Appendix H1
Dún Laoghaire to City Centre Core Bus Corridor Options Study – Feasibility and Options Assessment Report

H1 Dún Laoghaire to City Centre Core Bus Corridor Options Study – Feasibility and Options Assessment Report

The Dún Laoghaire to City Centre Core Bus Corridor Options Study – Feasibility and Options Assessment Report is available from the NTA BusConnects Website, and can be accessed by clicking on the links below:

- Dún Laoghaire to City Centre Core Bus Corridor – Feasibility and Options Assessment Report Executive Summary
  https://busconnects.ie/wp-content/uploads/2022/03/dlrtocc-executive-summary.pdf

- Dún Laoghaire to City Centre Core Bus Corridor – Feasibility and Options Assessment Report
  https://busconnects.ie/wp-content/uploads/2022/03/dlrtocc_report.pdf

- Dún Laoghaire to City Centre Core Bus Corridor – Feasibility and Options Assessment Report Appendices
  https://busconnects.ie/wp-content/uploads/2022/03/dlrtocc_appendices.pdf

- Dún Laoghaire to City Centre Core Bus Corridor Concept Design Drawings
  https://busconnects.ie/wp-content/uploads/2022/03/dlrtocc_drawings.pdf

Dún Laoghaire to City Centre Core Bus Corridor Options Study

Feasibility and Options Assessment Report Executive Summary

National Transport Authority

Project Number: 60507750
R 001

October 2017

Iveagh Court, Harcourt Lane
D02 WT20, Dublin 2
Ireland

Executive Summary

Introduction

This report presents the findings of the route options assessment work undertaken for the Dún Laoghaire to City Centre Core Bus Corridor (CBC) and a recommendation on the emerging preferred option is made. The study was commissioned by the National Transport Authority (NTA) and undertaken by AECOM Roughan and O'Donovan (ROD) Consulting Engineers.

Core Bus Network

The Transport Strategy for the Greater Dublin Area 2016 – 2035 identified a core bus network for the Greater Dublin Area (GDA). This core network represents the most important bus routes in the region, which are generally characterised by a high frequency of bus services, high passenger volumes and with significant trip attractors located along the route. The identified core network comprises sixteen radial bus corridors, three orbital bus corridors and six regional bus corridors. The Dun Laoghaire - City Centre corridor represents one of the 16 radial bus corridors (Core Bus Corridors) forming the Core Bus Network.

The GDA Transport Strategy includes objectives to develop the Core Bus network to achieve, as far as practicable, continuous priority for bus movement 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.

Scheme Objectives

The following specific objectives have been set for the proposed scheme:

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

The Study Area

Arising from the transport policy context and scheme objectives set for the Dun Laoghaire CBC, the broad study area identified for the proposed scheme is illustrated in red in Figure (i) below. The study area includes the road network in the vicinity of the existing bus routes and extends to include additional potentially feasible route options. The study area is generally bounded to the north by the City Centre and to the south by Sallynoggin/Glenageary. Due to other studies examining the R138/N11 corridor as a bus route (Blanchardstown to UCD BRT and Bray to City

Centre CBC); the Dún Laoghaire to City Centre CBC study area does not include the R138/N11 corridor.

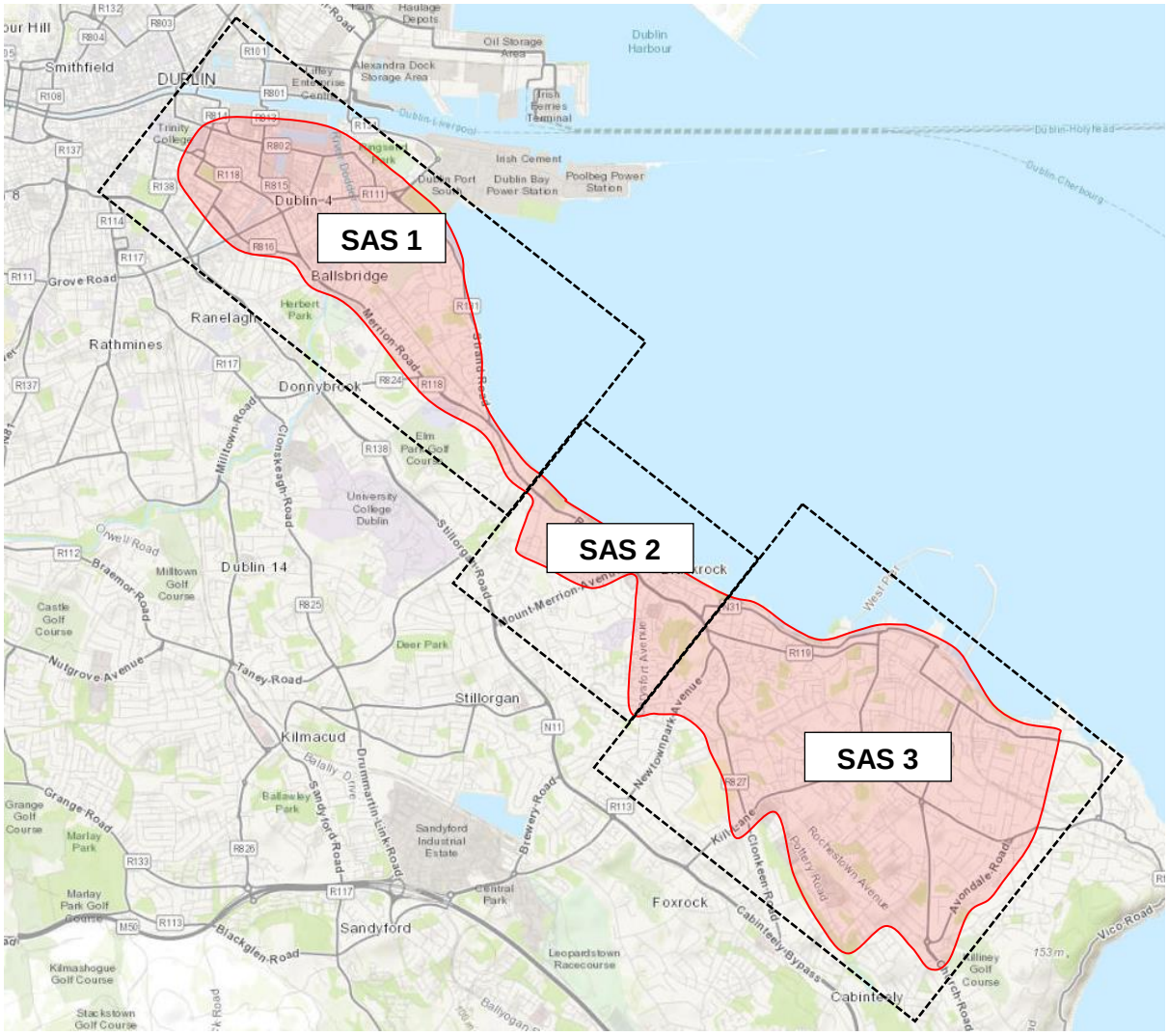

Figure (i) Study Area

The study area has been divided into three manageable sections to simplify the assessment process:

- Study Area Section (SAS) 1 – City Centre to Booterstown;
- Study Area Section (SAS) 2 – Booterstown to Blackrock; and
- Study Area Section (SAS) 3 – Blackrock to Dun Laoghaire.

The extent of each of these corridor sections is presented in Figure (i) above.

Assessment Process

An initial 'spiders-web' of potential route sections that could accommodate a CBC was identified for each Study Area Section. This 'spiders-web' of route sections was chosen with reference to the CBC characteristics and in order to meet the scheme objectives as listed above.

Initial route sections identified also took cognisance of the physical constraints and opportunities present and the ability to integrate with other public transport modes and routes, including:

- Existing Dublin Bus services at numerous locations along the route;
- Existing DART service along the route;
- Proposed Blueline BRT from Sandyford to Sydney Parade via UCD; and
- Eastern Bypass infrastructural proposals are also noted.

Of particular relevance in developing the spiders-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 spiders-web of route sections identified in the study area is presented in Figure (ii).

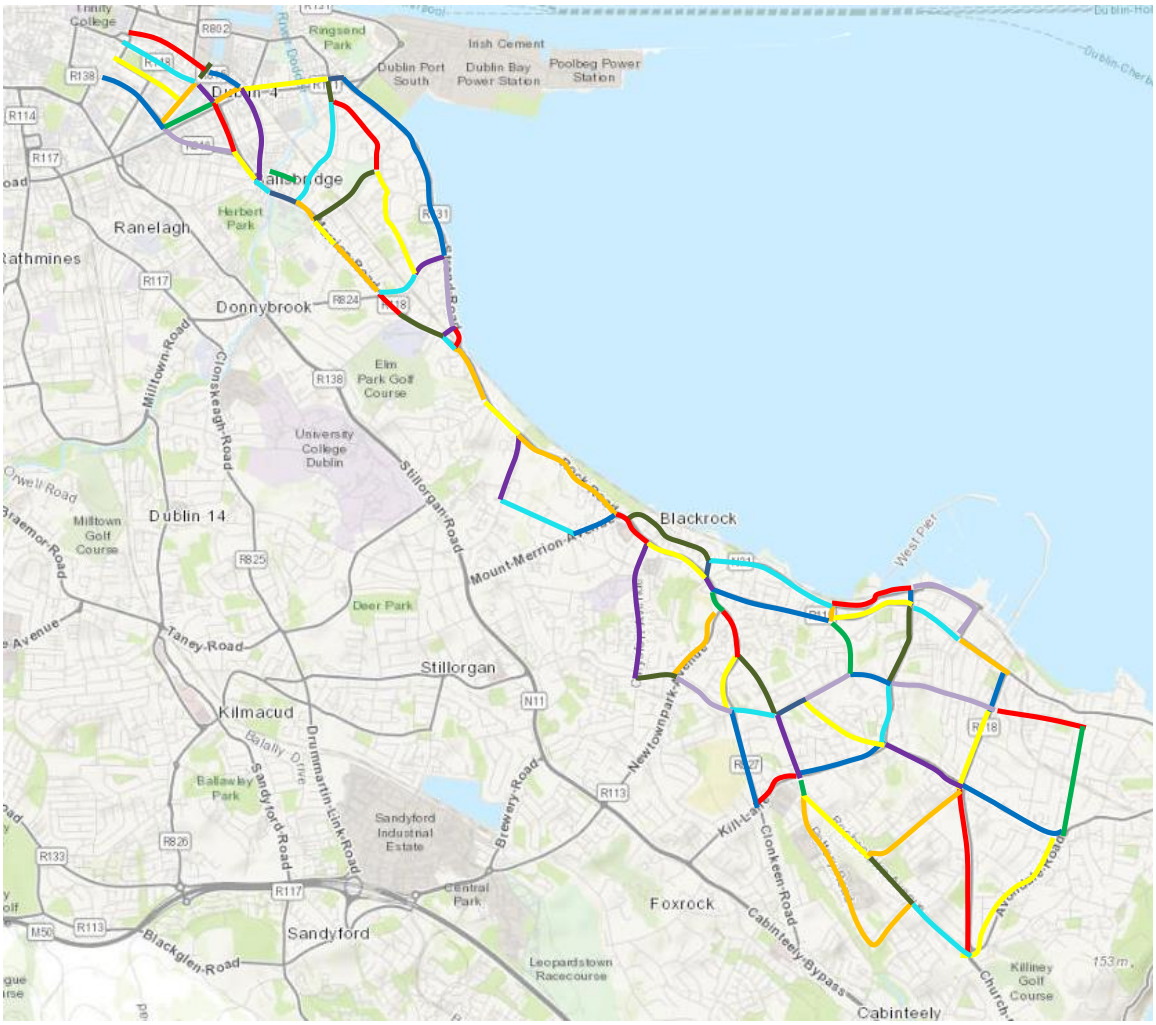

Figure (ii) Spider's Web of Route Sections

A two-stage assessment of the ‘spiders-web’ route sections was adopted:

Stage 1

At the Stage 1 ‘sifting’ stage, the initial ‘spiders-web’ of route sections presented in Figure (ii) 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).

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

Stage 2

Following completion of the ‘Stage 1’ assessment, the remaining potentially feasible route sections were progressed to Stage 2 of the assessment process which comprised a more detailed qualitative and quantitative assessment.

The first step in the Stage 2 assessment involved combining shorter route sections which passed the Stage 1 assessment to form longer end-to-end potential routes within each SAS. The resulting route options are presented in Figure (iii) below.

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 several scheme options for each route option within the three Study Area Sections.

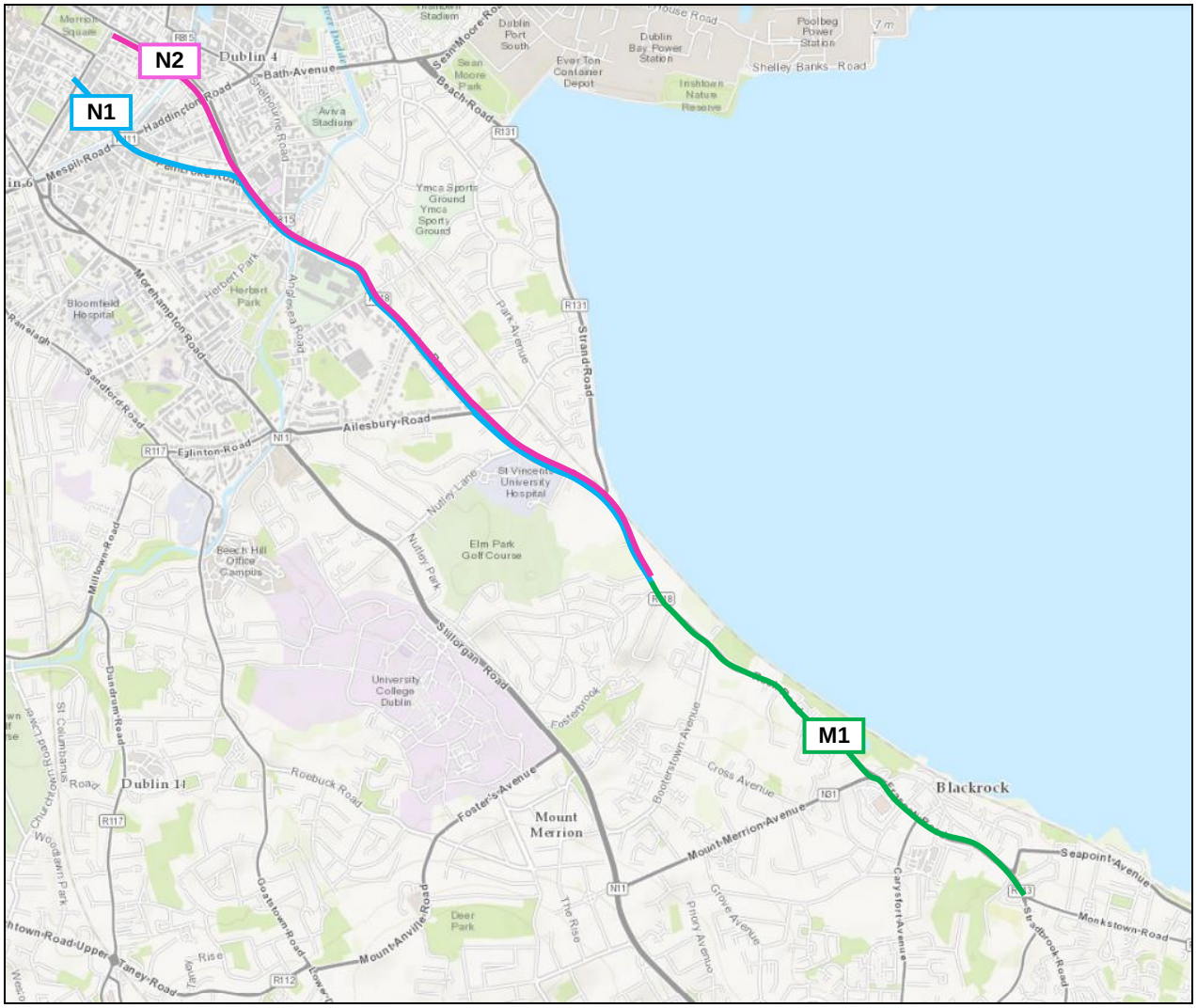

Figure (iii): Study area route options

The scheme options developed for each route option 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.

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.

MCA assessment

Table (i) presents a summary of the MCA criteria and sub-criteria used as part of the 'Stage 2' detailed route options assessment process.

Table (i) MCA criteria

MCA criteria	Assessment Sub-Criteria
1. Economy	1.a. Capital Cost
	1.b. Transport Reliability and Quality (Journey Time)
2. 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
3. Accessibility & Social Inclusion	3.a. Key Trip Attractors (Education/Health/Commercial/Employment)
	3.b. Deprived Geographic Areas
4. Safety	4.a. Road User Safety
5. 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

Each sub-criterion in the MCA table is evenly weighted and the scheme option which achieved the highest average score overall (within each Study Area Section) formed part of the overall preferred route for the Dun Laoghaire to City Centre CBC.

The following scheme options scored highest in each Study Area Section:

- SAS1 - Route N1 Option 2; A route design along Merrion Road, Pembroke Road and Baggot Street Lower.
- SAS2 - Route M1 Option 1; A route design along Frascati Road (N31) and Rock Road (R118).

The Preferred CBC Route

Based on the conclusions from the route options assessment process, the recommended preferred route for the proposed scheme is presented in Figure (iv).

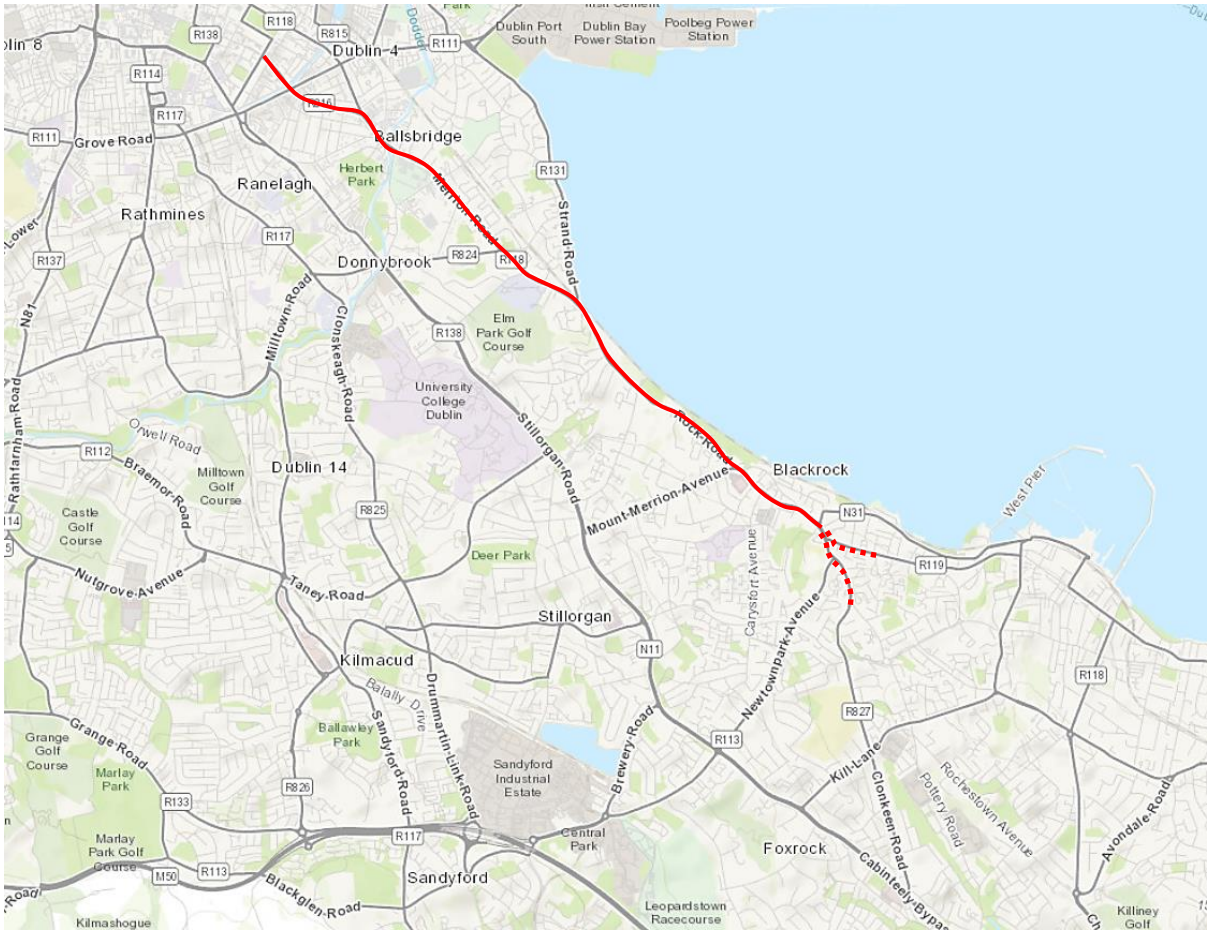

Figure (iv): Dun Laoghaire to City Centre CBC Scheme Preferred Route

This scheme is intended to serve the Dun Laoghaire to City Centre Corridor with stops at key locations along the route. The preferred route starts on Baggot Street Lower and connects to Booterstown via Pembroke Road and Merrion Road. From Booterstown, the CBC continues southwards to Blackrock via Rock Road and Frascati Road ending at Temple Hill Junction.

The proposed design incorporates the provision of inbound and outbound bus lanes, traffic lanes and cycle lanes whilst also providing inbound and outbound footpath facilities for a distance of approximately 7 kilometres from Baggot Street Lower /Fitzwilliam Street signalised junction to the signalised junction at Temple Hill/Monkstown Road.

Traffic light sequences shall also be amended at existing signalised junctions to allow bus lane priority along the prescribed route. The proposed bus and cycle infrastructure along the CBC is illustrated in Figure (v) below.

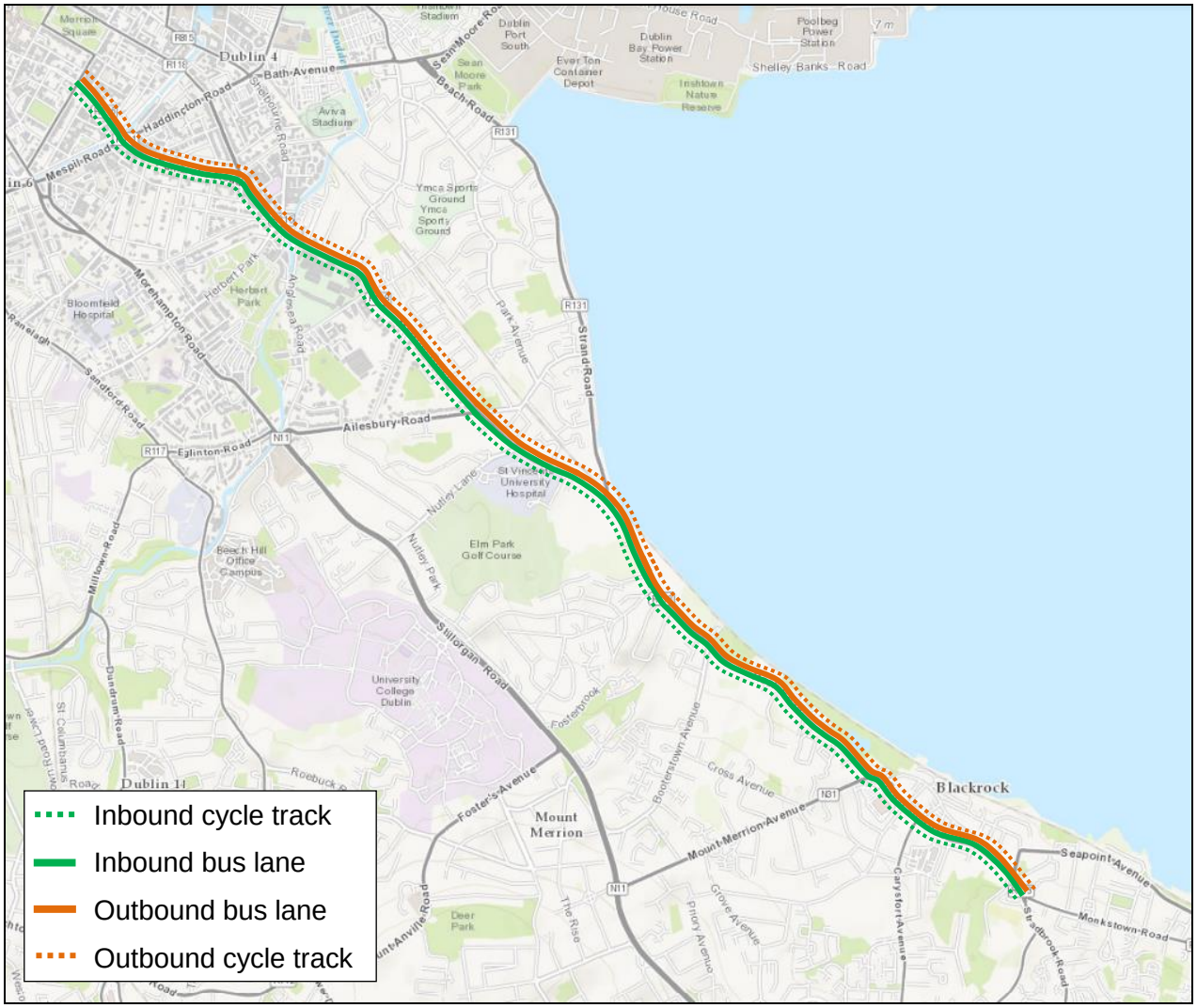

Figure (v): Bus and cycle infrastructure along the CBC

Bus stop locations have been optimised for the route to facilitate the route geometry and optimise catchment based on population and employment destinations.

The CBC stop locations are indicated in Figure **.** The residential catchment within 5, 10 and 15 minutes walking distance of the proposed stops is also illustrated in Figure **.** The outermost isochrone defines the perimeter within which the stop can be reached by pedestrians in 15 minutes or less at a typical walking pace. The population residing within each of the isochrones areas is summarised below:

- 5 minutes walking distance – 10,479 residents
- 5-10 minutes walking distance – 14,156 residents
- 10-15 minutes walking distance – 27,304 residents
- Total catchment within 15 minutes walking distance – 51,939 residents

These figures are based on the Census 2011 Small Area Population Statistics (SAPS). Furthermore, there are a total of 112,677 people working or attending an educational institution within the 15 minute walking catchment of the CBC stops i.e. 91,202 in employment and 21,475 in education.

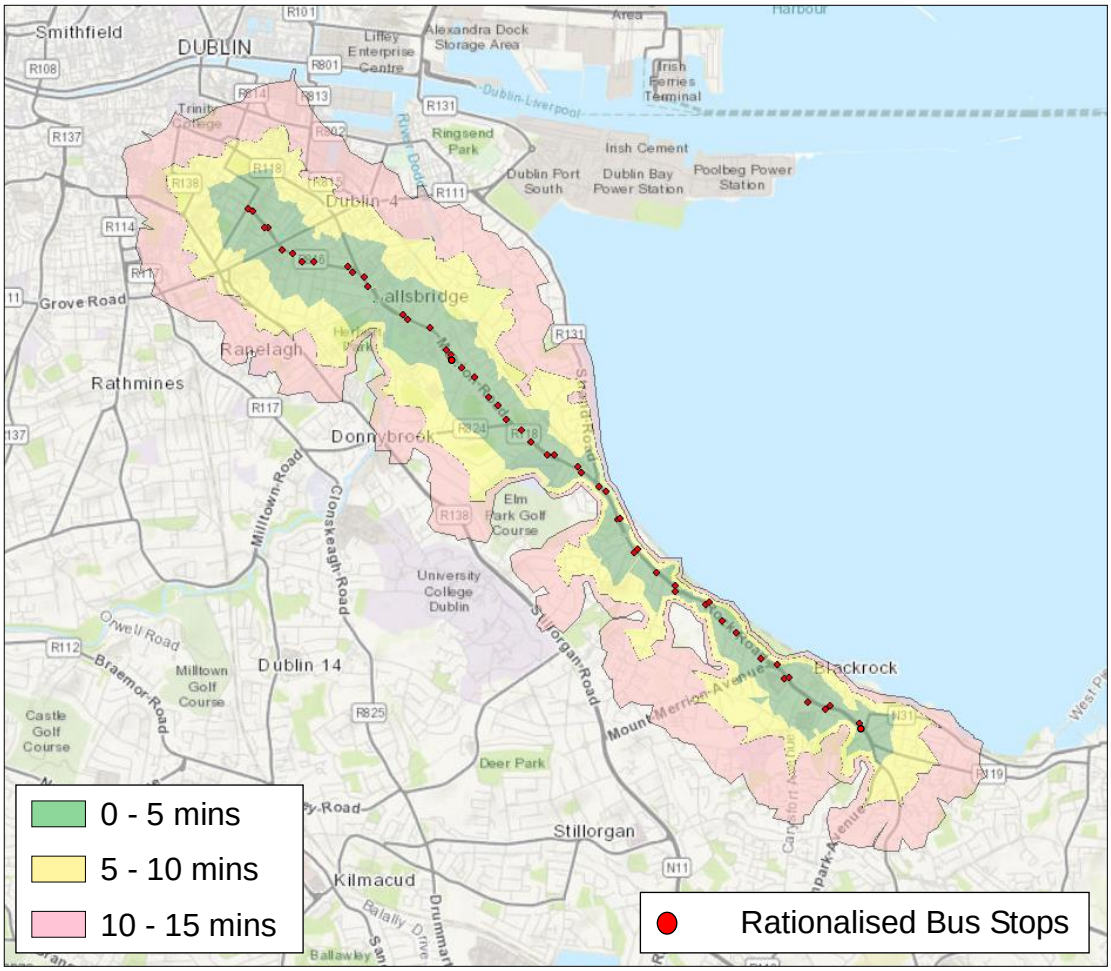

Figure (vi): Walking distance catchment zones for Rationalised CBC bus stops

The Greater Dublin Area Cycle Network Plan identifies the preferred corridor as part of a primary cycle network (Route 13) and secondary cycle network (Route 13A). Thus, the EPO forms a key part of the strategic cycle network. It is therefore important that CBC design along the corridor takes cognisance of this and it is intended that the proposed scheme incorporates, where practical, the cycle infrastructure required to provide a high quality of service in accordance with the National Cycle Manual, as required for a primary and secondary cycle route. A road segregated cycle track is proposed in each direction along the entirety of the CBC route (approximately 7 km), as illustrated in Figure . Existing signalised junctions at numerous locations throughout the route shall require upgrading to ensure the provision of cycle and pedestrian facilities at each “all arms” signalised junction.

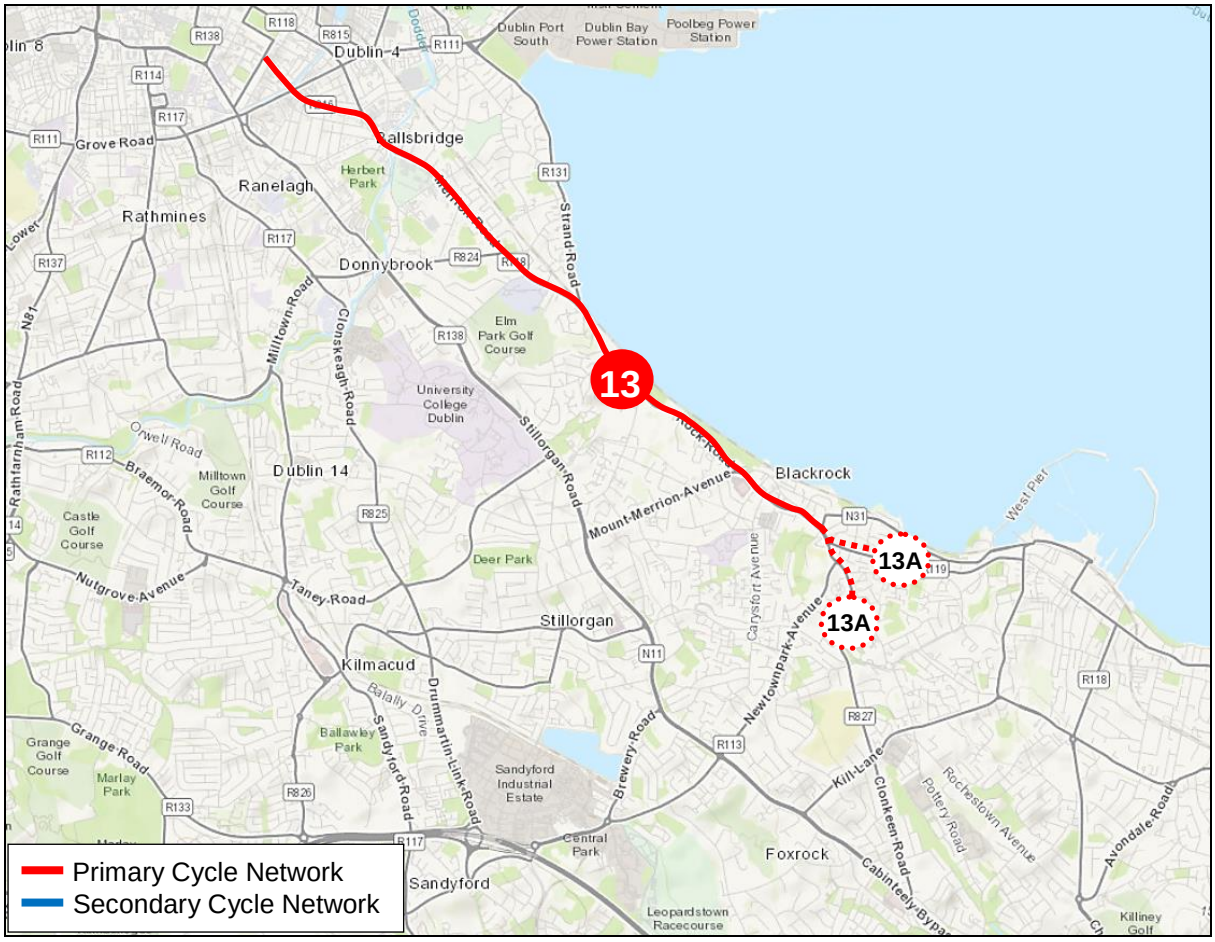

Figure (vi): GDA Cycle Network Plan along the EPO

The proposed design requires the introduction of entry raised treatments at a number of entrances along the route e.g. the entrances to Helens Road, Grotto Avenue, Booterstown train station, Blackrock College Car Park, main and rear entrances to Willow Terrace, The Willows, Castledawson Avenue, Seafort Parade, Emmett Square, Phoenix Terrace, Sion Hill and Ben Inagh Park to reduce the speed of traffic approaching the route via side street accesses, whilst allowing pedestrians to free flow through junction entry's/exits. All proposed inbound and outbound footpaths exceed the minimum standard width of 1.8 metres.

Summary

The following summarises the main features of the proposed EPO:

Table (ii): Summary table of preferred route

Route length	**7 km**
Length of bus priority (outbound)	7 km
Length of bus priority (inbound)	7 km
Length of dedicated cycle lane in each direction	7 km
Number of bus stops (outbound)	26
Number of bus stops (inbound)	25
Residential catchment area (within 15 mins walking distance of nearest bus stop)	76,600
Number of people working or attending an educational institution within the 15 minute catchment area	123,000
Journey Time outbound, peak time *** conservative calculation**: buses stop at every junction and pedestrian crossing for the maximum time, accordingly, see Appendix C	44 minutes
Journey Time inbound, peak time *** conservative calculation**: buses stop at every junction and pedestrian crossing for the maximum time, accordingly, see Appendix C	45 minutes

Feasibility Working Cost Estimate

A cost estimate for the Emerging Preferred Option has been developed for the scheme and is indicated in Table (iii) below. It was developed primarily based on standard rates that AECOM-ROD have available from similar types of projects in Dublin

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 (iii) Initial Cost Estimate for EPO

Study Area Section	*Total Capital Cost Estimate*
SAS 1 (N1 Option 2)	€13.6M
SAS 2 (M1 Option 2)	€3.8M
SAS 3 (First 300 meters)	€2.4M
Total	**€19.8M**
Study Area Section	*Total Capital Cost Estimate*
SAS 1 (N1 Option 2)	€13.6M
SAS 2 (M1 Option 2)	€3.8M
SAS 3 (First 300 meters)	€2.4M
Total	**€19.8M**

Emerging Preferred Scheme Benefits

In summary, the Emerging Preferred Scheme will have the following benefits:

- Increased reliability and faster journey times due to bus priority in the vast majority of locations;
- Reduction of commuting time;
- 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 Dun Laoghaire to City Centre Core CBC;
- Reconfiguration of existing junctions, which will provide considerable benefits for pedestrian accessibility and bus priority, making the bus routes more attractive;
- Proposed new bus stops, which increase the attractiveness and catchment area of the bus route in this Study Area;

- Interchange with DART – including complementary footpath upgrade and wayfinding proposals as part of the scheme design;
- Ability to extend bus services southwards; and
- Serving important trip attractors.

Next Stages of Design Development

This report has identified an emerging preferred option for the bus infrastructure along this Dun Laoghaire to City Centre Core Bus Corridor for 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 separate bus network review process. The proposals will be amended, if and as required, to integrate any resultant changes. The Preliminary Design will define the final practically achievable scheme for the CBC, taking into account more detailed studies of constraints, impacts and environmental assessment required at a local level.

Prior to finalisation of the Dun Laoghaire CBC scheme design, a public consultation process will be undertaken, with inputs and feedback received incorporated where practical and appropriate to do so. This 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.

Dún Laoghaire to City Centre Core Bus Corridor Options Study

Feasibility and Options Assessment Report

National Transport Authority

Project Number: 60507750
R 001

December 2017

Iveagh Court, Harcourt Lane
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Quality information

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Revision	Revision date	Details	Authorized	Name	Position
1	24/10/2016	Initial Working Draft	EOM	Dimitri Karakaxas	Associate Director
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3	10/10/2017	Final Draft	EOM	Dimitri Karakaxas	Associate Director
4	24/11/2017	Final Draft	JS	Dimitri Karakaxas	Associate Director
5	21/12/2017	Issue	JS	Dimitri Karakaxas	Associate Director

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Contents

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Tables

Glossary of Terms

- **BRT**: Bus Rapid Transit
- **DCC**: Dublin City Council
- **DTTAS**: Department of Transport, Tourism and Sport
- **EPO**: Emerging Preferred Option
- **EPS**: Emerging Preferred Scheme
- **FCC**: Fingal County Council
- **GDA**: Greater Dublin Area
- **GIS**: Geographic Information Systems
- **LAP**: Local Area Plan
- **LoS**: Level of Service
- **NTA:** National Transport Authority
- **OSi**: Ordnance Survey Ireland
- **pNHA**: proposed Natural Heritage Area
- **QBC**: Quality Bus Corridor
- **CBC**: Core Bus Corridor
- **QoS**: Quality of Service
- **RMP**: Record of Monuments and Places
- **ROA**: Route Options Assessment
- **RPA**: Railway Procurement Agency
- **RTPI**: Real Time Passenger Information
- **SAC**: Special Area of Conservation
- **SPA:** Special Protection Area

Definitions

- **Study Area**: The area along the Dun Laoghaire to City Centre corridor within which route options have been identified and assessed.
- **Study Area Section**: An identifiable extent of the study area between two locations.
- **Route Section**: The road(s) along which the Dun Laoghaire to City Centre Core Bus Corridor will 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. Typically, a number of scheme options are designed along each route option.
- **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 report Sections 4, 5, 6, 7 and 8 is based on OSi maps. The source is ArcGIS Viewer for Silverlight (ESRI), for which AECOM hold a license.
- Residential, employment destination and education destination figures in report Section 6 are based on the Census 2011 Small Area Population Statistics (SAPS).

Appendices

- **Appendix A - Multi Criteria Analysis Tables:** Presents the tables of criteria and sub criteria used to assess the developed scheme options along each route option identified in the Study Area.
- **Appendix B - Data Collection:** Presents a discussion on the data collected and the existing situation in the study area.
- **Appendix C - Bus Journey Times:** Presents the matrix and criteria used to calculate the journey times along each route.
- **Appendix D - Problem Identification:** Presents a summary of the problems identified as well as a discussion of the existing conditions along each of the route options.
- **Appendix E - Parking Survey:** Presents a discussion on the parking conditions identified in the existing road network within the study area.
- **Appendix F** - Cost Estimate: Presents a summary of the infrastructure and land acquisition costs associated with each of the scheme options considered.
- **Appendix G** - Infrastructural Cost Estimate: Presents a detailed breakdown of the infrastructural cost estimate for each of the scheme options considered.
- **Appendix H** - Environmental Desktop Study Report.
- **Emerging Scheme Design Drawings:** 20 Drawing Sheets

1. Introduction

1.1 Preamble

This report presents the findings of the route options assessment work undertaken for the Dún Laoghaire to City Centre Core Bus Corridor (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 CBC, based on the assumption that a number of high frequency bus services will avail of the CBC infrastructure.

The assessment undertaken of potentially feasible route options, identified within the scheme study area, against established 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 CBC on this corridor is discussed in this section.
- **Section 3:** The objectives of the core bus network and the proposed scheme are presented. The extent of the CBC study area assessed, effectively defining the proposed scheme corridor, is described in this section identifying key constraints and opportunities, 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 selection and determination of initial criteria for screening and assessing technically feasible route options, based on distinct, project-specific objectives;
  - the definition of MCA criteria; and
  - the identification of Study Area Sections where practical route options have been considered and presentation of an initial network ('spiders web') of route sections examined.
- **Sections 5 and 6:** Details the route options assessment for each of the three Study Area Sections.
- **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 Transport Strategy for the Greater Dublin Area 2016 – 2035

The Transport Strategy for the Greater Dublin Area 2016 – 2035 identified a core bus network for the Greater Dublin Area (GDA). This core network represents the most important bus routes in the region, which are generally characterised by a high frequency of bus services, high passenger volumes and with significant trip attractors located along the route. The identified core network comprises sixteen radial bus corridors, three orbital bus corridors and six regional bus corridors.

The GDA Transport Strategy includes objectives to develop the Core Bus network to achieve, as far as practicable, continuous priority for bus movement 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.

The Dún Laoghaire to City Centre CBC is identified as part of the Core Bus Network. The radial/orbital Core Bus Network identified in the GDA Transport Strategy is illustrated in Figure 2.1.1 and Figure 2.1.2 respectively. For context, the Dún Laoghaire CBC is highlighted in red.

Figure 2.1.1 2035 Radial Core Bus Network (Source: Figure 5.5 Transport Strategy 2016 – 2035)

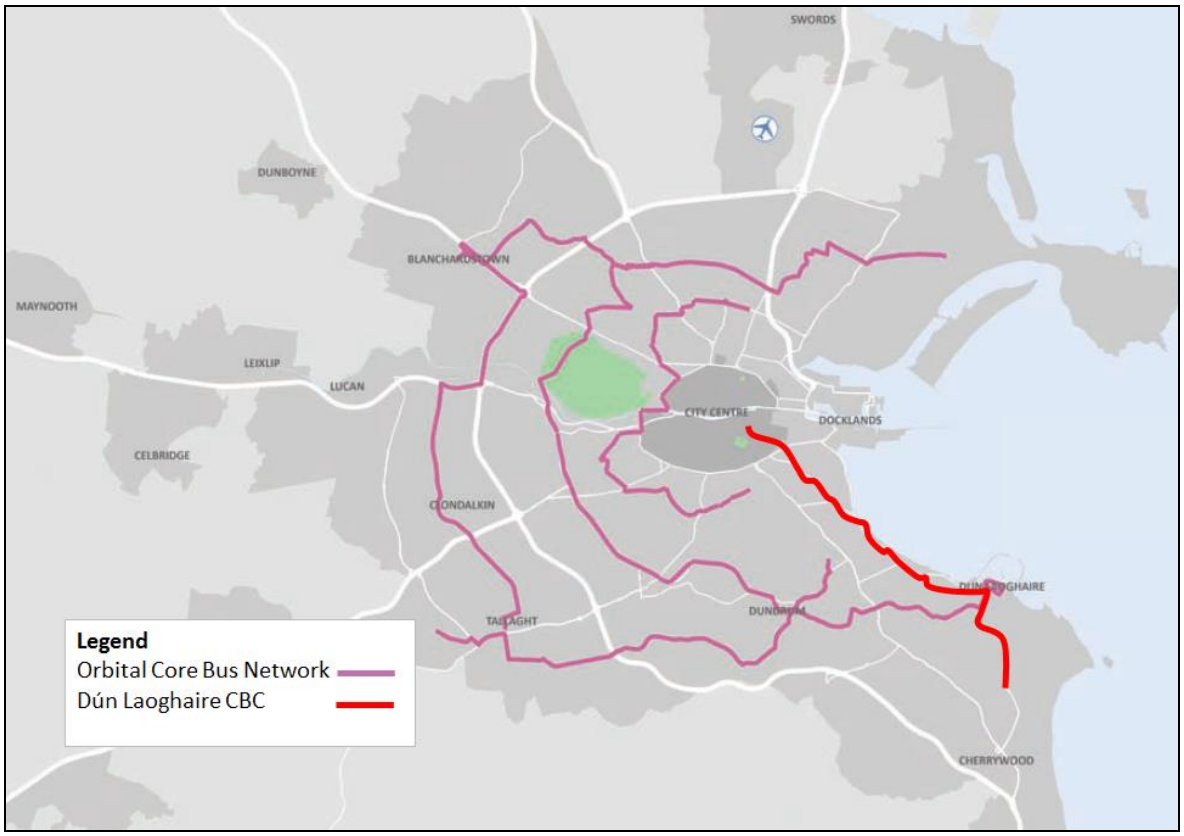


Figure 2.1.2 2035 Orbital Core Bus Network (Source: Figure 5.6 Transport Strategy 2016 – 2035)

2.2 Infrastructure and Capital Investment 2016-2021

On 29th September 2015, the Minister for Public Expenditure & Reform, Mr Brendan Howlin TD, announced an investment programme that proposed expenditure of €3.6 billion on public transport which included 'further upgrading of Quality Bus Corridors'.

2.3 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 up to 2018 including in 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 the subject 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 QBN 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;
- Seeking enhanced bus prioritisation at signalised traffic junctions in the GDA;

- Improving the level of interchange facilities between services and with other transport modes; and
- Creation of bus hubs or bus focal points in key urban locations in the GDA.

2.4 Greater Dublin Area Cycle Network Plan

The Greater Dublin Area (GDA) Cycle Network Plan sets out the strategy for the development of an integrated cycle network. It identifies that the Dún Laoghaire to City Centre corridor forms part of the primary cycle network (Routes S05, 13, 12, S03, 13, 13A), secondary cycle network (Route S02, S04, 13E, N5, 13D13G, 13F, S06) and thus form a key part of the strategic cycle network, see Figure 2.4.1**.**

It is therefore important that any upgrade to bus priority infrastructure along the corridor should take cognisance of this objective and, where practical, provide cycle infrastructure to the appropriate level and quality of service (as defined by the NTA National Cycle Manual) required for a primary and secondary cycle route.

Figure 2.4.1 GDA Cycle Network Plan (extract) – 1

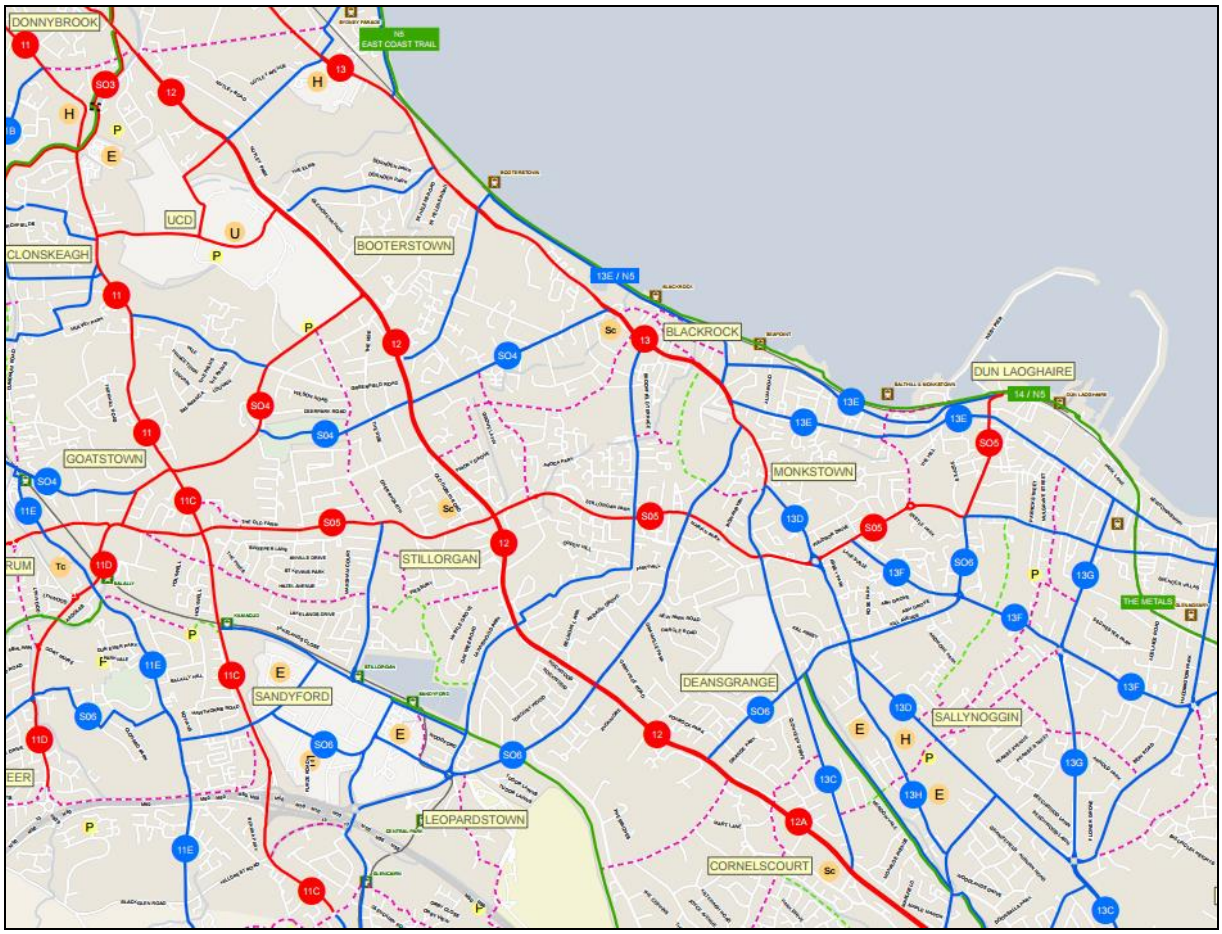


Figure 2.4.2 GDA Cycle Network Plan (extract) – 2

2.5 Dublin City Centre Transport Study

The Dublin City Centre Transport Study has been prepared to integrate the transport policies and proposals of Dublin City Council (DCC) and the National Transport Authority (NTA) and inform an agreed framework for strategic investment.

The study was issued for public consultation in June 2015 and proposes the following relevant measures to improve the operation, management and efficiency of the bus network within Dublin City:

- To maximise the performance of the bus network by ensuring that sufficient road capacity and junction priority are provided to allow buses to operate efficiently, with reliable and predictable journey times;
- To further optimise the routing of the bus corridors through the City Centre area, improving interchange arrangements and optimising the efficiency of the service.

In relation to existing QBCs, the study proposes to implement measures to rectify existing capacity and travel time issues. These measures include the provision of continuous bus lanes and the deployment of advanced ITS, such as traffic signal operation and journey time reporting.

2.6 Dublin City Council Development Plan (2016 – 2022)

- 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 Dún Laoghaire – Rathdown County Council 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 by creating the 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 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 Intelligent Transport Systems (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:

- Grand Canal (including protected structures);
- River Dodder;
- Royal Dublin Society (RDS);
- Embassy properties;
- Existing and committed future development along the route;
- Existing protected monuments within the study area;
- Significant street trees and other natural features along the potential route options within the study area;
- The existing urban and sub-urban roads and street network;
- Blackrock College;
- DART line (Iarnród Éireann);
- Dublin Bay;
- The need to maintain traffic flow for all modes during construction;
- Limited availability of land in urban and suburban areas; and
- Public parks including Blackrock Park, Elm Park and St Vincent's Park.

3.2 Interchange with existing and proposed public transport

One of the key objectives of the proposed CBC scheme is to enhance interchange between the various modes of public transport operating in the city and wider metropolitan area, both now and in the future. Route options within the study area have therefore been developed with this in mind and, in so far as possible, seek to provide for improved existing or new interchange opportunities with other transport services, including:

- Existing Dublin Bus services at numerous locations along the route;
- Existing DART service along the route;

The Eastern Bypass infrastructural proposals are also noted.

3.3 Compatibility with other users

A key objective of the proposed scheme is to improve pedestrian and cyclist facilities along the route. 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, the following objectives were established for the Dun Laoghaire CBC Corridor:

- Deliver the on street infrastructure necessary to provide continuous priority for bus movements along the Core Bus Corridor. This will mean enhanced bus lane provision on the corridor, removing current delays in relevant locations and enabling the bus to provide a faster alternative to car traffic along the route, making bus transport a more attractive alternative for road users. It will also make the bus system more efficient, as faster bus journeys means that more people can be moved with the same level of vehicle and driver resources; and
- Provide any cycle facilities along the route that are required under the Greater Dublin Area Cycle Network Plan (published by the NTA, 2013) to the target Quality of Service(s) specified therein and to give consideration to further providing cycle facilities along sections of the route where they may 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 Dun Laoghaire CBC, the broad study area identified for the proposed scheme is illustrated in red in Figure 4.2.1 below. The study area includes road network in the vicinity of the existing bus routes and extends to include additional potentially feasible route options. The study area is generally bounded to the north by the City Centre and to the south by Sallynoggin/Glenageary.

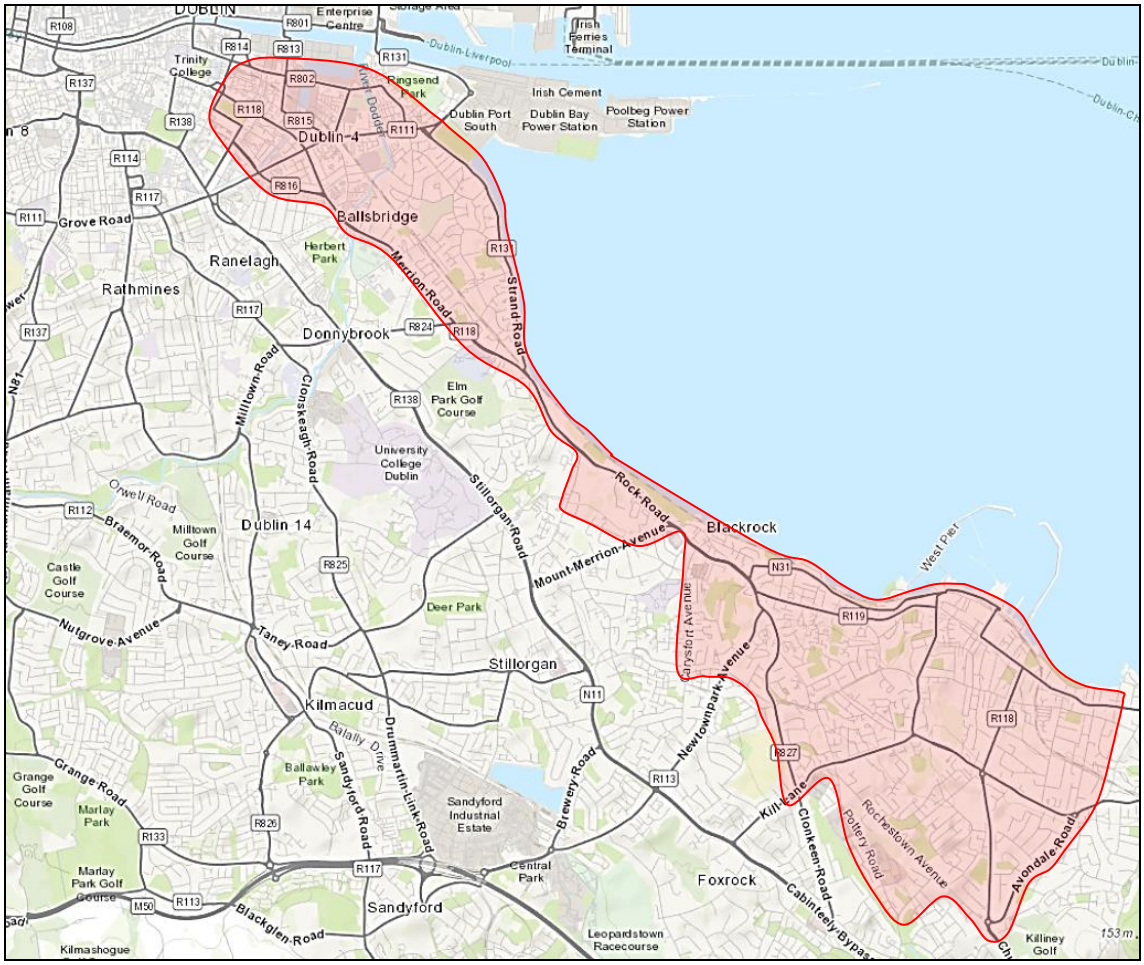


Figure 4.2.1 Study Area

Due to other studies examining the Stillorgan Road/ Bray Road (R138/N11) corridor as a bus route (Blanchardstown to UCD BRT and Bray to City Centre CBC); the Dún Laoghaire to City Centre CBC study area does not include the Stillorgan Road/ Bray Road (R138/N11) corridor. The study area has been divided into three manageable sections to simplify the assessment process:

- Study Area Section (SAS) 1 – City Centre to Booterstown;
- Study Area Section (SAS) 2 – Booterstown to Blackrock; and
- Study Area Section (SAS) 3 – Blackrock to Dun Laoghaire.

The extent of each of these corridor sections is presented in Figure 4.2.2.

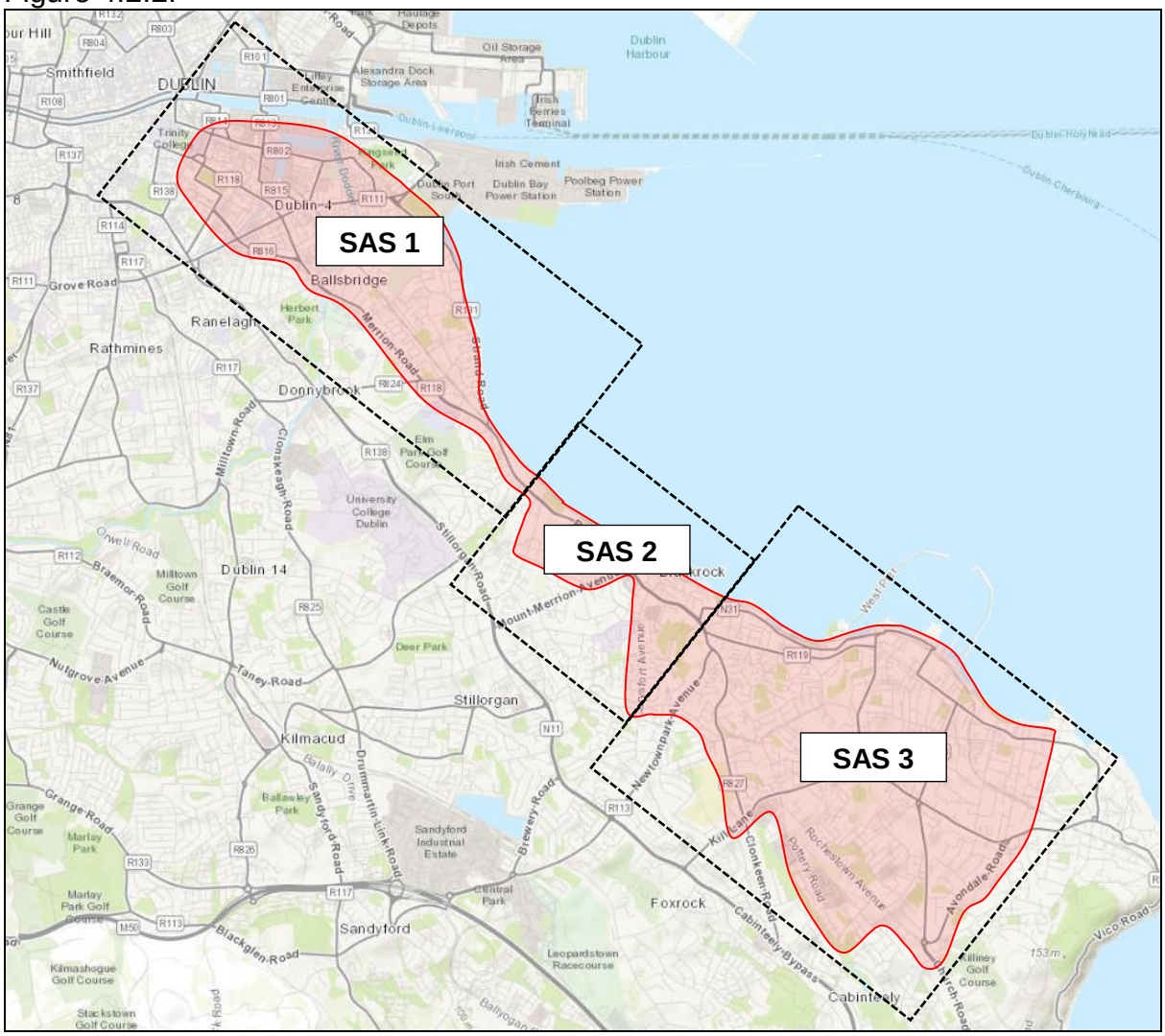


Figure 4.2.2: Study Area Sections

4.3 Stage 1: Route Sections Assessment – Sifting Stage

An initial 'spiders-web' of potential route sections that could accommodate a CBC was identified for each Study Area Section. This 'spiders-web' of route sections was chosen with reference to the CBC characteristics and in order to meet the scheme objectives as set out in Section 2 of this report.

Initial route sections identified also took cognisance of the physical constraints and opportunities present (Section 3.3) and the ability to integrate with other public transport modes and routes (Section 3.4). Of particular relevance in developing the spiders-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 spiders-web of route sections identified is presented in Figure 4.3.1.

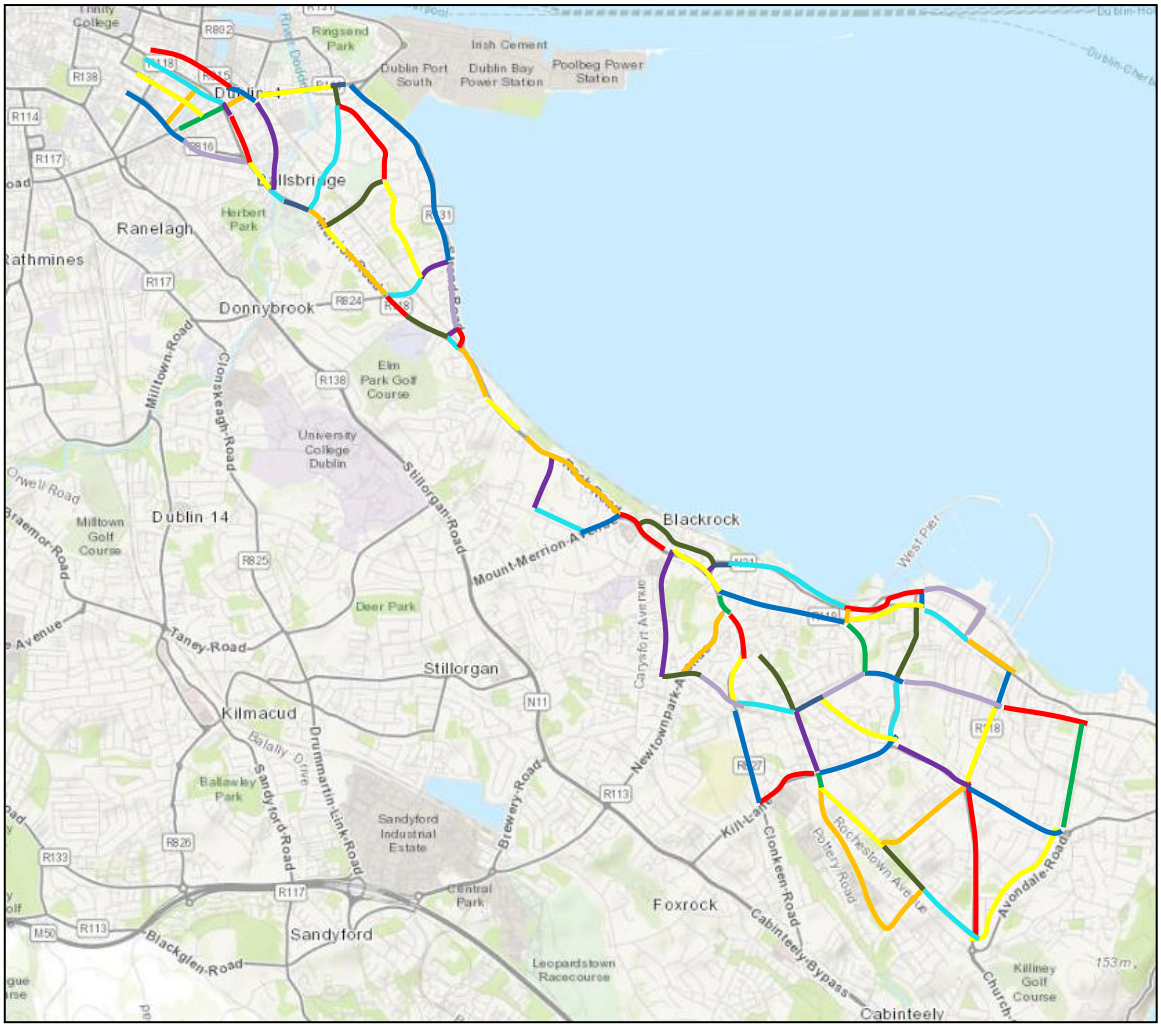


Figure 4.3.1 Spiders Web of Route Sections

At the Stage 1 'sifting' stage, the initial 'spiders-web' of route sections presented in Figure 4.3.1 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).

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

4.4 Stage 2: Scheme 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 each SAS.

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 several scheme options for each route within each SAS.

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 route options are considered to promote physical activity equally and as such it is not considered to be a key differentiator between route 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 presents a summary of the MCA criteria and sub-criteria used as part of the 'Stage 2' detailed route options assessment process.

Table 4.1: MCA criteria

MCA criteria	Assessment Sub-Criteria
1. Economy	1.a. Capital Cost
	1.b. Transport Reliability and Quality (Journey Time)
2. Integration	2.a. Land Use Integration
	2.b. Residential Population and Employment Catchments

MCA criteria	Assessment Sub-Criteria
	2.c. Transport Network Integration
	2.d. Cycle Network Integration
	2.e. Traffic Network Integration
3. Accessibility & Social Inclusion	3.a. Key Trip Attractors (Education/Health/Commercial/Employment)
	3.b. Deprived Geographic Areas
4. Safety	4.a. Road User Safety
5. 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. For the route options considered, an outline 'Order of Magnitude' cost was prepared for assessment and comparison purposes.

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. Corridor 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	• 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)	• 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):	• 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

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	• 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
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)	• 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)	• 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 (incl. 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, CBC stops have been assumed to comprise the following items:

- Raised Kerbs
- Raised Platform
- Paving
- Illuminated shelters
- Identification posts

- RTPI
- Lighting
- Associated ducting (communications and power)
- 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
- 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 introduction of cashless fares as part of the CBC/Bus Service upgrade programme in the Greater Dublin Area. Assumes that on average, buses stop at every second stop i.e. 30 second delay at every second stop);
- 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).

Delays at junctions and stops include delays associated with deceleration /acceleration to/from a stationary position.

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 (of most relevance to the City Centre area).

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, Swiftway 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, kiss-and-ride 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 CBC 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 Multi – Criteria Analysis (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 dis - benefit 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 score in terms of safety.

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 Table 4.4.

Table 4.4: Environmental Aspects Considered

Aspect	Rationale
Included in Environmental Assessment	
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 (see Section 5.3.6.1).
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.
Scoped out of Environmental Assessment	
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

Aspect	Rationale
	these impacts, particularly as the location and type of structures e.g. underpasses, bridges etc. is unknown.
Property/Land Acquisition	This aspect has been considered separately as part of the Economy criterion in the overall multi-criteria analysis 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 multi-criteria analysis.

An environmental impact study was undertaken by Roughan O' Donovan to assess the scheme options under the environmental aspects considered. The results of the study are included in the MCA tables presented in Appendix A and the Environmental Impact Report is included in Appendix H.

Archaeological, Architectural and Cultural Heritage

As mentioned previously 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 CBC route section, 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 CBC route sections 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 sections, 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 Route Options Summary Table

For each Study Area Section, a route options summary table (in Project Appraisal Balance Sheet, (PABS)) format has been prepared which collates and summarises the appraisal of route options under each of the assessment criterion.

The route options summary table for each Study Area Section 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 route options. For illustrative purposes, this five point scale is colour coded as presented in Table 4.5 with advantageous routes graded to 'dark green' and disadvantaged routes graded to 'dark red'.

Table 4.5: Route Options Colour Coded Scoring 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

The extent of reporting may vary between each Study Area Section options assessment, depending on the significance attached to specific criterion in terms of route differentiation.

At the end of each Study Area Section options assessment, an overall Multi Criterion Analysis (MCA) table is provided, bringing together each of the individual criterion assessments.

This is then summarised for each Study Area Section under the main assessment criterion as set out in Table 4.1.

A qualitative appraisal of, and conclusions from, the route options assessment is then provided, highlighting the key issues considered in determining recommended route options ('preferred' and in some instances, where applicable, 'next preferred'). It should be noted that a balanced approach is taken when assessing the preferred options.

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

The recommended options from each Study Area Section are then collated to provide the emerging preferred end-to-end option.

4.4.7 Conclusion

The outcome from the transport analysis and the findings of the multi-criteria analysis 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

As outlined in Section 4, the study area has been divided into three sections to simplify the assessment process:

- Study Area Section (SAS) 1 – City Centre to Booterstown;
- Study Area Section (SAS) 2 – Booterstown to Blackrock; and
- Study Area Section (SAS) 3 – Blackrock to Dun Laoghaire.

This Section of the report addresses the route sections in each of the Study Area Sections.

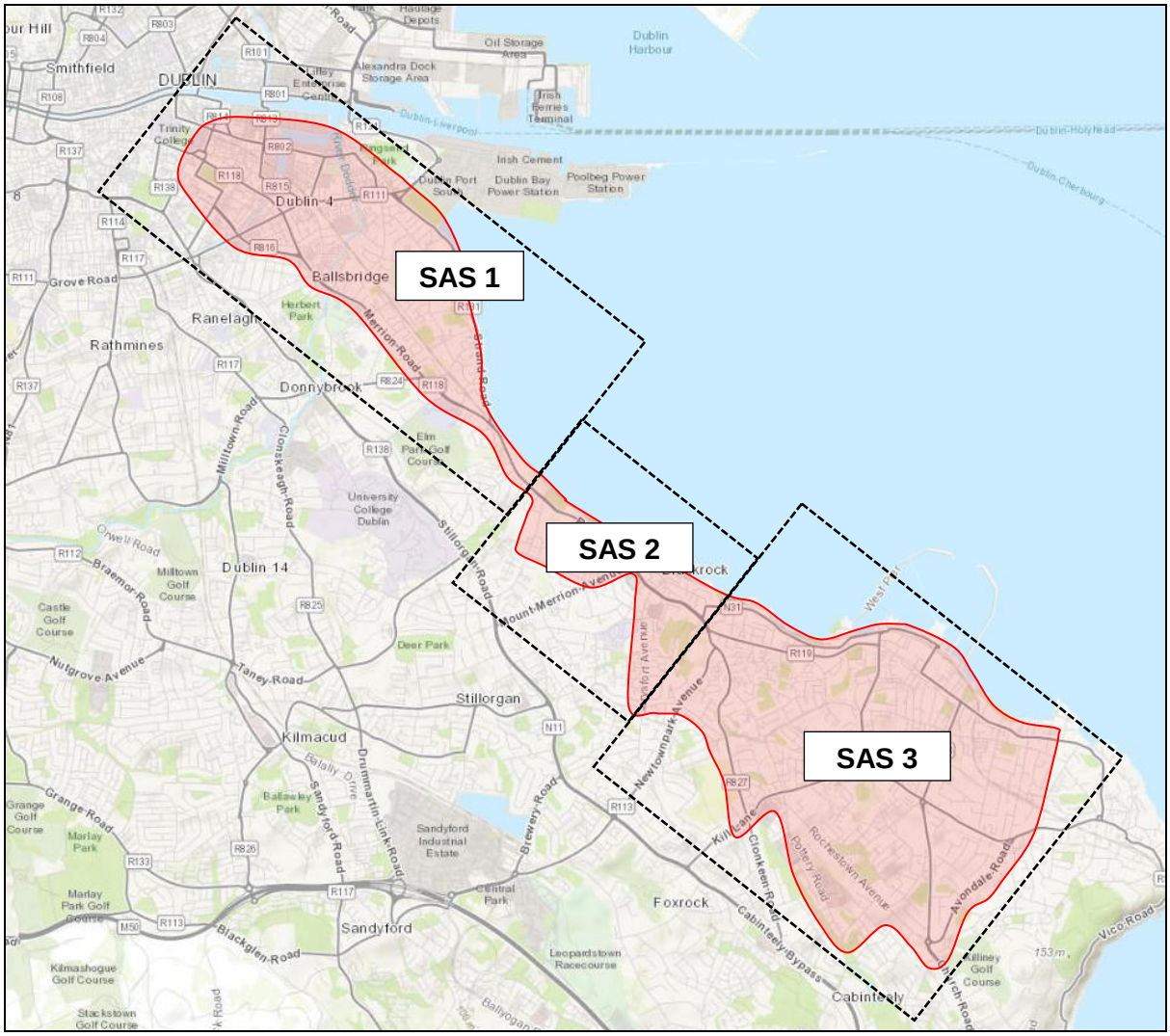


Figure 5.1.1: Study Area Sections

5.2 SAS 1: City Centre to Booterstown

Within SAS 1, there are a number of route sections which have been considered. The route sections considered are concentrated in the vicinity of Dublin City Centre.

As there are a large number of potential 'end-to-end' routes within study area, the roads available for CBC 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 have been combined to form longer route options where possible.

Figure 5.2.1 presents the initial potential route sections identified. A summary of the Stage 1 route sections sifting process is presented in Table 5.1.

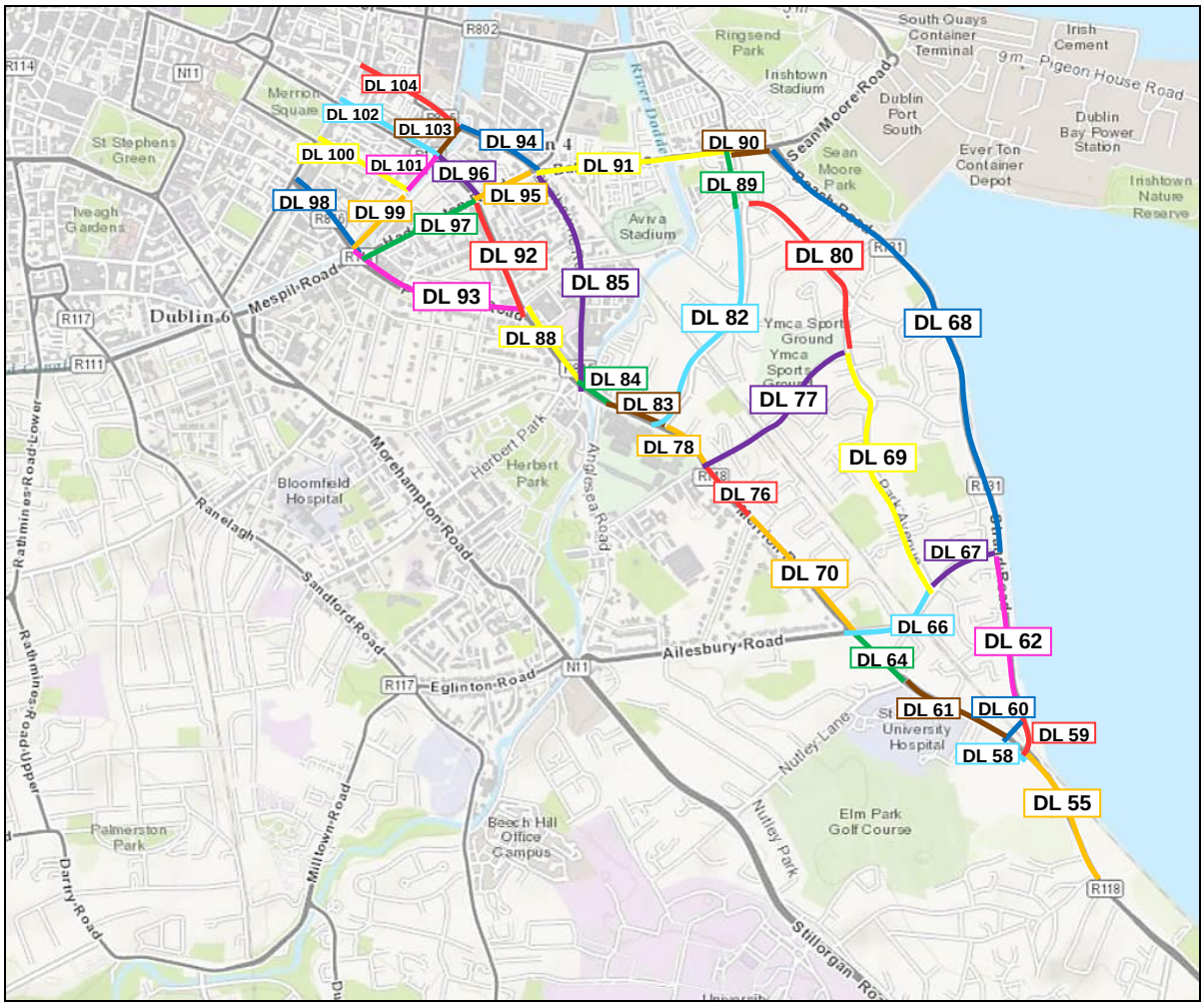


Figure 5.2.1: SAS 1 Route Sections – City Centre to Booterstown

Table 5.1: SAS 1 Route Sections Sifting (Stage 1) Summary

Section No.	Description	Area Characteristics	Comment	Pass /Fail
DL 55	Merrion Road (R118), Rock Road/Trimleston Avenue to Strand Road.	Suburban Wide carriageway with existing bus facilities in part. Protected houses.	Wide carriageway with two lanes in either direction, including a bus lane southbound; as a result, this is a viable route section.	Pass
DL 58	Merrion Rd, Strand Rd to New Bridge Link	Suburban	Four lane carriageway with bus lane inbound, limited capacity to widen due to protected structures, however space available on road; as a result, this is a viable route section.	Pass
DL 59	Strand Rd, Merrion Rd to New Link	Suburban	Narrow carriageway, with limited scope to widen. Some on-street parking activity; as a result this is not a viable route.	Fail
DL 60	New Bridge Link, Merrion Rd to Strand Rd	Suburban Proposed bridge	Proposed bridge link, therefore could be designed to accommodate facilities, as a result, this is a viable route section.	Pass
DL 61	Merrion Road (R118), Proposed Bridge (R131) to Nutley Lane.	Suburban Existing bus facilities.	Wide carriageway with existing fragmented bus facilities/on-street parking. Mature trees along the route, however direct access to key attractor, as a result, this is a viable route.	Pass
DL 62	Strand Road (R131), Proposed Bridge Link to Sydney Parade Avenue.	Suburban On-street parking activity. Protected lands to the east. Rail crossing	Narrow carriageway, with limited scope to widen. Some on-street parking activity. Protected lands to the east; as a result this is not a viable route.	Fail
DL 64	Merrion Road (R118), Nutley Lane to Ailesbury Road.	Suburban In-bound bus lane and outbound cycle lane. Tree lined.	Wide carriageway with existing inbound bus lane, and two outbound lanes; as a result, this is a viable route.	Pass
DL 66	Ailesbury Road – Sydney Parade Road, Merrion Road to Park Avenue	Suburban On-street parking towards eastern end. Large no of protected houses.	Wide carriageway in parts. However narrows at railway crossing. Number of embassies located along route and some protected houses; as a result, this is not a viable route section.	Fail
DL 67	Sydney Parade Avenue, Park Avenue to Strand Road.	Suburban	Single carriageway narrows in parts, with on street parking towards eastern end. Large number of residential developments, with limited capacity to widen; as a result this is not a viable route section.	Fail
DL 68	Strand Road (R131), Sydney Parade Avenue to Sean Moore Road/Bath Street.	Suburban Protected lands to east	Narrow carriageway, limited scope to widen, as a result, this is not a viable route section.	Fail

Section No.	Description	Area Characteristics	Comment	Pass /Fail
DL 69	Park Avenue – Gilford Road, Sydney Parade Avenue to Sandymount Avenue.	Suburban On-street car parking. Traffic calming provided.	Single carriageway with residential properties, some on-street parking to the north of the link, limited capacity to widen the road; as a result, this is not a viable route section.	Fail
DL 70	Merrion Road (R118), Ailesbury Road to Sandymount Avenue/Simmonscourt Road.	Suburban Tree Lined. No of Embassies present.	Wide carriageway with existing inbound bus lane and outbound cycle lane, large mature trees, and embassies, also a direct route to key attractor, therefore this is a viable route section.	Pass
DL 76	Merrion Road (R118), Shrewsbury Road to Simmonscourt Road/Sandymount Avenue.	Urban Tree lined. Embassies	Single carriageway with bus lane inbound and cycle lane outbound, Embassies on link, young tree lined, however provides a direct link to key attractor and wide footpaths could be reduced to provide sufficient space for facilities; as a result, this is a viable route section.	Pass
DL 77	Sandymount Avenue, Merrion Road (R118) to Gilford Road.	Suburban Narrow carriageway, on-street parking in sections. 5m height restriction at rail crossing. Bus route.	Single carriageway with some on-street parking, limited capacity to widen, narrow rail crossing, as a result this is not a viable route section.	Fail
DL 78	Merrion Road (R118), Sandymount Avenue/Simmonscourt Road to Serpentine Avenue.	Suburban Wide carriageway with existing bus facilities provided.	Wide carriageway with existing bus facilities in part, direct access to key attractor, as a result, this is a viable route section.	Pass
DL 80	Gilford Road – Sandymount Road, Sandymount Avenue to Tritonville Road.	Suburban Traffic calming provided.	Wide carriageway in parts though there is a large volume of on-street parking which would need to be removed to provide facilities, as a result, this is not a viable route.	Fail
DL 82	Serpentine Avenue – Tritonville Road, Merrion Road (R118) to Sandymount Road.	Suburban Traffic calming provided.	Carriageway width varies, with narrow sections at railway crossing; limited capacity to widen in part due to residential properties, as a result, this is not a viable section.	Fail
DL 83	Merrion Road (R118), Serpentine Avenue to Anglesea Road.	Suburban Tree lined. RDS Access	Wide carriageway with existing bus facilities, provides direct access to key attractor, as a result, this is a viable route section.	Pass
DL 84	Pembroke Road (R118), Anglesea Road to Shelbourne Road (R815)/Herbert Park	Urban	Wide carriageway with existing bus facilities, as a result, this is a viable route section.	Pass

Section No.	Description	Area Characteristics	Comment	Pass /Fail
DL 85	Shelbourne Road (R815), Pembroke Road (R118)/Herbert Park to Bath Avenue (R111)/South Lott's Road/Haddington Road (R111)/Grand Canal Street Upper (R815).	Suburban On-street parking. Embassy on link.	Wide carriageway on southern end, with on-street parking, reducing in width at northern end of link, limited availability to widen in part due to residential units; as a result, this is not a viable route.	Fail
DL 88	Pembroke Road (R118), Herbert Park/Shelbourne Road to Pembroke Road (R816)/Lansdowne Road.	Suburban Existing bus facilities. Embassy present.	Wide carriageway with existing bus facilities, as a result, this is a viable route section.	Pass
DL 89	Tritonville Road, Sandymount Road/Newbridge Avenue to Londonbridge Road/Church Avenue (R111).	Suburban On-street parking.	Wide carriageway with on-street parking, does not link to other routes, as a result this is not a viable route.	Fail
DL 90	Church Avenue, Bath Street/Beach Road/Sean Moore Road to Tritonville Road	Suburban	Single carriageway, narrow bounded by development and converges with another CBC study area; as a result, this is not a viable route section.	Fail
DL 91	Londonbridge Road- Bath Road, Irishtown Road to Shelbourne Road/Haddington Road, Grand Canal Street/South Lotts Street	Urban	Single carriageway with large volume of on-street parking, converges with another CBC study area, as a result, this is not a viable route section.	Fail
DL 92	Northumberland Rd, Pembroke Rd/Lansdown Rd to Haddington Rd	Urban Bus lane on one side of the road, with cycle facilities on the opposite side.	Wide carriageway with three lanes generally provided, including a bus lane on one side of the road (varies), with cycle facilities on the opposite side. Tree lined street, with wide footpaths, as such, this is a viable route section.	Pass
DL 93	Pembroke Road – Baggot Street (R816), Pembroke Road (R118)/Northumberland Road/Lansdowne Road to Mespil Rd/Haddington Rd.	Suburban On-street parking. Tree lined. Existing bus route.	Wide carriageway with four lanes in parts, on-street parking and large mature trees; as a result, this is a viable route section.	Pass
DL 94	Grand Canal Street Upper (R815), South Lott's Road/Bath Avenue (R111)/Shelbourne Road (R815)/Haddington Road (R111) to Clanwillian Place	Urban On-street parking provided. Dublin Bike station provided.	Converges with another CBC study area, as a result, this is not a viable route section.	Fail
DL 95	Haddington Road (R111), Northumberland Road (R118) to Grand Canal Street Upper (R815)/South Lott's Road/Bath Avenue R111)/Shelbourne Road (R815).	Suburban	Wide single carriageway with large volumes of on-street parking, limited capacity to widen, as a result, this is not a viable route section.	Fail

Section No.	Description	Area Characteristics	Comment	Pass /Fail
DL 96	Northumberland Road (R118), Haddington Road (R111) to Clanwilliam Place	Urban	Wide carriageway with some existing bus facilities and on street parking areas. Sufficient space for bus and cycle lanes and provides a direct route to key destination as a result, this is a viable route section.	Pass
DL 97	Haddington Road (R111), Northumberland Road (R118) to Baggot Street	Urban	Wide carriageway with on-street parking and trees, as a result, this is not a viable route section.	Fail
DL 98	Baggot Street (R816), Mespil Road/Baggot Street/Haddington Road to Baggot Street Lower/Ftizwilliam Street Upper	Suburban On-street parking. Tree lined. Existing bus route.	Wide carriageway with four lanes in parts, on-street parking and large mature trees though sufficient space for bus and cycle lanes and provides a direct route to end of scheme; as a result, this is a viable route section.	Pass
DL 99	Herbert Place, Baggot Street to Mount Street Upper/Warrington Place	Urban	Single carriageway with on-street parking and off-road cycle track; as a result this is not a viable route section.	Fail
DL 100	Mount Street Upper, Herbert Place/Warrington Place to Merrion Square South	Urban	Single carriageway with on-street parking, and insufficient space for facilities, as a result, this is not a viable route section.	Fail
DL 101	Warrington Place, Mount Street Upper/Herbert Place to Northumberland Road/Clanwilliam Place	Urban	Single carriageway with on-street parking and off-road cycle track; as a result this is not a viable route section.	Fail
DL 102	Northumberland Road (R118), Clanwilliam Place/Northumberland Road/Warrington Place to Merrion Square.	Urban Disjointed bus facilities. Some trees on southern section.	Wide carriageway with some existing bus facilities and on street parking areas. Sufficient space for facilities and provides a direct route to key destination as a result, this is a viable route section.	Pass
DL 103	Clanwilliam Place, Mount Street Lower/Warrington Place/Northumberland Road to Grand Canal Street	Urban	Single carriageway with on-street parking and sufficient space for facilities, provides direct link to key destination, as a result, this is a viable route section.	Pass
DL 104	Grand Canal Street Lower (R815), Clanwillian Place to Merrion Square East.\	Urban On-street parking provided. Dublin Bike station provided.	Converges with another CBC study area, as a result, this is not a viable route section.	Fail

Following the ‘Stage 1’ sift, 18 of the 37 route sections passed the initial sifting stage.

