, Tourism and Sport
- **NTA:** National Transport Authority
- **DCC:** Dublin City Council
- **DLRCoCo:** Dún Laoghaire – Rathdown County Council
- **CBC:** Core Bus Corridor
- **BRT:** Bus Rapid Transit
- **EPO:** Emerging Preferred Option
- **GDA:** Greater Dublin Area
- **GIS:** Geographic Information Systems
- **ITS:** Intelligent Transport Systems
- **LAP:** Local Area Plan
- **MCA:** Multi-Criteria Analysis
- **OSi:** Ordnance Survey Ireland
- **RMP:** Record of Monuments and Places
- **ROA:** Route Options Assessment
- **RTPI:** Real Time Passenger Information
- **SAC:** Special Area of Conservation
- **SPA:** Special Protection Area

Definitions

- **Study Area:** The area along the UCD to City Centre (St. Stephen's Green) Core Bus Corridor (CBC) within which route options have been identified and assessed.
- **Route Section:** The road(s) along which the UCD to City Centre (St. Stephen's Green) Core Bus Corridor may be provided. A route section is generally confined to a single road/street.
- **Route Options:** Various adjacent route sections are combined to form 'end-to-end' route options.
- **Scheme Option:** This refers to the detailed development of a route option in terms of bus and cycle provisions and road configuration along the route.
- **Journey Time:** The time taken to make a journey between two distinct points including dwell times at stops and delays at junctions.
- **CBC Infrastructure:** All physical facilities required to support the CBC system – stops, CBC lanes, public lighting, etc.

Route Options Assessment Study: The assessment process for potentially viable route options carried out in order to identify the nature and extent of the effects, both positive and negative, on the existing and planned transport infrastructure and receiving environment. The outcome of the route options assessment study is a recommendation for a preferred route for the proposed scheme.

Citations

- The background mapping used frequently in figures in the report is based on maps which AECOM holds a licence for. The source is ArcGIS Viewer for Silverlight (ESRI).
- Residential, employment destination and education destination figures in the report are based on the Census 2011 Small Area Population Statistics (SAPS).

1. Introduction

1.1 Preamble

This report presents the findings of the route options assessment work undertaken to identify the best bus corridor between Bray – UCD – Donnybrook CBC and Dun Laoghaire to City Centre CBC and a recommendation on the **emerging preferred option** is made.

The work presented in this report concentrates on the bus priority provision developed for the Ballsbridge to UCD bus corridor, based on the assumption that a number of high frequency bus services will avail of this corridor.

The assessment undertaken of potentially feasible route options, identified within the scheme Study Area, against established Multi-Criteria Analysis' (MCA) criteria is discussed in this report. Where a number of design options were considered along the preferred route, these are also discussed and documented. A concept scheme design along the emerging preferred option identified is subsequently presented.

1.2 Report Structure

- **Section 2:** The strategic transport policy context which has led to the identification of a need for the delivery of a bus corridor between the Dun Laoghaire to City Centre CBC and Bray – UCD – Donnybrook corridor is discussed in this section.
- **Section 3:** The objectives of the bus corridor and the proposed scheme are presented in the section. Key constraints and opportunities within the Study Area are identified. Also assessed are the integration of the corridor with the wider public transport network and the compatibility with other road users.
- **Section 4:** The methodology for identifying and assessing the feasibility of the various route options potentially available within the Study Area is discussed in this section including:
 - the identification of a Study Area where practical route options have been considered and presentation of an initial network (“spider’s web”) of route sections examined;
 - the selection and determination of initial criteria for screening and assessing technically feasible route options, based on distinct, project-specific objectives; and
 - the definition of MCA criteria.
- **Sections 5 and 6:** Details the stages of the options assessed.
- **Section 7:** The Emerging Preferred Option is identified and described.
- **Section 8:** Presents a cost estimate for the concept design of the Emerging Preferred Scheme.
- **Section 9:** Discusses the Emerging Scheme Benefits.
- **Section 10:** Discusses the next steps.

2. Transport Context

2.1 Ireland 2040 – Our Plan

The ‘National Planning Framework: Ireland 2040 – Our Plan’ (Department of Housing Planning and Local Government, September 2017) sets the long-term context for Ireland’s physical development and associated progress in economic, social and environmental terms and in an island. The objectives of ‘National Planning Framework: Ireland 2040 – Our Plan’, in relation to public transport, include:

- *“Expand attractive public transport alternatives to car transport to reduce congestion and emissions and enable the transport sector to cater for the demands associated with longer term population and employment growth in a sustainable manner...”*
- *“The provision of a well-functioning, integrated public transport system, enhancing competitiveness, sustaining economic progress and enabling sustainable mobility choices.”*
- *“Deliver the key public transport objectives of the Transport Strategy for the Greater Dublin Area 2016-2035 by investing in projects such as New Metro North, DART Expansion Programme, BusConnects in Dublin and key bus based projects in the other cities and towns.”*

2.2 Greater Dublin Area Transport Strategy 2016 – 2035

The ‘Greater Dublin Area Transport Strategy 2016 – 2035’ (NTA, 2015) identifies a Core Bus Network for the GDA. This core network represents the most important bus routes in the GDA, which are generally characterised by a high frequency of bus services, high passenger volumes and with significant trip attractors located along the route. The ‘Greater Dublin Area Transport Strategy 2016 – 2035’ includes objectives to develop the Core Bus Network to achieve, as far as practicable, continuous priority for bus movements on the sections of the Core Bus Network within the Metropolitan Area, with the goal of making the overall bus system more efficient and attractive to users including the core principle, which states: “Development in the GDA shall be directly related to investment in integrated high quality public transport services and focused on compact urban form.”

Section 2.2.1 of the ‘Greater Dublin Area Transport Strategy 2016 – 2035’ also states, as a Primary Policy: *“The Strategy must therefore, promote, within its legislative remit, transport options which provide for unit reductions in carbon emissions. This can most effectively be done by promoting public transport, walking and cycling, and by actively seeking to reduce car use in circumstances where alternative options are available.”*

The identified core network comprises a number of radial, orbital and regional bus corridors.

2.3 BusConnects

‘BusConnects’ is a programme of priority investment for public transport in the 2018 budget, which plans to fundamentally transform Dublin’s bus system. The objective of ‘BusConnects’ is to develop the radial and orbital bus corridors as identified in the ‘Greater Dublin Area Transport Strategy 2016 – 2035’, so that each will have continuous bus priority, i.e. a continuous bus lane in each direction.

‘BusConnects’ seeks the development of a more attractive and convenient bus system with greater scope for interconnection between routes, where connecting passengers don’t necessarily have to travel to Dublin City Centre.

A bus corridor is proposed to connect the following two radial bus corridors (see **Figure 2.1**):

- Dun Laoghaire to City Centre corridor; and
- Bray – UCD – Donnybrook corridor.

This connecting bus corridor will run from Ballsbridge to a terminus in UCD campus.



Figure 2.1: Radial Bus Corridors (‘BusConnects’ Next Generation Bus Corridors Fig. 1)

2.4 Integrated Implementation Plan 2013 – 2018

The NTA published the Integrated Implementation Plan 2013 – 2018 in February 2014. This report sets out the short term infrastructure investment programme for the GDA for a five year period up to 2018, including investment in existing bus services. The proposals in relation to bus investment are encompassed in four investment areas:

1. Bus Fleet Investment;
2. Bus Stop and Shelter Provision;
3. General Bus Network Improvements; and
4. Bus Rapid Transit Schemes.

Investment areas 2 & 3 are of most relevant to this scheme and will be addressed.

More specifically, the Integrated Implementation Plan proposes the following measures in relation to bus network improvements:

- Further development of a Quality Bus Corridor (QBC) appropriate to serve the needs of the GDA;
- Seeking to achieve, as far as practicable, continuous inbound priority and the maximum possible outbound priority on key bus routes into Dublin City Centre;
- Enhancing bus priority at other urban locations in the GDA;
- Improving the level of interchange facilities between services and with other transport modes;
- Seeking enhanced bus prioritisation at signalised traffic junctions in the GDA; and
- Creation of bus hubs or bus focal points in key urban locations in the GDA.

2.5 Greater Dublin Area Cycle Network Plan

The GDA Cycle Network Plan (NTA, 2013) sets out the strategy for the development of an integrated cycle network. It identifies that the Dún Laoghaire to City Centre corridor and Bray – UCD – Donnybrook corridor both form part of the primary cycle network. Moreover, there are a number of routes connecting the two corridors which form part of the primary, secondary and greenway cycle networks and thus form a key part of the strategic cycle network – see **Figure 2.2**. It is therefore important that any upgrade to bus priority infrastructure along the corridor should take cognisance of these objectives and, where practical, provide cycle infrastructure to the appropriate level and quality of service required for a primary and secondary cycle route.

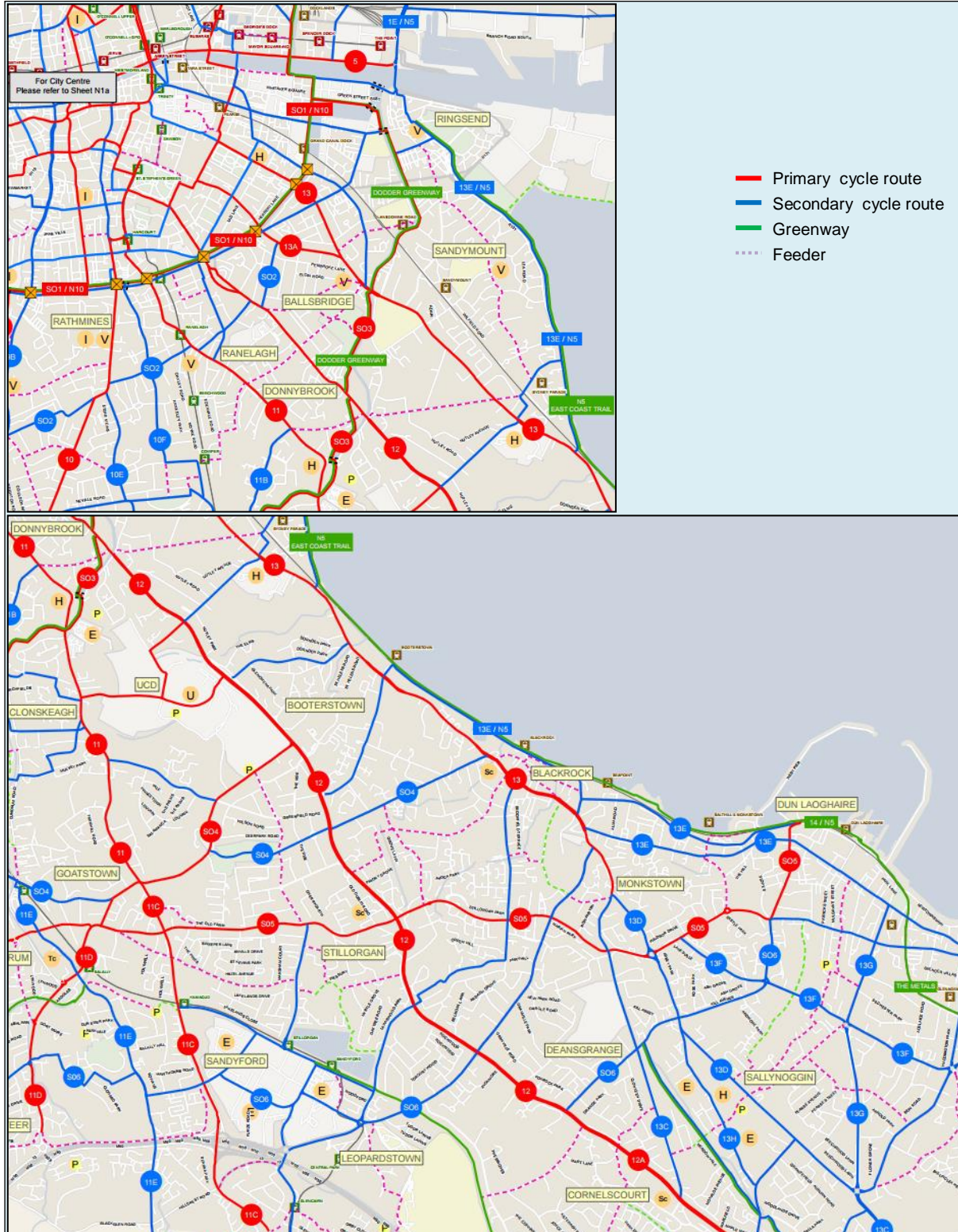


Figure 2.2: GDA Cycle Network Plan (extracts)

2.6 DCC Development Plan (2016 –2022)

The DCC Development plan outlines the following objectives:

- To support improvements to the city’s bus network and related services to encourage greater usage of public transport in accordance with the objectives of the NTA’s strategy and the Government’s ‘Smarter Travel’ document.
- To facilitate and support measures proposed by transport agencies to enhance capacity on existing public transport lines and services, to provide/improve interchange facilities and provide new infrastructure.
- To review future strategic provision of bus depots/garages in the city in consultation with Dublin Bus and the NTA.

2.7 DLRCoCo Development Plan (2016 – 2022)

This Development Plan seeks to protect and nurture the future growth of Dún Laoghaire-Rathdown both by serving and leading the community through creation of conditions that will attract and sustain social and economic development. It contains some objectives in relation to bus travel which are of general relevance to the scheme such as:

- An increased travel mode share for walking and cycling; this increase will be mainly related to local trips to work, schools, retail and leisure within the larger urban areas.
- An increased travel mode share for public transport for work trips to the main employment zones of Sandyford, Cherrywood and Dublin City Centre and between the other larger urban centres; there may be scope to improve public transport mode share to larger urban centres along the main bus and rail corridors, particularly where this improves access and interchange between bicycle and rail.
- Enhanced safety for all modes – especially for vulnerable road users.
- The delivery of major strategic transportation projects and infrastructural improvements such as, the Council Cycle Network, an expanded Bus Network, Luas Line B2 from Brides Glen to Fassaroe and the package of interventions to realise the full potential of the Sandyford Business District.

The continued expansion of the Bus Network is of the upmost importance. In addition, the continuation and improvement of existing bus services along radial and orbital routes, subject to sufficient demand and availability of finance, is also considered a priority. As part of the continuing development of the Bus Network in the County, the Council will facilitate the provision of radial and orbital bus priority schemes to integrate with established high quality and frequency bus and rail routes. The provision of bus priority measures on a route may include some, but not all, of the following measures:

- The deployment of advanced traffic management techniques and ITS applications, i.e. the provision of an urban traffic signalling systems such as SCATS (Sydney Coordinated Adaptive Traffic System), changes to the traffic signalling configuration, public transport traffic signal priority, route optimisation through traffic signal co-ordination, junction redesign.
- Reallocation of existing road space with increased levels of segregation from other vehicular traffic.
- Enhancement of nearby pedestrian and cycle facilities.
- High quality running surfaces.
- Widening of the roadway where appropriate.
- Traffic Management measures to include turning movement bans or a restriction on some, or all, other road vehicles on a section of road etc.

3. Corridor Audit and Scheme Objectives

3.1 Physical Constraints and Opportunities

There are a number of constraints and opportunities, both natural (i.e. existing natural environment) and physical (the built environment), which constrain route options for the proposed scheme within the defined Study Area. These include:

- The developing Greater Dublin Area Cycle Network;
- River Dodder (including protected structures);
- Existing and committed future development along the route, in particular in the city centre, much of which has heritage value, including particular Residential Conservation Areas;
- Embassy properties;
- Existing protected monuments within the Study Area;
- Significant street trees and other natural features along the route within the Study Area;
- Existing urban and sub-urban roads and street network;
- Availability of land in urban and suburban areas;
- Public parks including Elm Park Golf Club;
- The RDS; and
- The need to maintain traffic flow for all modes during construction.

Further details on the engineering and construction issues are contained in the Route Audit Report, within **Appendix D**.

3.2 Interchange with Public Transport

As part of the scheme it is desirable to enhance interchange between the various modes of public transport operating in the city and wider metropolitan area, both existing and proposed. Route options have therefore been developed with this in mind and, in so far as possible seek to provide for improved interchange opportunities with other transport services, including:

- Planned CBC route from Dun Laoghaire to City Centre;
- Planned regional Bray – UCD – Donnybrook bus corridor; and
- Existing Dublin Bus services along the route.

The following sections outline some of these opportunities in further detail.

3.2.1 Bus Network

The Ballsbridge to UCD bus corridor will form an integral part of the reconfigured bus network. The introduction of the bus corridor, with the capacity that it provides, will allow for the rationalisation of existing bus services. This will provide for a more efficient network overall and improve the cost effectiveness of the scheme. No reduction in the overall level of public transport service will be made.

Figure 3.1 illustrates the radial, orbital and regional networks within the Core Bus Network as per the GDA Transport Strategy. This identifies that the proposed scheme interfaces with the regional bus corridor from Bray – UCD – Donnybrook and the CBC from Dun Laoghaire to City Centre.