Though routes DL 60, 100 and 103 all passed, they were not progressed to the next assessment stage as they do not link with the other passing route sections.

The 15 route sections which progressed to Stage 2 are presented in Figure 5.2.2.

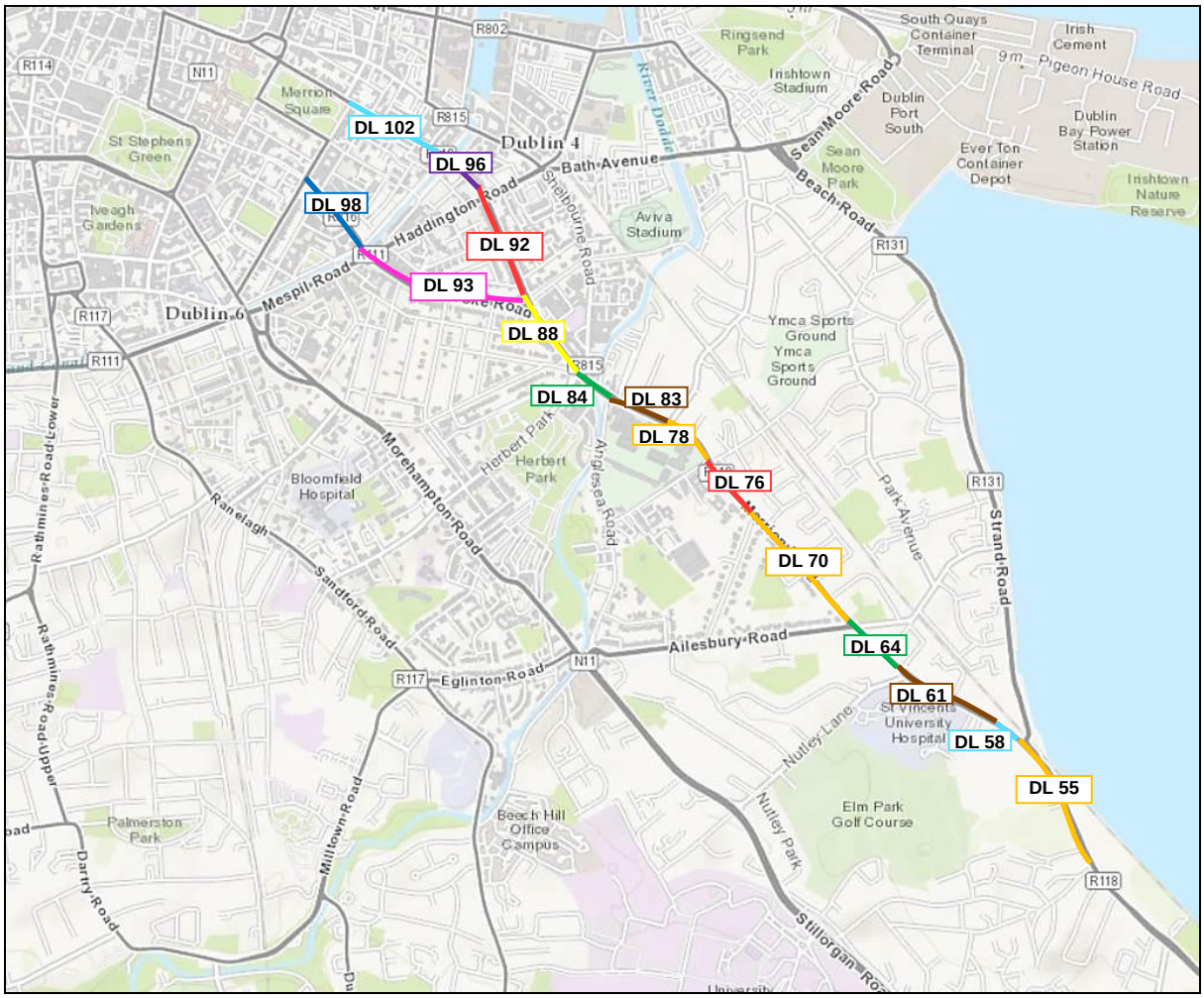


Figure 5.2.2: Route Sections passing Stage 1 ‘Sift’ in SAS 1

5.3 SAS 2: Booterstown to Blackrock

There are a relatively small number of potential 'end-to-end' routes within the Middle section in comparison with the Northern and Southern section of the study area. Figure 5.3.1 presents the initial potential route sections identified. A summary of the Stage 1 route sections sifting process is presented in Table 5.2.

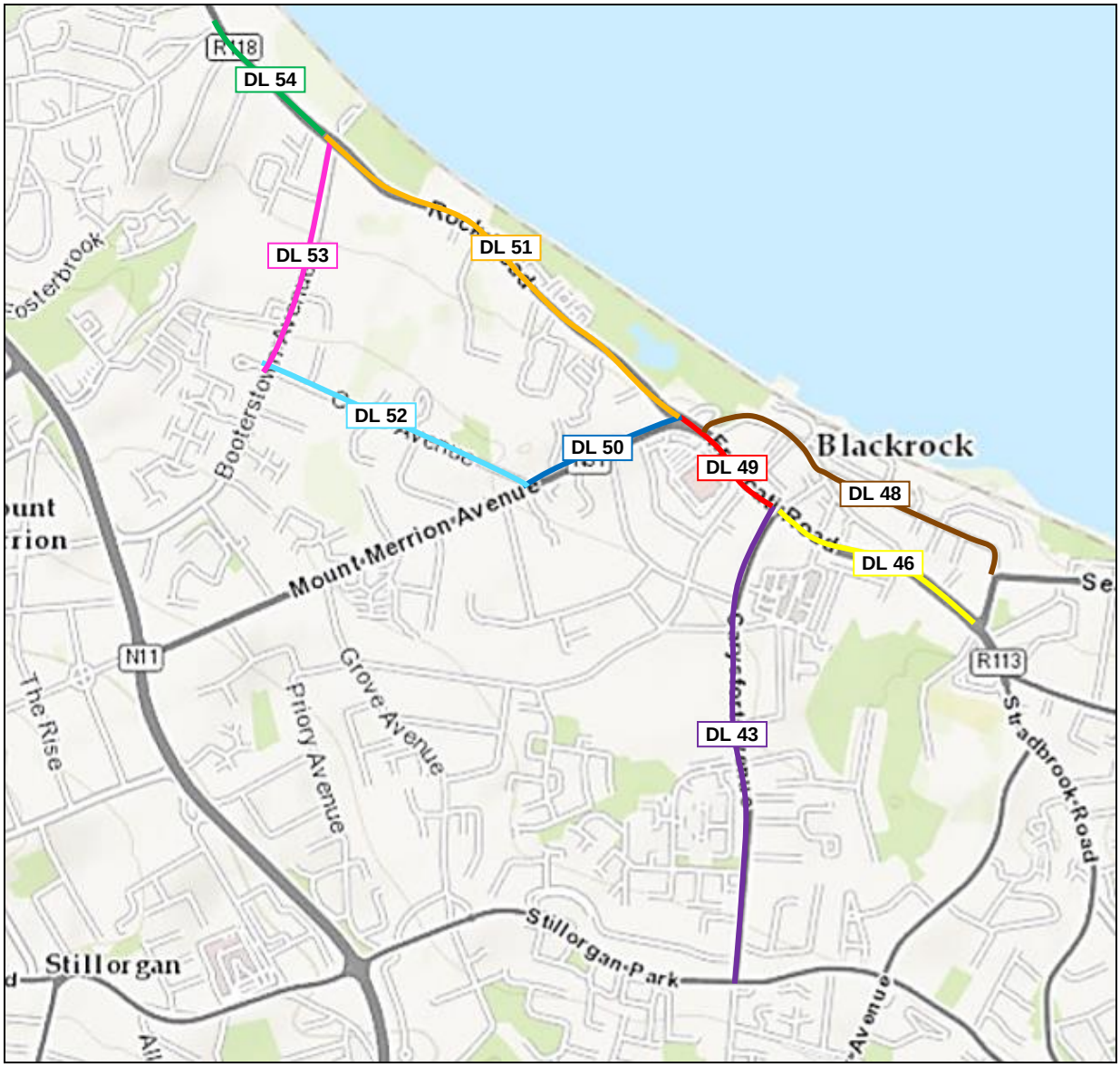


Figure 5.3.1: SAS 2 Route Sections – Booterstown to Blackrock

Table 5.2: SAS 2 Route Sections Sifting (Stage 1) Summary

Section No.	Description	Area Characteristics	Comment	Pass/ Fail
DL 43	Carysfort Avenue (R825), Stillorgan Park Avenue/Fleurville to Fascati Road (N31).	Suburban Existing bus route. On-street parking.	Single carriageway road, with large volume of on-street parking, narrowing at the northern end of the route with limited availability for land take, as a result, this is not a feasible route section.	Fail
DL 46	Temple Hill – Frascati Road (N31), Newtown Avenue/Temple Road (N113) to Craysfort Avenue	Suburban Off-road cycle facilities.	Dual carriageway with cycle facilities, as a result, this is a viable section.	Pass
DL 48	Newtown Avenue – Main Street – Craysfort Avenue, Seapoint Avenue (N31) to Craysfort Avenue (R825)/Frascati Road (N31).	Urban One way street with contra flow cycle track and on-street parking, moving to two-way on main street.	Limited potential to widen along much of this route; as a result, this is not a viable section.	Fail
DL 49	Frascati Road (N31), Craysfort Avenue (R828) to Mount Merrion Avenue (N31)/Rock Road (R118).	Suburban Cycle facilities.	Dual carriageway with cycle facilities, as a result, this is a viable route section.	Pass
DL 50	Mount Merrion Avenue (N31), Frascati Road/Rock Road to Cross Avenue.	Suburban Eastbound bus lane. On-street parking provided. St. Andrews Church.	Single carriageway road with east bound bus lane, large volume of on-street parking to be removed for west bound bus lane; as a result, this is not a viable section.	Fail
DL 51	Rock Road (R118), Frascati Road (N31)/Mount Merrion Avenue (N31) to Booterstown Avenue.	Suburban Wide carriageway with existing bus facilities. Protected lands to the east.	Wide carriageway with bus lanes in both directions, as a result, this is a viable route section.	Pass
DL 52	Cross Avenue, Mount Merrion Avenue (N31) to Booterstown Avenue.	Suburban On-street parking in places. Tree lined. Some protected houses.	Wide carriageway with wide grass verge, mature trees and on-street parking. Bus and cycle lanes could be provided along grass verge. As a result, this is a viable route section.	Pass
DL 53	Booterstown Avenue, Cross Avenue to Rock Road (R118).	Suburban On-street parking provided making carriageway narrow. Protected house.	Single carriageway, very narrow particularly at eastern end, limited potential to widen due to residential properties; as a result, this is not a viable route section.	Fail
DL 54	Rock Road (R118), Booterstown Avenue to Trimleston Avenue.	Suburban Existing bus facilities. On street parking. Protected lands to the east. Protected structures to West.	Wide carriageway with two lanes in each direction and existing bus facilities, as a result, this is a viable route.	Pass

Following the 'Stage 1' sift, 5 of the 9 route sections assessed passed the initial sifting stage.

Though route DL 52 passed, it was not progressed to the next assessment stage as it does not link with the other passing route sections.

The 4 route sections which progressed to Stage 2 are presented in Figure 5.3.2.

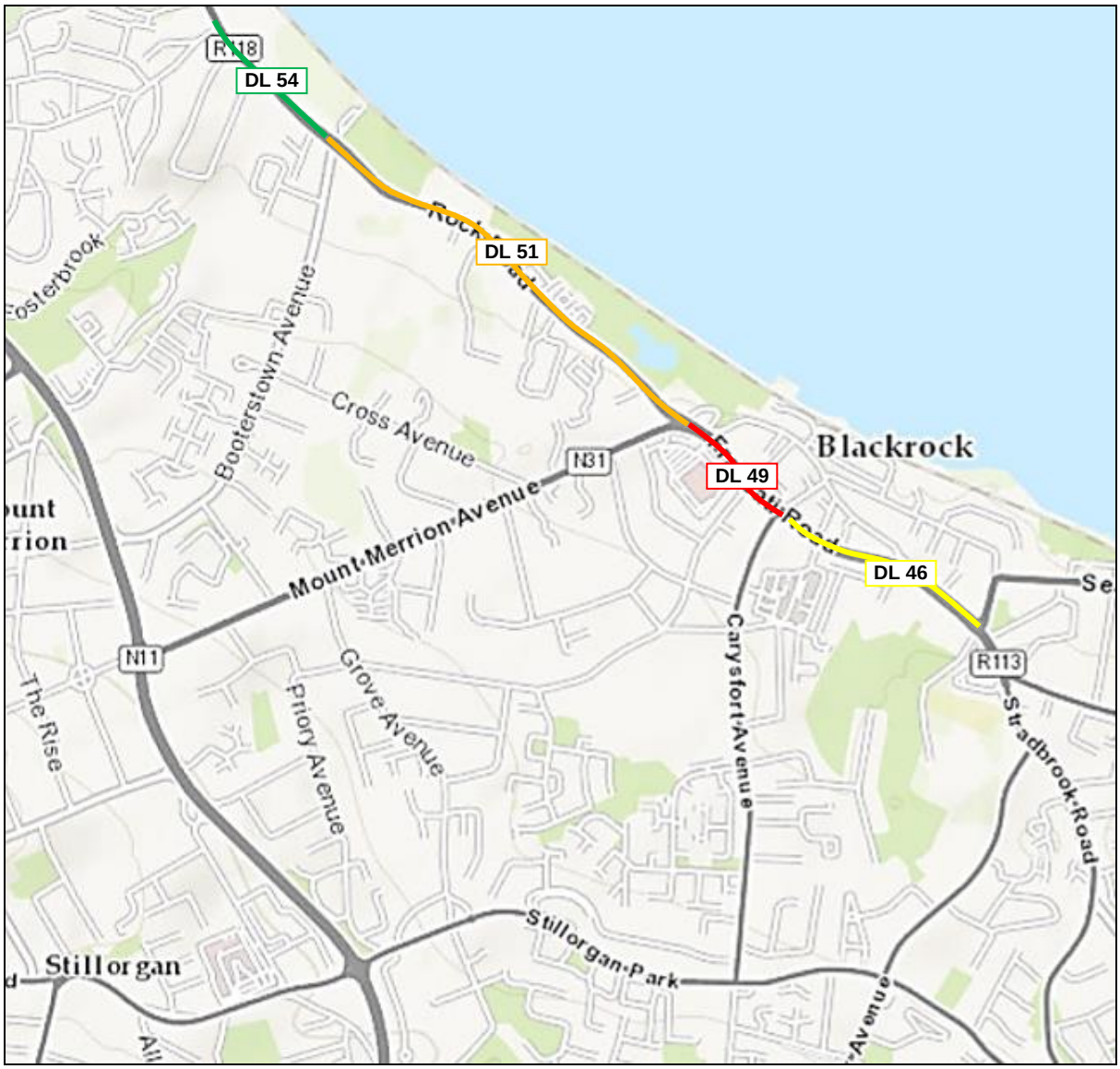


Figure 5.3.2: Route Sections passing Stage 1 'Sift' in SAS 2

5.4 SAS 3: Booterstown to Dun Laoghaire

As with SAS 1, there are a large number of potential 'end-to-end' routes with SAS 3.

The roads available for CBC 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 5.4.1 presents the initial potential route sections identified. A summary of the Stage 1 route sections sifting process is presented in Table 5.3.

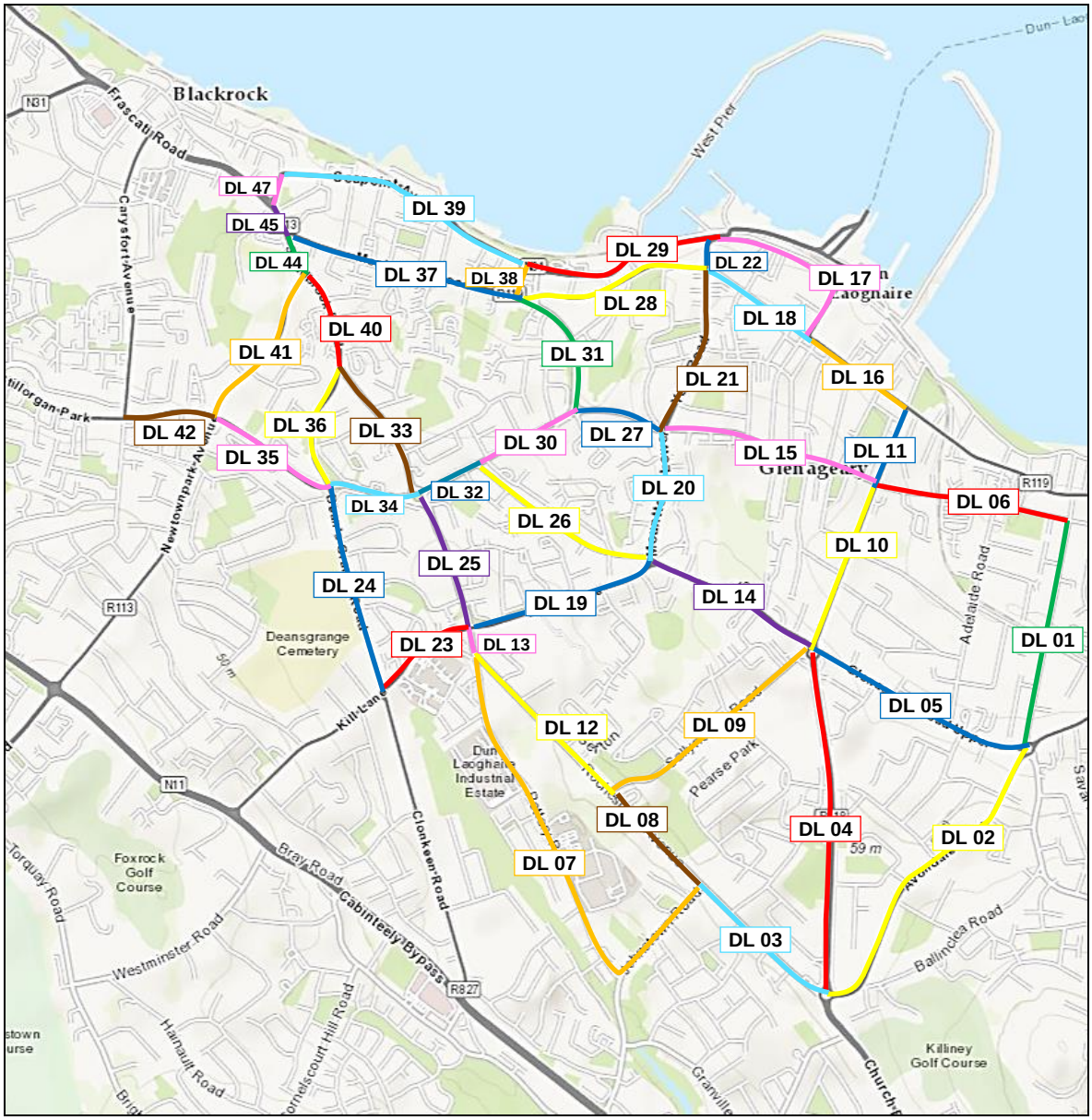


Figure 5.4.1: SAS 3 Route Sections – Blackrock to Dun Laoghaire

Table 5.3: SAS 3 Route Sections Sifting (Stage 1) Summary

Section No.	Description	Area Characteristics	Comment	Pass/ Fail
DL 01	Albert Road Lower, Elton Park/Hudson Road to Killiney Towers Roundabout	Suburban On-street parking	Single carriageway road with residential frontage and a number of dedicated disabled parking bays provided. On street parking also provided: as a result it is not a feasible section	Fail
DL 02	Avondale Road, Killiney Towers Roundabout to The Graduate Roundabout	Suburban Off-street parking. Existing cycle lanes and grass verges. Existing bus route	Single carriageway road with grass verges on both sides and trees. Cycle lane facilities provided. Parking off-street with sufficient space for bus lanes; as a result it is a feasible route section.	Pass
DL 03	Rochestown Avenue (R828), The Graduate Roundabout to Johnstown Road	Suburban, Off-street parking. Wide verge on one side. Existing bus route	Single carriageway road with wide grass verge on one side where bus and cycle lanes could be provided; as a result it is a feasible route section.	Pass
DL 04	Sallyglen Road (R118), The Graduate Roundabout to The Deerhunter Roundabout	Suburban, Off-road cycle track New bus route proposed for this link.	Single carriageway road with grass verge and young trees. Walled lined route with cycle facilities provided behind the wall so grass verge could be used for bus lanes; as a result this is a feasible section.	Pass
DL 05	Glenageary Road Upper, Killiney Towers Roundabout to The Deerhunter Roundabout	Suburban Existing on-road cycle lanes. Existing bus route.	Single carriageway with on-road cycle lanes. Off-road parking for residential properties, road could be widened to provide bus lanes; as a result this is a feasible section	Pass
DL 06	Hudson Road/Eden Road Upper and Lower, Albert Road Lower to Glenageary Road Lower.	Suburban On-street parking.	Single carriageway with some on-street parking, due to residential development bounding the road, limited capacity to widen in parts; as a result, this is not a viable route section.	Fail
DL 07	Johnstown Road/Pottery Road, Rochestown Avenue (R828) to Rochestown Avenue (R828)	Suburban Johnstown Road: Off-road car parking. Existing cycle facilities. Pottery Road: Cycle facilities provided.	Recently widened single carriageway with the maximum widening achievable provided in some locations but north of Lidl; little scope to widen further. Circuitous route away from principal trip attractors; as a result this is not a feasible section.	Fail
DL 08	Rochestown Avenue (R828), Johnstown Road to Sallynoggin Road.	Suburban Wide carriageway with lands available to widen into.	Single carriageway with building lines set back over much of the route; as a result this is a feasible section.	Pass

Section No.	Description	Area Characteristics	Comment	Pass/ Fail
DL 09	Sallynoggin Road Upper, Rochestown Avenue (R828) to The Deerhunter Roundabout	Suburban Wide carriageway, some traffic calming in place. On-street parking provided in places.	Single carriageway with parking over much of its length. While it does serve a potential user demand, the circuitous route makes it an unviable routing.	Fail
DL 10	Glenageary Road Lower, The Deerhunter Roundabout to Eden Park Upper/Corrig Road	Suburban Off-street parking. Some traffic calming.	Single carriageway with large number of properties fronting the road with limited land available to widen; as a result this is not a feasible section	Fail
DL 11	Glenageary Road Lower, Eden Road Upper/Corrig Road to Glasthule Road/Park Road/George Street Upper	Suburban,	Single carriageway with large number of properties fronting the road with limited land available to widen; as a result this is not a feasible section	Fail
DL 12	Rochestown Avenue, Sallynoggin Road to Pottery Road/Rochestown Avenue	Suburban Cycle facilities provided.	Single carriageway with building lines set back over much of the route; as a result this is a feasible section.	Pass
DL 13	Rochestown Avenue, Pottery Road/Rochestown Avenue to Bakers Corner	Suburban Existing cycle facilities.	Single carriageway with available space to provide facilities; as a result this is a feasible section.	Pass
DL 14	Glenageary Road Upper, The Deerhunter Roundabout to Jct of Kill Ave/Oliver Plunkett Road/Mounttown Lower/Highthorn Park/Glenageary Road Upper.	Suburban Cycle facilities and fragmented bus facilities.	Single carriageway with existing bus and cycle facilities, narrows towards southern end; however this is a feasible route section.	Pass
DL 15	Corrig Road/Tivoli Road, Glenageary Road Upper (R118)/Eden Road Upper to York Road/Mounttown Road Upper/Mounttown Road Lower.	Suburban, Narrow carriageway with double yellow lines.	Single carriageway narrow road with residential properties located along its length. Limited potential to widen over much of the route, as a result it is not a feasible section.	Fail
DL 16	George Street Upper, Park Road/Glasthule Road/Glenageary Road Upper to Marine Road/George Street Lower	Urban Main street, with sections of on-street parking. Some traffic calming features. Existing bus route.	Limited potential to widen however it is an existing bus route serving multiple bus lines and provides a direct route into the town centre section to connect with other bus routes; as a result this is a feasible section.	Pass
DL 17	Marine Road/Crofton Road, George Street Upper/Lower to York Road/Old Dunleary Road (N31).	Urban Link to main street, wide carriageway, existing bus route/terminus.	Limited potential to widen due to location of DART line, however it is an existing bus route serving multiple bus lines and provides link to DART services and town centre; as a result this is a feasible section.	Pass

Section No.	Description	Area Characteristics	Comment	Pass/ Fail
DL 18	George Street Lower, Marine Road/George Street Upper to York Road.	Urban Main Street, traffic calmed, loading facilities, one-way westbound for some sections.	Limited potential to widen however it is an existing bus route serving multiple bus lines and provides a direct route into the town centre section to connect with other bus routes; as a result this is a feasible section.	Pass
DL 19	Kill Avenue (R830), Bakers Corner to Jct of Kill Ave/Oliver Plunkett Road/Mounttown Lower/Highthorn Park/Glenageary Road Upper.	Suburban Bus lane westbound and cycle lane eastbound. Dun Laoghaire Fire Station and IADT located along route.	Potential to widen road to provide/improve facilities; as a result this is a feasible section.	Pass
DL 20	Mounttown Lower, Jct of Kill Ave/Oliver Plunkett Road/Mounttown Lower/Highthorn Park/Glenageary Road Upper and Mounttown Road Upper/Tivoli Road/York Road	Suburban Existing bus route. Some on-street parking occurs	Limited potential to widen road due to large number of residential properties, however it is an existing bus route and provides connection between other links; as a result this is a feasible section.	Pass
DL 21	York Road, Mounttown Lower/Upper/Tivoli Road to Cumberland St/Clarence Street/George Street Lower.	Suburban Narrow carriageway with double yellow lines. Existing bus route.	Limited potential to widen road due to large number of residential properties, as a result this is not a feasible section.	Fail
DL 22	Clarence Street, Cumberland Street/York Road/George Street Lower to Old Dunleary Road/Crofton Road	Suburban Wide carriageway with existing bus facilities.	Wide carriageway which provides a direct link to DART line; as a result, this is a feasible route section.	Pass
DL 23	Kill Lane, Bakers Corner to Deansgrange Road/Kill Lane (R830)/Clonkeen Road	Suburban Wide carriageway with existing cycle facilities. Short sections of bus lane provided.	Route is travelling away from key attractors, leading to a circuitous route; as a result this is not a feasible route section.	Fail
DL 24	Deansgrange Road, Kill Lane (R830), Clonkeen Road to Brookville Park, Deansgrange Road	Suburban On-street parking. In sections wide grass verge provided with trees. Existing bus route	Route is travelling away from key attractors, leading to a circuitous route; as a result this is not a feasible route section.	Fail
DL 25	Abbey Road, Bakers Corner to Stradbrook Roundabout	Suburban Existing bus route.	Wide carriageway with grass verge on one side where bus and cycle lanes could be provided; as a result, this is a feasible section.	Pass

Section No.	Description	Area Characteristics	Comment	Pass/ Fail
DL 26	Oliver Plunkett Rd/Monkstown Farm, Kill Ave/Glenageary Rd Upper/Mounttown Lower to Monkstown Ave	Suburban Existing bus route. On-street parking in parts.	At southern end, on-street parking provided. Road carriageway narrows considerably as route progresses, with residential properties bounding either side of the road. Limited capacity to widen in some locations, as a result this is not a viable section.	Fail
DL 27	Mounttown Road Upper, York Road/Tivoli Road/Mounttown Lower to Mounttown Roundabout.	Suburban On-street parking for residential properties with no alternative. On-road cycle lanes provided. Existing bus route.	Generally wide carriageway with potential to provide facilities, however a number of residential units with on-street parking and no alternative. This has been taken forward as a feasible route at this stage.	Pass
DL 28	Cumberland Street (R119)-Monkstown Crescent, George Street Upper/York Street to Clifton Avenue Carrickbrennan Road	Suburban On-street parking provided. Existing bus route.	Provision of facilities would result in a loss of a large volume of parking; as a result this is not a viable route section.	Fail
DL 29	Old Dunleary Road (N31), Crofton Road/York Road to Clifton Avenue.	Suburban Wide carriageway with double yellow lines.	Limited capacity to widen in places, and would result in loss of some on-street parking, however provides direct link to DART services; as a result this is a viable route section.	Pass
DL 30	Monkstown Avenue, Monkstown Roundabout to Oliver Plunkett Rd/Monkstown Farm	Suburban Existing bus route.	Single carriageway with grass verges provided along route where bus and cycle lanes could be provided, as a result, this is a viable route.	Pass
DL 31	Carrickbrennan Road, Stradbrook Roundabout to Monkstown Road/Clifton Avenue/Monkstown Crescent (R119)	Suburban On-street parking. Existing bus route.	Single carriageway road with potential to widen, will result in some loss of parking in village; as a result this route is a viable section.	Pass
DL 32	Monkstown Avenue, Oliver Plunkett Rd/Monkstown Farm to Stradbrook Rd/Abbey Rd	Suburban Existing Bus Route	Single carriageway with grass verges provided along route where bus and cycle lanes could be provided, as a result, this is a viable route.	Pass
DL 33	Stradbrook Road (R828), Stradbrook Roundabout to Rowan Park (R827)	Suburban Wide carriageway with grass verge in places.	Single carriageway with central hatching provided over much of its length which could be removed to provide sufficient space for bus and cycle lanes; as a result this route is a viable section.	Pass

Section No.	Description	Area Characteristics	Comment	Pass/ Fail
DL 34	Rockford Park, Stradbrook Roundabout to Brookville Park/Deansgrange Road (R827)	Suburban Verges provided between parallel roads.	Single carriageway with grass verge provided between parallel roads which could be removed for the provision of bus and cycle lanes, as a result, this is a viable route section.	Pass
DL 35	Brookville Park/Rowanbyrn, Deansgrange Road (R827)/Rockfield Park to Newtownpark Avenue (R113) /Annaville Terrace	Suburban Existing bus lanes. Some traffic calming provided.	Existing facilities provided over much of the route, as a result, this is a feasible section.	Pass
DL 36	Deansgrange Road-Rowan Park (R827), Brookville Park/Rockford Park to Jct of Rowan Park/Stradbrook Road.	Suburban Existing bus route.	Limited capacity to widen at the northern end of the link, as a result this is not a feasible section.	Fail
DL 37	Monkstown Road (R119), Clifton Avenue/Monkstown Crescent/Carrickbrennan Road to Temple Hill (R113) Tempe Crescent.	Suburban	Limited capacity to widen over much of its length, however possibility to use a combined route with Seapoint Avenue, as a result, this is a viable section.	Pass
DL 38	Clifton Avenue, Monkstown Road (R119) to Longford Terrace/Clifton Lane (N31)	Suburban	Potential to widen however parking provided for commercial units, as a result, this is not viable section.	Fail
DL 39	Seapoint Avenue (N31), Clifton Avenue to Newtown Avenue.	Suburban	Limited potential to widen in some locations due to railway line however provides key link to DART services and is a key link between other feasible links, may also be used in combination with Monkstown Road; as a result, this is a viable section.	Pass
DL 40	Stradbrook Road (R827), Rowan Park/Stradbrook Road(R828) to Newtownpark Avenue (R113)/Temple Hill (R113).	Suburban Existing bus route. Cycle facilities in some sections.	Single carriageway, wide in parts, bounded on the east by wall, behind which is a grass verge where cycle facilities could be provided, as a result this is a viable route section.	Pass
DL 41	Newtownpark Avenue (R113), Annaville Terrace/Rowanbyrn to Stradbrook Road (R827)/Temple Hill (R113)	Suburban Existing bus route.	Single carriageway with potential to widen, however a number of key pinch points, as well as a being circuitous; as a result, this is not a viable route section.	Fail
DL 42	Annaville Terrace-Fleurville, Newtownpark Avenue/Rowanbyrn to Stillorgan Park Road (R825)/Craysfort Avenue (R825).	Suburban Existing bus route. Off-road cycle facilities.	Single carriageway travelling away from key attractors and leading to circuitous route and greater journey time, as a result, this is not a feasible section.	Fail

Section No.	Description	Area Characteristics	Comment	Pass/ Fail
DL 44	Temple Hill (R113), Newtownpark Avenue (R825)/Stradbrook Road (R827) to Monkstown Road (R119)/Temple Crescent.	Suburban Existing bus route. Cycle facilities.	Wide road with two lanes in each direction, as a result, this is a viable route section.	Pass
DL 45	Temple Hill (R113), Monkstown Road (R119)/Temple Crescent to Newtown Avenue/Temple Road (N31).	Suburban Wide carriageway	Dual carriageway, with 2-3 lanes in each direction, as a result, this is a viable section.	Pass
DL 47	Newtown Avenue (N31), Temple Road (R113-N31) to Seapoint Avenue (N31)	Suburban On-street parking.	Single carriageway, with limited on-street parking and wide footpaths, which could be reduced in width to provide space for bus and cycle lanes; as a result, this is a viable route.	Pass

Following the 'Stage 1' sift, 29 of the 45 route sections assessed passed the initial sifting stage.

Though routes DL 2, 5, 16, 30, 32, 34 and 35 all passed, they were not progressed to the next assessment stage as they do not link with the other passing route sections.

The 22 route sections which progressed to Stage 2 are presented in Figure 5.4.2.

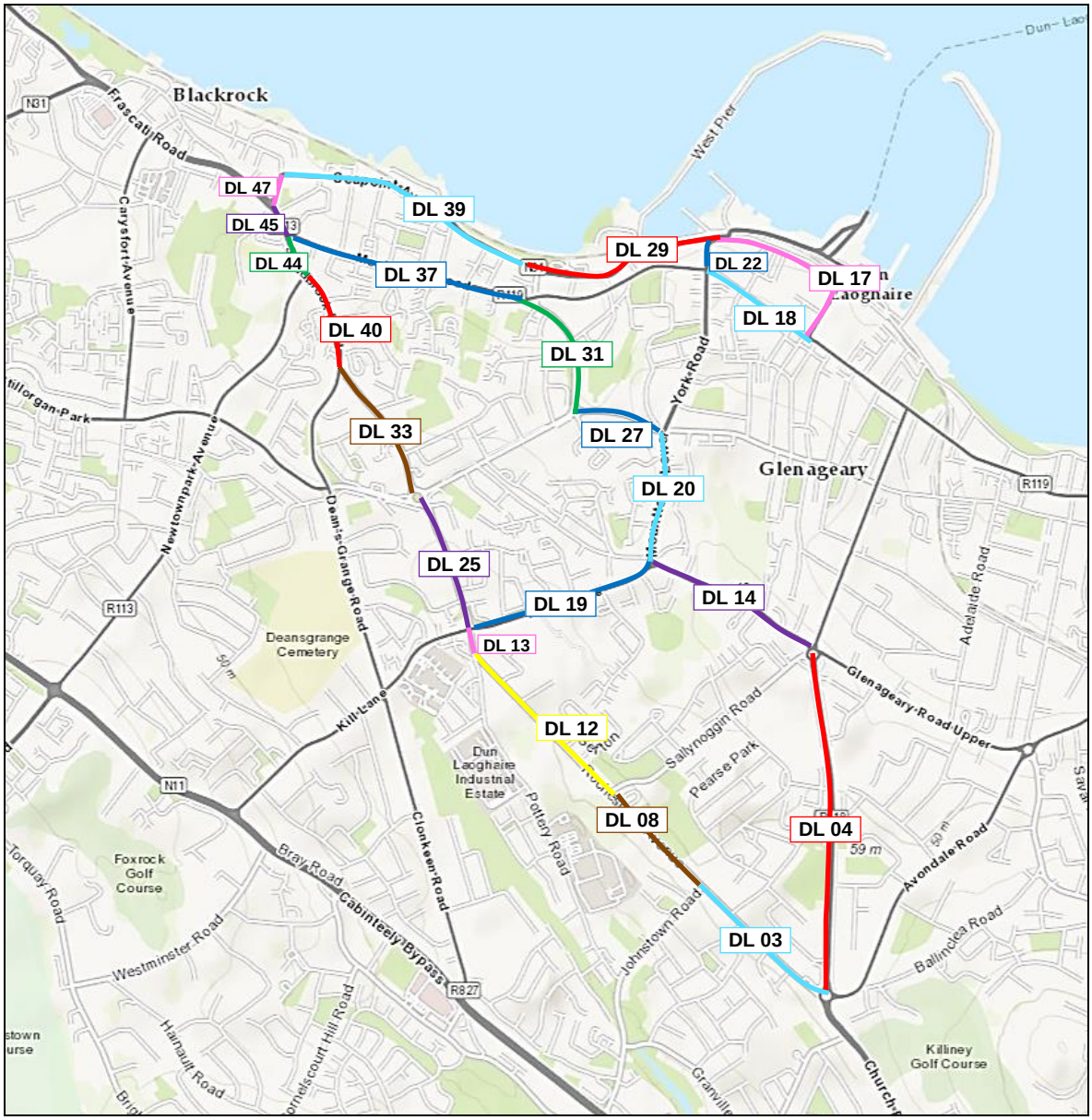


Figure **5.4.2**: Route Sections passing Stage 1 ‘Sift’ in SAS 3

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 each SAS.

After developing routes options, each was explored using different design concepts to identify potential scheme options for each route. The scheme options for each route within each SAS are described in this report Section.

6.2 SAS 1: City Centre to Booterstown

6.2.1 Introduction

Following the 'Stage 1' sift for SAS 1/Northern Terminus study area, the remaining 15 route sections were combined to form two cohesive route options as shown in Figure 6.2.1 below.

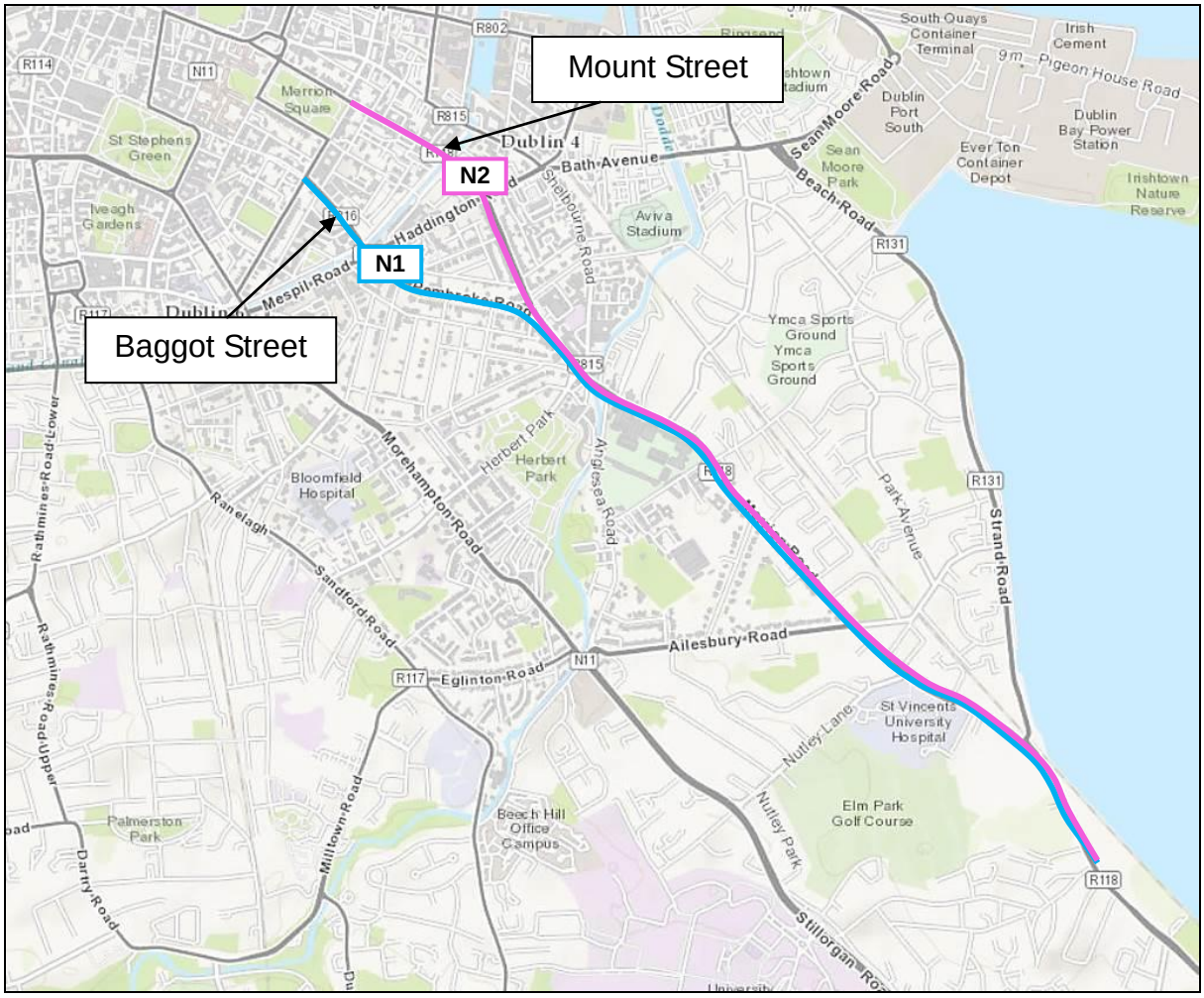


Figure 6.2.1: SAS 1 / Northern Terminus Cohesive Route Options

- N1: A route option via Merrion Road, Pembroke Road and Baggot Street Lower; and
- N2: A route option via Merrion Road, Northumberland Road and Merrion Square North.

Two scheme options have been developed for each of the route options in SAS 1; see Table 6.1.

Table 6.1: Study Area Section1 Scheme options

SAS 1	N1 (Baggot Street)	Option 1
		Option 2
	N2 (Mount Street)	Option 1
		Option 2

6.2.1 N1 – Booterstown to Merrion Street Upper Route

Figure 6.2.2 below illustrates the population residing within the 5, 10 and 15 minute catchment zones of the existing and proposed bus stops along route N1.

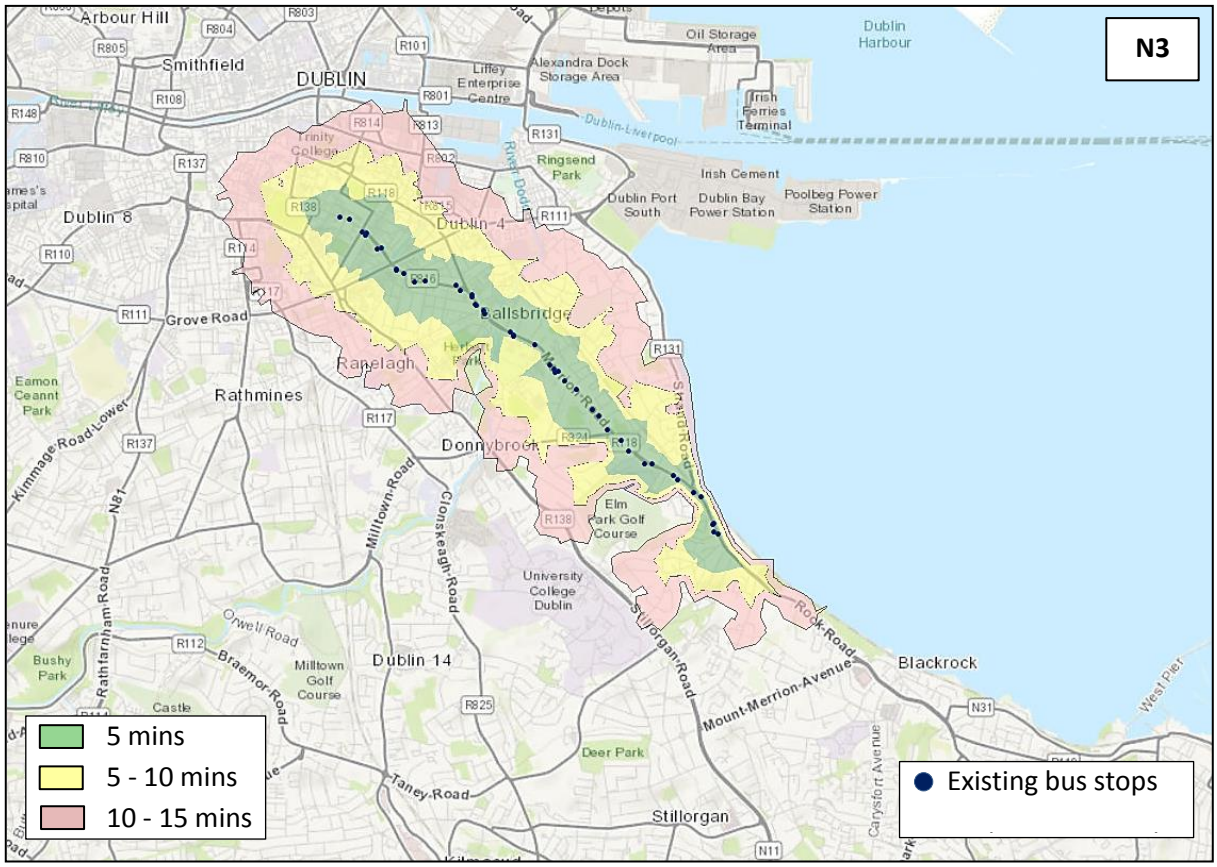


Figure 6.2.2: Walking distance catchment zones for route N1 bus stops

Inbound: This route option would connect Booterstown to Merrion Street Upper via Merrion Road, Pembroke Road and Baggot Street Lower.

Outbound: Southbound, buses would travel the same route as taken by inbound vehicles. This route is approximately 4.4 km in each direction.

Stops: 16 inbound and 17 outbound bus stops would be provided in each direction along this route. See Figure 6.2.2. Bus stop locations have been optimised to

facilitate the route geometry and optimise catchment based on population and employment destinations.

Catchment: The outermost isochrone contour defines the perimeter within which the nearest bus stop could be reached by pedestrians in 15 minutes or less at a typical walking pace. The population residing within each of the isochrone contour areas is summarised below:

- 5 minutes walking distance – 8,300 residents
- 5-10 minutes walking distance – 12,000 residents
- 10-15 minutes walking distance – 23,000 residents
- Total catchment within 15 minutes walking distance – 43,300 residents

These figures are based on the Census 2011 Small Area Population Statistics (SAPS).

Junctions: There are a total of 15 signalised junctions and 4 pedestrian crossings along this route option. ITS measures may be required to deliver the level of bus priority required for additional bus services.

Constraints: The following constraints would need to be considered if this route option is progressed:

- The replacement of parallel parking along Merrion Road and Baggot Street Lower;
- The presence of trees along Merrion Road;
- The presence of numerous entrances to existing residential properties and commercial establishments along the route option;
- Bridge crossing of River Dodder;
- Bridge crossing of Grand Canal (Baggot Street Bridge);
- Limited potential for widening along certain sections of Merrion Road to provide segregated bus and cycle facilities in each direction.

Environmental Impact: The impacts are summarised in the MCA table in Appendix A and in discussed in greater detail in the Environmental Impact Report in Appendix H

6.2.2 N1 – Booterstown to Merrion Street Upper Scheme Options

Two scheme options have been developed along route N1; Option 1 and Option 2. N1 Option 1 and N1 Option 2 are illustrated in Figure 6.2.3 and Figure 6.2.4 respectively.

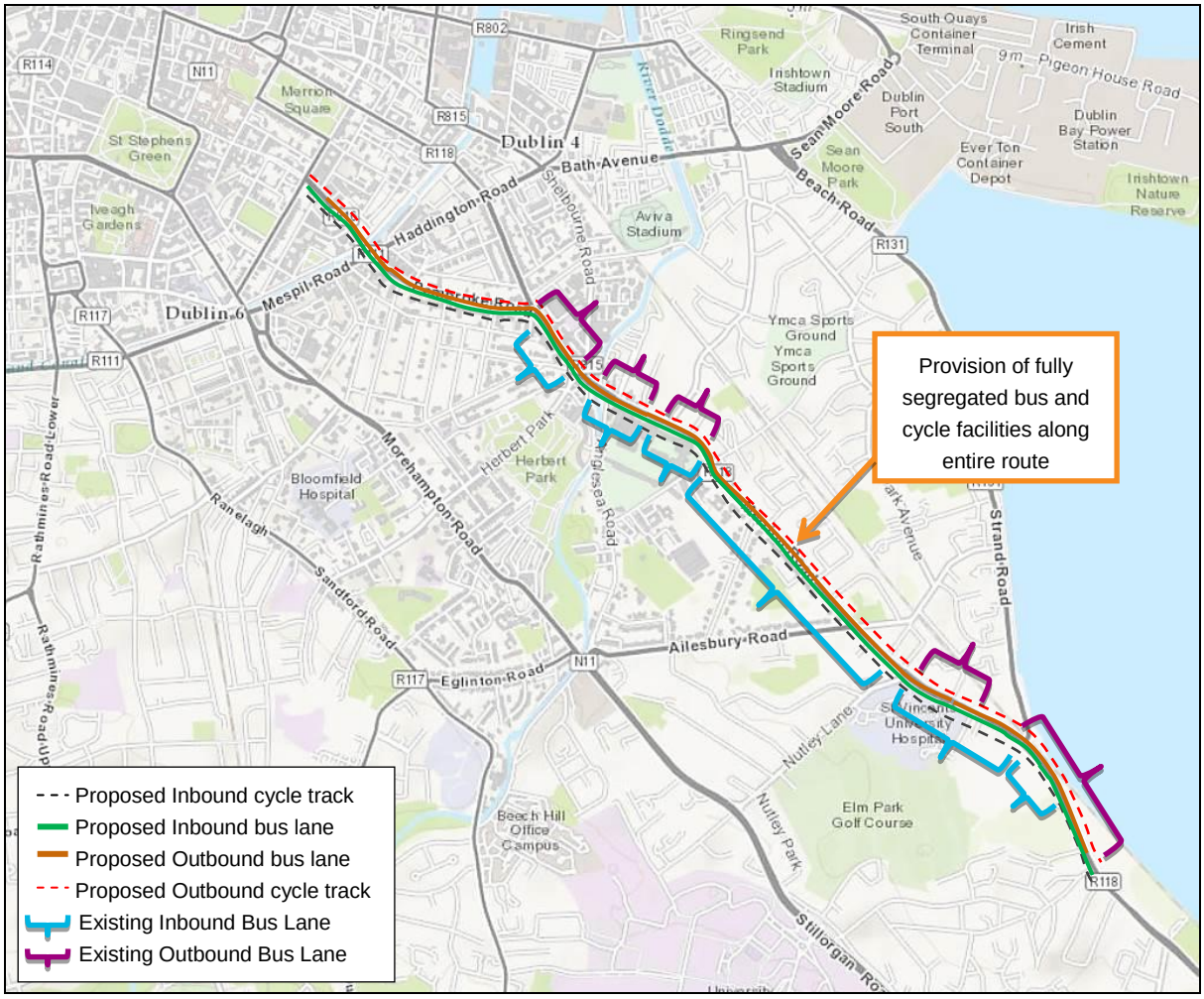


Figure 6.2.3: Route N1 Option 1

At present, there are existing bus facilities both inbound and outbound along the majority of the route along Merrion Road. There are no segregated bus or cycle facilities along Pembroke Road (from the Israeli Embassy towards the City Centre) and Baggot Street. The facilities to be provided by the proposed scheme option are shown above. Analysis of the traffic impact of the proposed works in comparison to the existing conditions has shown that:

- Merrion Road - Provision of full bus and cycle facilities to consolidate existing cycle and bus lanes although this will require converting significant lengths of shared traffic lanes to segregated bus lanes – Moderate negative impact
- Pembroke Road (from Ballsbridge Park to U.S Embassy) - Provision of full bus and cycle facilities to consolidate existing cycle and bus lanes although this will require converting significant lengths of shared traffic lanes to segregated bus lanes – Moderate negative impact
- Pembroke Road (from U.S Embassy to Israeli Embassy) - Provision of additional cycle lanes and consolidation of existing bus lanes - minor positive impact

- Pembroke Road (from Israeli embassy to City Centre) - Provision of full bus and cycle facilities where none presently exist – Major positive impact
- Baggot Street - Provision of full bus and cycle facilities where none presently exist – Major positive impact

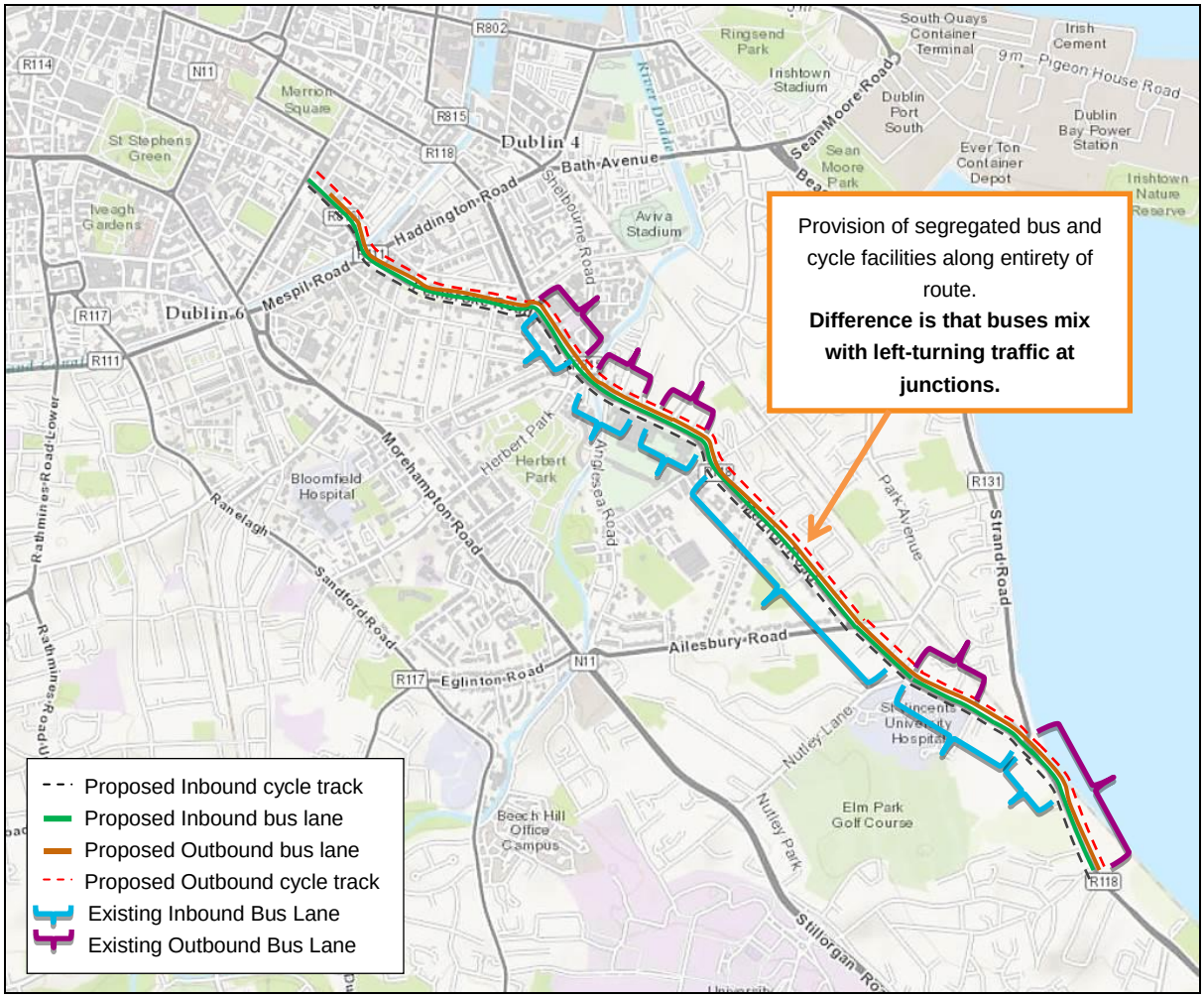


Figure 6.2.4: Route N1 Option 2

At present, there are existing bus facilities both inbound and outbound along the majority of the route along Merrion Road. There are no segregated bus or cycle facilities along Pembroke Road (from the Northumberland Road junction to the City Centre) and Baggot Street. The facilities to be provided by the proposed scheme option are shown above. Analysis of the traffic impact of the proposed works in comparison to the existing conditions has shown that:

- Merrion Road - Provision of full cycle facilities and bus lanes along the majority of the route to consolidate existing cycle and bus lanes although this will require converting lengths of shared traffic lanes to segregated bus lanes – Moderate negative impact.
- Pembroke Road (from Ballsbridge Park to Elgin Road junction) - Provision of full bus and cycle facilities to consolidate existing cycle and bus lanes although this will require converting significant lengths of shared traffic lanes to segregated bus lanes – Moderate negative impact

- Pembroke Road (from Northumberland Road junction to Elgin Road junction) - Provision of additional cycle lanes and consolidation of existing bus lanes - minor positive impact
- Pembroke Road (from Israeli embassy to City Centre) - Provision of full bus and cycle facilities where none presently exist – Major positive impact
- Baggot Street - Provision of full bus and cycle facilities where none presently exist – Major positive impact

As both options follow the same inbound and outbound route the constraints are the same, as are the number of bus stops and junctions. The two options differ in terms of the length and location of bus and cycle lane provisions along the route, which consequently impacts the journey time and cost.

Table 6.2: N1 Scheme Options Comparison

N1 Scheme Option	Inbound Journey Time	Outbound Journey Time	Total Cost	Infrastructure costs	Land acquisition costs
Option 1	26 minutes	26 minutes	€13.5M	€12.5M	€1M
Option 2	31 minutes	31 minutes	€12.9M	€12.1M	€0.8M

6.2.3 N1 – Booterstown to Merrion Street Upper Design Impacts on Existing Infrastructure

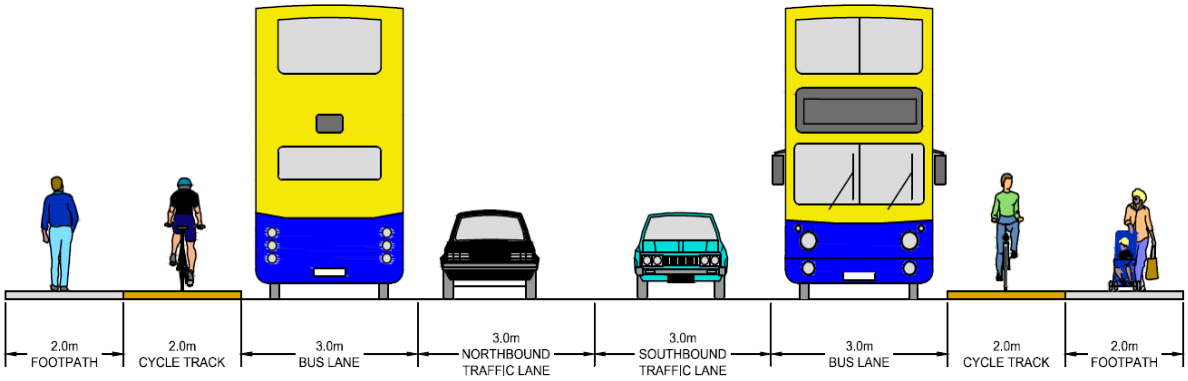
Bus stop locations have been optimised for N1 Option 1 and 2 to facilitate the route geometry and optimise catchment based on population and employment destinations. Additionally, junctions were designed to DMURS standards (e.g. kerb buildouts, raised tables) to improve pedestrian friendliness.

6.2.3.1 N1 Option 1

Summary

N1 Option 1 would optimise bus, cycle and pedestrian facilities along the entire route by applying the following lane widths for each direction of traffic, as recommended by DMURS:

- 3.0 m Bus lane;
- 3.0 m Traffic Lane;
- 2.0 m Footpath; and
- 2.0 m Cycle Track



N1 Option 1 would also provide indented bus stops (2.8m width) along its route.

Between Fitzwilliam Place and Grand Canal
Inbound left-turning traffic would get a separate traffic phase to inbound buses on Baggot Street Lower at the Fitzwilliam Street junction. The optimised footpath, bus and cycle lane widths as well as indented bus stops would be provided within the existing cross section of Baggot Street Lower. Existing trees would be retained – i.e. no impact between Ch.0m and CH. 350m. Parking would be removed on the west side of the road between Fitzwilliam Place and Grand Canal. On the east side, parking would be formalised and a buffer would be provided in between the parking bays and cycle lane.

Between Grand Canal and Lansdowne Road
Leeson Street Bridge would need to be widened to provide sufficient space for the optimised (20m) cross section. Inbound left-turning traffic would get a separate traffic phase to inbound buses on Baggot Street Lower at the Mespil Road junction and at the Waterloo Road junction. Existing trees and parking would need to be removed between Ch.635m and Ch. 960m for the optimised footpath, bus and cycle lane widths and indented bus stops. This would also encroach on properties along

Pembroke Road. Parking would be removed on the west side of the road and along most of the east side. A left turning lane for traffic would need to be provided for inbound traffic on Pembroke Road at the Lansdowne Road.

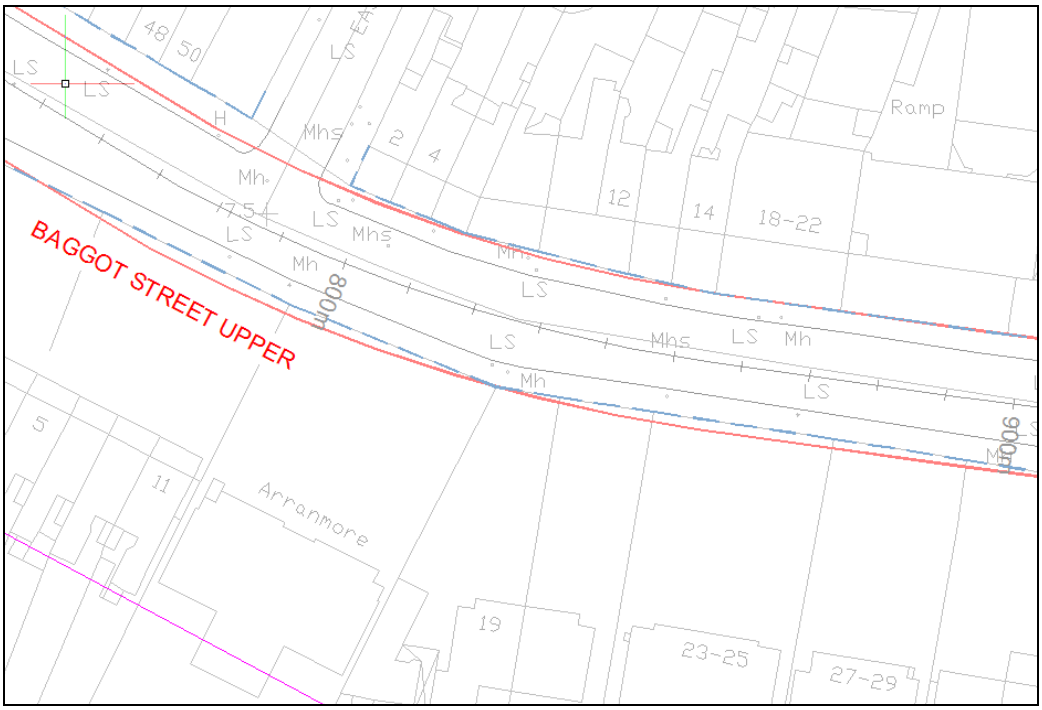


Figure 6.A: N1 Option 1 boundary (red) against existing building line (blue)

Between Lansdowne Road and River Dodder

A single compact junction is proposed for Northumberland Road / Lansdowne Road / Pembroke Road and also for Pembroke Road / Herbert Park / Shelbourne Road. A left turning lane would need to be provided for inbound traffic on Pembroke Road at the Lansdowne Road. A cul-de-sac is proposed on Elgin Road at the Pembroke Road end. Optimised footpath, bus and cycle lane widths and indented bus stops would fit along this section without impacting on existing properties or trees. Right turn from Pembroke Road to Shelbourne Road would be prohibited - Shelbourne Road would be accessible from Pembroke Road via Lansdowne Road.

Between River Dodder and Nutley Lane

The optimised footpath, bus and cycle lane widths (20m cross section) would encroach on a number of existing properties between Simmonscourt Road and Nutley Lane. Furthermore, indented bus stops and left-turning traffic lanes at junctions would further impact on property throughout this section. Some existing trees would be impacted. Parking will not be impacted along this section. Pedestrian facilities, as per DMURS, would be applied to the majority of minor arm junctions along this section.

Between Nutley Lane and Strand Road

Continuous median would be provided between Nutley Lane and St Vincent's Hospital with pedestrian crossing facilities. No existing trees would be impacted though all parking spaces would be removed and the optimised 20m cross section would encroach on property between St Vincent's Hospital and Strand Road on the west side of the road. The proposed indented bus stops and left-turning traffic lanes at junctions would not impact on property. Raised tables would be provided at the following minor arm junctions; Merrion Avenue, Herbert Avenue and Estate Avenue.

Between Strand Road and Elm Park

A median would be provided along this section with pedestrian crossing facilities. A 70m parking bay would be provided at the Strand Road end of this section, on the east side of the road. A cul-de-sac is proposed on Strand Road where it currently connects to Merrion Road. Traffic on Merrion Road would reach Strand Road via a new road proposed through the carparks of Our Lady Queen of Peace Church and Sandymount Gym (Body Rock Performance) office block. The optimised 20m cross-section and indented bus stops would not impact on trees or properties along this section.

Between Elm Park and Trimleston Avenue

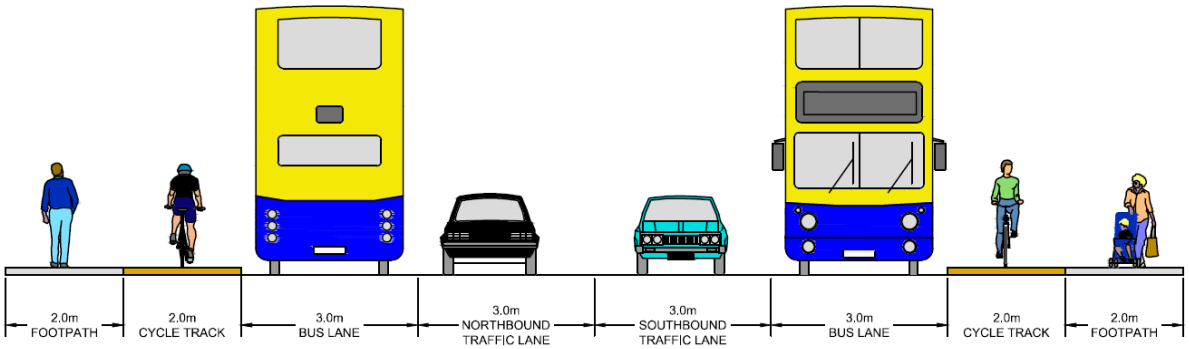
The optimised footpath, bus and cycle lane widths and indented bus stops would impact on properties along this section. Furthermore, left-turning lanes for inbound traffic would require land acquisition at the Elm Park and Trimleston Avenue junctions. There is no existing parking or trees which would be impacted. A raised table would be provided at the Trimleston Avenue junction.

6.2.3.2 N1 Option 2

Summary

N1 Option 2 would provide bus priority where practical as well as cycle and pedestrian facilities along the entire route by applying the following lane widths for each direction of traffic, as recommended by DMURS:

- 3.0 m Bus lane;
- 3.0 m Traffic Lane;
- 2.0 m Footpath; and
- 2.0 m Cycle Track



The difference between N1 Option 1 and Option 2 is that Option 2 would provide some indented bus stops (2.8m width) and some in-line bus stops along its route. Also, with Option 2, buses would merge with left-turning traffic at junctions.

Between Fitzwilliam Place and Grand Canal

Inbound left-turning traffic would get a separate traffic phase to inbound buses on Baggot Street Lower at the Fitzwilliam Street junction. Continuous bus and cycle lanes would be provided along this section, which would require the removal of the median between Ch.35m and Ch. 60m. Fixed cross sections would be applied continuously by building out from the existing kerb; maximising pedestrian facilities to accommodate increased pedestrian activity along this section. Existing trees would be retained - no impact. However, bus stops would not be indented as that would involve encroachment into existing properties i.e. would involve demolition.

Parking would be removed on the west side of the road between Fitzwilliam Place and Grand Canal. On the east side, parking would be formalised and a buffer would be provided in between the parking bays and cycle lane.

Between Grand Canal and Lansdowne Road

Continuous bus and cycle lanes would be provided along Baggot Street Upper and Pembroke Road – no cycle lanes are proposed on Leeson Street Bridge. Inbound left-turning traffic would get a separate traffic phase to inbound buses on Baggot Street Lower at the Mespil Road junction and at the Waterloo Road junction. Footpath widths would need to be reduced to provide sufficient space for fixed cross sections and indented parking bays on the east side of the road – requires the removal of one existing tree. Parking would be removed on the west side of the road and along most of the east side. Potentially, some of the properties would be impacted.

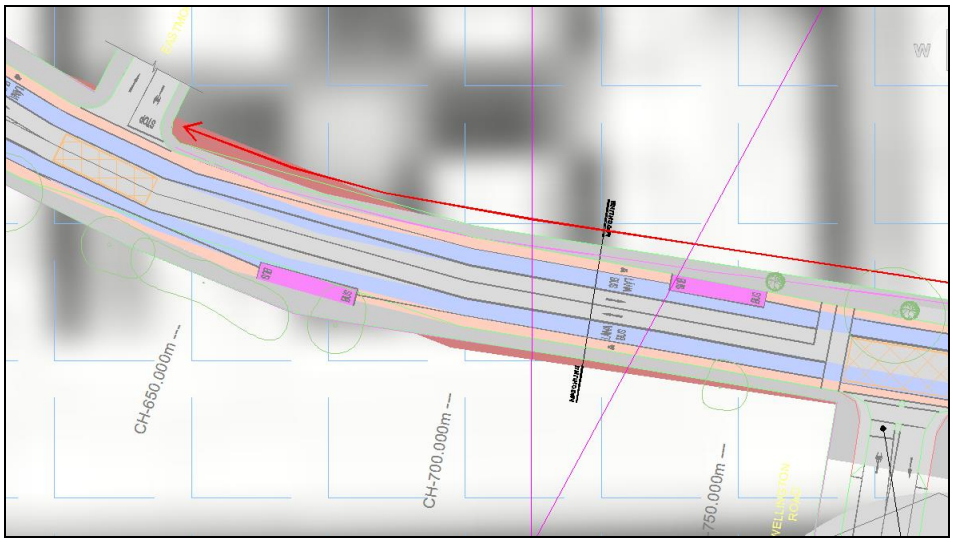


Figure 6.B: N1 Option 2 boundary (red) against existing building line (blue)

Between Lansdowne Road and River Dodder

A single compact junction is proposed for Northumberland Road / Lansdowne Road / Pembroke Road and also for Pembroke Road / Herbert Park / Shelbourne Road. Left-turning inbound traffic would share the bus lane on Pembroke Road at the Lansdowne Road junction (approx. 85m) and also at the Herbert Park junction (approx. 24m). Left-turning outbound traffic would share the bus lane on Pembroke Road at the Shelbourne Road junction (approx. 42m).

A cul-de-sac is proposed on Elgin Road at the Pembroke Road end of this section. Continuous bus and cycle lanes would be provided along Pembroke Road. Design would not impact on existing trees or properties. Right turn from Pembroke Road to Shelbourne Road would be prohibited – Shelbourne Road would be accessible from Pembroke Road via Lansdowne Road.

Between River Dodder and Nutley Lane

Left-turning inbound traffic would share the bus lane on Merrion Road at the Anglesea Road (approx. 60m) junction, at the Simmonscourt Road junction (approx. 24m) and also at the Ailesbury Road junction (approx. 18m). Left-turning inbound traffic would get a separate traffic phase to inbound buses at the Shrewsbury Road junction. Left-turning outbound traffic would share the bus lane on Merrion Road at the Ballsbridge Park junction (approx. 35m), Serpentine Avenue junction (approx. 30m), Sandymount Avenue (approx. 25m) and the Ailesbury Road junction (approx. 26m).

Continuous bus and cycle lanes would be provided along this section, requiring the existing footpath widths to be reduced. Some existing trees would be impacted. Parking will not be impacted along this section. Some existing trees would be impacted. Parking will not be impacted along this section. Pedestrian facilities, as per DMURS, would be applied to the majority of minor arm junctions along this section. Potentially, some of the properties would be impacted on the west side of the road between Ailesbury Road and Nutley Lane (as shown on Dun Laoghaire to City Centre CBC Sheet 9 of 20).

Between Nutley Lane and Strand Road

Continuous bus and cycles lanes would be provided, requiring the existing footpath widths to be reduced along this section. Continuous median would be provided between Nutley Lane and St Vincent's Hospital with pedestrian crossing facilities. No existing trees would be impacted though all parking spaces would be removed and property would be encroached on between St Vincent's Hospital and Strand Road on the west side of the road. Raised tables would be provided at the following minor arm junctions; Merrion Avenue, Herbert Avenue and Estate Avenue. Left-turning outbound traffic would share the bus lane on Merrion Road at the Merrion Avenue junction (approx. 50m).

Between Strand Road and Elm Park

Continuous bus and cycles lanes would be provided, requiring the existing footpath widths to be reduced. A central median would be provided along this section with pedestrian crossing facilities. A 70m parking bay would be provided at the Strand Road end of this section (between Ch.3855m and Ch.3925m as shown on Dun Laoghaire to City Centre CBC Sheet 11 of 20), on the east side of the road. A cul-de-sac is proposed on Strand Road where it currently connects to Merrion Road. Traffic on Merrion Road would reach Strand Road via a new road proposed through the carparks of Our Lady Queen of Peace Church and Sandymount Gym (Body Rock Performance). The cycle facility would be two-way on the east side of the road and one-way on the west side.

Between Elm Park and Trimleston Avenue

Continuous bus and cycles lanes would be provided, requiring the existing footpath widths to be reduced along certain sections. The existing parking and trees would be maintained though property and private land would be impacted on (as shown on Dun Laoghaire to City Centre CBC Sheet 12 of 20). The cycle facility would be two-way on the east side of the road and one-way on the west side. A raised table would be provided at the Belview Avenue junction. Inbound buses would get a separate phase to traffic at the Elm Park junction to eliminate conflict with inbound left turning traffic.

6.2.4 N2 – Booterstown to Merrion Square West Route

Figure 6.2.5 below illustrates the population residing within the 5, 10 and 15 minute catchment zones of the existing and proposed bus stops along route N2.

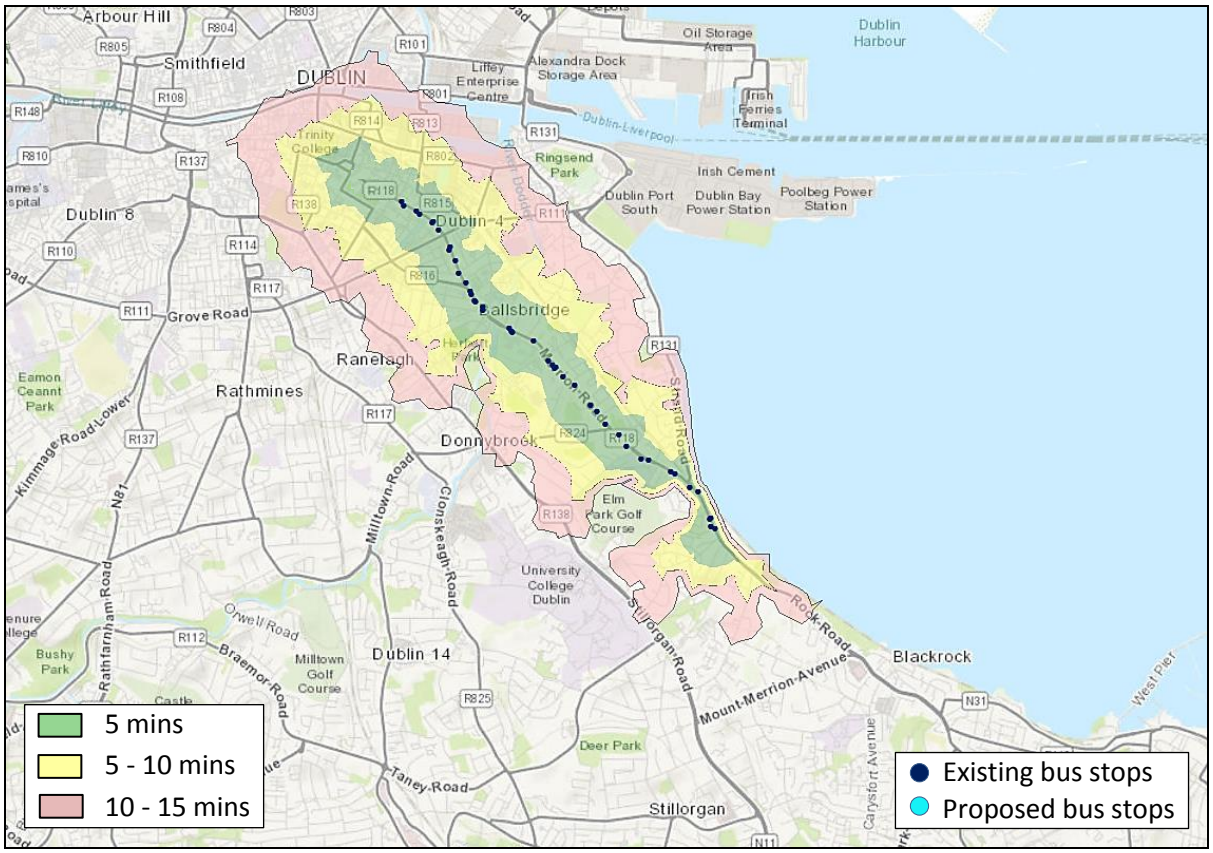


Figure 6.2.5: Walking distance catchment zones for route N2 bus stops

Inbound: This route option would connect Booterstown to Merrion Square West via Merrion Road, Northumberland Road and Merrion Square North.

Outbound: Southbound, buses would travel the same route as taken by inbound vehicles. This route is approximately 4.5 km in each direction.

Stops: 16 inbound and 17 outbound bus stops would be provided in each direction along this route. See Figure 6.2.2. Bus stop locations have been optimised to facilitate the route geometry and optimise catchment based on population and employment destinations.

Catchment: The outermost isochrone contour defines the perimeter within which the nearest bus stop could be reached by pedestrians in 15 minutes or less at a typical walking pace. The population residing within each of the isochrone contour areas is summarised below:

- 5 minutes walking distance – 10,200 residents
- 5-10 minutes walking distance – 14,700 residents
- 10-15 minutes walking distance – 21,200 residents
- Total catchment within 15 minutes walking distance – 46,100 residents

These figures are based on the Census 2011 Small Area Population Statistics (SAPS).

Junctions: There are a total of 16 signalised junctions and 4 pedestrian crossings along this route option. ITS measures may be required to deliver the level of bus priority required for additional bus services.

Constraints: The following constraints would need to be considered if this route option is progressed:

- The replacement of parallel parking along Merrion Road and Merrion Square North;
- The presence of trees along Merrion Road;
- The presence of numerous entrances to existing residential properties and commercial establishments along the route option;
- Bridge crossing of River Dodder;
- Bridge crossing of Grand Canal (Northumberland Road Bridge);

Limited potential for widening along certain sections of Merrion Road to provide segregated bus and cycle facilities in each direction.

Environmental Impact: The impacts are summarised in the MCA table in Appendix A and in discussed in greater detail in the Environmental Impact Report in Appendix H

6.2.5 N2 – Booterstown to Merrion Square West Scheme Options

Two scheme options have been developed along route N2; Option 1 and Option 2. N2 Option 1 and N2 Option 2 are illustrated in Figure 6.2.6 and Figure 6.2.7 respectively.

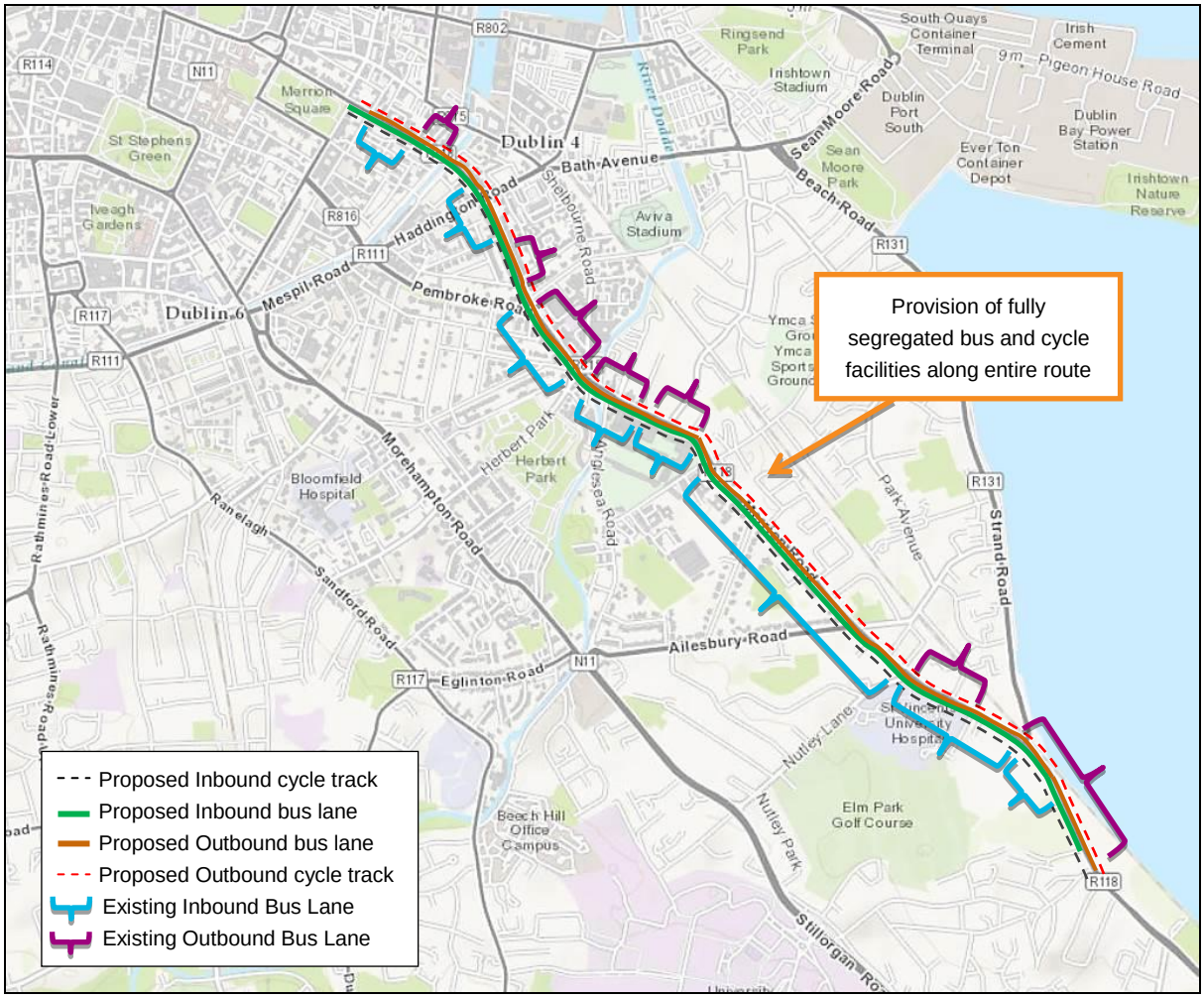


Figure 6.2.6: Route N2 Option 1

At present, there are existing bus facilities both inbound and outbound along the majority of the route along Merrion Road. There are existing bus and cycle lanes along Northumberland Road and Mount Street Lower (alternating between inbound and outbound). The facilities to be provided by the proposed scheme option are shown above. Analysis of the traffic impact of the proposed works in comparison to the existing conditions has shown that:

- Merrion Road - Provision of full bus and cycle facilities to consolidate existing cycle and bus lanes (inbound and outbound) although this will require converting significant lengths of shared traffic lanes to segregated bus lanes – Moderate negative impact.
- Pembroke Road (from Ballsbridge Park to U.S Embassy) - Provision of full bus and cycle facilities to consolidate existing cycle and bus lanes although this will require converting significant lengths of shared traffic lanes to segregated bus lanes – Moderate negative impact.
- Northumberland Road - Provision of full bus and cycle facilities to consolidate existing cycle and bus lanes (inbound and outbound) although this will require

converting significant lengths of shared traffic lanes to segregated bus lanes – Moderate negative impact.

- Mount Street Lower - Provision of full bus and cycle facilities to consolidate existing cycle and bus lanes (inbound and outbound) although this will require converting significant lengths of shared traffic lanes to segregated bus lanes – Moderate negative impact.

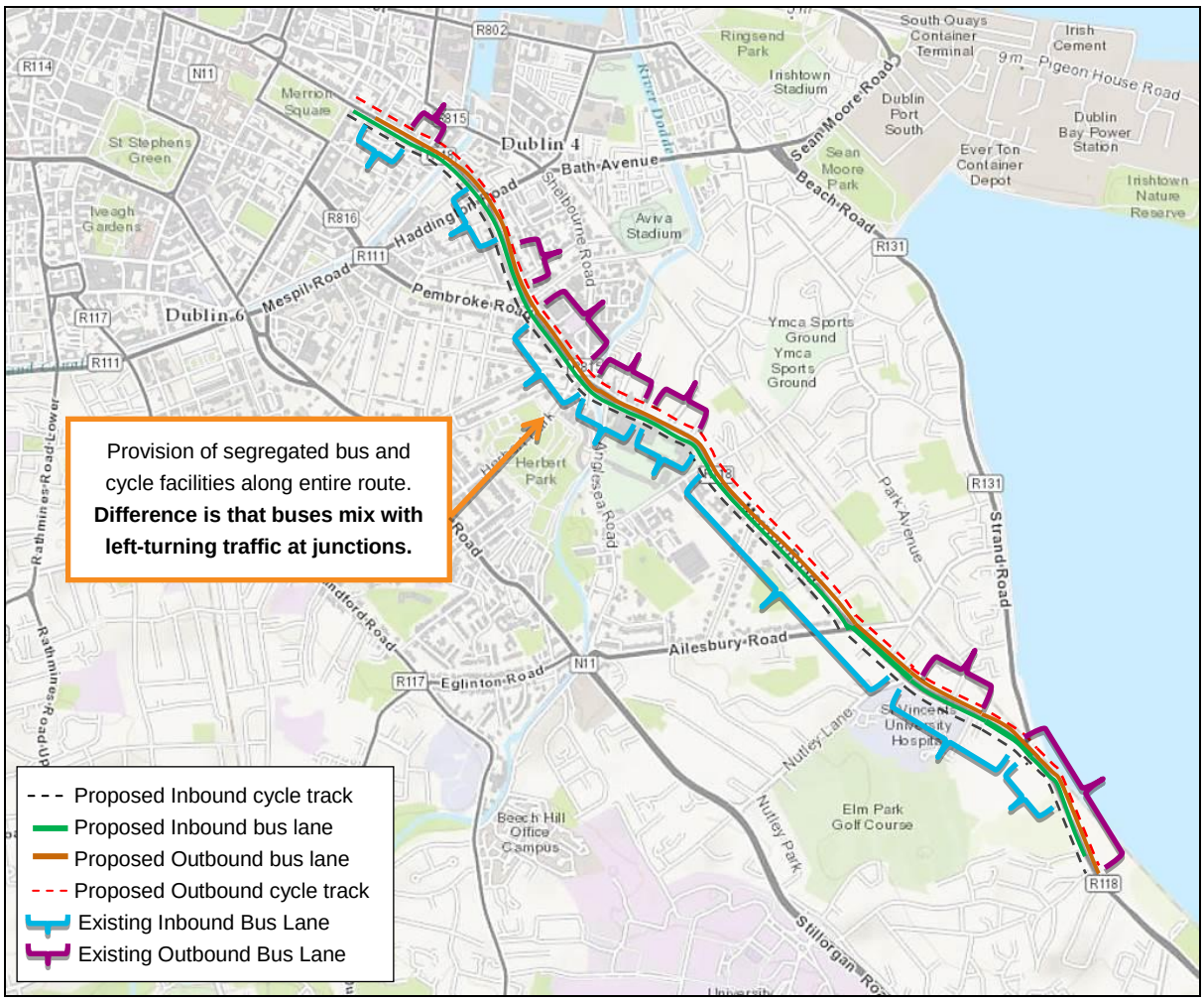


Figure 6.2.7: Route N2 Option 2

At present, there are existing bus facilities both inbound and outbound along the majority of the route along Merrion Road. There are existing bus and cycle lanes along Northumberland Road and Mount Street Lower (alternating between inbound and outbound). The facilities to be provided by the proposed scheme option are shown above. Analysis of the traffic impact of the proposed works in comparison to the existing conditions has shown that:

- Merrion Road - Provision of full bus and cycle facilities to consolidate existing cycle and bus lanes (inbound and outbound) although this will require converting significant lengths of shared traffic lanes to segregated bus lanes – Moderate negative impact.
- Pembroke Road (from Ballsbridge Park to U.S Embassy) - Provision of full bus and cycle facilities to consolidate existing cycle and bus lanes although this will require converting significant lengths of shared traffic lanes to segregated bus lanes – Moderate negative impact.

- Northumberland Road - Provision of full bus and cycle facilities to consolidate existing cycle and bus lanes (inbound and outbound) although this will require converting significant lengths of shared traffic lanes to segregated bus lanes – Moderate negative impact.
- Mount Street Lower - Provision of full bus and cycle facilities to consolidate existing cycle and bus lanes (inbound and outbound) although this will require converting significant lengths of shared traffic lanes to segregated bus lanes – Moderate negative impact.

As both options follow the same inbound and outbound route the constraints are the same, as are the number of bus stops and junctions. The two options differ in terms of the length and location of bus and cycle lane provisions along the route, which consequently impacts the journey time and cost.

Table 6.3: N2 Scheme Options Comparison

N2 Scheme Option	Inbound Journey Time	Outbound Journey Time	Total Cost	Infrastructure costs	Land acquisition costs
Option 1	27 minutes	27 minutes	€14.6M	€11.9M	€2.7M
Option 2	31 minutes	32 minutes	€13.5M	€11.4M	€2.1M

6.2.6 N2 – Booterstown to Merrion Square West Design Impacts on Existing Infrastructure

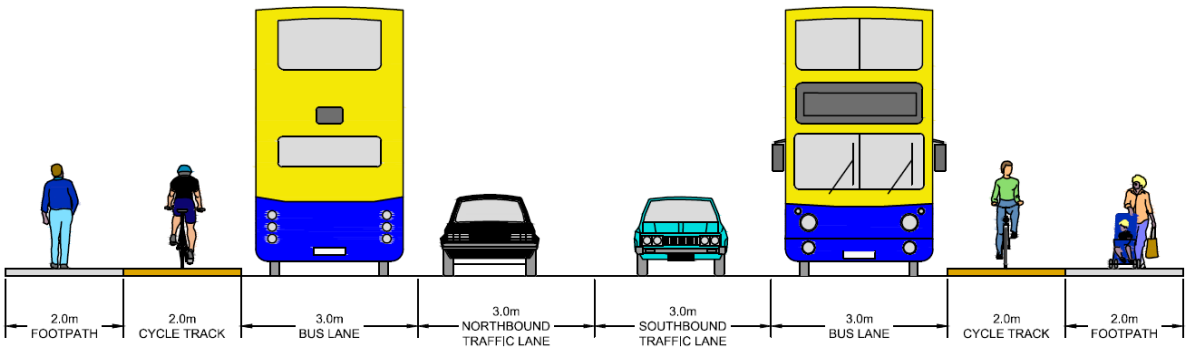
Bus stop locations have been optimised for N2 Option 1 and 2 to facilitate the route geometry and optimise catchment based on population and employment destinations. Additionally, junctions were designed to DMURS standards (e.g. kerb buildouts, raised tables) to improve pedestrian friendliness.

6.2.6.1 N2 Option 1

Summary

N2 Option 1 would optimise bus, cycle and pedestrian facilities along the entire route by applying the following lane widths for each direction of traffic, as recommended by DMURS:

- 3.0 m Bus lane;
- 3.0 m Traffic Lane;
- 2.0 m Footpath; and
- 2.0 m Cycle Track



N2 Option 1 would also provide indented bus stops (2.8m width) along its route.

Between Fitzwilliam Place and Lansdowne Road

Inbound left-turning traffic would get a separate traffic phase to inbound buses on Mount Street Lower at the Fitzwilliam Street junction. The optimised footpath, bus and cycle lane widths as well as indented bus stops would not fit within the existing cross section of Mount Street Lower, as illustrated below. An increased number of existing trees and parking would be removed on Mount Street Lower. Details of tree type; condition etc., contained within tree survey conducted October 2016.

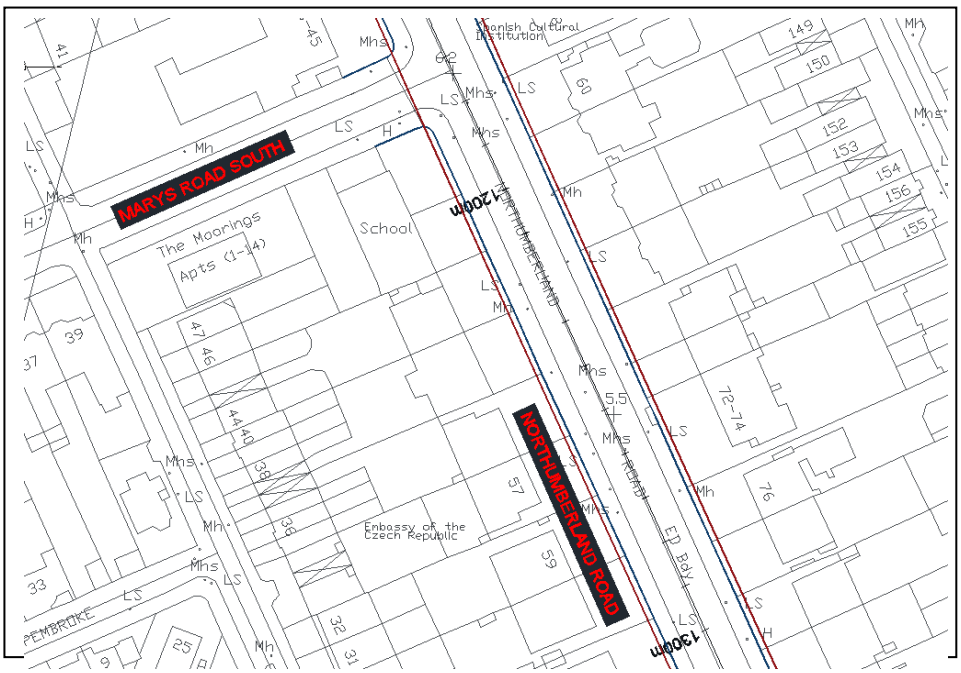


Figure 6.C: N2 Option 1 boundary (red) against existing building line (blue)

Between Lansdowne Road and River Dodder

Existing situation does not achieve objectives and benefits nor includes required bus priority. Therefore, the following have been assessed.

A single compact junction is proposed for Northumberland Road / Lansdowne Road / Pembroke Road and also for Pembroke Road / Herbert Park / Shelbourne Road.

A left turning lane would need to be provided for inbound traffic on Pembroke Road at the Lansdowne Road. A cul-de-sac is proposed on Elgin Road at the Pembroke Road end. Optimised footpath, bus and cycle lane widths and indented bus stops would fit a long this section without impacting on existing properties or trees. Right turn from Pembroke Road to Shelbourne Road would be prohibited - Shelbourne Road would be accessible from Pembroke Road via Lansdowne Road.

Between River Dodder and Nutley Lane

The optimised footpath, bus and cycle lane widths (20m cross section) would encroach on a number of existing properties between Simmonscourt Road and Nutley Lane. Furthermore, indented bus stops and left-turning traffic lanes at junctions would further impact on property throughout this section. Most of the existing trees and parking spaces would be impacted. Pedestrian facilities, as per DMURS, would be applied to the majority of minor arm junctions along this section.

Between Nutley Lane and Strand Road

Continuous median would be provided between Nutley Lane and St Vincent's Hospital with pedestrian crossing facilities. No existing trees would be impacted though all parking spaces would be removed and the optimised 20m cross section would encroach on property between St Vincent's Hospital and Strand Road on the west side of the road. The proposed indented bus stops and left-turning traffic lanes at junctions would not impact on property. Raised tables would be provided at the following minor arm junctions; Merrion Avenue, Herbert Avenue and Estate Avenue.

Between Strand Road and Elm Park

A median would be provided along this section with pedestrian crossing facilities. A 70m parking bay would be provided at the Strand Road end of this section, on the east side of the road. A cul-de-sac is proposed on Strand Road where it currently connects to Merrion Road. Traffic on Merrion Road would reach Strand Road via a new road proposed through the carparks of Our Lady Queen of Peace Church and Sandymount Gym (Body Rock Performance) office block. The optimised 20m cross-section and indented bus stops would not impact on trees or properties along this section.

Between Elm Park and Trimleston Avenue

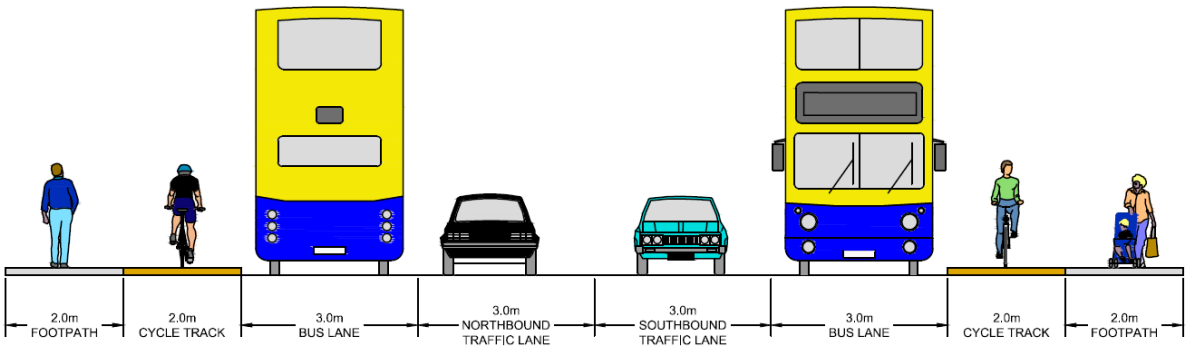
The optimised footpath, bus and cycle lane widths and indented bus stops would impact on properties along this section. Furthermore, left-turning lanes for inbound traffic would require land acquisition at the Elm Park and Trimleston Avenue junctions. There is no existing parking or trees which would be impacted. A raised table would be provided at the Trimleston Avenue junction.

6.2.6.2 N2 Option 2

Summary

N2 Option 2 would provide bus priority where practical as well as cycle and pedestrian facilities along the entire route by applying the following lane widths for each direction of traffic, as recommended by DMURS:

- 3.0 m Bus lane;
- 3.0 m Traffic Lane;
- 2.0 m Footpath; and
- 2.0 m Cycle Track



The difference between N2 Option 1 and Option 2 is that Option 2 would provide some indented bus stops (2.8m width) and some in-line bus stops along its route. Also, with Option 2, buses would merge with left-turning traffic at junctions.

Between Fitzwilliam Place and Lansdowne Road

Inbound left-turning traffic would get a separate traffic phase to inbound buses on Mount Street Lower at the Fitzwilliam Street junction. The proposed bus and cycle lanes in each direction would not fit within the existing cross section of Mount Street Lower or Northumberland Road. Existing trees and parking (as detailed in Appendix

E) would be removed on these streets. An increased number of existing trees and parking would be removed on Mount Street Lower. Details of tree type; condition etc., contained within tree survey conducted October 2016.

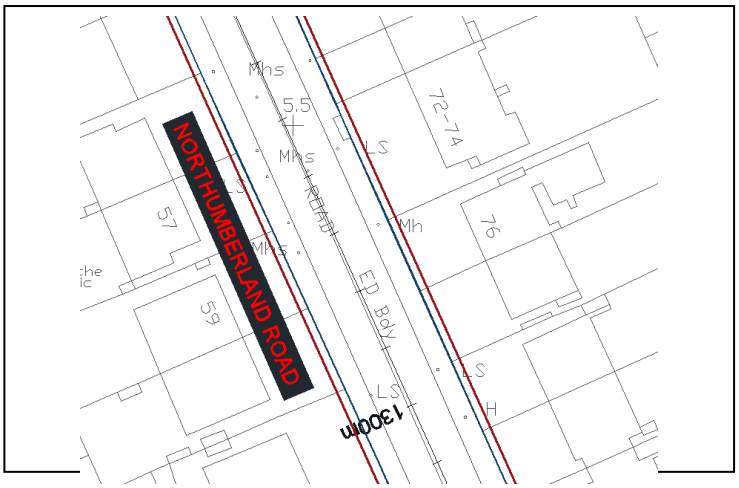


Figure 6.D: N2 Option 2 boundary (red) against existing building line (blue)

Between Lansdowne Road and River Dodder

A single compact junction is proposed for Northumberland Road / Lansdowne Road / Pembroke Road and also for Pembroke Road / Herbert Park / Shelbourne Road. Left-turning inbound traffic would share the bus lane on Pembroke Road at the Lansdowne Road junction (approx. 85m) and also at the Herbert Park junction (approx. 24m). Left-turning outbound traffic would share the bus lane on Pembroke Road at the Shelbourne Road junction (approx. 42m).

A cul-de-sac is proposed on Elgin Road at the Pembroke Road end of this section. Continuous bus and cycle lanes would be provided along Pembroke Road. Design would not impact on existing trees or properties. Right turn from Pembroke Road to Shelbourne Road would be prohibited – Shelbourne Road would be accessible from Pembroke Road via Lansdowne Road.

Between River Dodder and Nutley Lane

Left-turning inbound traffic would share the bus lane on Merrion Road at the Anglesea Road (approx. 60m) junction, at the Simmonscourt Road junction (approx. 24m) and also at the Ailesbury Road junction (approx. 18m). Left-turning inbound traffic would get a separate traffic phase to inbound buses at the Shrewsbury Road junction. Left-turning outbound traffic would share the bus lane on Merrion Road at the Ballsbridge Park junction (approx. 35m), Serpentine Avenue junction (approx. 30m), Sandymount Avenue (approx. 25m) and the Ailesbury Road junction (approx. 26m)

Continuous bus and cycle lanes would be provided along this section, requiring the existing footpath widths to be reduced. Some existing trees would be impacted. Parking will not be impacted along this section. Pedestrian facilities, as per DMURS, would be applied to the majority of minor arm junctions along this section. Potentially, some of the properties would be impacted on the west side of the road between Ailesbury Road and Nutley Lane (as shown on Dun Laoghaire to City Centre CBC Sheet 9 of 20)

Between Nutley Lane and Strand Road

Continuous bus and cycles lanes would be provided, requiring the existing footpath widths to be reduced along this section. Continuous median would be provided between Nutley Lane and St Vincent's Hospital with pedestrian crossing facilities. No existing trees would be impacted though all parking spaces would be removed and property would be encroached on between St Vincent's Hospital and Strand Road on the west side of the road. Raised tables would be provided at the following minor arm junctions; Merrion Avenue, Herbert Avenue and Estate Avenue. Left-turning outbound traffic would share the bus lane on Merrion Road at the Merrion Avenue junction (approx. 50m).

Between Strand Road and Elm Park

Continuous bus and cycles lanes would be provided, requiring the existing footpath widths to be reduced. A central median would be provided along this section with pedestrian crossing facilities. A 70m parking bay would be provided at the Strand Road end of this section (between Ch.3855m and Ch.3925m as shown on Dun Laoghaire to City Centre CBC Sheet 11 of 20), on the east side of the road. A cul-de-sac is proposed on Strand Road where it currently connects to Merrion Road. Traffic on Merrion Road would reach Strand Road via a new road proposed through the carparks of Our Lady Queen of Peace Church and Sandymount Gym (Body Rock Performance). The cycle facility would be two-way on the east side of the road and one-way on the west side.

Between Elm Park and Trimleston Avenue

Continuous bus and cycles lanes would be provided, requiring the existing footpath widths to be reduced along certain sections. The existing parking and trees would be maintained though property and private land would be impacted on. The cycle facility would be two-way on the east side of the road and one-way on the west side. A raised table would be provided at the Belview Avenue junction. Inbound buses would get a separate phase to traffic at the Elm Park junction to eliminate conflict with inbound left turning traffic.

6.2.7 SAS 1 Stage 2 Assessment Summary

A summary of the MCA results for the SAS1 scheme options is presented in Table 6.4. Neutral scoring sub-criteria are omitted from the summary table i.e. where scheme options score neutrally to other options.

In terms of economy, a differentiator between scheme options is the capital cost. Route N2 Option 1 would cost considerably more than other options, largely due to the quantity of private land-take required. Conversely, N1 Option 2 is the lowest costing due to the reduced level of land acquisition required. In terms of transport reliability and quality of service, Option 1 for each route scored highest due to the level of service reliability and journey time savings achievable through full segregation of bus lanes along the entirety of each route.

In terms of Integration, route N2 would serve a larger residential, employment and school/college catchment than route N1. Route N1 and N2 have similar potential for interchange with other transport services i.e. the DART and N11 QBC. Both routes also have been identified as primary cycle routes in the GDA Cycle Network Plan. Route N1 is deemed to have a greater positive impact on traffic compared with route N2.

As both route N1 and N2 primarily follow the same route (between Booterstown and Lansdowne Road), there are no significant differences between options in terms of accessibility and social inclusion and also road safety.

All options scored similarly under the environmental sub-criteria; route N1 options scored higher under land use character due to the lesser impact on existing on-street parking.

Each sub-criterion in the MCA table is evenly weighted. Of all the SAS1 scheme options, route N1 Option 2 received the highest average score overall. Hence, N1 Option 2 will form part of the overall EPO for the Dun Laoghaire to City Centre CBC.

Table 6.4: SAS 1 Route Options Assessment Summary (Main Criteria)

MCA criteria	Assessment Sub-Criteria	N1 Option 1	N1 Option 2	N2 Option 1	N2 Option 2
Economy	1.a. Capital Cost				
	1.b. Transport Reliability and Quality (Journey Time)				
	2.b. Residential Population and Employment Catchments				
	2.e. Traffic Network Integration				
	6.i. Land Use Character				

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

6.3 SAS 2: Booterstown to Blackrock Route Options

6.3.1 Introduction

Following the 'Stage 1' sift for the SAS 2/Middle section study area, the remaining 4 route sections were combined to form one cohesive route option (M1) as shown in Figure 6.3.1 below.

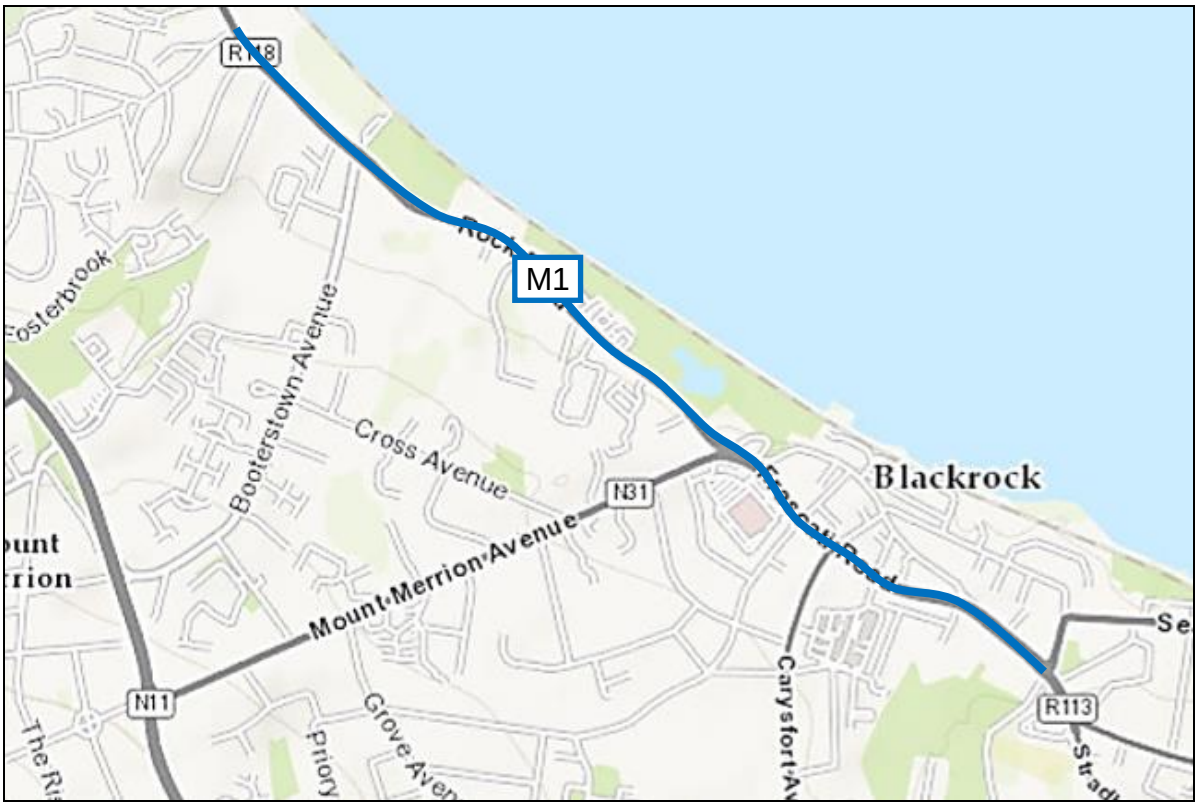


Figure 6.3.1: M1 / Middle Section Cohesive Route Option

- M1: A route option via Frascati Road (N31) and Rock Road (R118)

Two scheme options have been developed for the single route option in SAS 2; see Table 6.5.

Table 6.5: Study Area Section 2 Scheme options

SAS 2	M1	Option 1
		Option 2

6.3.2 M1 – Booterstown to Blackrock Route

Figure 6.3.2 below illustrates the population residing within the 5, 10 and 15 minute catchment zones of the existing and proposed bus stops along route M1.

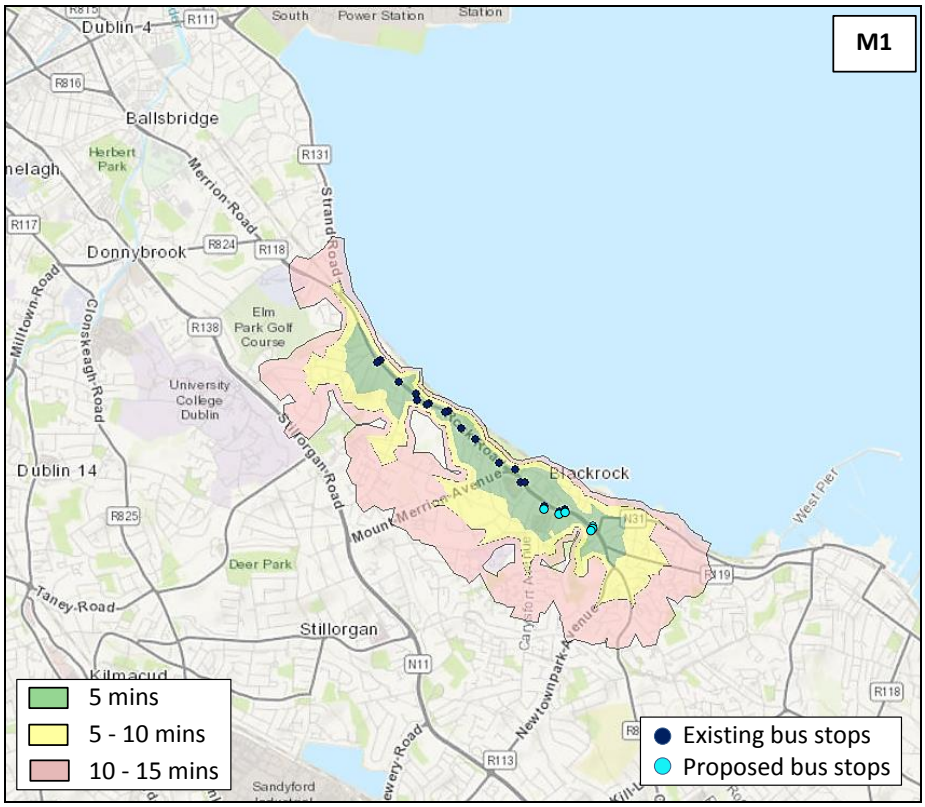


Figure 6.3.2: Walking distance catchment zones for route M1 bus stops

Inbound: This route option would connect Blackrock to Booterstown via Frascati Road and Rock Road.

Outbound: Southbound, buses would travel the same route as taken by inbound vehicles. This route is approximately 2.57km in each direction.

Stops: 9 stops would be provided in each direction along this route. Bus stop locations have been optimised to facilitate the route geometry and optimise catchment based on population and employment destinations.

Catchment: The outermost isochrone contour defines the perimeter within which the nearest bus stop could be reached by pedestrians in 15 minutes or less at a typical walking pace. The population residing within each of the isochrone contour areas is summarised below:

- 5 minutes walking distance – 2,700 residents
- 5-10 minutes walking distance – 4,000 residents
- 10-15 minutes walking distance – 9,600 residents
- Total catchment within 15 minutes walking distance – 16,300 residents

These figures are based on the Census 2011 Small Area Population Statistics (SAPS).

Junctions: There are a total of 9 signalised junctions and 2 pedestrian crossings along this route option. ITS measures may be required to deliver the level of bus priority required for additional bus services.

Constraints: There are no significant constraints associated with this option.

Environmental Impact: The impacts are summarised in the MCA table in Appendix A and in discussed in greater detail in the Environmental Impact Report in Appendix H

6.3.3 M1 – Booterstown to Blackrock Scheme Options

Two scheme options have been developed along M1; see Figure 6.3.3 below.

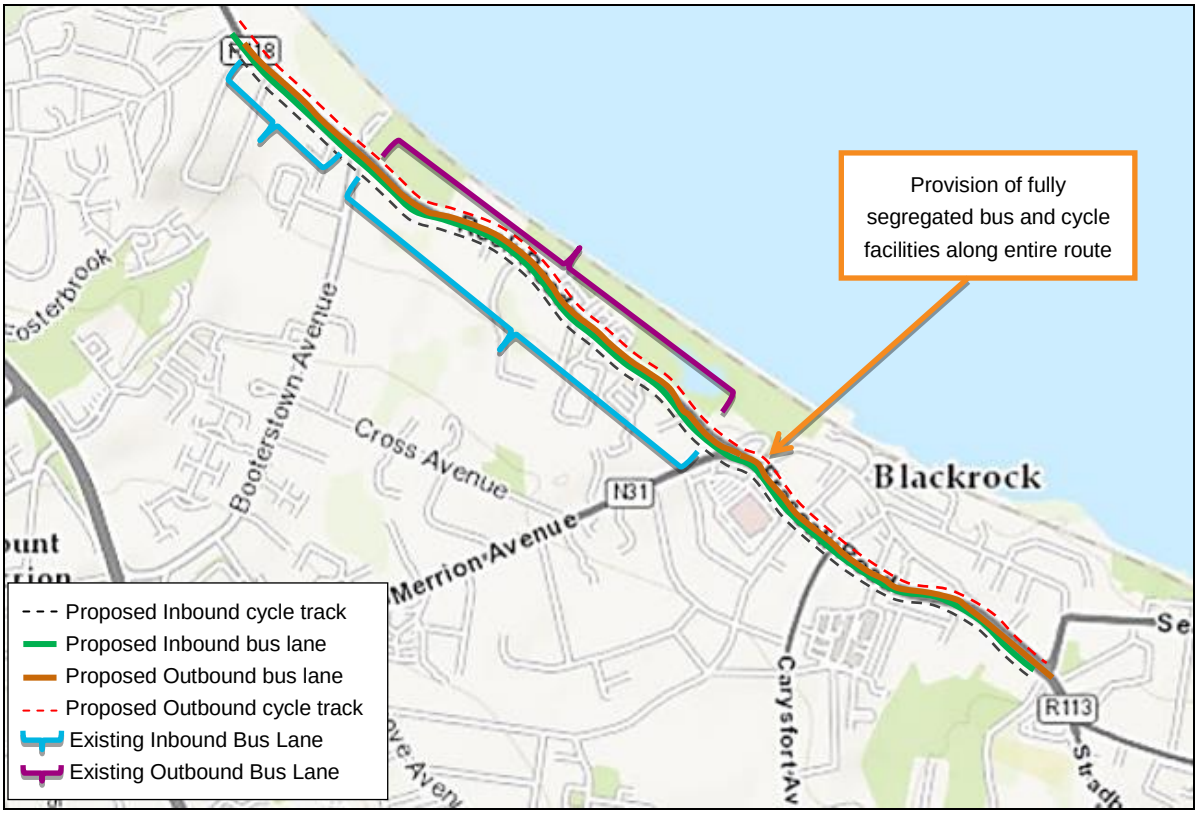


Figure 6.3.3: Route M1 Option 1

At present, there are existing cycle lanes along Frascati Road and Temple Road (alternating between inbound and outbound). There are existing bus facilities both inbound and outbound along Rock Road. The facilities to be provided by the proposed scheme option are shown above. Analysis of the traffic impact of the proposed works in comparison to the existing conditions has shown that:

- Temple Road - Provision of full bus and cycle facilities to consolidate existing cycle lanes although this will require converting significant lengths of shared traffic lanes to segregated bus lanes – Moderate negative impact
- Frascati Road - Provision of full bus and cycle facilities to consolidate existing cycle lanes although this will require converting significant lengths of shared traffic lanes to segregated bus lanes – Moderate negative impact
- Rock Road - Provision of full bus and cycle facilities to consolidate existing bus and cycle lanes although this will require converting small lengths of shared traffic lanes to segregated bus lanes – Minor negative impact

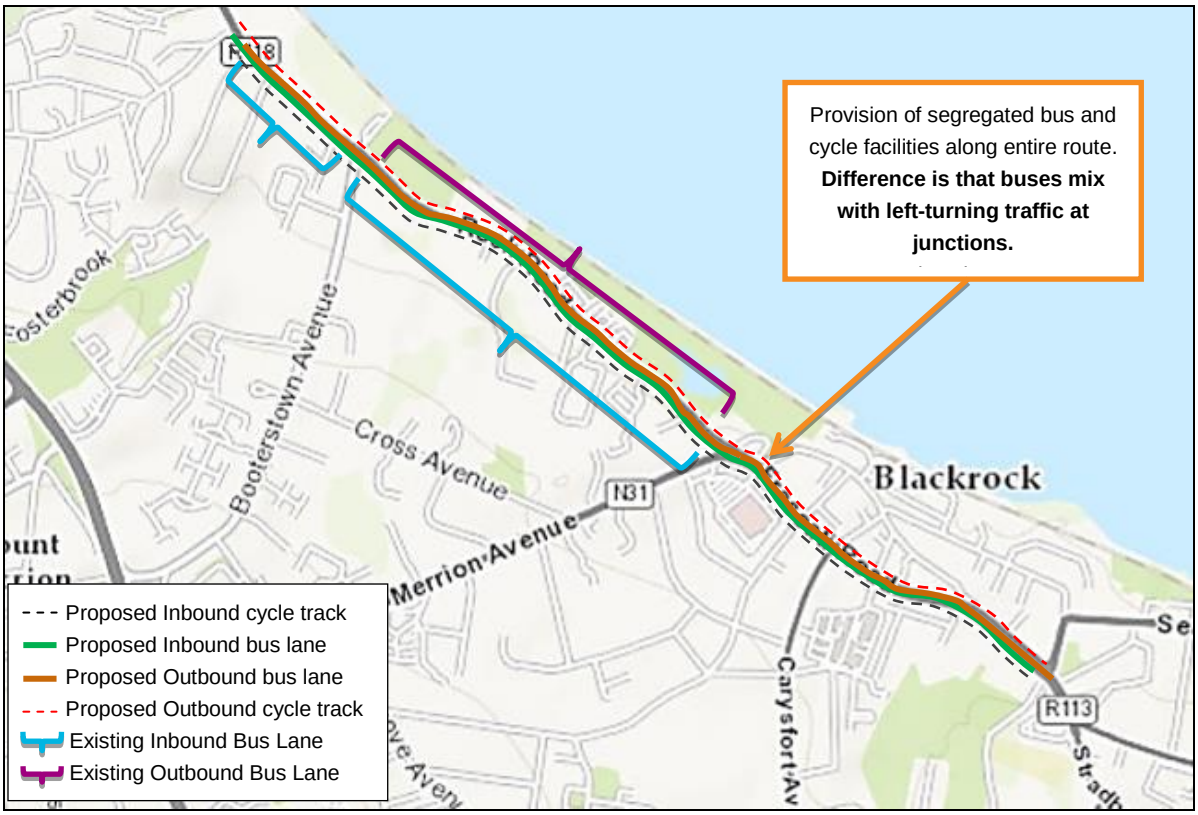


Figure 6.3.4: Route M1 Option 2

At present, there are existing cycle lanes along Frascati Road and Temple Road (alternating between inbound and outbound). There are existing bus facilities both inbound and outbound along Rock Road. The facilities to be provided by the proposed scheme option are shown above. Analysis of the traffic impact of the proposed works in comparison to the existing conditions has shown that:

- Temple Road - Provision of full bus and cycle facilities to consolidate existing cycle lanes although this will require converting significant lengths of shared traffic lanes to segregated bus lanes – Moderate negative impact
- Frascati Road - Provision of full bus and cycle facilities to consolidate existing cycle lanes although this will require converting significant lengths of shared traffic lanes to segregated bus lanes – Moderate negative impact
- Rock Road - Provision of full bus and cycle facilities to consolidate existing bus and cycle lanes although this will require converting small lengths of shared traffic lanes to segregated bus lanes – Minor negative impact

Table 6.6 M1 Scheme Options comparison

M1 Scheme Option	Inbound Journey Time	Outbound Journey Time	Total Cost	Infrastructure costs	Land acquisition costs
Option 1	14 minutes	14 minutes	€4.6M	€4.3M	€0.3M
Option 2	14 minutes	15 minutes	€3.8M	€3.8M	€0

6.3.4 M1 – Booterstown to Blackrock Route Design Impacts on Existing Infrastructure

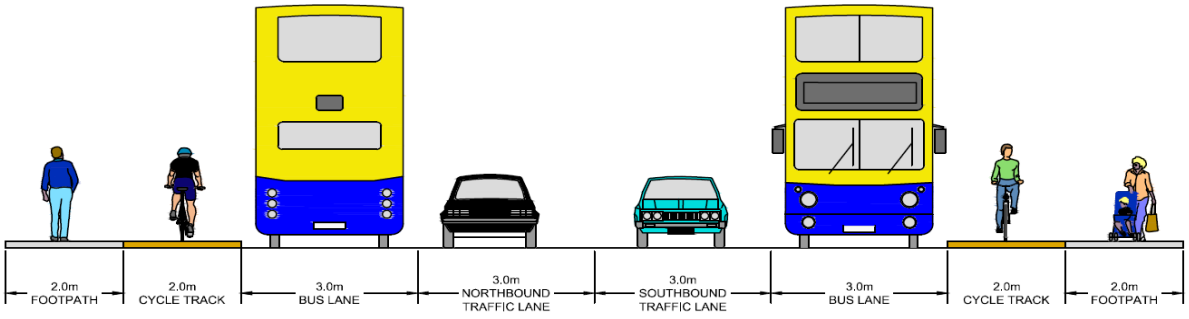
Bus stop locations have been optimised for M1 Option 1 and 2 to facilitate the route geometry and optimise catchment based on population and employment destinations. Additionally, junctions were designed to DMURS standards (e.g. kerb buildouts, raised tables) to improve pedestrian friendliness.

6.3.4.1 M1 Option 1

Summary

M1 Option 1 would optimise bus, cycle and pedestrian facilities along the entire route by applying the following lane widths for each direction of traffic, as recommended by DMURS:

- 3.0 m Bus lane;
- 3.0 m Traffic Lane;
- 2.0 m Footpath; and
- 2.0 m Cycle Track



M1 Option 1 would also provide indented bus stops (2.8m width) along its route.

Trimleston Avenue to Booterstown Avenue

The provision of this option along the Rock Road between Trimleston Avenue and Booterstown Avenue would require the removal of 29 parking spaces including 1 disabled. Some sections of footpaths and ancillaries (tactile paving, kerbs etc.) would be removed along with the relocation of all associated services where necessary. The footpaths would be replaced with new 2m footpaths on both sides. The design would incorporate a 2 metre wide segregated inbound cycle lane on the western carriageway and a two-way segregated cycle lane on the eastern carriageway up to the Booterstown Station turn. Raised tables would be retained across the entrances to St. Helen's Road residential estate and a new raised treatment would be installed at the entrance to Booterstown station.

The scheme option proposal would require that continuous bus lanes would be provided throughout the scheme. Due to the proximity of Trimleston Lodge to the Rock Road at the Trimleston junction a re-alignment of the road geometry would be required on the approach to the Trimleston Avenue junction to ensure provision of these designated bus lanes along with designated traffic turning lanes. To accommodate this road re-alignment the proposal would require approximately 50 square metres of land take from Booterstown Nature Reserve on the approach to

this junction along with the relocation of the boundary wall, signage and public lighting.

Although no geometrical changes would be required on the northbound approach to both entrances to St. Helen's Road, residential land take would be required to ensure the necessary road width to accommodate the designated traffic turning lanes. Approximately 70 square metres of land take would also be required from the Booterstown Nature Reserve to ensure the provision of a designated left hand turn into Booterstown station along with the relocation of a boundary wall, 4 adjacent parking spaces from the car park of Booterstown Station, the relocation of road signage and CCTV pole.

Booterstown Avenue junction to Castledawson Avenue/Seafort junction

The scheme option 1 proposal for this section would include removing the existing merging lane leaving the Booterstown station junction on the eastern carriageway which would allow the provision of a continuous bus lane from Booterstown Station to Seafort Parade and beyond.

To ensure the provision of a designated turning lane onto Booterstown Avenue approximately 160m of land take would be required from Blackrock Park, along with the relocation of the boundary wall, traffic bollards and traffic control cabinet. A proposed change to the existing road layout for 36m on the northbound approach to the Booterstown Avenue/Booterstown station junction would facilitate the inclusion of a designated right turning lane allowing motorists to turn into Booterstown station from this approach.

Some sections of footpath and ancillaries (tactile paving, kerbs etc.) would be removed along this section along with the relocation of all associated services where necessary. The existing footpaths would be replaced with new footpaths and cycle lanes alongside both carriageways. As a traffic calming measure and to aid pedestrians and cyclists to navigate across minor roads, raised tables would be installed at the entrances/exits to Blackrock College, Carroll & Kinsella, Seafort Parade and Castledawson Avenue. Additional landtake is required from Blackrock College. As a result of the landtake, the proposal would require the removal of approximately 35 trees –Details of tree type; condition etc., contained within tree survey conducted October 2016.

Castledawson Avenue/Seafort junction to Merrion Avenue junction

To ensure the full road geometry of the proposed scheme option some residential land take would be required on the northbound approach to Castledawson Avenue. This land take would require the relocation of a stone wall demarking the boundary of a residential property and would also require the relocation or possibly the removal of private parking spaces in the Blackrock Clinic car park. Further land take would be required on the eastern carriageway between Ch. 5720m and Ch.5960m to ensure adequate space to provide the full geometric design i.e. the designated turning lane into Castledawson residential estate. This land take would require the removal or relocation of the wall and entrance gates including ancillaries (piers, copings etc.) along the boundary of Blackrock Park, the relocation of adjacent car parking spaces in the park and the removal/relocation of approximately 15 trees along the boundary of Blackrock Park (number to be confirmed by engineer on site). The proposed scheme option also would require the removal of 13 formal car

parking spaces from the eastern carriageway (8 along Phoenix Terrace and 5 along the carriageway between Seafort Parade and Emmet square).

As a traffic calming measure and to aid pedestrians and cyclists to navigate across minor roads, raised tables would be installed or upgraded at the entrances/exits to Emmet Square, Phoenix Terrace, Castledawson residential estate and Ben Inagh Park. Some sections of footpath and ancillaries (tactile paving, kerbs etc.) would be removed between Castledawson Avenue and Merrion Avenue on both sides of the carriageway along with the relocation of all associated services where necessary. These sections of existing footpaths would be replaced with new continuous footpaths and cycle lanes alongside both carriageways. A new pedestrian crossing to complement the existing crossing at the Blackrock Clinic would be installed as part of the design proposal.

The proposed design would require changes to the traffic lane alignment between the entrance to Blackrock clinic and Castledawson Avenue on the western carriageway and the eastern carriageway between Seafort Avenue and Emmet Square. These changes would facilitate the provision of the continuous bus lane in the eastern carriageway, a designated turning lane into Blackrock Clinic approaching from the eastern carriageway and also a designated turning lane into Seafort Parade approaching from the western carriageway. The proposed scheme option would also require the removal of the ghost island in the median at the Phoenix Terrace junction to facilitate a designated turning lane into same.

To accommodate a designated turning lane into Castledawson residential estate from the southbound approach, traffic islands would be required in the median of the road between Ch. 5735 and Ch.5855m. To ensure a continuous segregated cycle lane on the western carriageway and also to provide a boarding/alighting area for passengers at the bus stop located at Ch. 5985m, the proposed design would require the construction of a section of a 2m footpath between Ch. 5955m and Ch.6030m. A reduction in the number of lanes would be required on approach to the Merrion Avenue junction on the eastern carriageway to facilitate the continuous bus lane.

Merrion Avenue junction to Temple Road/Barclay Court junction

The provision of a continuous designated bus lane from the Merrion Avenue junction to the Temple Road junction and vice versa would require some changes to the existing traffic lane alignment. The most significant change would be the reduction in the number of traffic lanes throughout to accommodate the bus lanes. Land take would be required on the southbound approach to Rock Hill to allow traffic approaching on the eastern carriageway to take the left turn. Land take would be also required on the southbound approach to Carysfort Avenue. This land take would require the removal of 16 parking spaces from the car park of Zurich Life Assurance. Land take would also be required to provide all turning lanes into the Frascati Shopping Centre, onto Merrion Avenue and Sweetman Avenue.

Temple Road/Barclay Court junction to Stradbrook Road

To ensure continuity of the bus lane from the Temple Road/Barclay Road junction through to the Newtownpark junction, the scheme option proposal would require that the amount of traffic lanes be reduced to accommodate this design. The proposals would require residential land take at the Craigmore Gardens junction to enable traffic to turn into the residential estate. From the Temple Park Avenue junction the

design proposes 70 metres of designated bus lane between Temple Park Avenue and the Temple Crescent/Monkstown Road junction on the eastern carriageway. The design proposals would include the provision of a designated bus lane on the western carriageway from Ch.7240m to Ch.7085m. As this lane is designated for buses only, land take would be required to accommodate a designated left turning lane into St. Vincents Park. Continuous segregated cycle lanes and footpaths with a minimum width of 2m would be provided alongside both carriageways throughout this section.

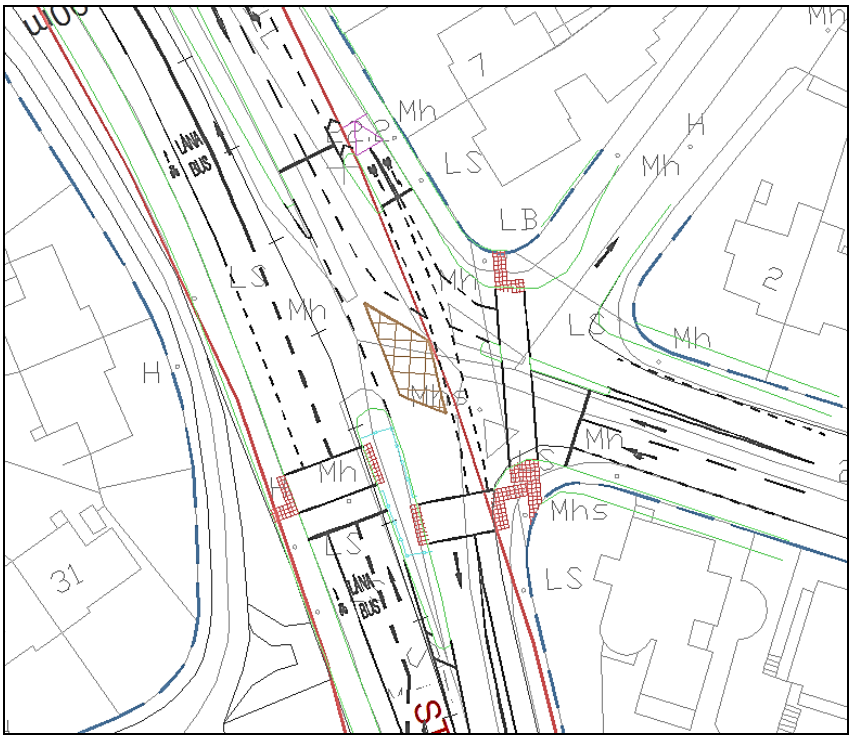


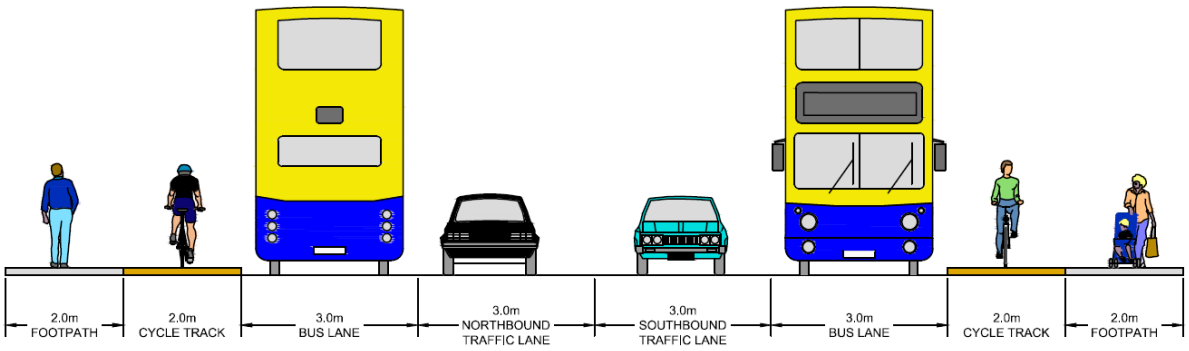
Figure 6.E: Scheme M1 Option 1 boundary (red) against existing building line (blue) at the Monkstown Avenue / Stradbrook Road junction

6.3.4.2 M1 Option 2

Summary

M1 Option 2 would provide bus priority where practical as well as cycle and pedestrian facilities along the entire route by applying the following lane widths for each direction of traffic, as recommended by DMURS:

- 3.0 m Bus lane;
- 3.0 m Traffic Lane;
- 2.0 m Footpath; and
- 2.0 m Cycle Track



The difference between M1 Option 1 and Option 2 is that Option 2 would provide some indented bus stops (2.8m width) and some in-line bus stops along its route. Also, with Option 2, buses would merge with left-turning traffic at junctions.

Trimleston Avenue to Booterstown Avenue

The provision of this option along the Rock Road between Trimleston Avenue and Booterstown Avenue would require the removal of 29 parking spaces including 1 disabled. Some sections of footpaths and ancillaries (tactile paving, kerbs etc.) would be removed along with the relocation of all associated services where necessary. The footpaths would be replaced with new 2m footpaths on both sides. The proposed design incorporates a 2 metre wide segregated inbound cycle lane on the western carriageway and a two-way segregated cycle lane on the eastern carriageway up to Booterstown Station turn. Raised tables would be retained across the entrances to St. Helen's Road residential estate and a new raised treatment installed at the entrance to Booterstown station.

In a slight change to the existing traffic alignment on the western carriageway, the proposal would require that the 50 metres of designated left hand turning lane into Trimleston Avenue shall be converted to a bus lane until 17 metres before the junction where the buses shall share with other traffic turning left onto Trimleston Avenue. Buses are not allowed to turn left from the Rock Road onto Trimleston Avenue at this junction. On the eastern carriageway the proposal would require the provision of a continuous bus lane from the Trimleston Avenue junction to the Booterstown station junction, although buses must share the lane for approximately 40 metres on approach to the junction with traffic turning left into Booterstown station. Continuous segregated cycle lanes would be provided along both carriageways. The proposal would require some land take in this section, the location of which may be viewed on Sheet No. 14 of 20 Dun Laoghaire to City Centre CBC, and also that no trees would be removed.

Booterstown Avenue junction to Castledawson Avenue/Seafort junction

The scheme option 2 proposals for this section would include removing the existing merging lane leaving the Booterstown station junction on the eastern carriageway to allow the provision of a continuous bus lane from Booterstown Station to Seafort Parade and beyond. On the western carriageway a continuous bus lane would be provided between the Castledawson Avenue junction and the Booterstown Avenue junction. A proposed reduction to the width of the central median for approximately 36 metres on approach to the Booterstown Avenue junction would facilitate the inclusion of a designated right turning lane allowing motorists to turn into Booterstown station from this approach.

Some sections of footpath and ancillaries (tactile paving, kerbs etc.) would be removed along this section along with the relocation of all associated services where necessary. The existing footpaths would be replaced with new footpaths and cycle lanes on both carriageways. As a traffic calming measure and to aid pedestrians and cyclists to navigate across minor roads, raised tables would be installed at the entrances/exits to Blackrock College, Carroll & Kinsella, Seafort Parade and Castledawson Avenue. The proposal would require some land take in this section, the location of which may be viewed on Dun Laoghaire to City Centre CBC Dwg Sheet. No 15 and 16. As a result of the landtake the proposal would require the removal of approximately 35 trees – Details of tree type; condition etc., contained within tree survey conducted October 2016.

Castledawson Avenue/Seafort junction to Merrion Avenue junction

To ensure the full road geometry of the scheme option, some land take would be required between Ch. 5590m and Ch. 5795m, the location of which can be found on Dun Laoghaire to City Centre Dwg. Sheet No. 16. This land take would require the removal of a stone wall demarking the boundary of a residential property and would also require the relocation or possibly the removal of parking spaces in the Blackrock Clinic car park. Further land take would be required on the eastern carriageway between Ch. 5720m and Ch.5960m. This land take would require the removal or relocation of the wall and entrance gates including ancillaries (piers, copings etc.) along the boundary of Blackrock Park, the relocation of adjacent car parking spaces in the park, the removal of 13 formal car parking spaces on the eastern carriageway (8 along Phoenix Terrace and 5 along the carriageway between Seafort Parade and Emmet square) and the removal/relocation of approximately 15 trees along the boundary of Blackrock Park – Details of tree type; condition etc., contained within tree survey conducted October 2016.

As a traffic calming measure and to aid pedestrians and cyclists to navigate across minor roads, raised tables would be installed or upgraded at the entrances/exits to Emmet Square, Phoenix Terrace, Castledawson residential estate and Ben Inagh Park. Some sections of footpath and ancillaries (tactile paving, kerbs etc.) would be removed between Castledawson Avenue and Merrion Avenue on both sides of the carriageway along with the relocation of all associated services where necessary. These sections of existing footpaths would be replaced with new continuous footpaths and cycle lanes alongside both carriageways. A new pedestrian crossing to complement the existing crossing at the Blackrock Clinic would be installed as part of the design proposal.

The proposed design would require changes to the traffic lane alignment between the entrance to Blackrock clinic and Castledawson Avenue on the western carriageway and the eastern carriageway between Seafort Avenue and Emmet Square. These changes would be to facilitate the provision of a continuous bus lane in the eastern carriageway, a designated turning lane into Blackrock Clinic approaching from the eastern carriageway and also a designated turning lane into Seafort Parade approaching from the western carriageway. The proposed scheme option would also require the removal of the ghost island in the median at the Phoenix Terrace junction to facilitate a designated turning lane into same.

To accommodate a designated turning lane into Castledawson residential estate, traffic islands would be required in the median of the road between Ch. 5735 and Ch.5855m. To ensure a continuous segregated cycle lane on the western carriageway and also to provide a boarding/alighting area for passengers at the bus

stop located at Ch. 5985m (see Dun Laoghaire to City Centre CBC Sheet No. 17), the proposed scheme option would require the construction of a section of a 2m footpath between Ch. 5955m and Ch.6030m. A reduction in the number of lanes would be required on approach to the Merrion Avenue junction on the eastern carriageway to facilitate the continuous bus lane.

Merrion Avenue junction to Temple Road/Barclay Court junction

The provision of a continuous designated bus lane from the Merrion Avenue junction to the Temple Road junction and vice versa would require some changes to the existing traffic lane alignment. The most significant change would be the reduction in the number of traffic lanes throughout to accommodate the bus lane. A proposed “keep clear” area in the bus lane on approach to Rock Hill would be provided to allow traffic approaching on the eastern carriageway to take the left turn. Buses would be required to share the lane with traffic turning left onto Temple Road for approximately 20m on approach from the eastern carriageway. To make the turns into the Frascati Shopping Centre, onto Merrion Avenue and Sweetman Avenue from the western carriageway, the proposed design would require traffic to share the bus lanes for 15m, 20m and 25m respectively.

Temple Road/Barclay Court junction to Stradbrook Road

To ensure continuity of the bus lane from the Temple Road/Barclay Road junction through to the Newtownpark junction, the design proposals require that the amount of traffic lanes be reduced to accommodate this design. Bus lanes would be designated for buses only, except at the Craigmore Gardens junction where the buses would share with traffic turning to and from the residential estate for 25 metres. From the Temple Park Avenue junction the scheme option proposes 70 metres of designated bus lane between Temple Park Avenue and the Temple Crescent/Monkstown Road junction on the eastern carriageway. The scheme option proposals include the provision of a designated bus lane on the western carriageway from Ch.7240m to Ch.7085m. This lane is designated buses only except for approximately 25 metres on where the bus lane would share with traffic turning left into St.Vincents Park. Continuous segregated cycle lanes and footpaths with a minimum width of 2m would be provided alongside both carriageways throughout this section.

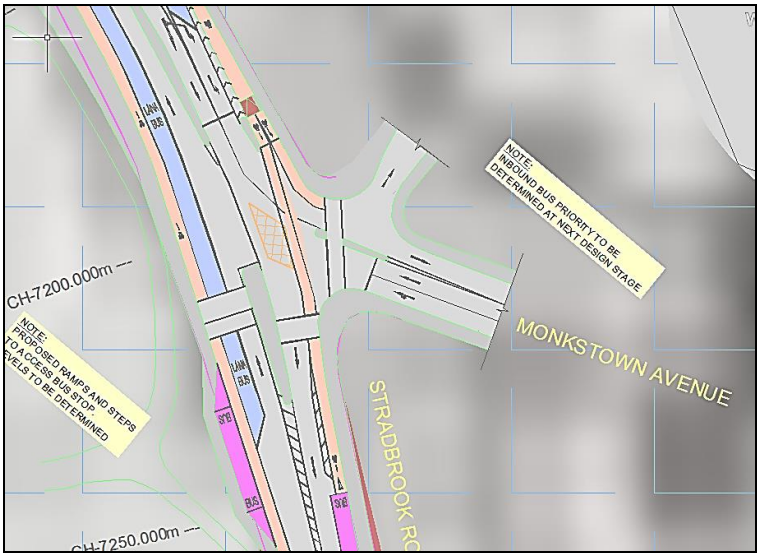


Figure 6.F: Scheme M1 Option 2 design at Monkstown Avenue / Stradbrook Road junction

6.3.5 SAS 2 Stage 2 Assessment Summary

A summary of the MCA results for the SAS2 scheme options is presented in Table 6.4. 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. M1 Option 1 and Option 2 primarily consist of the same scheme design with the exception of bus provisions at junctions. M1 Option 1 would provide fully segregated bus lanes throughout the entire route, including junction approaches. M1 Option 2 proposes that buses share the lane with left-turning traffic at junctions. Due to the similarity between the two design options, they score similarly under most of the MCA sub-criteria. Though Option 2 is slightly cheaper due to the lesser amount of land acquisition required, at junctions in particular. Hence, M1 Option 2 will form part of the EPO.

Table 6.7: SAS 2 Route Options Assessment Summary (Main Criteria)

MCA criteria	Assessment Sub-Criteria	M1 Option 1	M2 Option 2
Economy	1.a. Capital Cost		
Environment	6.i. Land Use Character		

6.4 SAS 3: Blackrock to Dun Laoghaire Route Options

Based on the catchment analysis and the information available for SAS3, and prior to the detailed MCA, it was apparent that the CBC route should stop at the southern end of SAS2 because bus services beyond that point would need to diverge within SAS3 to serve two different catchment areas; ultimately achieving two dissimilar purposes.

7. Emerging Preferred Route

7.2 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. A detailed description of the scheme proposals, which include ancillary measures required on other streets.

7.3 Route Options Assessment Conclusions

Within each Study Area Section, 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.

7.4 Scheme Description

Based on the conclusions from the route options assessment process, the recommended preferred route for the proposed scheme is presented in Figure 7.4.1.

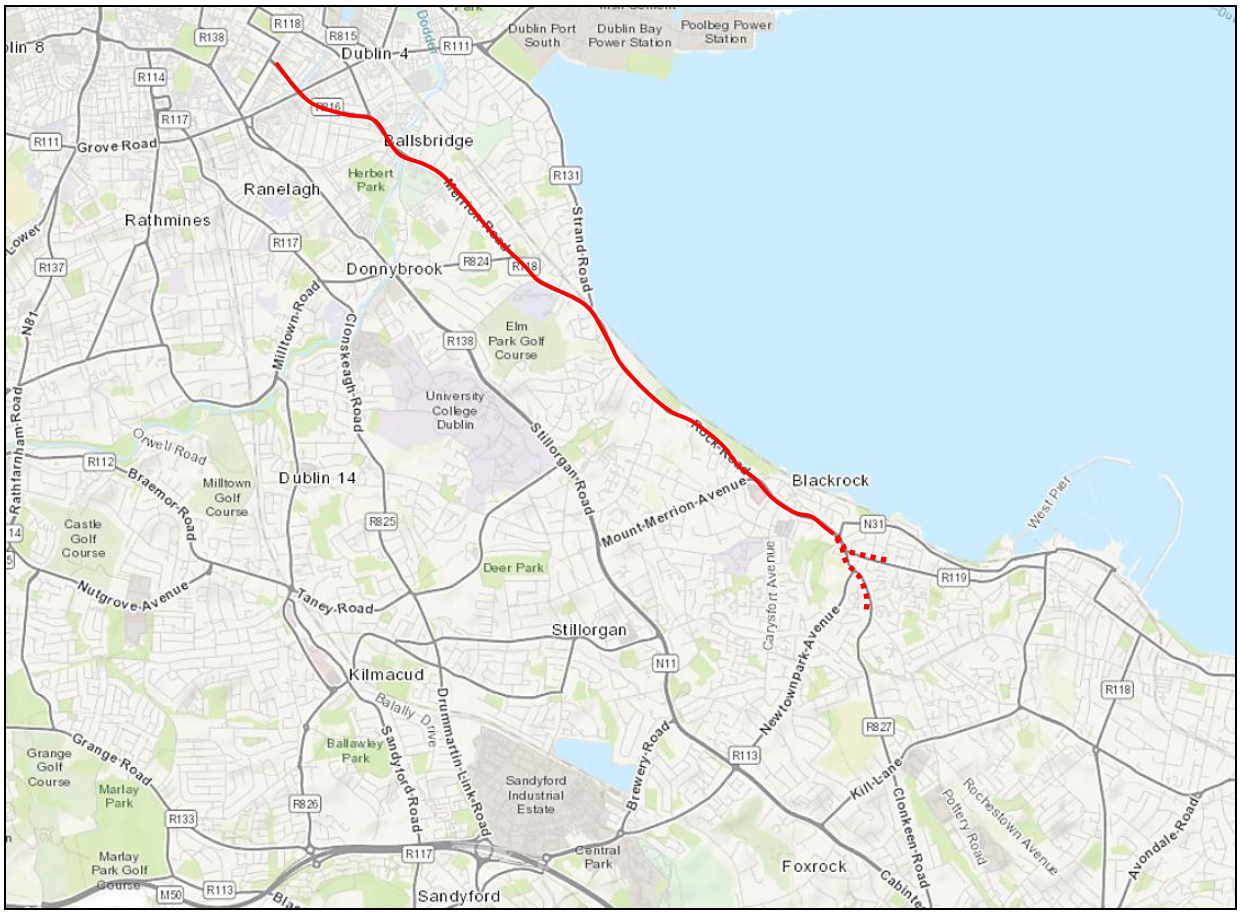


Figure 7.4.1: Dun Laoghaire to City Centre CBC Scheme Preferred Route

Between Fitzwilliam Place and Grand Canal

Inbound left-turning traffic will get a separate traffic phase to inbound buses on Baggot Street Lower at the Fitzwilliam Street junction. Continuous bus and cycle lanes will be provided along this section, which will require the removal of the median between Ch.35m and Ch. 60m. Fixed cross sections will be applied continuously by building out from the existing kerb; maximising pedestrian facilities to accommodate increased pedestrian activity along this section. Existing trees will be retained. Bus stops will not be indented to avoid encroachment into existing properties.

Parking will be removed on the west side of the road between Fitzwilliam Place and Grand Canal. On the east side, parking will be formalised and a buffer will be provided in between the parking bays and cycle lane.

Between Grand Canal and Lansdowne Road

Continuous bus and cycle lanes will be provided along Baggot Street Upper and Pembroke Road – no cycle lanes are proposed on Leeson Street Bridge. Inbound left-turning traffic will get a separate traffic phase to inbound buses on Baggot Street Lower at the Mespil Road junction and at the Waterloo Road junction. Footpath widths will need to be reduced to provide sufficient space for fixed cross sections and indented parking bays on the east side of the road – requires the removal of one existing tree. Parking will be removed on the west side of the road and along most of the east side. Potentially, some of the properties will be impacted.

Between Lansdowne Road and River Dodder

A single compact junction is proposed for Northumberland Road / Lansdowne Road / Pembroke Road and also for Pembroke Road / Herbert Park / Shelbourne Road. Left-turning inbound traffic will share the bus lane on Pembroke Road at the Lansdowne Road junction (approx. 85m) and also at the Herbert Park junction (approx. 24m). Left-turning outbound traffic will share the bus lane on Pembroke Road at the Shelbourne Road junction (approx. 42m). A cul-de-sac is proposed on Elgin Road at the Pembroke Road end of this section. Continuous bus and cycle lanes will be provided along Pembroke Road. The design will not impact on existing trees or properties. The right turn from Pembroke Road to Shelbourne Road will be prohibited – Shelbourne Road will be accessible from Pembroke Road via Lansdowne Road.

Between River Dodder and Nutley Lane

Left-turning inbound traffic will share the bus lane on Merrion Road at the Anglesea Road (approx. 60m) junction, at the Simmonscourt Road junction (approx. 24m) and also at the Ailesbury Road junction (approx. 18m). Left-turning inbound traffic will get a separate traffic phase to inbound buses at the Shrewsbury Road junction. Left-turning outbound traffic will share the bus lane on Merrion Road at the Ballsbridge Park junction (approx. 35m), Serpentine Avenue junction (approx. 30m), Sandymount Avenue (approx. 25m) and the Ailesbury Road junction (approx. 26m). Continuous bus and cycle lanes will be provided along this section, requiring the existing footpath widths to be reduced. No existing trees or parking spaces will be impacted. Pedestrian facilities, as per DMURS, will be applied to the majority of minor arm junctions along this section. Potentially, some of the properties will be impacted on the west side of the road between Ailesbury Road and Nutley Lane (as shown on Dun Laoghaire to City Centre CBC Sheet 9 of 20).

Between Nutley Lane and Strand Road

Continuous bus and cycles lanes will be provided, requiring the existing footpath widths to be reduced along this section. Continuous median will be provided between Nutley Lane and St Vincent's Hospital with pedestrian crossing facilities. No existing trees will be impacted though all parking spaces will be removed and property will be encroached on between St Vincent's Hospital and Strand Road on the west side of the road. Raised tables will be provided at the following minor arm junctions; Merrion Avenue, Herbert Avenue and Estate Avenue. Left-turning outbound traffic will share the bus lane on Merrion Road at the Merrion Avenue junction (approx. 50m).

Between Strand Road and Elm Park

Continuous bus and cycles lanes will be provided, requiring the existing footpath widths to be reduced. A central median will be provided along this section with pedestrian crossing facilities. A 70m parking bay will be provided at the Strand Road end of this section (between Ch.3855m and Ch.3925m as shown on Dun Laoghaire to City Centre CBC Sheet 11 of 20), on the east side of the road. A cul-de-sac is proposed on Strand Road where it currently connects to Merrion Road. Traffic on Merrion Road will reach Strand Road via a new road proposed through the carparks of Our Lady Queen of Peace Church and Sandymount Gym (Body Rock Performance). The cycle facility will be two-way on the east side of the road and one-way on the west side.

Between Elm Park and Trimleston Avenue

Continuous bus and cycles lanes will be provided, requiring the existing footpath widths to be reduced along certain sections. The existing parking and trees will be maintained though property and private land will be impacted on (as shown on Dun Laoghaire to City Centre CBC Sheet 12 of 20). The cycle facility will be two-way on the east side of the road and one-way on the west side. A raised table would be provided at the Belview Avenue junction. Inbound buses will get a separate phase to traffic at the Elm Park junction to eliminate conflict with inbound left turning traffic.

7.5 Summary

7.5.1 Emerging Preferred Scheme Option

This scheme is intended to serve the Dun Laoghaire to City Centre Corridor with stops at key locations along the route (see section 7.4). The preferred route starts on Baggot Street Lower and connects to Booterstown via Pembroke Road and Merrion Road. From Booterstown, the CBC continues southwards to Blackrock via Rock Road and Frascati Road ending at Temple Hill Junction.

It is proposed to include initial bus priority enabling measures along the first 200-300m on both S1 and S3 routes that could future-proof further additional measures along the entire preferred route length.

7.5.2 Proposed Scheme Design along the EPO (refer to the Emerging Scheme Design Drawings)

7.5.2.1 Bus Lanes

The proposed design incorporates the provision of inbound and outbound bus lanes, traffic lanes and cycle lanes whilst also providing inbound and outbound footpath facilities for a distance of approximately 7 kilometres from Baggot Street Lower /Fitzwilliam Street signalised junction to the signalised junction at Temple Hill/Monkstown Road.

Traffic light sequences shall also be amended at existing signalised junctions to allow bus lane priority along the prescribed route. The proposed bus and cycle infrastructure along the CBC is illustrated in Figure 7.3.2 below.

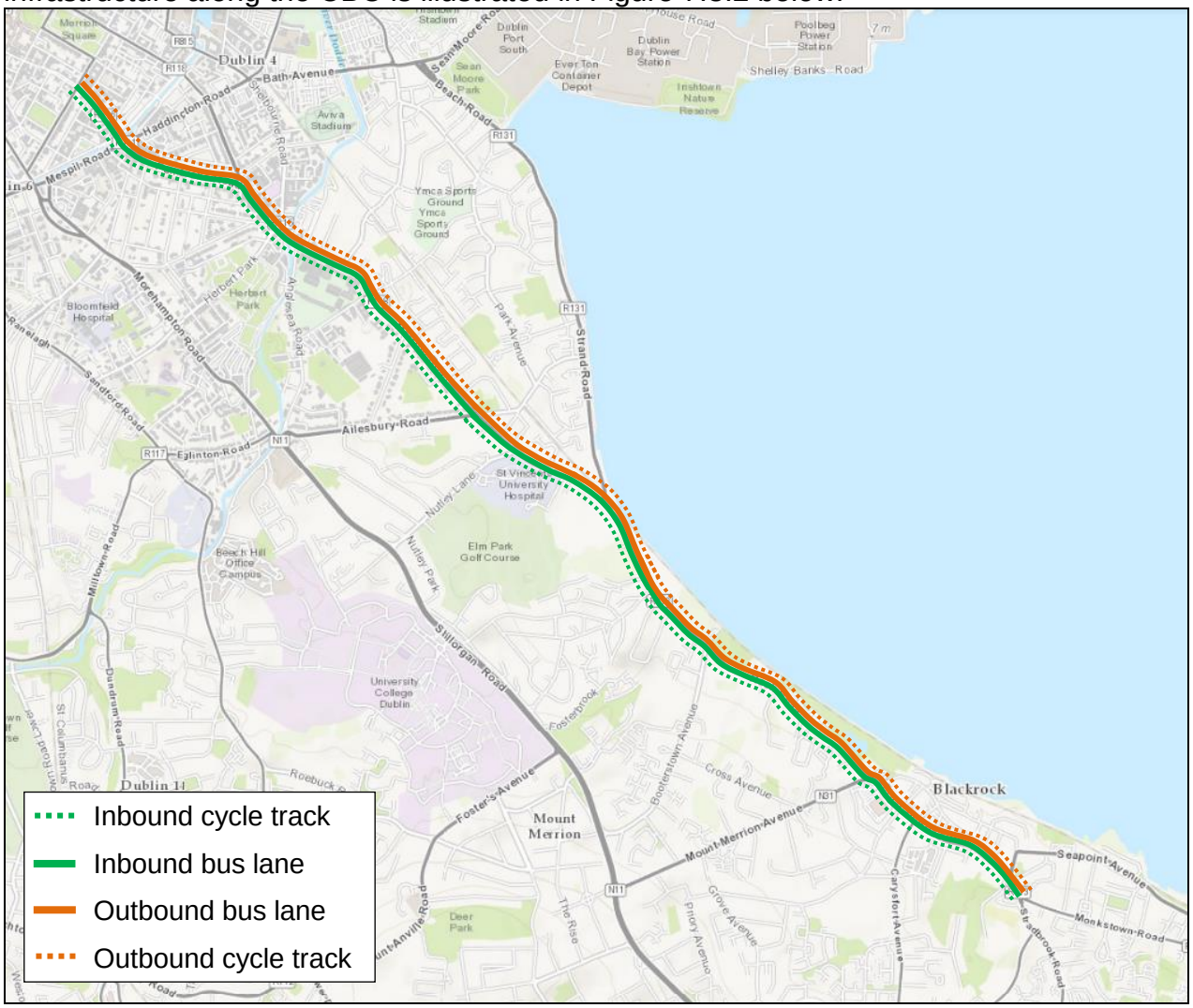


Figure 7.5.1: Bus and cycle infrastructure along the CBC

7.5.2.2 Bus Stops

Bus stop locations have been optimised for the route to facilitate the route geometry and optimise catchment based on population and employment destinations. The CBC stop locations are indicated in Figure 7.5.2**.** The residential catchment within 5, 10 and 15 minutes walking distance of the proposed stops is also illustrated in Figure 7.5.2**.** The outermost isochrone contour defines the perimeter within which

the stop can be reached by pedestrians in 15 minutes or less at a typical walking pace. The population residing within each of the isochrone contour areas is summarised below:

- 5 minutes walking distance – 10,479 residents
- 5-10 minutes walking distance – 14,156 residents
- 10-15 minutes walking distance – 27,304 residents
- Total catchment within 15 minutes walking distance – 51,939 residents

These figures are based on the Census 2011 Small Area Population Statistics (SAPS). Furthermore, there are a total of 112,677 people working or attending an educational institution within the 15 minute walking catchment of the CBC stops i.e. 91,202 in employment and 21,475 in education.

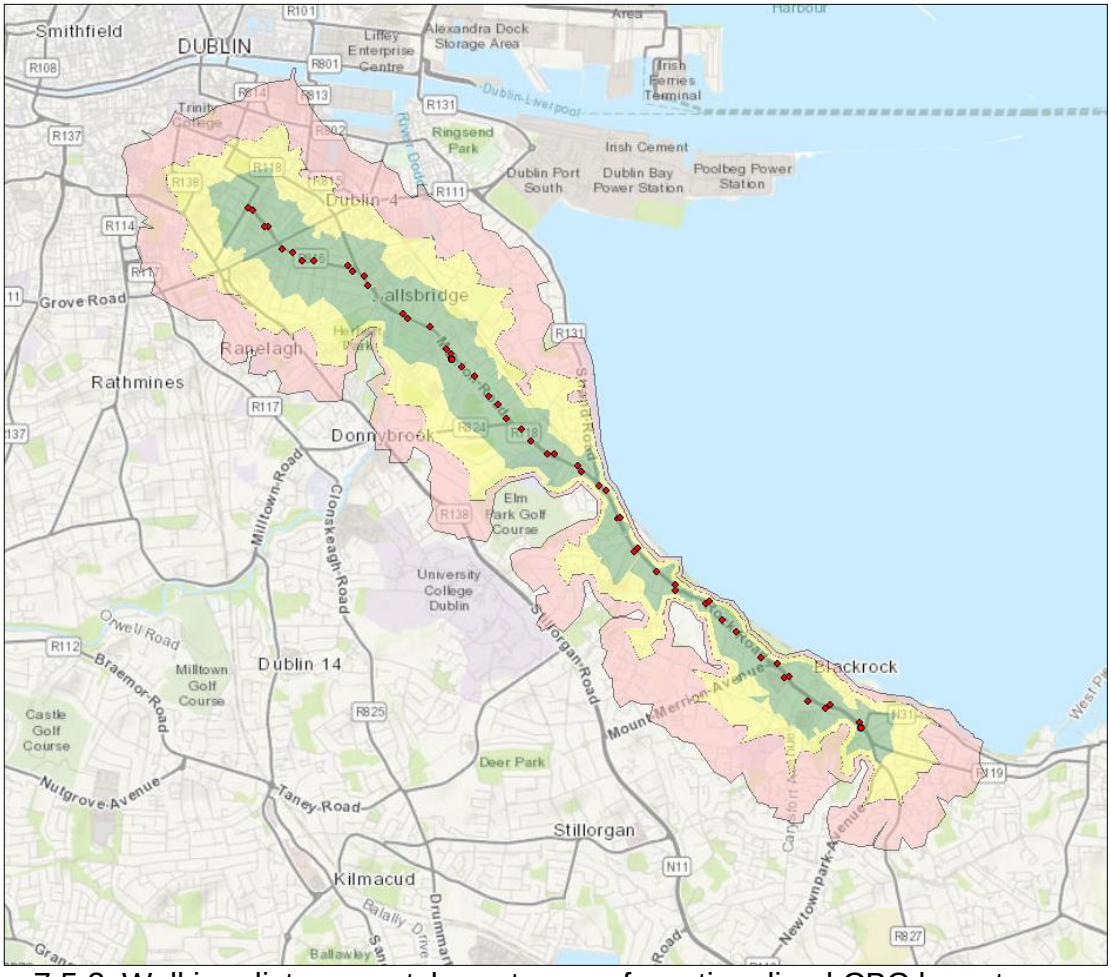


Figure 7.5.2: Walking distance catchment zones for rationalised CBC bus stops

7.5.2.3 Cyclist Facilities

The Greater Dublin Area Cycle Network Plan identifies the EPO corridor as part of a primary cycle network (Route 13) and secondary cycle network (Route 13A); see Figure 7.5.3. Thus, the EPO forms a key part of the strategic cycle network. It is therefore important that CBC design along the corridor takes cognisance of this and it is intended that the proposed scheme incorporates, where practical, the cycle infrastructure required to provide a high quality of service in accordance with the National Cycle Manual, as required for a primary and secondary cycle route. A road segregated cycle track is proposed in each direction along the entirety of the CBC

route (approximately 7 km), as illustrated in Figure 7.5.1. Existing signalised junctions at numerous locations throughout the route shall require upgrading to ensure the provision of cycle and pedestrian facilities at each “all arms” signalised junction.

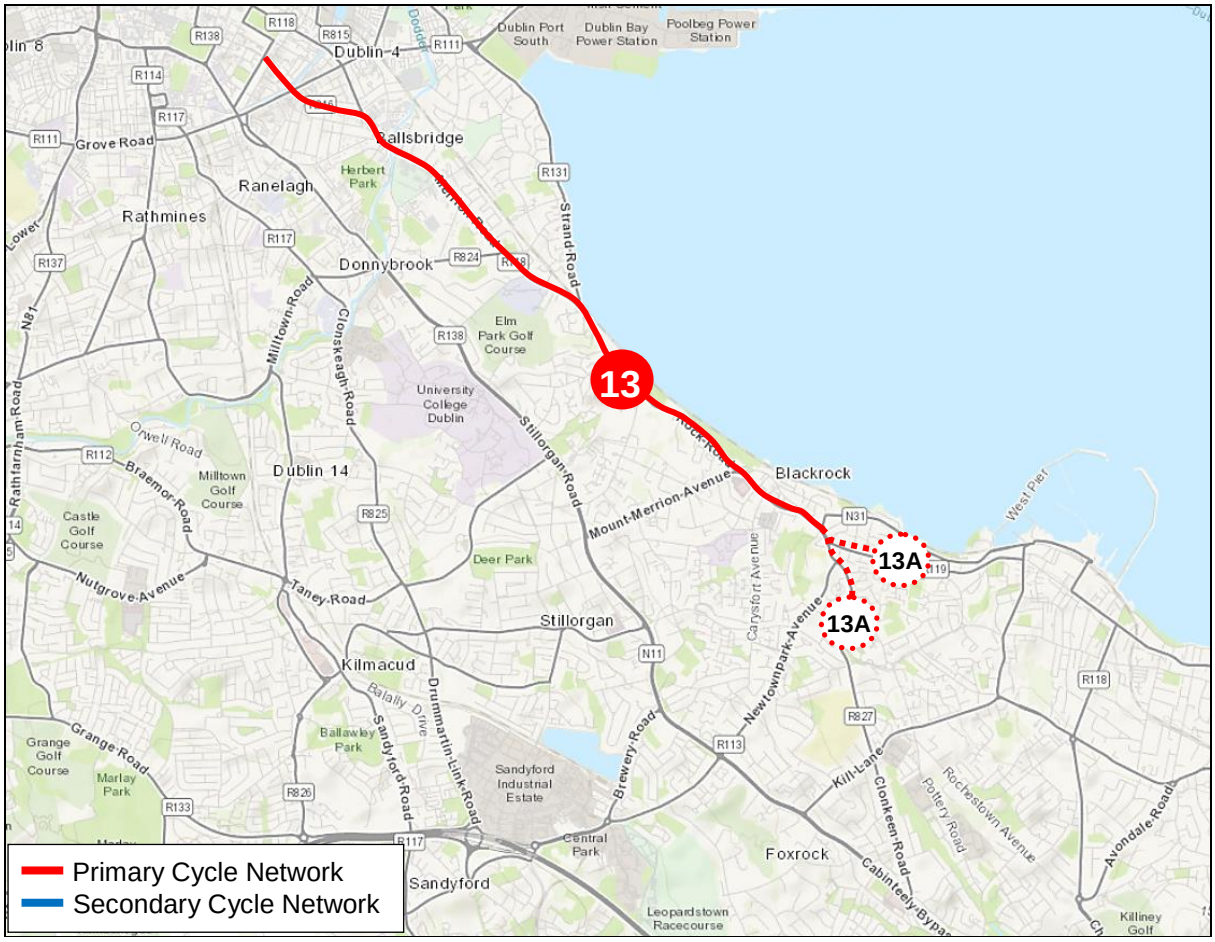


Figure 7.5.3: GDA Cycle Network Plan along the EPO

7.5.2.4 Pedestrian Facilities

The proposed design requires the introduction of entry raised treatments at a number of entrances along the route e.g. the entrances to Helens Road, Grotto Avenue, Booterstown train station, Blackrock College Car Park, main and rear entrances to Willow Terrace, The Willows, Castledawson Avenue, Seafort Parade, Emmett Square, Phoenix Terrace, Sion Hill and Ben Inagh Park to reduce the speed of traffic approaching the route via side street accesses, whilst allowing pedestrians to free flow through junction entry’s/exits. All proposed inbound and outbound footpaths exceed the minimum standard width of 1.8 metres.