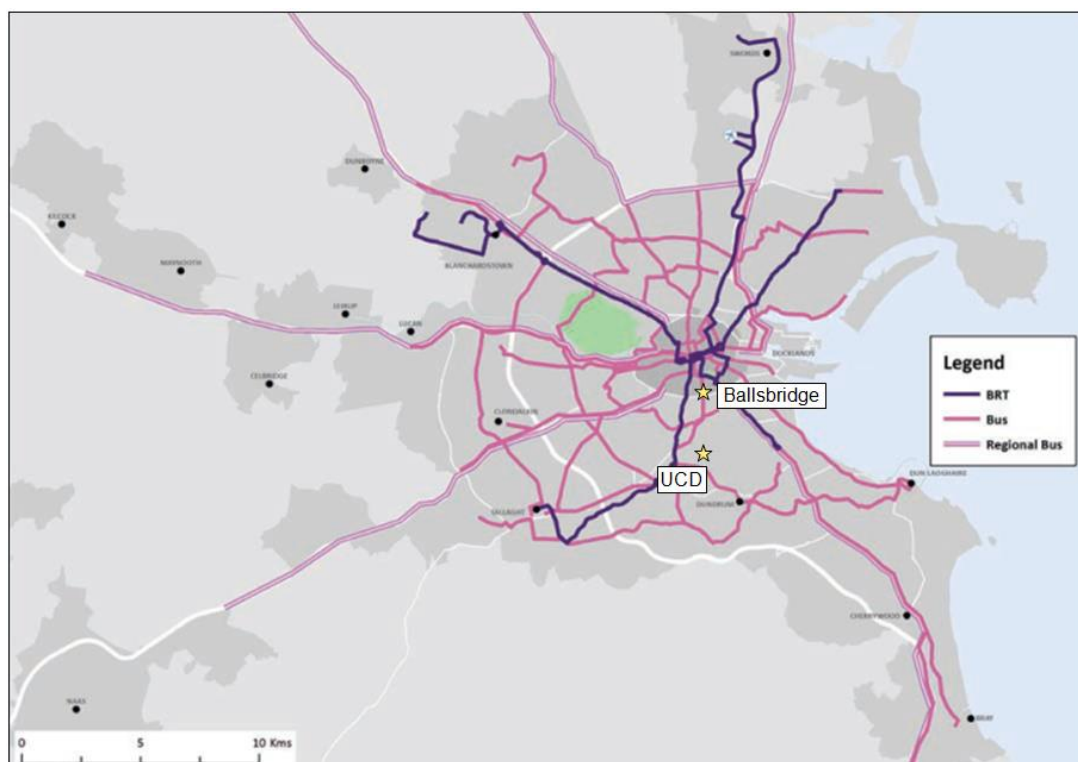


Figure 3.1: 2035 Orbital Corridors (Source: Figure 5.5 Transport Strategy 2016 – 2035)

3.3 Compatibility with other users

A key objective of the proposed scheme is to improve pedestrian and cyclist facilities along the route (in line with the GDA cycle network). In general, suitable level of service should be proposed for these modes. Where it is considered impractical to construct cycle facilities along a particular section of the CBC route, such facilities would need to be provided along suitable alternative routes and as required by the GDA Cycle Network Plan.

There may be locations where segregated cycle facilities cannot be provided along the CBC route and there is no suitable routing alternative. In this instance, it may be possible for cyclists to share with vehicles in the bus lane. However, such proposals need careful consideration and design to ensure the safety of cyclists, with additional mitigation measures, such as speed restrictions for vehicles in bus lanes being applied. General traffic flow and local access will generally be maintained along the CBC corridor although it is inevitable that there will be impacts on traffic capacity along the route associated with the reallocation of road space to CBC priority and cycle lanes and the introduction of turning movement restrictions. Reductions in traffic carrying capacity of the road network need, however, to be considered in the context of the overall significant increase in efficiency and reliability of the bus services that will be achieved.

3.4 Scheme Objectives

Having regard to the findings of the studies and plans set out in **Section 2** of this report, the following objectives were established to identify the best bus corridor for connecting the Dun Laoghaire to City Centre Core Bus Corridor to the Bray – UCD – Donnybrook Core Bus Corridor:

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

4. Assessment Methodology

4.1 Introduction

This section of the report presents the methodology used for the assessment of potentially viable route options identified within the Study Area. A two-stage assessment process was adopted as follows:

- An initial **Stage 1** high-level route sections assessment or 'sifting' process which appraised potentially viable route sections in terms of ability to achieve scheme objectives and whether they could be practically delivered; and
- Routes which passed this initial stage were taken forward to a more detailed **Stage 2** assessment.

4.2 Study Area

Arising from the transport policy context and scheme objectives set for the Ballsbridge to UCD bus corridor, the broad Study Area identified for the proposed scheme is illustrated in red in **Figure 4.1**.

The Study Area is generally bounded to the north by Ballsbridge (south of the River Dodder) and to the south by UCD.

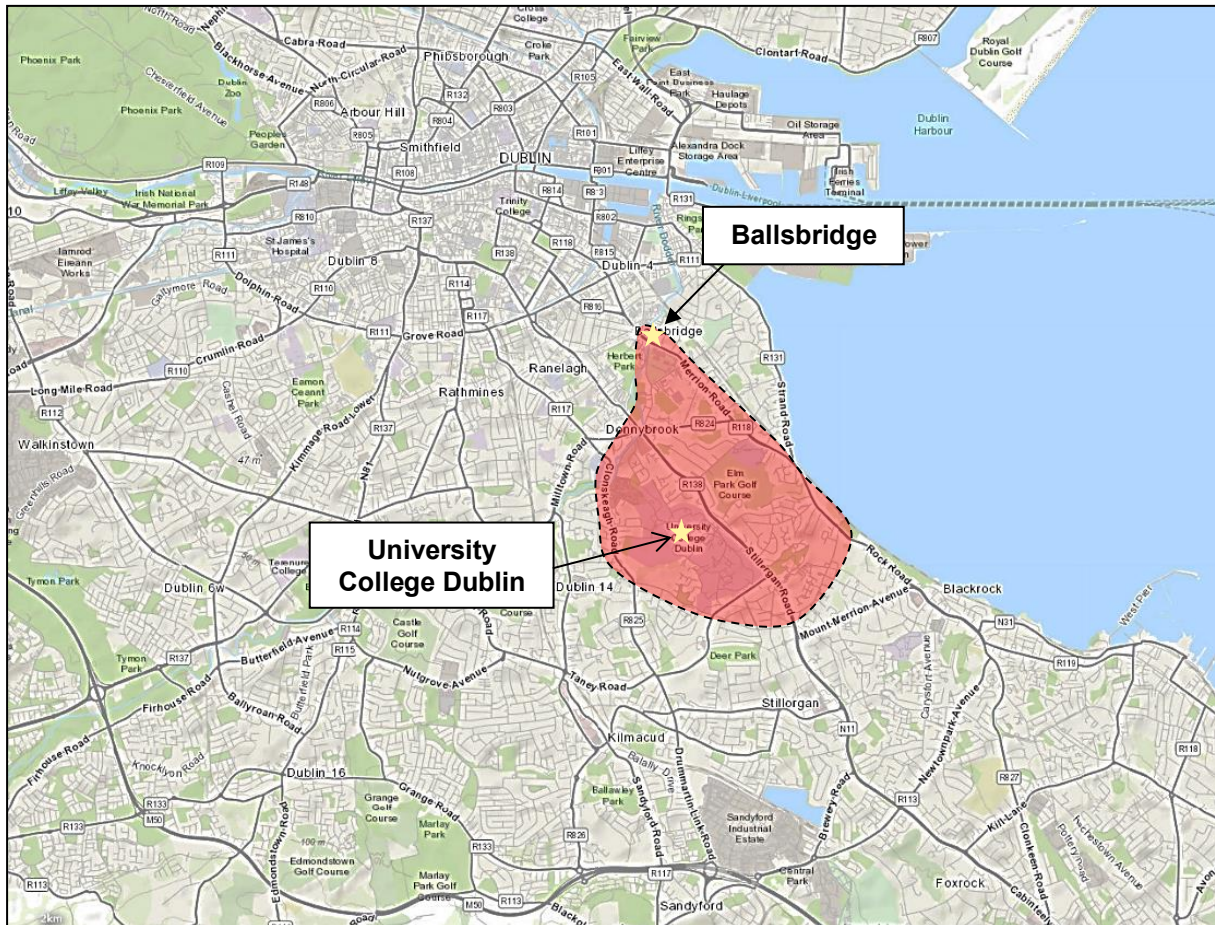


Figure 4.1: Study Area

4.3 Stage 1: Route Sections Assessment – Sifting Stage

4.3.1 “Spider’s Web”

An initial “spider’s web” of potential route sections that could possibly accommodate the bus corridor between Ballsbridge and UCD was identified for the Study Area.

This “spider’s web” of route sections was chosen in order to meet the scheme objectives as set out in **Section 3.4** of this report.

Initial route sections identified also took cognisance of the physical constraints and opportunities present (**Section 3.1** of this report) and the ability to integrate with other public transport modes and routes (**Section 3.2** of this report).

Of particular relevance in developing the “spider’s web” was the potential for the road or route sections to facilitate fast and reliable journey times and thereby be able to practically accommodate bus lane priority.

The resulting Study Area corridor “spider’s web” of route sections identified is presented in **Section 5** of this report.

4.3.2 Sifting Process

At the Stage 1, i.e. sifting stage, the initial “spider’s web” of route sections 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 from available survey information and site visits.

This exercise identified route sections that would either not achieve the scheme objectives or would be subject to significant cost and/or impact to achieve these objectives (e.g. excessive land-take).

4.4 Stage 2: Route Options Assessment – Detailed Assessment

Following completion of the Stage 1 assessment, the remaining potentially feasible route sections were progressed to Stage 2 of the assessment process.

This stage comprised a more detailed qualitative and quantitative assessment of scheme options identified along each potential route, using criteria established to compare scheme options.

The first step in the Stage 2 assessment was to combine shorter route sections which passed the Stage 1 assessment, to form longer end-to-end potential routes within the Study Area.

After developing routes options, each was explored using different design concepts to identify the degree of facility provision and necessary infrastructure requirements. This process involved the development of typically two scheme options for each route within the Study Area.

The scheme options for each route were then progressed to 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) under the following criteria:

- Economy;
- Integration;
- Accessibility and Social Inclusion;
- Safety;
 - Environment; and
 - Physical Activity.

Physical Activity has been scoped out of the multi-criteria analysis at this stage. This is because all scheme options are considered to promote physical activity equally and as such it is not considered to be a key differentiator between scheme options.

An appreciation of constraints and opportunities within the Study Area as well as the defined project objectives, led to the establishment of project-specific route options MCA criteria.

These were tailored to have commonality to the Common Appraisal Framework guidelines where practical.

Table 4.1: MCA criteria

MCA criteria	Assessment Sub-Criteria
Economy	1.a. Capital Cost
	1.b. Transport Reliability and Quality (Journey Time)
Integration	2.a. Land Use Integration
	2.b. Residential Population and Employment Catchments
	2.c. Transport Network Integration
	2.d. Cycle Network Integration
	2.e. Traffic Network Integration
Accessibility & Social Inclusion	3.a. Key Trip Attractors (Education/Health/Commercial/Employment)
	3.b. Deprived Geographic Areas
Safety	4.a. Road User Safety
Environment	5.a. Archaeology and Cultural Heritage
	5.b. Architectural Heritage
	5.c. Flora & Fauna
	5.d. Soils and Geology
	5.e. Hydrology
	5.f. Landscape and Visual
	5.g. Air Quality
	5.h. Noise & Vibration
	5.i. Land Use Character

In applying these criteria to the assessment process, it is clearly recognised that for different sections of the Study Area corridor, greater emphasis may need to be applied to some criterion over others in terms of their significance and influence on the route selection process.

4.4.1 Economy (Criterion 1)

4.4.1.1 Capital Cost (1.a.)

Capital cost estimates consist of both the indicative infrastructure cost estimate and land acquisition costs. This cost estimate was based on a range of per kilometre rates reflecting the extent of construction works required.

The following steps have been followed in order to derive cost estimates for each route option:

- Step 1: Define construction activity levels and assumptions for corridor sections.
- Step 2: Define construction activity levels and assumptions for junctions.
- Step 3: Estimation of cost rates in relation to construction activity levels for corridor sections.
- Step 4: Estimation of cost rates in relation to construction activity levels for junctions.
- Step 5: Estimation of cost rates in relation to construction activity levels for stops.
- Step 6: Apply appropriate cost rates to each route option to derive route option cost estimate.

Criterion 1.a.i. Indicative Infrastructure Cost Estimate

1.a.i.i. Route Sections

As part of the route optioneering process, constraints and associated mitigation measures, which provide improved / full bus lane provision, have been identified, grouped and ranked in levels.

Table 4.2: Construction Works for Corridor Sections

Construction Activity Level	Construction Works Assumption	€/km
Minor – Minor works locally	<ul style="list-style-type: none"> • Kerbs improvement locally (removal and replacement) • Footpaths improvement locally (breaking out/additional concrete) • Road resurfacing locally (milling/reinstatement or overlay) • Road markings (non-destructive removal of existing road markings, new road markings) • Signage (removal/relocation/replacement of existing and/or installation of new) 	€650,000
Moderate – Roadway widening (excluding private land acquisition)	<ul style="list-style-type: none"> • General site clearance (street furniture removal/relocation, etc.) • Safety barriers/guardrails (removal and new) • Services protection/relocation/diversion (power supply, communications) • Drainage works (removal of and installation of new drainage systems) • Limited earthworks • Pavement full depth reconstruction • Road markings (non-destructive removal of existing road markings, new road markings) • Kerbs footways and paved areas (removal and new) • Road lighting (relocation, cabling, ducting) • Signage (removal/relocation/replacement of existing and/or installation of new) • Street furniture removal/relocation • Landscaping works (top soiling, fence, trees relocation, hedges, road margins re-grading, etc.) 	€1,300,000

Construction Activity Level	Construction Works Assumption	€/km
Major – Roadway widening (including private land acquisition):	<ul style="list-style-type: none"> • General site clearance (street furniture removal/relocation, etc.) • Safety barriers/guardrails (removal and new) • Services protection/relocation/diversion (power supply, communications, water, gas) • Drainage works (removal of and installation of new drainage systems) • Earthworks (embankment treatments, retaining walls, slopes regrading, etc.) • Pavement full depth reconstruction • Kerbs footways and paved areas (removal and new) • Road markings (non-destructive removal of existing road markings, new road markings) • Signage (removal/relocation/replacement of existing and/or installation of new) • Road lighting (replacement, cabling, ducting) • Landscaping works (top soiling, fence, trees relocation, hedges, road margins, re-grading, etc.) • Property boundary reinstatement works (walls, gates, driveways landscaping etc.) 	€2,500,000

1.a.i.ii. Junctions

Table 4.3 presents the construction activity levels for junctions, the assumed level of works for each category and the per junction rate.

Table 4.3: Construction Works for Junctions

Construction Activity Level	Construction Works Assumption	€/junction
Minor – Modifications to existing signal controlled junctions to introduce bus priority (i.e. changing method of control, etc.), without significant alteration to their existing geometry and layout	<ul style="list-style-type: none"> • Road markings (non-destructive removal of existing road markings, new road markings) • Anti-skid surface • Signage (removal/relocation/replacement of existing and/or installation of new) • Dished kerbs and tactile paving • Guardrails/Bollards • Additional signal poles/heads • Additional traffic signals ducting, cabling and chambers • Modifications to the signal controller and associated traffic signal installation works (including electrical) • Additional loop detectors 	€70,000

Construction Activity Level	Construction Works Assumption	€/junction
Moderate – Upgrading existing minor/major junctions (including roundabouts) to signal control junctions, without significant alteration to their existing geometry and layout (excluding private land acquisition)	<ul style="list-style-type: none"> • Kerbs improvement locally (removal and new) • Footpaths improvement locally (breaking out and new) • Road markings (non-destructive removal of existing road markings, new road markings) • Signage (removal/relocation/replacement of existing and/or installation of new) • Anti-skid surface • Dished kerbs and tactile paving • Guardrails/Bollards • New signal poles/heads • New traffic signals ducting, cabling and chambers • New signal controller and associated traffic signal installation works (including electrical) • New loop detectors • Services protection/relocation/diversion (power supply, communications) • Limited earthworks • Pavement reconstruction • New road lighting (relocation, cabling, ducting) 	€230,000

Construction Activity Level	Construction Works Assumption	€/junction
Major – Significant modifications to existing signal controlled junctions (including private land acquisition)	<ul style="list-style-type: none"> • General site clearance (street furniture removal/relocation, etc.) • Safety barriers/guardrails (removal and new) • Services protection/relocation/diversion (power supply, communications, water, gas) • Drainage works (removal of and installation of new drainage systems) • Earthworks (embankment treatments, retaining walls, slopes re-grading, etc.) • Pavement full depth reconstruction • Kerbs footways and paved areas (removal and new) • Road markings (non-destructive removal of existing, new road markings) • Anti-skid surface • Signage (removal/relocation/replacement of existing and/or installation of new) • Dished kerbs and tactile paving • Guardrails/ Bollards • Additional signal poles/heads • Additional traffic signals ducting, cabling and chambers • Modifications to the signal controller and installation works (including electrical) • Additional loop detectors • Road lighting (replacement, cabling, ducting) • Landscaping works (top soiling, fence, trees, hedges, margins re-grading, etc.) • Property boundary reinstatement works (walls, gates, driveways landscaping etc.) 	€1,000,000

1.a.i.iii. Bus Stops

For cost estimation purposes only, the bus stops have been assumed to comprise the following items:

- Raised Kerbs;
- Paving;
- Illuminated shelters;
- Identification posts;
- RTPi;
- Lighting;
- Associated ducting (communications and power); and
- Bus Stop Furniture (i.e. passenger guardrails, benches, bollards, etc.).

Based on the above assumptions, outline costs for the bus stops were estimated to be €20,000/stop. These costs exclude VAT, professional fees and re-routing of services.

It should be noted that the above listed bus stop cost estimates are subject to refinement, based on a more detailed analysis at detailed design stage.

Criterion 1.a.ii. Land Acquisition Cost Estimate

Land Acquisition Costs will be accounted for separately @ €1,500/m²

Exclusions from the cost estimation process at this stage are listed below:

- VAT;
- Fees for planning process;
- Statutory Undertakers;
- Professional Fees; and
- Escalation and inflation adjustments.

4.4.1.2 Transport Reliability and Quality of Service (1.b.)

This criterion assesses route options in terms of the degree to which transport reliability and quality of service is likely to be achieved.

The assessment considers the following.

Criterion 1.b.i. Journey Time

the extent to which journey time savings, and associated economic benefits, for public transport services, can be achieved on a route.

This would be practically achieved through the extent to which any or all of the following measures can be implemented;

- Enhancement of existing bus and / or provision of new bus lanes along road links;
- Provision of bus lanes through junctions (preferably through signal controlled junctions);
- Local upgrading of road sections to provide more carriageway space and therefore, additional capacity;
- Use of traffic signals to provide virtual priority e.g. queue relocation;
- Removal of 'pinch points' for bus services and traffic along the route; and
- Rationalisation of existing bus stops in terms of location, indentation (i.e. ability to provide laybys to avoid blockage of bus lanes) and spacing.

Journey times for each route option have been calculated by comparing the time required by a bus to travel between common start and end points on each route.

The following assumptions have been made in calculating the comparative journey times along route options:

- Top operational speed (free-flow) of 50 kph in suburban areas and 30 kph in City Centre areas;
- Dwell time of 15 seconds per stop on average (assumes cashless fares i.e. Leap card. Assumes that on average, buses stop at every second stop i.e. 30 second delay at every second stop); and
- Delay of 15 seconds per junction on average (assumes buses stop at every second junction i.e. 30 second delay at every second junction)

These assumptions assume dedicated bus priority infrastructure or free-flowing traffic conditions along a route section by direction of travel.