7.6 Summary

The following summarises the main features of the proposed EPO:

Table 7.1: Summary table of preferred route

Route length	**7 km**
Length of bus priority (outbound)	7 km
Length of bus priority (inbound)	7 km
Length of dedicated cycle lane in each direction	7 km
Number of bus stops (outbound)	26
Number of bus stops (inbound)	25
Residential catchment area (within 15 mins walking distance of nearest bus stop)	76,600
Number of people working or attending an educational institution within the 15 minute catchment area	123,000
Journey Time outbound, peak time *** conservative calculation**: buses stop at every junction and pedestrian crossing for the maximum time, accordingly, see Appendix C	44 minutes
Journey Time inbound, peak time *** conservative calculation**: buses stop at every junction and pedestrian crossing for the maximum time, accordingly, see Appendix C	45 minutes

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);
- Design and Construction Supervision Costs; 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 EPO

Study Area Section	*Total Capital Cost Estimate*
SAS 1 (N1 Option 2)	€13.6M
SAS 2 (M1 Option 2)	€3.8M
SAS 3 (First 300 meters)	€2.4M
Total	**€19.8M**

8.2 Exclusions

The high-level cost estimate for the Dún Laoghaire CBC EPO does not consider:

- Professional Fees;
- Planning Costs;
- Marketing;
- Capital Contributions;
- Inflation;
- VAT;

- Costs associated with neighbouring proposed CBC projects (e.g. Ringsend 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 will deliver on-street infrastructure necessary to achieve practical continuous bus priority along the Dun Laoghaire to City Centre Core Bus Corridor, though 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 to car traffic along the route. The bus system is envisaged to become more efficient, as bus stop locations will be optimised and faster bus journeys mean that more people will be moved with the same level of vehicle and driver resources.

The Emerging Preferred Scheme 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 design fully integrates with existing and future planned development and transport infrastructure schemes in the vicinity of the study area.

The Emerging Preferred Scheme design incorporates sophisticated 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 will have the following benefits:

- Increased reliability and faster journey times due to bus priority in the vast majority of locations;
- Reduction of commuting time;
- 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 Dun Laoghaire to City Centre Core CBC;
- Reconfiguration of existing junctions, which will provide considerable benefits for pedestrian accessibility and bus priority, making the bus routes more attractive;
- Proposed new bus stops, which increase the attractiveness and catchment area of the bus route in this Study Area;
- Interchange with DART – including complementary footpath upgrade and wayfinding proposals as part of the scheme design;
- Ability to extend bus services southwards; and
- Serving important trip attractors.

10. Next Steps

This report has identified an emerging preferred option for the bus infrastructure along this Dun Laoghaire to City Centre Core Bus Corridor for 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 separate bus network review process. The proposals will be amended, if and as required, to integrate any resultant changes. The Preliminary Design will define the final practically achievable scheme for the CBC, taking into account more detailed studies of constraints, impacts and environmental assessment required at a local level.

Prior to finalisation of the Dun Laoghaire CBC scheme design, a public consultation process will be undertaken, with inputs and feedback received incorporated where practical and appropriate to do so. This 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.

Appendix A – Multi Criteria Analysis Tables

Table 1: SAS 1 Route Options Multi Criteria Analysis

MCA criteria	Assessment Sub-Criteria	N1 Option 1	N1 Option 2	N2 Option 1	N2 Option 2
Economy	1.a. Capital Cost	Capital Cost: €13.5M Length: 4.75km Cost/Km: 2.84M ***Indicative Scheme Infrastructure* Works Cost** - **€**12.5M ***Land Acquisition Cost*** - € 1M - 697 sq.m. of residential land	Capital Cost: €12.9M Length: 4.75km Cost/Km: 2.72M ***Indicative Scheme Infrastructure* Works Cost** - **€**12.1M ***Land Acquisition Cost*** - € 0.8M - 492 sq.m. of residential land	Capital Cost: €14.6M Length: 4.8km Cost/Km: 3.04M ***Indicative Scheme Infrastructure* Works Cost** - **€**11.9M ***Land Acquisition Cost*** - € 2.7M - 1,770 sq.m. of residential land	Capital Cost: €13.5M Length: 4.8km Cost/Km: 2.81M ***Indicative Scheme Infrastructure* Works Cost** - **€**11.4M ***Land Acquisition Cost*** - €2.1M - 1,441 sq.m. of residential land
	Rank				
	1.b. Transport Reliability and Quality (Journey Time)	Journey Time: 26 mins both directions Length: 4.4km No. of Junctions: 14 No. of pedestrian crossings: 3	Journey Time: 31 mins both directions Length: 4.4km No. of Junctions: 14 No. of pedestrian crossings: 3	Journey Time: 27 mins both directions Length: 4.5km No. of Junctions: 15 No. of pedestrian crossings: 4	Journey Time: 31mins inbound and 32mins outbound Length: 4.5km No. of Junctions: 15 No. of pedestrian crossings: 4
	Rank				
Integration	2.a. Land Use Integration	Integrates with existing / planned residential, educational, medical and leisure uses in this established area.	Integrates with existing / planned residential, educational, medical and leisure uses in this established area.	Integrates with existing / planned residential, educational, medical and leisure uses in this established area.	Integrates with existing / planned residential, educational, medical and leisure uses in this established area.
	Rank				
	2.b. Residential Population and Employment Catchments	***Residential Population Catchments*** - 5 minute walk catchment of approximately 8,300 - 10 minute walk catchment of approximately 20,300 - 15 minute walk catchment of approximately 43,300 ***Employment catchments*** 15 minute walk catchment of approximately 98,000 ***Education catchments*** 15 minute walk catchment of approximately 23,200	***Residential Population Catchments*** - 5 minute walk catchment of approximately 8,300 - 10 minute walk catchment of approximately 20,300 - 15 minute walk catchment of approximately 43,300 ***Employment catchments*** 15 minute walk catchment of approximately 98,000 ***Education catchments*** 15 minute walk catchment of approximately 23,200	***Residential Population Catchments*** - 5 minute walk catchment of approximately 10,200 - 10 minute walk catchment of approximately 24,900 - 15 minute walk catchment of approximately 46,100 ***Employment catchments*** 15 minute walk catchment of approximately 107,300 ***Education catchments*** 15 minute walk catchment of approximately 22,700	***Residential Population Catchments*** - 5 minute walk catchment of approximately 10,200 - 10 minute walk catchment of approximately 24,900 - 15 minute walk catchment of approximately 46,100 ***Employment catchments*** 15 minute walk catchment of approximately 107,300 ***Education catchments*** 15 minute walk catchment of approximately 22,700
	Rank				
	2.c. Transport Network Integration	Potential for interchange with the DART.	Potential for interchange with the DART.	Potential for interchange with the DART.	Potential for interchange with the DART.
	Rank				

	2.d. Cycle Network Integration	Both directions of the CBC align with primary route 13A and 13 as identified in the GDA Cycle Network Plan. See report Section 2 Figure 3. N1 and N2 are both primary cycle routes.	Both directions of the CBC align with primary route 13A and 13 as identified in the GDA Cycle Network Plan. See report Section 2 Figure 3. N1 and N2 are both primary cycle routes.	Both directions of the CBC align with primary route 13 as identified in the GDA Cycle Network Plan. See report Section 2 Figure 3. N1 and N2 are both primary cycle routes.	Both directions of the CBC align with primary route 13 as identified in the GDA Cycle Network Plan. See report Section 2 Figure 3. N1 and N2 are both primary cycle routes.
	Rank				
	2.e. Traffic Network Integration	Merrion Road - Provision of full bus and cycle facilities to consolidate existing cycle and bus lanes although this will require converting significant lengths of shared traffic lanes to segregated bus lanes – Moderate negative impact Pembroke Road (from Ballsbridge Park to U.S Embassy) - Provision of full bus and cycle facilities to consolidate existing cycle and bus lanes although this will require converting significant lengths of shared traffic lanes to segregated bus lanes – Moderate negative impact Pembroke Road (from U.S Embassy to Israeli Embassy) - Provision of additional cycle lanes and consolidation of existing bus lanes - minor positive impact Pembroke Road (from Israeli embassy to City Centre) - Provision of full bus and cycle facilities where none presently exist – Major positive impact Baggot Street - Provision of full bus and cycle facilities where none presently exist – Major positive impact	Merrion Road - Provision of full cycle facilities and bus lanes along the majority of the route to consolidate existing cycle and bus lanes although this will require converting lengths of shared traffic lanes to segregated bus lanes – Moderate negative impact. Pembroke Road (from Ballsbridge Park to U.S Embassy) - Provision of full bus and cycle facilities to consolidate existing cycle and bus lanes although this will require converting significant lengths of shared traffic lanes to segregated bus lanes – Moderate negative impact Pembroke Road (from U.S Embassy to Israeli Embassy) - Provision of additional cycle lanes and consolidation of existing bus lanes - minor positive impact Pembroke Road (from Israeli embassy to City Centre) - Provision of full bus and cycle facilities where none presently exist – Major positive impact Baggot Street - Provision of full bus and cycle facilities where none presently exist – Major positive impact	Merrion Road - Provision of full bus and cycle facilities to consolidate existing cycle and bus lanes (inbound and outbound) although this will require converting significant lengths of shared traffic lanes to segregated bus lanes – Moderate negative impact Pembroke Road (from Ballsbridge Park to U.S Embassy) - Provision of full bus and cycle facilities to consolidate existing cycle and bus lanes although this will require converting significant lengths of shared traffic lanes to segregated bus lanes – Moderate negative impact Northumberland Road - Provision of full bus and cycle facilities to consolidate existing cycle and bus lanes (inbound and outbound) although this will require converting significant lengths of shared traffic lanes to segregated bus lanes – Moderate negative impact Mount Street Lower - Provision of full bus and cycle facilities to consolidate existing cycle and bus lanes (inbound and outbound) although this will require converting significant lengths of shared traffic lanes to segregated bus lanes – Moderate negative impact	Merrion Road - Provision of full bus and cycle facilities to consolidate existing cycle and bus lanes (inbound and outbound) although this will require converting significant lengths of shared traffic lanes to segregated bus lanes – Moderate negative impact Pembroke Road (from Ballsbridge Park to U.S Embassy) - Provision of full bus and cycle facilities to consolidate existing cycle and bus lanes although this will require converting significant lengths of shared traffic lanes to segregated bus lanes – Moderate negative impact Northumberland Road - Provision of full bus and cycle facilities to consolidate existing cycle and bus lanes (inbound and outbound) although this will require converting significant lengths of shared traffic lanes to segregated bus lanes – Moderate negative impact Mount Street Lower - Provision of full bus and cycle facilities to consolidate existing cycle and bus lanes (inbound and outbound) although this will require converting significant lengths of shared traffic lanes to segregated bus lanes – Moderate negative impact
	Rank				
Accessibility & Social Inclusion	3.a. Key Trip Attractors (Education/Health/Commercial/Employment)	- St Vincent's Hospital - RDS - Ballsbridge - Aviva stadium See Appendix B Figure 2.	- St Vincent's Hospital - RDS - Ballsbridge - Aviva stadium See Appendix B Figure 2.	- St Vincent's Hospital - RDS - Ballsbridge - Aviva stadium See Appendix B Figure 2.	- St Vincent's Hospital - RDS - Ballsbridge - Aviva stadium See Appendix B Figure 2.
	Rank				
	3.b. Deprived Geographic Areas	This option primarily serves areas considered a**ffluent** and **very affluent** in the Pobal Deprivation Index. It also serves a very small number of areas considered **marginally above** and **marginally below average.**	This option primarily serves areas considered a**ffluent** and **very affluent** in the Pobal Deprivation Index. It also serves a very small number of areas considered **marginally above** and **marginally below average.**	This option primarily serves areas considered a**ffluent** and **very affluent** in the Pobal Deprivation Index. It also serves a very small number of areas considered **marginally above** and **marginally below average.**	This option primarily serves areas considered a**ffluent** and **very affluent** in the Pobal Deprivation Index. It also serves a very small number of areas considered **marginally above** and **marginally below average.**
	Rank				

Safety	4.a. Road Safety	No. of Junctions: 15 1 turn movement required in each direction (1 right turns/ 1 Left turn in each direction)	No. of Junctions: 15 1 turn movement required in each direction (1 right turns/ 1 Left turn in each direction)	No. of Junctions: 16 0 turning movements required in each direction	No. of Junctions: 16 0 turning movements required in each direction
	Rank				
Physical Activity	5.a Physical Activity	This criterion relates to the health benefits derived from using different transport modes. The subject scheme options under consideration relate to the same mode of travel (bus). As such, this criterion will not produce any relative differences between the options. The physical benefits associated with the scheme will be quantified as part of a future Cost – Benefit Analysis.	This criterion relates to the health benefits derived from using different transport modes. The subject scheme options under consideration relate to the same mode of travel (bus). As such, this criterion will not produce any relative differences between the options. The physical benefits associated with the scheme will be quantified as part of a future Cost – Benefit Analysis.	This criterion relates to the health benefits derived from using different transport modes. The subject scheme options under consideration relate to the same mode of travel (bus). As such, this criterion will not produce any relative differences between the options. The physical benefits associated with the scheme will be quantified as part of a future Cost – Benefit Analysis.	This criterion relates to the health benefits derived from using different transport modes. The subject scheme options under consideration relate to the same mode of travel (bus). As such, this criterion will not produce any relative differences between the options. The physical benefits associated with the scheme will be quantified as part of a future Cost – Benefit Analysis.
	Rank				
Environment **(refe**	6.a. Archaeology and Cultural Heritage	Route is in immediate proximity to **two recorded monuments**	Route is in immediate proximity to **two recorded monuments**	Route is in immediate proximity to **two recorded monuments**	Route is in immediate proximity to **two recorded monuments**
	Rank				
	6.b. Architectural Heritage	**NIAH** survey yet to be completed for southern section of Dublin City Centre. Approx. **47 protected structures** front onto Baggots St Lower. Approx. **32 protected structures** front onto Baggots St Upper. Approx. **86 protected structures** front onto Pembroke Road. **10 protected structures** fronting onto Merrion Road. **1 protected structure** at junction of Rock Rd & Trimleston Avenue.	**NIAH** survey yet to be completed for southern section of Dublin City Centre. Approx. **47 protected structures** front onto Baggots St Lower. Approx. **32 protected structures** front onto Baggots St Upper. Approx. **86 protected structures** front onto Pembroke Road. **10 protected structures** fronting onto Merrion Road. **1 protected structure** at junction of Rock Rd & Trimleston Avenue.	**NIAH** survey yet to be completed for southern section of Dublin City Centre. Approx. **15 protected structures** front onto Mount St Lower. Approx. **72 protected structures** front onto Northumberland Road. Approx. **86 protected structures** front onto Pembroke Road. **10 protected structures** fronting onto Merrion Road. **1 protected structure** at junction of Rock Rd & Trimleston Avenue.	**NIAH** survey yet to be completed for southern section of Dublin City Centre. Approx. **15 protected structures** front onto Mount St Lower. Approx. **72 protected structures** front onto Northumberland Road. Approx. **86 protected structures** front onto Pembroke Road. **10 protected structures** fronting onto Merrion Road. **1 protected structure** at junction of Rock Rd & Trimleston Avenue.
	Rank				
	6.c. Flora & Fauna	The installation of bus lanes will require the removal of **232** existing trees including those along Merrion Rd, and Pembroke Road. It unlikely that these trees are of roosting importance for bats due to the urban environment however they may be used for foraging. This route comes in close proximity to the South Dublin Bay SAC/pNHA and South Dublin Bay and River Tolka Estuary SPA on Merrion Rd however no impacts are expected due to small scale of works.	The installation of bus lanes will require the removal of **232** existing trees including those along Merrion Rd, and Pembroke Road. It unlikely that these trees are of roosting importance for bats due to the urban environment however they may be used for foraging. This route comes in close proximity to the South Dublin Bay SAC/pNHA and South Dublin Bay and River Tolka Estuary SPA on Merrion Rd however no impacts are expected due to small scale of works.	The installation of bus lanes may require the removal of **227** existing trees including those on Merrion Rd, Pembroke Rd and Northumberland Ave. It unlikely that these trees are of roosting importance for bats due to the urban environment however they may be used for foraging. This route comes in close proximity to the South Dublin Bay SAC/pNHA and South Dublin Bay and River Tolka Estuary SPA on Merrion Rd however no impacts are expected due to small scale of works.	The installation of bus lanes may require the removal of **227** existing trees including those on Merrion Rd, Pembroke Rd and Northumberland Ave. It unlikely that these trees are of roosting importance for bats due to the urban environment however they may be used for foraging. This route comes in close proximity to the South Dublin Bay SAC/pNHA and South Dublin Bay and River Tolka Estuary SPA on Merrion Rd however no impacts are expected due to small scale of works.
	Rank				
	6.d. Soils and Geology	No appreciable impacts	No appreciable impacts	No appreciable impacts	No appreciable impacts
	Rank				

	6.e. Hydrology	Route crosses the Grand Canal and River Dodder. No appreciable impacts expected due to designs being within existing bridge width. Flood event at Merrion Gates in 1963 due to Nutley Elm Stream, and 2000 due to extreme weather events.	Route crosses the Grand Canal and River Dodder. No appreciable impacts expected due to designs being within existing bridge width. Flood event at Merrion Gates in 1963 due to Nutley Elm Stream, and 2000 due to extreme weather events.	Route crosses the Grand Canal and River Dodder. No appreciable impacts expected due to designs being within existing bridge width. Flood event at Merrion Gates in 1963 due to Nutley Elm Stream, and 2000 due to extreme weather events.	Route crosses the Grand Canal and River Dodder. No appreciable impacts expected due to designs being within existing bridge width. Flood event at Merrion Gates in 1963 due to Nutley Elm Stream, and 2000 due to extreme weather events.
	Rank				
	6.f. Landscape and Visual	Road widening will significantly impact on existing tree lines along Merrion Rd, and Pembroke Road. Bus route already exists on this route. Route runs through the centre of Merrion Square Key View as identified in the Dublin City Development Plan 2011-2017.	Road widening will significantly impact on existing tree lines along Merrion Rd, and Pembroke Road. Bus route already exists on this route. Route runs through the centre of Merrion Square Key View as identified in the Dublin City Development Plan 2011-2017.	Road widening will significantly impact on existing tree lines on Merrion Rd and through Ballsbridge. Existing route carries bus traffic already. Buses may be seen in distance of Merrion Square Key View as identified in the Dublin City Development Plan 2011-2017.	Road widening will significantly impact on existing tree lines on Merrion Rd and through Ballsbridge. Existing route carries bus traffic already. Buses may be seen in distance of Merrion Square Key View as identified in the Dublin City Development Plan 2011-2017.
	Rank				
	6.g. Air Quality	Existing route carries bus traffic already. Possible impacts due to increased trafficking of road networks and closer proximity to residential properties due to road widening.	Existing route carries bus traffic already. Possible impacts due to increased trafficking of road networks and closer proximity to residential properties due to road widening.	Existing route carries bus traffic already. Possible impacts due to increased trafficking of road networks and closer proximity to residential properties due to road widening.	Existing route carries bus traffic already. Possible impacts due to increased trafficking of road networks and closer proximity to residential properties due to road widening.
	Rank				
	6.h. Noise & Vibration	Possible impacts due to increased trafficking of road networks and increased proximity of vehicles to houses and gardens if bus lanes installed. Existing route carries bus traffic already.	Possible impacts due to increased trafficking of road networks and increased proximity of vehicles to houses and gardens if bus lanes installed. Existing route carries bus traffic already.	Possible impacts due to increased trafficking of road networks and increased proximity of vehicles to houses and gardens if bus lanes installed. Existing route carries bus traffic already.	Possible impacts due to increased trafficking of road networks and increased proximity of vehicles to houses and gardens if bus lanes installed. Existing route carries bus traffic already.
	Rank				
	6.i. Land Use Character	Large numbers of trees will be removed on Merrion Rd and Pembroke Rd. On-street parking will be affected on Pembroke Road and Baggot Street Lower.	Large numbers of trees will be removed on Merrion Rd and Pembroke Rd. On-street parking provisions will be affected on Pembroke Road and Baggot Street Lower, though not to the same extent as N1 Option 1.	Large numbers of trees will be removed on Merrion Rd and Northumberland Rd. On-street parking will be affected along Mount Street Lower.	Large numbers of trees will be removed on Merrion Rd and Northumberland Rd. On-street parking will be affected along Mount Street Lower.
	Rank				

Table 2: SAS 2 Route Options Multi Criteria Analysis

MCA criteria	Assessment Sub-Criteria	M1 Option 1	M1 Option 2
Economy	1.a. Capital Cost	Capital Cost: €4.65M Length: 2.57 km Cost/Km: 1.81M ***Indicative Scheme Infrastructure* Works Cost** - **€**12.5M ***Land Acquisition Cost*** - € 0.33M - 219sq.m. of residential land	Capital Cost: €3.83M Length: 2.75km Cost/Km: 1.49M ***Indicative Scheme Infrastructure* Works Cost** - **€**3.83M ***No Land Acquisition Cost***
	Rank		
	1.b. Transport Reliability and Quality (Journey Time)	Journey Time: 14 mins both directions Length: 2.57 km No. of Junctions: 9 No. of pedestrian crossings: 2	Journey Time: 14 mins both directions Length: 2.57km No. of Junctions: 9 No. of pedestrian crossings: 2
	Rank		
Integration	2.a. Land Use Integration	Integrates with existing / planned residential, educational, medical and leisure uses in this established area.	Integrates with existing / planned residential, educational, medical and leisure uses in this established area.
	Rank		
	2.b. Residential Population and Employment Catchments	***Residential Population Catchments*** - 5 minute walk catchment of approximately 2,731 - 10 minute walk catchment of approximately 6,748 - 15 minute walk catchment of approximately 16,381 ***Employment catchments*** 15 minute walk catchment of approximately 8,390 ***Education catchments*** 15 minute walk catchment of approximately 5,869	***Residential Population Catchments*** - 5 minute walk catchment of approximately 2,731 - 10 minute walk catchment of approximately 6,748 - 15 minute walk catchment of approximately 16,381 ***Employment catchments*** 15 minute walk catchment of approximately 8,390 ***Education catchments*** 15 minute walk catchment of approximately 5,869
	Rank		
	2.c. Transport Network Integration	Potential for interchange with the DART.	Potential for interchange with the DART.
	Rank		
	2.d. Cycle Network Integration	Both directions of the CBC align with primary route 13 as identified in the GDA Cycle Network Plan. See report Section 2 Figure 3.	Both directions of the CBC align with primary route 13 as identified in the GDA Cycle Network Plan. See report Section 2 Figure 3.
	Rank		

	2.e. Traffic Network Integration	Temple Road -Provision of full bus and cycle facilities to consolidate existing cycle lanes although this will require converting significant lengths of shared traffic lanes to segregated bus lanes –Moderate negative impact Frascati Road -Provision of full bus and cycle facilities to consolidate existing cycle lanes although this will require converting significant lengths of shared traffic lanes to segregated bus lanes –Moderate negative impact Rock Road-Provision of full bus and cycle facilities to consolidate existing bus and cycle lanes although this will require converting small lengths of shared traffic lanes to segregated bus lanes –Minor negative impact	Temple Road -Provision of full bus and cycle facilities to consolidate existing cycle lanes although this will require converting significant lengths of shared traffic lanes to segregated bus lanes –Moderate negative impact Frascati Road -Provision of full bus and cycle facilities to consolidate existing cycle lanes although this will require converting significant lengths of shared traffic lanes to segregated bus lanes –Moderate negative impact Rock Road-Provision of full bus and cycle facilities to consolidate existing bus and cycle lanes although this will require converting small lengths of shared traffic lanes to segregated bus lanes –Minor negative impact
	Rank		
Accessibility & Social Inclusion	3.a. Key Trip Attractors (Education/Health/Commercial/Employment)	- St Vincent's Hospital - Blackrock Village See Appendix B Figure 2.	- St Vincent's Hospital - Blackrock Village See Appendix B Figure 2.
	Rank		
	3.b. Deprived Geographic Areas	This option primarily serves areas considered a**ffluent** and **very affluent** in the Pobal Deprivation Index. It also serves a very small number of areas considered **marginally above** and **marginally below average.**	This option primarily serves areas considered a**ffluent** and **very affluent** in the Pobal Deprivation Index. It also serves a very small number of areas considered **marginally above** and **marginally below average.**
	Rank		
Safety	4.a. Road Safety	No. of Junctions:9 No turning movements and full bus lane segregation	No. of Junctions: 9 No turning movements though left turning traffic mix with buses at junction
	Rank		
Physical Activity	5.a Physical Activity	This criterion relates to the health benefits derived from using different transport modes. The subject scheme options under consideration relate to the same mode of travel (bus). As such, this criterion will not produce any relative differences between the options. The physical benefits associated with the scheme will be quantified as part of a future Cost – Benefit Analysis.	This criterion relates to the health benefits derived from using different transport modes. The subject scheme options under consideration relate to the same mode of travel (bus). As such, this criterion will not produce any relative differences between the options. The physical benefits associated with the scheme will be quantified as part of a future Cost – Benefit Analysis.
	Rank		
Environment	6.a. Archaeology and Cultural Heritage	The route borders the South Dublin Bay and River Tolka Estuary SPA and the South Dublin Bay SAC/pNHA at a distance of 200m for a duration of 2.2km however there are no predicted impacts	The route borders the South Dublin Bay and River Tolka Estuary SPA and the South Dublin Bay SAC/pNHA at a distance of 200m for a duration of 2.2km however there are no predicted impacts
	Rank		
	6.b. Architectural Heritage	No impact on protected structures	Negligible effects on existing flora and fauna
	Rank		
	6.c. Flora & Fauna	Negligible effects on existing flora and fauna	Negligible effects on existing flora and fauna
	Rank		

	6.d. Soils and Geology	No appreciable impacts	No appreciable impacts
	Rank		
	6.e. Hydrology	The Rock Rd has previously been flooded in 2002 and previous to this in 1963. A flood event was recorded on Temple Rd in 2011 also. The scheme is not expected to impact on hydrology.	The Rock Rd has previously been flooded in 2002 and previous to this in 1963. A flood event was recorded on Temple Rd in 2011 also. The scheme is not expected to impact on hydrology.
	Rank		
	6.f. Landscape and Visual	Minor impact on landscape and visual	Minor impact on landscape and visual
	Rank		
	6.g. Air Quality	Minor impact on air quality	Minor impact on air quality
	Rank		
	6.h. Noise & Vibration	Minor impact on noise and vibration	Minor impact on noise and vibration
	Rank		
	6.i. Land Use Character	Land use character will remain unchanged	Land use character will remain unchanged
	Rank		

Appendix B – Data Collection

1. Study area visit

Each of the route sections were visited / driven, photographed and audited to identify any constraints which may not have been evident from maps and drawings. The site visits enabled a comprehensive evaluation of the route options in terms of their capacity to accommodate of a core bus corridor.

2. Land Use

The land use assessment was carried out using GIS and examined private and public land along the different route options. This information was used for developing cost estimates for each of the route options, based on the area and nature (public or private) of the land acquisition required. The land use assessment results are presented in the MCA tables in Appendix A.

3. Existing Bus Lanes

A map indicating the existing bus lanes throughout the CBC study area was produced to highlight sections of the corridor already capable of accommodating segregated facilities. Blue routes indicate inbound bus lanes while red routes indicated outbound bus lanes.

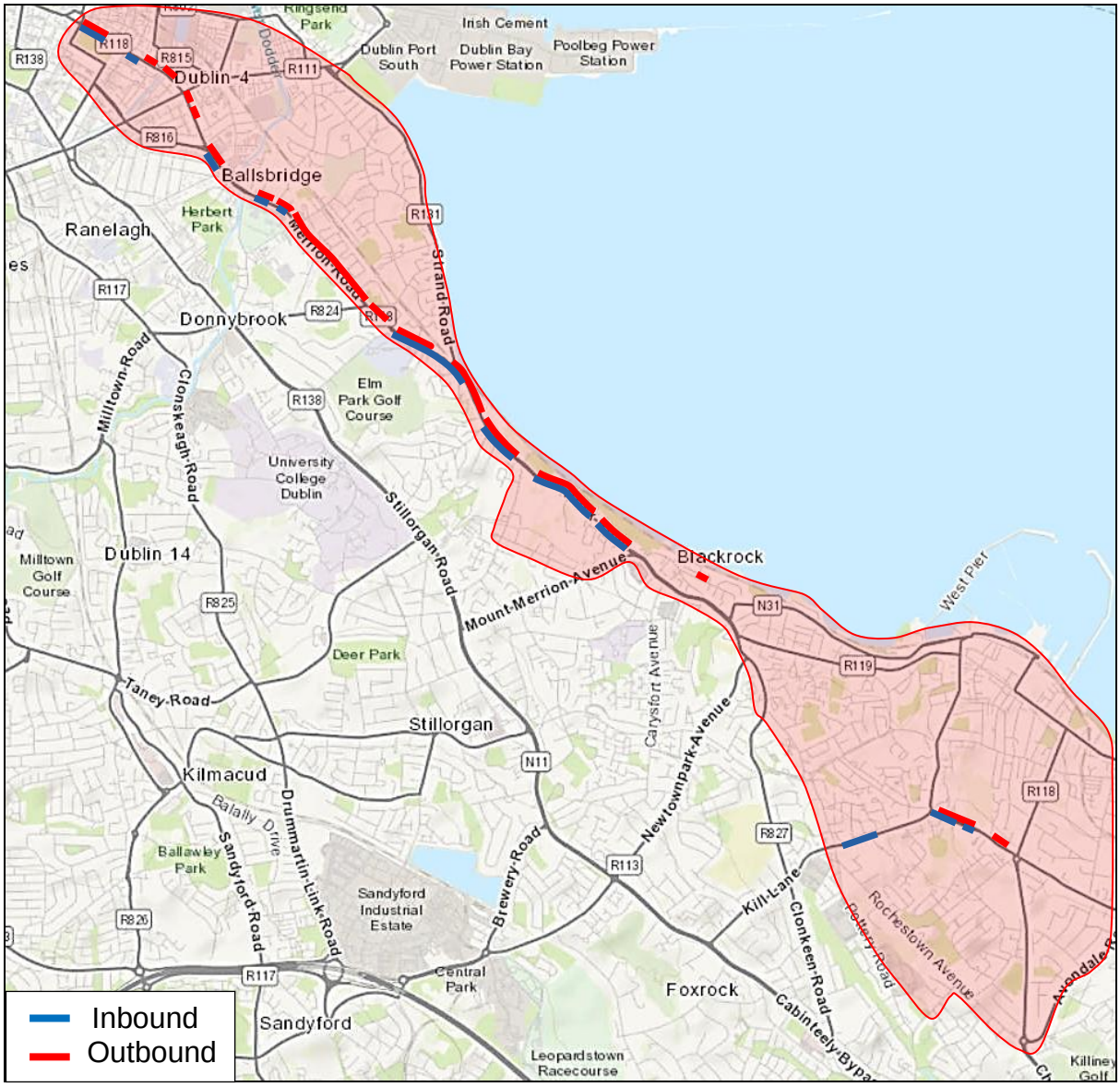


Figure 1: Existing bus lanes within the study area

4. Bus Journey Times

The bus travel times for each scheme option along the CBC were estimated based on a number of criteria, including;

- Length of segregated bus lane (suburban)
- Length of shared bus / traffic lane (urban / city centre)
- Number of signalised junctions with no turning lane and good priority
- Number of signalised junctions with no turning lane and poor priority
- Number of signalised junctions with right turning lane and good priority
- Number of signalised junctions with right turning lane and poor priority
- Number of signalised junctions with left turning lane and good priority
- Number of signalised junctions with left turning lane and poor priority
- Number of pedestrian crossings
- Number of busy bus stops
- Number of average use bus stops
- Number of lightly used bus stops

Due to the large number of route options and calculations, the results of the bus journey time estimates are presented in Appendix C.

5. Trip attractors

A map was produced to illustrate the location of the main trip destinations within the CBC study area, including IADT College, Dun Laoghaire, Blackrock Village, Blackrock Clinic, UCD, St. Vincent's Hospital, RTE, RDS, Ballsbridge, Sandymount Village and Aviva Stadium. Also identified were interchange points between different modes of public transport i.e. bus and rail routes. It is important that the CBC is designed to facilitate easy interchange for commuters between different transport systems along its route. This map was used to identify 'spider-web' routes sections for bus routes within the study area which could optimise connectivity between trip attractor destinations.

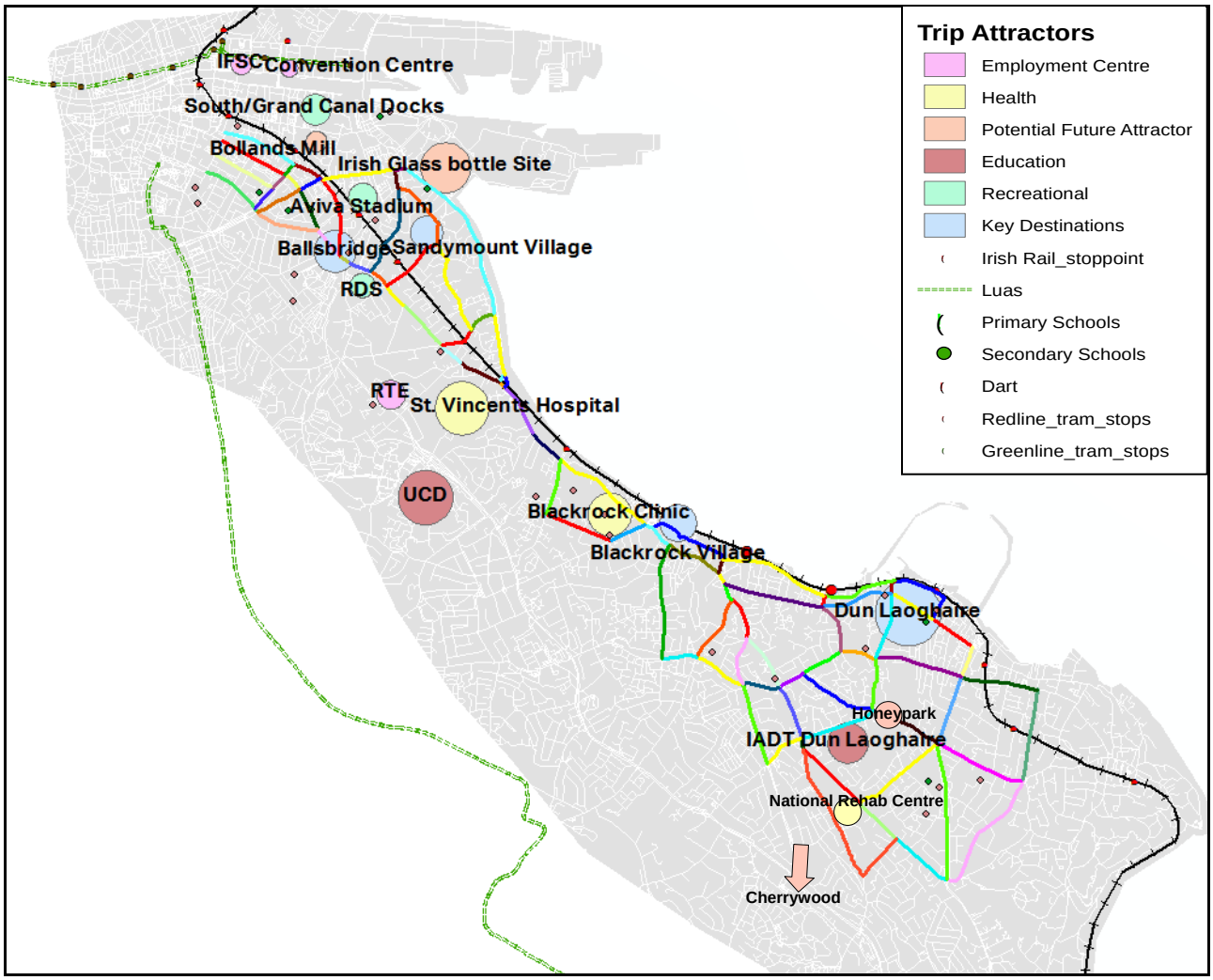


Figure 2: Trip attractors in the study area

6. Road collision history

The Road Safety Authority database of personal injury accidents was examined to establish if there are any existing safety issues in the study area that were not evident from the site visits. The database provides accident records for the period 2005 to 2013; in terms of location, year, road user type involved (pedestrian, car, cyclist, motorcyclist, bus etc.), circumstances and severity of collision (minor, serious or fatal). The following bus collision history maps indicate the location of incidents along the route options identified within each Study Area Section.

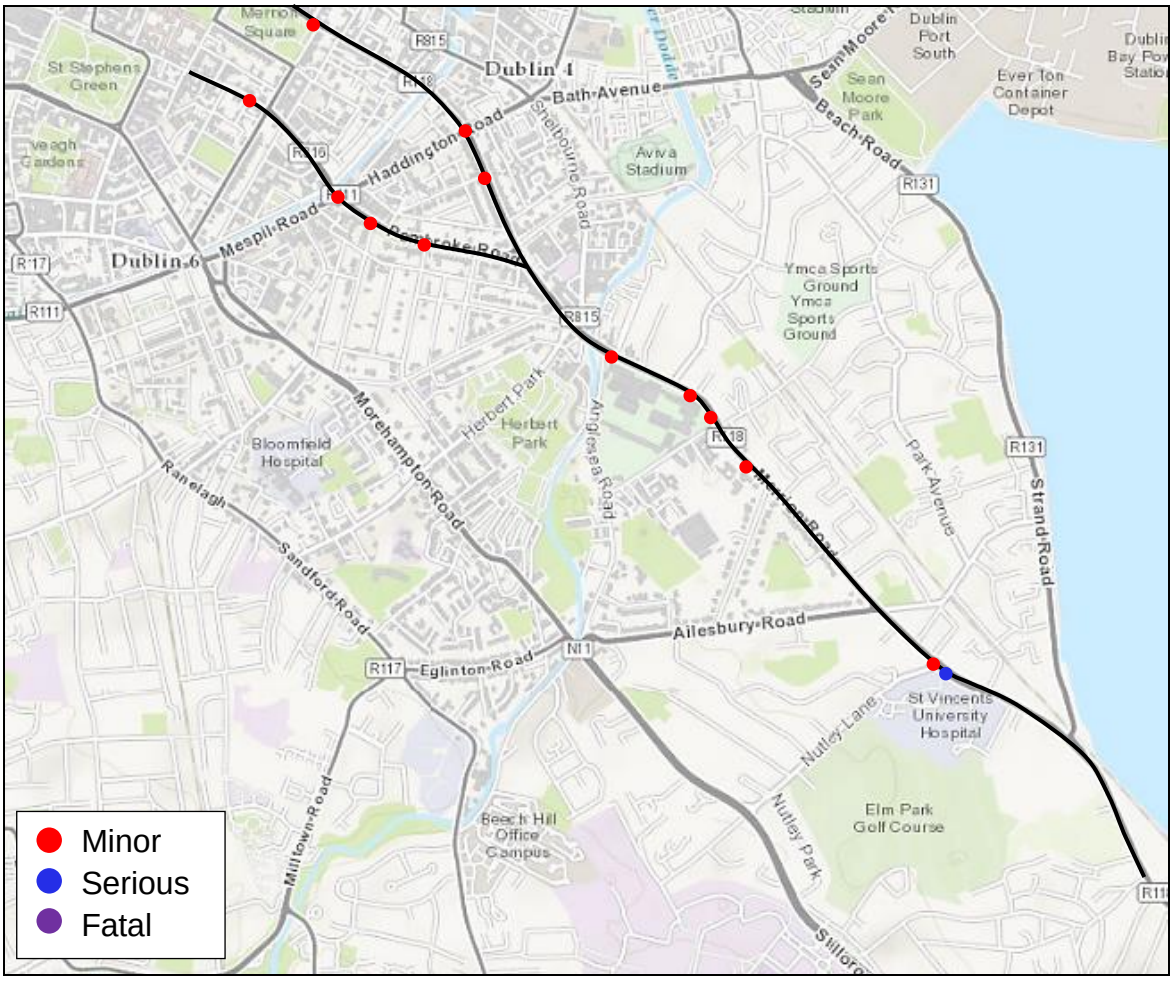


Figure 3: Bus collision history along SAS 1 route options

Figure 4: Bus collision history along SAS 2 route options

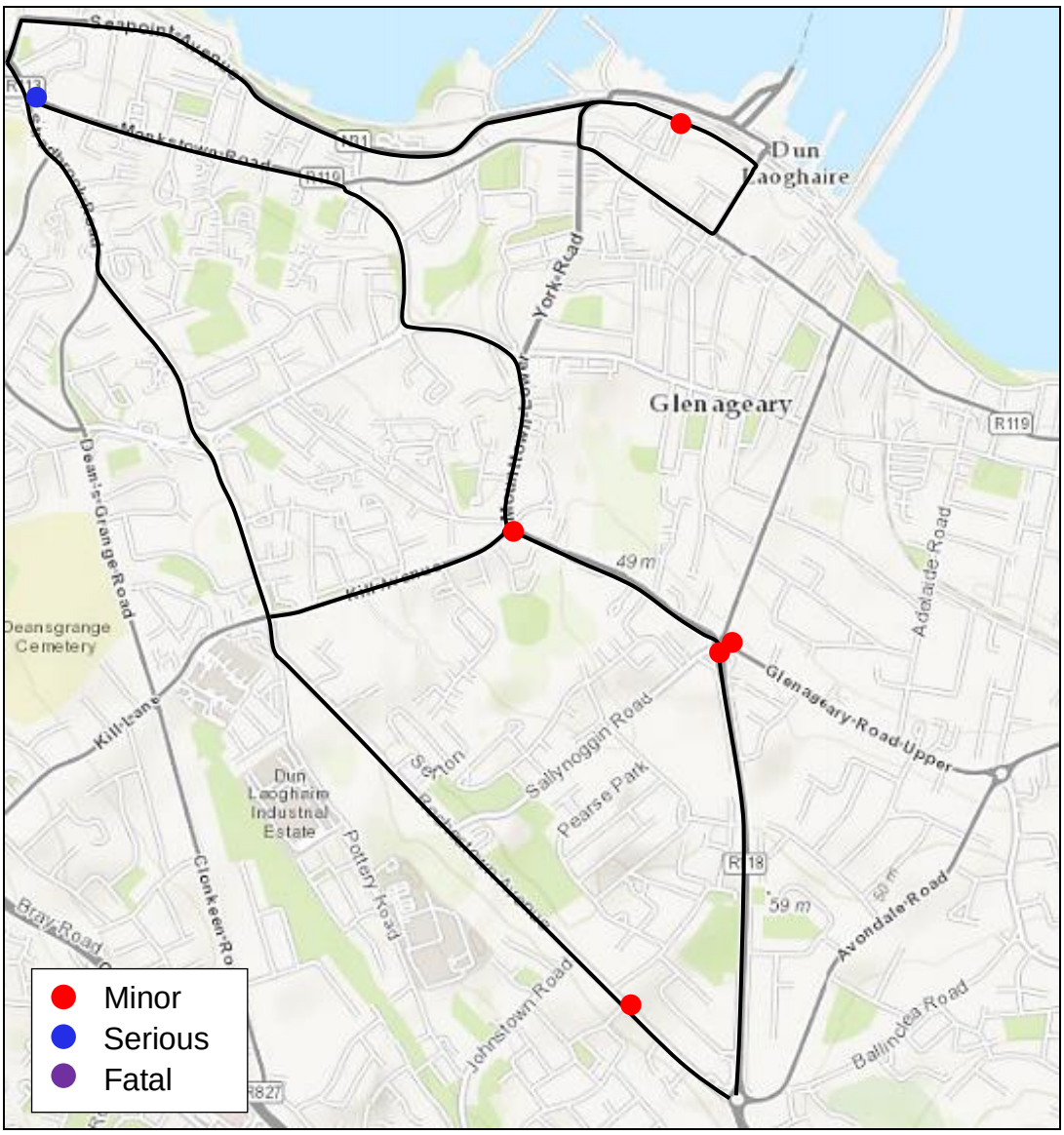


Figure 5: Bus collision history along SAS 3 route options

7. Tree surveys

Dr. Phillip Blackstock was commissioned to carry out a detailed and high-level tree survey along the route options. The tree survey assessment identified the number and approximate location of all roadside trees along the route options, as well as trees and hedges growing on adjoining grounds where their canopy extends over the carriageway. It also noted the location of those trees that have trunks or limbs close to and or within 5.1m above the carriageway. Due to the large number of drawings received, the results of the tree survey are contained in a separate document.

8. Permeability

An analysis for maximisation of accessibility through permeability opportunities in the Dun Laoghaire area has been completed and incorporated in the overall assessment. A number of permeability opportunities were identified along Rochestown Avenue which could significantly increase the number of people within a 5, 10 and 15 minute walking distance from the existing bus stops.

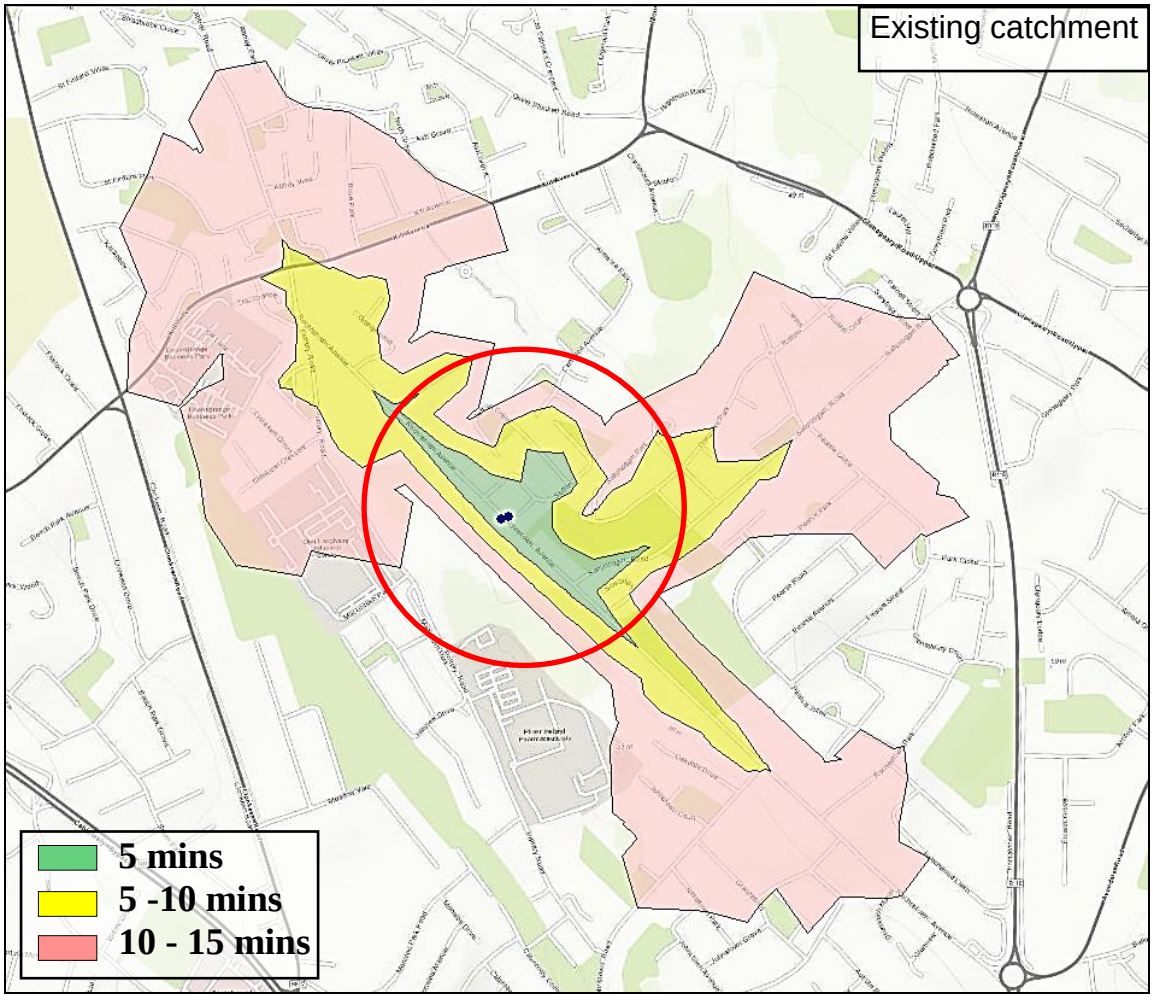


Figure 6: Existing catchment for bus stops on Rochestown Avenue

Figure above illustrates the existing catchment zones for the bus stops located midway along Rochestown Avenue. Figure below illustrates the proposed permeability routes (within the red circle in Figure above) which would greatly improve accessibility to the bus stops for a wider community.

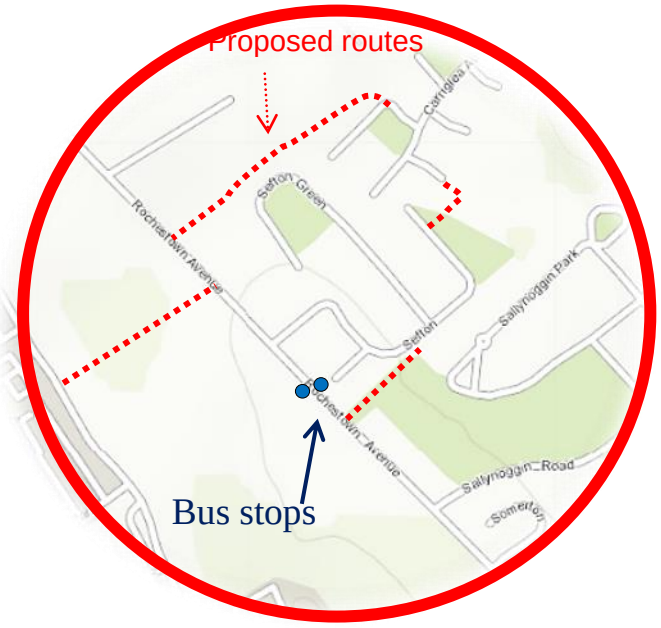


Figure 7: proposed permeability routes

Figure 8 below illustrates the new catchment zones for the Rochestown Avenue bus stops if the permeability routes were introduced for pedestrians.

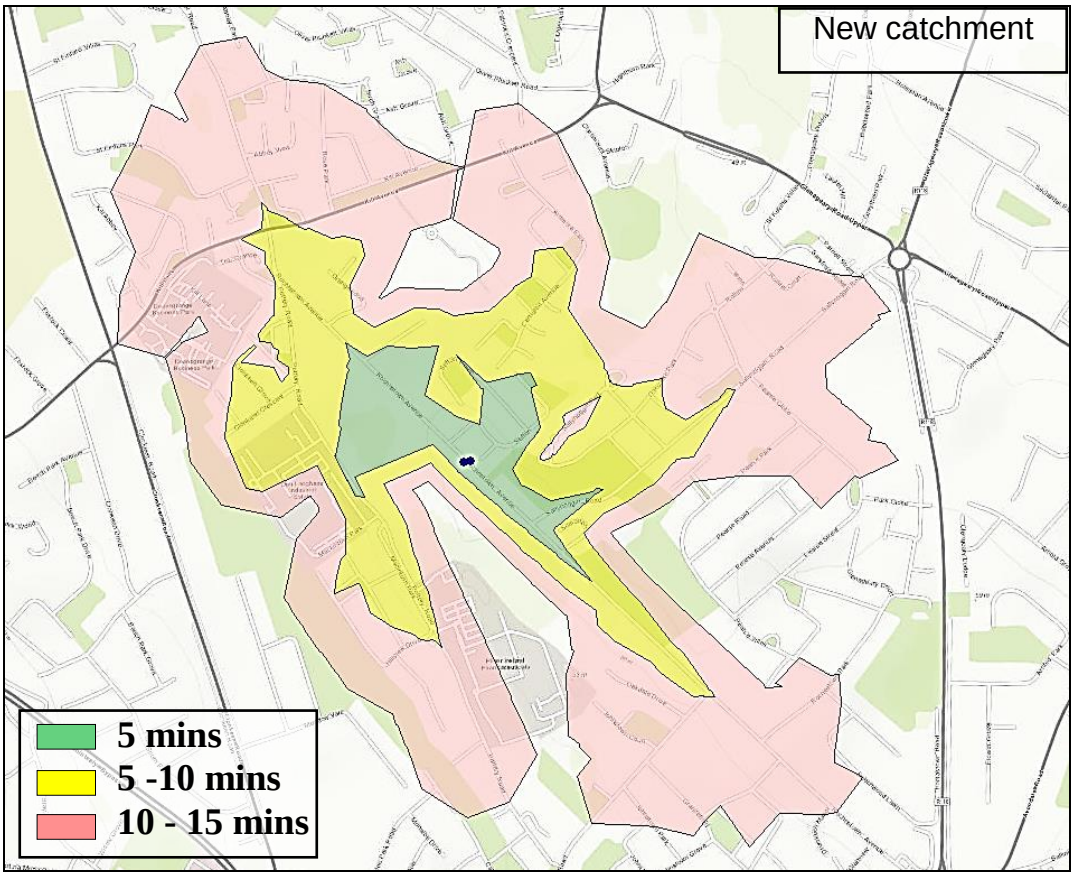


Figure 8: New (potential) catchment for bus stops on Rochestown Avenue

Table 1: Comparison of the new catchment against existing catchment

Walking time	Population
5 mins	79%
5 - 10 mins	53%
10 - 15 mins	16%
Within 15 mins	**24%**

Walking time	Destination Education
5 mins	100%
5 - 10 mins	244%
10 - 15 mins	32%
Within 15 mins	**67%**

Walking time	Destination Employment
5 mins	228%
5 - 10 mins	147%
10 - 15 mins	19%
Within 15 mins	**43%**

Table 1 shows that the number of people living within a 5 minute walking distance of the bus stops would increase by 79% if the permeability routes were introduced. Further, the percentage of people working or attending an educational institution within a 5 minute walk of the bus stops would increase by 228% and 100% respectively. This exemplifies the significant catchment area improvements which could be achieved by opening up several pedestrian routes along Rochestown Avenue to neighbouring housing estates.

9. Vertical alignments

Existing vertical alignments of all route options were examined as part of the scheme option designs development. The following images illustrate the road elevation along each of the routes.

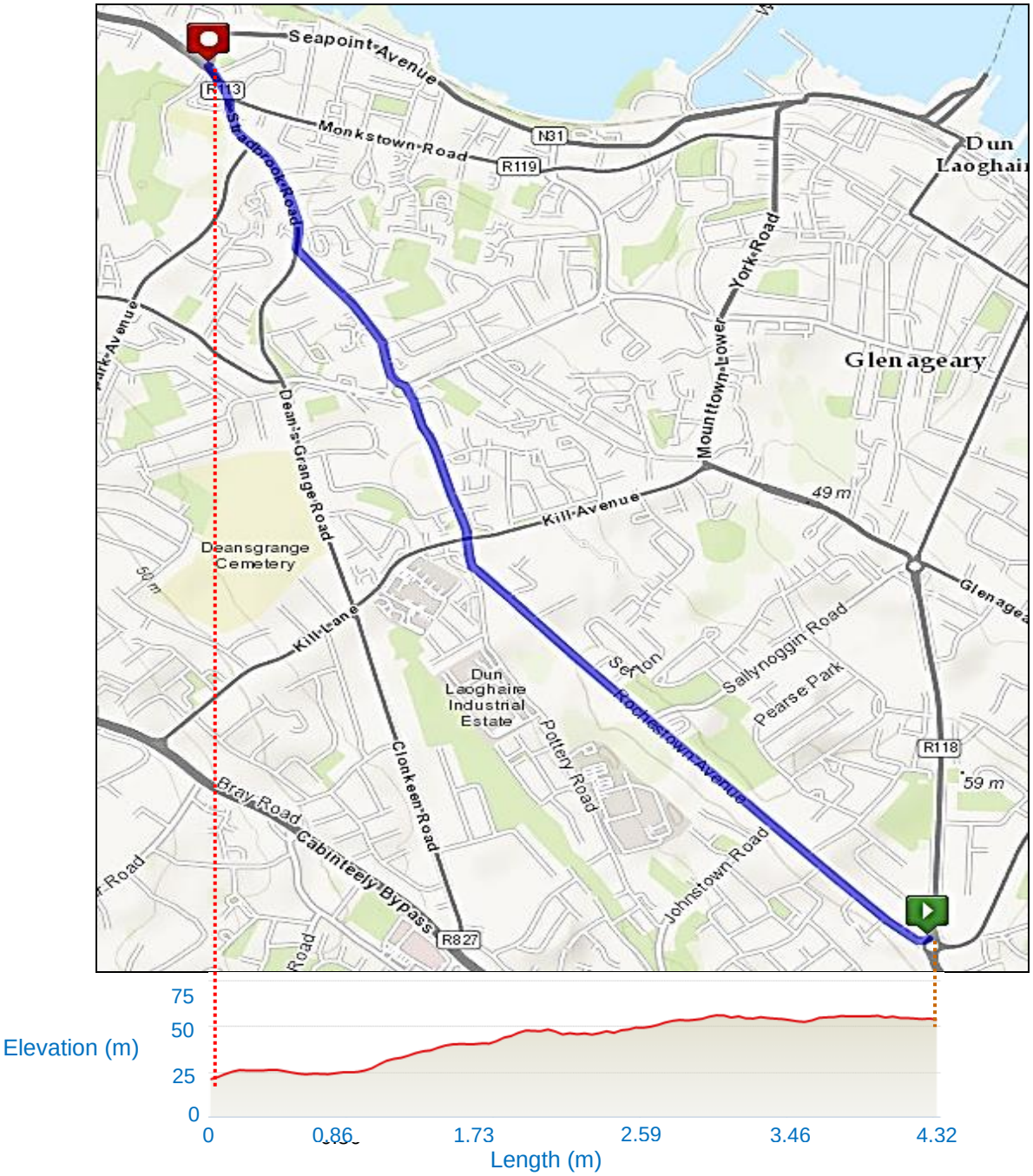


Figure 9: Vertical alignment of scheme option S1 in the inbound direction

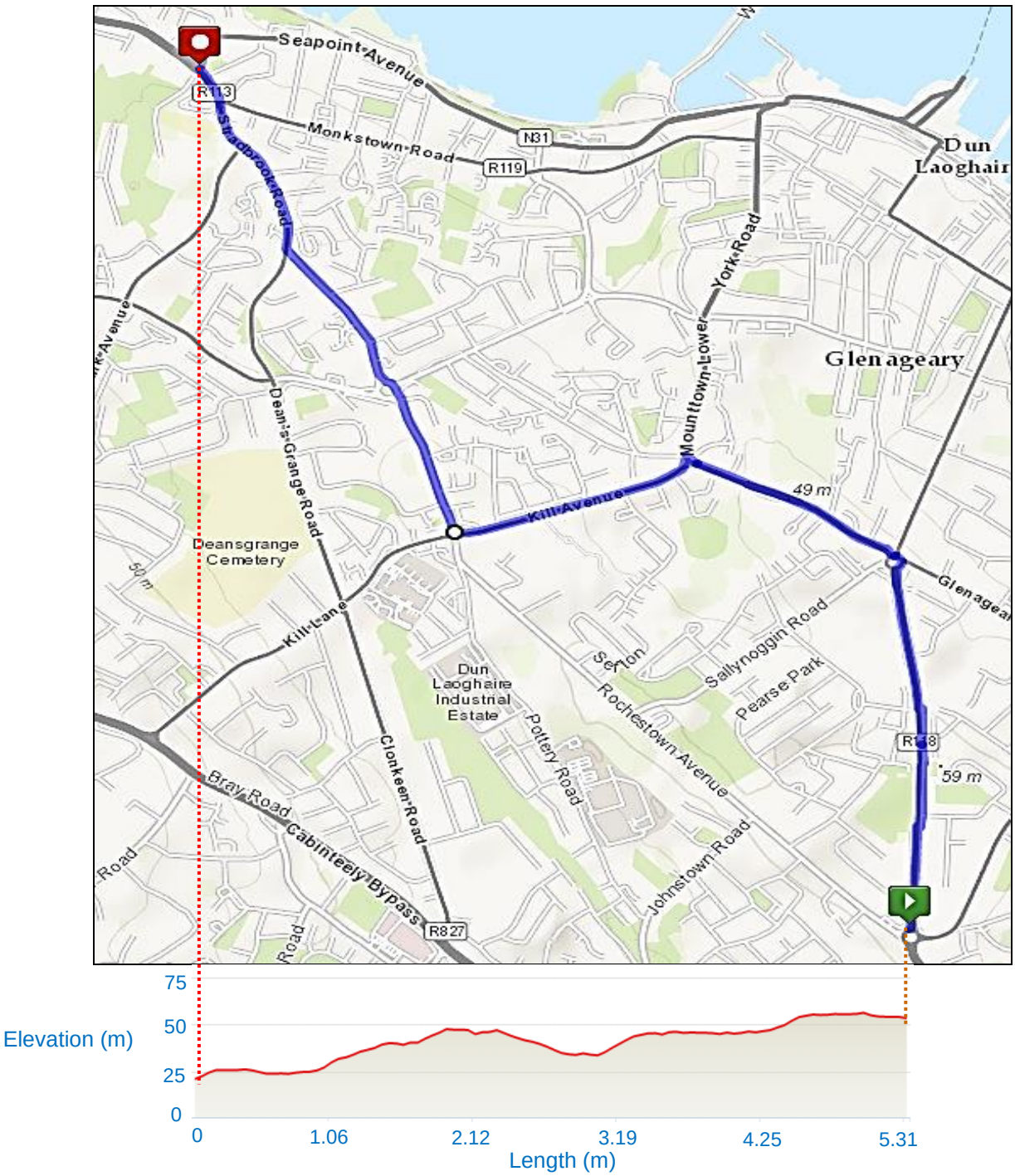


Figure 10: Vertical alignment of scheme option S2 in the inbound direction

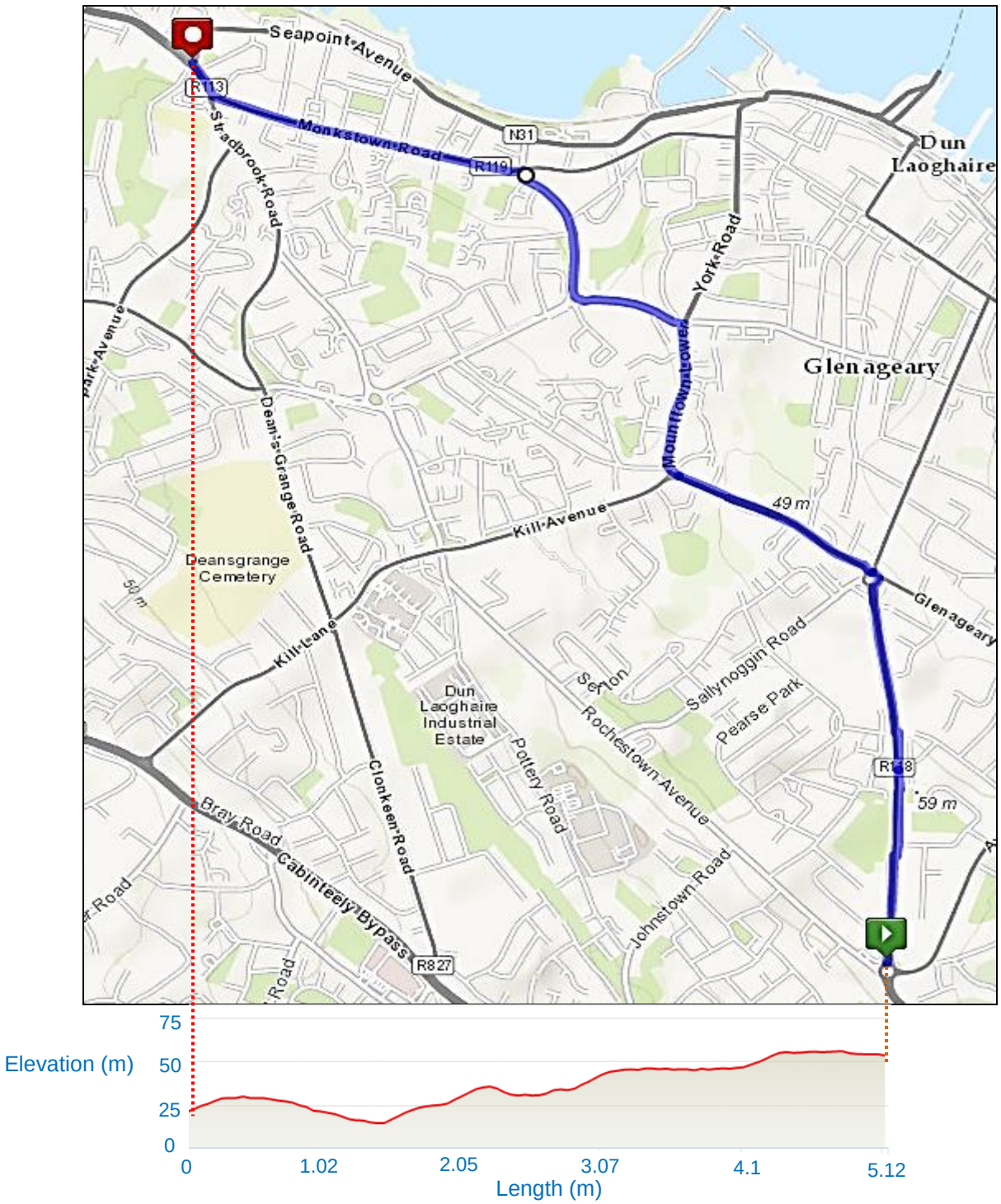


Figure 11: Vertical alignment of scheme option S3 in the inbound direction

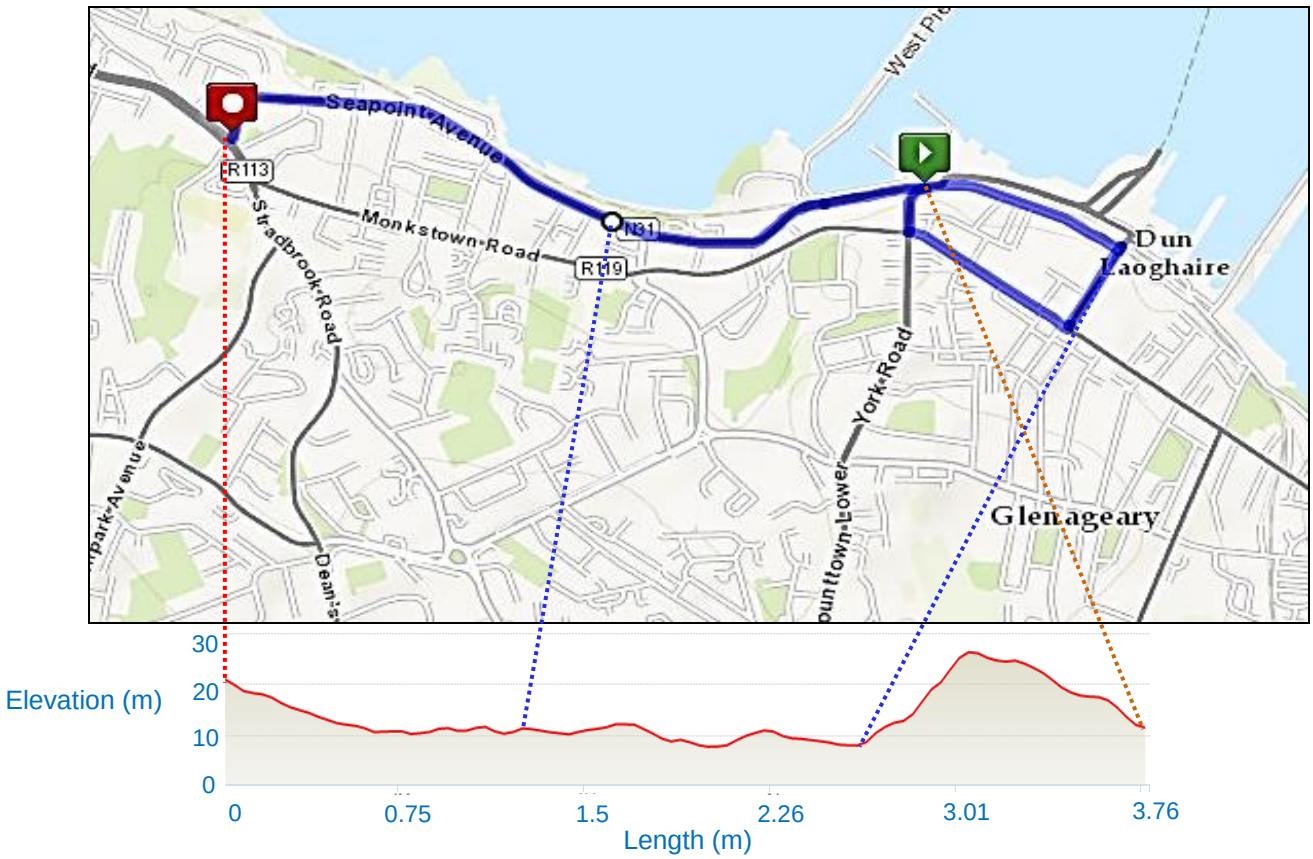


Figure 12: Vertical alignment of scheme option S4 in the inbound direction

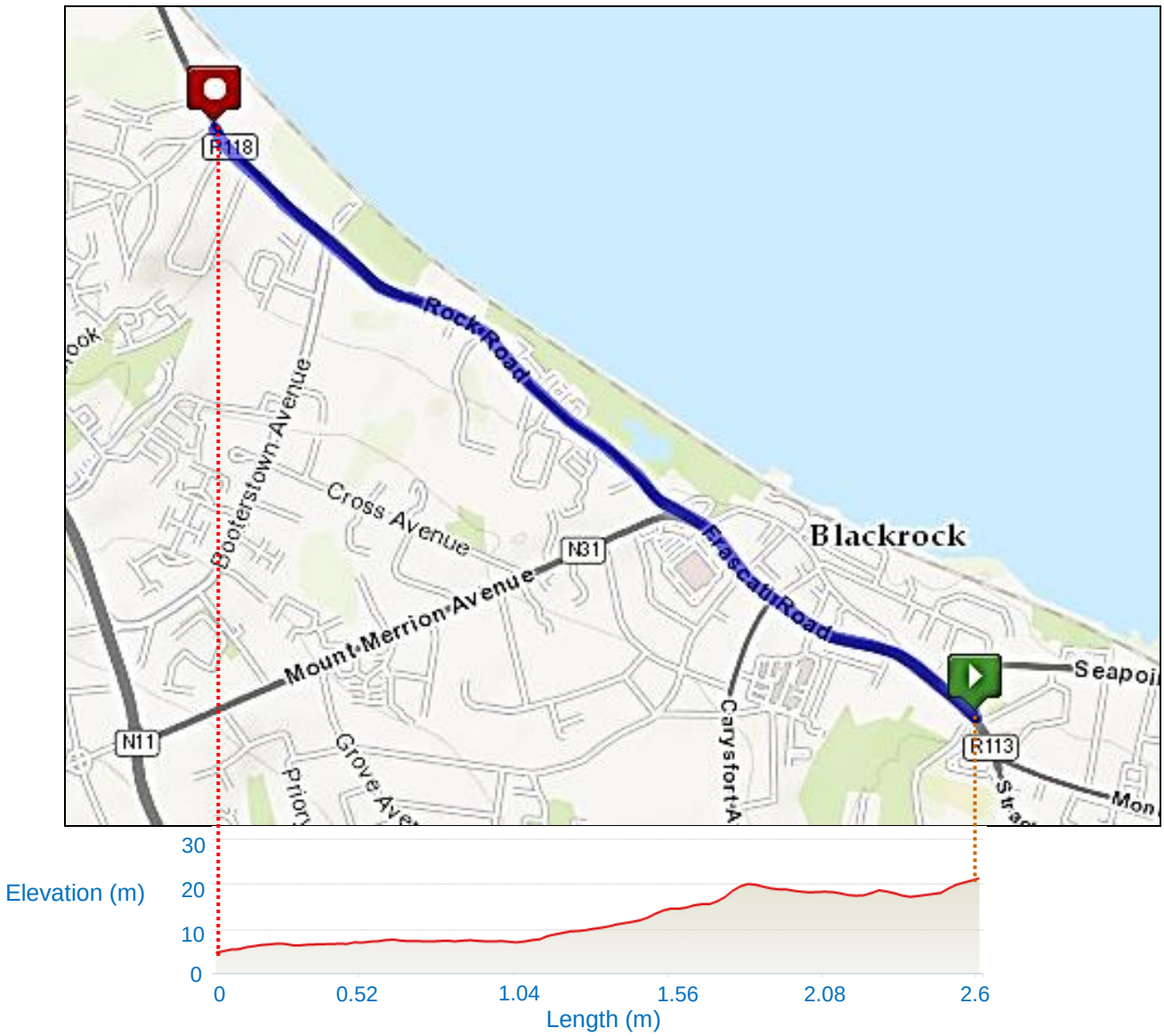


Figure 13: Vertical alignment of scheme option M1 in the inbound direction

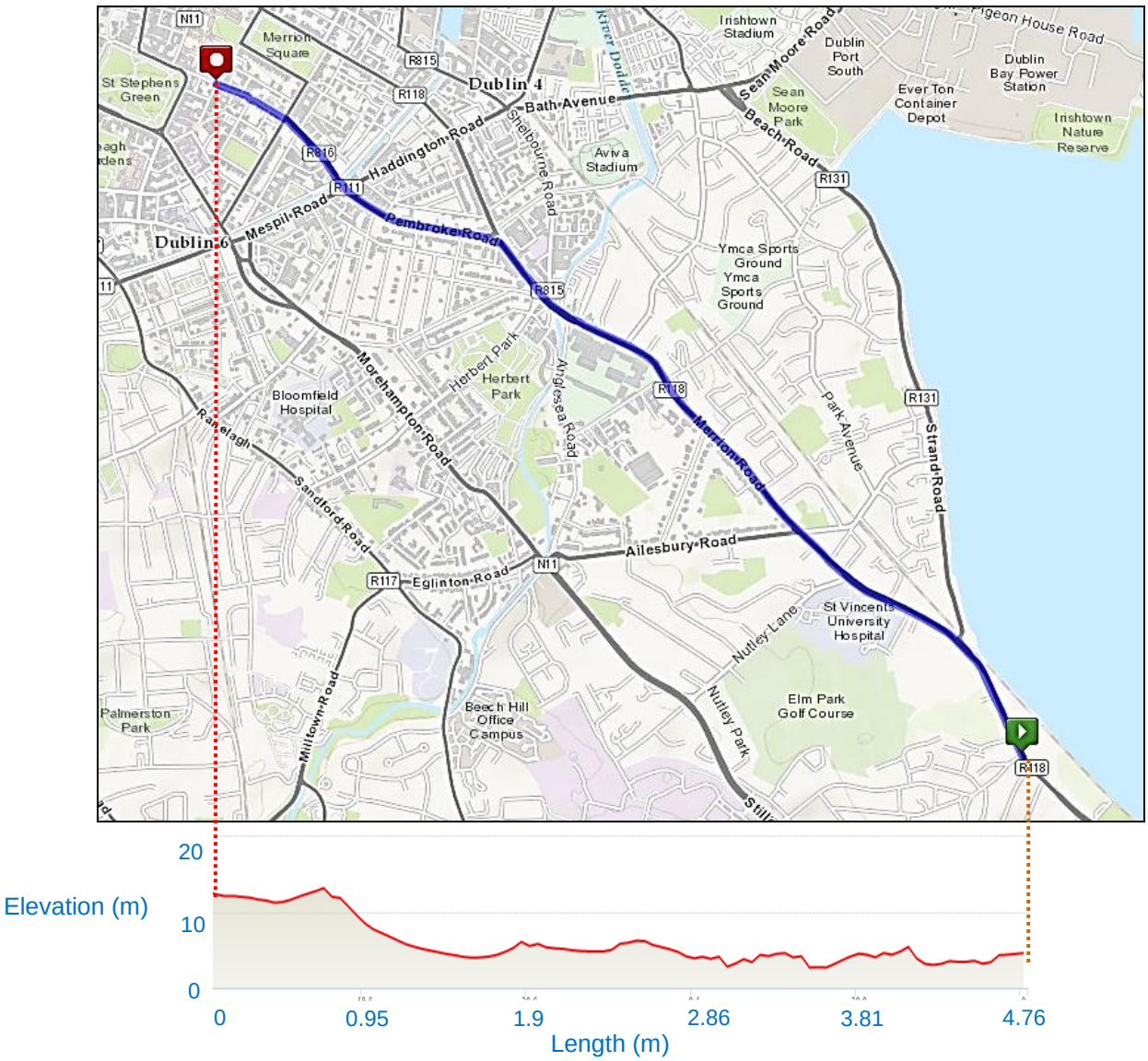


Figure 14: Vertical alignment of scheme option N1 in the inbound direction

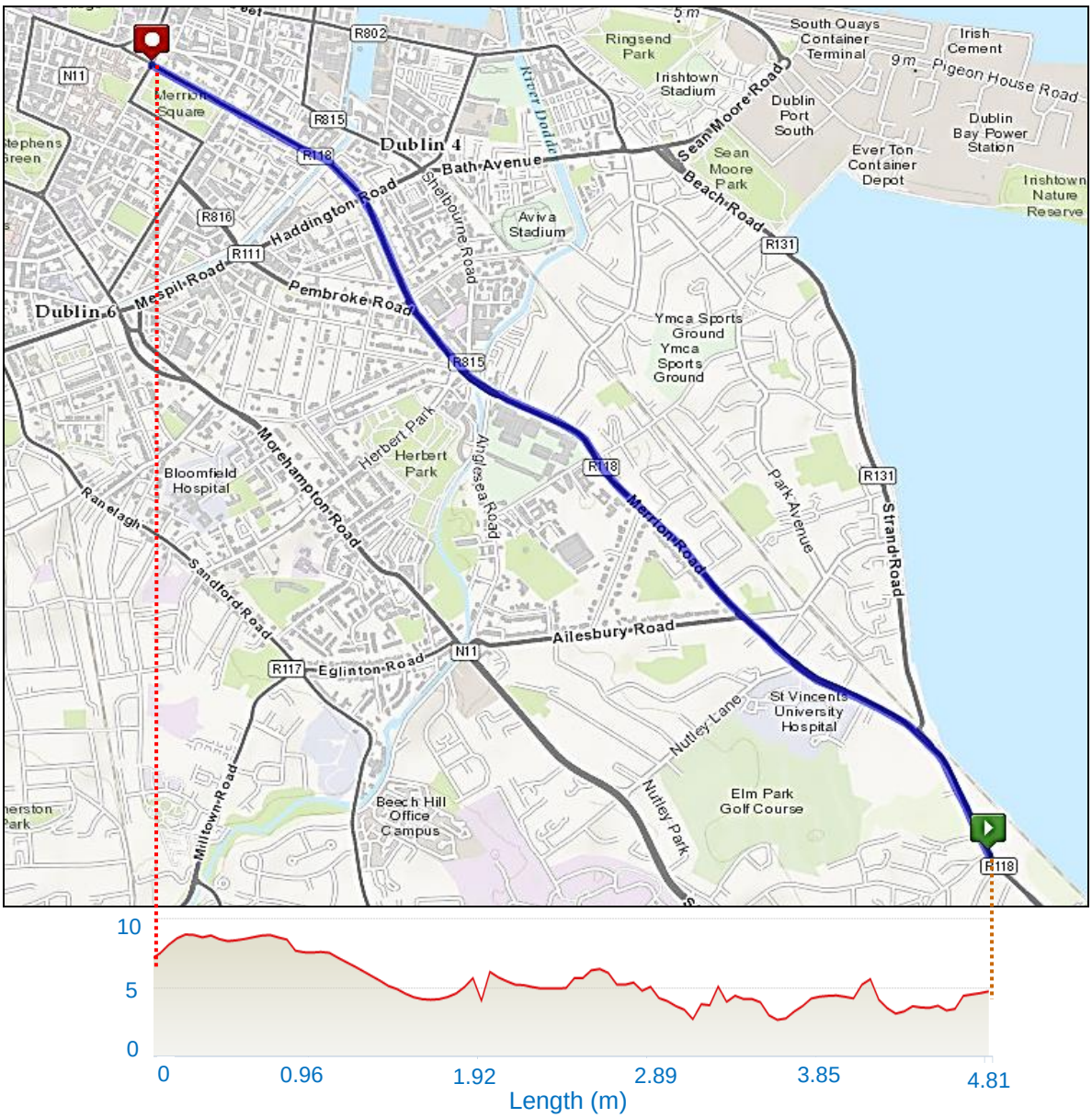


Figure 15: Vertical alignment of scheme option N2 in the inbound direction

10. Architectural and Archaeological information

Irish Archaeological Consultancy (IAC) and Roughan & O' Donovan (ROD) provided an environmental assessment of the different route options under the following criteria:

- Archaeology and Cultural Heritage
- Architectural Heritage
- Flora & Fauna
- Soils and Geology
- Hydrology
- Landscape and Visual
- Air Quality
- Noise & Vibration
- Land Use Character

The architectural and archaeological assessment results are presented in the MCA tables in Appendix A.

11. Problem identification

A detailed assessment of each route option was carried out to identify existing problems and constraints under the following criteria;

- Cycle Facilities
- Road Condition
- Pinch Points
- Footpath Condition
- Mobility Impaired and Disabled
- Dangerous Structures/Buildings
- Public Lighting
- Access Points
- Electricity Poles

The results of this assessment are contained in a report in Appendix D.

12. Parking survey

A parking survey study was carried out to identify the parking conditions in the existing road network. Each route was assessed under the following criteria:

- *Formal Parking:* On-street parking in which marked spaces has been provided. These are spaces in which the Local Authority charges an hourly rate to use.
- *Informal Parking:* On-street parking in which spaces may or may not be marked and in which the Local Authority does not charge for use.
- *Adjacent Parking:* Parking which is accessible to the general public and is located in close proximity to the street. These are spaces in which the Local Authority charges an hourly rate to use.

The results of the parking survey assessment are contained in a report in Appendix E.

13. Cost estimates

A breakdown of the cost estimation process is presented in Appendix F.

Appendix C – Bus Journey Times

1. SAS 1

1.1 N1 Scheme Options

Dun Laoghaire to City Centre Core Bus Corridor Scheme			**N1 Option 1**		**N1 Option 2**	
	km per Hour	*Average Delay (Minute)*	**Inbound**	**Outbound**	**Inbound**	**Outbound**
Length (km) of Fully Segregated Bus Lane	20		4.4	4.4	2.73	2.73
Length (km) of Shared Bus/Traffic Lane (suburban)	10				1.67	1.67
Length (km) of Shared Bus/Traffic Lane (urban/city centre)	8					
Number of Signalised Junctions with No turning and good Priority (15 Seconds)		0.25	14	14	14	14
Number of Signalised Junctions with No turning and poor Priority (60 Seconds)		1.00				
Number of Signalised Junction with Right turning Lane and Good Priority (45 seconds)		0.75				
Number of Signalised Junctions with Right turn and Poor Priority (2 minutes)		2.00				
Number of Signalised Junctions with Left turning Lane and Good Priority (30 seconds)		0.50				
Number of Signalised Junctions with Left turn and Poor Priority (2 minutes)		2.00				
Number of Pedestrian Crossings (15 second average)		0.25	3	3	3	3
Number of Busy Bus Stops; Dwell Time (60 seconds)		1.00				
Number of Average use Bus Stops; Dwell Time (30 Seconds)		0.50	17	17	17	17
Number of Lightly Used Bus Stops; Dwell Time (10 seconds)		0.17	3	3	3	3
Total Journey Time(Minutes)			26	26	31	31

1.2 N2 Scheme Options

Dun Laoghaire to City Centre Core Bus Corridor Scheme			**N2 Option 1**		**N2 Option 2**	
	km per Hour	*Average Delay (Minute)*	**Inbound**	**Outbound**	**Inbound**	**Outbound**
Length (km) of Fully Segregated Bus Lane	20		4.5	4.5	3.06	2.7
Length (km) of Shared Bus/Traffic Lane (suburban)	10				1.44	1.80
Length (km) of Shared Bus/Traffic Lane (urban/city centre)	8					
Number of Signalised Junctions with No turning and good Priority (15 Seconds)		0.25	15	15	15	15
Number of Signalised Junctions with No turning and poor Priority (60 Seconds)		1.00				
Number of Signalised Junction with Right turning Lane and Good Priority (45 seconds)		0.75				
Number of Signalised Junctions with Right turn and Poor Priority (2 minutes)		2.00				
Number of Signalised Junctions with Left turning Lane and Good Priority (30 seconds)		0.50				
Number of Signalised Junctions with Left turn and Poor Priority (2 minutes)		2.00				
Number of Pedestrian Crossings (15 second average)		0.25	4	4	4	4
Number of Busy Bus Stops; Dwell Time (60 seconds)		1.00				
Number of Average use Bus Stops; Dwell Time (30 Seconds)		0.50	16	16	16	16
Number of Lightly Used Bus Stops; Dwell Time (10 seconds)		0.17	3	3	3	3
Total Journey Time(Minutes)			27	27	31	32

2. SAS 2

2.1 M1 Scheme Options

Dun Laoghaire to City Centre Core Bus Corridor Scheme			**M1 Option 1**		**M1 Option 2**	
	km per Hour	*Average Delay (Minute)*	**Inbound**	**Outbound**	**Inbound**	**Outbound**
Length (km) of Fully Segregated Bus Lane	20		2.57	2.57	2.57	2.57
Length (km) of Shared Bus/Traffic Lane (suburban)	10					
Length (km) of Shared Bus/Traffic Lane (urban/city centre)	8					
Number of Signalised Junctions with No turning and good Priority (15 Seconds)		0.25	9	9	9	9
Number of Signalised Junctions with No turning and poor Priority (60 Seconds)		1.00				
Number of Signalised Junction with Right turning Lane and Good Priority (45 seconds)		0.75				
Number of Signalised Junctions with Right turn and Poor Priority (2 minutes)		2.00				
Number of Signalised Junctions with Left turning Lane and Good Priority (30 seconds)		0.50				
Number of Signalised Junctions with Left turn and Poor Priority (2 minutes)		2.00				
Number of Pedestrian Crossings (15 second average)		0.25	2	2	2	2
Number of Busy Bus Stops; Dwell Time (60 seconds)		1.00				
Number of Average use Bus Stops; Dwell Time (30 Seconds)		0.50	7	7	7	7
Number of Lightly Used Bus Stops; Dwell Time (10 seconds)		0.17	3	3	3	3
Total Journey Time(Minutes)			14	14	14	15

Appendix D – Problem Identification

1. Introduction

AECOM have been tasked by the National Transport Authority (NTA) to identify viable routes for a Core Bus Corridor which aims to provide ease of bus travel with the objective of improving journey times from South County Dublin into Dublin City Centre.

This report shall seek to identify problems with the existing conditions in the road network. Each route was assessed using the following criteria:

- *Cycle Facilities* – Each road along the possible route options were checked to see if cycle facilities such as cycle tracks have been provided and if so, the condition of the construction materials used.
- *Road Condition* - The roads along each route were assessed to determine the existing conditions of the road pavement, both the condition of the existing surface course and also the visibility of road markings, both in the carriageway and at existing bus stops.
- *Pinch Points* - Pinch points were assessed on whether each route could provide the minimum road standard width requirement to provide a two-way carriageway, a cycle track and a footpath. In areas that roads do not provide the minimum widths required these areas are identifiable as “pinch points”.
- *Footpath Condition* - The condition of the footpaths were also assessed along the possible route options to check for sections which have become dilapidated over time. The footpaths were also checked for uprights and traffic signs which may cause obstructions to pedestrians.
- *Mobility Impaired and Disabled* – Each road on the route options were assessed to determine if the correct facilities have been provided to ensure unrestricted movement, in the safest possible manner, for people with mobility impairments.
- *Dangerous Structures/Buildings* - Along each route, any buildings or structures which may potentially pose a health and safety risk to the general public and which may pose a hazard during any proposed construction works were recorded.
- *Public Lighting* – Public lighting columns along each route have been checked for damage. Any damage to the existing public lighting which may pose a hazard to the general public, and the location of same, was then duly recorded.
- *Access Points* – Each access point has been assessed to analyse the condition of pavements.
- *Electricity Poles* – Electricity Poles along each of the separate route options have been checked for damage. The location of the damaged poles have been recorded and also the damage that has occurred.
- Retaining Walls – Retaining walls locations have been identified along each of the separate routes.

2. SAS 3: Dun Laoghaire – Blackrock Route Options

2.1. Route Option S1: Rochestown Avenue/Abbey Road/Stradbrook Road

- Route Map Cycle Facilities

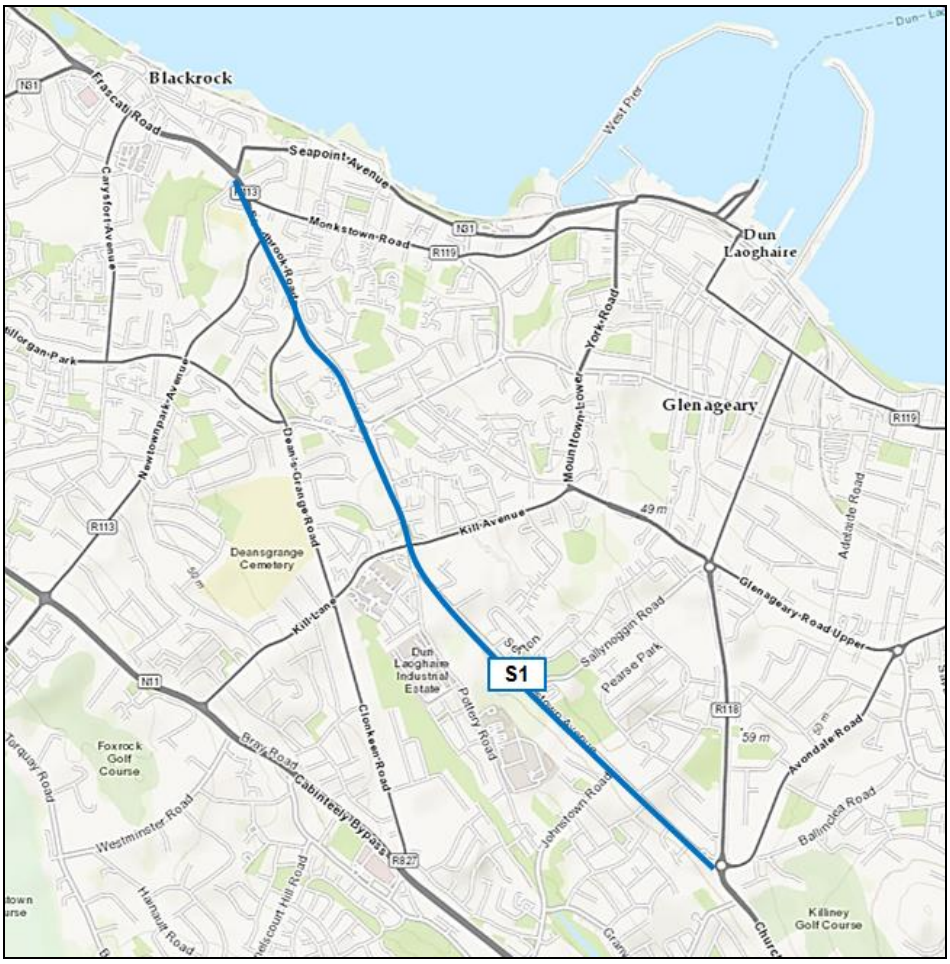


Figure 2.1: S1 Route Map

- Cycle Facilities

There are no cycle facilities along the full length of Rochestown Avenue from the Graduate Roundabout to the Rochestown/Pottery Lane junction, examples of which may be seen on Figure 2.2**Error! Reference source not found.** and Figure 2.3 below.

Figure 2.2: Example of lack of cycle facilities on Rochestown Avenue

Figure 2.3: Example of lack of cycle facilities on Rochestown Avenue

There are no cycle facilities along the length of Abbey Road until the approach to Abbey Road/Stradbrook Road/Monkstown Avenue roundabout, as shown in Figure 2.4 below.

Figure 2.4: Example of lack of cycle facilities on Abbey Road

There are no cycle facilities along Stradbrook Road from the Monkstown Avenue/ Abbey Road/Rockford roundabout to Stradbrook Lawn, examples of which are shown on Figure 2.5 **Error! Reference source not found.** and Figure 2.6 below.

Figure 2.5: Example of lack of cycle facilities on Stradbrook Road

Figure 2.6: Cycle facilities approaching Stradbrook Road/Rowan Park junction

Cycle lanes are provided (see Figure 2.7 below) including a shared surface segregated footpath (see Figure 2.8) along the route from the Stradbrook Road/Stradbrook Lawn junction to the Stradbrook Road/Monkstown Road junction.

Figure 2.7: Cycle facilities on approach to Stradbrook road/Newtownpark Avenue junction

Figure 2.8: Shared surface footpath Stradbrook Road

- Roads

Figure 2.9**Error! Reference source not found.** and Figure 2.10**Error! Reference source not found.** below show examples of the poor road conditions and markings as identified on Route Option S1.

Figure 2.9 Example of poor road condition along Rochestown Avenue

Figure 2.10: Dilapidated road condition at entrance to National rehab Centre

- Pinch Points

A pinch point was found at one location along this route namely a footpath with a width below the recommended standard width of 1.8m as shown in Figure 2.11 below.

Figure 2.11: Example of footpath with reduced width on Rochestown Avenue opposite Killiney Shopping Centre

- Footpaths

Travelling inbound towards the City Centre there are no footpath facilities from opposite the Somerton residential estate on Rochestown Avenue (see Figure 2.12) to Bakers Corner, examples of which can be seen on Figure 2.13 and Figure 2.14 below.

Figure 2.12: End of footpath opposite Somerton residential estate

Figure 2.13: Lack of footpath facilities on Rochestown Avenue

Figure 2.14: Lack of footpath facilities Rochestown Avenue

- Mobility Impaired and Disabled (MID)

There are several locations along the route at which tactile paving is not provided, an example of which can be seen on Figure 2.15**Error! Reference source not found.** below.

Figure 2.15: Lack of tactile paving at the crossing point at entrance to Kensington Manor

- Dangerous Structures/Buildings

One dilapidated wall was found on this route on Rochestown Avenue.

- Public Lighting

No problems were found with the existing street lighting.

- Access Points

One access point was found to be in a state of serious disrepair and this occurred at the entrance to the Abbey View residential estate, which is accessed from Abbey Road.

- Electricity Poles

One electricity pole was identified as being in need of repair and this was found on Rochestown Avenue in front of the Ulster Bank adjacent to Killiney Shopping Centre.

2.2. Route Option S2: Thomastown Road/Glenageary road/Kill Avenue/Abbey road/Stradbrook Road

- Route Map

Figure 2.16: Route Option S2 Location Map

- Cycle Facilities

Route S2 has adjacent segregated cycle facilities along Thomastown Road. Cycle lanes are also provided along Glenageary Road Upper as shown on Figure 2.17. The second half of this route follows the same route as Option S1 namely Abbey and Stradbrook roads, therefore encountering the same cycle facilities as detailed in Section S1 above.

Figure 2.17: Example of cycle facilities Glenageary Road Upper

- Roads

From the survey conducted the roads and markings along the first half of the route (along the Thomastown and Glengeary roads) are in good condition an example of which can be seen on **F**igure 2.18 below.

Figure 2.18: Example of road conditions on Thomastown Road

The second half of this route option follows the same route as Option S1 namely along the Abbey and Stradbrook roads therefore encountering the same road conditions as detailed in section S1 above.

- Pinch Points

No problems were found with pinch points along this route.

- Footpaths

Footpaths along the first half of the route are in good condition. The second half of this route option follows the same route as Option S1 namely Abbey and Stradbrook roads therefore encountering the same footpath conditions as detailed in section S1 above.

- Mobility Impaired Disabled (MID)

Mobility Impaired disabled facilities along the first half of the route are in good condition. The second half of this route option follows the same route as Option S1 namely Abbey and Stradbrook roads therefore encountering the same MID conditions as detailed in section S1 above

- Dangerous Structures/Buildings

No problems were found with the existing structures and buildings along this route.

- Public Lighting

No problems were found with the existing public lighting along this route.

- Access Points

Access points along the first half of the route are in good condition. The second half of this route option follows the same route as Option S1 namely Abbey and Stradbrook roads therefore encountering the same Access point conditions as detailed in section S1 above.

- Electricity Poles

No problems were found with the existing electricity poles along this route.

2.3. Route Option S3: Thomastown Road/Glenageary Road Upper/Mounttown/Carrickbrennan/Monkstown Road

- Route map

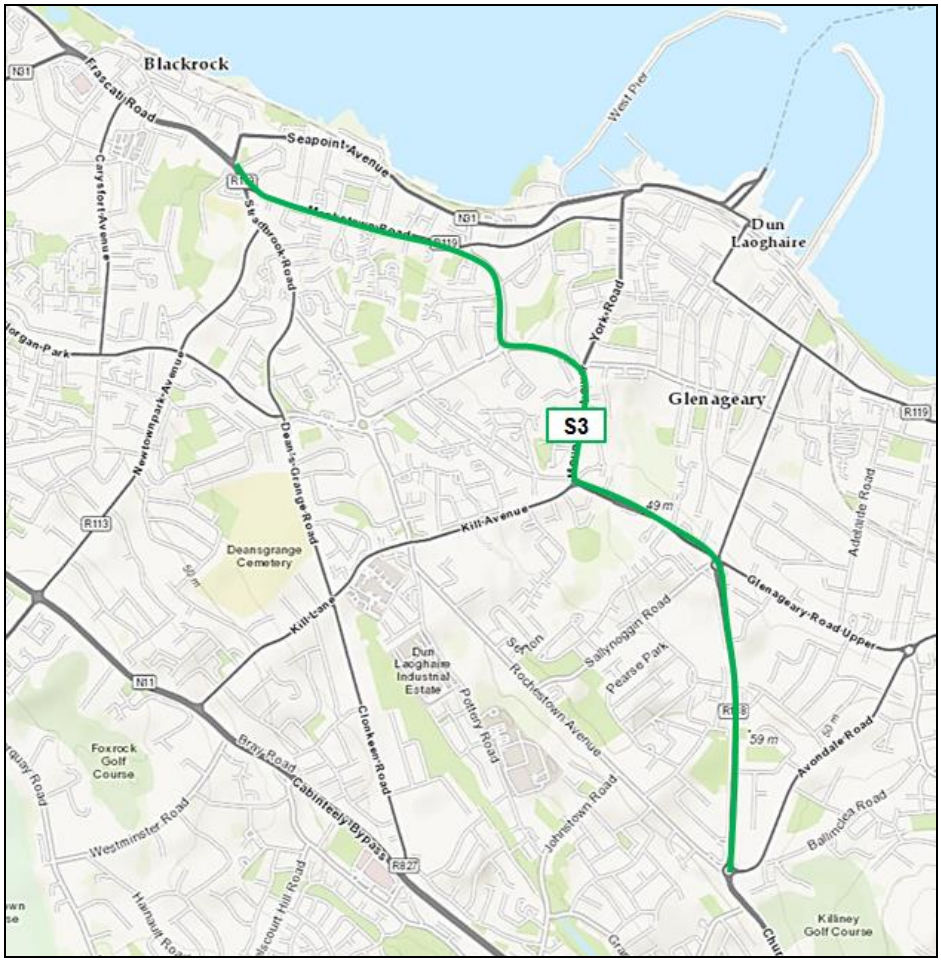


Figure 2.19: Route Option S3 Location Map

- Cycle Facilities

Route Option S3 follows the same route as Route Option S2 along Thomastown and Glenageary Roads which both have good cycle facilities. There is a lack of cycle facilities on the second half of the route along Mounttown, Carrickbrennan and Monkstown roads, examples of which can be seen in Figure 2.20 and Figure 2.21**Error! Reference source not found.** below.

Figure 2.20: Example of lack of cycle facilities on Carrickbrennan Road

Figure 2.21: Example of lack of cycle facilities on Monkstown road

- Roads

Route Option S3 follows the same route as Route Option as S2, i.e. along the Thomastown and Glenageary Roads along which the road pavement and markings are in good condition. Following an assessment of the second half of the route i.e. the Mounttown, Carrickbrennan and Monkstown roads, the roads were generally found to be in poor condition, examples of which can be seen on Figure 2.22**Error! Reference source not found.** – Figure 2.26**Error! Reference source not found.** below.

Figure 2.22: Example of poor road conditions at bus stop on Monkstown Road

Figure 2.23: Example of poor road conditions on Monkstown Road at entrance of Montpellier Manor

Figure 2.24: Road condition looking East-West on Monkstown road

Figure 2.25: Poor road condition Mounttown Road Upper

- Pinch Points

One pinch point was found along this route namely on Monkstown Road as shown on Figure 2.26 below.

Figure 2.26: Example of pinch point Monkstown Road

- Footpaths

The survey has identified locations along the route where footpaths are in poor condition, examples of which are shown on **Error! Reference source not found.** and **Error! Reference source not found.** below.

Figure 2.27: Section of dilapidated footpath Monkstown Road

Figure 2.28: Section of dilapidated footpath on Mounttown Road Lower

- Mobility Impaired Disabled (MID)

The survey has identified locations along the route were tactile paving is not provided, examples of which are shown on **Error! Reference source not found.** and **Error! Reference source not found.** below.

Figure 2.29: Entrance to Montpellier Manor illustrating lack of tactile paving

- Dangerous Structures/Buildings

No problems were found with the existing structures and buildings along this route.

- Public Lighting

No problems were found with the existing structures and buildings along this route.

- Access Points

The survey has identified locations along the route where access points are in poor condition. A full list of access points in poor condition and their locations is contained in Table 3.

- Electricity Poles

No problems were found with the existing electricity poles along this route.

- Retaining Walls

One retaining wall was found on this route at Montpellier parade which is shown on Figure 2.30 below. The wall retains earth with a height of approximately 1.5m. Several trees are planted in the retained earth.

Figure 2.30: Retaining Wall at Montpellier Parade

2.4. Route Option S4: Georges Street Upper/Marine Road/Crofton Road/Old DunLeary road/Seapoint Avenue/Newtown Avenue

- Route Map

Figure 2.31: Route Option S4 Location Map

- Cycle Facilities

The survey has identified a lack of cycle facilities on Newton Ave and Seapoint Avenue, Old DunLeary Road, Crofton Road, Marine Road, Georges Street Upper and Clarence Street examples of which can be seen in Figure 2.32**Error! Reference source not found.** - Figure 2.35 below.

Figure 2.32: Example of lack of cycle facilities on Crofton Road

Figure 2.33: Lack of Cycle Facilities on Old Dunleary Road

Figure 2.34: Lack of cycle facilities on Old Dunleary Road

Figure 2.35: Lack of cycle facilities on Seapoint Avenue

- Electricity Poles

No problems were found with the existing electricity poles along this route.

- Roads

One location was identified during this survey with poor road markings and is shown in Figure 2.36**Error! Reference source not found.** below.

Figure 2.36: Road in poor condition at the bus stop on Crofton Road

- Pinch Points

No problems were found with pinch points along this route.

- Footpaths

Two issues were identified on this route during the course of survey and these are shown on **Error! Reference source not found.** and Figure 2.38**Error! Reference source not found.** below.

Figure 2.37: Traffic sign upright causing obstruction in footpath Newtown Avenue

Figure 2.38: Footpath in poor condition Newtown Avenue

- Mobility Impaired Disabled (MID)

The survey has identified locations along the route where tactile paving is not provided, an example of which is shown on Figure 2.39 below.

Figure 2.39: Lack of tactile paving at Crofton Road/Stable Lane junction

- Dangerous Structures/Buildings

No problems were found with the existing structures and buildings along this route.

- Public Lighting

No problems were found with the existing structures and buildings along this route.

- Access Points

No problems were found with the existing access points along this route.

- Retaining Walls

One large retaining wall was found during the course of this survey located adjacent to the Marina House on the Old DunLeary road as shown on Figure 2.40 below.

Figure 2.40: Retaining Wall Old Dunleary Road

3. SAS 2: Blackrock – Booterstwon

3.1. Route Option M1: Temple Road/Frascati Road/Rock Road

- Route Map

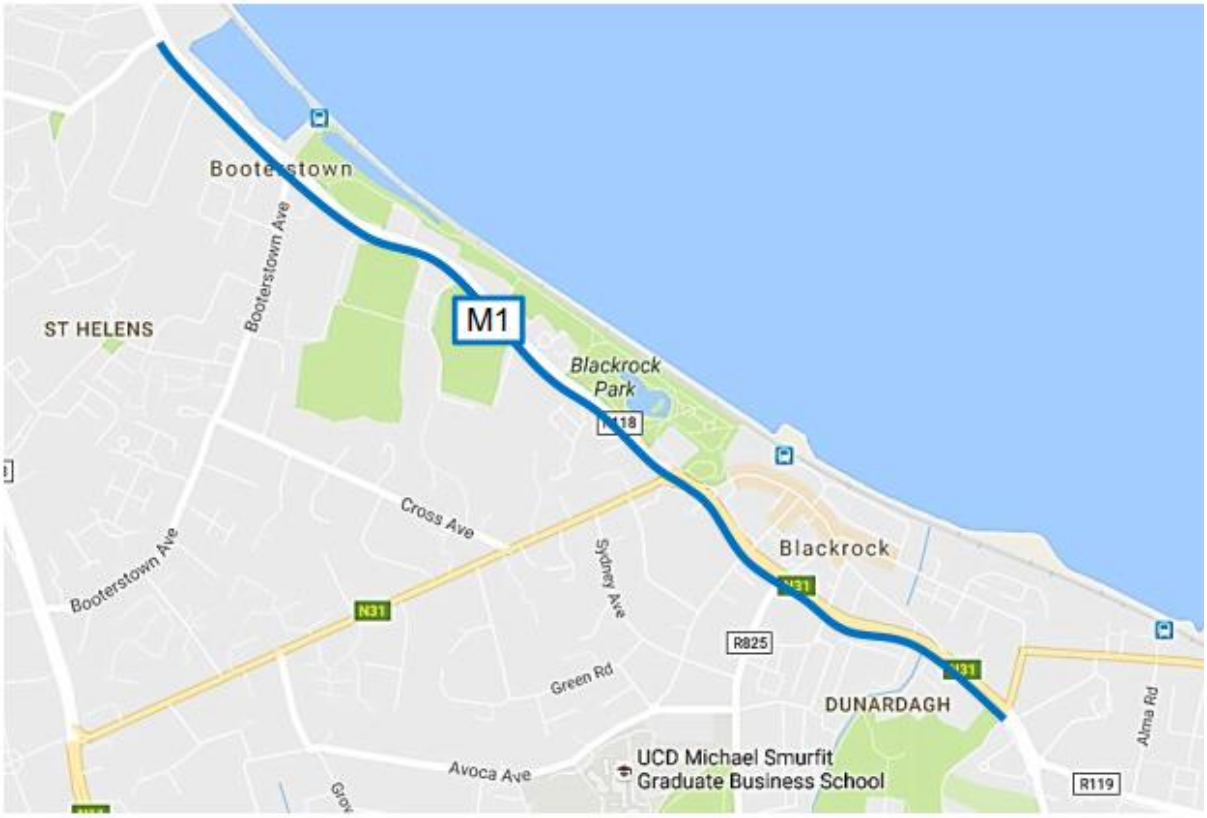


Figure 3.1: M1 Route Map

Route Option M1 is the middle section linking the Southern Route Options (e.g. Dun Laoghaire to Blackrock) to the Northern Route Options (e.g. Booterstown to the City Centre).

- Cycle facilities

Following the survey, good cycle facilities have been identified at the majority of locations along the route, examples of which can be seen in Figure 3.2**Error! Reference source not found.** below. The survey has also shown a number of issues at numerous locations such as dilapidated condition of cycle tracks and no thermoplastic material used in the surface course of the cycle tracks. Examples of these issues are shown on Figure 3.3**Error! Reference source not found.** below.

Figure 3.2: Example of good cycle facilities at Frascati Road/Barclay Court junction

Figure 3.3: Example of the lack of thermoplastic material in cycle track on Rock Road

- Roads

Following assessment of the route several locations were identified where the road pavement and markings were found to be in poor condition. A full list of the problems identified with the road pavement and markings along this route are contained within Table 4.

- Pinch points

No problems were found with pinch points along this route.

- Footpaths

The survey has identified two issues with the footpaths along the routes. A full list of the problems identified with the footpaths along this route is contained within Table 4.

- Mobility Impaired and Disabled (MID) facilities

The survey has identified numerous locations along the route where tactile paving is not provided. A full list of missing MID facilities and their locations is contained in Table 4.

- Dangerous structures/buildings

No problems were found with the existing structures and buildings along this route.

- Public Lighting

No problems were found with the existing public lighting along this route.

- Access points

One access point was identified during the survey as being in relatively poor condition.

- Electricity Pole

No problems were identified with the existing electricity poles along this route.

4. SAS 1: Booterstown – City Centre Route Options

4.1. Route Option N1: Merrion Road/Pembroke Road/Baggot Street

- Route Map

Figure 4.1: Map of Route Option N1

- Cycle facilities

Following the survey, a lack of cycle facilities has been identified at several locations along the route. The survey has also shown a number of issues at numerous locations such as the dilapidated condition of some cycle tracks and also a lack of thermoplastic material used in the surface course of the cycle tracks.

- Roads

Following assessment of the route several locations were identified where the roads were found to be in poor condition. A full list of the problems identified with the road pavement and markings along this route are contained within Table 5.

- Public Lighting

No problems were found with the existing public lighting along this route.

- Access points

No problems were found with existing access points along this route.

- Footpaths

The survey has identified several issues with the footpaths along the route.

- Mobility Impaired and Disabled (MID) Facilities

The survey has identified numerous locations along the route were tactile paving is not provided.

- Retaining Structures

No problems were found with existing retaining structures along this route.

- Dangerous structures/buildings

See Route Option N2 for problems identified.

- Electricity Pole

No problems were found with existing electricity poles along this route.

4.2. Route Option N2: Merrion Road/Pembroke Road/Northumberland Road/Mount Street Lower

- Route Map

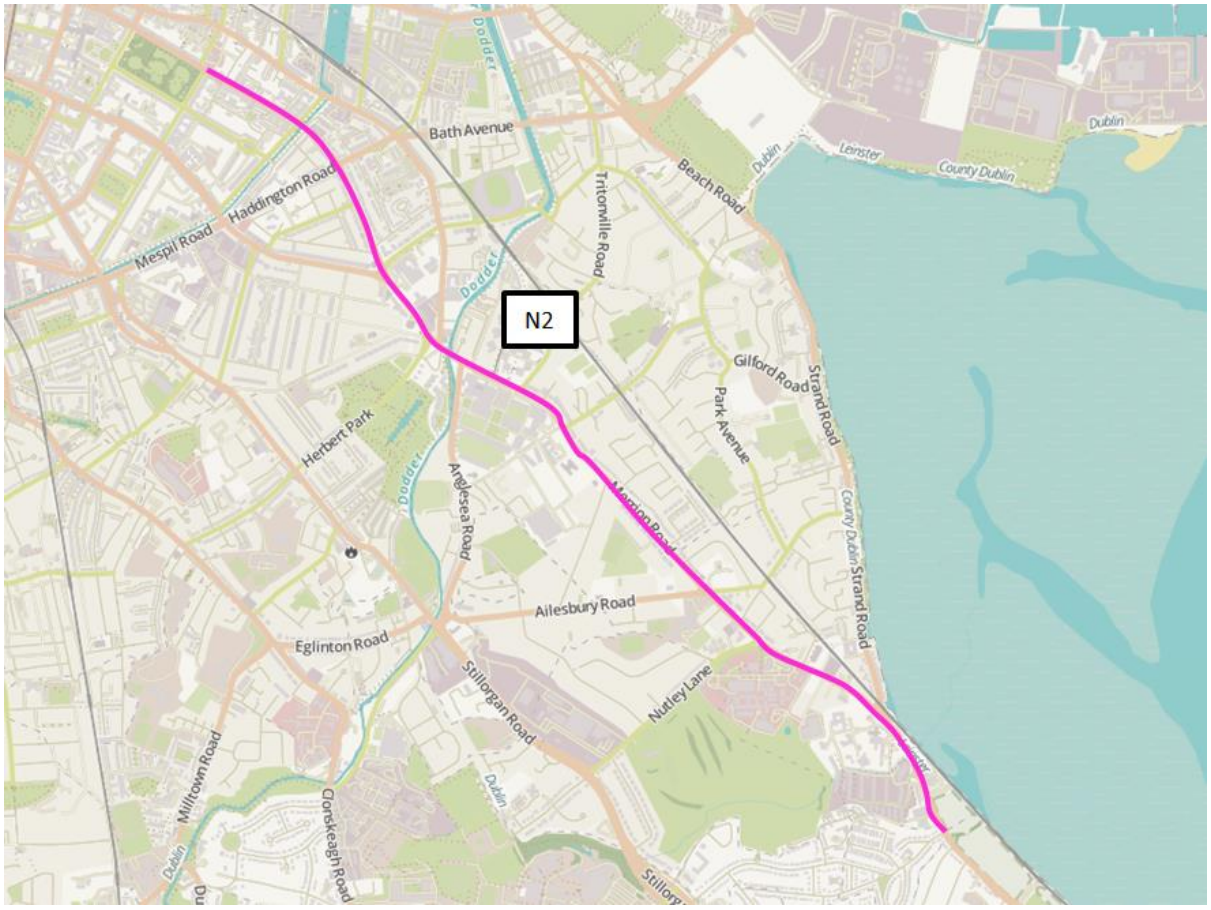


Figure 4.2: Map of Route Option N2

A large section of this route, namely along Merrion and Pembroke Road, have been documented in the Route Option N1 section above. The same issues identified in the N1 Route Option survey for Merrion Road/Pembroke Road, are also applicable to the N2 Route Option Survey for this section. The following section of the report shall concentrate on the problems identified on Northumberland Road and Mount Street Lower.

- Cycle facilities

The survey has identified the issue of a lack of thermoplastic material used in the surface course of the cycle tracks on Mount Street Lower.

- Roads

See Table 6 for problems identified.

- Pinch points

No problems were found with pinch points along this route.

- Footpaths

See Table 6 for problems identified.

- Retaining Structures

No existing retaining structures

- Dangerous structures/buildings

See Table 6 for problems identified.

- Electricity Pole

No problems were identified with the existing electricity poles along this route.

- Public Lighting

No problems were found with the existing structures and buildings along this route.

- Access Points

No problems were found with the existing access points along this route.

- Mobility Impaired and Disabled (MID) facilities

The survey has identified numerous locations along the route were tactile paving is not provided. A full list of missing MID facilities and their locations is contained in Table 6.

Table 1: Route S1 Problem Identification

Rochestown Avenue/Abbey Road/Stradbrook Existing Conditions		
Physical Items	**Condition**	**Location**
Cycle facilities	No cycle facilities	Along length of Rochestown Avenue until Pottery Road junction
	No cycle facilities	Along length of Abbey Road until approach to Abbey Road/Stradbrook/Monkstown Avenue roundabout
	No cycle facilities	Along full length of Stradbrook Road
Roads	Edge of Road in poor Condition	In front of bus stop,opposite entrance to Granitefield residential estate
	Edge of Road in poor Condition	At bus stop opposite Topaz, adjacent to entrance to Granitefield Mews
	Road Markings (Yellow junction box, Stop line) in poor condition	On approach to signalised pedestrian crossing at entrance to National Rehab Centre
	Road Pavement Cracking	On approach to entrance to National Rehab Centre
	Road pavement and markings in poor condition	On approach to Pottery road junction
	Road Markings in poor condition	At entrance and exit of Texaco garage, Abbey Road
	Bus Stop Road Markings in poor condition	At bus stop on approach to Texaco garage, adjacent to entrance to Rory O'Connor Park
Pinch points	Approx. 25m of footpath below minimum requirement of 1.8m width	Rochestown Avenue opposite Killiney Shopping Centre
	Approx. 30m of footpath below minimum requirement of 1.8m width	Between Newtown Park and St. Vincents
Lateral and Head Clearance		
Footpaths	Section of footpath in poor condition	Approaching Rory O'Connor Park from Texaco garage
MID facilities	Footpath ends, no tactile paving to indicate crossing point	Opposite Somerton residential estate
	No tactile paving	On footpath at entrance to National Rehab Centre
	No tactile paving at crossing point	Entrance to Sefton residential estate
	No tactile paving at crossing point	Entrance to Ruby Hall residential estate
	No tactile paving at crossing point	Entrance to Grangewood Residential estate
	No tactile paving at crossing point, unsuitable dishing.	Entrance to Abbey View Residential estate
	No tactile paving at crossing point	Entrance to Rory O'Connor Park
	No tactile paving at crossing point	Entrance to Brookland Wood Residential Estate
	No tactile paving at crossing point	Entrance to Stradbrook Park Residential Estate
	No tactile paving at crossing point	Entrance to Stradbrook Lawn Residential Estate
	No tactile paving at crossing point	At junction with Greenville Road (Across Entrance)
Retaining Structures		
Dangerous structures/buildings	Wall in delapidated condition, possibly due to proximity of trees	Opposite Texaco Garage on Rochestown Avenue
	Wall in delapidated condition, possible danger of collapse	Opposite Ruby Hall
Public Lighting	Pole lying off plumb, possible danger of collapse	On approach to Johnstown Road junction from Graduate roundabout
Boundary Treatments		
Access points	Road Pavement in poor condition	Access to Abbey view Residential Estate
Electricity Pole	Pole lying off plumb, possible danger of collapse	In front of Ulster Bank, adjacent to Killiney Shopping Centre

Table 2: Route S2 Problem Identification

Dun Laoghaire road/ Glengeary/Kill Avenue/Abbey road/Stradbrook Road Existing Conditions		
Physical Items	**Condition**	**Location**
Cycle facilities	No cycle facilities	Along length of Abbey Road until approach to Abbey Road/Stradbrook/Monkstown Avenue roundabout
	No cycle facilities	Along full length of Stradbrook Road
Roads	Road Markings in poor condition	At entrance and exit of Texaco garage, Abbey Road
	Bus Stop Road Markings in poor condition	At bus stop on approach to Texaco garage, adjacent to entrance to Rory O'Connor Park
Drainage	Road Gully blocked	Outside No.75 Kill Avenue
	Road Gully blocked	Kill Avenue-Opposite entrance/exit to Ardmore Park
Pinch points	Approx. 30m of footpath below minimum requirement of 1.8m width	Between Newtown Park Avenue and St. Vincents Park
Lateral and Head Clearance		
Footpaths	Section of footpath in poor condition	Approaching Rory O'Connor Park from Texaco garage
MID facilities	No tactile paving at crossing point, unsuitable dishing.	Entrance to Abbey View Residential estate
	No tactile paving at crossing point	Entrance to Rory O'Connor Park
	No tactile paving at crossing point	Entrance to Brookland Wood Residential Estate
	No tactile paving at crossing point	Entrance to Stradbrook Park Residential Estate
	No tactile paving at crossing point	Entrance to Stradbrook Lawn Residential Estate
	No tactile paving at crossing point	At junction with Greenville Road (Across Entrance)
Retaining Structures		
Dangerous structures/buildings		
Public Lighting		
Boundary Treatments		
Access points	Road Pavement in poor condition	Access to Abbey view Residential Estate
Electricity Pole		

Table 3: Route S3 Problem Identification

Dun Laoghaire road/Glengeary/Mounttown/Carrickbrennan/Monkstown Existing Conditions		
Physical Items	**Condition**	**Location**
Cycle facilities	No cycle facilities	Along Mounttown Road Lower
	Standard road gullies in cycle lane, thermoplastic material not used	On approach to Mounttown/Tivoli/York road junction
	No cycle facilities	Along Mounttown Road Upper from Mounttown/Tivoli/York road junction to St. John's Park
	Thermoplastic material not used	Along Mounttown Road Upper from St. John's Park to 11 Mountown Road Upper
	Thermoplastic material not used	Mounttown Road Upper from Monkstown Park School to St. John's Park
	Thermoplastic material not used	Mounttown Road Upper from Monkstown Park School to Mounttown/Carrickbrennan Roundabout
	No cycle facilities	Along Carrick brennan Road
Roads	Road Markings in poor condition	Mounttown Road Upper from Monkstown park school approaching Mounttown/Carrickbrennan Roundabout
	Double yellow line markings in poor condition	Approaching and departing Mounttown/Carrickbrennan Roundabout
	Road Pavement in delipadated condition	Along Carrickbrennan Road from Mounttown/Carrickbrennan Roundabout to Richmond Hill
	Road Marking in poor condition	Carrickbrennan road at junction with Richmond Hill
	Road Pavement in delipadated condition	Between Pakenham Road and Carrickbrennan/Monkstown Road junction
	Road Markings in poor condition	Between St. Patricks Church and Carrickbrennan/Monkstown Road junction
	Road Markings in poor condition	Approaching Carrickbrennan/Monkstown Road junction outside Monkstown Parish church
	Road Pavement in delipadated condition	Monkstown Road from Carrickbrennan junction to Knox Memorial hall
	Anti skid surface has been replaced with standard asphalt	Monkstown Road at entrance to Monkstown Valley
	Road Pavement in delipadated condition	Monkstown Road at junction with Belgrave Square
	Road Pavement and Markings in poor condition	Monkstown Road between Belgrave Square and Montpellier Manor
	Road Markings in need of improvement	Monkstown Road/Temple Road junction
Drainage		
Pinch points		
Lateral and Head Clearance		
Footpaths	Footpath in poor condition	Between Engleberg Court and St. John's Close
	Road signs restricting mobility access	Footpath on approach to Mounttown/Tivoli/York road junction
	Footpath in poor condition	Opposite St. John's Park
	Footpath in poor condition	Outside No. 65 Monkstown Road
MID facilities	No tactile paving at crossing point	Mounttown road Lower at Entrance to Mounttown Park
	No tactile paving at crossing point	Mounttown road Lower at Entrance to Engleberg court
	No tactile paving at crossing point	Mounttown road Lower at Entrance to Glandore Park
	No tactile paving at crossing point	Mounttown road upper at entrance to St.John's Park
	No tactile paving at crossing point	Monkstown Road at entrance to Drayton Close
Retaining Structures		
Dangerous structures/buildings		
Public Lighting		
Boundary Treatments		
Access points	Footpath in poor condition	Between access points to 51 and 53 Mounttown Lower
	Footpath in poor condition	Access to Mounttown Park
	Footpath in poor condition	Entrance/exit at Richmond Green
Electricity Pole		

Table 4: Route S4 Problem Identification

Georges Street/Marine Road/Crofton Road/Old DunLeary road/Seapoint Avenue/Newport Ave. Existing Conditions		
Physical Items	**Condition**	**Location**
Cycle facilities	No Cycle facilities	Newton Ave and Seapoint Ave.
	No Cycle facilities	Old Dunleary Road/Crofton Road
	No Cycle facilities	Marine Road/Georges Street/Clarence Street
Roads	Road Marking in poor condition	Junction of Seapoint Avenue and Brighton Avenue
Drainage		
Pinch points	Footpath below 1.8m recommended width	Approximately 75m along Newton Ave. travelling North from Temple road junction
Lateral and Head Clearance		
Footpaths	Traffic sign upright causing obstruction in footpath	Southern footpath on approach to Albany Avenue (Seapoint Avenue)
	Footpath in poor condition	Northern footpath at junction of Seapoint avenue and Clarence Street
MID facilities	No tactile paving at crossing point	At junction of Seapoint ave. and Tobernea Terrace
	No tactile paving at crossing point	At junction of Seapoint Ave. and Alma Road
	No tactile paving at crossing point	At junction of Seapoint Ave. and Belgrave Road
	No tactile paving at crossing point	At junction of Seapoint Ave. and Brighton Vale
	No tactile paving at crossing point	At junction of Seapoint Ave. and Seafield Avenue
	No tactile paving at crossing point	At junction of Seapoint Ave. and Albany avenue
	No tactile paving or dishing at crossing point	At junction of Seapoint Ave. and Brighton Avenue
	No tactile paving at crossing point	At junction of Seapoint Ave. and Longford Terrace
	No tactile paving or dishing at crossing point	At junction of Seapoint Ave. and Cumberland Street
	No tactile paving at crossing point	At junction of Crofton road and Kelly's Avenue
	No tactile paving at crossing point	At junction of Crofton road and Crofton Avenue
Retaining Structures		
Dangerous structures/buildings		
Public Lighting		
Boundary Treatments		
Access points		
Electricity Pole		

Table 5: Route N1 Problem Identification

Merrion Road/Pembroke Road/Baggot Street Existing Conditions		
Physical Items	**Condition**	**Location**
Cycle facilities	No Cycle Facilities	Travelling East-West along Merrion Road from Trimelston Road to Nutley Lane junction
	No Cycle Facilities	Travelling West-East along Merrion Road from Nutley Lane to Trimelston Road junction
	No Cycle Facilities	Travelling East-West along Merrion Road from Nutley Lane to Merrion View Avenue junction
	No thermoplastic material in Cycle Lane	Travelling East-West along Merrion Road from Sandymount Avenue junction to Aylesbury road junction
	No Cycle Facilities	Travelling East-West along Merrion Road from Aylesbury road to opposite Sydenham Road junction
	No Cycle Facilities	Travelling West-East along Merrion Road from Serpentine Avenue and Sandymount avenue junction
	No Cycle Facilities	Travelling East-West along Merrion Road for approx. 180m at front of RDS
	No Cycle Facilities	Travelling East-West along Merrion Road from Pembroke Road/Ballsbridge Terrace to Northumberland/Landsdowne junction
	No Cycle Facilities	Travelling East-West along Pembroke Road and Baggot Street
	No Cycle Markings in Cycle Lane	Travelling West-East along Baggot Street Upper for approx.80m
Roads	Road Pavement in poor condition	At junction of Merrion Road and Herbert Avenue
	Road Pavement in poor condition	Approaching Nutley Lane/Merrion Road junction
	Bus Stop Road Markings in poor condition	Merrion Road Bus Stop
	Bus Stop Road Markings in poor condition	Merrion Road Bus Stop (British Embassy)
	Bus Stop Road Markings in poor condition	Pembroke Road Bus Stop
	Bus Stop Road Markings in poor condition	Upper Baggot Street Bus Stop
	Road Pavement in poor condition	At junction of Baggot Street Lower and Herbert Street
	Road Pavement in poor condition	At junction of Baggot Street Lower and Pembroke Road
	Road Pavement in poor condition	In both lanes along Baggot Street Upper
	Central Median in poor condition	Central median Baggot Street approaching Fitzwilliam Street Upper Junction
	Road Pavement in poor condition	In both lanes along Baggot Street Lower
Drainage		
Pinch points		
Lateral and Head Clearance		
Footpaths	Footpath in dilapidated condition	Travelling West-East along Merrion Road opposite Merrion shopping centre
	Footpath in dilapidated condition	Travelling East-West along Merrion Road at gateway to St.Michaels College
	Footpath in dilapidated condition	Travelling West-East along Merrion Road from Sandymount Avenue to opposite the British Embassy
	Footpath in dilapidated condition	Travelling East-West along Merrion Road in front of Wanderers Rugby club
	Footpath in dilapidated condition	Surrounding trees at numerous locations along Merrion and Pembroke roads

MID facilities	No tactile paving at crossing point	At junction of Merrion Road and Bellevue Avenue
	No tactile paving at crossing point	At junction of Merrion Road and Merlyn Park
	No tactile paving at crossing point	At junction of Merrion Road and Merlyn Road
	No tactile paving at crossing point	At junction of Merrion Road and Shrewsbury Park
	No tactile paving at crossing point	At junction of Merrion Road and Shrewsbury Road
	No tactile paving at crossing point	At junction of Merrion Road and Sandymount Avenue
	No tactile paving at crossing point	At junction of Merrion Road and Sydenham Road
	No tactile paving at crossing point	At junction of Merrion Road and Ballsbridge Park
	No tactile paving at crossing point	At junction of Pembroke Road and Ballsbridge Terrace
	No tactile paving at crossing point	At junction of Pembroke Road and Beatty's Avenue
	No tactile paving at crossing point	At junction of Pembroke Road and Herbert Park
	No tactile paving at crossing point	At junction of Pembroke Road and Raglan Road
	No tactile paving at crossing point	At junction of Pembroke Road and Wellington Road
	No tactile paving at crossing point	At junction of Pembroke Road and Eastmoreland Place
	No tactile paving at crossing point	At junction of Baggot Street Lower and Herbert Street
	No tactile paving at crossing point	At junction of Baggot Street Lower and Pembroke Road
	No tactile paving at crossing point	At junction of Baggot Street Lower and James Street East
Retaining Structures		
Dangerous structures/buildings	Delapidated Wall	Just past Rock Road (Tara Towers Hotel) Bus Stop travelling South-North
Public Lighting		
Boundary Treatments		
Access points		
Electricity Pole		

Table 6: Route N2 Problem Identification

Merrion Road/Pembroke Road/Northumberland Road/Mount Street Lower Existing Conditions		
Physical Items	**Condition**	**Location**
Cycle facilities	No Cycle Facilities	Travelling East-West along Merrion Road from Trimelston Road to Nutley Lane junction
	No Cycle Facilities	Travelling West-East along Merrion Road from Nutley Lane to Trimelston Road junction
	No Cycle Facilities	Travelling East-West along Merrion Road from Nutley Lane to Merrion View Avenue junction
	No thermoplastic material in Cycle Lane	Travelling East-West along Merrion Road from Sandymount Avenue junction to Aylesbury road junction
	No Cycle Facilities	Travelling East-West along Merrion Road from Aylesbury road to opposite Sydenham Road junction
	No Cycle Facilities	Travelling West-East along Merrion Road from Serpentine Avenue and Sandymount avenue junction
	No Cycle Facilities	Travelling East-West along Merrion Road for approx. 180m at front of RDS
	No Cycle Facilities	Travelling East-West along Merrion Road from Pembroke Road/Ballsbridge Terrace to Northumberland/Landsdowne junction
	No thermoplastic material in Cycle Lane	Cycle lanes on both sides of Mount St Lower
Roads	Road Pavement in poor condition	At junction of Merrion Road and Herbert Avenue
	Road Pavement in poor condition	Approaching Nutley Lane/Merrion Road junction
	Bus Stop Road Markings in poor condition	Merrion Road Bus Stop
	Bus Stop Road Markings in poor condition	Merrion Road Bus Stop (British Embassy)
Drainage		
Pinch points		
Lateral and Head Clearance		
Footpaths	Footpath in dilapidated condition	Travelling West-East along Merrion Road opposite Merrion shopping centre
	Footpath in dilapidated condition	Travelling East-West along Merrion Road at gateway to St.Michaels College
	Footpath in dilapidated condition	Travelling West-East along Merrion Road from Sandymount Avenue to opposite the British Embassy
	Footpath in dilapidated condition	Travelling East-West along Merrion Road in front of Wanderers Rugby club
	Footpath in dilapidated condition	Surrounding trees at numerous locations along Merrion and Pembroke and Northumberland roads
MID facilities	No tactile paving at crossing point	At junction of Merrion Road and Bellevue Avenue
	No tactile paving at crossing point	At junction of Merrion Road and Merlyn Park
	No tactile paving at crossing point	At junction of Merrion Road and Merlyn Road
	No tactile paving at crossing point	At junction of Merrion Road and Shrewsbury Park
	No tactile paving at crossing point	At junction of Merrion Road and Shrewsbury Road
	No tactile paving at crossing point	At junction of Merrion Road and Sandymount Avenue
	No tactile paving at crossing point	At junction of Merrion Road and Sydenham Road
	No tactile paving at crossing point	At junction of Merrion Road and Ballsbridge Park
	No tactile paving at crossing point	At junction of Pembroke Road and Ballsbridge Terrace
	No tactile paving at crossing point	At junction of Pembroke Road and Beatty's Avenue
	No tactile paving at crossing point	At junction of Pembroke Road and Herbert Park
	No tactile paving at crossing point	At junction of Northumberland Road and Landsdowne Park
	No tactile paving at crossing point	At junction of Northumberland Road and St.Mary's Road

MID facilities	No tactile paving at crossing point	At junction of Northumberland Road and Estate Cottages
	No tactile paving at crossing point	At junction of Northumberland Road and Percy Place
	No tactile paving at crossing point	At junction of Mount Street Lower and Love Lane
	No tactile paving at crossing point	At junction of Mount Street Lower and Grattan Court
	No tactile paving at crossing point	At junction of Mount Street Lower and Grattan Street
	No tactile paving at crossing point	At junction of Mount Street Lower and Grants Row
	No tactile paving at crossing point	At junction of Mount Street Lower and Stephen's Place
Retaining Structures		
Dangerous structures/buildings	Delapidated Wall	Just past Rock Road (Tara Towers Hotel) Bus Stop travelling South-North
Public Lighting		
Boundary Treatments		
Access points		
Electricity Pole		

Table 7: Route M1 Problem Identification

Temple Road/Frascati Road/Rock Road Existing Conditions		
Physical Items	**Condition**	**Location**
Cycle facilities	No Cycle Facilities	Travelling in both directions Along Temple Road
	No Cycle Facilities	Travelling in both directions Along Frascati Road
	No thermoplastic material in Cycle Lane	Along Rock Road From Rock Road Bus Stop to Trimelston Avenue junction (With the exception of junctions)
	No thermoplastic material in Cycle Lane	Along Rock Road from Trimelston avenue junction to Mount Merrion Avenue junction
Roads	Road Markings in poor condition	Blackrock shopping centre crossing point
	Bus Stop Road Markings in poor condition	Rock Road Bus Stop
	Road Markings in poor condition	At junction of Rock Road and Blackrock Clinic
	Road Pavement in poor condition	At junction of Rock Road and Blackrock Clinic
	Bus Stop Road Markings in poor condition	Rock Road Booterstown Hall Bus Stop
Drainage		
Pinch points		
Lateral and Head Clearance		
Footpaths	Traffic sign causing obstruction in footpath	Travelling East-West along Temple Road
	Traffic sign causing obstruction in footpath	At entrance to Craigmore Gardens
	Footpath in dilapidated condition	At entrance to Alzheimer Society Day and Respite Care Centre Temple Road
MID facilities	No tactile paving at crossing point	Central Median Blackrock shopping centre crossing point
	No tactile paving at crossing point	At junction of Rock Road and Castledawson
	No tactile paving at crossing point	At junction of Rock Road and Blackrock Clinic
	No tactile paving at crossing point	At junction of Rock Road and Phoenix Terrace
	No tactile paving at crossing point	At junction of Rock Road and Emmet Square
	No tactile paving at crossing point	At junction of Rock Road and Seafort Parade Entrance 1 and 2
	No tactile paving at crossing point	At junction of Rock Road and Blackrock College
	No tactile paving at crossing point	At junction of Rock Road and Grotto Avenue
Retaining Structures		
Dangerous structures/buildings		
Public Lighting		
Boundary Treatments		
Access points	Entrance pavement in poor condition	Rear entrance to Blackrock College
Electricity Pole		

Appendix E – Parking Survey

1. Introduction

AECOM have been tasked by the National Transport Authority (NTA) to identify viable routes for a Core Bus Corridor which aims to provide ease of bus travel with the objective of improving journey times from South County Dublin into Dublin City Centre.

This report shall seek to identify the parking conditions in the existing road network. Each route was assessed using criteria specified by the NTA. The assessment criteria for the existing parking on the separate routes are listed as follows:

- *Formal Parking:* On-street parking in which marked spaces has been provided. These are spaces in which the Local Authority charges an hourly rate to use.
- *Informal Parking:* On-street parking in which spaces may or may not be marked and in which the Local Authority does not charge for use.
- *Adjacent Parking:* Parking which is accessible to the general public and is located in close proximity to the street. These are spaces in which the Local Authority charges an hourly rate to use.

Legend

- This colour represents sections along a route which has no parking facilities.
- This colour represents sections along a route which has formal parking facilities.
- This colour represents sections along a route which has informal parking facilities.
- This colour represents sections along a route which has adjacent parking facilities.
- This colour represents sections along a route which have taxi facilities.

2. SAS 1: Dun Laoghaire – Blackrock Route Options

2.1. Route Option S1: Rochestown Avenue/Abbey Road/Stradbrook Road

- Route Map

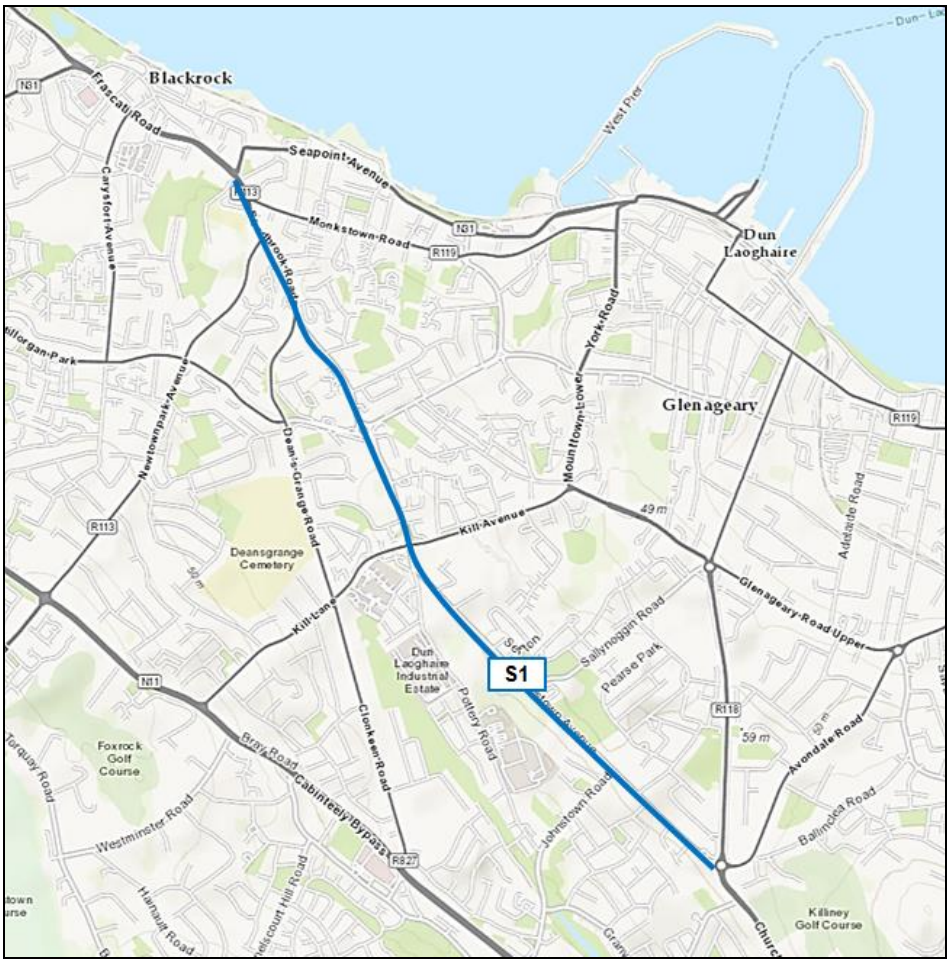


Figure 2.1. Map of Route Option S1

The survey has shown a lack of parking facilities along the majority of Rochestown Avenue. This lack of parking has resulted in illegal parking in a number of locations. There are approximately 10 informal parking spaces in the area adjacent to the Ulster Bank and the Dentist's practise. The parking breakdown on Rochestown Avenue is as follows:

- Formal Parking – 0 spaces.
- Informal Parking – 10 spaces.
- Adjacent parking – 0 spaces.

This breakdown has been graphically represented on **Error! Reference source not found.**2 below.

Figure 2.2. Rochestown Parking facilities

Each proposed scheme option requires full usage of the entire width of Rochestown Avenue and as such, all ten informal parking spaces outside the Ulster Bank and the Dentist's practise will be removed as part of the proposed works.

- Abbey Road

The survey has shown a lack of parking facilities along the entire length of Abbey Road, as shown on **Figure 2.3** below. This lack of parking has resulted in illegal parking in a number of locations.

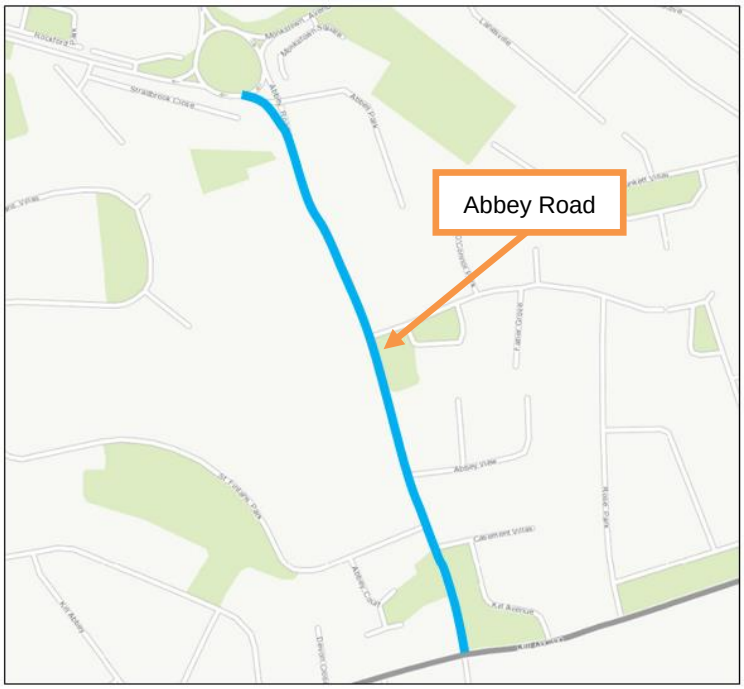


Figure 2.3: Abbey Road Parking Facilities

- Stradbrook Road

The survey has shown a lack of parking facilities along the entire length of Stradbrook Road, as shown on

Figure **2.4** below. This lack of parking has resulted in illegal parking in a number of locations.

Figure 2.4: Stradbrook Road Parking Facilities

As there are no parking facilities along the length of Abbey and Stradbrook Roads, no parking shall be affected by the proposed works.

2.2. Route Option S2: Dun Laoghaire Road/Glengeary road/Kill Avenue/Abbey road/Stradbrook Road

- Route Map

Figure 2.5: Map of Route Option S2

Route Option S2 begins at the Graduate Roundabout. The route follows Thomastown Road, Glenageary road and Kill Avenue before taking the same route as Route Option S1 i.e. along Abbey Road and Stradbrook Road. Therefore the same parking conditions identified in the S1 Route Option survey from the Rochestown Avenue/Kill Avenue/Stillorgan road junction, are also applicable to the S2 Route Option Survey.

- Thomastown Road

The survey has shown no parking facilities along the entire length of Thomastown Road, as shown on **Figure 2.6** below.

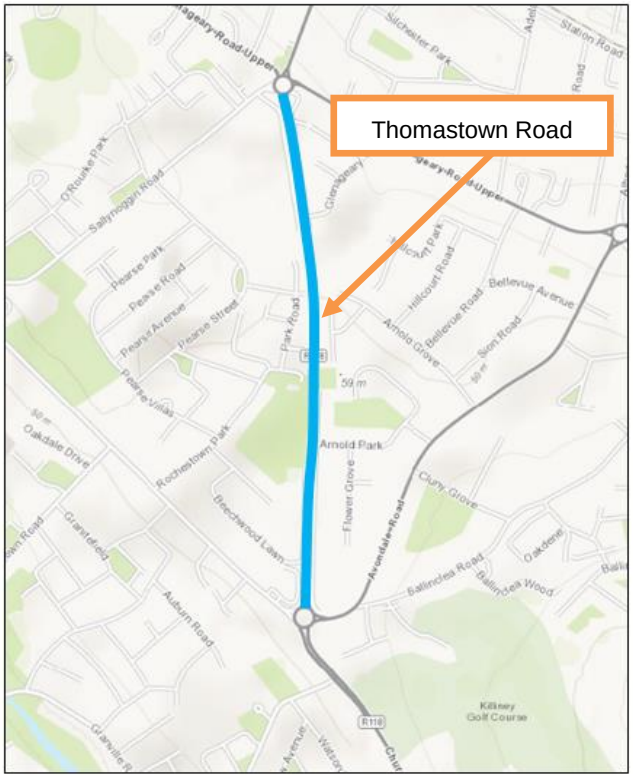


Figure 2.6: Thomastown Road Parking Facilities

- Glenageary Road

The survey has shown a lack of parking facilities along the entire length of Glengeary Road, an example of which is shown on **Figure 2.7** below.

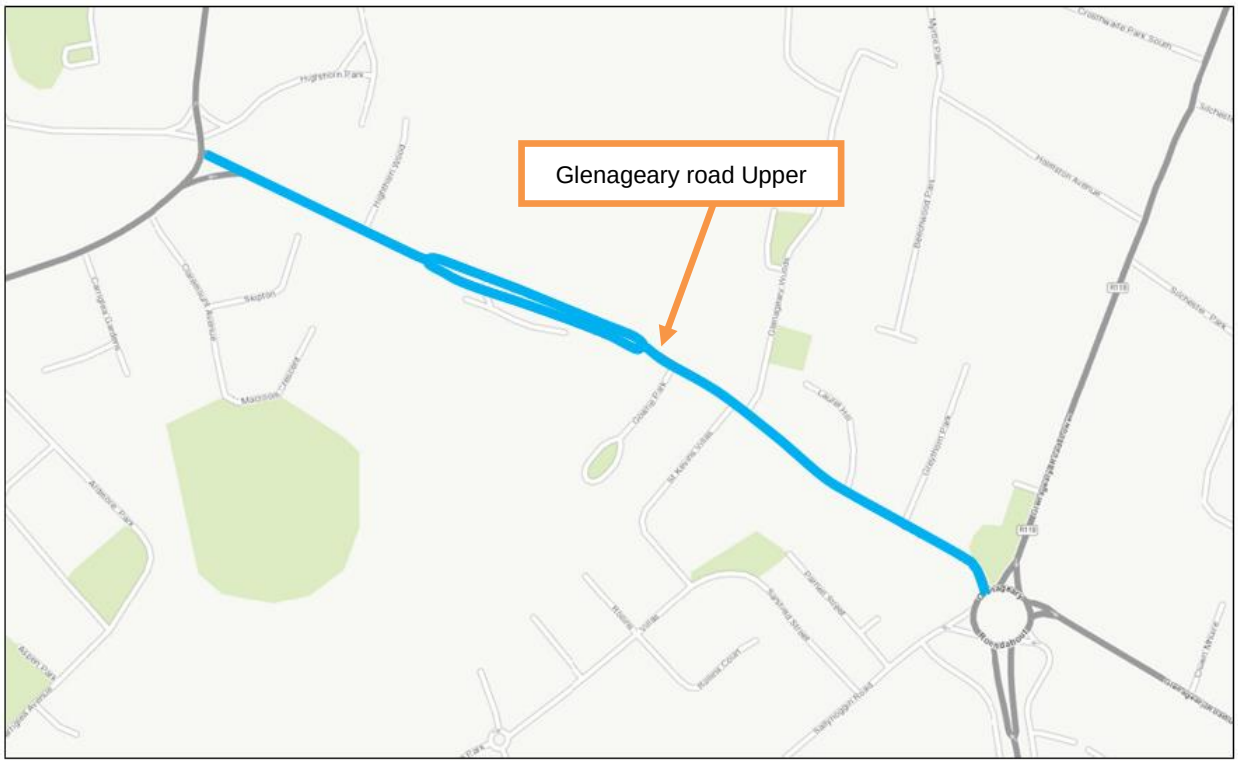


Figure 2.7: Glengeary Road Upper Parking Facilities

- Kill Avenue

The survey has shown a lack of parking facilities along the entire length of Kill Avenue, as shown on

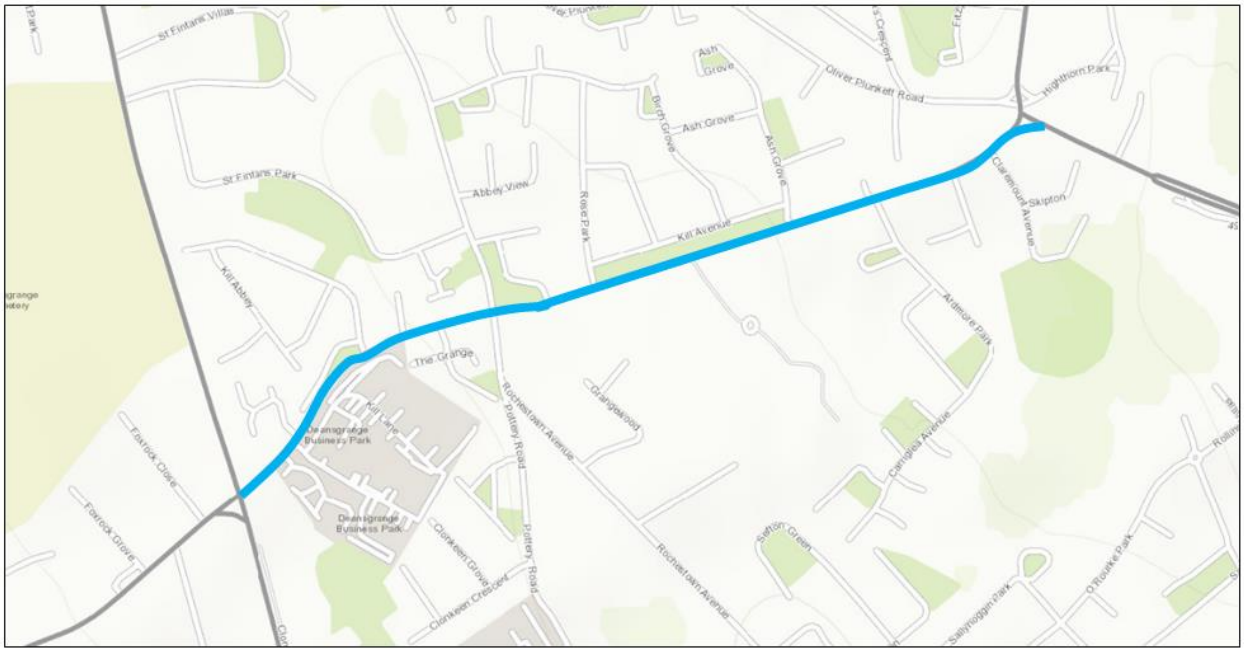


Figure 2.8 below.

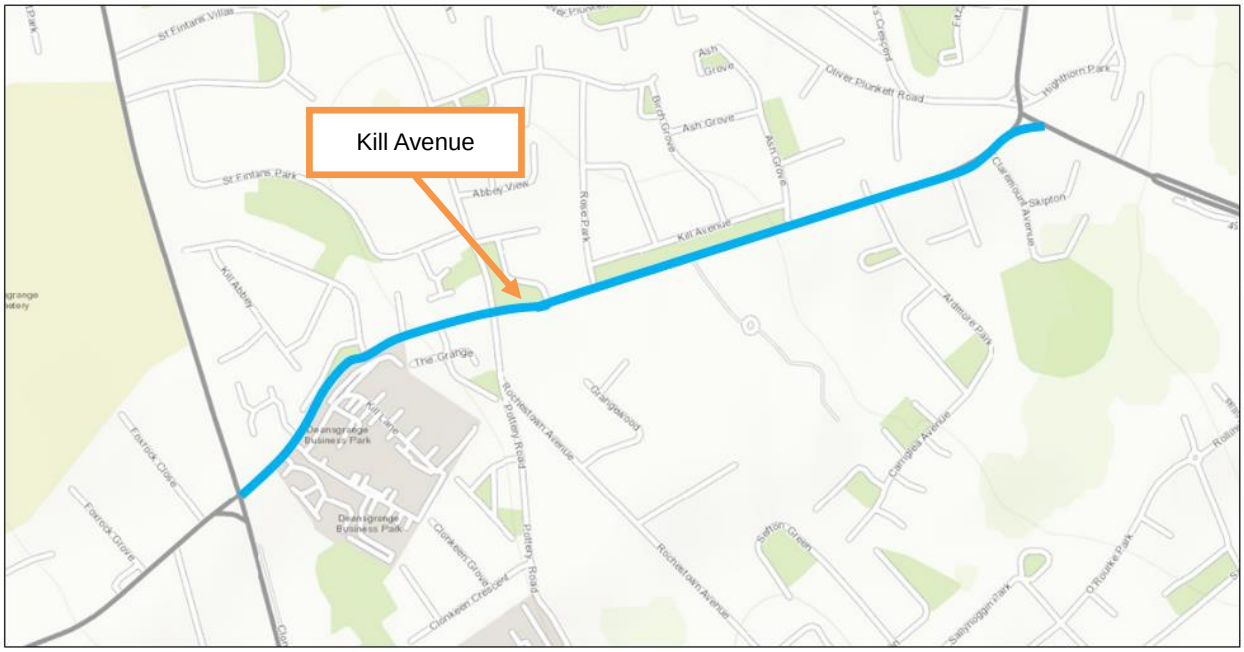


Figure 2.8: Kill Avenue Parking Facilities

As there are no parking facilities along Thomastown Road/Glengeary road/Kill Avenue/Abbey road/Stradbrook Road no parking shall be removed along these routes.

2.3. Route Option S3: Dun Laoghaire road/Glengeary Road Upper/Mounttown Road Lower/ Mounttown Road Upper/ Carrickbrennan/Monkstown Road

- Route map

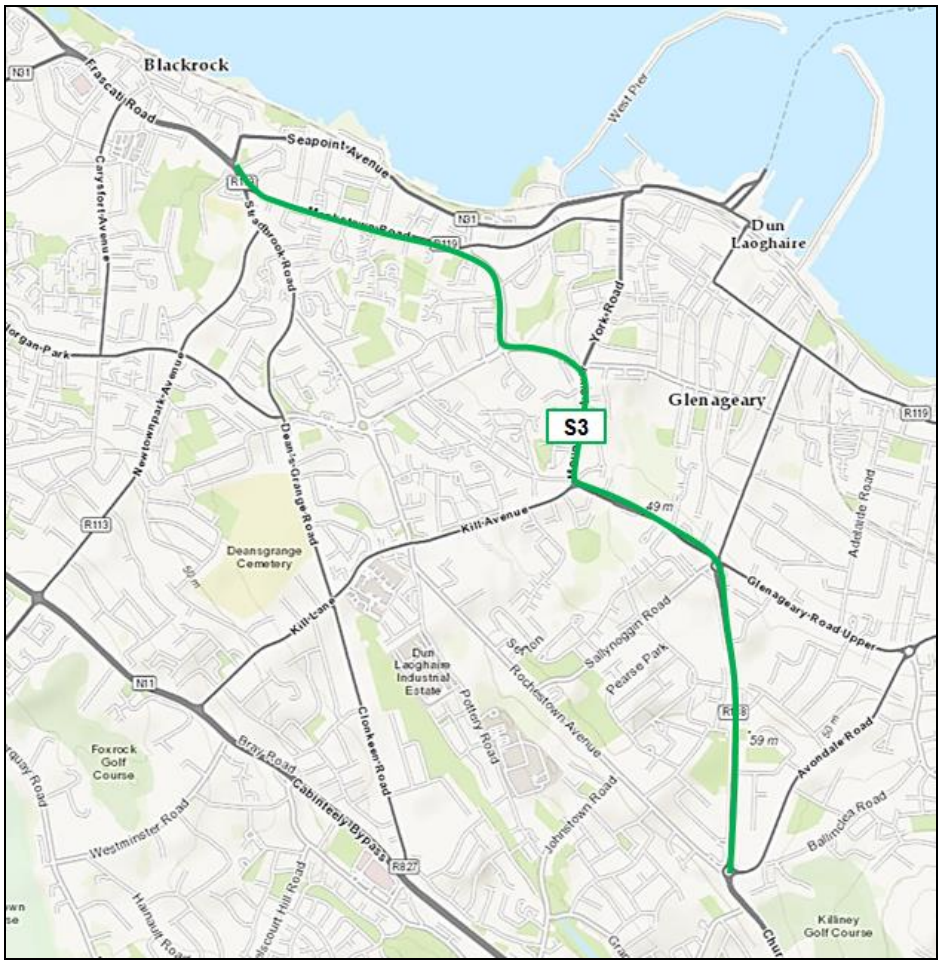


Figure 2.9: Map of Route Option S3

Route Option S3 begins at the Graduate Roundabout. The route follows the same route as Route Option S2 along the Thomastown and Glenageary Roads which have no parking facilities. As such, the same parking conditions identified in the S2 Route Option survey section from the Graduate roundabout to the Glengeary Road Upper/Mounttown/ Kill Avenue junction, are also applicable to the S3 Route Option Survey. This section shall concentrate on the second half of the route.

- Mounttown Road Lower

The survey has identified a lack of parking facilities for the approximately 280m from the Mounttown Road Lower/Glengeary Road/Kill Avenue junction travelling south-north. There is evidence of informal on-street parking and also some adjacent parking around Mounttown Business Park as shown on Figure 2.10. The parking breakdown on Mounttown Lower Avenue is as follows:

- Formal Parking – 0 spaces.
- Informal Parking – Approximately 18 spaces.
- Adjacent Parking – Approximately 5 spaces.

Figure 2.10: Parking Facilities Mounttown Road lower

All scheme options require full usage of the entire width of Mounttown Road Lower and as such, both the informal and adjacent spaces listed above will be removed as part of the proposed works.

- Mounttown Road Upper

The survey has identified both formal and informal on-street parking along Mounttown Road Upper as shown on **Figure 2.11**. The parking breakdown on Mounttown Road Upper is as follows:

- Formal Parking – 23 spaces.
- Informal Parking – Approximately 12 Spaces.
- Adjacent Parking – 0 Spaces.

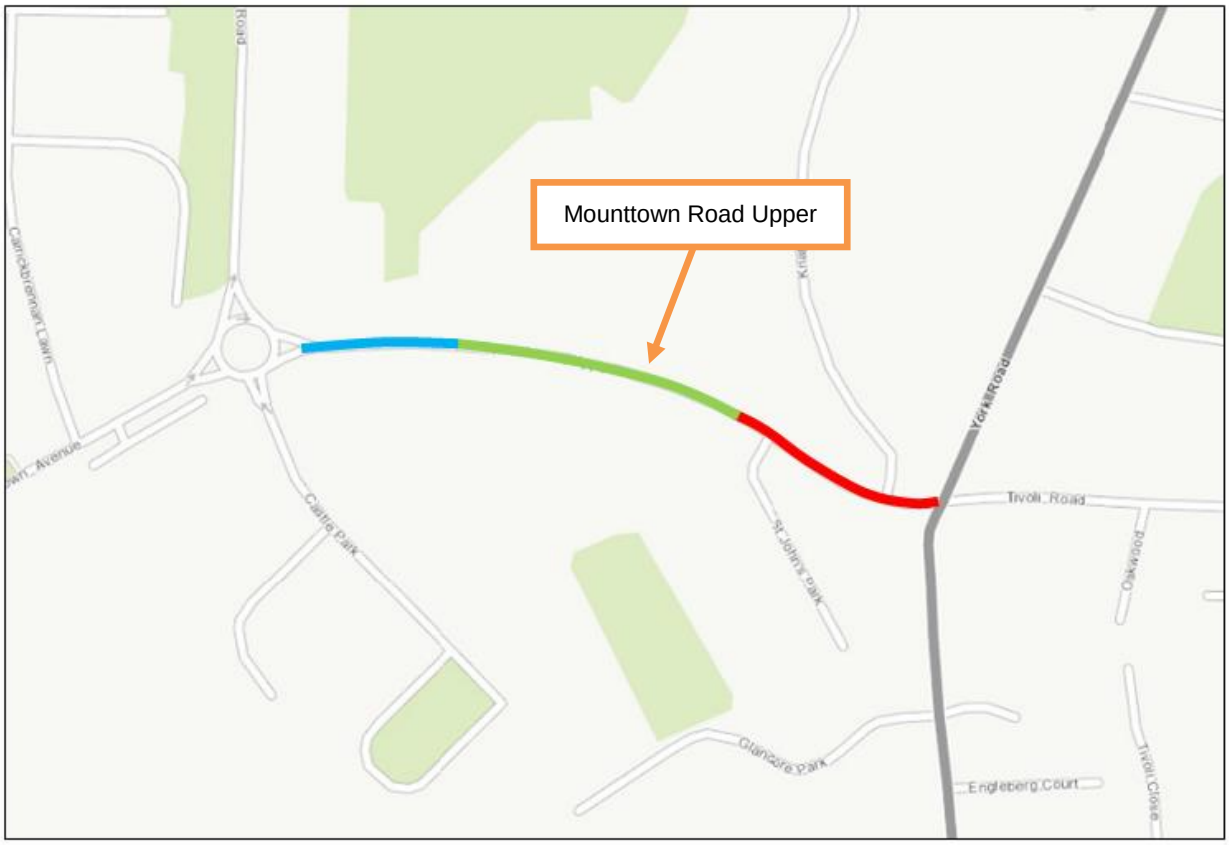


Figure 2.11: Mounttown Road Upper Parking Facilities

All scheme options require full usage of the entire width of Mounttown Road Lower and as such, both the formal (23 spaces) and informal (approximately 12) spaces listed above will be removed as part of the proposed works.

- Carrickbrennan road

The survey has shown that there is formal parking available at numerous locations along Carrickbrennan Road as shown on **Figure 2.12**. The parking breakdown on Carrickbrennan Road is as follows:

- Formal Parking – Approximately 92 spaces.
- Informal Parking –0 Spaces.
- Adjacent Parking – 0 Spaces.

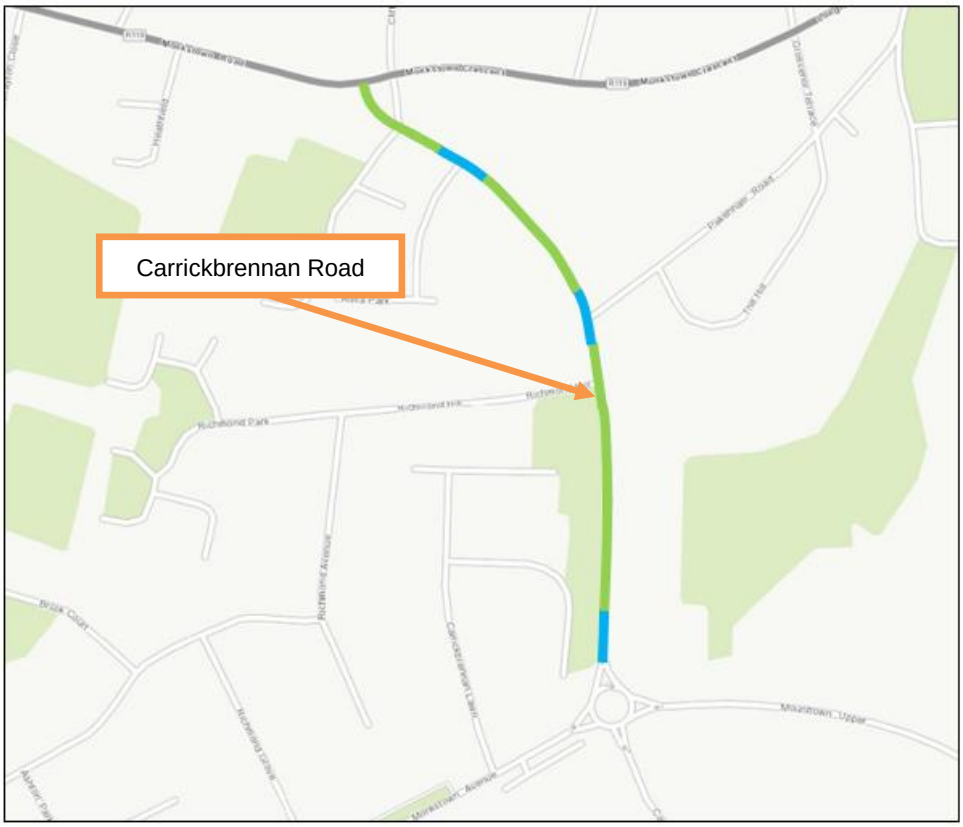


Figure 2.12: Carrickbrennan Road Parking Facilities

- Monkstown Road

Following the survey, no parking facilities were found on Monkstown Road, as shown on **Figure 2.13** below.

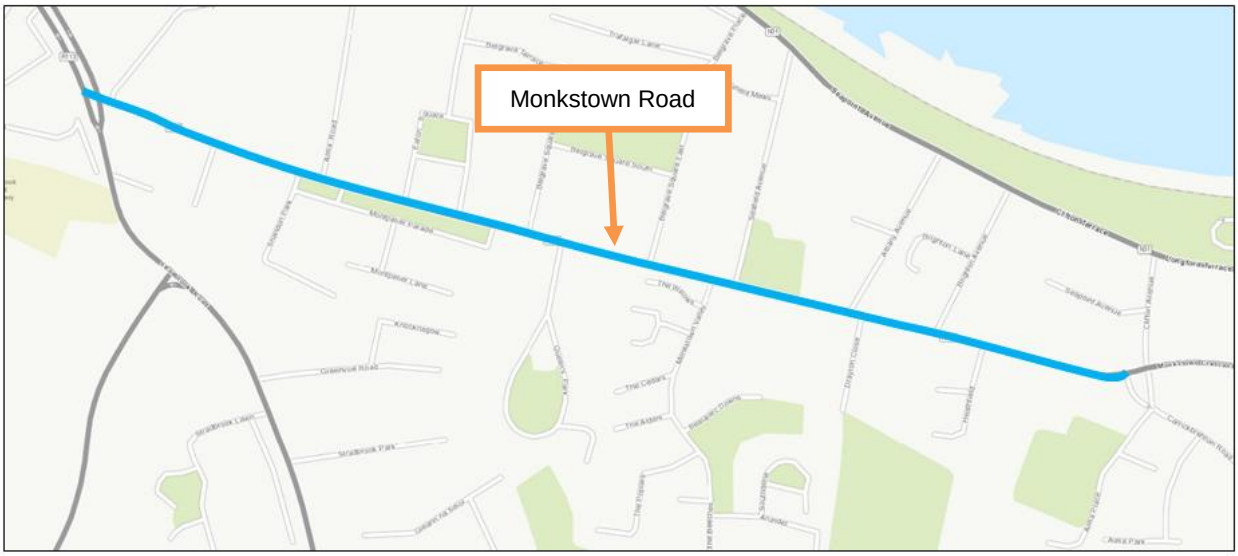


Figure 2.13: Monkstown Road Parking Facilities

2.4. Route Option S4: Georges Street Upper/Marine Road/Crofton Road/Old DunLeary road/Seapoint Avenue/Newtown Avenue/Georges Street Lower/Clarence Street

- Route Map

Figure 2.14: Map of Route Option S4

- Marine Road

The survey has shown that there is formal parking available at numerous locations along Marine Road as shown on **Figure 2.15** below. Of these formal spaces, 4 are shared as a loading bay between 7am and 7 pm Monday to Saturday. There is also a shared taxi rank and loading bay. The parking breakdown on Marine Road is as follows:

- Formal Parking – Approximately 20 spaces.
- Informal Parking – 0 Spaces.
- Adjacent Parking – 0 Spaces.
- Taxi Spaces/Loading Bay – 10 Spaces.

Figure 2.15: Marine Road Parking Facilities

All scheme options require full usage of the entire width of Marine Road and as such, both the formal parking spaces (approximately 20 No) and taxi rank spaces (approximately 10 No.) will be removed as part of the proposed works.

- Crofton Road

The survey has shown that there is formal parking available at the locations along Crofton Road as shown on **Figure 2.16** below. The breakdown of the car parking facilities along Crofton Road is as follows:

- Formal Parking – Approximately 35 spaces (1 Disabled).
- Informal Parking – 0 Spaces.
- Adjacent Parking – 0 Spaces.

Figure 2.16: Crofton Road Parking Facilities

All scheme options require full usage of the entire width of Crofton Road and as such, the formal parking spaces (approximately 36 No.) will be removed as part of the proposed works.

- Old Dun Laoghaire Road

Following the survey formal car parking has been found at a number of locations as shown on **Figure 2.17** below. There is also an adjacent car park servicing the Salthill and Monkstown Dart station. The breakdown of the car parking facilities along the Old Dun Laoghaire Road is as follows:

- Formal Parking – Approximately 11 spaces.
- Informal Parking – 0 Spaces.
- Adjacent Parking – Approximately 84 Spaces.

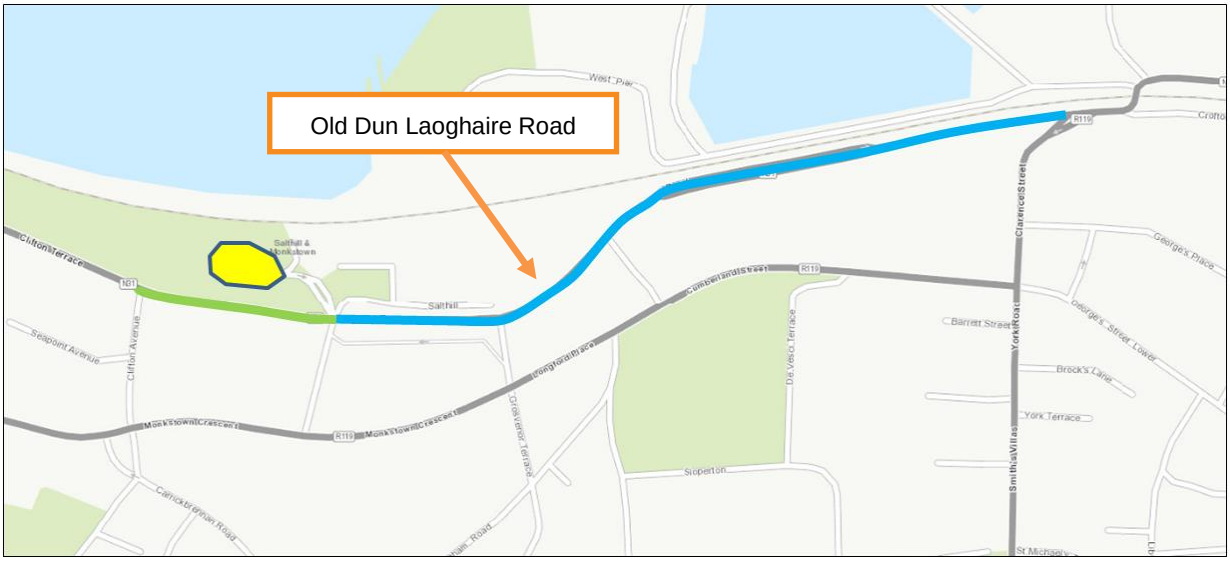


Figure 2.17: Old Dun Laoghaire Road Car Parking facilities

All scheme options require full usage of the entire width of the Old Dunleary Road and as such, the formal parking spaces (approximately 11 No.) will be removed as part of the proposed works. The proposed works for the scheme options will not affect the adjacent parking spaces at Salthill and Monkstown DART station.

- Seapoint Avenue

Following the survey formal car parking has been found at a number of locations as shown on **Figure 2.18** below. The breakdown of the car parking facilities along Seapoint Avenue is as follows:

- Formal Parking – Approximately 24 (Including 1 Disabled) spaces.
- Informal Parking – 0 Spaces.
- Adjacent Parking – 0 Spaces.