Where the indicative scheme determined for a route suggests that this is not practically achievable, modified speeds and delay assumption are applied as appropriate.

These additional delays are estimated based on available queue length information, automatic vehicle location information from Dublin Bus and estimates of the impact of traffic management measures (such as queue relocation).

Criterion 1.b.ii. Number of Major Junctions

The number of major junctions / signalised crossings along each route have been compared.

For the purposes of this assessment, major junctions are generally defined as signalised junctions and roundabouts i.e. any junction likely to cause delays to buses.

Regardless of the level of practical or feasible bus priority provided at major junctions, there will always be an element of delay to buses associated with signalised junctions, even with the most efficient signalling system being provided.

While it is impossible to completely avoid major junctions on any route option, this risk of potential delay has been considered when comparing route options.

This feeds into the overall journey time calculations as indicated above.

Criterion 1.b.iii. Level of Bus Priority Provision

The level of bus priority achievable along route options has been considered and compared.

The level of priority is predominantly concerned with the degree to which road space can practically be allocated to buses, the amount of protection afforded to this priority, i.e. segregation, and the provision for buses at junctions such as bus lanes at the stop line.

This feeds into the overall journey time calculations as indicated above.

4.4.2 Integration (2)

4.4.2.1 Land-Use Integration (2.a.)

This criterion identifies the extent to which a route would encourage or support planned development and provide for economic opportunities; whether particular route options offer synergies with other urban enhancement proposals and whether route options afford the potential to regenerate particular streets or quarters.

The interaction of routes with Local Area Plans (LAPs), masterplans or specific objectives in the County Development Plans are also considered under this criterion.

4.4.2.2 Residential Population and Employment Catchments (2.b.);

Criterion 2.b.i. Residential Population Catchments

This criterion compares the existing residential populations within 5, 10 and 15 minute walk catchments from bus stops and is representative of the number of potential bus users for a particular route option.

The assessment does not include future populations of zoned, but yet undeveloped residential development lands along route options.

The analysis involved extracting 2011 population statistics from the Central Statistics Office (CSO) 'small areas' dataset.

GeoDirectory was used to assist in calculating the proportional figures for the population within the specific contour bands for each of the routes.

This information was subsequently used to calculate the population living within the contours.

Criterion 2.b.ii. Employment Population Catchments

This criterion compares the existing employment populations within a 10 minute walk catchments.

The analysis involved extracting information from the 2011 POWSCAR (Place of Work, School or College - Census of Anonymised Records) data, which contains data on employment and school goers within specific areas.

The areas used for the analysis were taken from the NTA's multi-modal transport model of the Greater Dublin Area and correspond to the zones defined in the model.

These zones are effectively modified Central Statistics Office (CSO) boundaries.

GeoDirectory was used to assist in calculating the proportional figures for the employment units within the specific contour bands for each of the routes.

This information was subsequently used to calculate the number of people working within the contours.

As with the residential population catchments, the assessment does not quantitatively assess the future populations of zoned, but yet undeveloped commercial development lands along route options.

4.4.2.3 Transport Network Integration (2.c.)

This criterion identifies the extent to which route options would maximise wider public transport usage and reach in terms of facilitating efficient interchange between other transport routes and modes (e.g. other core/feeder bus routes, BRT routes, Luas, DART, suburban rail, future Metro).

Linked to this, is the availability of space at potential interchange locations for facilities such as cycle parking areas, covered interchange areas, safe walking areas to and from stops etc.

4.4.2.4 Cycle Network Integration (2.d.)

This criterion considers whether a route option forms part of the GDA Cycle Network Plan, with routes which overlap with designated Cycle Routes given a higher designation in terms of benefits arising where cycle infrastructure can be provided as part of the proposed scheme.

In some instances however it may be more appropriate to modify an existing or proposed cycle route as part of the GDA Cycle Network so that bus and cycle network objectives can both be achieved within the broader corridor area.

Consideration is also given to cycle routes intersecting with the bus route.

The quality of cycle provision practically achievable on route options has been assessed as this is considered to be a proxy for encouraging physical activity along the route.

For comparison purposes, the highest level of practical cycle provision achievable on each route has been determined and compared between route options.

4.4.2.5 Traffic Network Integration (2.e.)

A comparative assessment of the expected traffic impact of each route option was undertaken based on professional judgement and understanding of traffic conditions in the Study Area.

This represents a high level assessment of the traffic impact of the route options considered in the Stage 2 MCA.

The anticipated traffic impact expected to be incurred by motorists using private vehicles as a result of the different route options will be assessed.

The disadvantages experienced by motorists in respect of reduced junction capacity and restricted movements will be considered.

4.4.3 Accessibility and Social Inclusion (3)

4.4.3.1 Key Trip Attractors (3.a.)

This assessment criterion identifies key trip attractors located within approximately 15 minute walk catchments which would generate significant demand for bus services but would not be otherwise picked up by either the employment or residential catchment analysis.

For the purposes of this assessment the following land-uses have been considered as key trip attractors:

- Education (schools and universities);
- Commercial centres (shopping centres, town centres etc.);
- Healthcare (hospitals);
- Leisure (sport stadiums, theatres, cinemas etc.); and
- Employment (business parks, large office developments etc.).

4.4.3.2 Deprived Geographic Areas (3.b.)

The possible impact of the route options on deprived geographic areas including RAPID (Revitalising Areas by Planning, Investment and Development) areas and the HP Deprivation Index was investigated.

4.4.4 Safety (4)

4.4.4.1 Road User Safety (4.a.)

Generally, the introduction of CBC will result in a reduction in road collisions due to people switching from private car to public transport. However, the reduction in collisions is unlikely to differ between various route options, particularly over the short sections being investigated as part of this assessment. Therefore, for the purposes of comparing route options, the number of junctions along the route has been used as a proxy for road safety.

The number of junctions is effectively a measure of the number of potential conflicts on the route and therefore a measure of the potential for a collision. The type of movement required by the bus at junctions on the route is also considered with routes where turning movements (either left or right) are required being assigned a lower ranking in terms of safety. Road User Safety also refers to cyclist and pedestrian safety such as segregated cycle facilities and safer pedestrian crossing facilities, in line with the National Cycle Manual and the Design Manual for Urban Roads and Streets.

4.4.5 Environmental (5)

The scope and methodology for the environmental assessment was established by considering what environmental aspects are likely to be impacted and are therefore of importance in evaluating the route options.

A list of the environmental topics considered is outlined in and **Table 4.4**.

Table 4.4: Environmental Aspects Considered – Aspects Scoped out of Environmental Assessment

Aspects Scoped out of Environmental Assessment	Rationale
Agronomy	Given the urban/suburban nature of the proposed scheme and the assumption that the CBC will run on predominantly existing road infrastructure, this aspect is not considered to be relevant to the assessment.
Hydrogeology	Hydrogeology is not considered to be a determining factor in the selection of the preferred route option. Also at this stage of the design process it is not possible to determine the quality, type or duration of these impacts, particularly as the location and type of structures e.g. underpasses, bridges etc. are unknown.
Property/Land Acquisition	This aspect has been considered separately as part of the Economy criterion in the overall MCA commensurate with the information available at the route option assessment stage.
Socio-economics	Elements of socio-economics such as journey times, catchment analysis, transport integration, quality of service for cyclists etc. are assessed under other non-environmental criteria and will be considered as part of the MCA.

Table 4.5: Environmental Aspects Considered – Aspects Included in Environmental Assessment

Aspects Included in Environmental Assessment	Rationale
6.a./6.b. Archaeological, Architectural and Cultural Heritage	The provision of CBC infrastructure has the potential to impact on the archaeological, architectural and cultural heritage environment. At this stage of the assessment process, a conservative approach has been adopted in assessing the potential for impact and this is further described below.
6.c. Flora and Fauna	The provision of CBC infrastructure has the potential to impact on flora and fauna.
6.d. Soils and Geology	The provision of CBC infrastructure has the potential to impact on soil and geology as a result of land-take and possible ground excavation (including potential to encounter ground contamination).
6.e. Hydrology	The provision of CBC infrastructure has the potential to impact on surface water bodies as a result of land-take (with particular emphasis on floodplains and flood zones).
6.f. Landscape and Visual	The provision of CBC infrastructure has the potential to impact the townscape/streetscape along the CBC route.
6.g. Air Quality	The provision of CBC infrastructure has the potential to impact the air quality along the CBC route.
6.h. Noise & Vibration	The provision of CBC infrastructure has the potential to impact the noise environment along the CBC route.
6.i. 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.

When preparing an Environmental Impact Assessment Report (EIAR) for the preferred route and scheme design, if necessary, the environmental topics that have been scoped out (and others that are not considered relevant for the route options assessment), will have to be reviewed and incorporated into the EIAR as appropriate.

4.4.5.1 Archaeological, Architectural and Cultural Heritage

As discussed above, a conservative approach has initially been adopted in undertaking the route options assessment in relation to the archaeological, architectural and cultural heritage environment. The constraints comprise Recorded Monuments and Protected Structures (RMPs) within 50m of each scheme option, extending to 250 m in greenfield areas.

Sites of archaeological and cultural heritage merit and sites of architectural heritage merit which are directly intersected by the scheme option are also included within the scope of this assessment.

During the detailed design of the proposed scheme, the aim will be to avoid known constraints and/or minimise the number of constraints which may be directly or indirectly impacted by the proposed scheme.

Appropriate mitigation for construction will be included which will seek, where practicable, to ensure preservation in situ of archaeological remains and the avoidance of impacts on archaeological and cultural heritage constraints. A similar approach has been adopted in relation to the route options assessment for architectural heritage.

As a result, the assessment effectively evaluates the potential for impact on architectural heritage from façade to façade which provides for a comparative and qualitative evaluation of Protected Structures along route, in particular along heavily developed sections such as those identified within the City Centre.

However, it is important to note that the CBC route will primarily travel on existing established road networks.

Other than locations of potential significant widening of the existing road curtilage, it is currently not anticipated that adjacent structures and buildings will be impacted by the proposed scheme (while acknowledging that the designation of, and protection afforded to a Protected Structure is not restricted to the structure itself but to all elements within its curtilage, e.g. coal cellars and boundary elements).

Within the City Centre, the selection of a viable route options will involve the running of the CBC service in the vicinity of numerous Protected Structures irrespective of which route section is preferred (archaeological, architectural and cultural heritage is only one of the criteria being considered as part of the MCA analysis).

The detailed design of the proposed scheme will seek to avoid and minimise impacts on architectural heritage.

4.4.6 Scheme Options Summary Table






A scheme options summary table, in Project Appraisal Balance Sheet, (PABS) format has been prepared which collates and summarises the appraisal of scheme options under each of the assessment criterion.

The scheme options summary table is presented in **Appendix A**.

For each individual assessment criterion considered, routes have been relatively compared against each other based on a five point scale, ranging from having significant advantages to having significant disadvantages over other scheme options.

For illustrative purposes, this five point scale is colour coded as presented in with advantageous routes graded to ‘dark green’ and disadvantaged routes graded to ‘dark red’.

Table 4.6: Scheme Options Colour Coded Ranking Scale

Colour	Description
	Significant advantages over the other options
	Some advantages over other options
	Neutral compared to other options
	Some disadvantages compared to other options
	Significant disadvantages compared to other options

At the end of the route options assessment, an overall MCA table is provided, bringing together each of the individual criterion assessments.

A qualitative appraisal of, and conclusions from, the route options assessment is then provided, highlighting the key issues considered in determining recommended scheme options (‘preferred’ and in some instances, where applicable, ‘next preferred’).

A balanced approach is taken when assessing the preferred routes.

All criteria are considered in undertaking the assessment and a lower ranking on one criterion, for example, will not necessarily mean that the route is not suitable.

The recommended scheme options are then collated to provide the emerging preferred end-to-end scheme option.

4.4.7 Conclusion

The outcome from the transport analysis and the findings of the MCA are then finally considered in a holistic manner to derive a preferred “end-to-end” route.

5. Stage 1: Route Sections Assessment

5.1 Introduction

The Study Area is generally bounded to the north by Ballsbridge (south of the River Dodder) and to the south by UCD.

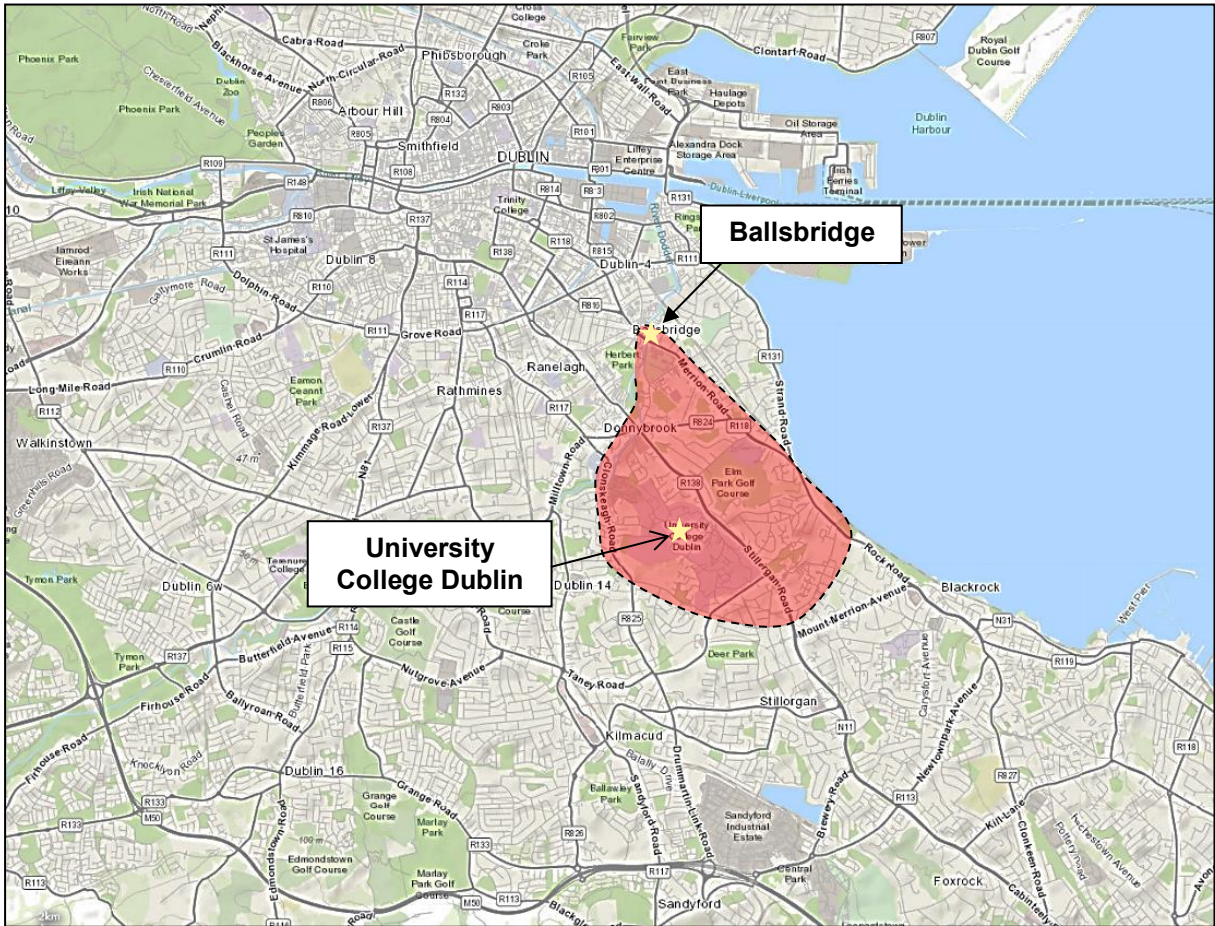


Figure 5.1: Study Area

Within the Study Area, there are a number of route sections which have been considered. The roads available for bus routing have been subdivided into shorter sections for the purposes of the Stage 1 route sections sifting process.

Following the route sifting process, remaining routes sections have been combined to form longer route options where possible.

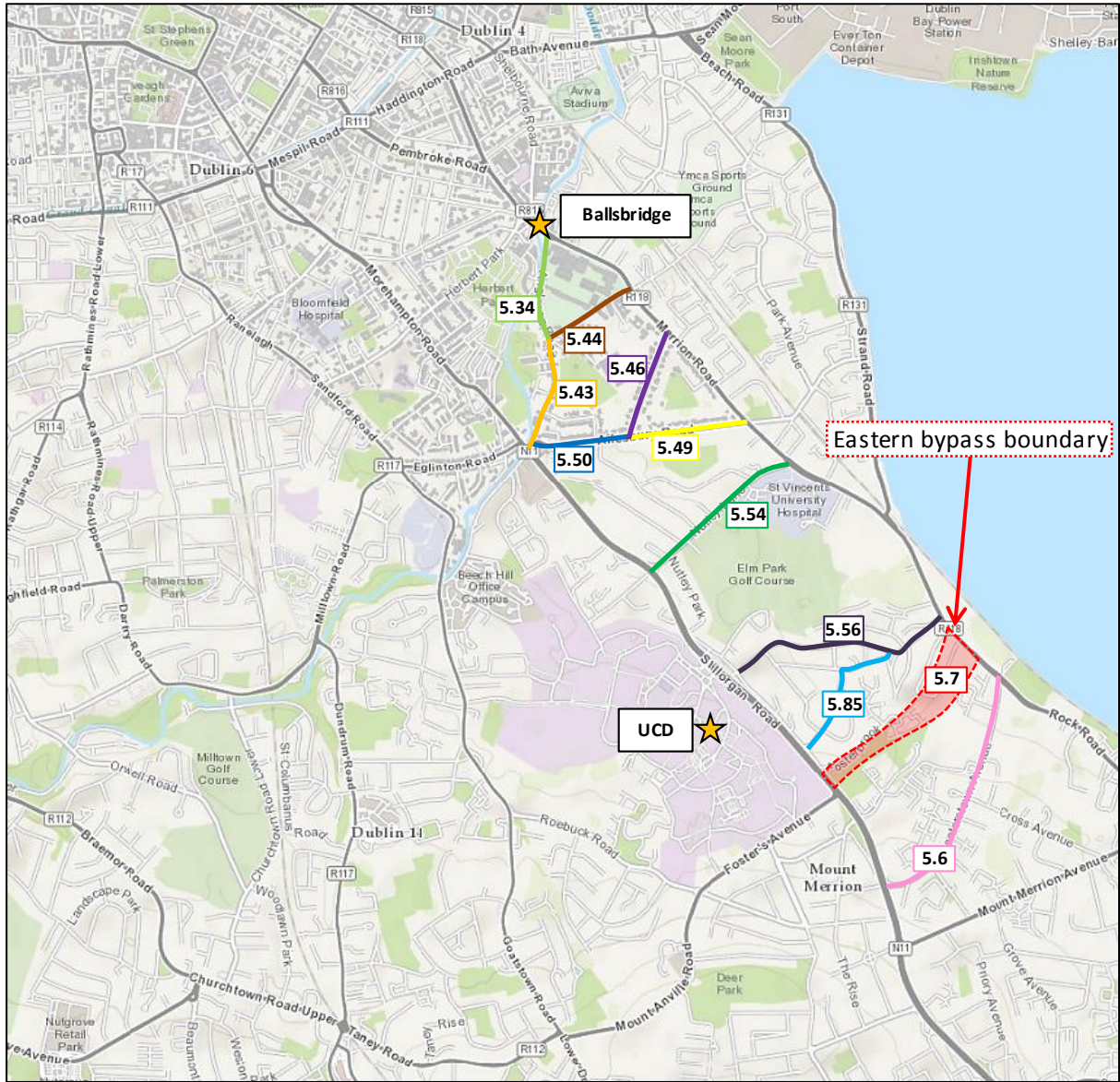


Figure 5.2 presents the initial potential route sections identified. A summary of the Stage 1 route sections sifting process is presented in **Table 5.1**.