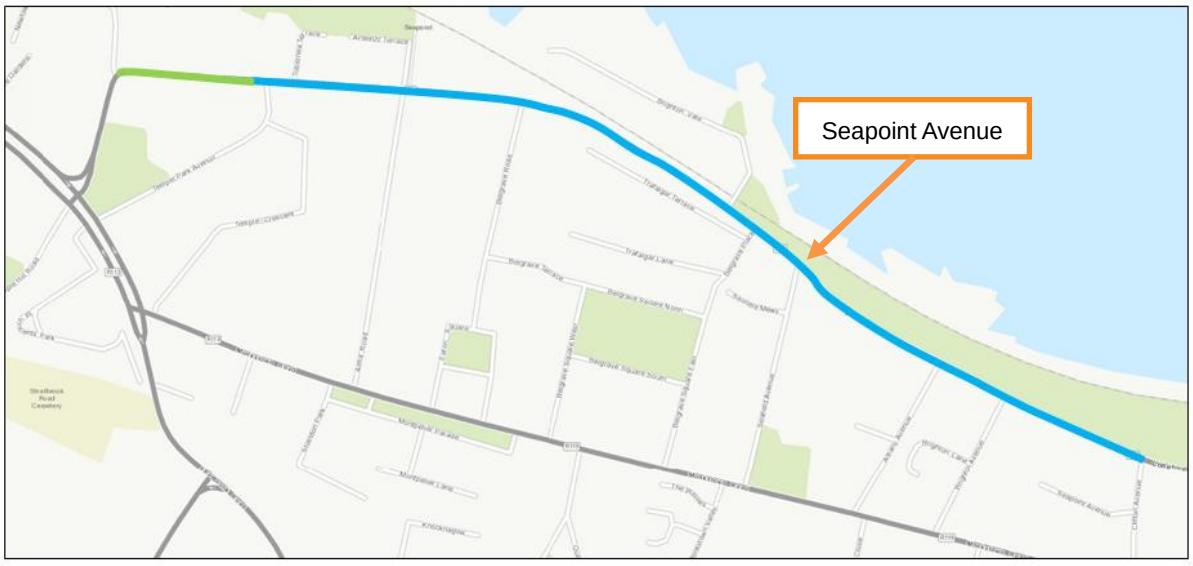


Figure 2.18: Seapoint Avenue Car Parking Facilities

All scheme options require full usage of the entire width of the Seapoint Avenue and as such, the formal parking spaces (approximately 25 No. including one disability) will be removed as part of the proposed works.

- Newtown Avenue

There are 3 formal car parking spaces located on Newtown Avenue, the location of which is as shown on **Figure 2.19** below.

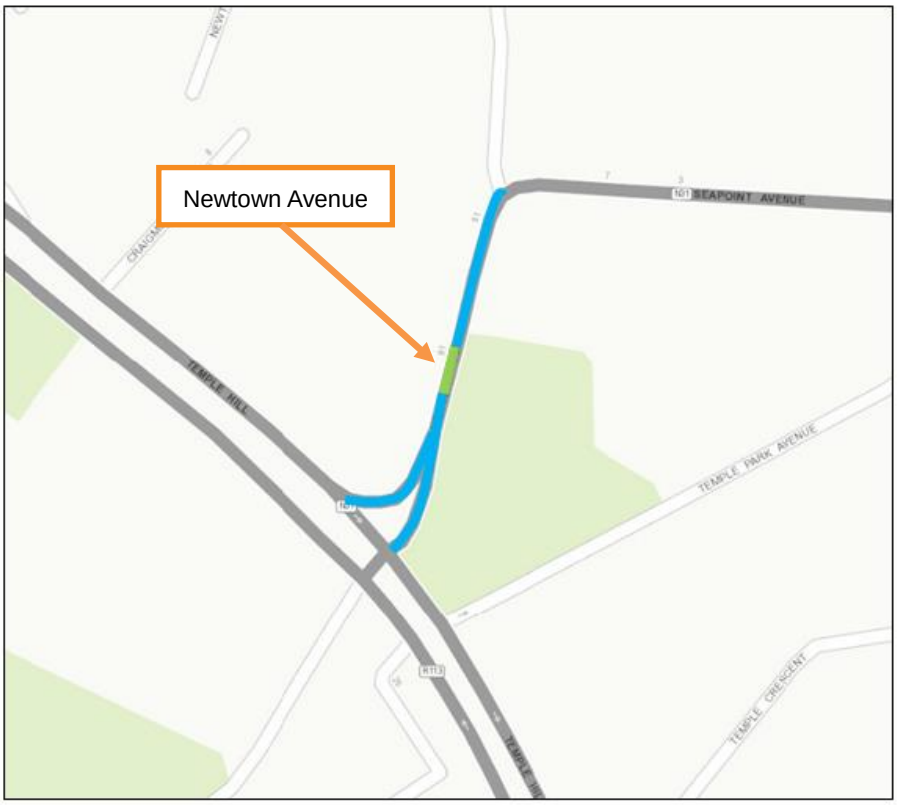


Figure 2.19: Newtown Avenue Car Parking Facilities

All scheme options require full usage of the entire width of the Seapoint Avenue and as such, the formal parking spaces (approximately 3 No.) will be removed as part of the proposed works.

- George's Street Lower

There are a number of formal parking spaces located at the western end of George's Street Lower as shown on **Figure 2.20** below. There is also a car park on Convent Lane adjacent to George's Street Lower. The breakdown of the car parking facilities along George's Street Lower is as follows:

- Formal Parking – Approximately 13 spaces.
- Informal Parking – 0 Spaces.
- Adjacent Parking – 8 (Including 1 Disabled) Spaces.
- Total Spaces – 4 spaces

Figure 2.20: George's Street Lower Car Parking Facilities

All scheme options require full usage of the entire width of Georges Street Lower and as such, the formal parking spaces (approximately 13 No.) will be removed as part of the proposed works. 4 No. of the adjacent spaces and 2 No. of the taxi rank spaces will also be removed as part of these works.

- Clarence Street

There is no car parking facilities on Clarence Street as shown on **Figure 2.21** below.

Figure 2.21: Clarence Street Car Parking Facilities

3. SAS 2: Booterstown – City Centre Route Options

3.1. Route Option N1: Merrion Road/Pembroke Road/Baggot Street

- Route Map

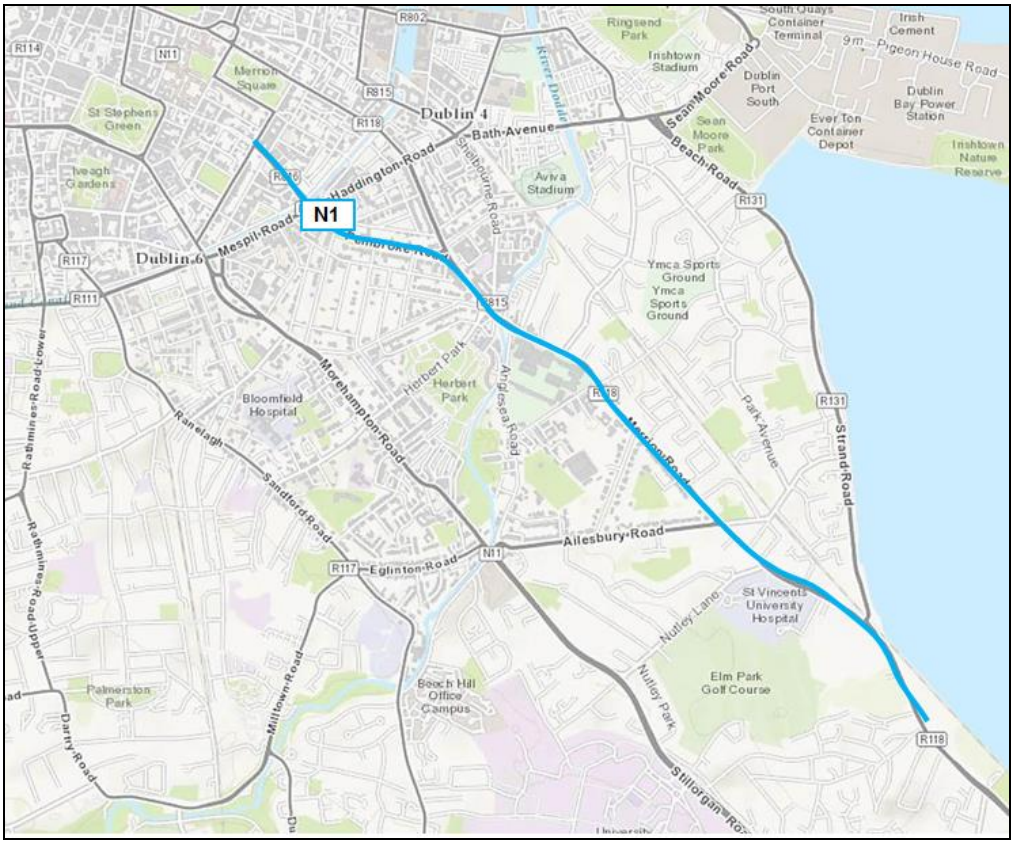


Figure 3.1: Map of Route Option N1

- Merrion Road

Following the survey formal, adjacent and informal car parking has been found on Merrion Road between Trimleston Avenue and Nutley Lane; the locations of which are as shown on Error! Reference source not found. below. The breakdown of the car parking facilities along this section of Merrion Road is as follows:

- Formal Parking – Approximately 12 Spaces.
- Informal Parking – Approximately 15 Spaces.
- Adjacent Parking – Approximately 206 (Of which 5 are Disabled Parking) Spaces.

Figure 3.2: Merrion Road Car Parking Facilities

All scheme options require full usage of the entire width of this section of Merrion road and as such, the formal parking spaces (approximately 12 No.) and informal parking spaces (approximately 15 No.) will be removed as part of the proposed works. The adjacent car parks will not be affected by any proposed works.

There are no parking facilities along the majority of the section of Merrion Road from the Nutley Lane junction to the Merrion Road/Beatty's Avenue junction aside from 9 formal parking spaces, the locations of which are shown on **Figure 3.3** below. The breakdown of the car parking facilities is as follows:

- Formal Parking – Approximately 9 Spaces.
- Informal Parking – 0 Spaces.
- Adjacent Parking – 0 Spaces.

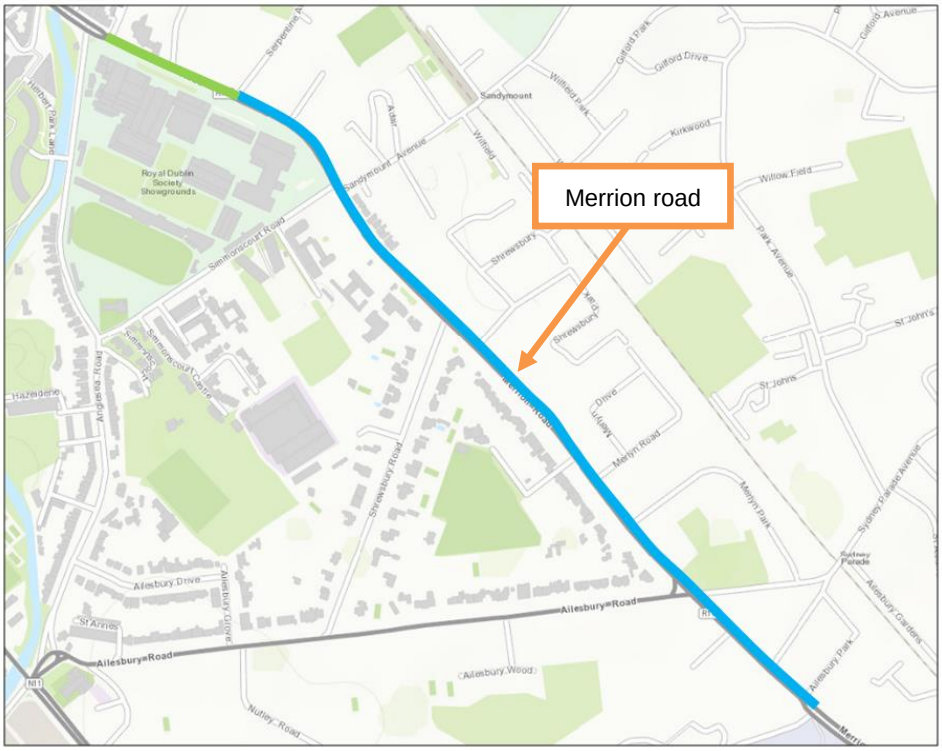


Figure 3.3: Merrion Road Car parking facilities

The proposed works in the scheme options do not affect the formal parking on Merrion Road listed above.

- Pembroke Road

The survey has shown formal car parking facilities along the majority of the length of Pembroke Road as shown on **Figure 3.4** below. There are no informal or adjacent parking spaces on Pembroke Road.

- Formal Parking – Approximately 110 Spaces.

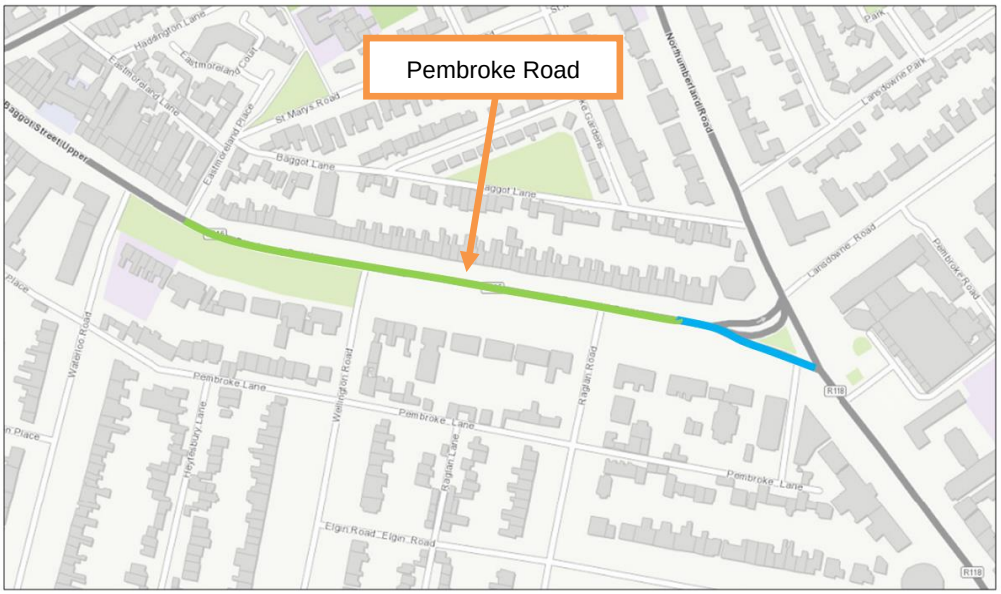


Figure 3.4: Pembroke Road Car Parking Facilities

All scheme options require full usage of the entire width of Pembroke Road and as such, the formal parking spaces (approximately 110 No.) will be removed as part of the proposed works.

- Baggot Street

The survey has shown formal car parking facilities at numerous locations along the length of Baggot Street as shown on **Figure 3.5** below. There are no informal or adjacent parking spaces on Baggot Street. A breakdown of the car parking facilities on Baggot Street is as follows:

- Formal Parking – 111 (Of which 1 Disabled Parking) Spaces.
- Taxi Rank 6 Spaces

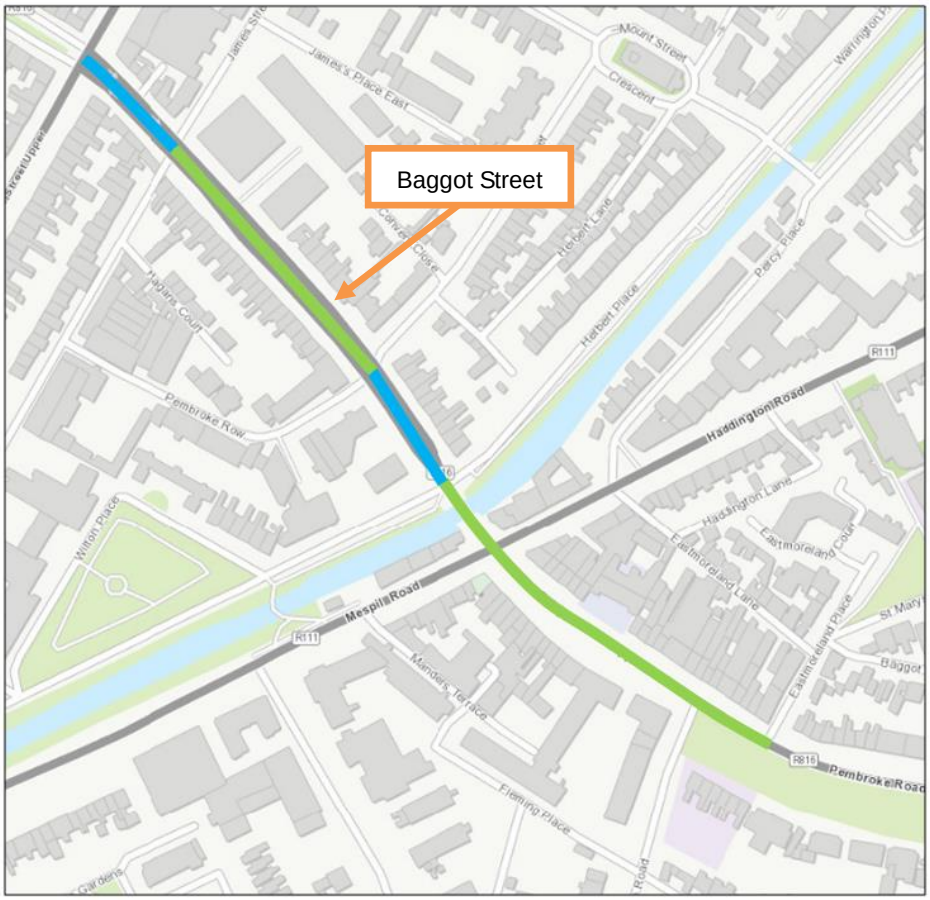


Figure 3.5: Baggot Street Car Parking Facilities

All scheme options require full usage of the entire width of Pembroke Road and as such, the formal parking (approximately 111 No.) and taxi rank spaces will be removed as part of the proposed works.

3.2. Route Option N2: Merrion Road/Northumberland Road/Mount Street Lower

- Route Map

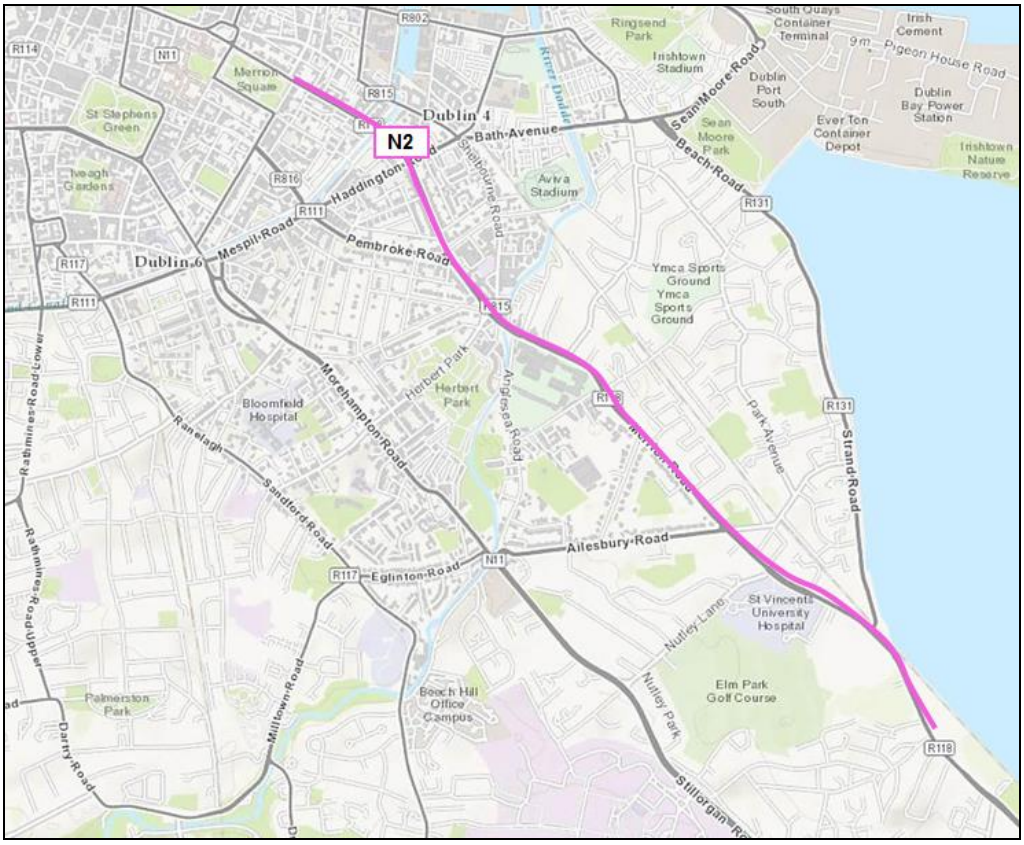


Figure 3.6: N2 Route Map

A large section of this route, namely along Merrion and Pembroke Road, have been documented in Route Option N1 above. The same car parking facilities identified in these sections for Merrion Road are also applicable to the N2 Parking Survey for this section. The following section of the report shall concentrate on the car parking facilities on Northumberland Road and Mount Street Lower.

- Northumberland Road

The survey has shown formal car parking facilities at certain locations along the length of Northumberland Road as shown on **Figure 3.7** below. There are no informal or adjacent parking spaces on Northumberland Road.

- Formal Parking – Approximately 21 Spaces.

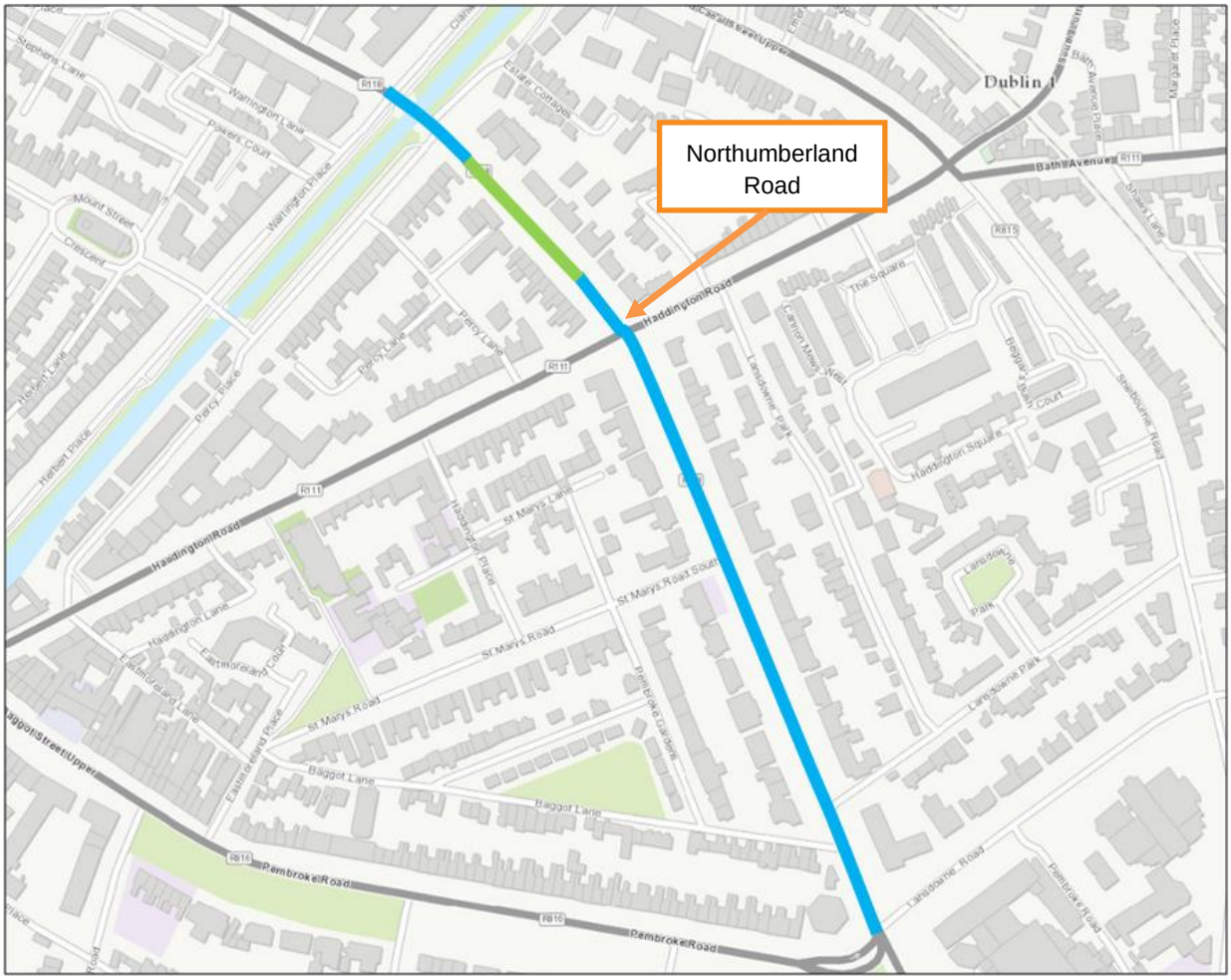


Figure 3.7: Northumberland Road Car Parking Facilities

All scheme options require full usage of the entire width of Pembroke Road and as such, the formal parking (approximately 21 No.) will be removed as part of the proposed works.

- Mount Street Lower

The survey has shown formal car parking facilities at certain locations along the length of Mount Street Lower as shown on **Figure 3.8** below. There are no informal or adjacent parking spaces on mount Street Lower.

- Formal Parking – Approximately 27 Spaces.

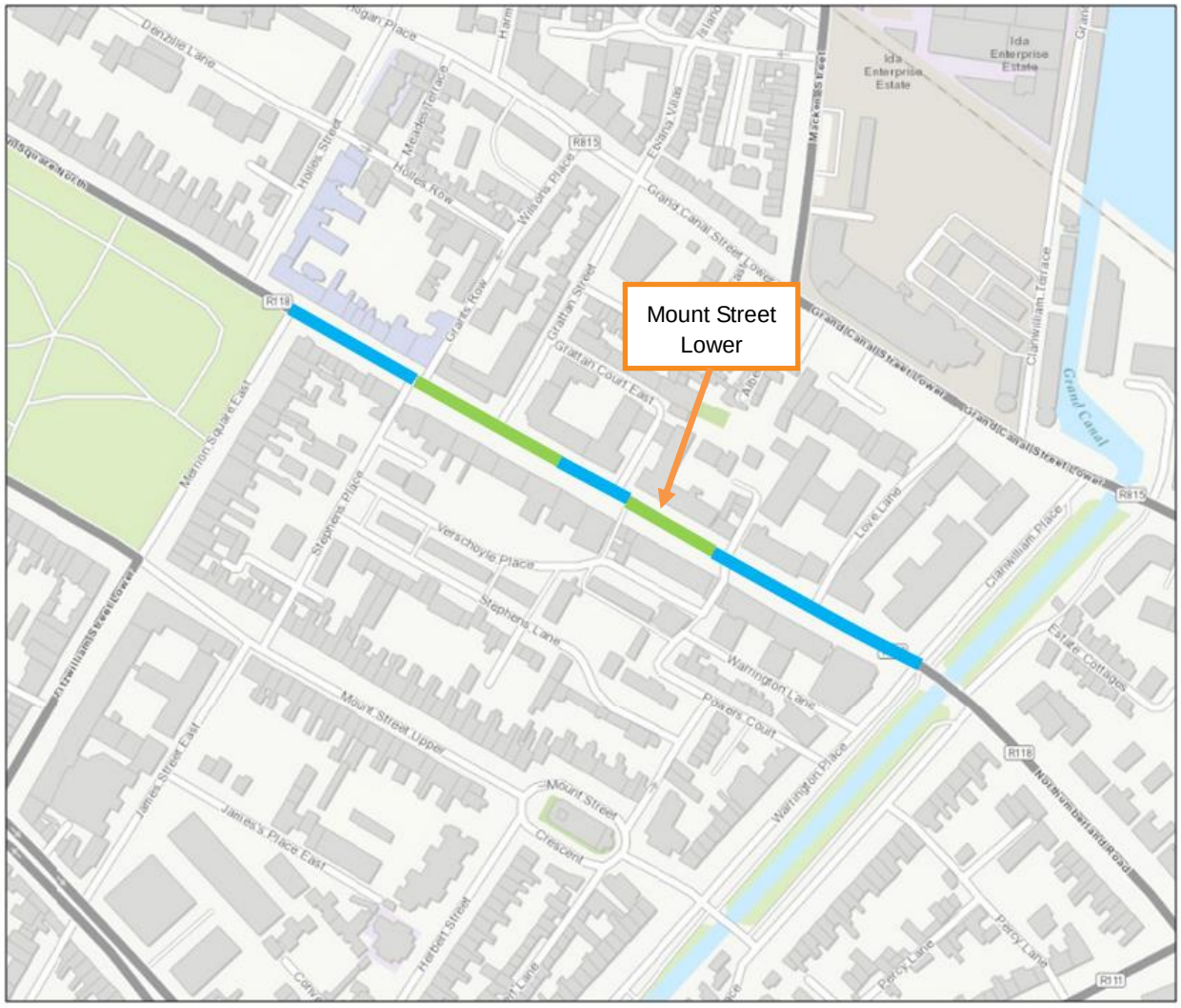


Figure 3.8: Mount Street Lower Car Parking Facilities

All scheme options require full usage of the entire width of Mount Street Lower and as such, the formal parking (approximately 27 No.) will be removed as part of the proposed works.

4. SAS 3: Blackrock- Booterstown Route Options

4.1. Route Option M1: Temple Road/Frascati Road/Rock Road

- Route Map

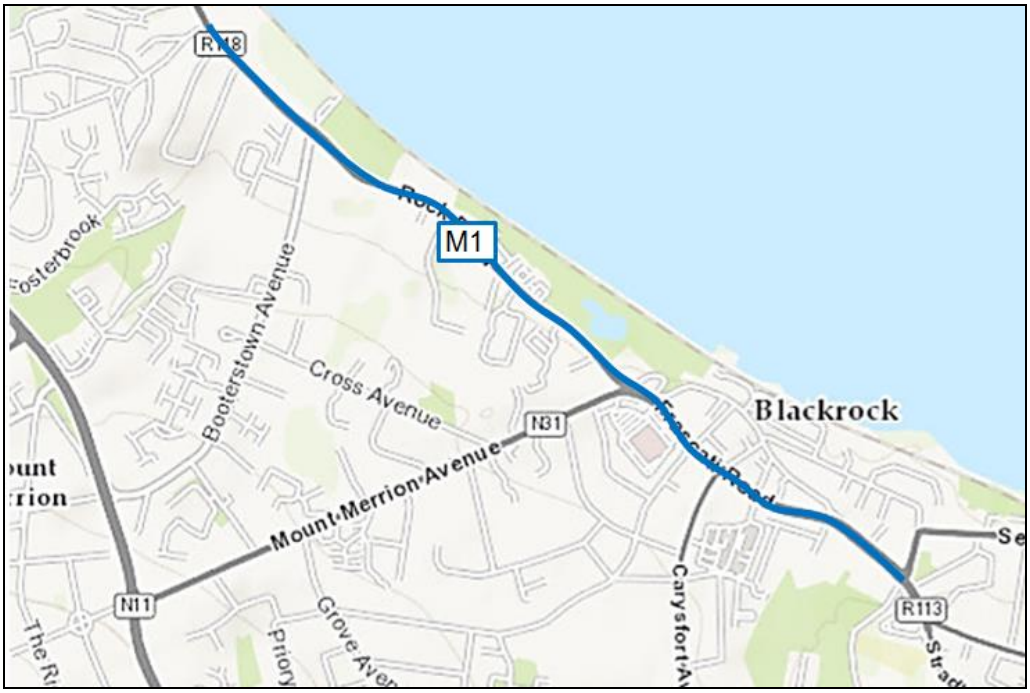


Figure 4.1: M1 Route Map

Route Option M1 is the middle section linking the Southern Route Options (e.g. Dun Laoghaire to Blackrock) to the Northern Route Options (e.g. Booterstown to the City Centre).

- Temple Road

The survey has shown no car parking facilities along the length of Temple Road as shown on **Figure 4.2** below.

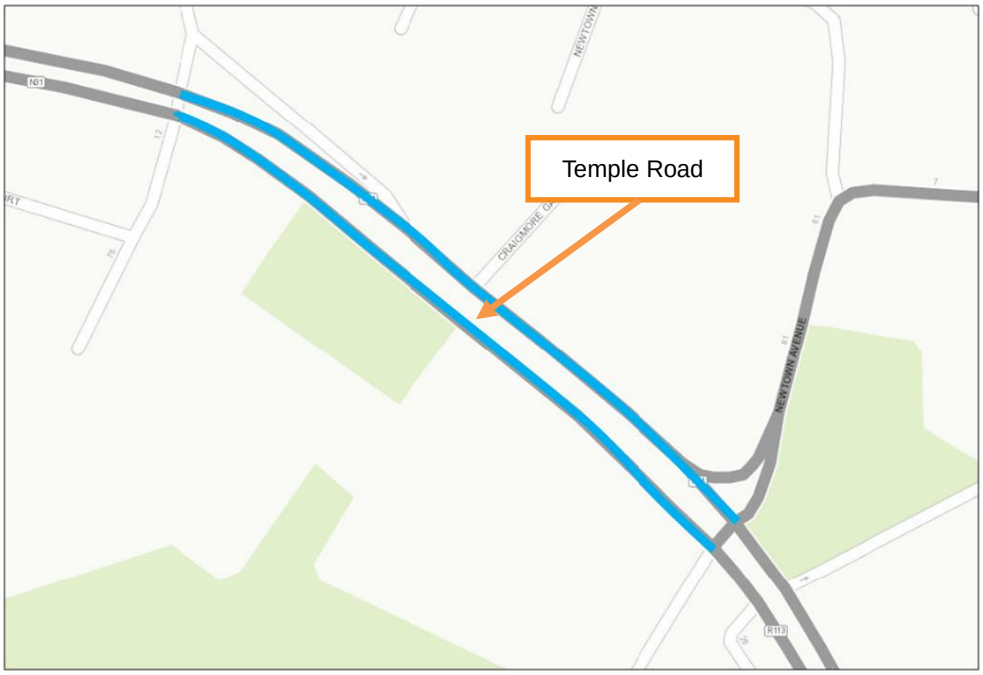


Figure 4.2: Temple Road Car Parking Facilities

- Frascati Road

The survey has shown no car parking facilities along the length of Temple Road as shown on **Figure 4.3** below.

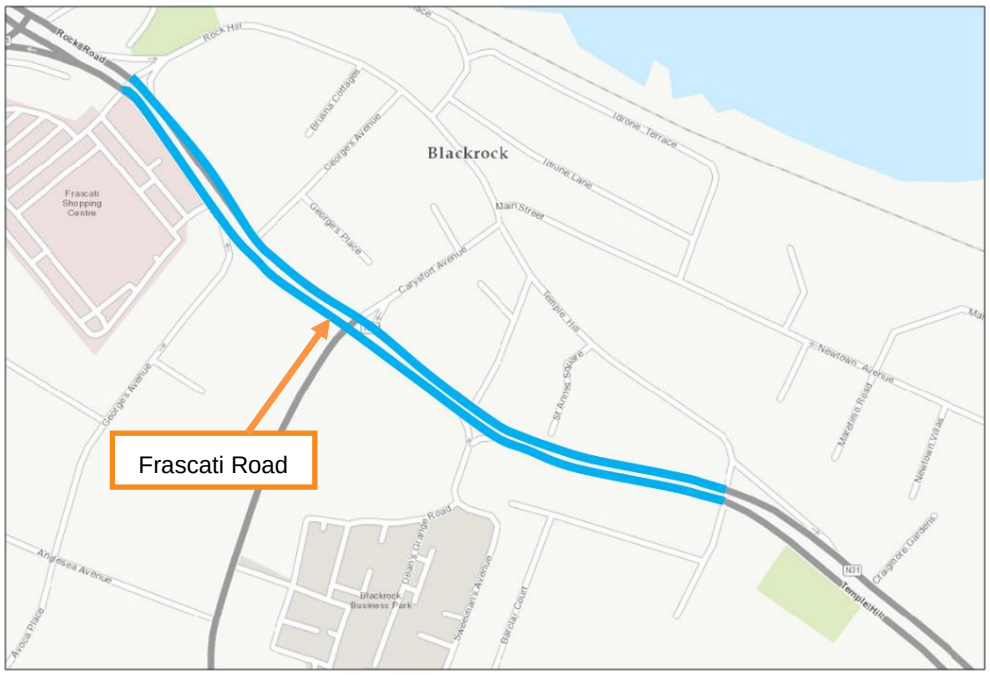


Figure 4.3: Frascati Road Car Parking Facilities

- Rock Road

The survey has shown that there is formal and adjacent parking available at the locations along Rock Road as shown on **Figure 4.4** below. The breakdown of the car parking facilities along Rock Road is as follows:

- Formal Parking – Approximately 40 spaces (1 Disabled).
- Informal Parking – 0 Spaces.
- Adjacent Parking – 112 Spaces.

Figure 4.4: Rock Road Car Parking Facilities

All scheme options require full usage of the entire width of the Rock road and as such, the formal parking spaces (approximately 40 No.) will be removed as part of the proposed works. The adjacent car parks will not be affected by any proposed works.

5. Summary of Figures

Summary of Figures								
Route Option	Formal Parking		Informal Parking		Adjacent Parking		Taxi Spaces	
	Existing	Proposed	Existing	Proposed	Existing	Proposed	Existing	Proposed
S1	0	0	10	0	0	0	0	0
S2	0	0	0	0	0	0	0	0
S3	115	0	30	0	5	0	0	0
S4	107	0	0	0	92	88	14	2
M1	40	0	0	0	112	112	0	0
N1	242	0	15	0	206	206	6	0
N2	69	0	15	0	206	206	0	0

Appendix F – Cost Estimate

Route: N1 Option 1					
Route Sections		Route Section Cost Rates (EUR / km)			Route Section Cost
		CAL 1: Minor	CAL 2: Moderate	CAL 3: Major	
		€ 650,000	€ 1,300,000	€ 2,500,000	
1	Section Length (km)		0.195		€ 253,500
2		0.015			€ 9,750
3			0.321		€ 417,300
4				0.106	€ 265,000
5			0.374		€ 486,200
6			0.091		€ 118,300
7				0.089	€ 222,500
8			0.032		€ 41,600
9				0.145	€ 362,500
10			0.114		€ 148,200
11				0.227	€ 567,500
12			0.308		€ 400,400
13			0.159		€ 206,700
14			0.154		€ 200,200
15			0.065		€ 84,500
16			0.211		€ 274,300
17			0.310		€ 403,000
18				0.105	€ 262,500
20					€ 0
21		0.079			€ 51,350
22			0.031		€ 40,300
23			0.399		€ 518,700
				Total of Route Sections Cost	**€ 5,334,300**

Junctions	Junction Cost Rates (EUR / junction)			Junctions Cost
	CAL 1: Minor	CAL 2: Moderate	CAL 3: Major	
	€ 70,000	€ 230,000	€ 1,000,000	
No of CL1	7			€ 490,000
No of CL2		6		€ 1,380,000
No of CL3			6	€ 6,000,000
			Total of Junctions Lower Costs	**€ 7,870,000**

Land Acquisition	Average Land Value (EUR / sq.m.)	Land Take Cost
	1,500 €	
Sum of Residential along Route (sq.m).	697	1,045,500 €
Sum of Commercial along Route (sq.m).		0 €
Sum of Agricultural along Route (sq.m).		0 €
Sum of Industrial along Route (sq.m).		0 €
	Total of Route Junctions Cost	**€ 1,045,500**

Route: N1 Option 1	**Total Cost =**	**€ 14,249,800**

Route: N1 Option 2					
Route Sections		Route Section Cost Rates (EUR / km)			Route Section Cost
		CAL 1: Minor	CAL 2: Moderate	CAL 3: Major	
		€ 650,000	€ 1,300,000	€ 2,500,000	
1	Section Length (km)		0.195		€ 253,500
2		0.015			€ 9,750
3			0.800		€ 1,040,000
4			0.207		€ 269,100
5				0.097	€ 242,500
6			0.165		€ 214,500
7				0.227	€ 567,500
8			0.308		€ 400,400
9			0.159		€ 206,700
10			0.154		€ 200,200
11			0.065		€ 84,500
12			0.192		€ 249,600
13			0.311		€ 404,300
14				0.109	€ 272,500
15		0.079			€ 51,350
16			0.032		€ 41,600
17			0.176		€ 228,800
18				0.111	€ 277,500
19					
20					
21					
22					
23					
				Total of Route Sections Cost	**€ 5,014,300**

Junctions	Junction Cost Rates (EUR / junction)			Junctions Cost
	CAL 1: Minor	CAL 2: Moderate	CAL 3: Major	
	€ 70,000	€ 230,000	€ 1,000,000	
No of CL1	7			€ 490,000
No of CL2		6		€ 1,380,000
No of CL3			6	€ 6,000,000
			Total of Junctions Lower Costs	**€ 7,870,000**

Land Acquisition	Average Land Value (EUR / sq.m.)	Land Take Cost
	1,500 €	
Sum of Residential along Route (sq.m).	492	738,000 €
Sum of Commercial along Route (sq.m).		0 €
Sum of Agricultural along Route (sq.m).		0 €
Sum of Industrial along Route (sq.m).		0 €
		Total of Route Junctions Cost	**€ 738,000**

Route: N1 Option 2	**Total Cost**	**€ 13,622,300**

Route: N2 Option 1					
Route Sections		Route Section Cost Rates (EUR / km)			Route Section Cost
		CAL 1: Minor	CAL 2: Moderate	CAL 3: Major	
		€ 650,000	€ 1,300,000	€ 2,500,000	
1	Section Length (km)		0.195		€ 253,500
2		0.015			€ 9,750
3			0.321		€ 417,300
4				0.106	€ 265,000
5			0.374		€ 486,200
6			0.091		€ 118,300
7				0.089	€ 222,500
8			0.032		€ 41,600
9				0.145	€ 362,500
10			0.114		€ 148,200
11				0.227	€ 567,500
12			0.308		€ 400,400
13			0.159		€ 206,700
14			0.154		€ 200,200
15			0.065		€ 84,500
16			0.211		€ 274,300
17			0.027		€ 35,100
18				0.345	€ 862,500
19				0.162	€ 405,000
20			0.168		€ 218,400
				0.008	€ 20,000
			0.143		€ 185,900
				0.041	€ 102,500
			0.235		€ 305,500
				Total of Route Sections Cost	**€ 6,193,350**

Junctions		Junction Cost Rates (EUR / junction)			Junctions Cost
		CAL 1: Minor	CAL 2: Moderate	CAL 3: Major	
		€ 70,000	€ 230,000	€ 1,000,000	
No of CL1		8			€ 560,000
No of CL2			4		€ 920,000
No of CL3				5	€ 5,000,000
				Total of Junctions Lower Costs	**€ 6,480,000**

Land Acquisition	Average Land Value (EUR / sq.m.)	Land Take Cost
	1,500 €	
Sum of Residential along Route (sq.m).	1770	2,655,000 €
Sum of Commercial along Route (sq.m).		0 €
Sum of Agricultural along Route (sq.m).		0 €
Sum of Industrial along Route (sq.m).		0 €
	Total of Route Junctions Cost	**€ 2,655,000**

Route: N2 Option 1	**Total Cost =**	**€ 15,328,350**

Route: N2 Option 2					
Route Sections		Route Section Cost Rates (EUR / km)			Route Section Cost
		CAL 1: Minor	CAL 2: Moderate	CAL 3: Major	
		€ 650,000	€ 1,300,000	€ 2,500,000	
1	Section Length (km)		0.195		€ 253,500
2		0.015			€ 9,750
3			0.800		€ 1,040,000
4			0.180		€ 234,000
5				0.097	€ 242,500
6			0.165		€ 214,500
7				0.227	€ 567,500
8			0.308		€ 400,400
9			0.159		€ 206,700
10			0.153		€ 198,900
11			0.065		€ 84,500
12			0.192		€ 249,600
13			0.037		€ 48,100
14				0.335	€ 837,500
15				0.110	€ 275,000
16			0.060		€ 78,000
17			0.360		€ 468,000
18			0.234		€ 304,200
19					
20					
				Total of Route Sections Cost	**€ 5,712,650**

Junctions	Junction Cost Rates (EUR / junction)			Junctions Cost
	CAL 1: Minor	CAL 2: Moderate	CAL 3: Major	
	€ 70,000	€ 230,000	€ 1,000,000	
No of CL1	8			€ 560,000
No of CL2		4		€ 920,000
No of CL3			5	€ 5,000,000
			Total of Junctions Lower Costs	**€ 6,480,000**

Land Acquisition	Average Land Value (EUR / sq.m.)	Land Take Cost
	1,500 €	
Sum of Residential along Route (sq.m).	1411	2,116,500 €
Sum of Commercial along Route (sq.m).		0 €
Sum of Agricultural along Route (sq.m).		0 €
Sum of Industrial along Route (sq.m).		0 €
	Total of Route Junctions Cost	**€ 2,116,500**

Route: N2 Option 2	**Total Cost =**	**€ 14,309,150**

Route: M1 Middle Section Option 1					
Route Sections		Route Section Cost Rates (EUR / km)			Route Section Cost
		CAL 1: Minor	CAL 2: Moderate	CAL 3: Major	
		€ 650,000	€ 1,300,000	€ 2,500,000	
1	Section Length (km)		0.129		€ 167,700
2			0.267		€ 347,100
3			0.191		€ 248,300
4			0.040		€ 52,000
5			0.105		€ 136,500
6				0.022	€ 55,000
7			0.330		€ 429,000
8				0.125	€ 312,500
9			0.015		€ 19,500
10				0.017	€ 42,500
11			0.013		€ 16,900
12				0.109	€ 272,500
13			0.331		€ 430,300
14			0.010		€ 13,000
15		0.081			€ 52,650
16			0.050		€ 65,000
17		0.025			€ 16,250
18			0.123		€ 159,900
19		0.017			€ 11,050
20			0.019		€ 24,700
21		0.039			€ 25,350
				Total of Route Sections Cost	**€ 2,897,700**

Junctions	Junction Cost Rates (EUR / junction)			Junctions Cost
	CAL 1: Minor	CAL 2: Moderate	CAL 3: Major	
	€ 70,000	€ 230,000	€ 1,000,000	
No of CL1	6			€ 420,000
No of CL2				€ 0
No of CL3			1	€ 1,000,000
			Total of Junctions Lower Costs	**€ 1,420,000**

Land Acquisition	Average Land Value (EUR / sq.m.)	Land Take Cost
	1,500 €	
Sum of Residential along Route (sq.m).	219	328,500 €
Sum of Commercial along Route (sq.m).		0 €
Sum of Agricultural along Route (sq.m).		0 €
Sum of Industrial along Route (sq.m).		0 €
	Total of Land Acquisition Cost	**€ 328,500**

Route: M1 Middle Section	**Cost**	**€ 4,646,200**

Route: M1 Middle Section Option 2					
Route Sections		Route Section Cost Rates (EUR / km)			Route Section Cost
		CAL 1: Minor	CAL 2: Moderate	CAL 3: Major	
		€ 650,000	€ 1,300,000	€ 2,500,000	
1	Section Length (km)		0.129		€ 167,700
2			0.270		€ 351,000
3			0.194		€ 252,200
4			1.010		€ 1,313,000
5		0.166			€ 107,900
6			0.116		€ 150,800
7		0.02			€ 15,600
8			0.019		€ 24,700
9		0.039			€ 25,350
				Total of Route Sections Cost	**€ 2,408,250**

Junctions	Junction Cost Rates (EUR / junction)			Junctions Cost
	CAL 1: Minor	CAL 2: Moderate	CAL 3: Major	
	€ 70,000	€ 230,000	€ 1,000,000	
No of CL1	6			€ 420,000
No of CL2				€ 0
No of CL3			1	€ 1,000,000
			Total of Junctions Lower Costs	**€ 1,420,000**

Land Acquisition	Average Land Value (EUR / sq.m.)	Land Take Cost
	1,500 €	
Sum of Residential along Route (sq.m).	0	0 €
Sum of Commercial along Route (sq.m).		0 €
Sum of Agricultural along Route (sq.m).		0 €
Sum of Industrial along Route (sq.m).		0 €
	Total of Land Acquisition Cost	**€ 0**
Route: M1 Middle Section	**Total Cost =**	**€ 3,828,250**

Appendix G – Infrastructural Cost Estimate

1. Route Option M1

1.1 Design option 1

1.1.1. Frascati Road

- **Minor modifications** are required at the Newtown Avenue/Frascati Road junction. I.e. the works associated with this categorization include: removal and replacement of kerbs, footways and paved areas, laying of Anti-skid surface, Protection/relocation/diversion of services (i.e. power supply, communications, water and gas), removal and replacement of existing road markings, dished kerbs and tactile paving at all crossing points, the provision of guardrails and bollards, landscaping works, additional traffic signals including ducting, cabling and chambers and additional signal poles/heads. No land take is required at this junction and as such property boundary re-instatement works are needed.

- For 130m approximately from the Newtown Avenue junction, the proposed works have been categorized as **moderate**. I.e. the works associated with widening of the road to accommodate a 20m buffer include the removal of kerbs and footways greater than 500mm and the removal of and installation of new drainage systems. Existing services (power supply, communications, water, gas) will have to be protected/relocated/diverted. Existing road signage may need to be removed and relocated and/or replaced. No land take is required.

- **Minor modifications** are required at the Frascati Road/Temple Road junction. I.e. the works associated with this categorization include: removal and replacement of kerbs, footways and paved areas, laying of Anti-skid surface, Protection/relocation/diversion of services (i.e. power supply, communications, water and gas), removal and replacement of existing road

markings, dished kerbs and tactile paving at all crossing points, the provision of guardrails and bollards, landscaping works, additional traffic signals including ducting, cabling and chambers and additional signal poles/heads. No land take is required at this junction and as such property boundary re-instatement works are needed.

- For the next 270m approximately, the proposed works have been categorized as **moderate**. I.e. the works associated with widening of the road to accommodate a 20m buffer include the removal of kerbs, central median and footways with a width greater than 500mm and the removal of and installation of new drainage systems. Existing services (power supply, communications, water, gas) will have to be protected/relocated/diverted. Existing road signage to be removed and relocated and/or replaced. No land take is required.

- **Minor modifications** are required at the Frascati Road/Carysfort Avenue junction. I.e. the works associated with this categorization include: removal and replacement of kerbs, footways and paved areas, laying of Anti-skid surface, Protection/relocation/diversion of services (i.e. power supply, communications, water and gas), removal and replacement of existing road markings, dished kerbs and tactile paving at all crossing points, the provision of guardrails and bollards, landscaping works, additional traffic signals including ducting, cabling and chambers and additional signal poles/heads. No land take is required at this junction and as such property boundary re-instatement works are needed.

- For the next 190m approximately, the proposed works have been categorized as **moderate**. I.e. the works associated with widening of the road to accommodate a 20m buffer include the removal of kerbs and footways greater than 500mm and the removal of and installation of new drainage systems. Existing services (power supply, communications, water, gas) will have to be protected/relocated/diverted. Existing road signage to be removed and relocated and/or replaced. To accommodate the 20m buffer some small trees and small plants need to removed/relocated and/or replaced at Permanent TSB therefore major landscaping works are also required along with full depth pavement reconstruction and associated road markings. No land take is required.

1.1.2 Rock Road

- **Minor modifications** are required at the Rock Hill/Rock Road junction. I.e. the works associated with this categorization include: removal and replacement of kerbs, footways and paved areas, laying of Anti-skid surface, Protection/relocation/diversion of services (i.e. power supply, communications, water and gas), removal and replacement of existing road markings, dished kerbs and tactile paving at all crossing points, the provision of guardrails and bollards, landscaping works, additional traffic signals including ducting, cabling and chambers and additional signal poles/heads. No land take is required at this junction and as such property boundary re-instatement works are needed.

- For 40m approximately, from the Rock Hill junction, the proposed works have been categorized as **moderate**. I.e. the works associated with widening of the road to accommodate a 20m buffer include the removal of kerbs and footways greater than 500mm and the removal of and installation of new drainage

systems. Existing services (power supply, communications, water, gas) will have to be protected/relocated/diverted. Safety barriers and guardrails must be replaced at the Rock Hill junction. Changes are required to the existing road geometry (i.e. removal of traffic islands, central median etc.) Existing road signage to be removed and relocated and/or replaced. No land take is required.

- **Minor modifications** are required at the Mount Merrion Avenue /Rock Road junction. I.e. the works associated with this categorization include: removal and replacement of kerbs, footways and paved areas, laying of Anti-skid surface, Protection/relocation/diversion of services (i.e. power supply, communications, water and gas), removal and replacement of existing road markings, dished kerbs and tactile paving at all crossing points, the provision of guardrails and bollards, landscaping works, additional traffic signals including ducting, cabling and chambers and additional signal poles/heads. No land take is required at this junction and as such property boundary re-instatement works are needed.

- For 105m approximately, from the Mount Merrion Avenue junction, the proposed works have been categorized as **moderate**. I.e. the works associated with widening of the road to accommodate a 20m buffer include the removal of kerbs and footways (including central median) with a width greater than 500mm and the removal of and installation of new drainage systems. Existing services (power supply, communications, and water, gas) to be protected/relocated/diverted. Existing road signage to be removed and relocated and/or replaced. Existing road markings to be removed and replaced. No land take is required.

- For the next 22m, the proposed works have been categorized as **major**. I.e. the works associated with widening of the road to accommodate a 20m buffer include the removal of kerbs and footways greater than 500mm and the removal of and installation of new drainage systems. Existing services (power supply, communications, water, gas) will have to be protected/relocated/diverted. Existing road signage may need to be removed and relocated and/or replaced. Some land take is required and as such boundary re-instatement works (walls, gates, driveways, etc.) are needed.

- For the next 330m approximately, works have been categorized as **moderate** due to the removal of kerbs and footways greater than 500mm. Some road signage and road furniture (bins and bollards) to be removed/ relocated or replaced. Existing services (power supply, communications, and water, gas) to be protected/relocated/diverted. Existing road markings to be removed and replaced. No land take is required along this section.

- For the next 125m approximately, the proposed works have been categorized as **major**. I.e. the works associated with widening of the road to accommodate a 20m buffer include the removal of kerbs and footways greater than 500mm, the removal of and installation of new drainage systems. As this section of Marine Road is predominantly a commercial area, associated services (power supply, communications, water and gas) to be protected/relocated/diverted. Existing road signage to be removed and relocated and/or replaced. Existing road markings to be removed and replaced. Some land take is required and as such boundary re-instatement works (walls, gates, driveways, etc.) are needed.

- For the next 15m approximately, works have been categorized as **moderate** due to the removal of kerbs and footways greater than 500mm and the removal/realignment of drainage systems and services. Some road signage and road furniture (bins and bollards) will have to be removed/ relocated or replaced. Existing road markings to be removed and replaced. No land take is required along this section.

- For the next 17m, the proposed works have been categorized as **major**. I.e. the works associated with widening of the road to accommodate a 20m buffer include the removal of kerbs and footways greater than 500mm and the removal of and installation of new drainage systems. Existing services (power supply, communications, water, gas) will have to be protected/relocated/diverted. Existing road signage to be removed and relocated and/or replaced. Some land take is required and as such boundary re-instatement works (walls, gates, driveways, etc.) are needed.

- For the next 13m approximately, works have been categorized as **moderate** due to the removal of kerbs and footways greater than 500mm and the removal/realignment of drainage systems and services. Some road signage and road furniture (bins and bollards) to be removed/ relocated or replaced. No land take is required along this section.

- For the next 109m, the proposed works have been categorized as **major**. I.e. the works associated with widening of the road to accommodate a 20m buffer include the removal of kerbs and footways greater than 500mm and the removal of and installation of new drainage systems. Existing services (power supply, communications, water, gas) will have to be protected/relocated/diverted. Existing road signage may need to be removed and relocated and/or replaced. Some land take is required and as such boundary re-instatement works (walls, gates, driveways, etc.) are needed.

- For the next 331m approximately, works have been categorized as **moderate** due to the removal of kerbs and footways greater than 500mm and the removal/realignment of drainage systems and services. Some road signage and road furniture (bins and bollards) will have to be removed/ relocated or replaced. Existing road markings to be removed and replaced. No land take is required along this section.

- **Minor modifications** are required at the Booterstown Avenue /Rock Road junction. I.e. the works associated with this categorization include: removal and replacement of kerbs, footways and paved areas, laying of Anti-skid surface, Protection/relocation/diversion of services (i.e. power supply, communications, water and gas), removal and replacement of existing road markings, dished kerbs and tactile paving at all crossing points, the provision of guardrails and bollards, landscaping works, additional traffic signals including ducting, cabling and chambers and additional signal poles/heads. No land take is required at this junction and as such property boundary re-instatement works are needed.

- For 10m approximately, works have been categorized as **moderate** due to the removal of the central median with a width greater than 500mm. Some road signage and road furniture (bins and bollards) to be removed/ relocated or replaced. No land take is required along this section.

- For the next 80m, the proposed works have been categorized as **minor**. I.e. the works to accommodate a 20m buffer include the removal and replacement of existing road markings and local road re-surfacing. Existing road signage to be removed and relocated and/or replaced.

- For 50m approximately, works have been categorized as **moderate** due to the removal of the central median with a width greater than 500mm and the removal/realignment of drainage systems and services. Some road signage to be removed/ relocated or replaced. No land take is required along this section.

- For the next 25m, the proposed works have been categorized as **minor**. I.e. the works associated with widening of the road to accommodate a 20m buffer include the removal of kerbs and footways with a width less than 500mm and the removal of and installation of new drainage systems. Existing services (power supply, communications, water, gas) will have to be protected/relocated/diverted.

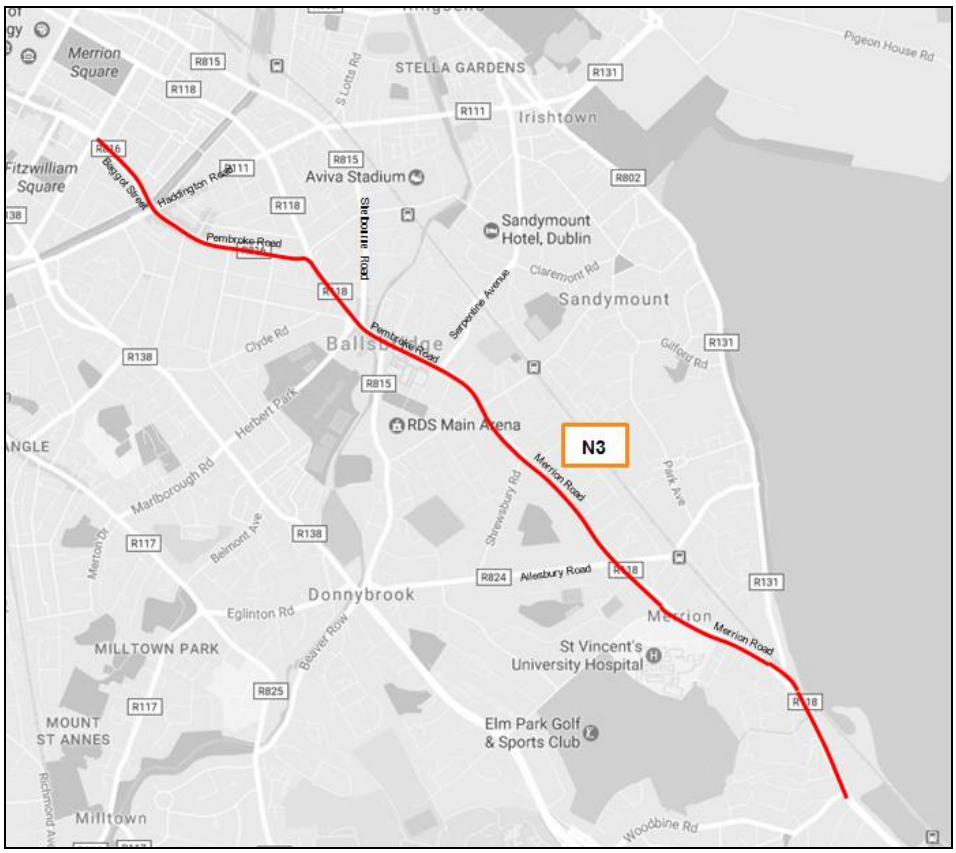
- For 125m approximately, works have been categorized as **moderate** due to the removal of kerbs and footways greater than 500mm and the removal/realignment of drainage systems and services. No land take is required along this section.

- For the next 20m, the proposed works have been categorized as **minor**. I.e. the works associated with widening of the road to accommodate a 20m buffer include the removal of kerbs and footways with a width less than 500mm. Existing road markings to be removed and replaced. No land take is required along this section.

- For 60m approximately, works have been categorized as **moderate** due to the removal of kerbs and footways (including central median) with a width greater than 500mm and the removal/realignment of drainage systems and services. Some road signage to be removed/ relocated or replaced. Existing road markings to be removed and replaced. No land take is required along this section.

2. Route Option N1

2.1 Design Option 1



2.1.1 Merrion Road

- **Significant major modifications** are required at the Merrion Road/Trimleston Avenue junction i.e. the works to accommodate the 20m buffer include: General site clearance, removal and replacement of kerbs, footways and paved areas, laying of Anti-skid surface, Protection/relocation/diversion of services (i.e. power supply, communications, water and gas), removal and replacement of existing road markings, dished kerbs and tactile paving at all crossing points, the provision of guardrails and bollards, landscaping works, additional traffic signals including ducting, cabling and chambers and additional signal poles/heads. Some land take is required at this junction and as such property boundary re-instatement works are needed.

- For 195m approximately from Trimleston Road travelling towards the city, works have been categorized as **moderate** due to the removal of kerbs and footways greater than 500mm and the removal/realignment of drainage systems and services. Road lighting (and associated works i.e. cabling and ducting) along the route to be protected/relocated/diverted. Existing services (power supply, communications, water, gas) will have to be protected/relocated/diverted. Road signage to be removed/ relocated or replaced. No land take is required along this section.

- For the next 15m, the proposed works have been categorized as **minor**. I.e. the works associated with widening of the road to accommodate a 20m buffer include the removal of kerbs and footways with a width less than 500mm. Existing road markings to be removed and replaced. No land take is required along this section.

- **Minor modifications** are required at the Elmpark/Merrion Road junction. I.e. the works associated with this categorization include: removal and

replacement of kerbs, footways and paved areas, laying of Anti-skid surface, Protection/relocation/diversion of services (i.e. power supply, communications, water and gas), removal and replacement of existing road markings, dished kerbs and tactile paving at all crossing points, the provision of guardrails and bollards, landscaping works, additional traffic signals including ducting, cabling and chambers and additional signal poles/heads. No land take is required at this junction and as such property boundary re-instatement works are needed.

- For the next 320m approximately, works have been categorized as **moderate** due to the removal of kerbs, central median and footways with a width greater than 500mm and the removal/realignment of drainage systems and services. Road lighting (and associated works i.e. cabling and ducting) along the route to be protected/relocated/diverted. Existing services (power supply, communications, water and gas) to be protected/relocated/diverted. Road signage and road furniture (bins and bollards) will have to be removed/ relocated or replaced. Safety barriers/guard rails to be removed/relocated/replaced at entrance to Elmpark Business Campus and along the central median to entrance to St. Mary's Nursing Home. No land take is required along this section.

- For 160m approximately, works have been categorized as **moderate** due to the removal of kerbs and footways greater than 500mm and the removal/realignment of drainage systems and services. Road lighting (and associated works i.e. cabling and ducting) along the route to be protected/relocated/diverted. Existing services (power supply, communications, water, gas) will have to be protected/relocated/diverted. To accommodate the 20m buffer a sizeable number of trees to be removed along the route and as such, limited earthworks works are also required along with full depth pavement reconstruction and associated road markings. Road signage and road furniture (bins and bollards) will have to be removed/ relocated or replaced. No land take is required along this section.

- For the next 375m approximately, works have been categorized as **moderate** due to the removal of kerbs and footways greater than 500mm and the removal/realignment of drainage systems and services. Road lighting (and associated works i.e. cabling and ducting) along the route to be protected/relocated/diverted. Existing services (power supply, communications, water, gas) will have to be protected/relocated/diverted. To accommodate the 20m buffer a number of trees to be removed along the route and as such, limited earthworks works are also required along with full depth pavement reconstruction and associated road markings. Road signage and road furniture (bins and bollards) will have to be removed/ relocated or replaced. No land take is required along this section.

- **Significant major modifications** are required at the Merrion Road/Nutley Lane junction i.e. the works to accommodate the 20m buffer include: General site clearance, removal and replacement of kerbs, footways and paved areas, laying of Anti-skid surface, Protection/relocation/diversion of services (i.e. power supply, communications, water and gas), removal and replacement of existing road markings, dished kerbs and tactile paving at all crossing points, the provision of guardrails and bollards, landscaping works, additional traffic signals including ducting, cabling and chambers and additional signal

poles/heads. Some land take is required at this junction and as such property boundary re-instatement works are needed.

- For 90m approximately from the Nutley lane junction travelling towards the city, works have been categorized as **moderate** due to the removal of kerbs and footways with a width greater than 500mm and the removal/realignment of drainage systems and services. Road lighting (and associated works i.e. cabling and ducting) along the route to be protected/relocated/diverted. To accommodate the 20m buffer a number of trees to be removed along the route and as such, limited earthworks works are also required along with full depth pavement reconstruction and associated road markings. Existing services (power supply, communications, water, gas) will have to be protected/relocated/diverted. Road signage to be removed/ relocated or replaced. No land take is required along this section.

- For the next 90m, approximately, the proposed works have been categorized as **major**. I.e. the works associated with widening of the road to accommodate a 20m buffer include the removal of kerbs and footways greater than 500mm and the removal of and installation of new drainage systems. Road lighting (and associated works i.e. cabling and ducting) along the route to be protected/relocated/diverted. Existing services (power supply, communications, water and gas) to be protected/relocated/diverted. To accommodate the 20m a number of trees to be removed along the route and as such, limited earthworks works are also required along with full depth pavement reconstruction and associated road markings. Road signage to be removed/ relocated or replaced. Some land take is required and as such boundary re-instatement works (walls, gates, driveways, etc.) are needed. Existing road markings to be removed and replaced.

- **Moderate upgrade modifications** are required at the Aylesbury road/Merrion Road junction i.e. the works to accommodate the buffer include: General site clearance, removal and replacement of kerbs, footways and paved areas, laying of Anti-skid surface, Protection/relocation/diversion of services (i.e. power supply, communications, water and gas), removal and replacement of existing road markings, dished kerbs and tactile paving at all crossing points, the provision of guardrails and bollards, landscaping works, additional traffic signals including ducting, cabling and chambers and additional signal poles/heads. No land take is required at this junction and as such property boundary re-instatement works are needed.

- For the next 30m approximately, works have been categorized as **moderate** due to the removal of kerbs and footways greater than 500mm and the removal/realignment of drainage systems and services. Road lighting (and associated works i.e. cabling and ducting) along the route to be protected/relocated/diverted. Existing services (power supply, communications, water and gas) will have to be protected/relocated/diverted. To accommodate the 20m buffer a number of trees to be removed along the route and as such, limited earthworks works are also required along with full depth pavement reconstruction and associated road markings. Road signage and road furniture (bins, bollards, signal boxes, seating) will have to be removed/ relocated or replaced. No land take is required along this section.

- For the next 145m, approximately, the proposed works have been categorized as **major**. I.e. the works associated with widening of the road to

accommodate a 20m buffer include the removal of kerbs and footways greater than 500mm and the removal of and installation of new drainage systems. Road lighting (and associated works i.e. cabling and ducting) along the route to be protected/relocated/diverted. Existing services (power supply, communications, water and gas) to be protected/relocated/diverted. To accommodate the 20m a number of trees to be removed along the route and as such, limited earthworks works are also required along with full depth pavement reconstruction and associated road markings. Road signage and road furniture (e.g. bollards at Merlyn Park junction) to be removed/ relocated or replaced. Some land take is required and as such boundary re-instatement works (walls, gates, driveways, etc.) are needed. Existing road markings to be removed and replaced.

- For the next 115m approximately, works have been categorized as **moderate** due to the removal of kerbs and footways greater than 500mm and the removal/realignment of drainage systems and services. Road lighting (and associated works i.e. cabling and ducting) along the route to be protected/relocated/diverted. Existing services (power supply, communications, water and gas) will have to be protected/relocated/diverted. To accommodate the 20m buffer a number of trees to be removed along the route and as such, limited earthworks are also required along with full depth pavement reconstruction and associated road markings. Road signage and road furniture (bins, bollards, signal boxes, seating) will have to be removed/ relocated or replaced. No land take is required along this section.

- For the next 225m, approximately, the proposed works have been categorized as **major**. I.e. the works associated with widening of the road to accommodate a 20m buffer include the removal of kerbs and footways greater than 500mm and the removal of and installation of new drainage systems. Road lighting (and associated works i.e. cabling and ducting) along the route to be protected/relocated/diverted. Existing services (power supply, communications, water and gas) to be protected/relocated/diverted. To accommodate the 20m a number of trees to be removed along the route and as such, limited earthworks works are also required along with full depth pavement reconstruction and associated road markings. Road signage and road furniture to be removed/ relocated or replaced. Some land take is required and as such boundary re-instatement works (walls, gates, driveways, etc.) are needed. Existing road markings to be removed and replaced.

- For the next 310m approximately, works have been categorized as **moderate** due to the removal of kerbs and footways greater than 500mm and the removal/realignment of drainage systems and services. Road lighting (and associated works i.e. cabling and ducting) along the route to be protected/relocated/diverted. Existing services (power supply, communications, water and gas) will have to be protected/relocated/diverted. To accommodate the 20m buffer a number of trees to be removed along the route and as such, limited earthworks are also required along with full depth pavement reconstruction and associated road markings. Road signage and road furniture (bins, bollards, signal boxes, seating) will have to be removed/ relocated or replaced. No land take is required along this section.

- **Minor modifications** are required at the Sandymount Avenue/Simonscourt Road junction. I.e. the works associated with this categorization include: removal and replacement of kerbs, footways and paved areas, laying of Anti-

skid surface, Protection/relocation/diversion of services (i.e. power supply, communications, water and gas), removal and replacement of existing road markings, dished kerbs and tactile paving at all crossing points, the provision of guardrails and bollards, landscaping works, additional traffic signals including ducting, cabling and chambers and additional signal poles/heads. No land take is required at this junction and as such property boundary re-instatement works are needed.

- For the 160m approximately, from Sandymount Avenue/Simonscourt Road works have been categorized as **moderate** due to the removal of kerbs and footways greater than 500mm and the removal/realignment of drainage systems and services. Road lighting (and associated works i.e. cabling and ducting) along the route to be protected/relocated/diverted. Existing services (power supply, communications, water and gas) will have to be protected/relocated/diverted. To accommodate the 20m buffer a number of trees to be removed along the route and as such, limited earthworks are also required along with full depth pavement reconstruction and associated road markings. Road signage and road furniture (bins, bollards, signal boxes, seating) will have to be removed/ relocated or replaced. No land take is required along this section.

- **Minor modifications** are required at the Serpentine Avenue/Merrion Road junction. I.e. the works associated with this categorization include: removal and replacement of kerbs, footways and paved areas, laying of Anti-skid surface, Protection/relocation/diversion of services (i.e. power supply, communications, water and gas), removal and replacement of existing road markings, dished kerbs and tactile paving at all crossing points, the provision of guardrails and bollards, landscaping works, additional traffic signals including ducting, cabling and chambers and additional signal poles/heads. No land take is required at this junction and as such property boundary re-instatement works are needed.

- For the 155m approximately, from the Serpentine Avenue junction works have been categorized as **moderate** due to the removal of kerbs and footways greater than 500mm and the removal/realignment of drainage systems and services. Road lighting (and associated works i.e. cabling and ducting) along the route to be protected/relocated/diverted. Existing services (power supply, communications, water and gas) will have to be protected/relocated/diverted. To accommodate the 20m buffer a number of trees to be removed along the route and as such, limited earthworks are also required along with full depth pavement reconstruction and associated road markings. Road signage and road furniture (bins, bollards, signal boxes, seating) will have to be removed/ relocated or replaced. No land take is required along this section.

2.1.2 Pembroke Road

- **Minor modifications** are required at the Anglesea Road/Merrion Road/Pembroke Road junction. I.e. the works associated with this categorization include: removal and replacement of kerbs, footways and paved areas, laying of Anti-skid surface, Protection/relocation/diversion of services (i.e. power supply, communications, water and gas), removal and replacement of existing road markings, dished kerbs and tactile paving at all crossing points, the provision of guardrails and bollards, landscaping works, additional traffic signals including ducting, cabling and chambers and

additional signal poles/heads. No land take is required at this junction and as such property boundary re-instatement works are needed.

- For 65m approximately, from the Anglesea Road junction works have been categorized as **moderate** due to the removal of kerbs and footways greater than 500mm and the removal/realignment of drainage systems and services. Road lighting (and associated works i.e. cabling and ducting) along the route to be protected/relocated/diverted. Existing services (power supply, communications, water and gas) will have to be protected/relocated/diverted. To accommodate the 20m buffer a number of trees to be removed along the route and as such, limited earthworks are also required along with full depth pavement reconstruction and associated road markings. Road signage and road furniture such as bins, bollards and signal boxes, will have to be removed/ relocated or replaced. No land take is required along this section.

- **Minor modifications** are required at the Herbert park/Shelbourne Road/Elgin Road/Pembroke Road junction. I.e. the works associated within this categorization include: removal and replacement of kerbs, footways and paved areas, laying of Anti-skid surface, Protection/relocation/diversion of services (i.e. power supply, communications, water and gas), removal and replacement of existing road markings, dished kerbs and tactile paving at all crossing points, the provision of guardrails and bollards, landscaping works, additional traffic signals including ducting, cabling and chambers and additional signal poles/heads. No land take is required at this junction and as such property boundary re-instatement works are needed.

- For 210m approximately, from the Herbert Park junction, works have been categorized as **moderate** due to the removal of kerbs and footways greater than 500mm and the removal/realignment of drainage systems and services. Road lighting (and associated works i.e. cabling and ducting) along the route to be protected/relocated/diverted. Existing services (power supply, communications, water and gas) will have to be protected/relocated/diverted. To accommodate the 20m buffer a number of trees to be removed along the route and as such, limited earthworks are also required along with full depth pavement reconstruction and associated road markings. Road signage and road furniture such as bins, bollards and signal boxes, to be removed/ relocated or replaced. No land take is required along this section.

- **Minor modifications** are required at the Lansdowne Road/Northumberland Road/Pembroke Road junction. I.e. the works associated with this categorization include: removal and replacement of kerbs, footways and paved areas, laying of Anti-skid surface, Protection/relocation/diversion of services (i.e. power supply, communications, water and gas), removal and replacement of existing road markings, dished kerbs and tactile paving at all crossing points, the provision of guardrails and bollards, landscaping works, additional traffic signals including ducting, cabling and chambers and additional signal poles/heads. No land take is required at this junction and as such property boundary re-instatement works are needed.

- For 310m approximately, from the Lansdowne Road junction, works have been categorized as **moderate** due to the removal of kerbs and footways greater than 500mm and the removal/realignment of drainage systems and services. Central median and traffic bollards also to be removed/relocated/replaced. Road lighting (and associated works i.e. cabling

and ducting) along the route to be protected/relocated/diverted. Existing services (power supply, communications, water and gas) will have to be protected/relocated/diverted. To accommodate the 20m buffer a number of trees to be removed along the route and as such, limited earthworks are also required along with full depth pavement reconstruction and associated road markings. Road signage and road furniture such as bins, bollards and signal boxes, to be removed/ relocated or replaced. No land take is required along this section.

- For the next 105m, approximately, the proposed works have been categorized as **major**. I.e. the works associated with widening of the road to accommodate a 20m buffer include the removal of kerbs and footways greater than 500mm and the removal of and installation of new drainage systems. Road lighting (and associated works i.e. cabling and ducting) along the route to be protected/relocated/diverted. Existing services (power supply, communications, water and gas) to be protected/relocated/diverted. To accommodate the 20m a number of trees to be removed along the route and as such, limited earthworks are also required along with full depth pavement reconstruction and associated road markings. Road signage and road furniture to be removed/ relocated or replaced. Some land take is required and as such boundary re-instatement works (walls, gates, driveways, etc.) are needed. Existing road markings to be removed and replaced.

- **Significant major modifications** are required at the Eastmoreland Place/Pembroke Road/Baggot Street Upper junction i.e. the works to accommodate the 20m buffer include: General site clearance, removal and replacement of kerbs, footways and paved areas, laying of Anti-skid surface, Protection/relocation/diversion of services (i.e. power supply, communications, water and gas), removal and replacement of existing road markings, dished kerbs and tactile paving at all crossing points, the provision of guardrails and bollards, landscaping works, additional traffic signals including ducting, cabling and chambers and additional signal poles/heads. Some land take is required at this junction and as such property boundary re-instatement works are needed.

- **Moderate upgrade modifications** are required at the Waterloo Road/Baggot Street junction i.e. the works to accommodate the buffer include: General site clearance, removal and replacement of kerbs, footways and paved areas, laying of Anti-skid surface, Protection/relocation/diversion of services (i.e. power supply, communications, water and gas), removal and replacement of existing road markings, dished kerbs and tactile paving at all crossing points, the provision of guardrails and bollards, landscaping works, additional traffic signals including ducting, cabling and chambers and additional signal poles/heads. No land take is required at this junction and as such property boundary re-instatement works are needed.

2.1.3 Baggot Street

- For the next 80m, the proposed works have been categorized as **minor**. I.e. the works to accommodate a 20m buffer include the removal and replacement of existing road markings and local road re-surfacing. Existing road signage to be removed and relocated and/or replaced.

- **Significant major modifications** are required at the Herbert Place/Wilton Terrace/Mespil Road/Haddington Road/Baggot Street Upper junction i.e. the works to accommodate the 20m buffer include: General site clearance, removal and replacement of kerbs, footways and paved areas, laying of Anti-skid surface, Protection/relocation/diversion of services (i.e. power supply, communications, water and gas), removal and replacement of existing road markings, dished kerbs and tactile paving at all crossing points, the provision of guardrails and bollards, landscaping works, additional traffic signals including ducting, cabling and chambers and additional signal poles/heads. Some land take is required at this junction and as such property boundary re-instatement works are needed.

- For 30m approximately, from the Herbert Place/Wilton Terrace/Mespil Road/Haddington Road junction, works have been categorized as **moderate** due to the removal of kerbs and footways greater than 500mm and the removal/realignment of drainage systems and services. Central median and traffic bollards also to be removed/relocated/replaced. Road lighting (and associated works i.e. cabling and ducting) along the route to be protected/relocated/diverted. Existing services (power supply, communications, water and gas) will have to be protected/relocated/diverted. To accommodate the 20m buffer a number of trees to be removed along the route and as such, limited earthworks are also required along with full depth pavement reconstruction and associated road markings. Local road resurfacing works to be conducted at several locations along this section. Road signage and road furniture such as bins, bollards and signal boxes, to be removed/ relocated or replaced. No land take is required along this section.

- **Moderate upgrade modifications** are required at the Herbert Street/Baggot Street junction i.e. the works to accommodate the buffer include: General site clearance, removal and replacement of kerbs, footways and paved areas, laying of Anti-skid surface, Protection/relocation/diversion of services (i.e. power supply, communications, water and gas), removal and replacement of existing road markings, dished kerbs and tactile paving at all crossing points, the provision of guardrails and bollards, landscaping works, additional traffic signals including ducting, cabling and chambers and additional signal poles/heads. No land take is required at this junction and as such property boundary re-instatement works are needed.

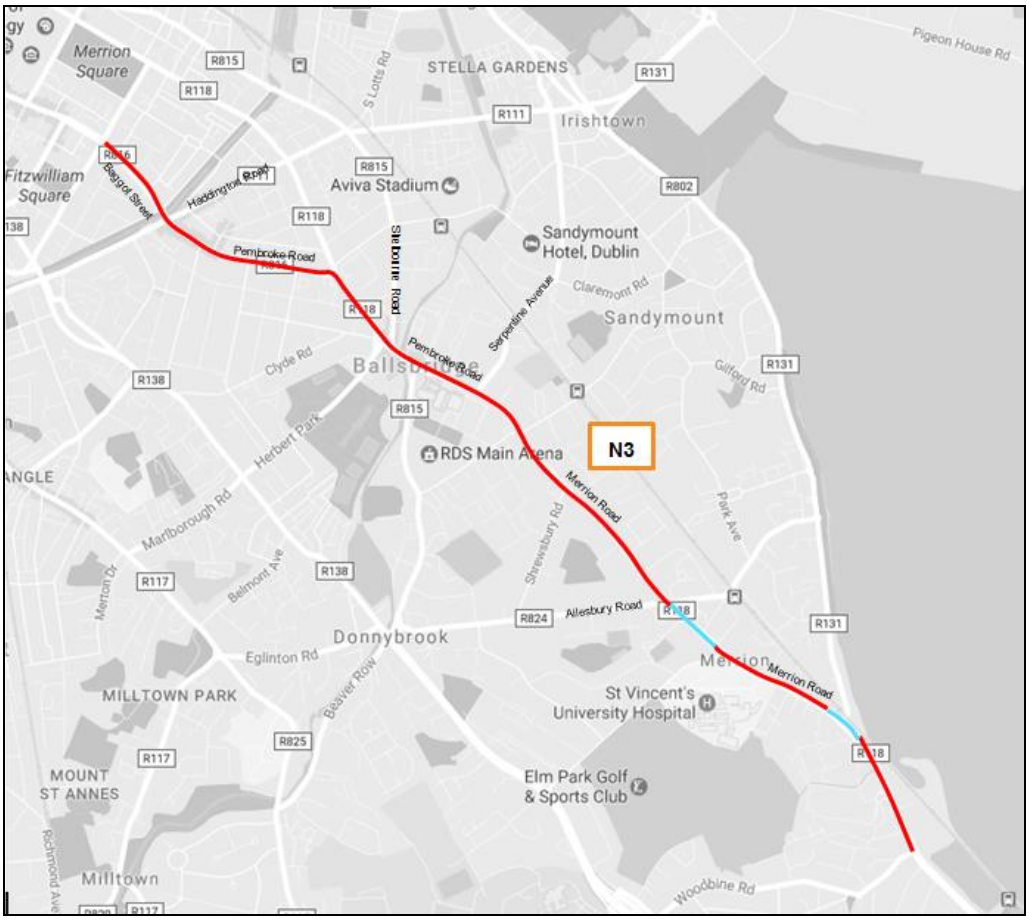
- For the next 410m approximately, works have been categorized as **moderate** due to the removal of kerbs and footways greater than 500mm and the removal/realignment of drainage systems and services. Road lighting (and associated works i.e. cabling and ducting) along the route to be protected/relocated/diverted. Existing services (power supply, communications, water and gas) will have to be protected/relocated/diverted. To accommodate the 20m buffer a number of trees to be removed along the route and as such, limited earthworks are also required along with full depth pavement reconstruction and associated road markings. Road signage and road furniture (bins, bollards, signal boxes, seating) will have to be removed/ relocated or replaced. No land take is required along this section.

- **Significant major modifications** are required at the Fitzwilliam Street Lower/Baggot Street Lower junction i.e. the works to accommodate the 20m buffer include: General site clearance, removal and replacement of kerbs,

footways and paved areas, laying of Anti-skid surface, Protection/relocation/diversion of services (i.e. power supply, communications, water and gas), removal and replacement of existing road markings, dished kerbs and tactile paving at all crossing points, the provision of guardrails and bollards, landscaping works, additional traffic signals including ducting, cabling and chambers and additional signal poles/heads. Some land take is required at this junction and as such property boundary re-instatement works are needed.

- **Significant major modifications** are required at the Pembroke Street Lower/Baggot Street Lower junction i.e. the works to accommodate the 20m buffer include: General site clearance, removal and replacement of kerbs, footways and paved areas, laying of Anti-skid surface, Protection/relocation/diversion of services (i.e. power supply, communications, water and gas), removal and replacement of existing road markings, dished kerbs and tactile paving at all crossing points, the provision of guardrails and bollards, landscaping works, additional traffic signals including ducting, cabling and chambers and additional signal poles/heads. Some land take is required at this junction and as such property boundary re-instatement works are needed.

2.2 Design Option 2



2.2.1 Merrion Road

- **Significant major modifications** are required at the Merrion Road/Trimleston Avenue junction i.e. the works to accommodate the 20m buffer include: General site clearance, removal and replacement of kerbs, footways and paved areas, laying of Anti-skid surface, Protection/relocation/diversion of services (i.e. power supply, communications, water and gas), removal and replacement of existing road markings, dished kerbs and tactile paving at all crossing points, the provision of guardrails and bollards, landscaping works, additional traffic signals including ducting, cabling and chambers and additional signal poles/heads. Some land take is required at this junction and as such property boundary re-instatement works are needed.

- For 195m approximately from Trimleston Road travelling towards the city, works have been categorized as **moderate** due to the removal of kerbs and footways greater than 500mm and the removal/realignment of drainage systems and services. Road lighting (and associated works i.e. cabling and ducting) along the route to be protected/relocated/diverted. Existing services (power supply, communications, water, gas) will have to be protected/relocated/diverted. Road signage to be removed/ relocated or replaced. No land take is required along this section.

- For the next 15m, the proposed works have been categorized as **minor**. I.e. the works associated with widening of the road to accommodate a 20m buffer include the removal of kerbs and footways with a width less than 500mm. Existing road markings to be removed and replaced. No land take is required along this section.

- **Minor modifications** are required at the Elmpark/Merrion Road junction. I.e. the works associated with this categorization include: removal and replacement of kerbs, footways and paved areas, laying of Anti-skid surface, Protection/relocation/diversion of services (i.e. power supply, communications, water and gas), removal and replacement of existing road markings, dished kerbs and tactile paving at all crossing points, the provision of guardrails and bollards, landscaping works, additional traffic signals including ducting, cabling and chambers and additional signal poles/heads. No land take is required at this junction and as such property boundary re-instatement works are needed.

- For the next 800m approximately, works have been categorized as **moderate** due to the removal of kerbs, central median and footways with a width greater than 500mm and the removal/realignment of drainage systems and services. Road lighting (and associated works i.e. cabling and ducting) along the route to be protected/relocated/diverted. Existing services (power supply, communications, water and gas) to be protected/relocated/diverted. Road signage and road furniture (bins and bollards) will have to be removed/ relocated or replaced. Safety barriers/guard rails to be removed/relocated/replaced at entrance to Elmpark Business Campus and along the central median to entrance to St. Mary's Nursing Home. No land take is required along this section.

- **Significant major modifications** are required at the Merrion Road/Nutley Lane junction i.e. the works to accommodate the 20m buffer include: General site clearance, removal and replacement of kerbs, footways and paved areas,

laying of Anti-skid surface, Protection/relocation/diversion of services (i.e. power supply, communications, water and gas), removal and replacement of existing road markings, dished kerbs and tactile paving at all crossing points, the provision of guardrails and bollards, landscaping works, additional traffic signals including ducting, cabling and chambers and additional signal poles/heads. Some land take is required at this junction and as such property boundary re-instatement works are needed.

- For 205m approximately from the Nutley lane junction travelling towards the city, works have been categorized as **moderate** due to the removal of kerbs and footways with a width greater than 500mm and the removal/realignment of drainage systems and services. Road lighting (and associated works i.e. cabling and ducting) along the route to be protected/relocated/diverted. To accommodate the 20m buffer a number of trees to be removed along the route and as such, limited earthworks works are also required along with full depth pavement reconstruction and associated road markings. Existing services (power supply, communications, water, gas) will have to be protected/relocated/diverted. Road signage to be removed/ relocated or replaced. No land take is required along this section.

- **Moderate upgrade modifications** are required at the Aylesbury road/Merrion Road junction i.e. the works to accommodate the buffer include: General site clearance, removal and replacement of kerbs, footways and paved areas, laying of Anti-skid surface, Protection/relocation/diversion of services (i.e. power supply, communications, water and gas), removal and replacement of existing road markings, dished kerbs and tactile paving at all crossing points, the provision of guardrails and bollards, landscaping works, additional traffic signals including ducting, cabling and chambers and additional signal poles/heads. No land take is required at this junction and as such property boundary re-instatement works are needed.

- For the next 95m, approximately, the proposed works have been categorized as **major**. I.e. the works associated with widening of the road to accommodate a 20m buffer include the removal of kerbs and footways greater than 500mm and the removal of and installation of new drainage systems. Road lighting (and associated works i.e. cabling and ducting) along the route to be protected/relocated/diverted. Existing services (power supply, communications, water and gas) to be protected/relocated/diverted. To accommodate the 20m a number of trees to be removed along the route and as such, limited earthworks works are also required along with full depth pavement reconstruction and associated road markings. Road signage to be removed/ relocated or replaced. Some land take is required and as such boundary re-instatement works (walls, gates, driveways, etc.) are needed. Existing road markings to be removed and replaced.

- For 160m approximately, works have been categorized as **moderate** due to the removal of kerbs and footways greater than 500mm and the removal/realignment of drainage systems and services. Road lighting (and associated works i.e. cabling and ducting) along the route to be protected/relocated/diverted. Existing services (power supply, communications, water, gas) will have to be protected/relocated/diverted. To accommodate the 20m buffer a sizeable number of trees to be removed along the route and as such, limited earthworks works are also required along with full depth pavement reconstruction and associated road markings. Road

signage and road furniture (bins and bollards) will have to be removed/ relocated or replaced. No land take is required along this section.

- For the next 225m, approximately, the proposed works have been categorized as **major**. I.e. the works associated with widening of the road to accommodate a 20m buffer include the removal of kerbs and footways greater than 500mm and the removal of and installation of new drainage systems. Road lighting (and associated works i.e. cabling and ducting) along the route to be protected/relocated/diverted. Existing services (power supply, communications, water and gas) to be protected/relocated/diverted. To accommodate the 20m a number of trees to be removed along the route and as such, limited earthworks works are also required along with full depth pavement reconstruction and associated road markings. Road signage and road furniture to be removed/ relocated or replaced. Some land take is required and as such boundary re-instatement works (walls, gates, driveways, etc.) are needed. Existing road markings to be removed and replaced.

- For the next 310m approximately, works have been categorized as **moderate** due to the removal of kerbs and footways greater than 500mm and the removal/realignment of drainage systems and services. Road lighting (and associated works i.e. cabling and ducting) along the route to be protected/relocated/diverted. Existing services (power supply, communications, water, gas) will have to be protected/relocated/diverted. To accommodate the 20m buffer a sizeable number of trees to be removed along the route and as such, limited earthworks works are also required along with full depth pavement reconstruction and associated road markings. Road signage and road furniture (bins and bollards) will have to be removed/ relocated or replaced. No land take is required along this section.

- **Minor modifications** are required at the Sandymount Avenue/Simonscourt Road junction. I.e. the works associated with this categorization include: removal and replacement of kerbs, footways and paved areas, laying of Anti-skid surface, Protection/relocation/diversion of services (i.e. power supply, communications, water and gas), removal and replacement of existing road markings, dished kerbs and tactile paving at all crossing points, the provision of guardrails and bollards, landscaping works, additional traffic signals including ducting, cabling and chambers and additional signal poles/heads. No land take is required at this junction and as such property boundary re-instatement works are needed.

- For the 160m approximately, from Sandymount Avenue/Simonscourt Road works have been categorized as **moderate** due to the removal of kerbs and footways greater than 500mm and the removal/realignment of drainage systems and services. Road lighting (and associated works i.e. cabling and ducting) along the route to be protected/relocated/diverted. Existing services (power supply, communications, water and gas) will have to be protected/relocated/diverted. To accommodate the 20m buffer a number of trees to be removed along the route and as such, limited earthworks are also required along with full depth pavement reconstruction and associated road markings. Road signage and road furniture (bins, bollards, signal boxes, seating) will have to be removed/ relocated or replaced. No land take is required along this section.

- **Minor modifications** are required at the Serpentine Avenue/Merrion Road junction. I.e. the works associated with this categorization include: removal and replacement of kerbs, footways and paved areas, laying of Anti-skid surface, Protection/relocation/diversion of services (i.e. power supply, communications, water and gas), removal and replacement of existing road markings, dished kerbs and tactile paving at all crossing points, the provision of guardrails and bollards, landscaping works, additional traffic signals including ducting, cabling and chambers and additional signal poles/heads. No land take is required at this junction and as such property boundary re-instatement works are needed.

- For the 155m approximately, from Serpentine Avenue works have been categorized as **moderate** due to the removal of kerbs and footways greater than 500mm and the removal/realignment of drainage systems and services. Road lighting (and associated works i.e. cabling and ducting) along the route to be protected/relocated/diverted. Existing services (power supply, communications, water and gas) will have to be protected/relocated/diverted. To accommodate the 20m buffer a number of trees to be removed along the route and as such, limited earthworks are also required along with full depth pavement reconstruction and associated road markings. Road signage and road furniture (bins, bollards, signal boxes, seating) will have to be removed/ relocated or replaced. No land take is required along this section.

2.2.2 Pembroke Road

- **Minor modifications** are required at the Anglesea Road/Merrion Road/Pembroke Road junction. I.e. the works associated with this categorization include: removal and replacement of kerbs, footways and paved areas, laying of Anti-skid surface, Protection/relocation/diversion of services (i.e. power supply, communications, water and gas), removal and replacement of existing road markings, dished kerbs and tactile paving at all crossing points, the provision of guardrails and bollards, landscaping works, additional traffic signals including ducting, cabling and chambers and additional signal poles/heads. No land take is required at this junction and as such property boundary re-instatement works are needed.

- For 65m approximately, from the Anglesea Road junction works have been categorized as **moderate** due to the removal of kerbs and footways greater than 500mm and the removal/realignment of drainage systems and services. Road lighting (and associated works i.e. cabling and ducting) along the route to be protected/relocated/diverted. Existing services (power supply, communications, water and gas) will have to be protected/relocated/diverted. To accommodate the 20m buffer a number of trees to be removed along the route and as such, limited earthworks are also required along with full depth pavement reconstruction and associated road markings. Road signage and road furniture such as bins, bollards and signal boxes, will have to be removed/ relocated or replaced. No land take is required along this section.

- **Minor modifications** are required at the Herbert park/Shelbourne Road/Elgin Road/Pembroke Road junction. I.e. the works associated within this categorization include: removal and replacement of kerbs, footways and paved areas, laying of Anti-skid surface, Protection/relocation/diversion of services (i.e. power supply, communications, water and gas), removal and replacement of existing road markings, dished kerbs and tactile paving at all

crossing points, the provision of guardrails and bollards, landscaping works, additional traffic signals including ducting, cabling and chambers and additional signal poles/heads. No land take is required at this junction and as such property boundary re-instatement works are needed.

- For 190m approximately, from the Herbert Park junction, works have been categorized as **moderate** due to the removal of kerbs and footways greater than 500mm and the removal/realignment of drainage systems and services. Road lighting (and associated works i.e. cabling and ducting) along the route to be protected/relocated/diverted. Existing services (power supply, communications, water and gas) will have to be protected/relocated/diverted. To accommodate the 20m buffer a number of trees to be removed along the route and as such, limited earthworks are also required along with full depth pavement reconstruction and associated road markings. Road signage and road furniture such as bins, bollards and signal boxes, to be removed/ relocated or replaced. No land take is required along this section.

- **Minor modifications** are required at the Lansdowne Road/Northumberland Road/Pembroke Road junction. I.e. the works associated with this categorization include: removal and replacement of kerbs, footways and paved areas, laying of Anti-skid surface, Protection/relocation/diversion of services (i.e. power supply, communications, water and gas), removal and replacement of existing road markings, dished kerbs and tactile paving at all crossing points, the provision of guardrails and bollards, landscaping works, additional traffic signals including ducting, cabling and chambers and additional signal poles/heads. No land take is required at this junction and as such property boundary re-instatement works are needed.

- For 310m approximately, from the Lansdowne Road junction, works have been categorized as **moderate** due to the removal of kerbs and footways greater than 500mm and the removal/realignment of drainage systems and services. Central median and traffic bollards also to be removed/relocated/replaced. Road lighting (and associated works i.e. cabling and ducting) along the route to be protected/relocated/diverted. Existing services (power supply, communications, water and gas) will have to be protected/relocated/diverted. To accommodate the 20m buffer a number of trees to be removed along the route and as such, limited earthworks are also required along with full depth pavement reconstruction and associated road markings. Road signage and road furniture such as bins, bollards and signal boxes, to be removed/ relocated or replaced. No land take is required along this section.

- For the next 110m, approximately, the proposed works have been categorized as **major**. I.e. the works associated with widening of the road to accommodate a 20m buffer include the removal of kerbs and footways greater than 500mm and the removal of and installation of new drainage systems. Road lighting (and associated works i.e. cabling and ducting) along the route to be protected/relocated/diverted. Existing services (power supply, communications, water and gas) to be protected/relocated/diverted. To accommodate the 20m a number of trees to be removed along the route and as such, limited earthworks works are also required along with full depth pavement reconstruction and associated road markings. Road signage and road furniture to be removed/ relocated or replaced. Some land take is

required and as such boundary re-instatement works (walls, gates, driveways, etc.) are needed. Existing road markings to be removed and replaced.

- **Significant major modifications** are required at the Eastmoreland Place/Pembroke Road/Baggot Street Upper junction i.e. the works to accommodate the 20m buffer include: General site clearance, removal and replacement of kerbs, footways and paved areas, laying of Anti-skid surface, Protection/relocation/diversion of services (i.e. power supply, communications, water and gas), removal and replacement of existing road markings, dished kerbs and tactile paving at all crossing points, the provision of guardrails and bollards, landscaping works, additional traffic signals including ducting, cabling and chambers and additional signal poles/heads. Some land take is required at this junction and as such property boundary re-instatement works are needed.

- **Moderate upgrade modifications** are required at the Waterloo Road/Baggot Street junction i.e. the works to accommodate the buffer include: General site clearance, removal and replacement of kerbs, footways and paved areas, laying of Anti-skid surface, Protection/relocation/diversion of services (i.e. power supply, communications, water and gas), removal and replacement of existing road markings, dished kerbs and tactile paving at all crossing points, the provision of guardrails and bollards, landscaping works, additional traffic signals including ducting, cabling and chambers and additional signal poles/heads. No land take is required at this junction and as such property boundary re-instatement works are needed.

2.2.3 Baggot Street

- For the next 80m, the proposed works have been categorized as **minor**. I.e. the works to accommodate a 20m buffer include the removal and replacement of existing road markings and local road re-surfacing. Existing road signage to be removed and relocated and/or replaced.

- **Significant major modifications** are required at the Herbert Place/Wilton Terrace/Mespil Road/Haddington Road/Baggot Street Upper junction i.e. the works to accommodate the 20m buffer include: General site clearance, removal and replacement of kerbs, footways and paved areas, laying of Anti-skid surface, Protection/relocation/diversion of services (i.e. power supply, communications, water and gas), removal and replacement of existing road markings, dished kerbs and tactile paving at all crossing points, the provision of guardrails and bollards, landscaping works, additional traffic signals including ducting, cabling and chambers and additional signal poles/heads. Some land take is required at this junction and as such property boundary re-instatement works are needed.

- For 30m approximately, from the Herbert Street junction, works have been categorized as **moderate** due to the removal of kerbs and footways greater than 500mm and the removal/realignment of drainage systems and services. Central median and traffic bollards also to be removed/relocated/replaced. Road lighting (and associated works i.e. cabling and ducting) along the route to be protected/relocated/diverted. Existing services (power supply, communications, water and gas) will have to be protected/relocated/diverted. To accommodate the 20m buffer a number of trees to be removed along the route and as such, limited earthworks are also required along with full depth

pavement reconstruction and associated road markings. Local road resurfacing works to be conducted at several locations along this section. Road signage and road furniture such as bins, bollards and signal boxes, to be removed/ relocated or replaced. No land take is required along this section.

- **Moderate upgrade modifications** are required at the Herbert Street/Baggot Street junction i.e. the works to accommodate the buffer include: General site clearance, removal and replacement of kerbs, footways and paved areas, laying of Anti-skid surface, Protection/relocation/diversion of services (i.e. power supply, communications, water and gas), removal and replacement of existing road markings, dished kerbs and tactile paving at all crossing points, the provision of guardrails and bollards, landscaping works, additional traffic signals including ducting, cabling and chambers and additional signal poles/heads. No land take is required at this junction and as such property boundary re-instatement works are needed.

- For the next 175m approximately, works have been categorized as **moderate** due to the removal of kerbs and footways greater than 500mm and the removal/realignment of drainage systems and services. Road lighting (and associated works i.e. cabling and ducting) along the route to be protected/relocated/diverted. Existing services (power supply, communications, water, gas) will have to be protected/relocated/diverted. To accommodate the 20m buffer a sizeable number of trees to be removed along the route and as such, limited earthworks works are also required along with full depth pavement reconstruction and associated road markings. Road signage and road furniture (bins and bollards) will have to be removed/ relocated or replaced. No land take is required along this section.

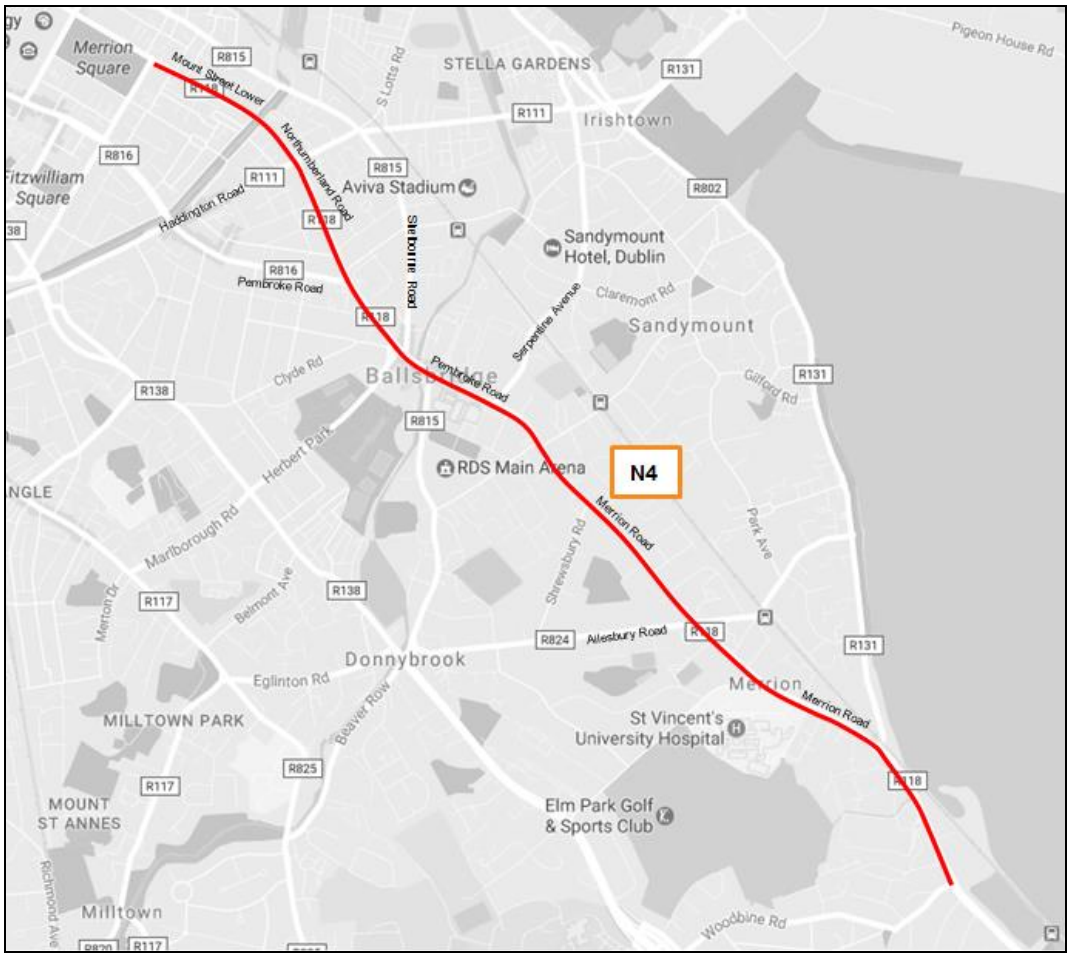
- For the next 110m, approximately, the proposed works have been categorized as **major**. I.e. the works associated with widening of the road to accommodate a 20m buffer include the removal of kerbs and footways greater than 500mm and the removal of and installation of new drainage systems. Road lighting (and associated works i.e. cabling and ducting) along the route to be protected/relocated/diverted. Existing services (power supply, communications, water and gas) to be protected/relocated/diverted. To accommodate the 20m a number of trees to be removed along the route and as such, limited earthworks works are also required along with full depth pavement reconstruction and associated road markings. Road signage and road furniture to be removed/ relocated or replaced. Some land take is required and as such boundary re-instatement works (walls, gates, driveways, etc.) are needed. Existing road markings to be removed and replaced.

- **Significant major modifications** are required at the Fitzwilliam Street Lower/Baggot Street Lower junction i.e. the works to accommodate the 20m buffer include: General site clearance, removal and replacement of kerbs, footways and paved areas, laying of Anti-skid surface, Protection/relocation/diversion of services (i.e. power supply, communications, water and gas), removal and replacement of existing road markings, dished kerbs and tactile paving at all crossing points, the provision of guardrails and bollards, landscaping works, additional traffic signals including ducting, cabling and chambers and additional signal poles/heads. Some land take is required at this junction and as such property boundary re-instatement works are needed.

- **Significant major modifications** are required at the Pembroke Street Lower/Baggot Street Lower junction i.e. the works to accommodate the 20m buffer include: General site clearance, removal and replacement of kerbs, footways and paved areas, laying of Anti-skid surface, Protection/relocation/diversion of services (i.e. power supply, communications, water and gas), removal and replacement of existing road markings, dished kerbs and tactile paving at all crossing points, the provision of guardrails and bollards, landscaping works, additional traffic signals including ducting, cabling and chambers and additional signal poles/heads. Some land take is required at this junction and as such property boundary re-instatement works are needed.

3. Route Option N2

3.1 Design Option 1



3.1.1 Merrion Road

- **Significant major modifications** are required at the Merrion Road/Trimleston Avenue junction i.e. the works to accommodate the 20m buffer include: General site clearance, removal and replacement of kerbs, footways and paved areas, laying of Anti-skid surface, Protection/relocation/diversion of services (i.e. power supply, communications, water and gas), removal and replacement of existing road markings, dished kerbs and tactile paving at all crossing points, the provision of guardrails and bollards, landscaping works, additional traffic signals including ducting, cabling and chambers and

additional signal poles/heads. Some land take is required at this junction and as such property boundary re-instatement works are needed.

- For 195m approximately from Trimleston Road travelling towards the city, works have been categorized as **moderate** due to the removal of kerbs and footways greater than 500mm and the removal/realignment of drainage systems and services. Road lighting (and associated works i.e. cabling and ducting) along the route to be protected/relocated/diverted. Existing services (power supply, communications, water, gas) will have to be protected/relocated/diverted. Road signage to be removed/ relocated or replaced. No land take is required along this section.

- For the next 15m, the proposed works have been categorized as **minor**. I.e. the works associated with widening of the road to accommodate a 20m buffer include the removal of kerbs and footways with a width less than 500mm. Existing road markings to be removed and replaced. No land take is required along this section.

- **Minor modifications** are required at the Elmpark/Merrion Road junction. I.e. the works associated with this categorization include: removal and replacement of kerbs, footways and paved areas, laying of Anti-skid surface, Protection/relocation/diversion of services (i.e. power supply, communications, water and gas), removal and replacement of existing road markings, dished kerbs and tactile paving at all crossing points, the provision of guardrails and bollards, landscaping works, additional traffic signals including ducting, cabling and chambers and additional signal poles/heads. No land take is required at this junction and as such property boundary re-instatement works are needed.

- For the next 320m approximately, works have been categorized as **moderate** due to the removal of kerbs, central median and footways with a width greater than 500mm and the removal/realignment of drainage systems and services. Road lighting (and associated works i.e. cabling and ducting) along the route to be protected/relocated/diverted. Existing services (power supply, communications, water and gas) to be protected/relocated/diverted. Road signage and road furniture (bins and bollards) will have to be removed/ relocated or replaced. Safety barriers/guard rails to be removed/relocated/replaced at entrance to Elmpark Business Campus and along the central median to entrance to St. Mary's Nursing Home. No land take is required along this section.

- For 162m approximately, works have been categorized as **moderate** due to the removal of kerbs and footways greater than 500mm and the removal/realignment of drainage systems and services. Road lighting (and associated works i.e. cabling and ducting) along the route to be protected/relocated/diverted. Existing services (power supply, communications, water, gas) will have to be protected/relocated/diverted. To accommodate the 20m buffer a sizeable number of trees to be removed along the route and as such, limited earthworks works are also required along with full depth pavement reconstruction and associated road markings. Road signage and road furniture (bins and bollards) will have to be removed/ relocated or replaced. No land take is required along this section.

- For the next 375m approximately, works have been categorized as **moderate** due to the removal of kerbs and footways greater than 500mm and the

removal/realignment of drainage systems and services. Road lighting (and associated works i.e. cabling and ducting) along the route to be protected/relocated/diverted. Existing services (power supply, communications, water, gas) will have to be protected/relocated/diverted. To accommodate the 20m buffer a number of trees to be removed along the route and as such, limited earthworks works are also required along with full depth pavement reconstruction and associated road markings. Road signage and road furniture (bins and bollards) will have to be removed/ relocated or replaced. No land take is required along this section.

- **Significant major modifications** are required at the Merrion Road/Nutley Lane junction i.e. the works to accommodate the 20m buffer include: General site clearance, removal and replacement of kerbs, footways and paved areas, laying of Anti-skid surface, Protection/relocation/diversion of services (i.e. power supply, communications, water and gas), removal and replacement of existing road markings, dished kerbs and tactile paving at all crossing points, the provision of guardrails and bollards, landscaping works, additional traffic signals including ducting, cabling and chambers and additional signal poles/heads. Some land take is required at this junction and as such property boundary re-instatement works are needed.

- For 90m approximately from the Nutley lane junction travelling towards the city, works have been categorized as **moderate** due to the removal of kerbs and footways greater than 500mm and the removal/realignment of drainage systems and services. Road lighting (and associated works i.e. cabling and ducting) along the route to be protected/relocated/diverted. To accommodate the 20m buffer a number of trees to be removed along the route and as such, limited earthworks works are also required along with full depth pavement reconstruction and associated road markings. Existing services (power supply, communications, water, gas) will have to be protected/relocated/diverted. Road signage to be removed/ relocated or replaced. No land take is required along this section.

- For the next 90m, approximately, the proposed works have been categorized as **major**. I.e. the works associated with widening of the road to accommodate a 20m buffer include the removal of kerbs and footways greater than 500mm and the removal of and installation of new drainage systems. Road lighting (and associated works i.e. cabling and ducting) along the route to be protected/relocated/diverted. Existing services (power supply, communications, water and gas) to be protected/relocated/diverted. To accommodate the 20m a number of trees to be removed along the route and as such, limited earthworks works are also required along with full depth pavement reconstruction and associated road markings. Road signage to be removed/ relocated or replaced. Some land take is required and as such boundary re-instatement works (walls, gates, driveways, etc.) are needed. Existing road markings to be removed and replaced.

- **Moderate upgrade modifications** are required at the Aylesbury road/Merrion Road junction i.e. the works to accommodate the buffer include: General site clearance, removal and replacement of kerbs, footways and paved areas, laying of Anti-skid surface, Protection/relocation/diversion of services (i.e. power supply, communications, water and gas), removal and replacement of existing road markings, dished kerbs and tactile paving at all crossing points, the provision of guardrails and bollards, landscaping works,

additional traffic signals including ducting, cabling and chambers and additional signal poles/heads. No land take is required at this junction and as such property boundary re-instatement works are needed.

- For the next 30m approximately, works have been categorized as **moderate** due to the removal of kerbs and footways greater than 500mm and the removal/realignment of drainage systems and services. Road lighting (and associated works i.e. cabling and ducting) along the route to be protected/relocated/diverted. Existing services (power supply, communications, water and gas) will have to be protected/relocated/diverted. To accommodate the 20m buffer a number of trees to be removed along the route and as such, limited earthworks works are also required along with full depth pavement reconstruction and associated road markings. Road signage and road furniture (bins, bollards, signal boxes, seating) will have to be removed/ relocated or replaced. No land take is required along this section.

- For the next 145m, approximately, the proposed works have been categorized as **major**. I.e. the works associated with widening of the road to accommodate a 20m buffer include the removal of kerbs and footways greater than 500mm and the removal of and installation of new drainage systems. Road lighting (and associated works i.e. cabling and ducting) along the route to be protected/relocated/diverted. Existing services (power supply, communications, water and gas) to be protected/relocated/diverted. To accommodate the 20m a number of trees to be removed along the route and as such, limited earthworks works are also required along with full depth pavement reconstruction and associated road markings. Road signage and road furniture (e.g. bollards at Merlyn Park junction) to be removed/ relocated or replaced. Some land take is required and as such boundary re-instatement works (walls, gates, driveways, etc.) are needed. Existing road markings to be removed and replaced.

- For the next 115m approximately, works have been categorized as **moderate** due to the removal of kerbs and footways greater than 500mm and the removal/realignment of drainage systems and services. Road lighting (and associated works i.e. cabling and ducting) along the route to be protected/relocated/diverted. Existing services (power supply, communications, water and gas) will have to be protected/relocated/diverted. To accommodate the 20m buffer a number of trees to be removed along the route and as such, limited earthworks are also required along with full depth pavement reconstruction and associated road markings. Road signage and road furniture (bins, bollards, signal boxes, seating) will have to be removed/ relocated or replaced. No land take is required along this section.

- For the next 225m, approximately, the proposed works have been categorized as **major**. I.e. the works associated with widening of the road to accommodate a 20m buffer include the removal of kerbs and footways greater than 500mm and the removal of and installation of new drainage systems. Road lighting (and associated works i.e. cabling and ducting) along the route to be protected/relocated/diverted. Existing services (power supply, communications, water and gas) to be protected/relocated/diverted. To accommodate the 20m a number of trees to be removed along the route and as such, limited earthworks works are also required along with full depth pavement reconstruction and associated road markings. Road signage and road furniture to be removed/ relocated or replaced. Some land take is

required and as such boundary re-instatement works (walls, gates, driveways, etc.) are needed. Existing road markings to be removed and replaced.

- For the next 310m approximately, works have been categorized as **moderate** due to the removal of kerbs and footways greater than 500mm and the removal/realignment of drainage systems and services. Road lighting (and associated works i.e. cabling and ducting) along the route to be protected/relocated/diverted. Existing services (power supply, communications, water and gas) will have to be protected/relocated/diverted. To accommodate the 20m buffer a number of trees to be removed along the route and as such, limited earthworks are also required along with full depth pavement reconstruction and associated road markings. Road signage and road furniture (bins, bollards, signal boxes, seating) will have to be removed/ relocated or replaced. No land take is required along this section.

- **Minor modifications** are required at the Sandymount Avenue/Simonscourt Road junction. I.e. the works associated with this categorization include: removal and replacement of kerbs, footways and paved areas, laying of Anti-skid surface, Protection/relocation/diversion of services (i.e. power supply, communications, water and gas), removal and replacement of existing road markings, dished kerbs and tactile paving at all crossing points, the provision of guardrails and bollards, landscaping works, additional traffic signals including ducting, cabling and chambers and additional signal poles/heads. No land take is required at this junction and as such property boundary re-instatement works are needed.

- For 160m approximately, from Sandymount Avenue/Simonscourt Road works have been categorized as **moderate** due to the removal of kerbs and footways greater than 500mm and the removal/realignment of drainage systems and services. Road lighting (and associated works i.e. cabling and ducting) along the route to be protected/relocated/diverted. Existing services (power supply, communications, water and gas) will have to be protected/relocated/diverted. To accommodate the 20m buffer a number of trees to be removed along the route and as such, limited earthworks are also required along with full depth pavement reconstruction and associated road markings. Road signage and road furniture (bins, bollards, signal boxes, seating) will have to be removed/ relocated or replaced. No land take is required along this section.

- **Minor modifications** are required at the Serpentine Avenue/Merrion Road junction. I.e. the works associated with this categorization include: removal and replacement of kerbs, footways and paved areas, laying of Anti-skid surface, Protection/relocation/diversion of services (i.e. power supply, communications, water and gas), removal and replacement of existing road markings, dished kerbs and tactile paving at all crossing points, the provision of guardrails and bollards, landscaping works, additional traffic signals including ducting, cabling and chambers and additional signal poles/heads. No land take is required at this junction and as such property boundary re-instatement works are needed.

- For 155m approximately, from Serpentine Avenue works have been categorized as **moderate** due to the removal of kerbs and footways greater than 500mm and the removal/realignment of drainage systems and services. Road lighting (and associated works i.e. cabling and ducting) along the route

to be protected/relocated/diverted. Existing services (power supply, communications, water and gas) will have to be protected/relocated/diverted. To accommodate the 20m buffer a number of trees to be removed along the route and as such, limited earthworks are also required along with full depth pavement reconstruction and associated road markings. Road signage and road furniture (bins, bollards, signal boxes, seating) will have to be removed/ relocated or replaced. No land take is required along this section.

3.1.2 Pembroke Road

- **Minor modifications** are required at the Anglesea Road/Merrion Road/Pembroke Road junction. I.e. the works associated with this categorization include: removal and replacement of kerbs, footways and paved areas, laying of Anti-skid surface, Protection/relocation/diversion of services (i.e. power supply, communications, water and gas), removal and replacement of existing road markings, dished kerbs and tactile paving at all crossing points, the provision of guardrails and bollards, landscaping works, additional traffic signals including ducting, cabling and chambers and additional signal poles/heads. No land take is required at this junction and as such property boundary re-instatement works are needed.

- For 65m approximately, from the Anglesea Road junction works have been categorized as **moderate** due to the removal of kerbs and footways greater than 500mm and the removal/realignment of drainage systems and services. Road lighting (and associated works i.e. cabling and ducting) along the route to be protected/relocated/diverted. Existing services (power supply, communications, water and gas) will have to be protected/relocated/diverted. To accommodate the 20m buffer a number of trees to be removed along the route and as such, limited earthworks are also required along with full depth pavement reconstruction and associated road markings. Road signage and road furniture such as bins, bollards and signal boxes, will have to be removed/ relocated or replaced. No land take is required along this section.

- **Minor modifications** are required at the Herbert park/Shelbourne Road/Elgin Road/Pembroke Road junction. I.e. the works associated within this categorization include: removal and replacement of kerbs, footways and paved areas, laying of Anti-skid surface, Protection/relocation/diversion of services (i.e. power supply, communications, water and gas), removal and replacement of existing road markings, dished kerbs and tactile paving at all crossing points, the provision of guardrails and bollards, landscaping works, additional traffic signals including ducting, cabling and chambers and additional signal poles/heads. No land take is required at this junction and as such property boundary re-instatement works are needed.

- For 210m approximately, from the Herbert Park junction, works have been categorized as **moderate** due to the removal of kerbs and footways greater than 500mm and the removal/realignment of drainage systems and services. Road lighting (and associated works i.e. cabling and ducting) along the route to be protected/relocated/diverted. Existing services (power supply, communications, water and gas) will have to be protected/relocated/diverted. To accommodate the 20m buffer a number of trees to be removed along the route and as such, limited earthworks are also required along with full depth pavement reconstruction and associated road markings. Road signage and

road furniture such as bins, bollards and signal boxes, to be removed/ relocated or replaced. No land take is required along this section.

- **Minor modifications** are required at the Lansdowne Road/Northumberland Road/Pembroke Road junction. I.e. the works associated with this categorization include: removal and replacement of kerbs, footways and paved areas, laying of Anti-skid surface, Protection/relocation/diversion of services (i.e. power supply, communications, water and gas), removal and replacement of existing road markings, dished kerbs and tactile paving at all crossing points, the provision of guardrails and bollards, landscaping works, additional traffic signals including ducting, cabling and chambers and additional signal poles/heads. No land take is required at this junction and as such property boundary re-instatement works are needed.

3.1.3 Northumberland Road

- For 30m approximately, from the Lansdowne Road junction, works have been categorized as **moderate** due to the removal of kerbs and footways greater than 500mm and the removal/realignment of drainage systems and services. Road lighting (and associated works i.e. cabling and ducting) along the route to be protected/relocated/diverted. Existing services (power supply, communications, water and gas) will have to be protected/relocated/diverted. To accommodate the 20m buffer a number of trees to be removed along the route and as such, limited earthworks are also required along with full depth pavement reconstruction and associated road markings. Road signage and road furniture such as bins, bollards and signal boxes, to be removed/ relocated or replaced. No land take is required along this section.

- For the next 345m, approximately, the proposed works have been categorized as **major**. I.e. the works associated with widening of the road to accommodate a 20m buffer include the removal of kerbs and footways greater than 500mm and the removal of and installation of new drainage systems. Road lighting (and associated works i.e. cabling and ducting) along the route to be protected/relocated/diverted. Existing services (power supply, communications, water and gas) to be protected/relocated/diverted. To accommodate the 20m buffer a number of trees to be removed along the route and as such, limited earthworks works are also required along with full depth pavement reconstruction and associated road markings. Road signage and road furniture to be removed/ relocated or replaced. Some land take is required and as such boundary re-instatement works (walls, gates, driveways, etc.) are needed. Existing road markings to be removed and replaced.

- **Significant major modifications** are required at the Haddington Road/Northumberland Road junction i.e. the works to accommodate the 20m buffer include: General site clearance, removal and replacement of kerbs, footways and paved areas, laying of Anti-skid surface, Protection/relocation/diversion of services (i.e. power supply, communications, water and gas), removal and replacement of existing road markings, dished kerbs and tactile paving at all crossing points, the provision of guardrails and bollards, landscaping works, additional traffic signals including ducting, cabling and chambers and additional signal poles/heads. Some land take is required at this junction and as such property boundary re-instatement works are needed.

- For 160m approximately from the Haddington Road junction the proposed works have been categorized as **major**. I.e. the works associated with widening of the road to accommodate a 20m buffer include the removal of kerbs and footways greater than 500mm and the removal of and installation of new drainage systems. Road lighting (and associated works i.e. cabling and ducting) along the route to be protected/relocated/diverted. Existing services (power supply, communications, water and gas) to be protected/relocated/diverted. To accommodate the 20m buffer a number of trees to be removed along the route and as such, limited earthworks works are also required along with full depth pavement reconstruction and associated road markings. Road signage and road furniture to be removed/ relocated or replaced. Some land take is required and as such boundary re-instatement works (walls, gates, driveways, etc.) are needed. Existing road markings to be removed and replaced.

3.1.4 Mount Street Lower

- **Significant major modifications** are required at the Northumberland Road/Clanwilliam Place/Mount Street Lower junction i.e. the works to accommodate the 20m buffer include: General site clearance, removal and replacement of kerbs, footways and paved areas, laying of Anti-skid surface, Protection/relocation/diversion of services (i.e. power supply, communications, water and gas), removal and replacement of existing road markings, dished kerbs and tactile paving at all crossing points, the provision of guardrails and bollards, landscaping works, additional traffic signals including ducting, cabling and chambers and additional signal poles/heads. Some land take is required at this junction and as such property boundary re-instatement works are needed.

- For the next 170m approximately, works have been categorized as **moderate** due to the removal of kerbs and footways greater than 500mm and the removal/realignment of drainage systems and services. Road lighting (and associated works i.e. cabling and ducting) along the route to be protected/relocated/diverted. Existing services (power supply, communications, water and gas) will have to be protected/relocated/diverted. To accommodate the 20m buffer a number of trees to be removed along the route and as such, limited earthworks are also required along with full depth pavement reconstruction and associated road markings. Road signage and road furniture (bins, bollards, signal boxes, seating) will have to be removed/ relocated or replaced. No land take is required along this section.

- For the next 8m, approximately, the proposed works have been categorized as **major**. I.e. the works associated with widening of the road to accommodate a 20m buffer include the removal of kerbs and footways greater than 500mm and the removal of and installation of new drainage systems. Road lighting (and associated works i.e. cabling and ducting) along the route to be protected/relocated/diverted. Existing services (power supply, communications, water and gas) to be protected/relocated/diverted. To accommodate the 20m a number of trees to be removed along the route and as such, limited earthworks works are also required along with full depth pavement reconstruction and associated road markings. Road signage and road furniture to be removed/ relocated or replaced. Some land take is required and as such boundary re-instatement works (walls, gates, driveways, etc.) are needed. Existing road markings to be removed and replaced.

- For the next 145m approximately, works have been categorized as **moderate** due to the removal of kerbs and footways greater than 500mm and the removal/realignment of drainage systems and services. Road lighting (and associated works i.e. cabling and ducting) along the route to be protected/relocated/diverted. Existing services (power supply, communications, water and gas) will have to be protected/relocated/diverted. To accommodate the 20m buffer a number of trees to be removed along the route and as such, limited earthworks are also required along with full depth pavement reconstruction and associated road markings. Road signage and road furniture (bins, bollards, signal boxes, seating) will have to be removed/ relocated or replaced. No land take is required along this section.

- For the next 40m, approximately, the proposed works have been categorized as **major**. I.e. the works associated with widening of the road to accommodate a 20m buffer include the removal of kerbs and footways greater than 500mm and the removal of and installation of new drainage systems. Road lighting (and associated works i.e. cabling and ducting) along the route to be protected/relocated/diverted. Existing services (power supply, communications, water and gas) to be protected/relocated/diverted. To accommodate the 20m a number of trees to be removed along the route and as such, limited earthworks works are also required along with full depth pavement reconstruction and associated road markings. Road signage and road furniture to be removed/ relocated or replaced. Some land take is required and as such boundary re-instatement works (walls, gates, driveways, etc.) are needed. Existing road markings to be removed and replaced.

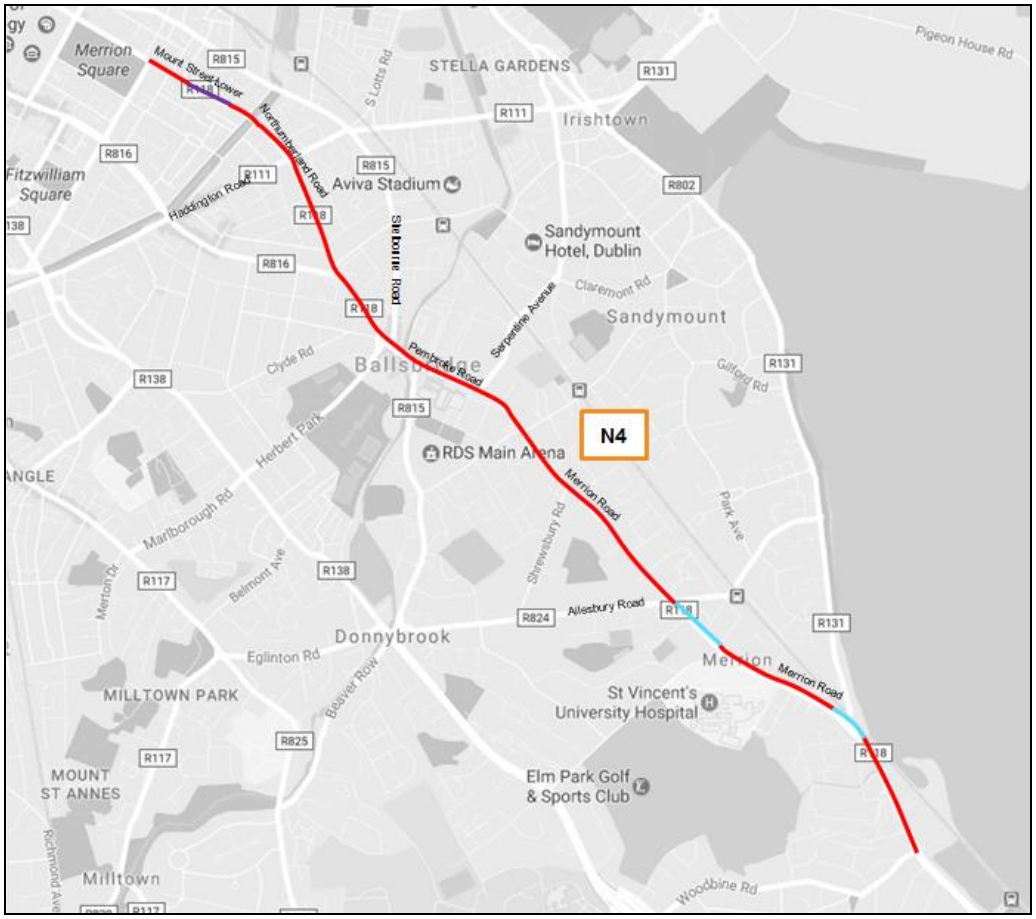
- **Significant major modifications** are required at the Holles Street**/**Merrion Square/Mount Street Lower junction i.e. the works to accommodate the 20m buffer include: General site clearance, removal and replacement of kerbs, footways and paved areas, laying of Anti-skid surface, Protection/relocation/diversion of services (i.e. power supply, communications, water and gas), removal and replacement of existing road markings, dished kerbs and tactile paving at all crossing points, the provision of guardrails and bollards, landscaping works, additional traffic signals including ducting, cabling and chambers and additional signal poles/heads. Some land take is required at this junction and as such property boundary re-instatement works are needed.

- For the next 235m approximately, works have been categorized as **moderate** due to the removal of kerbs and footways greater than 500mm and the removal/realignment of drainage systems and services. Road lighting (and associated works i.e. cabling and ducting) along the route to be protected/relocated/diverted. Existing services (power supply, communications, water and gas) will have to be protected/relocated/diverted. To accommodate the 20m buffer a number of trees to be removed along the route and as such, limited earthworks are also required along with full depth pavement reconstruction and associated road markings. Road signage and road furniture (bins, bollards, signal boxes, seating) will have to be removed/ relocated or replaced. No land take is required along this section.

- **Minor modifications** are required at the Merrion Square North/Merrion Street Lower junction. I.e. the works associated with this categorization include: removal and replacement of kerbs, footways and paved areas, laying of Anti-skid surface, Protection/relocation/diversion of services (i.e. power supply,

communications, water and gas), removal and replacement of existing road markings, dished kerbs and tactile paving at all crossing points, the provision of guardrails and bollards, landscaping works, additional traffic signals including ducting, cabling and chambers and additional signal poles/heads. No land take is required at this junction and as such property boundary re-instatement works are needed.

3.2 Design Option 2



3.2.1 Merrion Road

- **Significant major modifications** are required at the Merrion Road/Trimleston Avenue junction i.e. the works to accommodate the 20m buffer include: General site clearance, removal and replacement of kerbs, footways and paved areas, laying of Anti-skid surface, Protection/relocation/diversion of services (i.e. power supply, communications, water and gas), removal and replacement of existing road markings, dished kerbs and tactile paving at all crossing points, the provision of guardrails and bollards, landscaping works, additional traffic signals including ducting, cabling and chambers and additional signal poles/heads. Some land take is required at this junction and as such property boundary re-instatement works are needed.

- For 195m approximately from Trimleston Road travelling towards the city, works have been categorized as **moderate** due to the removal of kerbs and footways greater than 500mm and the removal/realignment of drainage systems and services. Road lighting (and associated works i.e. cabling and

ducting) along the route to be protected/relocated/diverted. Existing services (power supply, communications, water, gas) will have to be protected/relocated/diverted. Road signage to be removed/ relocated or replaced. No land take is required along this section.

- For the next 15m, the proposed works have been categorized as **minor**. I.e. the works associated with widening of the road to accommodate a 20m buffer include the removal of kerbs and footways with a width less than 500mm. Existing road markings to be removed and replaced. No land take is required along this section.

- **Minor modifications** are required at the Elmpark/Merrion Road junction. I.e. the works associated with this categorization include: removal and replacement of kerbs, footways and paved areas, laying of Anti-skid surface, Protection/relocation/diversion of services (i.e. power supply, communications, water and gas), removal and replacement of existing road markings, dished kerbs and tactile paving at all crossing points, the provision of guardrails and bollards, landscaping works, additional traffic signals including ducting, cabling and chambers and additional signal poles/heads. No land take is required at this junction and as such property boundary re-instatement works are needed.

- For the next 800m approximately, works have been categorized as **moderate** due to the removal of kerbs, central median and footways with a width greater than 500mm and the removal/realignment of drainage systems and services. Road lighting (and associated works i.e. cabling and ducting) along the route to be protected/relocated/diverted. Existing services (power supply, communications, water and gas) to be protected/relocated/diverted. Road signage and road furniture (bins and bollards) will have to be removed/ relocated or replaced. Safety barriers/guard rails to be removed/relocated/replaced at entrance to Elmpark Business Campus and along the central median to entrance to St. Mary's Nursing Home. No land take is required along this section.

- **Significant major modifications** are required at the Merrion Road/Nutley Lane junction i.e. the works to accommodate the 20m buffer include: General site clearance, removal and replacement of kerbs, footways and paved areas, laying of Anti-skid surface, Protection/relocation/diversion of services (i.e. power supply, communications, water and gas), removal and replacement of existing road markings, dished kerbs and tactile paving at all crossing points, the provision of guardrails and bollards, landscaping works, additional traffic signals including ducting, cabling and chambers and additional signal poles/heads. Some land take is required at this junction and as such property boundary re-instatement works are needed.

- For 205m approximately from the Nutley lane junction travelling towards the city, works have been categorized as **moderate** due to the removal of kerbs and footways with a width greater than 500mm and the removal/realignment of drainage systems and services. Road lighting (and associated works i.e. cabling and ducting) along the route to be protected/relocated/diverted. To accommodate the 20m buffer a number of trees to be removed along the route and as such, limited earthworks works are also required along with full depth pavement reconstruction and associated road markings. Existing services (power supply, communications, water, gas) will have to be

protected/relocated/diverted. Road signage to be removed/ relocated or replaced. No land take is required along this section.

- **Moderate upgrade modifications** are required at the Aylesbury road/Merrion Road junction i.e. the works to accommodate the buffer include: General site clearance, removal and replacement of kerbs, footways and paved areas, laying of Anti-skid surface, Protection/relocation/diversion of services (i.e. power supply, communications, water and gas), removal and replacement of existing road markings, dished kerbs and tactile paving at all crossing points, the provision of guardrails and bollards, landscaping works, additional traffic signals including ducting, cabling and chambers and additional signal poles/heads. No land take is required at this junction and as such property boundary re-instatement works are needed.

- For the next 95m, approximately, the proposed works have been categorized as **major**. I.e. the works associated with widening of the road to accommodate a 20m buffer include the removal of kerbs and footways greater than 500mm and the removal of and installation of new drainage systems. Road lighting (and associated works i.e. cabling and ducting) along the route to be protected/relocated/diverted. Existing services (power supply, communications, water and gas) to be protected/relocated/diverted. To accommodate the 20m a number of trees to be removed along the route and as such, limited earthworks works are also required along with full depth pavement reconstruction and associated road markings. Road signage to be removed/ relocated or replaced. Some land take is required and as such boundary re-instatement works (walls, gates, driveways, etc.) are needed. Existing road markings to be removed and replaced.

- For 160m approximately, works have been categorized as **moderate** due to the removal of kerbs and footways greater than 500mm and the removal/realignment of drainage systems and services. Road lighting (and associated works i.e. cabling and ducting) along the route to be protected/relocated/diverted. Existing services (power supply, communications, water, gas) will have to be protected/relocated/diverted. To accommodate the 20m buffer a sizeable number of trees to be removed along the route and as such, limited earthworks works are also required along with full depth pavement reconstruction and associated road markings. Road signage and road furniture (bins and bollards) will have to be removed/ relocated or replaced. No land take is required along this section.

- For the next 225m, approximately, the proposed works have been categorized as **major**. I.e. the works associated with widening of the road to accommodate a 20m buffer include the removal of kerbs and footways greater than 500mm and the removal of and installation of new drainage systems. Road lighting (and associated works i.e. cabling and ducting) along the route to be protected/relocated/diverted. Existing services (power supply, communications, water and gas) to be protected/relocated/diverted. To accommodate the 20m a number of trees to be removed along the route and as such, limited earthworks works are also required along with full depth pavement reconstruction and associated road markings. Road signage and road furniture to be removed/ relocated or replaced. Some land take is required and as such boundary re-instatement works (walls, gates, driveways, etc.) are needed. Existing road markings to be removed and replaced.

- For the next 310m approximately, works have been categorized as **moderate** due to the removal of kerbs and footways greater than 500mm and the removal/realignment of drainage systems and services. Road lighting (and associated works i.e. cabling and ducting) along the route to be protected/relocated/diverted. Existing services (power supply, communications, water, gas) will have to be protected/relocated/diverted. To accommodate the 20m buffer a sizeable number of trees to be removed along the route and as such, limited earthworks works are also required along with full depth pavement reconstruction and associated road markings. Road signage and road furniture (bins and bollards) will have to be removed/ relocated or replaced. No land take is required along this section.

- **Minor modifications** are required at the Sandymount Avenue/Simonscourt Road junction. I.e. the works associated with this categorization include: removal and replacement of kerbs, footways and paved areas, laying of Anti-skid surface, Protection/relocation/diversion of services (i.e. power supply, communications, water and gas), removal and replacement of existing road markings, dished kerbs and tactile paving at all crossing points, the provision of guardrails and bollards, landscaping works, additional traffic signals including ducting, cabling and chambers and additional signal poles/heads. No land take is required at this junction and as such property boundary re-instatement works are needed.

- For the 160m approximately, from Sandymount Avenue/Simonscourt Road works have been categorized as **moderate** due to the removal of kerbs and footways greater than 500mm and the removal/realignment of drainage systems and services. Road lighting (and associated works i.e. cabling and ducting) along the route to be protected/relocated/diverted. Existing services (power supply, communications, water and gas) will have to be protected/relocated/diverted. To accommodate the 20m buffer a number of trees to be removed along the route and as such, limited earthworks are also required along with full depth pavement reconstruction and associated road markings. Road signage and road furniture (bins, bollards, signal boxes, seating) will have to be removed/ relocated or replaced. No land take is required along this section.

- **Minor modifications** are required at the Serpentine Avenue/Merrion Road junction. I.e. the works associated with this categorization include: removal and replacement of kerbs, footways and paved areas, laying of Anti-skid surface, Protection/relocation/diversion of services (i.e. power supply, communications, water and gas), removal and replacement of existing road markings, dished kerbs and tactile paving at all crossing points, the provision of guardrails and bollards, landscaping works, additional traffic signals including ducting, cabling and chambers and additional signal poles/heads. No land take is required at this junction and as such property boundary re-instatement works are needed.

- For the 155m approximately, from Serpentine Avenue works have been categorized as **moderate** due to the removal of kerbs and footways greater than 500mm and the removal/realignment of drainage systems and services. Road lighting (and associated works i.e. cabling and ducting) along the route to be protected/relocated/diverted. Existing services (power supply, communications, water and gas) will have to be protected/relocated/diverted. To accommodate the 20m buffer a number of trees to be removed along the

route and as such, limited earthworks are also required along with full depth pavement reconstruction and associated road markings. Road signage and road furniture (bins, bollards, signal boxes, seating) will have to be removed/ relocated or replaced. No land take is required along this section.

3.2.2 Pembroke Road

- **Minor modifications** are required at the Anglesea Road/Merrion Road/Pembroke Road junction. I.e. the works associated with this categorization include: removal and replacement of kerbs, footways and paved areas, laying of Anti-skid surface, Protection/relocation/diversion of services (i.e. power supply, communications, water and gas), removal and replacement of existing road markings, dished kerbs and tactile paving at all crossing points, the provision of guardrails and bollards, landscaping works, additional traffic signals including ducting, cabling and chambers and additional signal poles/heads. No land take is required at this junction and as such property boundary re-instatement works are needed.

- For 65m approximately, from the Anglesea Road junction works have been categorized as **moderate** due to the removal of kerbs and footways greater than 500mm and the removal/realignment of drainage systems and services. Road lighting (and associated works i.e. cabling and ducting) along the route to be protected/relocated/diverted. Existing services (power supply, communications, water and gas) will have to be protected/relocated/diverted. To accommodate the 20m buffer a number of trees to be removed along the route and as such, limited earthworks are also required along with full depth pavement reconstruction and associated road markings. Road signage and road furniture such as bins, bollards and signal boxes, will have to be removed/ relocated or replaced. No land take is required along this section.

- **Minor modifications** are required at the Herbert park/Shelbourne Road/Elgin Road/Pembroke Road junction. I.e. the works associated within this categorization include: removal and replacement of kerbs, footways and paved areas, laying of Anti-skid surface, Protection/relocation/diversion of services (i.e. power supply, communications, water and gas), removal and replacement of existing road markings, dished kerbs and tactile paving at all crossing points, the provision of guardrails and bollards, landscaping works, additional traffic signals including ducting, cabling and chambers and additional signal poles/heads. No land take is required at this junction and as such property boundary re-instatement works are needed.

- For 190m approximately, from the Herbert Park junction, works have been categorized as **moderate** due to the removal of kerbs and footways greater than 500mm and the removal/realignment of drainage systems and services. Road lighting (and associated works i.e. cabling and ducting) along the route to be protected/relocated/diverted. Existing services (power supply, communications, water and gas) will have to be protected/relocated/diverted. To accommodate the 20m buffer a number of trees to be removed along the route and as such, limited earthworks are also required along with full depth pavement reconstruction and associated road markings. Road signage and road furniture such as bins, bollards and signal boxes, to be removed/ relocated or replaced. No land take is required along this section.

- **Minor modifications** are required at the Lansdowne Road/Northumberland Road/Pembroke Road junction. I.e. the works associated with this categorization include: removal and replacement of kerbs, footways and paved areas, laying of Anti-skid surface, Protection/relocation/diversion of services (i.e. power supply, communications, water and gas), removal and replacement of existing road markings, dished kerbs and tactile paving at all crossing points, the provision of guardrails and bollards, landscaping works, additional traffic signals including ducting, cabling and chambers and additional signal poles/heads. No land take is required at this junction and as such property boundary re-instatement works are needed.

3.2.3 Northumberland Road

- For 30m approximately, from the Lansdowne Road junction, works have been categorized as **moderate** due to the removal of kerbs and footways greater than 500mm and the removal/realignment of drainage systems and services. Road lighting (and associated works i.e. cabling and ducting) along the route to be protected/relocated/diverted. Existing services (power supply, communications, water and gas) will have to be protected/relocated/diverted. To accommodate the 20m buffer a number of trees to be removed along the route and as such, limited earthworks are also required along with full depth pavement reconstruction and associated road markings. Road signage and road furniture such as bins, bollards and signal boxes, to be removed/ relocated or replaced. No land take is required along this section.

- For the next 345m, approximately, the proposed works have been categorized as **major**. I.e. the works associated with widening of the road to accommodate a 20m buffer include the removal of kerbs and footways greater than 500mm and the removal of and installation of new drainage systems. Road lighting (and associated works i.e. cabling and ducting) along the route to be protected/relocated/diverted. Existing services (power supply, communications, water and gas) to be protected/relocated/diverted. To accommodate the 20m buffer a number of trees to be removed along the route and as such, limited earthworks works are also required along with full depth pavement reconstruction and associated road markings. Road signage and road furniture to be removed/ relocated or replaced. Some land take is required and as such boundary re-instatement works (walls, gates, driveways, etc.) are needed. Existing road markings to be removed and replaced.

- **Significant major modifications** are required at the Haddington Road/Northumberland Road junction i.e. the works to accommodate the 20m buffer include: General site clearance, removal and replacement of kerbs, footways and paved areas, laying of Anti-skid surface, Protection/relocation/diversion of services (i.e. power supply, communications, water and gas), removal and replacement of existing road markings, dished kerbs and tactile paving at all crossing points, the provision of guardrails and bollards, landscaping works, additional traffic signals including ducting, cabling and chambers and additional signal poles/heads. Some land take is required at this junction and as such property boundary re-instatement works are needed.

- For 110m approximately from the Haddington Road junction the proposed works have been categorized as **major**. I.e. the works associated with widening of the road to accommodate a 20m buffer include the removal of

kerbs and footways greater than 500mm and the removal of and installation of new drainage systems. Road lighting (and associated works i.e. cabling and ducting) along the route to be protected/relocated/diverted. Existing services (power supply, communications, water and gas) to be protected/relocated/diverted. To accommodate the 20m buffer a number of trees to be removed along the route and as such, limited earthworks works are also required along with full depth pavement reconstruction and associated road markings. Road signage and road furniture to be removed/ relocated or replaced. Some land take is required and as such boundary re-instatement works (walls, gates, driveways, etc.) are needed. Existing road markings to be removed and replaced.

- For the next 60m approximately, works have been categorized as **moderate** due to the removal of kerbs and footways greater than 500mm and the removal/realignment of drainage systems and services. Road lighting (and associated works i.e. cabling and ducting) along the route to be protected/relocated/diverted. Existing services (power supply, communications, water, gas) will have to be protected/relocated/diverted. To accommodate the 20m buffer a sizeable number of trees to be removed along the route and as such, limited earthworks works are also required along with full depth pavement reconstruction and associated road markings. Road signage and road furniture (bins and bollards) will have to be removed/ relocated or replaced. No land take is required along this section.

3.2.4 Mount Street Lower

- **Significant major modifications** are required at the Northumberland Road/Clanwilliam Place/Mount Street Lower junction i.e. the works to accommodate the 20m buffer include: General site clearance, removal and replacement of kerbs, footways and paved areas, laying of Anti-skid surface, Protection/relocation/diversion of services (i.e. power supply, communications, water and gas), removal and replacement of existing road markings, dished kerbs and tactile paving at all crossing points, the provision of guardrails and bollards, landscaping works, additional traffic signals including ducting, cabling and chambers and additional signal poles/heads. Some land take is required at this junction and as such property boundary re-instatement works are needed.

- For 360m approximately from Clanwilliam Place, works have been categorized as **moderate** due to the removal of kerbs and footways greater than 500mm and the removal/realignment of drainage systems and services. Road lighting (and associated works i.e. cabling and ducting) along the route to be protected/relocated/diverted. Existing services (power supply, communications, water, gas) will have to be protected/relocated/diverted. Road signage and road furniture (bins and bollards) will have to be removed/ relocated or replaced. No land take is required along this section.

- **Significant major modifications** are required at the Holles Street**/**Merrion Square/Mount Street Lower junction i.e. the works to accommodate the 20m buffer include: General site clearance, removal and replacement of kerbs, footways and paved areas, laying of Anti-skid surface, Protection/relocation/diversion of services (i.e. power supply, communications, water and gas), removal and replacement of existing road markings, dished kerbs and tactile paving at all crossing points, the provision of guardrails and

bollards, landscaping works, additional traffic signals including ducting, cabling and chambers and additional signal poles/heads. Some land take is required at this junction and as such property boundary re-instatement works are needed.

- For 235m approximately from The National Maternity Hospital, works have been categorized as **moderate** due to the removal of kerbs and footways greater than 500mm and the removal/realignment of drainage systems and services. Road lighting (and associated works i.e. cabling and ducting) along the route to be protected/relocated/diverted. Existing services (power supply, communications, water, gas) will have to be protected/relocated/diverted. Road signage and road furniture (bins and bollards) will have to be removed/ relocated or replaced. No land take is required along this section.

- **Minor modifications** are required at the Merrion Square North/Merrion Street Lower junction. I.e. the works associated with this categorization include: removal and replacement of kerbs, footways and paved areas, laying of Anti-skid surface, Protection/relocation/diversion of services (i.e. power supply, communications, water and gas), removal and replacement of existing road markings, dished kerbs and tactile paving at all crossing points, the provision of guardrails and bollards, landscaping works, additional traffic signals including ducting, cabling and chambers and additional signal poles/heads. No land take is required at this junction and as such property boundary re-instatement works are needed.

Appendix H – Environmental Impact Report

Dun Laoghaire to City Centre Core Bus Corridor Options Study – Feasibility and Options Assessment Report

Environmental Desktop Study Report

Draft - January 2017

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Dun Laoghaire to City Centre Core Bus Corridor Options Study – Feasibility and Options Assessment Report

Environmental Desktop Study Report

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Made:..... Gemma Rothwell

Checked:.....

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Dun Laoghaire to City Centre Core Bus Corridor Study

Environmental Desktop Study Report

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1.0 INTRODUCTION

1.1 Introduction (Objectives and Benefits)

Roughan & O'Donovan – AECOM Alliance Consulting Engineers has been commissioned by the National Transport Authority (NTA) to identify improvement proposals for the Dun Laoghaire to City Centre Core Bus Corridor Scheme (hereafter referred to as the "Scheme"). This report was compiled by Gemma Rothwell, an Environmental Scientist with Roughan & O'Donovan.

The main objectives of the Scheme are as follows:

- To deliver on-street infrastructure in order to provide continuous priority for bus movements along the Core Bus Corridor, facilitating a reliable and effective bus service;
- To provide on-street cycle facilities, particularly those required under the Greater Dublin Area Cycle Network Plan; and
- To optimise the movement of people and goods along the corridor, consistent with local constraints and place-making requirements.

1.2 Site Location

Although the exact route is not decided, there are four possible northern and southern routes with a connector route between the northern and southern sections. The northern routes propose to connect St Stephens Green, Baggot Street and Merrion Square to Booterstown while the southern routes connect Blackrock with Glenageary and Dun Laoghaire. The study area is shown in See Figure 1.1 and Appendix A. Each route has two scheme options, one being a 20m cross section area comprising a 2.0m footpath, a 2.0m cycle track, a 3.0m bus lane and a 3.0m traffic lane on both sides of the road. The other scheme options for the 9 routes are the 'B' options which comprise narrower sections of the route in areas where reducing the 20m buffer would prevent adverse impacts. These 'B' options can include the original 20m cross section, a 16.1m cross section including a 1.8m footpath, a 1.75m cycle track, a 3.0m traffic lane on both sides with a 3.0m bus lane on one side only, or a 13.1m cross section which comprise a 1.8m footpath, a 1.75m cycle track and a 3.0m traffic lane on both sides.

1.3 Purpose of the Environmental Desktop Study

This Environmental Desktop Study has been carried out with the objective of compiling as much information as possible relating to the natural environment in order to identify and assess all feasible potential scheme options for each proposed route. This data collection is focused on determining environmental constraints and designated sites which could affect the routing of the scheme.

As part of the Desktop Study, an assessment of two scheme options have been considered for each proposed route option of the Scheme. These have taken into account the environmental constraints of the study area. The chapters that follow examine these constraints in more detail.

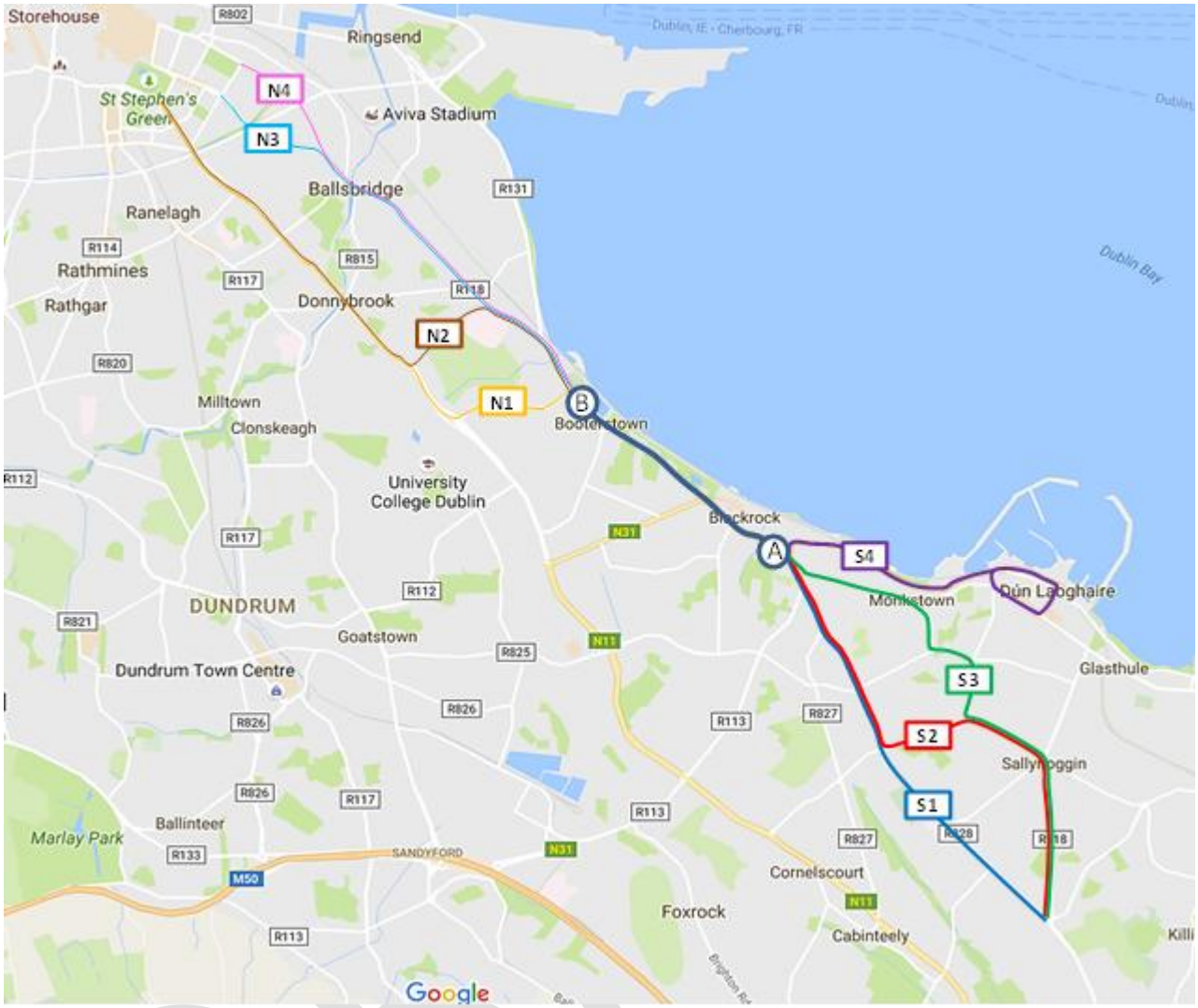


Figure 1.1 Proposed Route Options of the Scheme

2.0 METHODOLOGY

2.1 Desktop Study

A desktop study was initially undertaken to review potential environmental constraints within the study area. A review of the following available online data sources was carried out to screen the proposed project area for potential impacts:

- OSI mapping;
- Aerial photography;
- National Parks and Wildlife (NPWS); and
- National Biodiversity Data Centre Ireland (NBDC).

A review of the National Parks and Wildlife Service (NPWS) website database was undertaken to determine the boundaries of designated areas for conservation in the vicinity of the proposed project and to identify any known records of protected species within the area.

The National Biodiversity Data Centre Ireland (NBDC) database was reviewed to identify any known species records within 2km of the proposed scheme. The Draft Dublin City Biodiversity Action Plan 2015-2020 was also reviewed.

The desk study identified the potential for a range of flora and fauna to be present within the study area, of which protected species identified may be present or utilise the area. A review of the NPWS and the NBDC websites was undertaken to determine the boundaries of designated areas for conservation and to identify known records of the species listed for protection.

2.2 Reporting

The evaluation of the ecological environment and the criteria used to assess the significance of impacts are derived from the Guidelines for Assessment of Ecological Impacts on National Road Schemes (NRA, Rev. 2, 2009) and the Chartered Institute of Ecology and Environmental Management (CIEEM) Guidelines for Ecological Impact Assessment (EcIA).

3.0 RECEIVING ENVIRONMENT

3.1 Introduction

This chapter of the Environmental Desktop Study Report considers the key constraints for the planning of the Scheme. It reviews the constraints and opportunities for the project in relation to ecology, landscape and flooding. The route of the proposed Scheme is shown in Figure 1.1 and Appendix A.

3.2 Designated Areas

3.2.1 Natura 2000 sites

Areas of international significance for nature conservation have been included in a European Union network of protected areas known as Natura 2000. These areas are:

- **Special Areas of Conservation (hereafter referred to as SACs)** are designated under the EU Habitats Directive (92/43/EEC) which are transposed into Irish law by the European Communities (Birds and Natural Habitats) Regulations, 2011 (S.I. No 477 of 2011).
- **Special Protection Areas (SPAs)** are designated under the EU Birds Directive (79/409/EEC) which are transposed into Irish law by the European Communities (Birds and Natural Habitats) Regulations, 2011 (S.I. No 477 of 2011).

A review of the National Parks and Wildlife Service database has identified the following designated sites as being within 10km of the site:

Table 3.1: Designated Sites within 10km

Name	Site code	Approximate Location
South Dublin Bay and River Tolka Estuary SPA	004024	200m north east
South Dublin Bay SAC/pNHA	000210	200m north east
Rockabill to Dalkey Island SAC	003000	3km east
Dalkey Islands SPA	004172	3km east
North Bull Island SPA	004006	5km east
North Dublin Bay SAC/pNHA	000206	5km north
Knocksink Wood SAC	000725	7km south
Ballyman Glen SAC	000713	8km south
Broadmeadow/Swords SPA	004025	8km north east
Bray Head SAC	000714	9km south east
Howth Head SAC/pNHA	000202	9km north east
Howth Head Coast SPA	004113	9 km north east
Wicklow Mountains SAC	002122	10km south west
Wicklow Mountains SPA	004040	10km south west
Liffey Valley pNHA	000128	5km west
Santry Demesne pNHA	000178	7km north
Dodder Valley pNHA	000991	9km south west
Dolphins, Dublin Docks pNHA	000201	5km east
Ballybetagh Bog pNHA	001202	8km south-west

Name	Site code	Approximate Location
Booterstown/Marsh pNHA	001205	10m east
Dalkey Coastal Zone and Killiney Hill pNHA	001206	500m east
Dingle Glen pNHA	001207	3km south west
Fitzsimon's Wood pNHA	001753	5km south west
Loughlinstown Woods pNHA	001211	2.5km south west
Royal Canal pNHA	002103	1km north east
Grand Canal pNHA	002104	0km

The study area does not cross any SACs or SPAs. The study area borders the South Dublin Bay and River Tolka Estuary SPA (Site Code 004024) and the South Dublin Bay SAC/pNHA (Site Code 000210). The route from A to B is located approx 200m from these Natura 2000 sites for a distance of 2.2km. Route S4 also runs adjacent to these Natura 2000 sites for a further 2.7km. Three of the northern routes (N2, N3 and N4) come within close proximity to these Natura 2000 sites on Merrion Road.

Depending on the location and the timing of the works, screening of effects on winter-breeding birds may be required.

The site synopses and full versions of the Conservation Objectives for the Natura 2000 sites can be found on the NPWS website at: http://www.npws.ie/protectedsites/.

3.3 Protected Species

Online sources of publicly available data provided by National Biodiversity Centre (NBDC) with regards to protected species recorded within 2km of the site informed the desk study and are presented in Appendix B.

There are many records of species protected under EU Directives recorded within 2km of the site. Due to the close proximity to designated areas, many of these species have habitats nearby, however the proposed site does not offer suitable habitats for these species.

3.4 Invasive Species

Publicly available data offered online by NBDC with regards to invasive species are presented in Table 2 of Appendix B. The presence of Japanese Knotweed (*Fallopia japonica*) was identified within 2km of the site for all northern routes as recently as 2014 and 2016. With regard to the southern routes, Japanese Knotweed was found within 2km of routes S3 and S4 in 2013. Japanese Knotweed, Giant Hogweed and Indian Balsam are species subject to restrictions (Third Schedule) under Regulations 49 and 50 of the European Communities (Birds and Natural Habitats) Regulations 2011. **A complete invasive species survey will be required for the preferred route prior to the commencement of works.**

3.5 Bats

It is unlikely that bat roosts are present within the treelines along the route of the Scheme due to the urban, exposed and well lit nature of the study area. Records of bat species have been obtained from the NBDC along each of the proposed routes. Linear routes and overgrown vegetation may provide foraging and commuting areas for bats and the potential effects on bats from the removal of trees along the route will need to be assessed. Therefore, **a bat suitability assessment should be**

carried out by a bat specialist during the bat active survey season, between April to September, in advance of construction. The assessment should be carried out in accordance with Bat Conservation Trust guidance (Collins. J, 2016) and should determine baseline patterns of site use, identifying specific sections of the route that are important for bats. The NBDC online source of publicly available data determined that six species of bats have been recorded within 2km of the Site including Common Pipistrelle (*Pipistrellus pipistrellus*), Soprano Pipistrelle (*Pipistrellus pygmaeus*), Lesser Noctule (*Nyctalus leisleri*), Nathusius's Pipistrelle (*Pipistrellus nathusii*), Daubenton's Bat (*Myotis daubentonii*) and Brown Long-eared Bat (*Plecotus auritus*) (see Table 2). Routes S2 and M1 had the least records of bat species with only two species recorded along each. Regarding the northern routes, N3 and N4 had records of 4 species along each route while N1 and N2 had records of 5 species along each route.

3.6 Other Protected Mammals

NBDC data provided one Otter record within 2km of the Site boundary from 2015 for the southern routes S1-S4, see Table 1 in Appendix B. Similarly for the northern routes N1-N4 one otter record was recorded within 2km of the site in 2016. Due to the urban and exposed nature of the study area along with the lack of suitable habitat for the species, it is unlikely that the study area comprises Otter or Badger habitats. Therefore, no protected mammal survey is deemed necessary in relation to the proposed works.

3.7 Trees

A tree survey and report was undertaken by Dr Philip Blackstock in October 2016 along the majority of the proposed route options. After assessment of the results of this survey and the proposed designs, the potential effects of the proposed routes on treelines are described below.

Northern Routes

There are four routes outlined in the Northern Section of the proposed Scheme to link the City Centre to the Rock Rd in Booterstown. Route Options N1 & N2 both travel from Leeson St Lower to Stillorgan Rd, where Route Option N2 diverts along Nutley Lane and then joins Merrion Rd in the direction of the Rock Road. Route Option N1 remains on Stillorgan Rd and turns onto Woodbine Rd, joining Route N2 again after turning of Trimlestown Avenue onto the Rock Rd. Route Options N3 and N4 travel from Baggot Street Lower and Merrion Square North respectively to the Rock Rd in Booterstown. They merge on Pembroke Rd before travelling down Merrion Rd. Scheme Options N1-N4 aim to provide a 20m cross-section for the whole route while Scheme Options N1B – N4B include design changes along the route reducing the cross-section to a 16.1m Do Something buffer or a 13.1m Do Something buffer.

Scheme Option N1 Leeson Street Lower to Booterstown

Scheme Option N1 runs from Leeson Street Lower to the Rock Road in Booterstown. The proposed 'Do Max' design will in total remove 144 individual trees and one group of trees on Woodbine Rd. Scheme Option N1 also has the potential to affect a large green area including trees, surrounding the junction for Woodbine Rd on Stillorgan Rd. Some of those trees that will be affected by route option N1 are located on Sussex Rd and Leeson St Upper as shown in Plates 1 & 2.

Plate 1 Sussex Rd

Plate 2 Leeson St Upper

A large number of trees lining both sides of Morehampton Rd and Donnybrook Rd will also be affected as illustrated in Plates 3 & 4.

Plate 3 Morehampton Road

Plate 4 Donnybrook Road

The scheme option does not have such a severe impact on Stillorgan Rd as the route is well developed and already has bus lanes present therefore only a small number of trees in the centre of the road will be affected by the proposed Scheme. The green area at the Woodbine Junction on Stillorgan Rd as outlined in red in Plate 5 below is also within the 'Do Max' buffer. Therefore the scheme has the potential to affect this area.

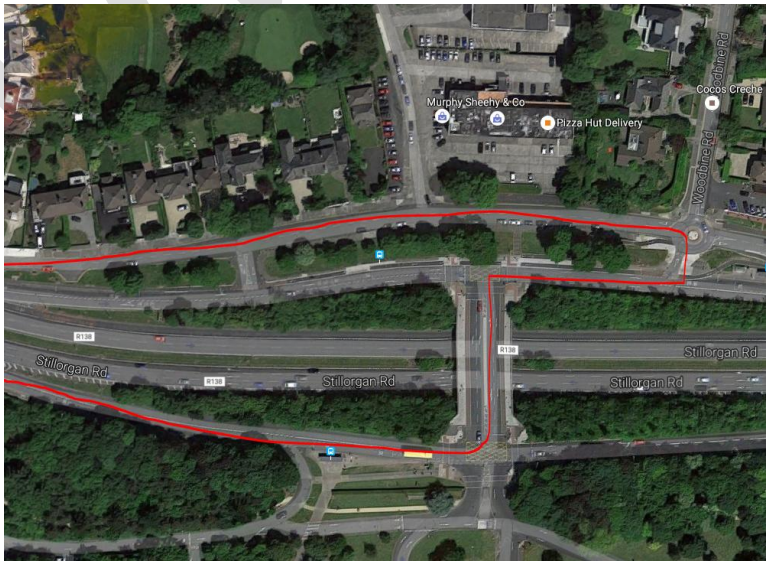


Plate 5 Woodbine Junction on the Stillorgan Rd

Scheme Option N1 also proposes to remove trees and a number of hedgerows along Woodbine Rd and Trimleston Ave.

Scheme Option N1B

The difference in Scheme Option N1B compared to N1 is small, as N1B still proposes to remove 144 trees. The 16.1m cross-section on Donnybrook Rd still affects the same amount of trees as the 20m 'Do Max' buffer for the same section. On Trimleston Park, the proposed 13.1m buffer does not reduce the individual tree count to be removed, however it does slightly reduce the landtake which includes residential gardens and an enclosed area of trees.

Scheme Option N2 Leeson Street Lower to Booterstown

Scheme Option N2 travels from Leeson Street Lower to the Rock Rd via Nutley Lane and has the potential to remove 189 trees as well as 5 groups of trees along Nutley Lane. Scheme Option N2 is similar to N1 as it travels from Leeson St Lower to Stillorgan Rd with the same designs and cross-section. Therefore the same number of trees on this section of the route will be affected as in Scheme Option N1, as illustrated in Plates 1-4 above.

Scheme Option N2 differs from N1 as it leaves Stillorgan Rd and travels along Nutley Lane. The 20m 'Do Max' buffer along the 800m stretch that is Nutley Lane proposes to remove 57 individual trees within the existing road boundaries as can be seen in Plate 6, while also affecting four areas of dense trees along the route and infringing on a 400m long strip of golf course and its barrier hedgerow as illustrated in Plate 7.

Plate 6 Nutley Lane

Plate 7 Hedgerow on Nutley Lane

The proposed Scheme then merges with Merrion Rd and has the potential to affect trees lining either side of the road as illustrated in Plate 11 below.

Scheme Option N2B

Scheme Option N2B differs from Option N2 along Donnybrook Rd as with N1 and N1B. Other than this the majority of the Scheme Option is subject to a 20m 'Do Max' buffer and therefore the potential effect on trees is as described under Scheme Option N2.

Scheme Option N3 Baggot Street to Booterstown

Scheme Option N3 runs from Baggot Street to the Rock Rd in Booterstown. The Scheme proposes to remove 232 trees in total. Included in this total are trees along

the centre of Baggot Street Lower as seen in Plate 8, trees on either side of Baggot Street Upper and 7 trees along Pembroke Rd as seen in Plate 9.

Plate 8 Baggot Street

Plate 9 Pembroke Road

Scheme N3 then merges with Scheme Option N4 on Pembroke Rd and has the potential to affect the trees that line both sides of Pembroke Road as shown in Plate 10 below. The trees that line Merrion Road as shown below are also within the 20 metre do max buffer and therefore will also be affected by the proposed Scheme.

Plate 10 Pembroke Road

Plate 11 Merrion Road

Scheme Option N3B

The effect of Scheme Options N3 and N3B are minimal. The only change in route N3B is the cross-section of the route goes from 20m to 16.1m for two short stretches on Merrion Rd, which would essentially prevent only two trees being removed.

Scheme Option N4 Merrion Square to Booterstown

Scheme Option N4 has the potential to remove 227 trees along its route from Merrion Square North and the Rock Rd. Scheme Option N4 travels along Northumberland Road, which has approx 40 large trees lining the avenue as pictured below. These trees are within the 20m do max buffer and therefore could potentially be affected.

Plate 12 Northumberland Rd

The route then merges with Scheme Option N3 and due to the same design scheme, has the potential to affect the same tree lines from Pembroke Rd and Merrion Rd as outlined under Scheme Option N3 above and as illustrated in Plates 10&11.

Scheme Option N4B

Scheme Option N4B is different from Scheme Option N4 as a short section on Mount Street Lower is changed from a 20m Do Max buffer to a 16.1m buffer. This means that one tree will not be affected by the N4B route. Similar to Scheme Option N3B, two further decreases in cross section on Merrion Road will only prevent 2 trees from being removed.

Scheme Option M1 - Booterstown to Blackrock

From Booterstown to Blackrock along the Rock Road, the number of trees that will potentially be affected is minimal. This is due to the 20 metre do max buffer being standard including bus lanes as can be seen below.

Plate 13 Rock Road

Plate 14 Rock Road

A tree survey concluded that 14 trees and three groups of 10 trees will potentially be affected.

Scheme Option M1B

Scheme Option M1B includes minor changes in design on the Rock Rd compared to route M1, however these do not affect the potential tree removal.

Southern Routes

The Southern section includes four routes connecting to route M1. Route Options S1-S3 run from Blackrock to Rochestown via Rochestown Ave, Monkstown and Sallynoggin while Route Option S4 travels from Blackrock to Dun Laoghaire. Southern Scheme Options S1-S4 include a 20m cross section for the duration of the route while Scheme Options S1B-S4B contain design changes such as periods of reduced cross-sectional area from a 20m Do Max buffer to a 16.1m or 13.1m Do Something buffer.

Scheme Option S1 Blackrock to Rochestown

Scheme Option S1 begins on Temple Hill in Booterstown and travels along Stradbrook Rd, Abbey Rd and Rochestown Avenue as far as Graduate Roundabout. Scheme Option S1 has the potential to remove 140 and effect 33 groups of trees on adjoining lands, of which three quarters are classed as moderate quality. These include trees on Abbey Road as seen in plates 15 & 16 and trees such as those shown in Plates 17 & 18 within the existing boundaries of Rochestown Avenue.

Plates 15 & 16 Trees on Abbey Road within the do max buffer

Plates 17 & 18 Trees on Rochestown Avenue

Scheme Option S1B

Scheme Option S1B includes sections along Stradbrook Rd and Abbey Rd being reduced from a 20m buffer to a 13.1m buffer. This scheme option reduces the impacts on treelines by preventing 14 trees from being removed and potentially preventing 5 groups of trees from being affected. Therefore Scheme option S1B has the potential to affect 127 trees and 27 groups of trees on adjoining lands.