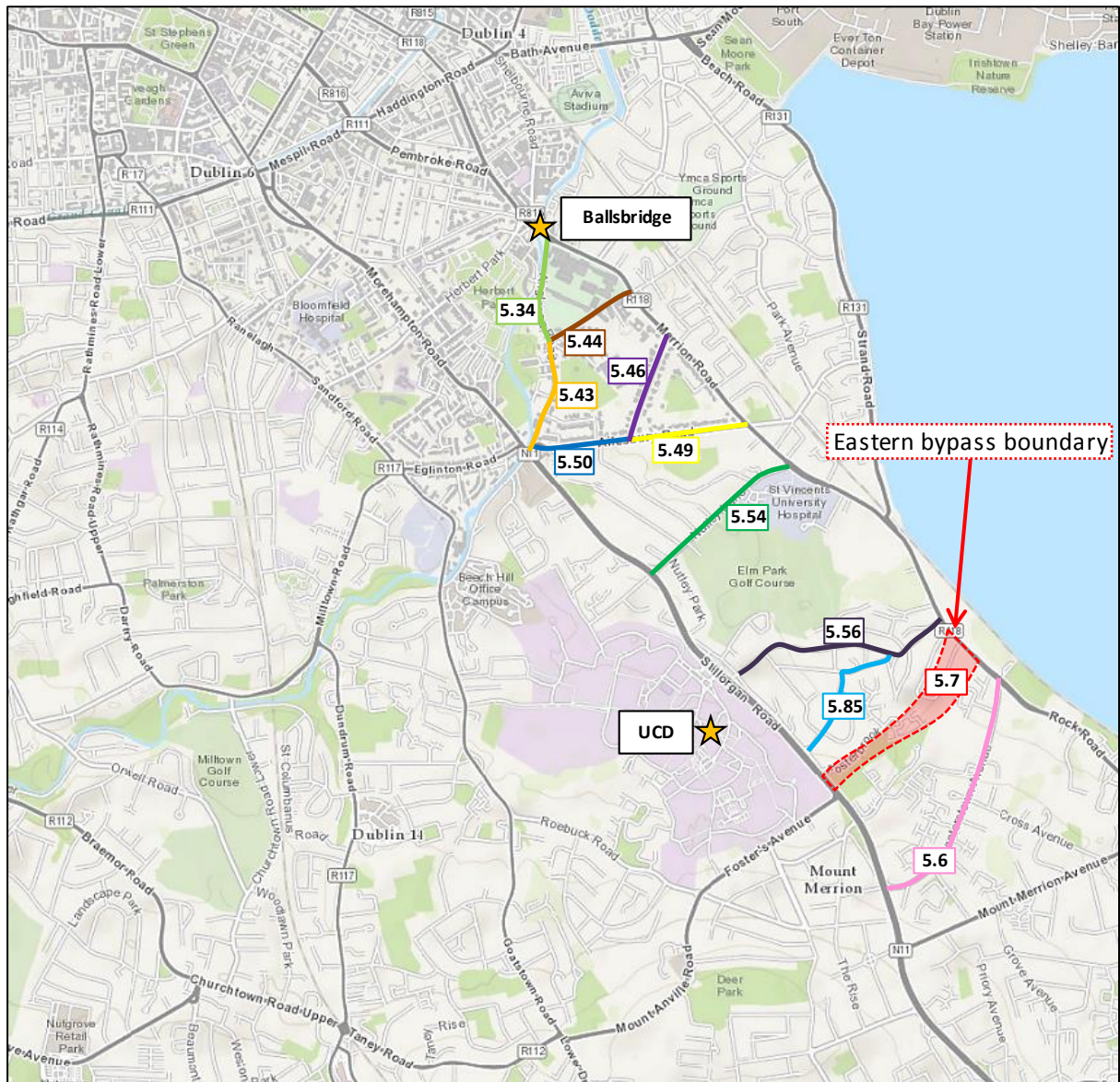


Figure 5.2: Study Area Route Sections

Table 5.1: Route Sections Sifting (Stage 1) Summary

Section No.	Description	Area Characteristics	Summary	Pass/Fail
5.34	Anglesea Road from Pembroke Road to Simmonscourt Road (5.44)	Suburban – Narrow Carriageway width. Traffic calming measures in place. Several pinch points have been identified along the section, between buildings on the grounds of the RDS and the River Dodder which runs parallel to Anglesea Road. Some on-street parking activity.	This section has not identified in the proposed GDA National Cycle Network Plan. Provision of bus facilities would require widening along the majority of this section, with landtake required along the southern part of the route section. The narrow existing carriageway (southern half) has limited scope to widen due to pinch points formed by existing buildings (including RDS) and St Mary's Church which is a Georgian Conservation Area; as a result, this is not a viable route section.	Fail
5.43	Anglesea Road from Beaver Row Junction to Anglesea Road Junction (5.34)	Suburban – Standard width carriageway. On-street parking and footpaths on both sides. No cycle or bus facilities. Traffic calming measures in place. River Dodder runs beside the route for 100m at the southern end.	This section has not been identified in the GDA Cycle Network. Housing along parts of the section is zoned by Dublin City Council as Residential Conservation Areas. Widening would require land take from residential properties on both sides. Some on-street parking activity. Narrow existing carriageway, requiring landtake, with limited scope to widen due to Conservation Areas (on both sides of carriageway in one part of the route section); as a result this is not a viable route section.	Fail
5.44	Simmonscourt Road from Anglesea Road Junction (5.34) to Merrion Road Junction	Suburban – Standard carriageway, wide in parts. On-street parking and footpath on both sides. No existing cycle lanes. Traffic calming measures in place. Existing bus stops. Mature trees along route.	This route section has not been identified on the GDA Cycle Network. Widening would require the removal of on-street parking, mature trees and landtake along parts (eastern end) of the route section. Housing along parts of the section is zoned by Dublin City Council as Residential Conservation Areas. The narrow existing carriageway (eastern end) has limited scope to widen due to pinch points formed by Residential Conservation Areas and St Mary's Church (Georgian Conservation Area); as a result, this is not a viable route section.	Fail
5.46	Shrewsbury Road from Merrion Road Junction to Ailesbury Road Junction (5.49)	Suburban – Standard carriageway. On-street parking and grass verges lined with semi-mature trees on both sides. Traffic calming measures in place. No existing bus or cycle facilities.	This section has not been identified on the GDA Cycle Network. The residential properties on both sides are zoned as Residential Conservation Areas. Provision for bus facility (with no dedicated cycle facilities) would require widening of the carriageway, with removal of on-street parking and trees. However, no land take would be required; as a result, this is a viable route section.	Pass
5.49	Ailesbury Road from Ailesbury Road Junction (5.50) to Merrion Road Junction	Suburban – Standard carriageway. Traffic calming measures in place. No bus or cycle facilities. On-street parking. A number of Embassies are located along the route.	This section has been identified as a feeder route on the GDA Cycle Network. The residential properties on both sides are zoned as Residential Conservation Areas. Provision of bus and cycle facilities would require land take from residential properties on both sides and removal of on-street parking and trees. Land take is required, with limited scope to widen due to Conservation Areas and with a number of Embassies along the section; as a result this is not a viable route section.	Fail

Section No.	Description	Area Characteristics	Summary	Pass/Fail
5.50	Ailesbury Road from Ailesbury Road Junction to Shrewsbury Road junction (5.46)	Suburban – Standard carriageway. Traffic calming measures. On-street parking. Footpaths and grass verges lined with trees on both sides. Russian Embassy located along road.	Section has been identified as a feeder route on the GDA Cycle Network. The residential properties on both sides are zoned as Residential Conservation Areas. Provision of bus and cycle facilities would require land take from residential properties on both sides and removal of on-street parking and trees. Land take is required, with limited scope to widen due to Conservation Areas and with a number of Embassies along the section; as a result this is not a viable route section.	Fail
5.54	Nutley Lane from Stillorgan Road Junction to Merrion Road Junction	Suburban – Traffic calming measures in place. Sydney Parade Train Station is within walking distance. Existing bus stops in both directions. No cycle lanes. Footpaths on both sides. On-street parking in sections.	This route has been identified as a secondary route on the GDA Cycle Network Plan. Provision of bus and cycle facilities would require widening along the majority of this section, requiring landtake. The route is lined by residential property and St. Vincent's University Hospital, Elm Park Golf & Sports Club and RTE Offices. Widening would also require the removal of existing mature trees and on-street parking. While landtake is required, this section provides direct access to key attractors and benefits from existing bus operations along the route, with no identified Conservation Areas; as a result, this is a viable route section.	Pass
5.56	Woodbine Road/Trimleston Avenue from Stillorgan Road Junction to Merrion Road Junction	Suburban – Local access road. On-street parking along a majority of route. No cycle facilities. Footpaths on both sides. Embassy of Germany is located along the route. Residential properties within close proximity on both sides. Small local centre located along route. Traffic calming measures in place.	The section has been identified as a secondary route on the GDA Cycle Network. Provision of bus and cycle facilities would require landtake along the entire route This would encroach on residential private parking and also remove on-street parking. The Embassy of Germany is located along this section which also limits landtake. Narrow existing carriageway, with limited scope to widen; as a result this is not a viable route section.	Fail
5.6	Booterstown Avenue	Suburban – Standard carriageway. No traffic calming measures in place. No bus or cycle facilities. On-street parking. A number of businesses are located along the route.	The section has been identified as a secondary route on the GDA Cycle Network. The provision of bus and cycle facilities would be achievable without land take along a number of stretches on Booterstown Avenue, particularly between South Hill Park and Willow Place (Gleasons bar and restaurant). However, the wide footpaths would need to be reduced and on street parking removed. This section provides direct access to key attractors (e.g. businesses and schools) with no identified Conservation Areas; as a result, this is a viable route section.	Pass

Section No.	Description	Area Characteristics	Summary	Pass/Fail
5.7	Eastern Bypass	Open Space with trees and hedgerow. No existing traffic, bus or cycle facilities. A number of residential estates intersect the eastern bypass area e.g. Castle Court, St. Helen's Road.	A route section has been considered within the proposed eastern bypass boundary since there are already plans to develop road infrastructure along this section. A bus and cycle route could be developed through the eastern bypass area with minimal impact on existing developments e.g. St. Andrew's College, Castle Court, St. Helen's Road and Seamount; as a result, this is a viable route section.	Pass
5.85	Seafield Road/Trimleston Road from Stillorgan Road to Route Woodbine Road/Trimleston Avenue (5.56)	Suburban – Narrow carriageway used for local residential access. On-street parking. No bus stops or lanes. No cycle facilities. Footpaths on both sides. Grass verge on both sides in parts. Tree lined in sections. No road markings. Traffic calming measures in place.	This route has not been identified on the GDA Cycle Network Plan. Provision for bus facilities would require landtake along the entire route. This would encroach on residential private parking and also remove on-street parking. Narrow existing carriageway, with limited scope to widen; as a result this is not a viable route section.	Fail

Following the Stage 1 sift, 4 of the 11 route sections assessed passed the initial sifting stage and were progressed to the next assessment stage.

These route sections are presented in **Figure 5.3**.

Passing route sections are shown in green and those which failed the Stage 1 sift are shown in red.

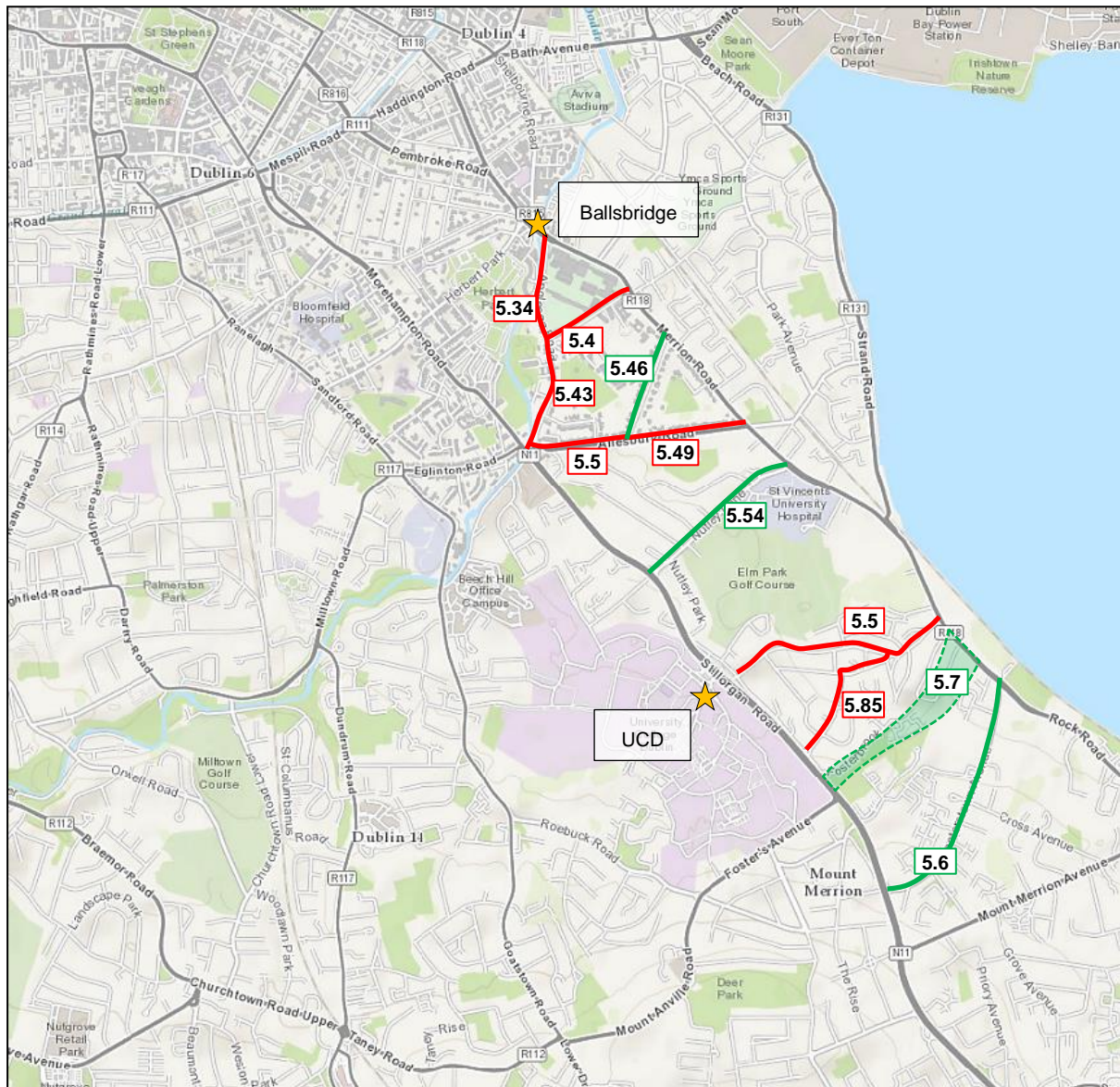


Figure 5.3: Route Sections passing Stage 1 Sift

6. Stage 2: Scheme Options Assessment

6.1 Introduction

The first step in the Stage 2 assessment involves combining shorter route sections which passed the Stage 1 assessment, to form longer end-to-end potential routes within the Study Area.

Three cohesive route options between Ballsbridge and UCD were identified using the remaining routes sections – see Route 1 in **Figure 6.1**.

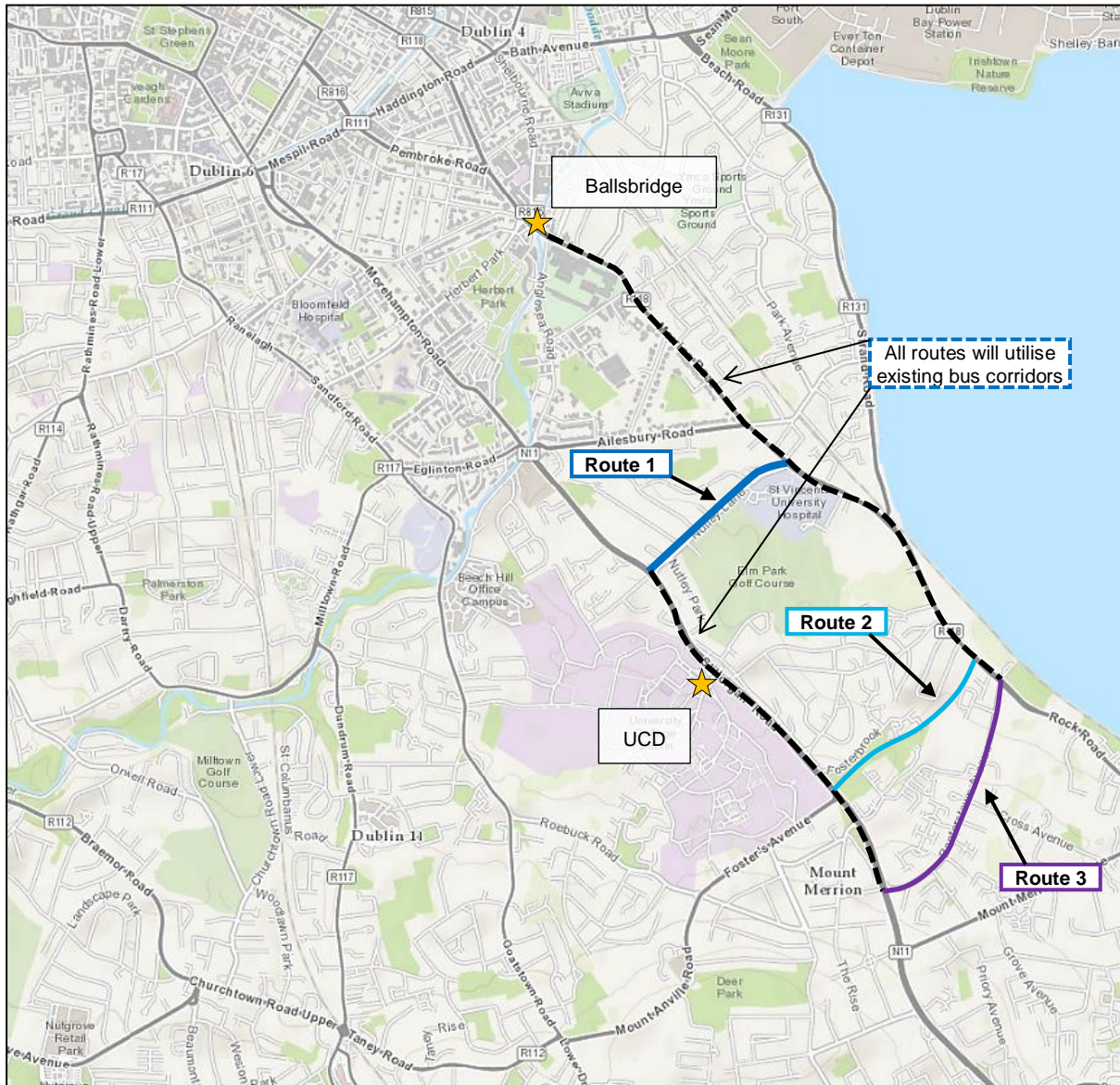


Figure 6.1: Route Option connecting Ballsbridge to UCD

6.2 Route Option 1 – Nutley Lane

6.2.1 Existing facilities

There are no existing bus or cycle lanes along Nutley Lane, though bus stops are provided in both directions. This route has been identified as a secondary route on the GDA Cycle Network Plan. Young and mature trees are planted on the wide footpaths along most of Nutley Lane. Traffic calming measures are in place (ramps) and on-street parking (56 formal parking spaces of which 4 are disabled parking bays, see **Appendix E**) is provided along a number of sections.

6.2.2 Stops

Route Option 1 would use the existing bus stops provided in each direction along this route – see **Figure 6.2**.

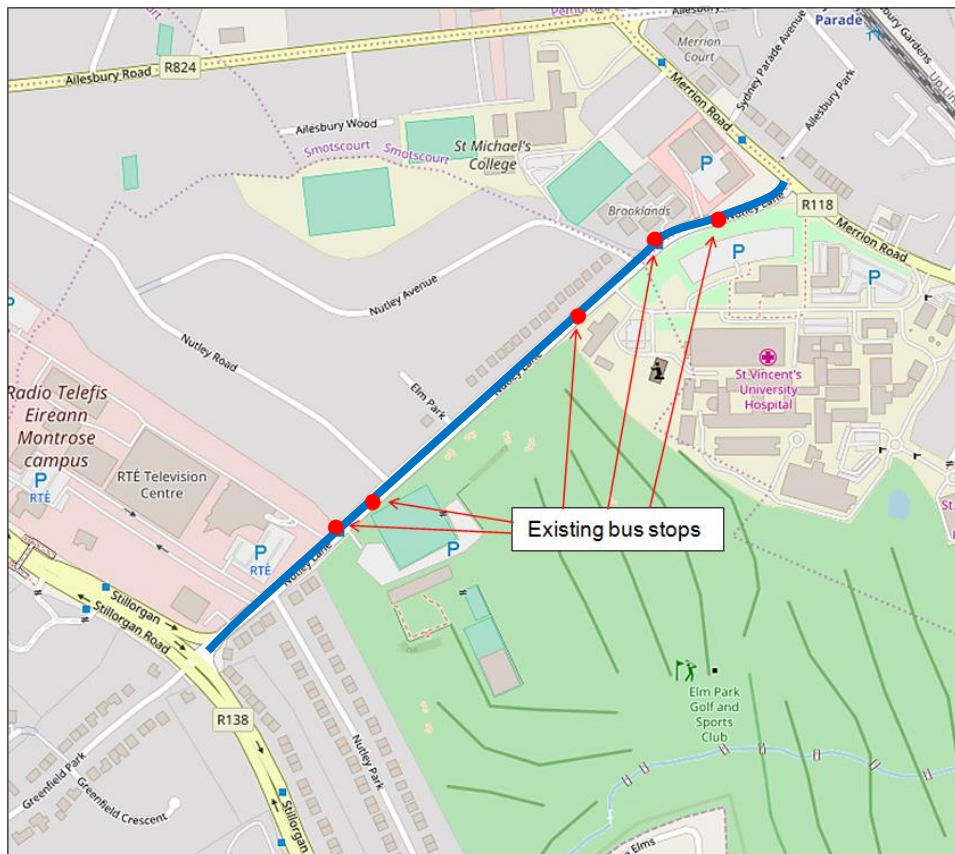


Figure 6.2: Existing bus stop locations

6.2.3 Junctions

There are a total of 3 signalised junctions along Route Option 1. ITS measures may be required to deliver the level of bus priority required for additional bus services.

6.2.4 Constraints

The following constraints would need to be considered if Route Option 1 is progressed:

- The presence of numerous entrances to existing residential properties and commercial establishments e.g. Elm Park Golf & Sports Club, RTÉ Offices and St. Vincent's Hospital;
- The replacement of parallel parking; and
- The presence of trees on footpaths.

6.2.5 Environmental Impact

The impacts are summarised in the MCA table in **Appendix A**.

6.3 Route 1 Scheme Options

Route Option 1 was explored using different design concepts to identify potential scheme options. The three resulting scheme options (1A, 1B and 1C) are detailed below.

6.3.1 Scheme Option 1A

The first scheme option, 1A, would provide a single traffic lane, bus lane and cycle lane in each direction along the entire route, as illustrated in Error! Reference source not found. and Error! Reference source not found..

The provision of this scheme option would require third party land take at various locations along the route. All of the on-street formal parking spaces and trees would be removed to facilitate the proposed works.

For concept design drawings see **Appendix H**.

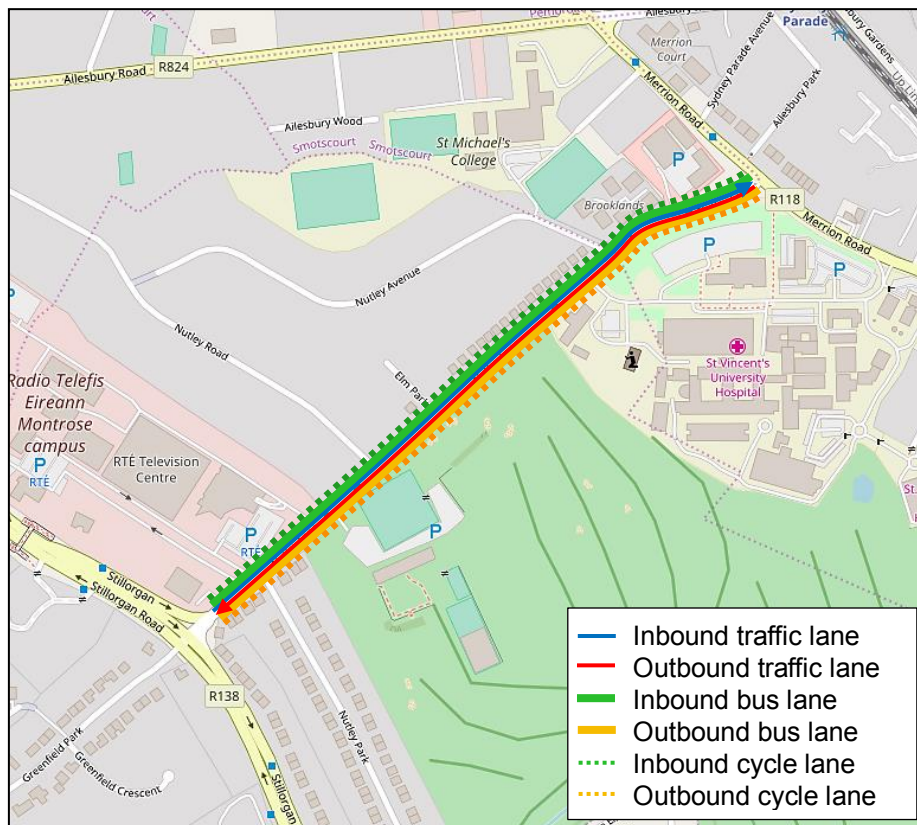


Figure 6.3: Scheme Option 1A

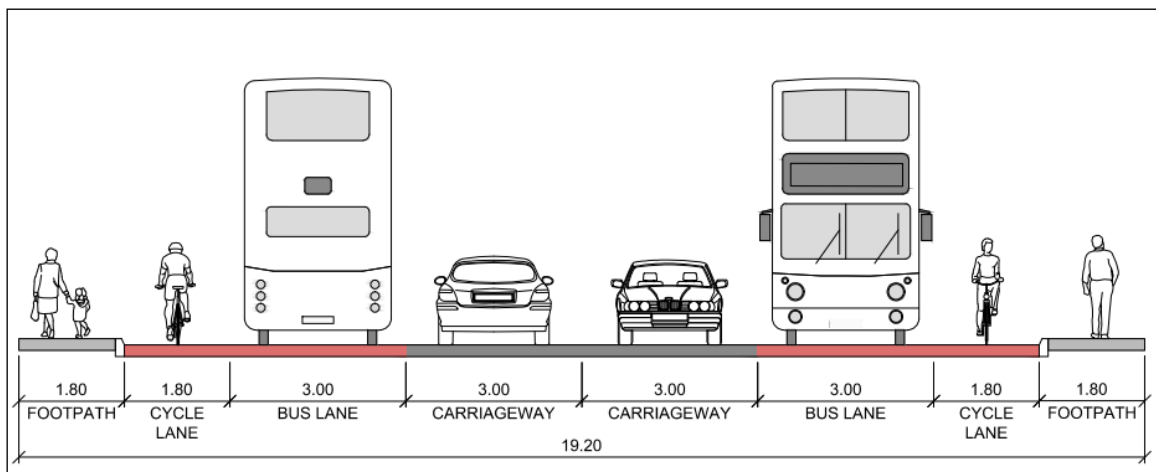


Figure 6.4: Scheme Option 1A – Typical Cross-section

6.3.2 Scheme Option 1B

The second scheme option, 1B, would provide a single traffic lane in each direction and shared outbound bus/cycle lane along the entire route.

A shared inbound bus/cycle lane would be provided along Nutley Lane from the Stillorgan Road junction to just beyond the Nutley Avenue junction; beyond which point a separate bus and cycle lane would be provided up to the Merrion Road junction – see **Figure 6.5** and **Figure 6.6**.

Unlike Scheme Option 1A, the provision of Scheme Option 1B would not require third party land take.

All of the on-street formal car parking spaces and trees would be removed to facilitate the proposed works.

For concept design drawings, refer to **Appendix H**.

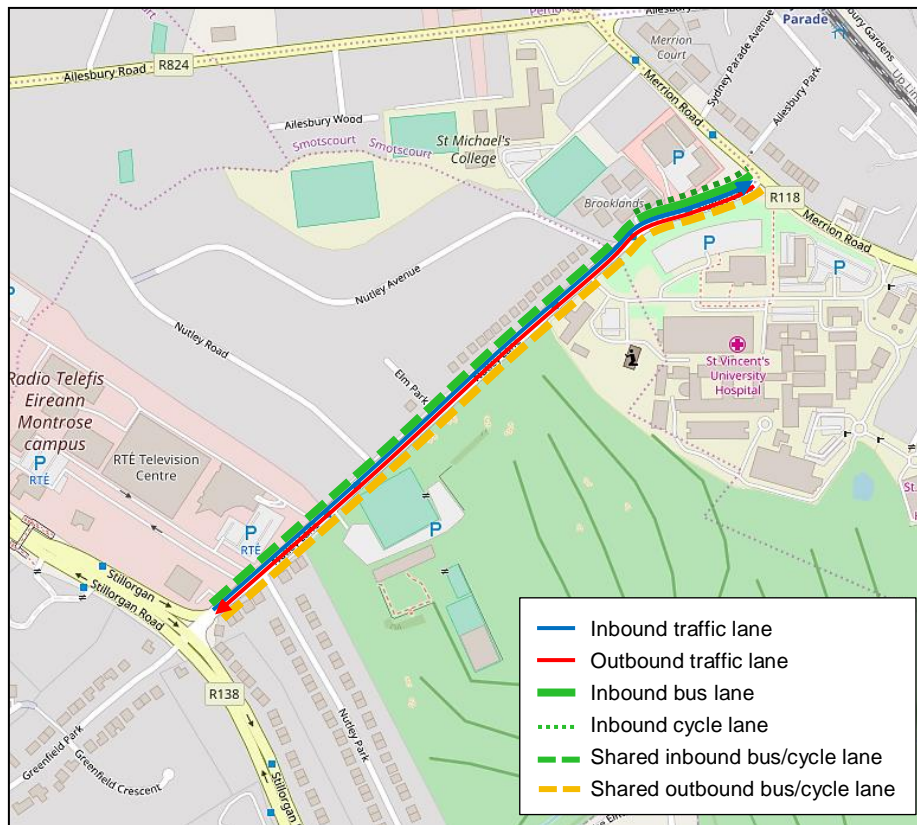


Figure 6.5: Scheme option 1B

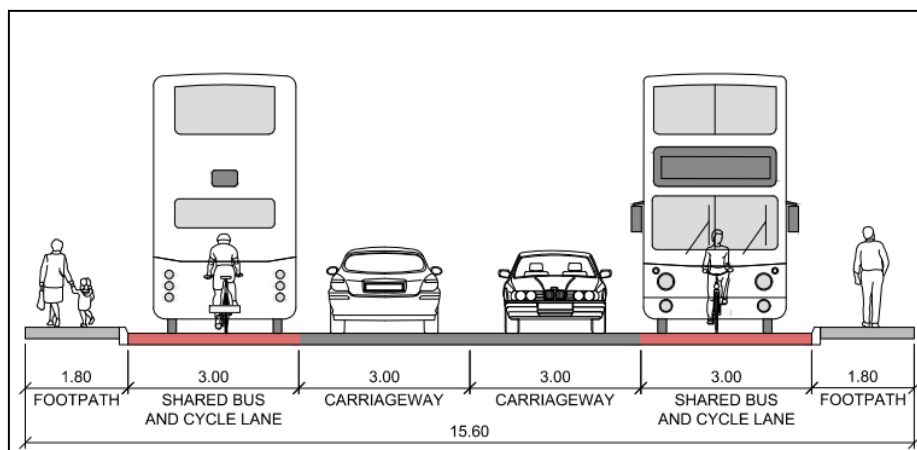


Figure 6.6: Scheme Option 1B – Typical Cross-section

6.3.3 Scheme Option 1C

The third scheme option, 1C, would provide a segregated bus and cycle lane in each direction along the entire length of Nutley Lane. This scheme option proposes a one-way traffic system in the eastbound direction along Nutley Lane between Nutley Avenue and Nutley Road.

Existing westbound traffic travelling between Merrion Road and Stillorgan Road via Nutley Lane would be rerouted via Ailesbury Road. Local access to Nutley Lane would be provided for by a loop around Nutley Avenue and Nutley Road, which would involve opening the existing cul-de-sac (see Figure 6.7 below).

This scheme option would require third party land take. All of the on-street formal car parking spaces and trees would be removed to facilitate the proposed works. For concept design drawings, refer to Appendix H.