Scheme Option S2 Booterstown to Rochestown

Scheme Option S2 travels from Booterstown to Rochestown via Abbey Rd, Kill Avenue and Glenageary Rd Upper and the R118 Regional Road. The route in total has the potential to remove 200 trees and affect up to 17 groups of trees on adjoining lands and an area of grasses/reeds on Kill Avenue. As Scheme Options S1 and S2 both travel Stradbrook Rd and Abbey Rd, trees to be removed by Scheme Option S2 will include those shown in Plates 15 & 16. Trees on Kill Avenue will also be affected such as those in Plates 19 & 20 below.

Plate 19 Kill Avenue

Plate 20 A group of trees on Kill Avenue

Scheme Option S2 will also affect an avenue of young trees lining Thomastown Road. These trees comprise four of the 17 groups of trees to be affected by this Scheme Option. They are classed as small/low quality Hornbeam trees and there are approx 140 trees within the four groups as classified during the tree survey. These treelines provide a positive visual and landscape aspect to the area however they are young and are of local importance only.

Plate 21 Thomastown Road

Scheme Option S2B

Scheme Option S2B includes sectional changes in cross sectional distance on Stradbrook Rd and Abbey Rd as in S1B. Other proposed changes include sections of reduced cross section on Kill Avenue and Glenageary Rd Upper. These scheme changes will prevent 16 trees and 5 groups of trees on adjoining lands from being affected by the route, bringing the total tree removal of the scheme option to 184 trees and 12 groups.

Scheme Option S3 – Blackrock to Rochestown via Monkstown

Scheme Option S3 commences on Monkstown Rd, follows on to Carrickbrennan Rd, Mounttown Rd Upper & Lower before joining Scheme Option S2 on Glenageary Rd as far as the Graduate Roundabout. The route has the potential to affect 104 trees along with 21 groups of trees, mostly on adjoining lands. These trees include trees such as those shown in Plate 22 below, on Monkstown Rd and Carrickbrennan Rd.

Plate 22 Monkstown Rd

Plate 23 Carrickbrennan Rd

Also included in the 21 groups are the 4 groups of young trees lining Thomastown Avenue which contain approx. 140 young trees as detailed above under Scheme Option S2.

Scheme Option S3B

Scheme Option S3b differs to S3 as sections along Monkstown Rd and Carrickbrennan Rd have been reduced to a cross-section area of 16.1m, while sections on Mount Town Rd Upper and Lower and Glenageary Rd Upper have been reduced to a cross-section of 13.1m. This would potentially prevent the scheme from affecting 10 individual trees and 4 groups of trees on adjoining lands bring the potential affect to 94 trees and 17 groups.

Scheme Option S4 – Blackrock to Dun Laoghaire

Scheme Option S4 begins on Newtown Avenue and runs as far as Dun Laoghaire via Seapoint Avenue. The route travels a loop around Dun Laoghaire Town, via Crofton Road, Marine Road, George's Street Lower and Clarence Street. The Scheme Option has the potential to remove 161 individual trees, with one group of trees on adjoining lands being affected. The individual trees include those in Plate 24, and the group of trees to be removed is shown in Plate 25 below.

Plate 24 Old Dunleary Road

Plate 25 Longford Terrace, Dun Laoghaire

Scheme Option S4B

Scheme Option S4B includes design changes to Scheme Option S4 in the form of a reduced cross section of 13.1m for the majority of the route with transitional periods of 16.1m cross section and stretches along Crofton Road and George's Street Lower with a 20m cross-section. These design changes have the potential to prevent 51 trees from being affected by the route, bringing the affect of Scheme Option S4B to 110 trees and one group of trees on adjoining lands as seen in Plate 25 above.

3.8 Breeding birds

Potential disturbance during construction may cause some temporary displacement of birds from treelines. The treelines on the route of the Scheme are likely to hold a community of breeding birds that would be dominated by small passerine species such as Blackbird, Robin, Chaffinch and Wren. The range of species present is likely to be low due to the urban nature of the study area, the high exposure of the trees to wind, the absence of ground cover and the lighting along the route. A breeding bird survey will not be required as a result of the proposed construction works.

However, any removal of trees required for the Works should be undertaken in a series of phases, thus avoiding simultaneous disturbance on the entire length of the project. Potential disturbance to breeding birds in the existing treelines should be avoided by confining the felling of trees and other site clearance to the period 1st September to 28th February. It is noted that the design of the proposed development is being developed so as to minimise the intrusiveness of the construction methodologies required.

3.9 Landscaping and Visual Impact

The most significant potential landscape and visual impact associated with the proposed development would arise in the case of the removal of tree lines. These tree lines provide a positive visual and landscape aspect to the area at present. The age of the trees to be felled will vary with each potential route and will therefore determine the magnitude of potential impact.

Additionally the view looking north up Fitzwilliam Place, from Leeson Street Lower is identified as a key view by the Dublin City Development Plan 2011-2017, as shown in Figure 4. This key view will be taken into consideration when developing the Scheme. Although the loss of trees along certain roads will have an adverse landscape and visual impact it is anticipated that with sensitive design there will not

be any significant adverse impacts, however a more detailed Landscape and Visual Impact Assessment will be required at planning stage.

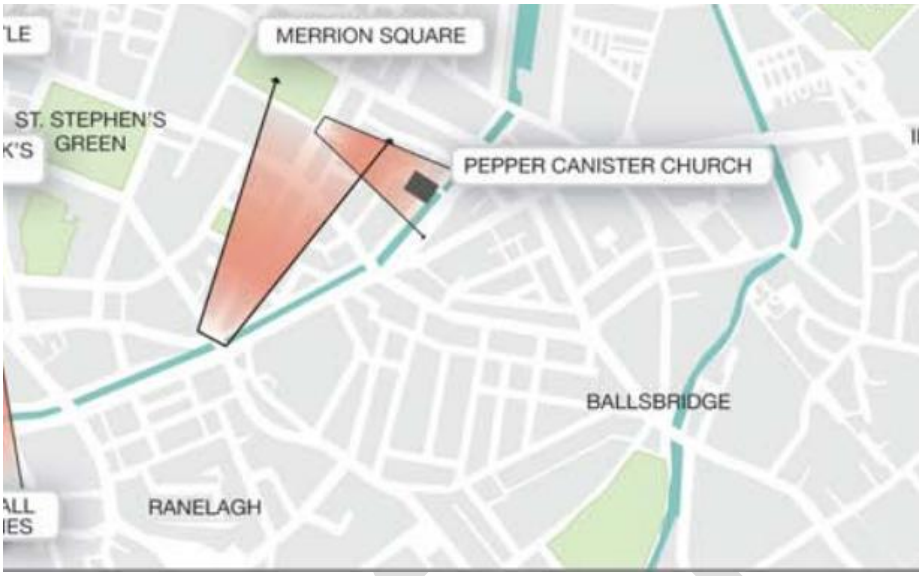


Figure 3.1 Key Views and Prospects from the Dublin City Development Plan 2011-2017

3.10 Flooding

A desktop study was carried out to investigate the flooding history of the site and the existing drainage regime within the study area.

The OPW floodmaps.ie website was consulted to determine the extent of flooding along the road network of the study area. Flood events within the area include flooding on Crofton Road in 2002 (see plate 3.2) which is located on Route S4, flooding on Carrickbrennan Road in 1993 and 2011 on route S3 and flooding at Stradbrook Gardens in 2011 which is located on the route of S1 and S2. A large stretch of route A-B at Nutley Elm was flooded in 1963 as shown in Plate 3.3, while a flooding event that occurred at the junction of Barclay Road and Temple Road in 2011 is also located on this route. The northern routes also have history of flooding events with flooding on the Rock Road in 2000 being located on route options N2, N3 and N4. Flooding was also recorded on Morehampton Rd in 1963 due to the Dodder, affecting route options N1 and N2, while flooding of Nutley Elm Park Stream affected Stillorgan Rd, Rock Rd and Merrion Gates in 1963, affecting all four route options.

These events will be taken into consideration when developing the Scheme, however, it is noted that flood improvement works have since been implemented in recent years and further schemes are planned.

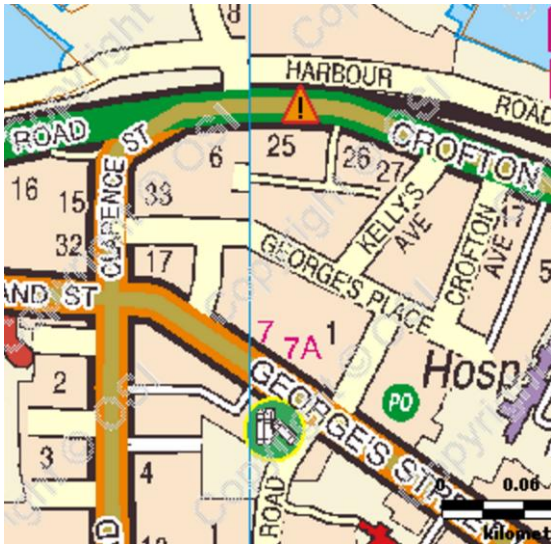


Plate 3.2 Location of flood on Crofton Road 2002 (OPW)

Plate 3.3 Flood event June 1963, Nutley Elm Park (OPW)

4.0 CONCLUSION

The proposed Scheme will be developed along an urban, well developed area of artificial landscaping, which has minimal biodiversity value at present. Although the site borders the South Dublin Bay and River Tolka Estuary SPA and the South Dublin Bay SAC/pNHA, with appropriate timing of the works it is not likely to impact on any designated sites due to the small scale works.

A bat suitability assessment should be carried out by a bat specialist prior to construction works. A protected mammal survey is not deemed necessary as no suitable habitat is likely to be found onsite. **Due to records of invasive species within the site, a complete invasive species survey will be required for the entire route prior to the commencement of works.**

Any felling of trees required for the works should be undertaken in a series of phases, thus avoiding simultaneous disturbance to breeding birds along the entire length of the project. The felling of trees should be confined to the period 1st September to 28th February and felled trees should be left in-situ for 24 hours prior to removal off site.

Provided that the presented avoidance measures are incorporated into the design of the development, the scheme is not expected to have any appreciable environmental impacts.

5.0 REFERENCES

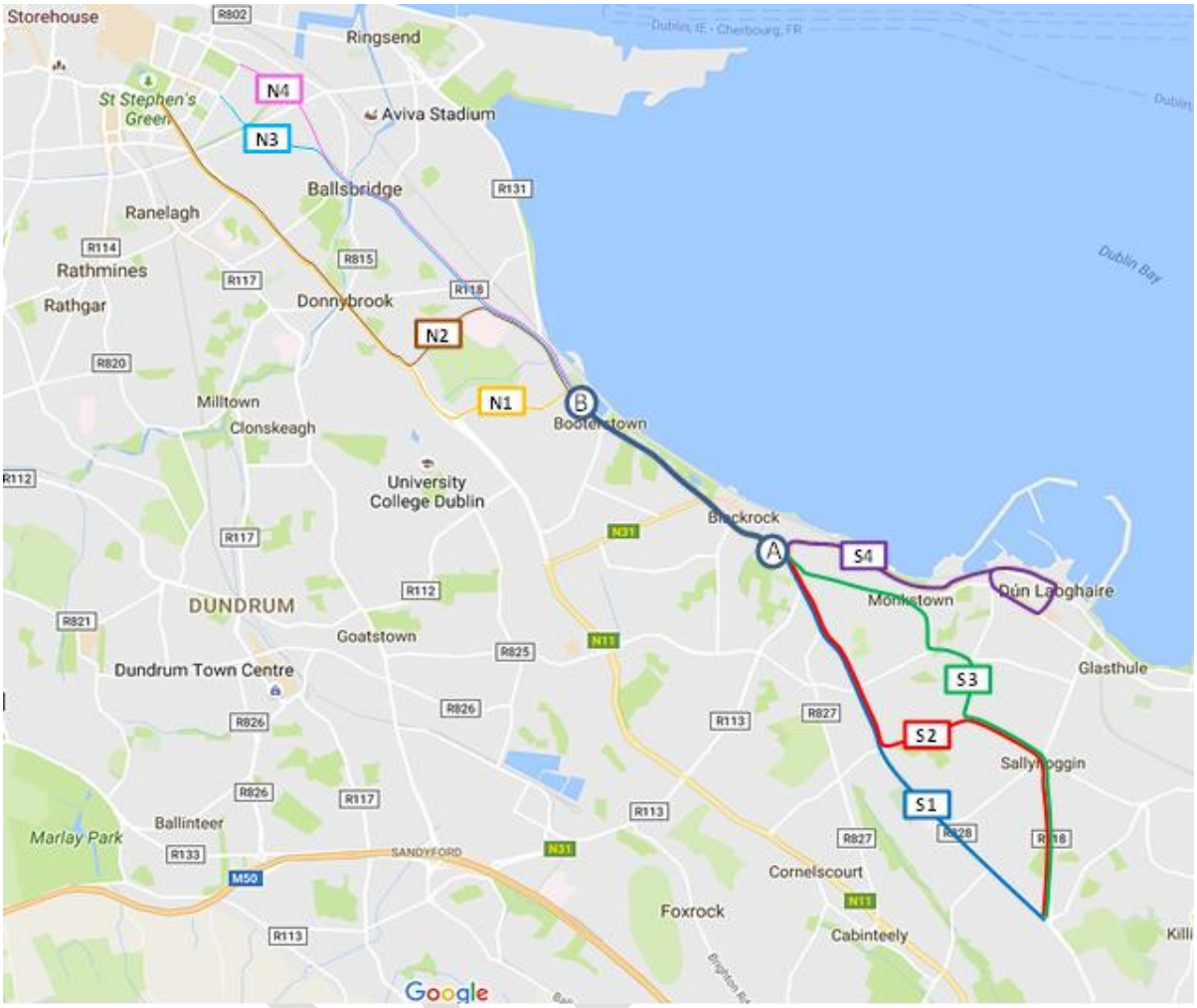
Chartered Institute of Ecology and Environmental Management (CIEEM), (2016), Guidelines for Ecological Impact Assessment (EcIA) in the UK and Ireland

Collins, J (ed). (2016), Bat Surveys: Good Practice Guidelines, 3rd Edition, Bat Conservation Trust, London

Dublin City Development Plan, 2011-2017. Written Statement

NRA, (2009), Guidelines for Assessment of Ecological Impacts on National Road Schemes Rev. 2

Appendix A:
Outline of Proposed Core Bus Corridor Route


Storehouse
R802
Ringsend
St Stephen's Green
N4
N3
Aviva Stadium
Ballsbridge
R131
Ranelagh
R114
Rathmines
R815
R117
Rathgar
Donnybrook
R118
N2
R820
N1
B
Milltown
Clonskeagh
University College Dublin
R112
Blackrock
N31
A
S4
R117
DUNDRUM
R112
Monkstown
Dún Laoghaire
R821
Goatstown
N11
R825
Dundrum Town Centre
Glasthule
S3
R826
R826
R113
R827
S2
Sallynoggin
R826
R117
S1
Ballinteer
R113
Marlay Park
R827
R133
SANDYFORD
N31
R116
M50
Cornelscourt
N11
Foxrock
Cabinteely
R113
Google

Appendix B:
Protected and Invasive Species within 2km of the site

Table 1: Notable Protected Species Records within 2km of the Site

Species	Most Recent Date Recorded	Suitable Habitat Within the Site
EU Directive		
Route S1		
Common Frog (*Rana temporaria*)	2016	No
Dunlin (*Calidris alpine*)	2012	No
Rock Pigeon (*Columba palumbus*)	2011	Yes
Common Wood Pigeon (*Columba palumbus*)	2016	Yes
Great Northern Diver (*Gavia immer*)	2015	No
Red-throated Diver (*Gavia stellata*)	2016	No
Mediterranean Gull (*Larus melanocephalus*)	2016	No
Bar-tailed Godwit (*Limosa lapponica*)	2011	No
Red-breasted Merganser (*Mergus serrator*)	2016	No
Eurasian Curlew (*Numenius arquata*)	2012	No
Common Tern (*Sterna hirundo*)	2012	No
Common Dolphin (*Delphinus delphis*)	2009	No
European Otter (*Lutra lutra*)	2015	No
Grey Seal (*Halichoerus grypus*)	2016	No
Common Porpoise (*Phocoena phocoena*)	2016	No
Lesser Noctule (*Nyctalus leisleri*)	2012	Yes
Common Kingfisher (*Alcedo atthis*)	2010	No
Mallard (*Anas platyrhynchos*)	2011	No
Little Egret (*Egretta garzetta*)	2012	No
Pipistrelle (*Pipistrellus pipistrellus sensu lato*)	2004	Yes
Peregrine Falcon (*Falco peregrinus*)	2011	No
Wall (*Lasiommata megera*)	1982	Yes
Daubenton's Bat (*Myotis daubentonii*)	2004	Yes
Brown Long-eared Bat (*Plecotus auritus*)	2008	Yes
Route S2		
Common Frog (*Rana temporaria*)	2016	No
Dunlin (*Calidris alpine*)	2012	No
Rock Pigeon (*Columba palumbus*)	2011	Yes
Common Wood Pigeon (*Columba palumbus*)	2016	Yes
Great Northern Diver (*Gavia immer*)	2015	No
Red-throated Diver (*Gavia stellata*)	2016	No
Mediterranean Gull (*Larus melanocephalus*)	2016	No
Bar-tailed Godwit (*Limosa lapponica*)	2011	No
Red-breasted Merganser (*Mergus serrator*)	2016	No
Eurasian Curlew (*Numenius arquata*)	2012	No
Common Tern (*Sterna hirundo*)	2012	No
Common Dolphin (*Delphinus delphis*)	2009	No
European Otter (*Lutra lutra*)	2015	No
Grey Seal (*Halichoerus grypus*)	2016	No
Common Porpoise (*Phocoena phocoena*)	2016	No

Species	Most Recent Date Recorded	Suitable Habitat Within the Site
Lesser Noctule (*Nyctalus leisleri*)	2012	Yes
Common Kingfisher (*Alcedo atthis*)	2010	No
Mallard (*Anas platyrhynchos*)	2011	No
Little Egret (*Egretta garzetta*)	2012	No
Pipistrelle (*Pipistrellus pipistrellus sensu lato*)	2012	Yes
Peregrine Falcon (*Falco peregrines*)	2011	No
Northern Lapwing (*Vanellus vanellus*)	2011	No
Wall (*Lasiommata megera*)	1982	Yes
Daubenton's Bat (*Myotis daubentonii*)	2004	Yes
Brown Long-eared Bat (*Plecotus auritus*)	2008	Yes
Route S3 (Monkstown)		
Common Frog (*Rana temporaria*)	2016	No
Dunlin (*Calidris alpine*)	2012	No
Rock Pigeon (*Columba palumbus*)	2011	Yes
Common Wood Pigeon (*Columba palumbus*)	2016	Yes
Great Northern Diver (*Gavia immer*)	2015	No
Red-throated Diver (*Gavia stellata*)	2016	No
Mediterranean Gull (*Larus melanocephalus*)	2016	No
Bar-tailed Godwit (*Limosa lapponica*)	2011	No
Red-breasted Merganser (*Mergus serrator*)	2016	No
Eurasian Curlew (*Numenius arquata*)	2012	No
Common Tern (*Sterna hirundo)*	2012	No
Common Dolphin (*Delphinus delphis*)	2009	No
European Otter (*Lutra lutra*)	2015	No
Grey Seal (*Halichoerus grypus*)	2016	No
Common Porpoise (*Phocoena phocoena*)	2016	No
Lesser Noctule (*Nyctalus leisleri*)	2012	Yes
Common Kingfisher (*Alcedo atthis*)	2010	No
Mallard (*Anas platyrhynchos*)	2011	No
Little Egret (*Egretta garzetta*)	2012	No
Pipistrelle (*Pipistrellus pipistrellus sensu lato*)	2012	Yes
Peregrine Falcon (*Falco peregrines*)	2011	No
Northern Lapwing (*Vanellus vanellus*)	2011	No
Wall (*Lasiommata megera*)	1982	Yes
Daubenton's Bat (*Myotis daubentonii*)	2004	Yes
Brown Long-eared Bat (*Plecotus auritus*)	2008	Yes
Route S4 (Dun Laoghaire)		
Common Frog (*Rana temporaria*)	2003	No
Common Wood Pigeon (*Columba palumbus*)	2011	Yes
Whooper Swan (*Cygnus Cygnus*)	2011	No
Peregrine Falcon (*Falco peregrines*)	2011	No
Common Snipe (*Gallinago gallinago*)	2011	No

Species	Most Recent Date Recorded	Suitable Habitat Within the Site
Great Northern Diver (*Gavia immer*)	2015	No
Red-throated Diver (*Gavia stellata*)	2016	No
Mediterranean Gull (*Larus melanocephalus*)	2016	No
Little Gull (*Larus minutes*)	2011	No
Bar-tailed Godwit (*Limosa lapponica*)	2011	No
Red-breasted Merganser (*Mergus serrator*)	2016	No
Eurasian Curlew (*Numenius arquata*)	2012	No
Roseate Tern (*Aterna dougallii*)	2011	No
Common Tern (*Sterna hirundo*)	2012	No
Arctic Tern (*Aterna paradisaea*)	2001	No
Sandwich Tern (*Sterna sandvicensis*)	2016	No
Northern Lapwing (*Vanellus vanellus*)	2011	No
Grey Seal (*Halichoerus grypus*)	2016	No
Common Seal (*Phoca vitulina*)	2016	No
Common Porpoise (*Phocoena phocoena*)	2016	No
Bottle-nosed Dolphin (*Tursiops truncates*)	2012	No
Lesser Noctule (*Nyctalus leisleri*)	2012	Yes
Pipistrelle (*Pipistrellus pipistrellus sensu lato*)	2012	Yes
Dunlin (*Calidris alpine*)	2012	No
Rock Pigeon (*Columba palumbus*)	2011	Yes
Common Dolphin (*Delphinus delphis*)	2009	No
European Otter (*Lutra lutra*)	2015	No
Route A-B		
Common Frog (*Rana temporaria*)	2011	No
Common Kingfisher (*Alcedo atthis*)	2011	No
Mallard (*Anas platyrhynchos*)	2016	No
Dunlin (*Calidris alpine*)	2011	No
Rock Pigeon (*Columba palumbus*)	2011	Yes
Common Wood Pigeon (*Columba palumbus*)	2016	Yes
Little Egret (*Egretta garzetta*)	2016	No
Peregrine Falcon (*Falco peregrinus*)	2014	No
Mediterranean Gull (*Larus melanocephalus*)	2015	No
Bar-tailed Godwit (*Limosa lapponica*)	2011	No
Common Porpoise (*Phocoena phocoena*)	2004	No
Lesser Noctule (*Nyctalus leisleri*)	2004	Yes
Pipistrelle (*Pipistrellus pipistrellus sensu lato*)	2004	Yes
Red-breasted Merganser (*Mergus serrator*)	2011	No
Eurasian Curlew (*Numenius arquata*)	2012	No
Roseate Tern (*Sterna dougallii*)	2012	No
Common Tern (*Sterna hirundo*)	2012	No
Arctic Tern (*Sterna paradisaea*)	2012	No
Sandwich Tern (*Sterna sandvicensis*)	2012	No
Route (N1)		

Species	Most Recent Date Recorded	Suitable Habitat Within the Site
Common Frog (*Rana temporaria*)	2007	No
Mallard (*Anas platyrhynchos*)	2016	No
Dunlin (*Calidris alpine*)	2011	No
Rock Pigeon (*Columba palumbus*)	2016	Yes
Common Wood Pigeon (*Columba palumbus*)	2016	Yes
Little Egret (*Egretta garzetta*)	2016	No
Peregrine Falcon (*Falco peregrinus*)	2011	No
Bar-tailed Godwit (*Limosa lapponica*)	2011	No
Eurasian Curlew (*Numenius arquata*)	2016	No
Common Porpoise (*Phocoena phocoena*)	2013	No
Lesser Noctule (*Nyctalus leisleri*)	2016	Yes
Pipistrelle (*Pipistrellus pipistrellus sensu lato*)	2013	Yes
Soprano Pipistrelle (*Pipistrellus pygmaeus*)	2013	Yes
Daubenton's Bat (*Myotis daubentonii*)	2014	Yes
Common Kingfisher (*Alcedo atthis*)	2016	No
European Otter (*Lutra lutra*)	2016	No
Nathusius's Pipistrelle (*Pipistrellus nathusii*)	2009	Yes
Route N2		
Common Frog (*Rana temporaria*)	2007	No
Mallard *(Anas platyrhynchos)*	2016	No
Dunlin *(Calidris alpine)*	2011	No
Rock Pigeon (*Columba palumbus*)	2016	Yes
Common Wood Pigeon (*Columba palumbus*)	2016	Yes
Little Egret (*Egretta garzetta*)	2016	No
Peregrine Falcon (*Falco peregrinus*)	2011	No
Bar-tailed Godwit (*Limosa lapponica*)	2011	No
Eurasian Curlew (*Numenius arquata*)	2016	No
Common Porpoise (*Phocoena phocoena*)	2013	No
Lesser Noctule (*Nyctalus leisleri*)	2016	Yes
Pipistrelle (*Pipistrellus pipistrellus sensu lato*)	2013	Yes
Soprano Pipistrelle (*Pipistrellus pygmaeus*)	2013	Yes
Daubenton's Bat (*Myotis daubentonii*)	2014	Yes
Common Kingfisher (*Alcedo atthis*)	2016	No
European Otter (*Lutra lutra*)	2016	No
Nathusius's Pipistrelle (*Pipistrellus nathusii*)	2009	Yes
Route N3		
Common Frog (*Rana temporaria*)	2003	No
Mallard (*Anas platyrhynchos*)	2016	No
Dunlin (*Calidris alpine*)	2011	No
Rock Pigeon (*Columba palumbus*)	2012	Yes
Common Wood Pigeon (*Columba palumbus*)	2014	Yes
Little Egret (*Egretta garzetta*)	2012	No

Species	Most Recent Date Recorded	Suitable Habitat Within the Site
Peregrine Falcon (*Falco peregrinus*)	2011	No
Bar-tailed Godwit (*Limosa lapponica*)	2011	No
Eurasian Curlew (*Numenius arquata*)	2016	No
Common Porpoise (*Phocoena phocoena*)	2013	No
Lesser Noctule (*Nyctalus leisleri*)	2011	Yes
Pipistrelle (*Pipistrellus pipistrellus sensu lato*)	2011	Yes
Soprano Pipistrelle (*Pipistrellus pygmaeus*)	2011	Yes
European Otter (*Lutra lutra*)	2016	No
Daubenton's Bat (*Myotis daubentonii*)	2011	Yes
Common Kingfisher (*Alcedo atthis*)	2011	No
Mediterranean Gull (*Larus melanocephalus*)	2011	No
Red-breasted Merganser (*Mergus serrator*)	2011	No
Common Tern (*Sterna hirundo)*	2011	No
Northern Lapwing (*Vanellus vanellus*)	2011	No
Grey Seal (*Halichoerus grypus*)	2013	No
Common Porpoise (*Phocoena phocoena*)	2012	No
Route N4		
Common Frog (*Rana temporaria*)	2003	No
Mallard (*Anas platyrhynchos*)	2016	No
Dunlin (*Calidris alpine*)	2011	No
Rock Pigeon (*Columba palumbus*)	2012	Yes
Common Wood Pigeon (*Columba palumbus*)	2014	Yes
Little Egret (*Egretta garzetta*)	2012	No
Peregrine Falcon (*Falco peregrinus*)	2011	No
Bar-tailed Godwit (*Limosa lapponica*)	2011	No
Eurasian Curlew (*Numenius arquata*)	2016	No
Common Porpoise (*Phocoena phocoena*)	2013	No
Lesser Noctule (*Nyctalus leisleri*)	2011	Yes
Pipistrelle (*Pipistrellus pipistrellus sensu lato*)	2011	Yes
Soprano Pipistrelle (*Pipistrellus pygmaeus*)	2011	Yes
European Otter (*Lutra lutra*)	2016	No
Daubenton's Bat (*Myotis daubentonii*)	2011	Yes
Common Kingfisher (*Alcedo atthis)*	2011	No
Mediterranean Gull (*Larus melanocephalus*)	2011	No
Red-breasted Merganser (*Mergus serrator*)	2011	No
Common Tern (*Sterna hirundo*)	2011	No
Northern Lapwing (*Vanellus vanellus*)	2011	No
Grey Seal (*Halichoerus grypus*)	2013	No
Common Porpoise (*Phocoena phocoena*)	2012	No

Table 2: Invasive Species Records within 2km of the site

Species	Most Recent Date Recorded	Suitable Habitat Within the Site
Route S1		
Sycamore (*Acer pseudoplatanus*)	2014	
Butterfly-bush (*Buddleja davidii*)	2014	
European Rabbit (*Oryctolagus cuniculus*)	2015	
Cherry Laurel (*Prunus laurocerasus*)	2014	
Eastern Grey Squirrel (*Sciurus carolinensis)*	2015	
Nuttall's Waterweed (*Elodea nuttallii*)	2007	
Brown Rat (*Rattus norvegicus*)	2014	
New Zealand Flatworm (*Arthurdendyus triangulates*)	2012	
Sea-buckthorn (*Hippophae rhamnoides*)	1994	
House Mouse (*Mus musculus*)	2016	
Route S2		
Sycamore (*Acer pseudoplatanus*)	2015	
Butterfly-bush (*Buddleja davidii*)	2015	
European Rabbit (*Oryctolagus cuniculus*)	2015	
Cherry Laurel (*Prunus laurocerasus*)	2014	
Eastern Grey Squirrel (*Sciurus carolinensis)*	2015	
New Zealand Pigmyweed (*Crassula helmsii*)	2014	
Giant Hogweed (*Heracleum mantegazzianum*)	1929	
House Mouse (*Mus musculus*)	2016	
Raccoon (*Procyon lotor*)	2014	
New Zealand Flatworm (*Arthurdendyus triangulates*)	2012	
Nuttall's Waterweed (*Elodea nuttallii*)	1999	
Sea-buckthorn (*Hippophae rhamnoides*)	1994	
Brown Rat *(Rattus norvegicus)*	2014	
Route S3		
Butterfly-bush (*Buddleja davidii*)	2015	
Japanese Knotweed (*Fallopia japonica*)	2013	
House Mouse (Mus musculus)	*2015*	
Brown Rat *(Rattus norvegicus)*	2014	
Eastern Grey Squirrel (*Sciurus carolinensis)*	2015	
Sycamore (Acer pseudoplatanus)	2015	
European Rabbit (*Oryctolagus cuniculus*)	2015	
Cherry Laurel (*Prunus laurocerasus*)	2014	
Eastern Grey Squirrel (*Sciurus carolinensis)*	2015	
New Zealand Pigmyweed (*Crassula helmsii*)	2014	
Giant Hogweed (*Heracleum mantegazzianum*)	1929	

Species	Most Recent Date Recorded	Suitable Habitat Within the Site
Raccoon (*Procyon lotor*)	2014	
New Zealand Flatworm (*Arthurdendyus triangulates*)	2012	
Nuttall's Waterweed (*Elodea nuttallii*)	1999	
Sea-buckthorn (*Hippophae rhamnoides*)	1994	
Route S4 (Dun Laoghaire)		
Japanese Knotweed (*Fallopia japonica*)	2013	
Butterfly-bush (*Buddleja davidii*)	2015	
House Mouse (*Mus musculus)*	*2015*	
Brown Rat (Rattus norvegicus)	2014	
Eastern Grey Squirrel (*Sciurus carolinensis)*	2015	
Japanese Skeleton Shrimp (*Caprella mutica*)	2006	
Common Broomrape (*Orobanche minor*)	2010	
Common Garden Snail (*Cornu aspersum*)	2002	
Budapest Slug (*Tandonia budapestensis*)	2002	
Leathery Sea Squirt (*Styela clava*)	2004	
Route A-B		
Japanese Knotweed (*Fallopia japonica*)	2012	
Giant Hogweed (*Heracleum mantegazzianum*)	1987	
American Mink (*Mustela vison*)	1963	
Eastern Grey Squirrel (*Sciurus carolinensis*)	2012	
Brown Rat (*Rattus norvegicus*)	2013	
Route N1		
Sycamore (*Acer pseudoplatanus*)	2015	
Three-cornered Garlic (*Allium triquetrum*)	2016	
Butterfly-bush (*Buddleja davidii*)	2015	
Bohemian Knotweed (*Fallopia japonica x sachalinensis = F. x bohemica*)	2010	
Giant Hogweed (*Heracleum mantegazzianum*)	2012	
Parrot's-feather (*Myriophyllum aquaticum*)	2008	
Brown Rat (*Rattus norvegicus*)	2015	
Eastern Grey Squirrel (*Sciurus carolinensis*)	2016	
Japanese Knotweed (*Fallopia japonica*)	2016	
Indian Balsam (*Impatiens glandulifera*)	2013	
Nuttall's Waterweed (*Elodea nuttallii*)	2009	
House Mouse (*Mus musculus*)	2015	
American Mink (*Mustela vison*)	2016	
Water Fern (*Azolla filiculoides*)	1984	
Canadian Waterford (*Elodea Canadensis*)	2009	

Species	Most Recent Date Recorded	Suitable Habitat Within the Site
European Rabbit (*Oryctolagus cuniculus*)	2015	
Least Duckweed (*Lemna minuta*)	1993	
Route N2		
Sycamore (*Acer pseudoplatanus*)	2015	
Three-cornered Garlic (*Allium triquetrum*)	2016	
Butterfly-bush (*Buddleja davidii*)	2015	
Bohemian Knotweed (*Fallopia japonica x sachalinensis = F. x bohemica*)	1999	
Giant Hogweed (*Heracleum mantegazzianum*)	2014	
Parrot's-feather (*Myriophyllum aquaticum*)	2008	
Brown Rat (*Rattus norvegicus*)	2015	
Eastern Grey Squirrel (*Sciurus carolinensis*)	2016	
Indian Balsam (*Impatiens glandulifera*)	2013	
Japanese Knotweed (*Fallopia japonica*)	2016	
Nuttall's Waterweed (*Elodea nuttallii*)	2009	
House Mouse (*Mus musculus*)	2015	
American Mink (*Mustela vison*)	2016	
Water Fern (*Azolla filiculoides*)	1984	
Canadian Waterford (*Elodea Canadensis*)	2009	
European Rabbit (*Oryctolagus cuniculus*)	2015	
Least Duckweed (*Lemna minuta*)	1993	
Route N3		
Sycamore (*Acer pseudoplatanus*)	2015	
Three-cornered Garlic (*Allium triquetrum*)	2016	
Butterfly-bush (*Buddleja davidii*)	2015	
Bohemian Knotweed (*Fallopia japonica x sachalinensis = F. x bohemica*)	1999	
Giant Hogweed (*Heracleum mantegazzianum*)	2014	
Parrot's-feather (*Myriophyllum aquaticum*)	2008	
Brown Rat (*Rattus norvegicus*)	2015	
Eastern Grey Squirrel (*Sciurus carolinensis*)	2016	
Nuttall's Waterweed (*Elodea nuttallii*)	1991	
Indian Balsam (*Impatiens glandulifera*)	2013	
House Mouse (*Mus musculus*)	2015	
American Mink (*Mustela vison*)	2016	
Traveller's Joy (*Clematis vitalba*)	1999	
Canadian Fleabane (*Conyza canadensis*)	2012	
Japanese Knotweed (*Fallopia japonica*)	2014	
Sea-buckthorn (*Hippophae rhamnoide*)	2014	
Narrow-leaved Ragwort (*Senecio inaequidens*)	2014	

Species	Most Recent Date Recorded	Suitable Habitat Within the Site
Route N4		
Sycamore (*Acer pseudoplatanus*)	2015	
Three-cornered Garlic (*Allium triquetrum*)	2016	
Butterfly-bush (*Buddleja davidii*)	2015	
Bohemian Knotweed (*Fallopia japonica x sachalinensis = F. x bohemica*)	1999	
Giant Hogweed (*Heracleum mantegazzianum*)	2014	
Parrot's-feather (*Myriophyllum aquaticum*)	2008	
Brown Rat (*Rattus norvegicus*)	2015	
Eastern Grey Squirrel (*Sciurus carolinensis*)	2016	
Nuttall's Waterweed (*Elodea nuttallii*)	1991	
Indian Balsam (*Impatiens glandulifera*)	2013	
House Mouse (*Mus musculus*)	2015	
American Mink (*Mustela vison*)	2016	
Traveller's Joy (*Clematis vitalba*)	1999	
Canadian Fleabane (*Conyza canadensis*)	2012	
Japanese Knotweed (*Fallopia japonica*)	2014	
Sea-buckthorn (*Hippophae rhamnoide*)	2014	
Narrow-leaved Ragwort (*Senecio inaequidens*)	2014	

Dún Laoghaire to City Centre Core Bus Corridor Options Study

Feasibility and Options Assessment Report

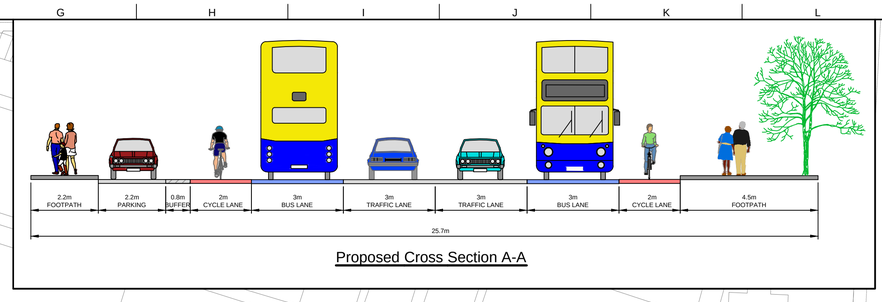
Drawings

National Transport Authority

Project Number: 60507750
R 001

October 2017

Iveagh Court, Harcourt Lane
D02 WT20, Dublin 2
Ireland



Proposed Cross Section A-A

AECOM RPS DRAFT

CH-0.000m

CH-50.000m

CH-100.000m

CH-150.000m

CH-200.000m

CH-250.000m

CH-300.000m

CH-350.000m

BAGGOT STREET LOWER

FITZWILLIAM STREET

JAMES STREET EAST

HERBERT STREET

PEMBROKE ROW

HAGAN'S COURT

CONVENT CLOSE

HERBERT PLACE

NOTE:
CONSTRUCTION DESIGN SUBJECT TO CELLAR SURVEYS AS REQUIRED

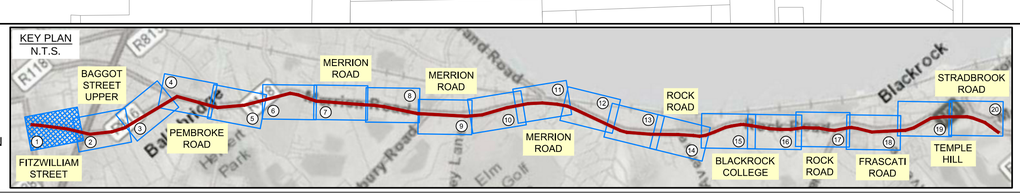
0 5.0 10.0 20.0 30.0 40.0 50.0m

SCALE 1:500 @ A1; 1:1000 @ A3

Legend:

- NEW FOOTPATH
- NEW CYCLE LANE
- NEW CARRIAGEWAY
- BUS STOP LOCATIONS
- NEW GRASS AREA/VERGE
- NEW BUS LANE
- EXISTING BOUNDARY
- POSSIBLE LAND ACQUISITION

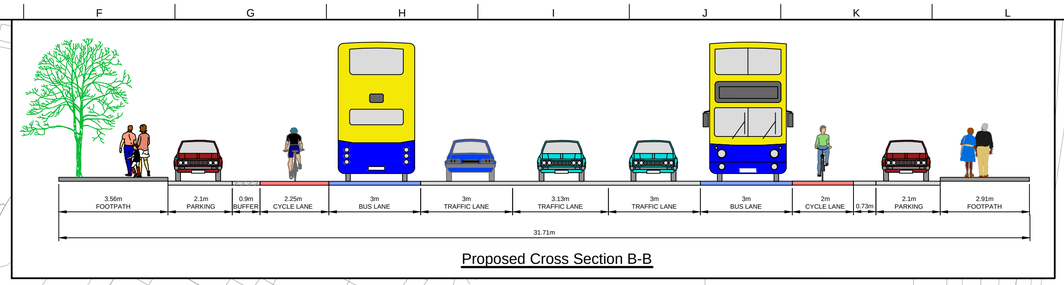
KEY PLAN
N.T.S.



Dún Laoghaire to City Centre CBC
Sheet 1 of 20

Do not scale

A1



Proposed Cross Section B-B

DRAFT

HERBERT PLACE

HADDINGTON ROAD

BAGGOT STREET UPPER

EASTMORELAND LANE

EASTMORELAND PLACE N.D.

WATERLOO ROAD

CH-350.000m

CH-400.000m

CH-450.000m

CH-500.000m

CH-550.000m

CH-600.000m

CH-650.000m

CH-700.000m

NOTE:
PROPOSED BUS PRIORITY MEASURE

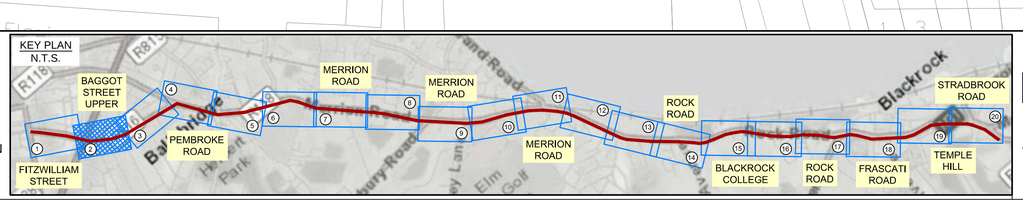
0 5.0 10.0 20.0 30.0 40.0 50.0m

SCALE 1:500 @ A1; 1:1000 @ A3

Legend:

- NEW FOOTPATH
- NEW CYCLE LANE
- NEW CARRIAGEWAY
- BUS STOP LOCATIONS
- NEW GRASS AREA/VERGE
- NEW BUS LANE
- EXISTING BOUNDARY
- POSSIBLE LAND ACQUISITION

KEY PLAN
N.T.S.



Dún Laoghaire to City Centre CBC
Sheet 2 of 20

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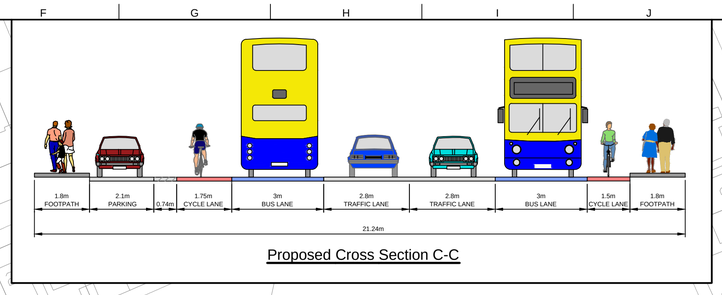


Proposed Cross Section C-C

DRAFT

PEMBROKE ROAD

CH-750.000m

CH-800.000m

CH-850.000m

CH-900.000m

CH-950.000m

CH-1000.000m

CH-1050.000m

CH-1100.000m

CH-1150.000m

WELLINGTON ROAD

RAGLAN ROAD

LANSDOWNE ROAD

NORTHUMERLAND ROAD

MATCHLINE

STOP

BUS

MWT

LAM

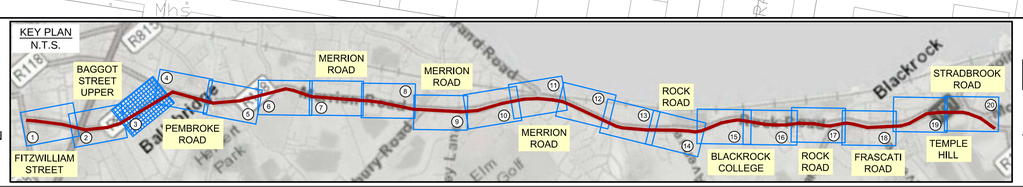
0 5.0 10.0 20.0 30.0 40.0 50.0m

SCALE 1:500 @ A1; 1:1000 @ A3

Legend:

- NEW FOOTPATH
- NEW CYCLE LANE
- NEW CARRIAGEWAY
- BUS STOP LOCATIONS
- NEW GRASS AREA/VERGE
- NEW BUS LANE
- EXISTING BOUNDARY
- POSSIBLE LAND ACQUISITION

KEY PLAN
N.T.S.



Dún Laoghaire to City Centre CBC
Sheet 3 of 20

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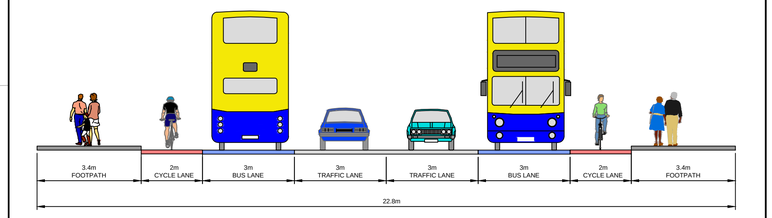


Proposed Cross Section D-D

AECOM / ROD

DRAFT

LANSDOWNE ROAD

NORTHUMERLAND ROAD

PEMBROKE ROAD

ELGIN ROAD

PEMBROKE LANE

SHELBOURNE LANE

Lansdowne House

Hotel

Hume House

Shelbourne Hall

Pembroke Court

Finsbury House

Bank

American Embassy

Israeli Embassy

Carrisbrook House

Shelbourne Hall Ramp

CH-1100.000m

CH-1150.000m

CH-1200.000m

CH-1250.000m

CH-1300.000m

CH-1350.000m

CH-1400.000m

CH-1050.000m

CH-1000.000m

NOTE:
EXISTING KIOSK TO BE RELOCATED

NOTE:
PROPOSED NEW LANDSCAPED AREA AS REQUIRED

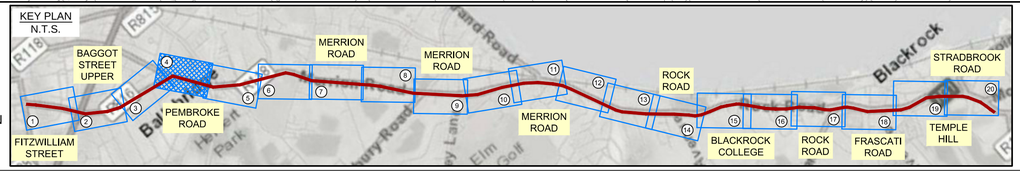
0 5.0 10.0 20.0 30.0 40.0 50.0m

SCALE 1:500 @ A1; 1:1000 @ A3

Legend:

- NEW FOOTPATH
- NEW CYCLE LANE
- NEW CARRIAGEWAY
- BUS STOP LOCATIONS
- NEW GRASS AREA/VERGE
- NEW BUS LANE
- EXISTING BOUNDARY
- POSSIBLE LAND ACQUISITION

KEY PLAN
N.T.S.



Dún Laoghaire to City Centre CBC
Sheet 4 of 20

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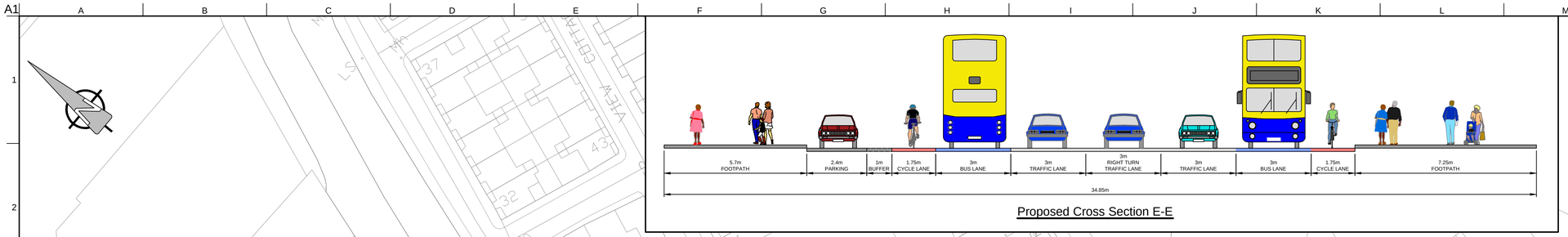


Proposed Cross Section E-E

AECOM PROD DRAFT

NOTE:
PROPOSED NEW LANDSCAPED AREA AS REQUIRED

NOTE:
PROPOSED NEW LANDSCAPED AREA AS REQUIRED

CH-1450.000m

CH-1500.000m

CH-1550.000m

CH-1600.000m

CH-1650.000m

CH-1700.000m

CH-1750.000m

CH-1800.000m

MERRION ROAD

ANGLESEA ROAD

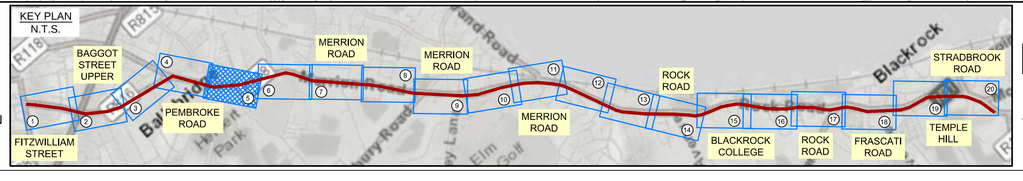
0 5.0 10.0 20.0 30.0 40.0 50.0m

SCALE 1:500 @ A1; 1:1000 @ A3

Legend:

- NEW FOOTPATH
- NEW CYCLE LANE
- NEW CARRIAGEWAY
- BUS STOP LOCATIONS
- NEW GRASS AREA/VERGE
- NEW BUS LANE
- EXISTING BOUNDARY
- POSSIBLE LAND ACQUISITION

KEY PLAN
N.T.S.

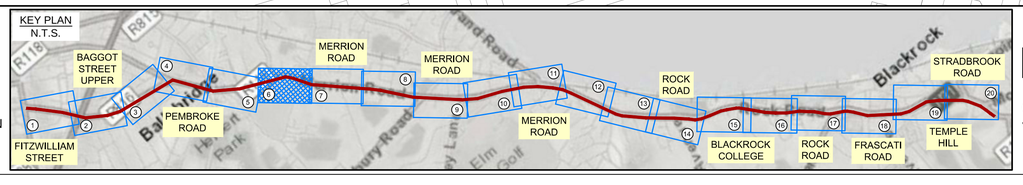


Dún Laoghaire to City Centre CBC
Sheet 5 of 20

Do not scale

Legend:

- NEW FOOTPATH
- NEW CYCLE LANE
- NEW CARRIAGEWAY
- BUS STOP LOCATIONS
- NEW GRASS AREA/VERGE
- NEW BUS LANE
- EXISTING BOUNDARY
- POSSIBLE LAND ACQUISITION



Dún Laoghaire to City Centre CBC
Sheet 6 of 20

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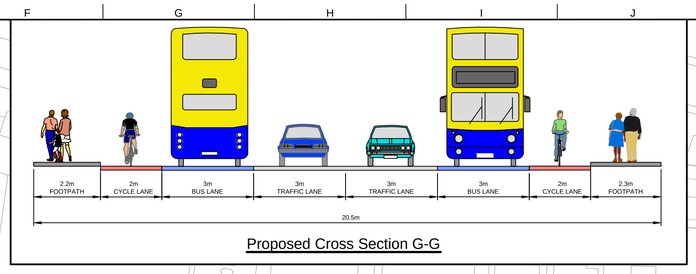


Proposed Cross Section G-G

DRAFT

MERRION ROAD

SHREWSBURY PARK

SHREWSBURY ROAD

SHREWSBURY ROAD

CH-2200.000m

CH-2250.000m

CH-2300.000m

CH-2350.000m

CH-2400.000m

CH-2450.000m

CH-2500.000m

CH-2550.000m

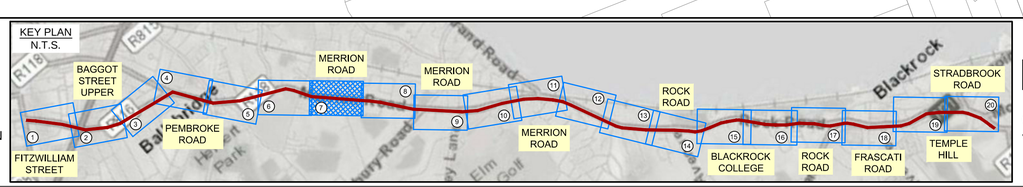
0 5.0 10.0 20.0 30.0 40.0 50.0m

SCALE 1:500 @ A1; 1:1000 @ A3

Legend:

- NEW FOOTPATH
- NEW CYCLE LANE
- NEW CARRIAGEWAY
- BUS STOP LOCATIONS
- NEW GRASS AREA/VERGE
- NEW BUS LANE
- EXISTING BOUNDARY
- POSSIBLE LAND ACQUISITION

KEY PLAN
N.T.S.



Dún Laoghaire to City Centre CBC
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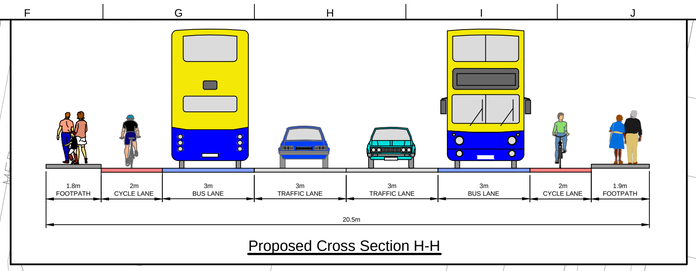


Proposed Cross Section H-H

AECOM RPS DRAFT

MERLYN DRIVE

MERLYN ROAD

MERLYN PARK

MATCHLINE

CH-2600.000m

CH-2650.000m

CH-2700.000m

CH-2750.000m

CH-2800.000m

CH-2850.000m

CH-2900.000m

CH-2950.000m

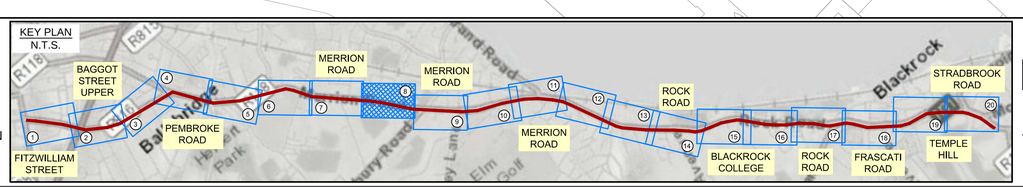
0 5.0 10.0 20.0 30.0 40.0 50.0m

SCALE 1:500 @ A1; 1:1000 @ A3

Legend:

- NEW FOOTPATH
- NEW CYCLE LANE
- NEW CARRIAGEWAY
- BUS STOP LOCATIONS
- NEW GRASS AREA/VERGE
- NEW BUS LANE
- EXISTING BOUNDARY
- POSSIBLE LAND ACQUISITION

KEY PLAN
N.T.S.



Dún Laoghaire to City Centre CBC
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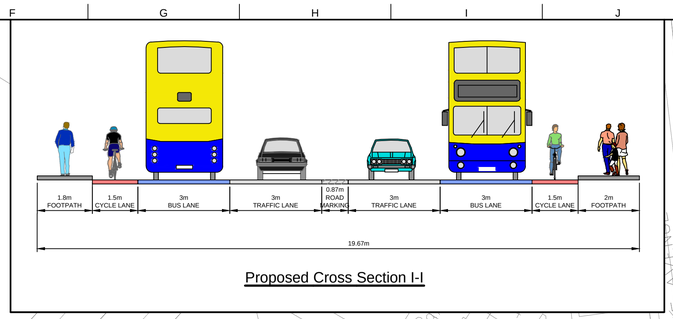


Proposed Cross Section I-I

AECOM ROD DRAFT

AILESBURY ROAD
MERRION ROAD
SYDNEY PARADE AVENUE
AILESBURY PARK
NUTLEY LANE
MERRION VIEW AVE
Spanish Embassy
Dutch Embassy
Embassy of Portugal
Merrion Court
Block A 1-32
Block B 33-48
Shopping Centre
Multi-storey Car Park
School
Allsbury Oaks
MATCHLINE
STOP
CH-3000.000m
CH-3050.000m
CH-3100.000m
CH-3150.000m
CH-3200.000m
CH-3250.000m
CH-3300.000m
BUS
SYB
HWM
LAM

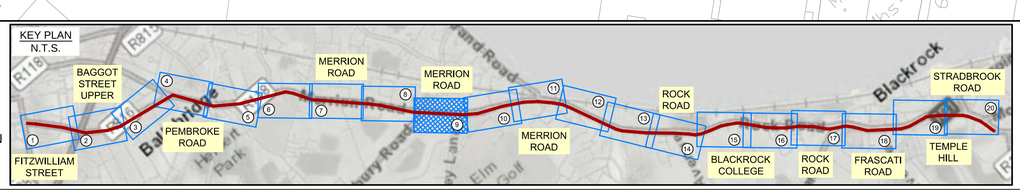
0 5.0 10.0 20.0 30.0 40.0 50.0m

SCALE 1:500 @ A1; 1:1000 @ A3

Legend:

- NEW FOOTPATH
- NEW CYCLE LANE
- NEW CARRIAGEWAY
- BUS STOP LOCATIONS
- NEW GRASS AREA/VERGE
- NEW BUS LANE
- EXISTING BOUNDARY
- POSSIBLE LAND ACQUISITION

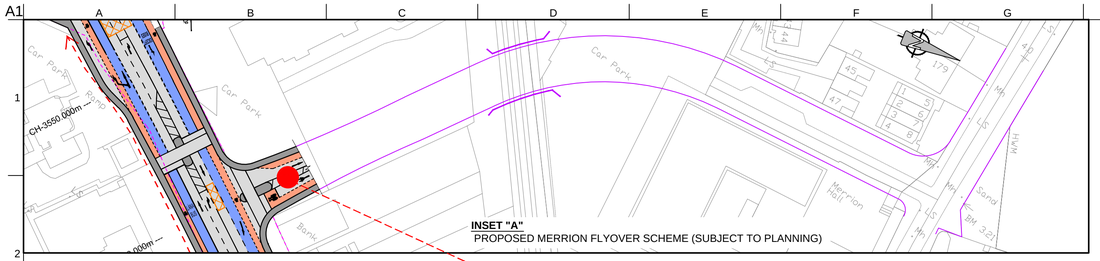
KEY PLAN N.T.S.

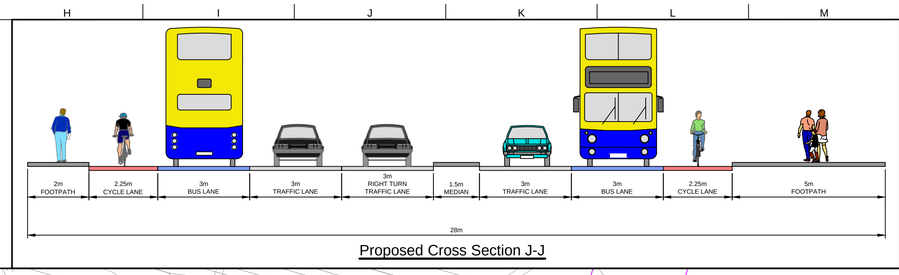


Dún Laoghaire to City Centre CBC
Sheet 9 of 20

Do not scale

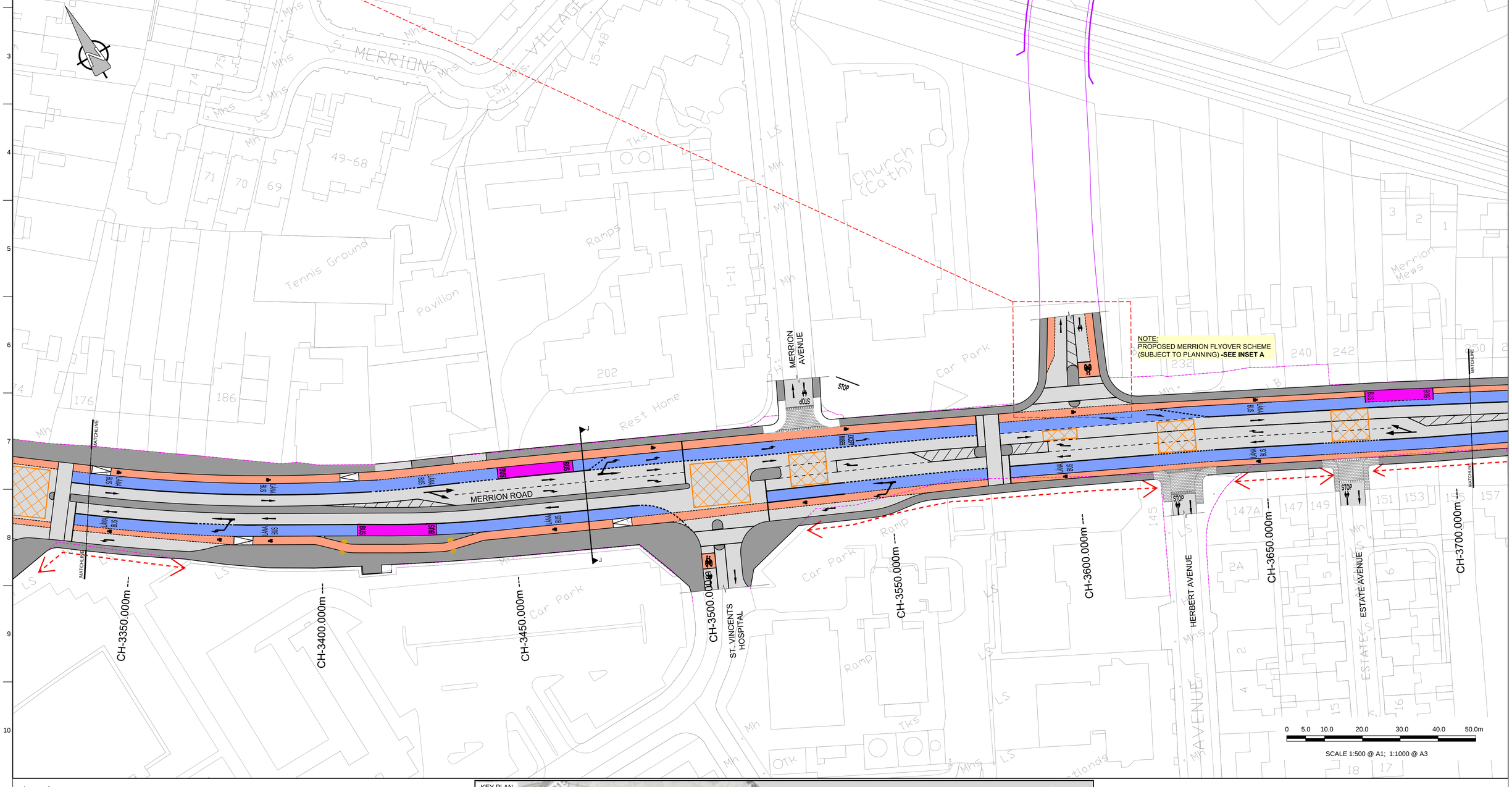
A1





Proposed Cross Section J-J

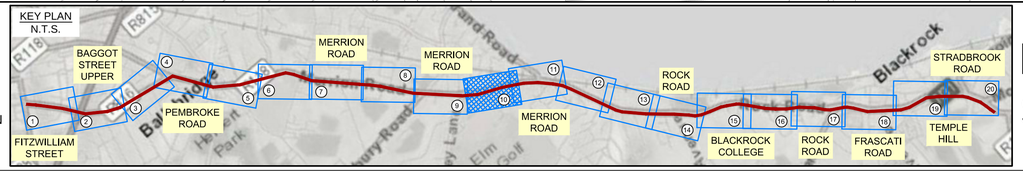
AECOM IROD DRAFT



Legend:

- NEW FOOTPATH
- NEW CYCLE LANE
- NEW CARRIAGEWAY
- BUS STOP LOCATIONS
- NEW GRASS AREA/VERGE
- NEW BUS LANE
- EXISTING BOUNDARY
- POSSIBLE LAND ACQUISITION

KEY PLAN
N.T.S.



Dún Laoghaire to City Centre CBC
Sheet 10 of 20

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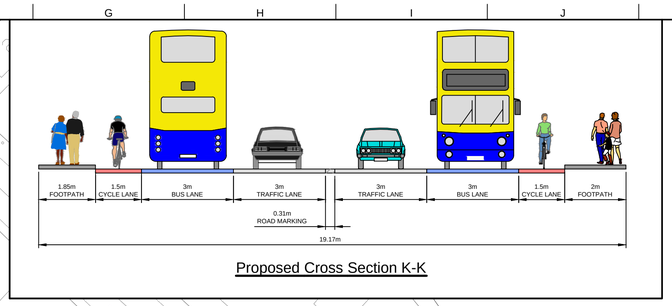


Proposed Cross Section K-K

DRAFT

NOTE:
PROPOSED MERRION FLYOVER SCHEME
(SUBJECT TO PLANNING)

CH-3700.000m
CH-3750.000m
CH-3800.000m
CH-3850.000m
CH-3900.000m
CH-3950.000m
CH-4000.000m
CH-4050.000m

MERRION ROAD

ESTATE AVENUE

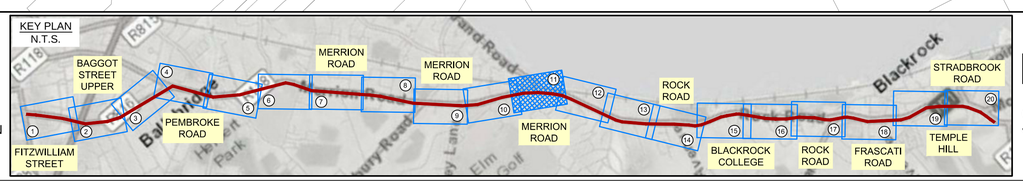
0 5.0 10.0 20.0 30.0 40.0 50.0m

SCALE 1:500 @ A1; 1:1000 @ A3

Legend:

- NEW FOOTPATH
- NEW CYCLE LANE
- NEW CARRIAGEWAY
- BUS STOP LOCATIONS
- NEW GRASS AREA/VERGE
- NEW BUS LANE
- EXISTING BOUNDARY
- POSSIBLE LAND ACQUISITION

KEY PLAN
N.T.S.



Dún Laoghaire to City Centre CBC
Sheet 11 of 20

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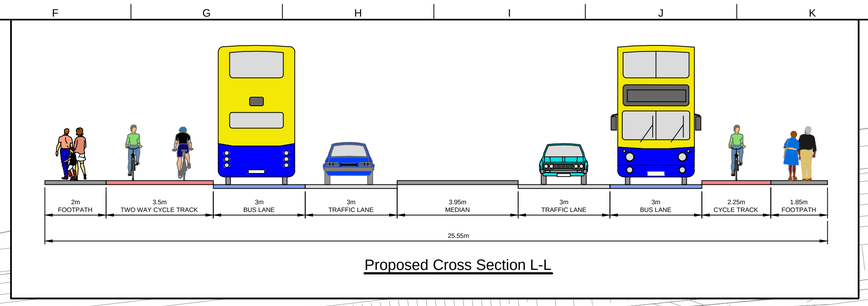


Proposed Cross Section L-L

AECOM for RPOD

DRAFT

MERRION ROAD

NOTE:
WAYFINDING SIGNAGE
FOR CYCLISTS REQUIRED

MERRION ROAD

CH-4050.000m

CH-4100.000m

CH-4150.000m

CH-4200.000m

CH-4250.000m

CH-4300.000m

CH-4350.000m

CH-4400.000m

MATCHLINE

BELVIEW AVENUE

STOP

Merrion House

Car Park

Hotel

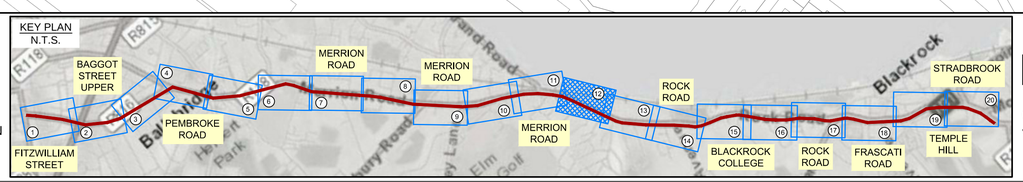
Burial Ground (Disused)

0 5.0 10.0 20.0 30.0 40.0 50.0m

SCALE 1:500 @ A1; 1:1000 @ A3

Legend:

- NEW FOOTPATH
- NEW CYCLE LANE
- NEW CARRIAGEWAY
- BUS STOP LOCATIONS
- NEW GRASS AREA/VERGE
- NEW BUS LANE
- EXISTING BOUNDARY
- POSSIBLE LAND ACQUISITION



Dún Laoghaire to City Centre CBC
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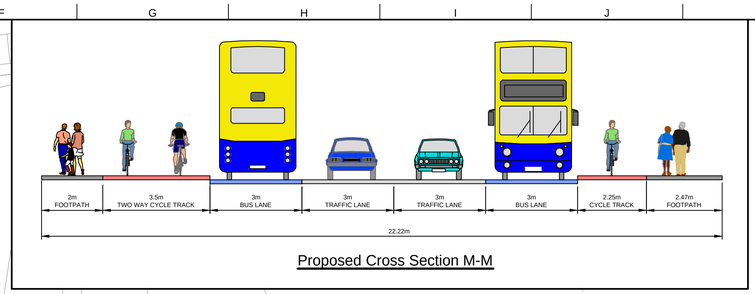


Proposed Cross Section M-M

DRAFT

ROCK ROAD

TRIMLESTON AVENUE

ST HELEN'S ROAD

CH-4400.000m

CH-4450.000m

CH-4500.000m

CH-4550.000m

CH-4600.000m

CH-4650.000m

CH-4700.000m

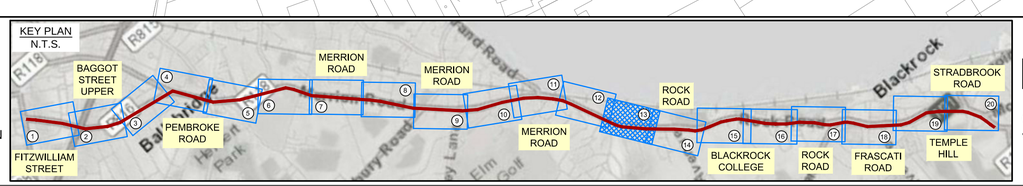
CH-4750.000m

0 5.0 10.0 20.0 30.0 40.0 50.0m

SCALE 1:500 @ A1; 1:1000 @ A3

Legend:

- NEW FOOTPATH
- NEW CYCLE LANE
- NEW CARRIAGEWAY
- BUS STOP LOCATIONS
- NEW GRASS AREA/VERGE
- NEW BUS LANE
- EXISTING BOUNDARY
- POSSIBLE LAND ACQUISITION



Dún Laoghaire to City Centre CBC
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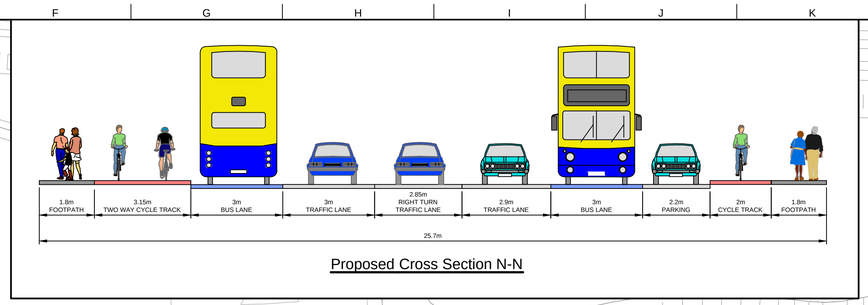
Do not scale



Proposed Cross Section N-N

DRAFT

ROCK ROAD

CH-4750.000m

CH-4800.000m

CH-4850.000m

CH-4900.000m

CH-4950.000m

CH-5000.000m

CH-5050.000m

BOOTESTOWN AVENUE

Playground

Car Park

GROTTO PLACE

School

Ramp

MATCHLINE

STOP

BUS

LAY-BY

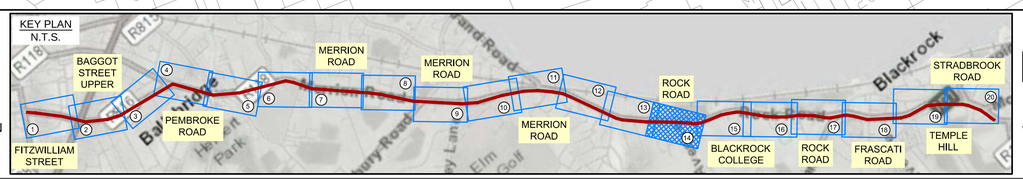
0 5.0 10.0 20.0 30.0 40.0 50.0m

SCALE 1:500 @ A1; 1:1000 @ A3

Legend:

- NEW FOOTPATH
- NEW CYCLE LANE
- NEW CARRIAGEWAY
- BUS STOP LOCATIONS
- NEW GRASS AREA/VERGE
- NEW BUS LANE
- EXISTING BOUNDARY
- POSSIBLE LAND ACQUISITION

KEY PLAN
N.T.S.



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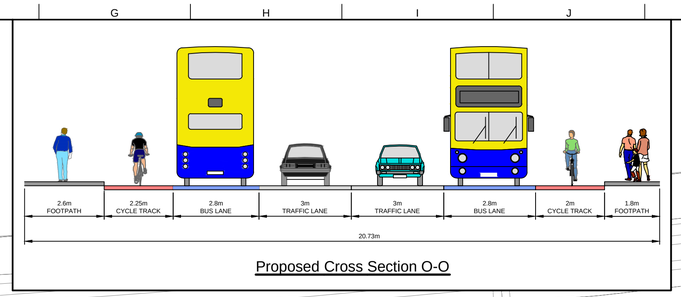


Proposed Cross Section O-O

DRAFT

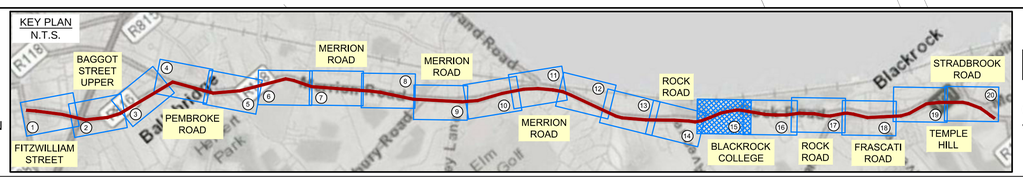
0 5.0 10.0 20.0 30.0 40.0 50.0m

SCALE 1:500 @ A1; 1:1000 @ A3

Legend:

- NEW FOOTPATH
- NEW CYCLE LANE
- NEW CARRIAGEWAY
- BUS STOP LOCATIONS
- NEW GRASS AREA/VERGE
- NEW BUS LANE
- EXISTING BOUNDARY
- POSSIBLE LAND ACQUISITION

KEY PLAN
N.T.S.



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Do not scale

A1

DRAFT

SEAFORT PARADE

ROCK ROAD

PHOENIX TERRACE

CASTLEDAWSON AVENUE

CH-5450.000m

CH-5500.000m

CH-5550.000m

CH-5600.000m

CH-5650.000m

CH-5700.000m

CH-5750.000m

CH-5800.000m

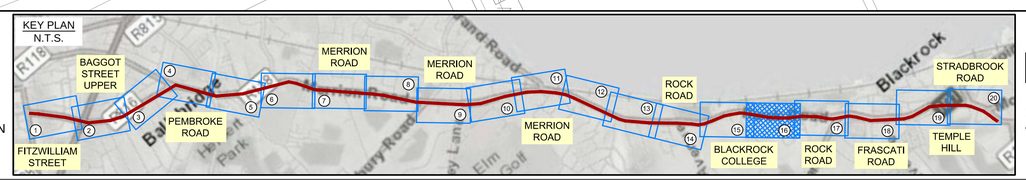
0 5.0 10.0 20.0 30.0 40.0 50.0m

SCALE 1:500 @ A1; 1:1000 @ A3

Legend:

- NEW FOOTPATH
- NEW CYCLE LANE
- NEW CARRIAGEWAY
- BUS STOP LOCATIONS
- NEW GRASS AREA/VERGE
- NEW BUS LANE
- EXISTING BOUNDARY
- POSSIBLE LAND ACQUISITION

KEY PLAN
N.T.S.



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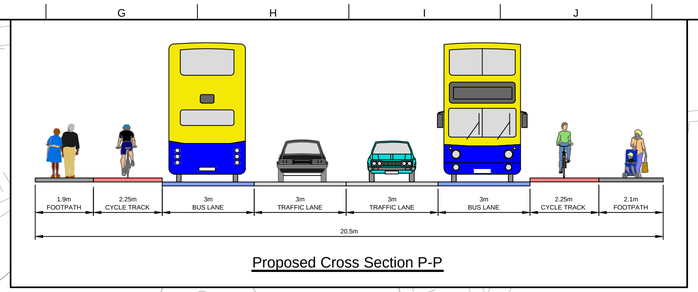


Proposed Cross Section P-P

DRAFT

ROCK ROAD

MATCHLINE

CH-5800.000m

CH-5850.000m

CH-5900.000m

CH-5950.000m

CH-6000.000m

CH-6050.000m

CH-6100.000m

CH-6150.000m

MERRION AVENUE

Blackrock Park

Platform

POND

Pavilion

Bandstand

BEN MADIGH PARK

Westfield Place

Sion Hill

Lisnea

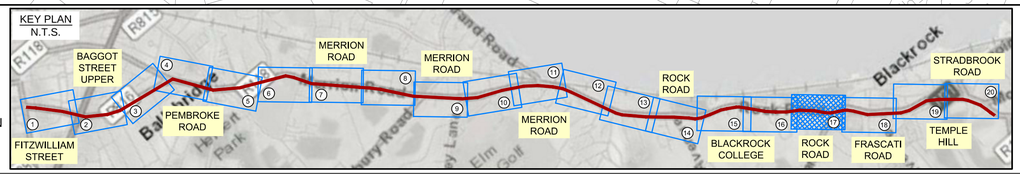
0 5.0 10.0 20.0 30.0 40.0 50.0m

SCALE 1:500 @ A1; 1:1000 @ A3

Legend:

- NEW FOOTPATH
- NEW CYCLE LANE
- NEW CARRIAGEWAY
- BUS STOP LOCATIONS
- NEW GRASS AREA/VERGE
- NEW BUS LANE
- EXISTING BOUNDARY
- POSSIBLE LAND ACQUISITION

KEY PLAN
N.T.S.



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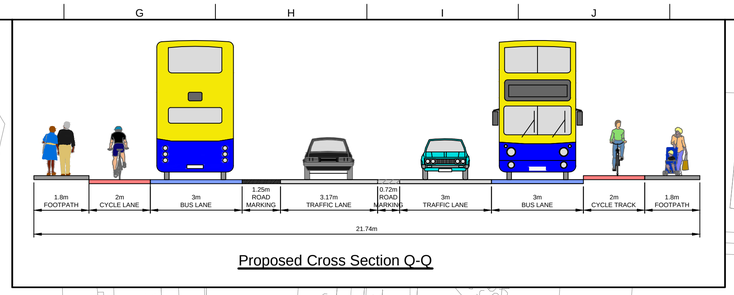


Proposed Cross Section Q-Q

DRAFT

ROCK HILL

FRASCATI ROAD

GEORGES AVENUE

CARYSFORT AVENUE

GEORGE'S PLACE

EAGLE HILL

COLLINS COURT

MATCHLINE

CH-6150.000m

CH-6200.000m

CH-6250.000m

CH-6300.000m

CH-6350.000m

CH-6400.000m

CH-6450.000m

CH-6500.000m

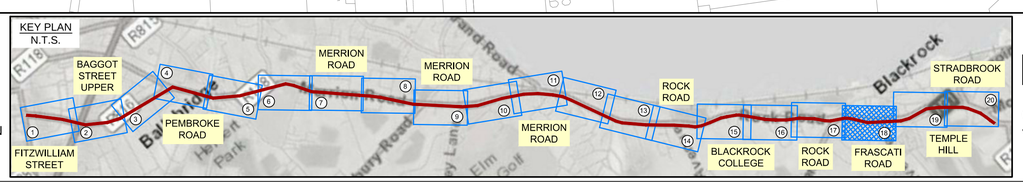
0 5.0 10.0 20.0 30.0 40.0 50.0m

SCALE 1:500 @ A1; 1:1000 @ A3

Legend:

- NEW FOOTPATH
- NEW CYCLE LANE
- NEW CARRIAGEWAY
- BUS STOP LOCATIONS
- NEW GRASS AREA/VERGE
- NEW BUS LANE
- EXISTING BOUNDARY
- POSSIBLE LAND ACQUISITION

KEY PLAN N.T.S.



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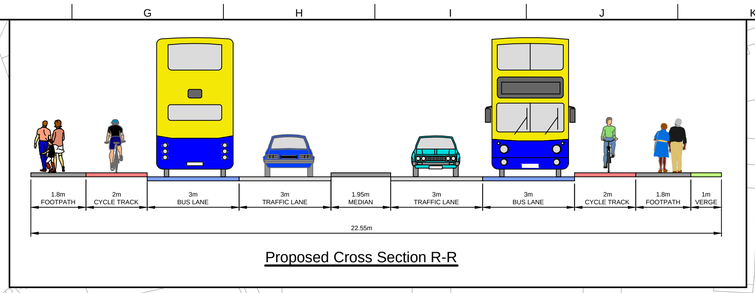


Proposed Cross Section R-R

AECOM ROD DRAFT

TEMPLE ROAD

FRASCATI ROAD

SWEETMANS AVENUE

CRAIGMORE GARDENS

CH-6550.000m

CH-6600.000m

CH-6650.000m

CH-6700.000m

CH-6750.000m

CH-6800.000m

CH-6850.000m

CH-6900.000m

MATCHLINE

STOP

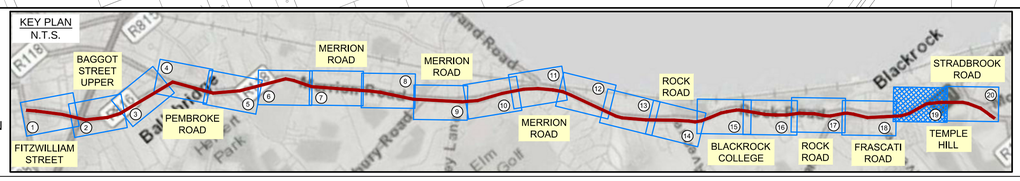
0 5.0 10.0 20.0 30.0 40.0 50.0m

SCALE 1:500 @ A1; 1:1000 @ A3

Legend:

- NEW FOOTPATH
- NEW CYCLE LANE
- NEW CARRIAGEWAY
- BUS STOP LOCATIONS
- NEW GRASS AREA/VERGE
- NEW BUS LANE
- EXISTING BOUNDARY
- POSSIBLE LAND ACQUISITION

KEY PLAN
N.T.S.



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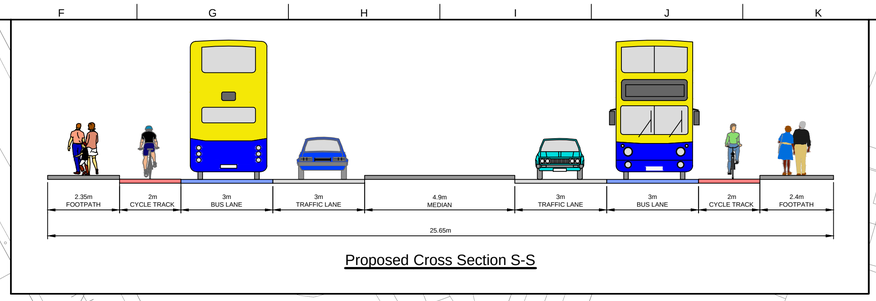


Proposed Cross Section S-S

AECOM PROD DRAFT

TEMPLE HILL

MONKSTOWN ROAD

MONKSTOWN AVENUE

STRADBROOK ROAD

MONTPELIER PLACE

CRAIGMORE GARDENS

TEMPLE CRESCENT

ST VINCENT'S PARK

Hospital

Basketball Ground

School

Alzheimer Society of Ireland

CH-6950.000m

CH-7000.000m

CH-7050.000m

CH-7100.000m

CH-7150.000m

CH-7200.000m

CH-7250.000m

CH-7300.000m

CH-7315.000m

MATCHLINE

NOTE:
INBOUND BUS PRIORITY TO BE DETERMINED AT NEXT DESIGN STAGE

NOTE:
PROPOSED RAMPS AND STEPS TO ACCESS BUS STOP. LEVELS TO BE DETERMINED

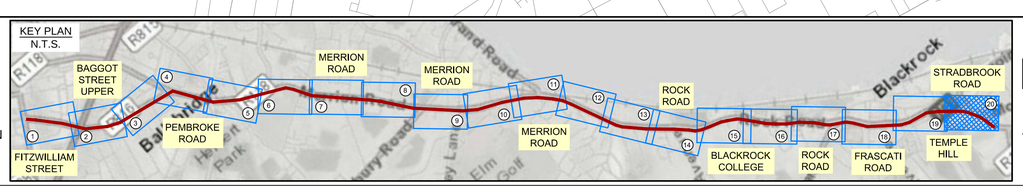
NOTE:
INBOUND BUS PRIORITY TO BE DETERMINED AT NEXT DESIGN STAGE

0 5.0 10.0 20.0 30.0 40.0 50.0m

SCALE 1:500 @ A1; 1:1000 @ A3

Legend:

- NEW FOOTPATH
- NEW CYCLE LANE
- NEW CARRIAGEWAY
- BUS STOP LOCATIONS
- NEW GRASS AREA/VERGE
- NEW BUS LANE
- EXISTING BOUNDARY
- POSSIBLE LAND ACQUISITION



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