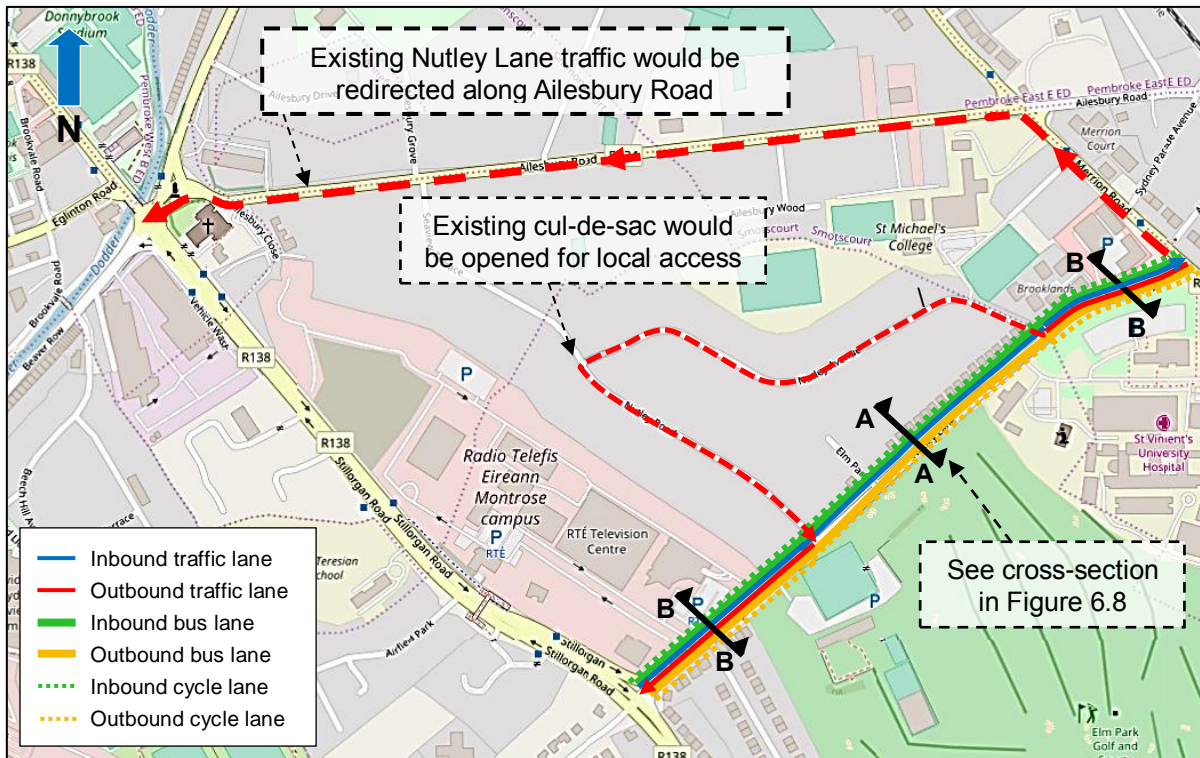


Figure 6.7: Scheme option 1C

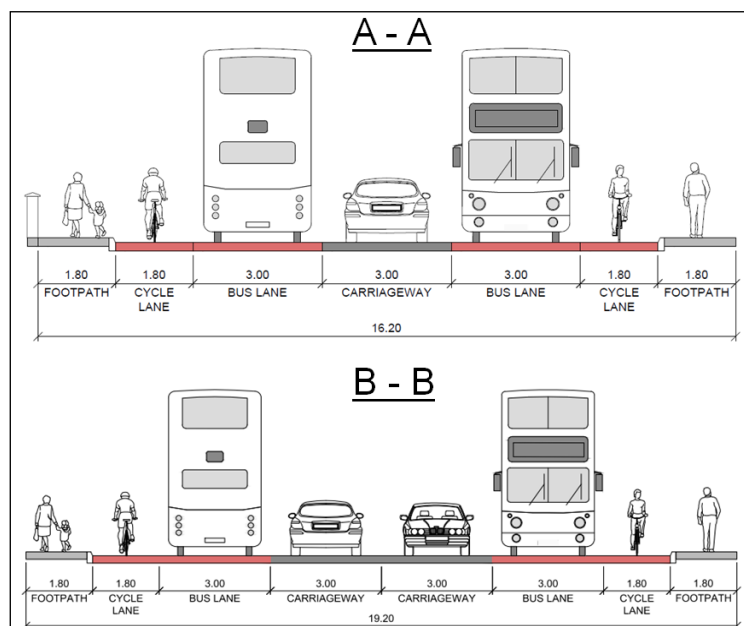


Figure 6.8: Scheme Option 1C – Cross-section

6.4 Route Option 2 – Eastern Bypass route

6.4.1 Existing facilities

There is no existing road infrastructure along this route option, which proposes to connect Stillorgan Road to Rock Road through the grounds of the Radisson Hotel, the undeveloped lands between Seamount Apartments and Saint Andrew’s College and also between St Helen’s Road and Castle Court – indicative route illustrated below.

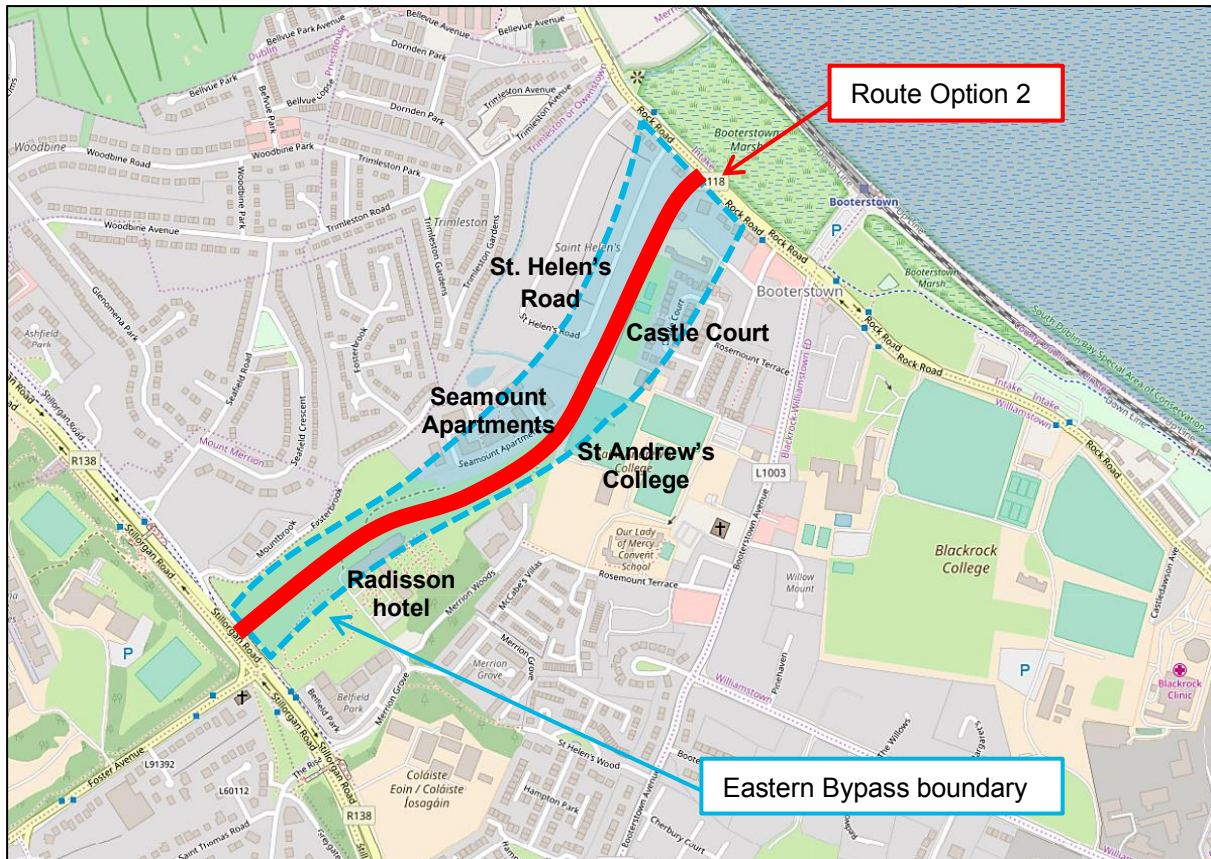


Figure 6.9: Indicative route (Route Option 2) within the boundary area of the proposed Eastern Bypass

Route Option 2 would run within the boundary area of the proposed Eastern Bypass (see Figure 6.9) between the Stillorgan Road and Rock Road. This route alignment would be designed to minimise impact on existing developments within the boundary area.

6.4.2 Constraints

The following constraints would need to be considered if Route Option 2 is progressed:

- The Radisson Hotel;
- Seamount Apartments;
- Merrion Wood/Close;
- St Andrew’s College,
- St Helen’s Road;
- Castle Court,
- St Mary’s Boys National School;
- Grotto Place; and
- The presence of trees along the route.

6.4.3 Environmental Impact

The impacts are summarised in the MCA table in **Appendix A**.

6.5 Route 2 Scheme Options

Route Option 2 was explored using different design concepts to identify potential scheme options. The two resulting scheme options (2A and 2B) are detailed below.

6.5.1 Scheme Option 2A

The first scheme option, 2A, would provide a bus lane and cycle lane in each direction along the majority of the route, as illustrated in Error! Reference source not found. and Error! Reference source not found.11. A footpath would be provided on one side of the route only - adjacent to the inbound cycle lane. The footpath and inbound cycle lane would start off as a shared pedestrian / cyclist facility for the first 150m from the Rock Road to avoid demolition along this section.

The provision of this scheme option would require third party land-take at various locations along the route, particularly from back gardens of the houses along St Helen's Road i.e. in order to avoid impact on St. Mary's Boys National School grounds.

For concept design drawings see **Appendix H**.

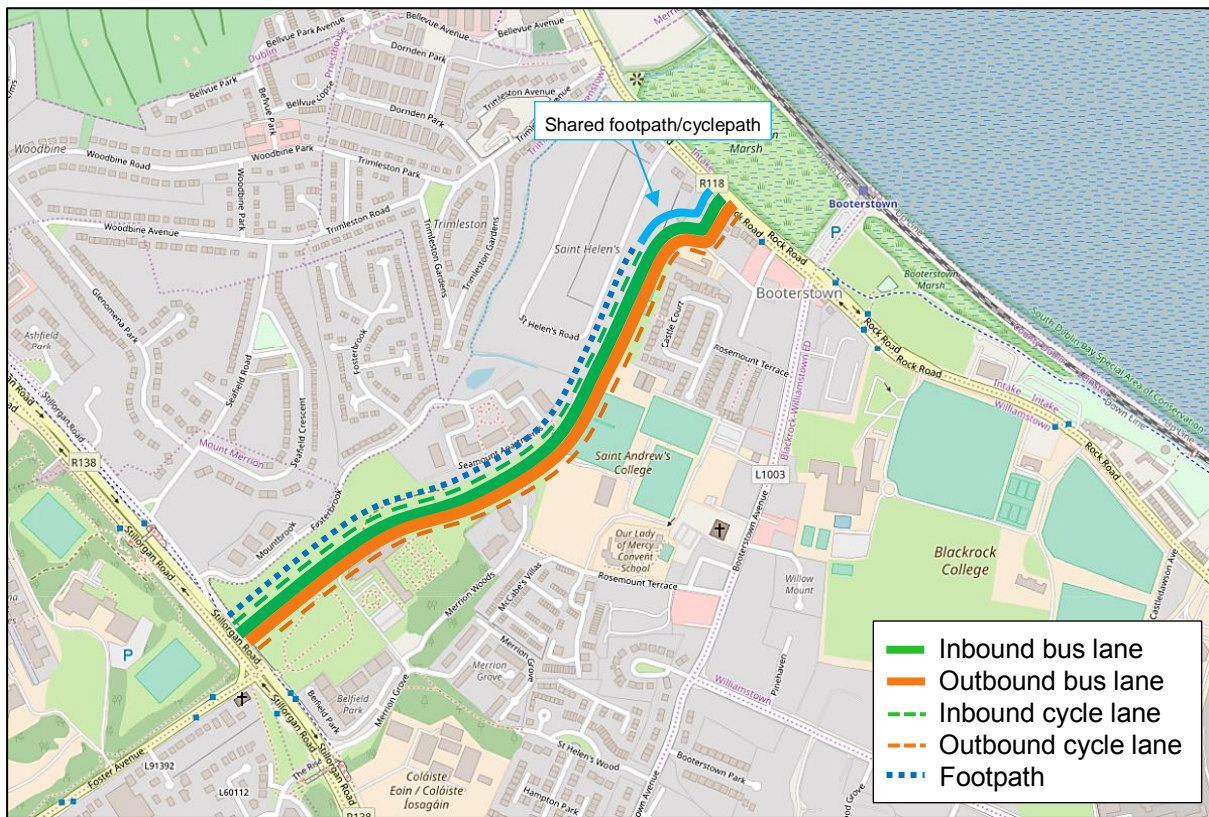


Figure 6.10: Scheme Option 2A

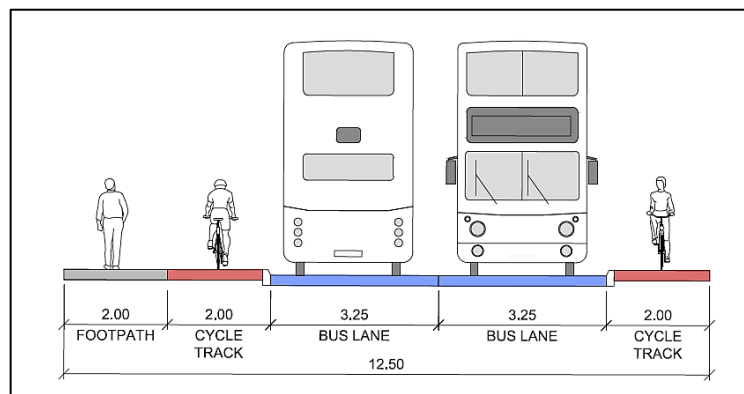


Figure 6.11: Scheme Option 2A – Typical Cross-section

6.5.2 Scheme Option 2B

Scheme Option 2B would provide a bus lane, cycle lane and footpath in each direction along the entire route, as illustrated in Error! Reference source not found. and Error! Reference source not found.13.

The provision of this scheme option would require third party land-take at various locations along the route, particularly from back gardens of the houses along St Helen's Road in order to avoid impact on St. Mary's Boys National School grounds. Demolition of a small number of structures fronting onto Rock Road would be required.

For concept design drawings see **Appendix H**.

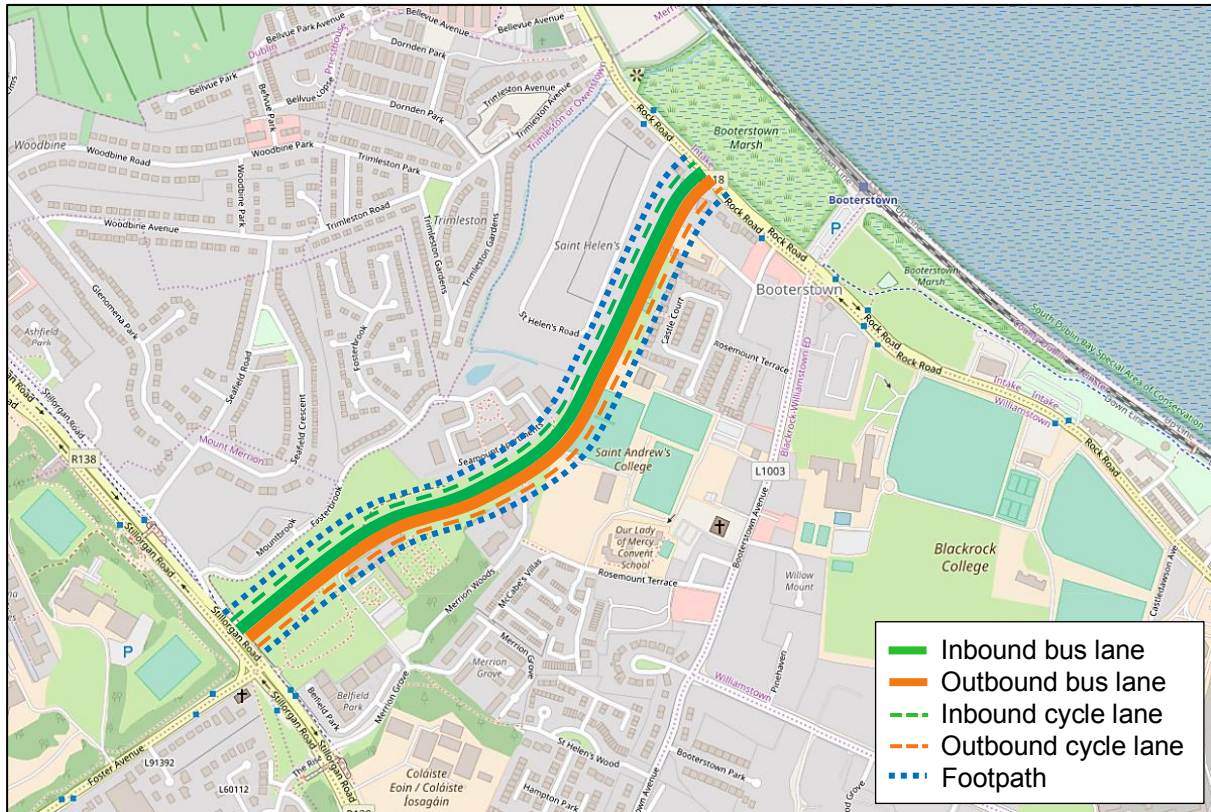


Figure 6.12: Scheme Option 2B

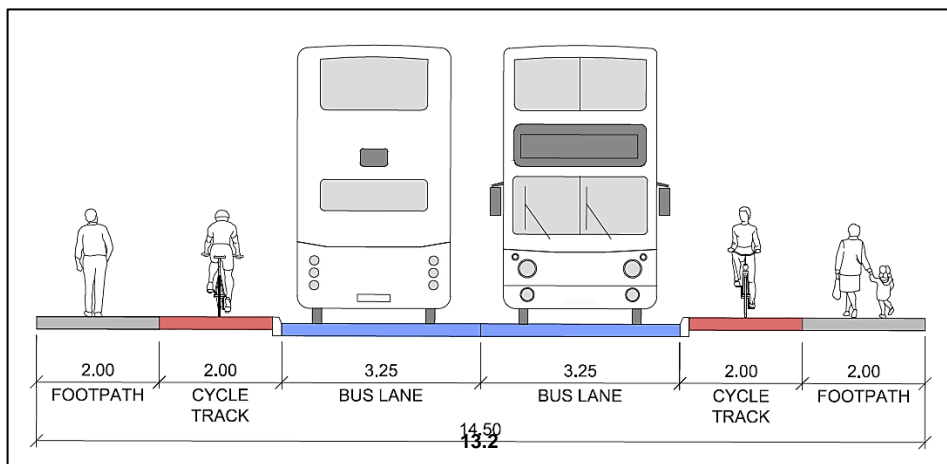


Figure 6.13: Scheme Option 2B – Typical Cross-section

Route Option 3 – Booterstown Avenue

6.5.3 Existing facilities

There are no existing bus lanes / bus services along Booterstown Avenue, which comprises of a wide (for the most part) two-way carriageway. Additionally, there are no cycle lanes along this route, though Booterstown Avenue has been identified as a secondary cycle route on the GDA Cycle Network Plan.

The footpaths either side of the carriageway are quite wide along the majority of the route, with a number of pinch points / narrow sections. On-street parking is provided between Booterstown Grove and Cross Avenue; many of the houses and businesses along this section do not have private off-road parking.

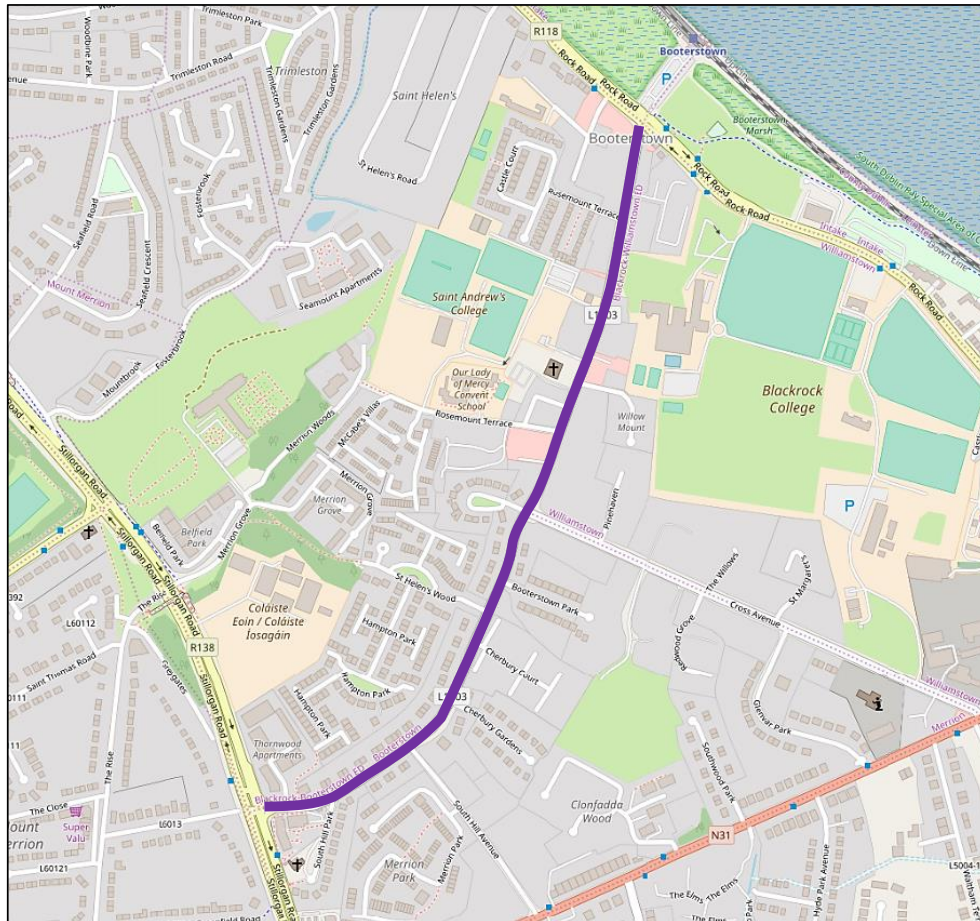


Figure 6.14: Route Option 3

6.5.4 Junctions

There are a total of three signalised junctions along Route Option 3 and one pedestrian crossing. ITS measures may be required to deliver the level of bus priority required for additional bus services.

6.5.5 Constraints

The following constraints would need to be considered if Route Option 3 is progressed:

- The presence of numerous entrances to existing residential properties, local businesses and commercial establishments e.g. Gleasons, Booterstown Pharmacy, Booterstown Parish.
- The replacement of parallel parking; and
- The presence of trees on footpaths.

6.5.6 Environmental Impact

The impacts are summarised in the MCA table in **Appendix A**.

6.6 Route 3 Scheme Options

Route Option 3 was explored using different design concepts to identify potential scheme options. The two resulting scheme options (3A and 3B) are detailed below.

6.6.1 Scheme Option 3A

The first scheme option, 3A, would replace the existing traffic lanes with bus lanes along the entire route. Booterstown Avenue would be accessible to local traffic only. Separate bus and traffic lanes would not fit within the existing width of Booterstown Avenue without significant land-take / demolition; hence this was not considered as an option.

No land-take would be required with Scheme Option 3A though all of the on-street formal parking spaces would be removed to facilitate the proposed works.

For concept design drawings see **Appendix H**.

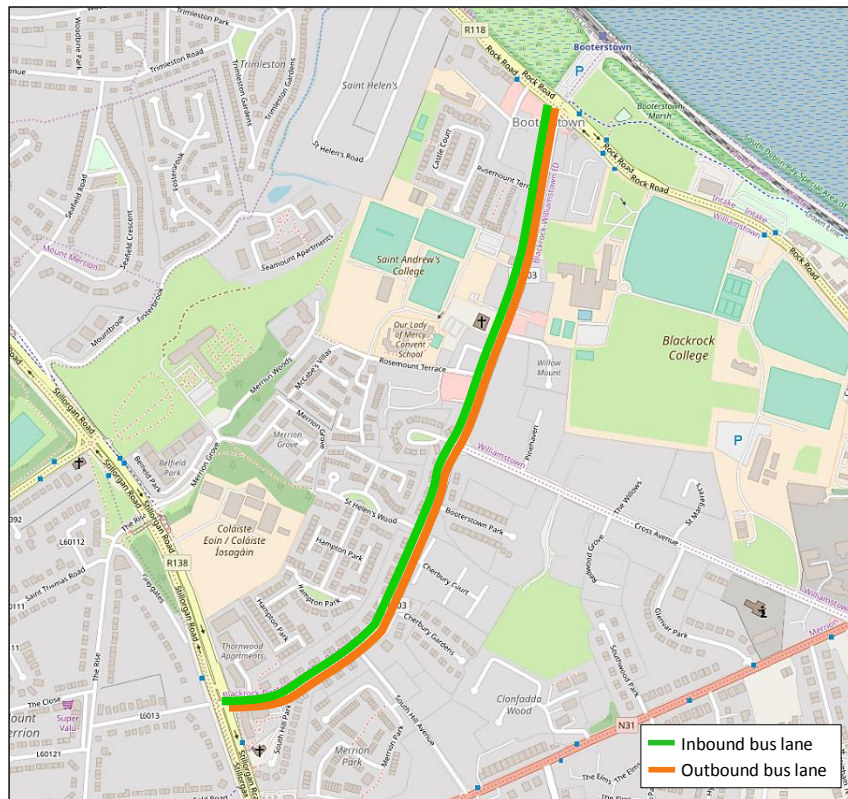


Figure 6.15: Scheme Option 3A

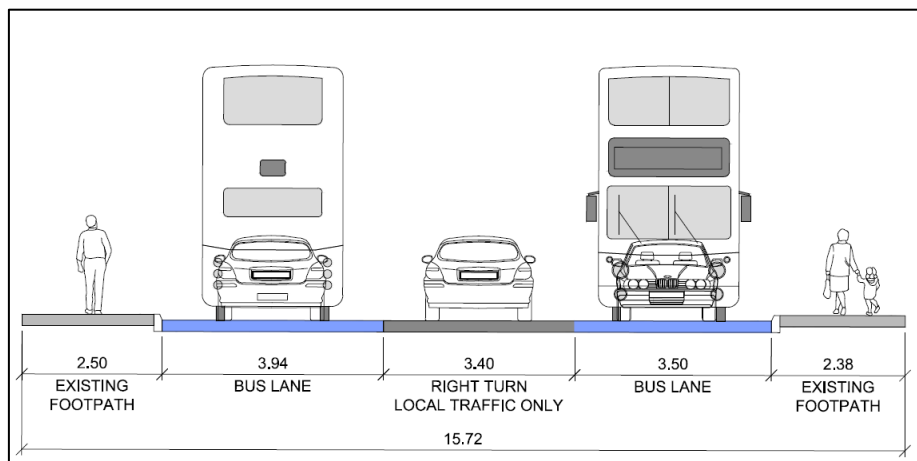


Figure 6.16: Scheme Option 3A – Typical Cross-section

6.6.2 Scheme Option 3B

Scheme Option 3B would maintain a traffic lane in both directions but would also provide an inbound bus lane where it could be achieved without avoid land-take / demolition; see in Error! Reference source not found. and Error! Reference source not found. No land-take would be required though footpath widths would need to be reduced to 1.8m in sections, as well as a small number of pinch points where the footpath would reduced to 1.5m. All of the on-street formal parking spaces would be removed to facilitate the proposed works.

For concept design drawings see **Appendix H**.

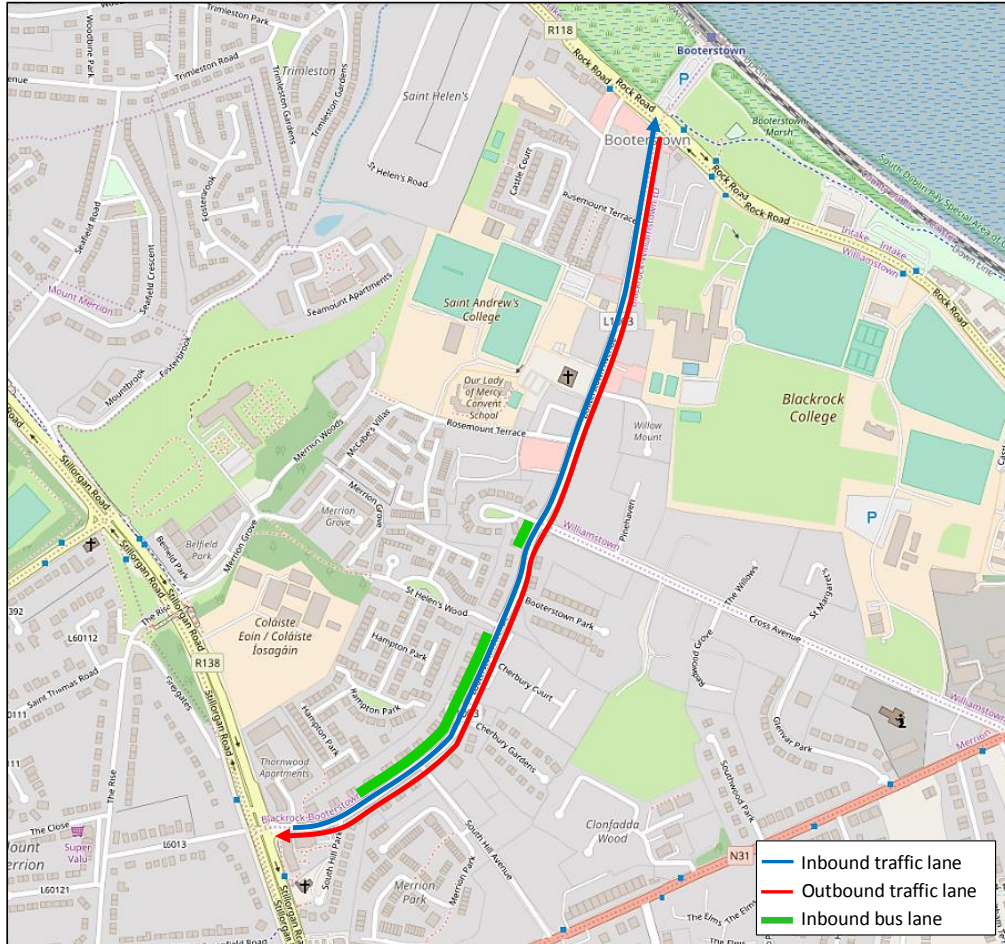


Figure 6.17: Scheme Option 3B

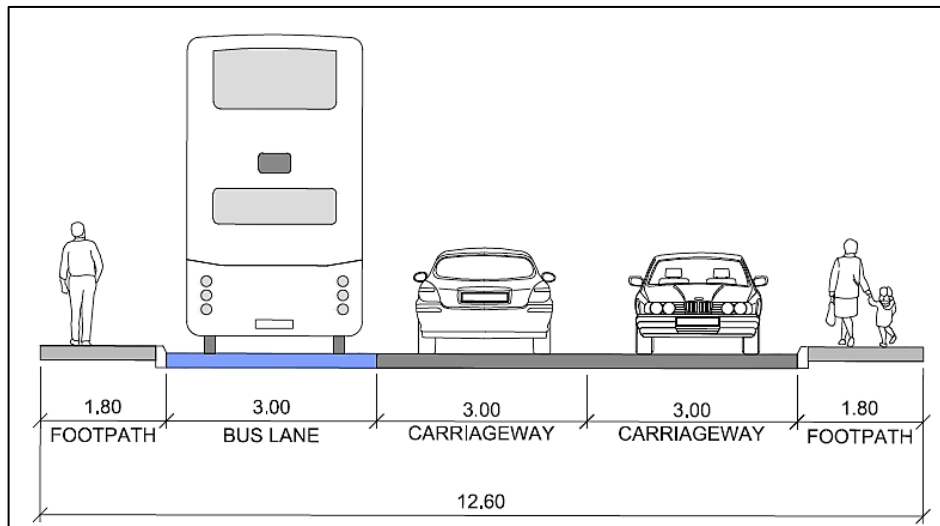


Figure 6.18: Scheme Option 3B – Typical Cross-section

Summary

All scheme options were brought forward to MCA to identify the most appropriate design for Route 1.

A summary of the MCA results is presented in **Table 6.1**.

Neutral scoring sub-criteria are omitted from the summary table i.e. where scheme options score neutrally to other options.

The full MCA table including a justification for the sub-criteria scoring awarded to each scheme option is presented in **Appendix A**.

In terms of **Economy**, Route 1 scheme options would be the lowest costing; Route 1 is shorter than Route 3 (less infrastructural works) and would require less land-take than Route 2. Route 1 scheme options would offer relatively faster and more reliable bus journey times due to the shorter length of Nutley Lane and the segregation of buses with Scheme Option 1A and 1C, in particular.

Furthermore, Route 1 scheme options scored highest under **Integration** as they would best integrate bus lanes within the existing traffic network while also providing cycle facilities. In particular, Scheme Option 1A and 1C propose segregated cycle lanes which would be safest for cyclists and in line with the GDA Cycle Network Plan, which identifies Nutley Lane as a secondary cycle route. Route 1 has potential to integrate with an 800-unit planned development in Montrose campus.

Route 1 and 3 scheme options would serve a greater residential and employment catchment than Route 2, with more key trip attractors along their length e.g. St. Vincent's Hospital and RTE Studios along Route 1, and Willow Park and St. Andrew's College along Route 3. There are significantly fewer developments within the immediate vicinity of Route 2; this route would not be as accessible to local residential estates/businesses. Hence, Route 1 and Route 3 scheme options score higher under **Accessibility**.

However, by removing buses, cyclists and pedestrians from the vicinity of traffic and junctions, Route 2 scheme options are anticipated to be safer for cyclists and pedestrians in particular. Therefore, Scheme Option 2A and 2B scored highest under **Road Safety**.

Route 2 scheme options would have the most significant impact on trees, landscape and visual. As a result, Scheme Option 2A and 2B scored lowest under **Environment**. Route 1 scheme options would require the removal of the trees along the length of Nutley lane which and consequently impact on the landscape and visual. Route 3 scheme options do not propose additional traffic lanes (existing lanes would be used for buses/traffic) and would not require any land-take. Scheme Option 3A and 3B are anticipated to have the least significant environmental impacts.

Overall, Scheme Option 1A scores highest and hence will form Route 1.

Table 6.1: Route 1 MCA

MCA criteria	Assessment Sub-Criteria	Scheme option							
		1A	1B	1C	2A	2B	3A	3B	
Economy	1.a. Capital Cost	Yellow	Green	Yellow	Red	Red	Green	Green	
	1.b. Transport Reliability and Quality (Journey Time)	Green	Yellow	Green	Green	Green	Green	Red	
Integration	2.a. Land Use Integration	Green	Green	Green	Yellow	Red	Green	Green	
	2.b. Residential Population & Employment Catchments	Green	Green	Green	Yellow	Yellow	Green	Green	
	2.d. Cycle Network Integration	Green	Yellow	Green	Green	Green	Red	Red	
	2.e. Traffic Network Integration	Green	Green	Red	Red	Red	Red	Green	
Accessibility	3.a. Key Trip Attractors	Green	Green	Green	Yellow	Yellow	Green	Green	
Safety	4.a. Road Safety	Green	Yellow	Yellow	Green	Green	Green	Red	
Environment	6.c. Flora & Fauna	Yellow	Yellow	Yellow	Red	Red	Green	Green	
	6.f. Landscape and Visual	Yellow	Green	Yellow	Red	Red	Green	Green	
	6.g. Air Quality	Green	Green	Yellow	Yellow	Yellow	Green	Green	
	6.h. Noise and Vibration	Green	Green	Yellow	Yellow	Yellow	Green	Green	
	6.i. Land Use Character	Yellow	Yellow	Yellow	Green	Green	Yellow	Yellow	

7. Emerging Preferred Route

7.1 Introduction

This section of the report presents:

- the final conclusions from the assessment process, for the end-to-end route / scheme options considered; and
- recommends an emerging preferred scheme option, including a description of the scheme proposals, which include ancillary measures on other streets, if required.

7.2 Route Options Assessment Conclusions

Within the Study Area, where potential route options were considered to be available, they have been assessed in accordance with the methodology set out in Chapter 4 including a 'Multi-Criteria Analysis' under the headings of Economy, Integration, Accessibility and Social Inclusion, Safety, Physical Activity and Environment.

7.3 Scheme Description

Based on the conclusions from the route options assessment process, the recommended emerging preferred route for the proposed scheme is presented in **Figure 7.1**.

Refer to **Appendix H** for concept drawings.

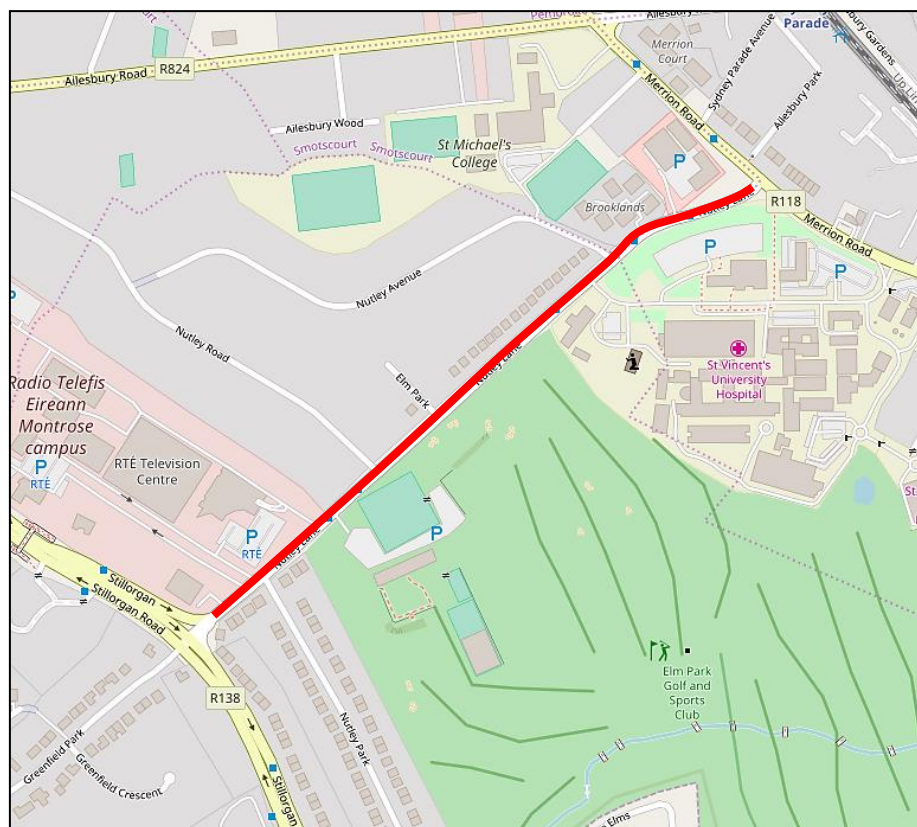


Figure 7.1: Emerging preferred route

7.3.1 Scheme Option 1A

The emerging preferred scheme option, 1A, will provide a single traffic lane, bus lane and cycle lane in each direction along the entire route, as illustrated in **Figure 7.2** and **Figure 7.3**.

Both directions of Nutley Lane align with a secondary cycle route, as identified in the GDA Cycle Network Plan, which connects two primary cycle corridors i.e. Merrion Road and Stillorgan Road.

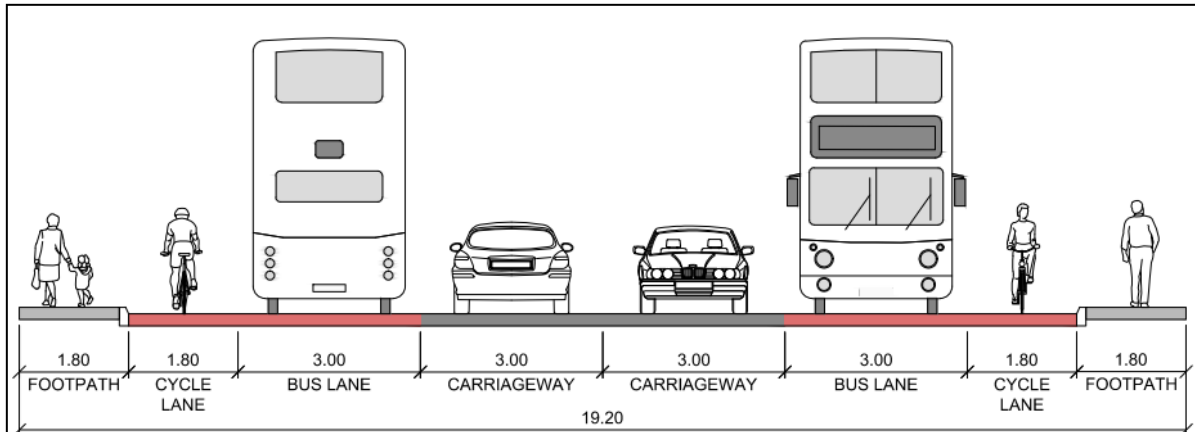


Figure 7.2: Scheme Option 1A – Typical Cross-section

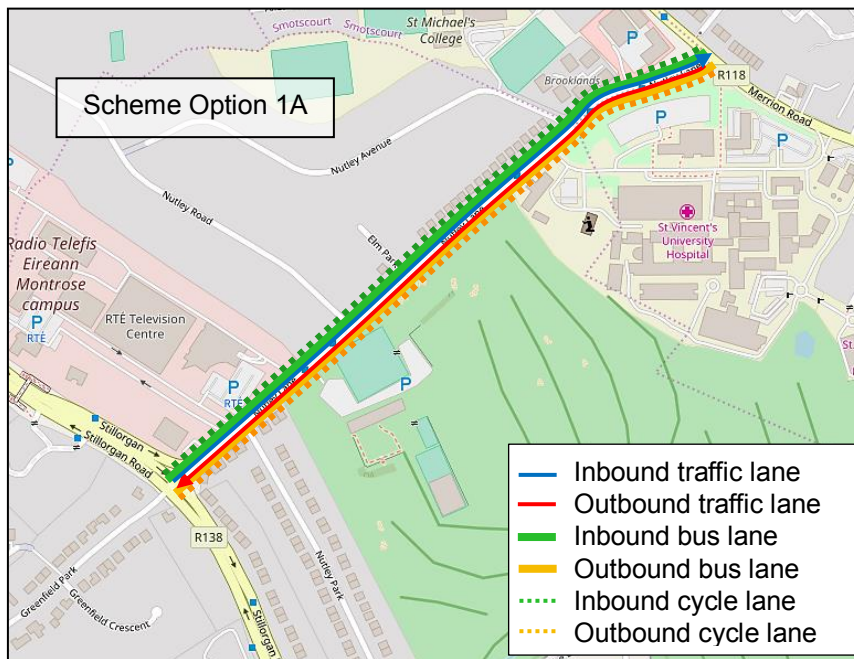


Figure 7.3: Emerging preferred scheme option

Nutley Lane will facilitate the interchange between two proposed Core Bus Corridors i.e. Dun Laoghaire to City Centre CBC and UCD to City Centre CBC.

The provision of this scheme option will require third-party land take at various locations along the route.

On-street parking spaces and trees would also be removed to facilitate the proposed works. This is to provide continuous bus priority along the route which will ensure increased reliability and faster journey times.

The scheme will reduce commuting time for public transport; the estimated bus travel time along Nutley Lane will be 3 minutes in each direction, using the segregated bus lanes.

Considerable benefits for pedestrian accessibility and bus priority will be provided through reconfiguration of existing junctions, making the bus routes more attractive.

The junctions along the scheme route will be designed to prioritise bus movements. Proposals for the two main junctions along the route are illustrated in **Figure 7.4** and **7.5**.

Figure 7.4 illustrates the proposed design for the Nutley Lane / Stillorgan Road junction. Buses travelling between UCD and Ballsbridge will be prioritised through dedicated bus lanes and bus gates on Nutley Lane and Stillorgan Road. This will allow for a separate stage for buses turning right onto Nutley Lane and turning left on Stillorgan Road i.e. from Nutley Lane.

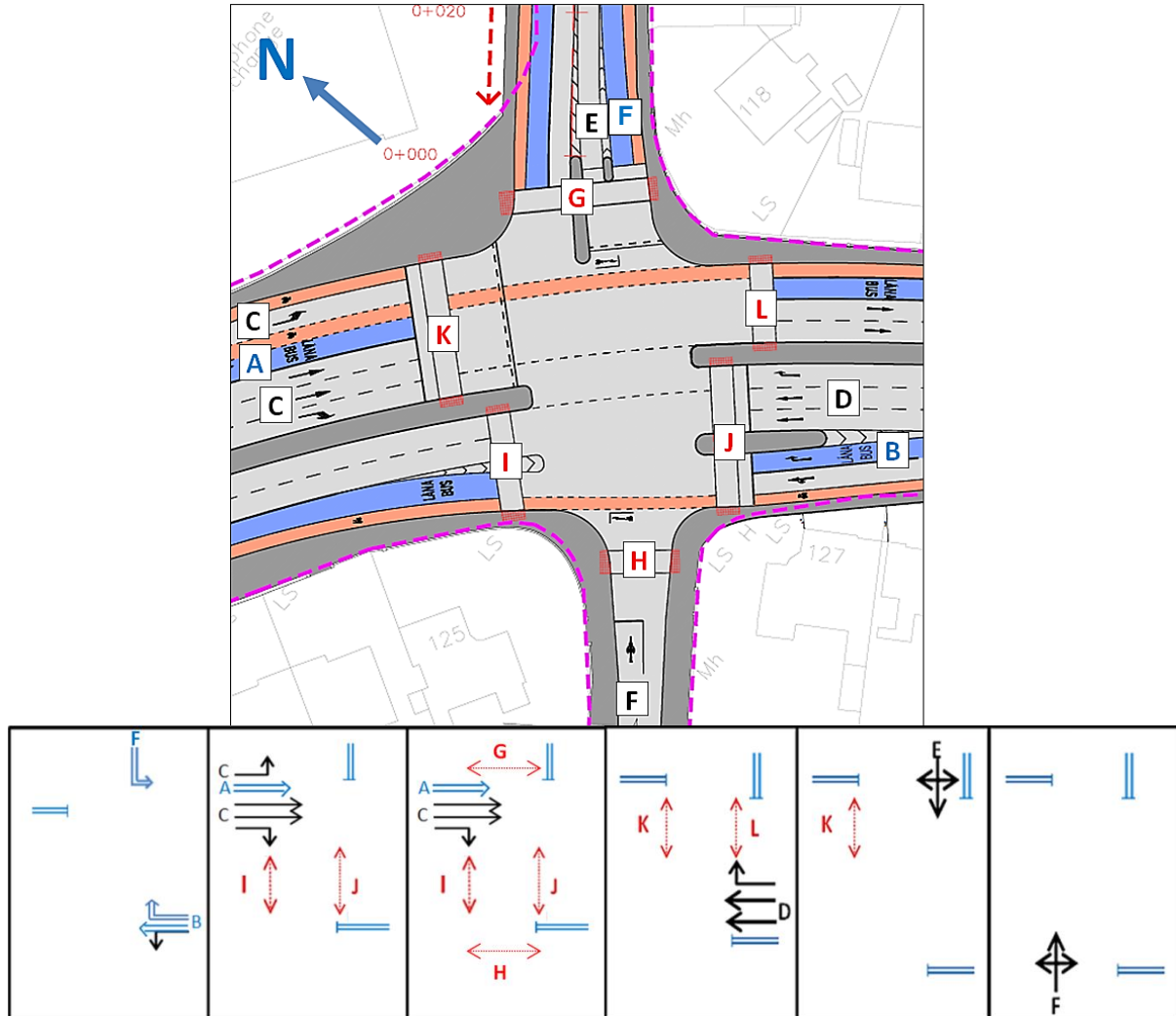


Figure 7.4: Nutley Lane / Stillorgan Road Junction Staging Diagram

Figure 7.5 illustrates the proposed design for the Nutley Lane / Merrion Road junction. Buses travelling between UCD and Ballsbridge will be prioritised through dedicated bus lanes and bus gates on Nutley Lane and Merrion Road. This will allow for a separate stage for buses turning right onto Nutley Lane and turning left on Merrion Road i.e. from Nutley Lane.

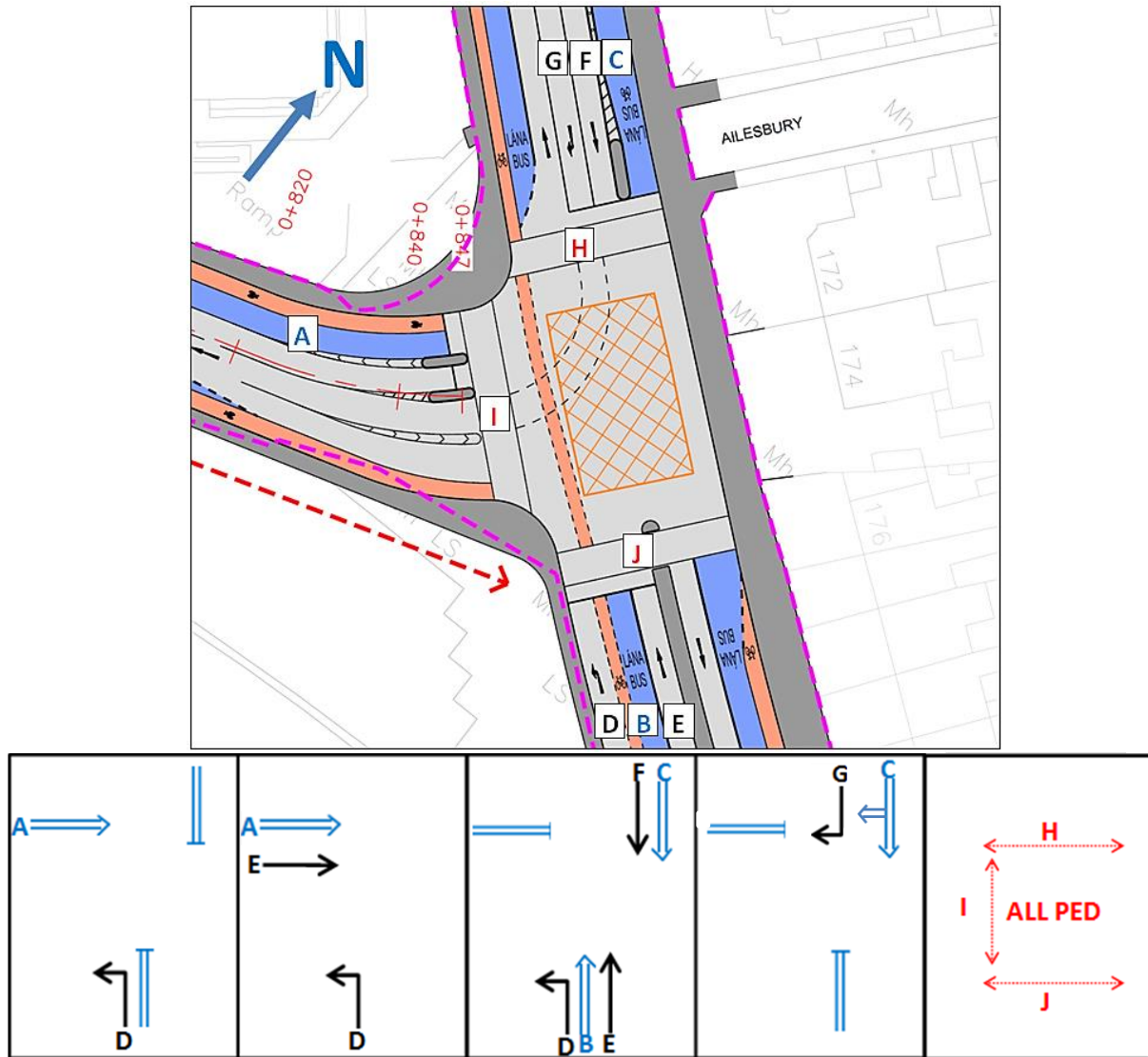


Figure 7.5: Nutley Lane / Merrion Road Junction Staging Diagram

8. Feasibility Working Cost Estimate

8.1 High Level Cost Estimate

A cost estimate for the Emerging Preferred Option has been developed for the scheme and is indicated in **Table 8.1** below. It was developed primarily based on standard rates that AECOM-ROD have available from similar types of projects in Dublin and includes high level information on the typical urban streetscape construction including:

- Preliminaries;
- Site Clearance;
- Earthworks;
- Pavement;
- Kerbs and Footways;
- Traffic Signs and Markings;
- Other Items (Ramps, Traffic Signals, Pedestrian Crossings, Street Lights, Landscaping, Boundary); and
- High Level Land Acquisition Costs.
- A detailed cost estimate and significant further work would be required to provide a more accurate cost at the subsequent stage of development. This detailed estimate would need to allow for Risk, Contingencies and future inflation etc.

Table 8.1: Feasibility Working Cost Estimate for Emerging Preferred Scheme Option

Cost Type	Total Capital Cost Estimate
Infrastructural	€ 2.93M
Land Acquisition	€0.37M
Total	€3.30M

8.2 Exclusions

The high-level cost estimate for the emerging preferred route option does not consider:

- Land acquisition costs from the following properties have not been included as this is subject to confirmation:
 - Eircom;
 - RTE;
 - Elm Park Golf Course; and
 - St Vincent Hospital.
- Professional Fees;
- Planning Costs;
- Marketing;
- Capital Contributions;
- Inflation;
- VAT;
- Costs associated with neighbouring proposed projects (e.g. Dun Laoghaire CBC);
- Potential city centre cellar works and acquisition of private landings;
- Administration and management costs; and
- Maintenance costs.

9. Emerging Preferred Scheme Benefits

The emerging preferred scheme option will deliver on-street infrastructure necessary to achieve practical continuous bus priority along the Ballsbridge to UCD bus corridor, through the provision of enhanced bus lanes. This way, delays that currently occur along specific sections and at constrained locations will be removed/minimised enabling the bus to become a faster and more attractive alternative to car traffic along the route. The bus system is envisaged to become more efficient and faster bus journeys mean that more people will be moved with the same level of vehicle and driver resources.

The emerging preferred scheme option will provide significantly enhanced cycle facilities with high Quality of Service along the route, as also required under the Greater Dublin Area Cycle Network Plan.

The emerging preferred scheme option design integrates with existing and future planned development and transport infrastructure schemes in the vicinity of the Study Area.

The emerging preferred scheme design incorporates traffic management techniques to maximise level of services for all road users, following the principles included in the Design Manual of Urban Streets and Roads and taking into account issues such as permeability, personal security, traffic conditions, mobility impaired access, and safe crossing of roads.

In summary, the emerging preferred scheme option will have the following benefits:

- Increased reliability and faster journey times due to bus priority;
- Reduction of commuting time for public transport;
- Reduction of car congestion and enhancement of attractiveness of urban centres;
- Provision of safe cycling facilities and the opportunity for more people to cycle along the Ballsbridge to UCD bus corridor (Nutley Lane);
- Reconfiguration of existing junctions, which will provide considerable benefits for pedestrian accessibility and bus priority, making the bus routes more attractive;
- Interchange with neighbouring CBC routes i.e. Dun Laoghaire to City Centre CBC and UCD to City Centre CBC;
- Interchange with the proposed Orbital Bus Network (GDA Transport Strategy) at UCD i.e. Dundrum / UCD – Tallaght orbital route; and
- Serving important trip attractors.

10. Next Steps

This report has identified an emerging preferred scheme option for the bus infrastructure along this Ballsbridge to UCD bus corridor which a concept design has been developed. The next project stage (The development of a Preliminary Design) will further refine and update the initial concept design along the route. Further account will be taken of likely public transport service levels, particularly the bus service patterns and any changes to the overall bus network which may arise from the BusConnects Plan proposals. The proposal will be amended, if and as required, to integrate any resultant changes. The Preliminary Design will define the final practically achievable scheme for the bus corridor, taking into account more detailed studies of constraints, impacts and environmental assessment required at a local level.

Prior to finalisation of the Ballsbridge to UCD bus corridor scheme design, a public consultation process will be undertaken, with inputs and feedback received incorporated where practical and appropriate to do so. The Preliminary Design will form the basis of the planning consent process for the scheme, which will require a development consent application to be made directly to An Bord Pleanála, due to the nature and extent of the proposed works.

